STEEL

The Magazine of Metalworking and Metalproducing

JULY 10, 1944

Volume 115—Number 2

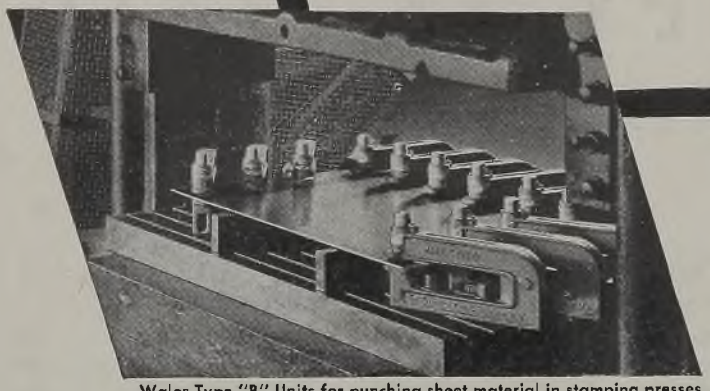
NEWS

TECHNICAL

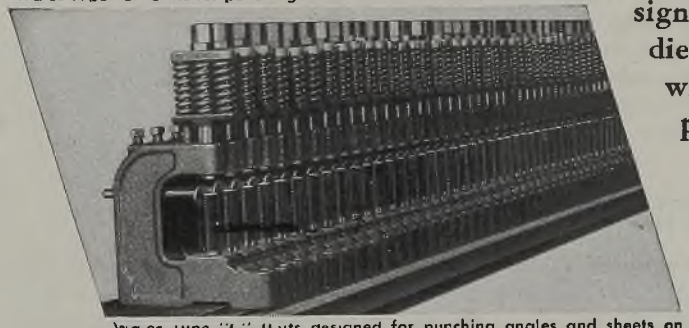
FEATURES

MARKETS

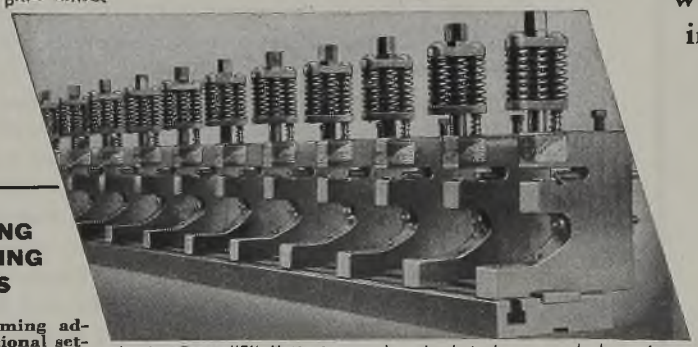
BEFORE YOU PUT HOLES IN
SHEETS
ANGLES
CHANNELS



Wales Type "B" Units for punching sheet material in stamping presses



Wales Type "C" Units designed for punching angles and sheets on press brakes



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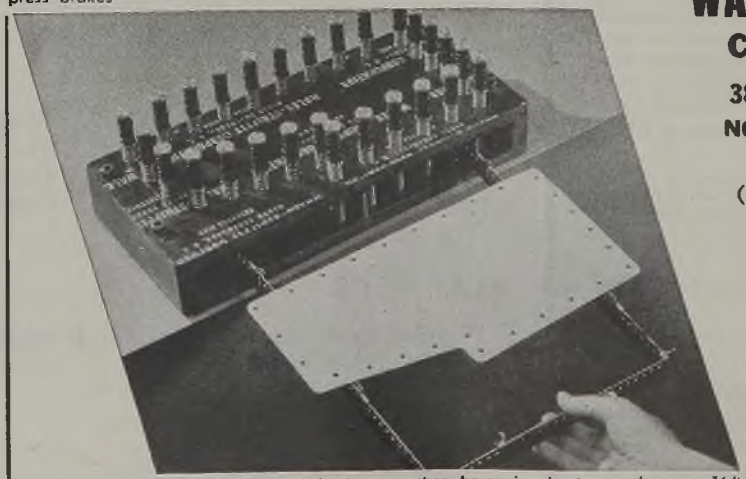

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STEEL
July 10, 1944

How To "Decentralize"

One of the primary needs of this country is a rebirth of a spirit of initiative and self reliance on the part of local communities. Just as children can be spoiled if given too much candy, so can states, cities, hamlets and rural areas be spoiled if they receive too much largesse from the federal government.

For 11 years almost every section of the 48 states has become accustomed to a fictitious prosperity made possible by deficit spending by Washington. First to offset the depression and later to wage war the government has distributed billions upon billions in public works projects, bonuses, subsidies, military establishments, government-owned plants, regional offices, etc. scattered widely throughout the nation.

These prodigious disbursements have had an unfortunate effect upon local authorities. Many of them have ceased to exercise the normal enterprise of a local community to advance its own interests. They have enjoyed the easy money of Washington so long that it will be difficult for them to redevelop self reliance.

Something of this willingness to live off the soft money from the government is found in the movement sponsored by Senator Pat McCarran to "decentralize" the heavy industries. He and a considerable number of senators and congressmen are promoting the idea that every state should have its complement of blast furnaces, steelworks, foundries and manufacturing establishments. They would seek this objective through government action, which is to say that they would encourage the local communities to continue to live off the central government.

No one can question the desire of non-industrial areas to become partly industrialized. However, to build an industrial structure solely upon the willingness of government to spend money on uneconomic ventures is to build upon the sand. Fortunately there is a better way to decentralize.

This better way is to encourage private enterprise. Throughout this war hundreds of small businesses not situated in long-established industrial areas have executed war contracts with unusual skill and ability. If the decentralizers would devote their talents to helping these and other worthy enterprises to become strong, they would go farther toward achieving their goal of decentralization than if they would expend their energies in getting the government to subsidize blast furnaces or steelworks in the areas.

Maury Maverick's efforts to help small business achieve economic independence promise more for sound decentralization than Pat McCarran's zeal to put government-sponsored plants all over the map.

STEEL FOR HIGHWAYS: Based on relationships prevailing in the middle thirties, about 5 per cent of the cost of highway construction goes into iron and steel products, including reinforcing bars, culverts, bridges, guards, etc. Since that time road building in the United States has progressed to the point where traffic separation, elevated highways and longer bridge spans probably are tending to increase the tonnage of steel per mile of highway.

This trend is important in considering the market for steel in postwar highway development. That highway transportation looms large in after-the-war planning by federal, state and local governments is assured by numerous projects already advanced beyond the blueprint stage.

Whether the cost is defrayed by federal grants or by taxes on users, as suggested by the United States Chamber of Commerce, the result will be expanded opportunities for the use of steel. The situation calls for renewed initiative on the part

(OVER)

of the mills and fabricators to make sure that reinforcing bars, structural shapes, wire rope and accessories are adapted to the latest developments in land transportation.

Yanks in Italy are seeing with their own eyes the tremendous importance of the centuries-old military highways of the Roman empire. Super-highway construction in the United States is in its infancy. Its development in the next decade holds great potentialities for steel. —p. 51

* * *

DRAIN ON RESOURCES: In reporting the consumption of raw materials by the iron and steel industry in 1943, the American Iron and Steel Institute reveals figures which should give pause to every thoughtful citizen. The industry charged into blast furnaces and steelworks furnaces 313,360,000 tons of raw materials, exclusive of ferroalloys and alloying elements. This includes 90,905,000 tons of coal, 108,025,000 tons of iron ore, and great quantities of tar and pitch, fuel oil, natural gas, limestone, etc.

This indicates an abnormally heavy drain upon our natural resources. We are throwing great stores of our precious minerals into the war, which is a destroyer of wealth. This generation and others to follow it must work hard at conservation to make up for this unprecedented waste. This is something to think about seriously. It can easily prove to be the nation's major problem in the not too distant future. —p. 81

* * *

IMPROVED STITCHING: In 1915 metal stitching was employed—probably for the first time—in the fabrication of gaskets. Stitching differs from stapling in that individual fasteners are cut from a coil of wire as each stitch is made while stapling involves the use of preformed individual fasteners. About eight years ago stitching came into general use in the assembly of automobiles. Much of this work was done with wire with tensile strengths of 230,000 to 260,000 pounds.

More recently stitching wire with tensile strengths up to 330,000 pounds and with sufficient ductility to permit formation of 90 degree bends required in making strong flat stitches has come into use. Improvements in stitching machines have accompanied the development of better wire with the result that the method now can be used in the fabrication of load-bearing structures. Its peacetime possibilities may be visualized by noting that stitches can be made in ¼-inch aluminum plate or in 0.030-inch stainless steel sheets. —p. 84

PRODUCTION NO. 1 JOB: Current war news puts leaders in government and in industry on a hot spot. On one hand, the general success of the Allied forces on all fronts except in China serves to warn all authorities that the time for perfecting plans for conversion to peacetime pursuits is running short. On the other hand, the mounting evidence of Allied superiority tends to promote complacency and this can play hob with highly important war production schedules.

Repercussions from this situation are found in Donald Nelson's munitions report for May, which shows peak production for air and water craft and deficiencies in some other items, and in the fillip to postwar economic planning which the invasion of Europe has given to Congress.

Plugging the gaps in production is the No. 1 job, but hastening the plans for transition cannot lag far behind. To a certain degree the nation is in the awkward position of having to carry water on both shoulders for awhile. —pp. 60, 82

* * *

TIMELY DEBUNKING: Apparently some thoughtful people have begun to see dangers in the postwar dream world which many manufacturers have been envisioning for the American public. Recently a prominent advertising executive warned the advertising profession that much of the enticing promotion of postwar dream gadgets will have a boomerang effect. He fears what will happen when Mr. and Mrs. America discover that some of the promised good things will not be available as promptly after the war as indicated.

Now leaders in the field of automobile design are beginning to debunk the postwar dream car. They point out that terms like "functional streamlining" have been overdone. They also feel that the public has been led to expect too much from certain innovations which have not yet been thoroughly tested.

These words of caution against "over selling" the public are timely. Every manufacturer has a big stake in developing postwar markets sanely.

—p. 67

E. L. Shaner

EDITOR-IN-CHIEF

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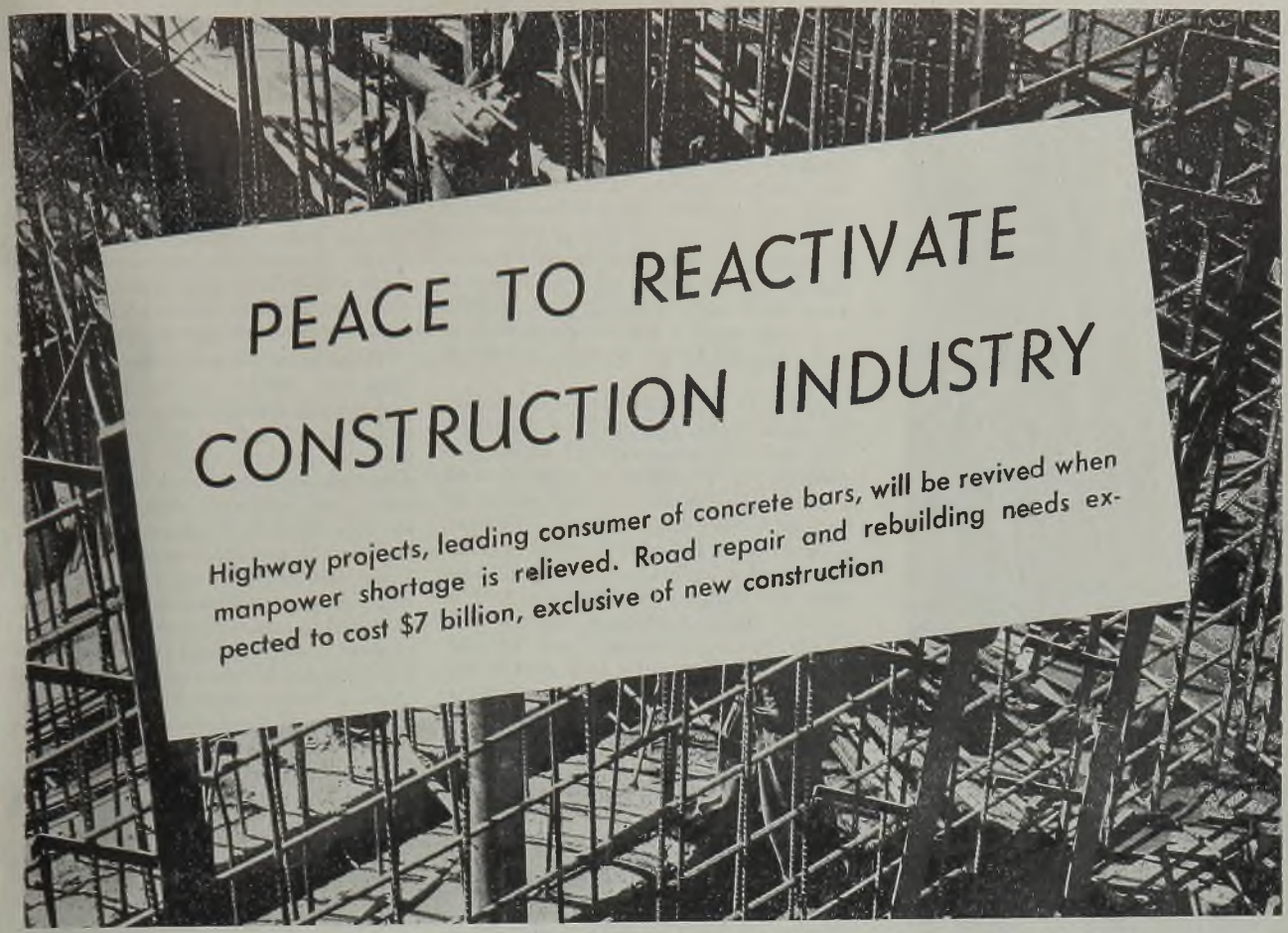


PEACE TO REACTIVATE CONSTRUCTION INDUSTRY

Highway projects, leading consumer of concrete bars, will be revived when manpower shortage is relieved. Road repair and rebuilding needs expected to cost $7 billion, exclusive of new construction

By R. L. HARTFORD
Associate Editor, STEEL

ONE of the first industries to be reactivated in the reconversion program will be construction. Largely a problem of available manpower, the builders are not now faced with insurmountable obstacles insofar as materials are concerned, particularly in such work as highways and bridges. The Portland Cement Association has been actively engaged for some time in attempts to boost the rapidly declining volume of demand for cement products, and there has also been more than an adequate supply of steel for reinforcing purposes.

Need for additional construction is not questioned. The highway program alone calls for several billion dollars worth of construction in the immediate postwar period. Many highway projects are already beyond the planning stage and have been approved, surveys and estimates made and are now waiting for the green light.

What is the picture in reinforcing steel? What new developments are expected? What will be their effect on the after-the-war markets? What will be the dimensions of postwar markets?

To establish a basis for comparison, consider 1939 as a base year. It is only reasonable to assume that in the postwar period the pattern of distribution will be close to the base year, which was the last full year not affected by military construction. Civilian demands after the war will probably vary geographically with the shift in population, but in all probability the relationship between highway and commercial or industrial building tonnage, for example, will remain virtually unchanged.

In 1939 the tonnage of concrete bars produced amounted to 1,060,000 tons, broken down as follows:

Roads and bridges	260,000 tons
Public works and utilities	250,000 "
Governmental buildings	240,000 "
Commercial and industrial buildings	130,000 "
Miscellaneous projects	180,000 "

This breakdown is reasonably close to the theoretical study which was prepared for the industry showing a normal prewar year to total 1,050,000 tons. Of this total, 300,000 tons went into highways; 200,000 tons into public works; 200,000 tons into commercial and industrial buildings; 150,000 tons into hospitals, educational and social buildings; and 200,000 tons into military buildings, religious buildings, residences, and miscellaneous projects.

Year after year, the largest tonnage of reinforcing steel goes into highway projects. This includes both bar and mesh reinforcing, as well as some additional steel items such as expansion dowels and separator strips. Since the highway program is more or less unaffected by economic conditions, it can be planned in advance. All states, many counties, and most municipalities already have definite projects lined up.

Industry's statistics show that the tonnage of concrete reinforcing steel used in roads and bridges total as follows:

1932	190,000 tons
1933	170,000 "
1934	180,000 "
1935	120,000 "
1936	250,000 "
1937	195,000 "
1938	160,000 "
1939	260,000 "

The Public Roads Administration estimates that 5 per cent of the total highway expenditure goes for iron and steel products, including bridges, ramps and culverts, as well as reinforcing mesh and bars in the roads themselves. These figures are based on extensive surveys made in 1935. Since that time there has been a sharp increase in the mileage of super-highways, which means more steel per mile because of overpasses, underpasses, clover leaf turns and similar adjuncts of these through roads.

In the postwar period a large part of new highway construction will be concentrated within 30 miles of large centers of populations since it is in these relatively small areas that the bulk of automotive traffic occurs. Estimates of the Concrete Reinforcing Bar Institute show that normal road construction requires 50 tons of steel per mile for a two-lane, 20-foot concrete highway. Including bridges,

Super-highway construction, still in its infancy in the United States, will be the answer to scenes like this in the postwar period. Traffic congestion, a major problem in many centers before the war, will be accentuated by an estimated increase in the number of motor vehicles to perhaps 50,000,000 *by* 1950

culverts and the like, this figure may go up to as high as 100 tons per mile.

A survey made in July, 1943, by the American Association of State Highway Officials showed at that time the minimum amount of needed construction work on principal highways throughout the country covered 158,466 miles of roads and 30,038 bridges either widened or rebuilt, for a total cost of more than $7 billion. This represents only the repair and maintenance work necessary to keep pace with increasing automobile and truck traffic, and does not include new super-highway projects in many cases.

American Road Builders' Association has made a thorough study of the situation, and has recommended annual expenditure of $3 billion to maintain and improve the highway system so as to keep pace with growing needs. This organization has prepared a complete postwar plan for highway construction. Congress has started work on support of a postwar highway program, but the bill which has been reported out by the House Roads Committee falls short of the goals set by both state highway bureaus and private industry as the necessary minimum. The present bill provides $500 million per year, to be matched by equal sums from states, cities or counties, for the first three postwar years.

Using the 5 per cent figure mentioned above, the annual expenditure for steel would be roughly $150 million. This is admittedly high, but the overall figure is likewise double the 1930 level, which was the maximum year in highway construction.

Outside of the work on the highway program outlined above, there has been little real public works planning. Col. W. N. Carey, chief engineer, Federal Works Agency, recently stated, "Except for a small but growing highway program, there just isn't any postwar public works program." He noted further that New York city had appropriated some $20,000,000 for preparation of plans, but to the present time only some 15 per cent of the list of projects had reached the blueprint stage. Outside of that city, there has been virtually no work done.

The public works program, however, accounts for 25 per cent or less of the total construction program. The big end of the tonnage comes from private construction, broken down into several categories. There is no doubt that the increase in school and residential building will be large, since this type of construction has been held up during the war and several years' pent-up demand will be thrown on the market almost immediately after the controls are off. There undoubtedly will be a heavy volume of commercial construction, also, if for no other reason than the normal growth and redistribution of population. Industrial construction may be somewhat slower, since there has been such a heavy volume of industrial expansion in the war effort. However, the reconversion job in itself will call for considerable remodeling and rebuilding of war plants to ready them for peacetime production.

There are a number of technical problems now confronting the industry, on which work is either being done or needs to be done to answer problems affecting postwar markets. For example, the American Iron and Steel Institute committee on reinforced concrete research has recently held forums with consulting engineers in ten different cities. In each forum the engineers were asked to present whatever problems they might have in regard to concrete construction. Some of them include a need for a method of combatting salt corrosion in East Coast cities, a better standardization of stress tests, a standardized system of design for welded stirrup and beam units in order to simplify design problems in building construction.

Starts Full Size Footing Tests

A new series of full size footing tests has been started at the University of Illinois to replace the current standards which were established in 1913. This is the first series of full size tests made since that time. In the interim the strength of concrete used has risen from 1600 pounds per square inch to 3000-3500 pounds per square inch.

Recent research in bonding of concrete to steel has resulted in several new styles of bars being introduced to the construction market. Probably the primary bar of this new type is known as the Menzel bar. Because the strength of the bond between these new bars and the concrete is increased, it is possible to design smaller members using less concrete and steel to support the same load as now carried by conventional bars of larger sizes and heavier concrete sections.

Another significant technical development is the start of a series of tests by the Bureau of Standards to examine the efficiency of concrete structures. Proponents of the so-called "plastic theory" believe that new designs using more steel and less concrete will result in more efficient structures with less deadweight. They will also reduce substantially the overall cost of concrete construction, and it is hoped this will broaden the markets where concrete construction may be used.

Another interesting development which is being fostered by the Engineering Practice Committee of the Concrete Reinforcing Steel Institute is a proposed change in the standardization of concrete reinforcing bars from the present system to a decimal system. Under the present system bars are identified by their nominal size outside diameters ranging from ¼-

inch to 1¼ inches. The proposed changes would substitute for the nominal sizes a numbering system whereby the number of the bar would represent the weight in pounds per yard. Thus a No. 1 bar would weigh 1 pound per yard and its cross sectional area will be 0.10-inch. This corresponds to the ⅜-inch bar; under the present system the cross sectional area is 0.11-inch. The No. 2 bar would weigh 2 pounds per yard, etc., up to No. 16 which weighs 16 pounds per yard and has a cross sectional area of 1.6 inches and which compares with the 1¼-inch square bar with a cross sectional area of 1.56 inches.

Reasons for instituting this change at the present time are apparently sound and a majority of the members of the industry thus far contacted have expressed approval of the new plan. In the first place, current business is exceedingly low and the change in specifications would be made much easier by the smaller number of jobs now extant. As mentioned above, there are new types of bar now in the making and most producers will change from old style to new style section. While the change in deformation is being made, it would be an ideal time to change the standards.

Under the present system it is most difficult to recognize the nominal size by looking at the bar. Under the new system the number of each bar would be marked in it or the bars could be tagged to denote the size.

Magnesium Association's Sand Cast Division Meets

The Sand Cast Division, Magnesium Association, recently held a meeting at the Waldorf-Astoria, New York, more than 70 members attending. Dan W. Moll, Mills-McCanna Co., Chicago, chairman, Sand Cast Division, presided.

Manley Brooks, Dow Chemical Co., Midland, Mich., outlined melting and pouring practice for foundry magnesium casting and told of how some of the major troubles can occur. E. R. Coyle of Diamond Magnesium Co., Painesville, O., outlined the alloying of magnesium; he told of their development with beryllium and how it eliminates burning to some extent. H. M. Griffith, Hills-McCanna Co., outlined the new test-bar proposal for magnesium sand castings.

W. B. Griffin, Apex Smelting Co., Chicago, read a paper on the "Conversion of Salvage Materials to High Grade Magnesium Alloys," showing where consistently fine grain ingot can be produced from such materials which would be well within the A.S.T.M. specification. J. D. Barrington, Dominion Magnesium, Ltd., Haley, Ont., told of some of the high lights of his recent trip to England to visit magnesium operations in that country. He stated that there has been considerable increase in consumption of magnesium since the metal has become more plentiful.

Oscar Blohm, Hills-McCanna Co., told of the work and recommendations of the Grain Size Committee. Among the recommendations mentioned he stated that 80 per cent scrap should be used in each charge where at all possible; metal should be refined at around 1360 degrees and stirred four minutes; that the holding time should be kept at a minimum and the crucibles should be cooled in the air.

Special Rate Approved by WLB in Unusual Case

The National War Labor Board last week approved as a rare and unusual case a special rate structure for a new plant of the Standard Steel Spring Co. at Madison, Ill., so that the plant may produce axles for heavy trucks.

The case had been accepted by the WLB as "rare and unusual" on May 18, at which time it authorized the company to establish a hiring rate of 75 cents an hour, reviewable July 15, and a rate range for tool and die makers of $1.35 to $1.55. In a supplemental ruling the board modified wage rates proposed by the company and the union and approved a special hiring rate for tool and die makers and a night shift differential of five cents for the second shift and 10 cents for the third.

In regard to tool and die makers, the board unanimously approved a hiring rate of not more than $1.65 an hour, the going rate in the area, for not more than eight specialist tool and die jobs up to Sept. 15, 1944. After that date, employes already hired at that rate will continue at the same rate, but no new employes may be hired in that classification.

The board further provided the company should not, within the first year of operation, hire more than 50 per cent of its new employes at rates in excess of the minimum of the approved range for a given job classification and after the first year, no more than 25 per cent may be so hired during a year.

Present Past and Pending

■ GREEN, CLEVELAND PNEUMATIC TOOL OFFICIAL, DIES

CLEVELAND—Daniel C. Green, chairman and chief executive officer, Cleveland Pneumatic Tool Co., this city, died July 2 at the Little Traverse hospital, Petosky, Mich.

■ RHEEM MFG. CO. BUYS ATLAS STEEL BARREL PLANT

NEW YORK—Rheem Mfg. Co., New York, has purchased the Atlas Steel Barrel division, Bethlehem Steel Co., at Bayonne, N. J. Robert Campbell, manager of the plant, will become vice president of the Rheem company.

■ AIRCRAFT OUTPUT DIPS 9.5 PER CENT IN JUNE

WASHINGTON—Aircraft output for June was 8049 planes, a drop of 9.5 per cent from the May figure. Decline is attributed partly to the shorter work month and partly to failure to meet schedules on the part of three companies producing smaller types of planes. Output in terms of airframe weight was about 100 million pounds, compared with record output of 102½ million pounds in May. Four-engined bombers remain ahead of schedule.

■ NAVY BOOSTS LANDING CRAFT PRODUCTION SCHEDULE

WASHINGTON—Navy department has raised its goal for landing craft production of all types 20,000 to a total of 100,000. Construction has exceeded the 40,000 mark.

■ REPORTS ON NAVY'S CONSERVATION RESULTS

WASHINGTON—Redesign and other conservation efforts have resulted in a saving of 14,000 tons of steel in construction of one year's supply of pontoons for the Navy, using 10-gage steel in lieu of $\frac{3}{16}$-inch plate. A new design concrete mixer, developed for the Navy, conserves 1200 pounds of critical metal per unit, resulting in an annual saving of 120 tons of this item alone.

■ RIVET INDUSTRY PLANS STANDARDIZATION PROGRAM

WASHINGTON—Rivet Industry Advisory Committee is studying plans for creation of a voluntary standardization and simplification program for the industry which is expected to result in a saving in manpower and material and a reduction in stocks and tools.

■ MIDLAND PLANS TO UTILIZE DISABLED VETERANS

CLEVELAND—Midland Steel Products Co. has underway a program to determine how many of the 111 job classifications in its plants can be handled successfully by partially disabled veterans, E. J. Kulas, president, announced last week.

■ ALUMINUM CANS TO POSE PROBLEMS

NEW YORK—Authorization by WPB of the use of 7,000,000 pounds of aluminum for cans for specified products poses interesting problems of price and the use of the material in manufacture, American Can Co. officials state.

Mine Operator Warns Higher Wage Rate Would Decrease Employment

War Labor Board panel told additional labor costs would retard development and exploration for new ore bodies, discourage the development of new processes, and adversely affect the competitive position of the Lake Superior district

DULUTH, MINN.

A SHORT-SIGHTED policy of superimposing additional labor costs on the iron mining industry will bring about less employment in the near future, retard the development and exploration for new ore bodies, discourage the development of new processes and adversely affect the ability of the Lake Superior iron ore ranges to maintain their position and employment as against competing ores.

This statement was put before the special iron ore panel of the War Labor Board here by Alexander C. Brown, vice president, Cleveland Cliffs Iron Mining Co. The United Steelworkers of America—CIO is asking for a 17-cent hourly increase and other benefits.

Mr. Brown laid particular stress, in his statement, on the adverse effect increased production costs would have on the underground mines. These properties employ 57 per cent of the miners in the region and have production costs per ton of ore that are four times greater than open pit mines.

Would Disrupt Cost Relationships

Consequences of increased costs would include serious disruptions in the commercial or cost relationships between the various types of mines—underground, beneficiating pits and direct-shipping pits; a tendency toward the elimination of the mines which give the largest amount of employment; serious impairment of the orderly development of an important natural resource; and the adverse effects on the communities which are dependent upon the mines whose competitive position would be jeopardized, Mr. Brown said.

In connection with the latter, Mr. Brown pointed out that various mines, both captive and commercial, compete with one another and with other ores in more distant markets. The markets the Lake Superior ranges must compete with are the increasing developments in New York and New Jersey, the large Canadian developments now beginning production, and the high-grade properties of Brazil which are being developed.

"Underground mines are compelled by the natural characteristics of their operations to employ on the average four times as many men per ton of product as are required on the average by the open pit mines; and the beneficiating pits employ, on the average, three times as many men per ton of product as are required by the direct-shipping pits," he said.

He presented figures showing underground mines employ approximately 13,750 men, or about 57 per cent of the industry's total employes, and produced approximately 20,600,000 tons in 1943. Beneficiating pits, from which most of the ore is beneficiated, had approximately 4900 men last year, representing about 20 per cent of the industry's total. These pits produced about 15,000,000 tons of ore.

Thus, the underground properties and the beneficiating pits employed about 77 per cent of the employes, but produced only about 42 per cent of the ore, or 35,600,000 tons. The remainder of the 1943 production of around 86,000,000 tons was produced by the open pit mines, with approximately 25 per cent of the employes.

Industry and the public have seen the need of further encouraging the investigation and experimentation necessary to develop processes for bringing more of the low grade materials into production, Mr. Brown said, and added that, "A good start has been made. Nothing should be done now to discourage the continuance of these efforts, on which the continued employment of many of those now resident in this mining region may depend."

The witness described the wide spread in employment between the three different groups of mines, and said for underground and beneficiating properties that, "It will continue to be inevitable that normal economic progress, as in other sections of the country, will force out of operation these mines which, by their inherent characteristics, require the largest number of men per ton of ore produced.

"Any further increases in labor costs," he declared, "with their disproportionate application to each of the three classes of mines, will augment such consequences, not for a small fraction of the industry, but for the large majority of the mines and their employes.

"Thus, the question which these facts pose to this panel is whether, in this natural resource industry, and in others which may be similarly situated, the hardships normally incident to a gradual rise in wage levels and costs must be increased so that they affect not a minor percentage, but a large majority of the employes, mines and communities involved."

A recent survey for OPA on production costs shows, Mr. Brown said, that the underground mines cannot sustain any increased labor costs under present OPA maximum prices, and that necessary increases in price cannot be collected by the underground mines under any normal conditions.

Capital Values Being Exhausted

A study of Michigan underground mines showed that the operators of the properties are not only failing to make any material profit or to cover interest on their capital, but are even failing to replace their capital values which are being exhausted.

"For every one cent by which the labor cost per ton may be increased for the direct-shipping pits, the increase for the beneficiating pits will be three cents per ton, and for the underground mines over six cents per ton," Brown said.

He presented statistics on underground mines from 1940 to 1943 showing the average total cost per ton for all labor, including the minor portion not in the bargaining unit, has increased from $1.11 in 1940 to $1.51 in 1943, or a total of 40 cents per ton, thus accounting for the larger part of the reduction in so-called "margin" on underground ore.

OPA study of profit margin before federal taxes shows that the average margin on underground mines' ore from this region sold on the open market has been falling steadily, and in 1943 was down to .108 cents per ton and is expected to fall to .038 cents per ton this year.

"Statistics show that if the union's demand for the 17 cents per hour increase had been in effect in 1943 for the bargaining unit employes only, it would have increased labor costs on such properties over 23 cents per ton. With such increase applied to all labor, the increased cost would have been two cents more per ton, or a total rise of 25 cents per ton.

"One of the main reasons the union gives for this 17 cents per hour wage increase is that prices have gone up while their pay has gone down in value. In this iron ore industry the published

MARK ORE CENTENNIAL

Centennial of the discovery of iron ore in the Lake Superior district was observed by the residents of Negaunee, Mich., in a civic celebration July 4. Citizens of the mining town, in co-operation with those of neighboring Ishpeming, staged a parade during the afternoon and in the evening retold the story of the discovery of ore in an outdoor pageant. Ore was discovered in the Lake Superior district Sept. 19, 1844, by surveyors exploring copper mines when they noticed the needle on their solar compass fluctuating wildly.

prices for ore went down 50 cents per ton in 1940 and have since remained at such reduced level, while the average weekly, monthly and annual earnings of the men have gone up 45 per cent.

"If the union demands involving increased costs which can be directly and normally related to production (exclusive of severance pay and guaranteed weekly wage) had also been in effect in 1943 as to all labor (including that not in the bargaining unit) they would have increased the per ton costs for the underground mines in that year by approximately another 22 cents.

"Thus, the total cost to the underground mines in 1943 of only such indicated demands of the union would have been approximately 47 cents per ton, or a total increase in per ton labor costs as compared with 1940 of nearly 87 cents per ton.

"In other words," Mr. Brown said, "if only the indicated union demands had been in effect in 1943 as to all labor, the total per ton labor costs for the underground mines would have been increased from $1.51 per ton to $1.98 per ton.

"This may not seem like a large figure to the panel members who have sat in the steel cases and dealt with much larger per ton values and costs," Mr. Brown averred, but noted, "when it is remembered, however, that the average value of the ore at the mine is only about $2.60 per ton, the relation of such increases to this industry can be more readily appreciated."

The iron ore industry has been among the more advanced industries in furnishing higher wage rates and higher standards of living for its employes, the panel was told. "Anyone who has seen the communities has visual evidence that it does not harbor substandards."

In this connection the speaker noted that the union, in the iron ore hearings, has not attempted to show that the wage raises are necessary to correct maladjustments or to eliminate substandards of living.

David L. Cole, chairman of the special iron ore panel, announced that the hearing of union rebuttals on both the iron ore and steel cases would be postponed to July 11 in Washington.

Lake Ore Movement to Date Reported on Schedule

Ore movement on the Great Lakes and by railroad routes was discussed at an Iron and Steel Transportation Industry Advisory Committee meeting in Washington last week.

Delivery of ore on the Great Lakes was reported on schedule, and capacity of the Great Lakes fleets appears to be in balance with the season's requirements. The cumulative deliveries of ore via the Great Lakes, as of June 26, 1944, was reported to be 27,000,218 gross tons, compared with 23,661,800 gross tons reported in the same week of 1943.

Seven Demands of Union Estimated To Cost Steel Industry $691 Million

AN INCREASE of $691,400,000 annually in employment costs of the steel industry would result from the granting of seven of the 14 demands of the United Steelworkers of America, now before the steel panel of the War Labor Board, according to a brief filed on behalf of the Steel Case Research Committee by Richard H. Appert, an attorney representing the steel companies.

The cost to the companies now before the panel, who employ 92 per cent of the wage earners in the industry, was estimated at $635,700,000.

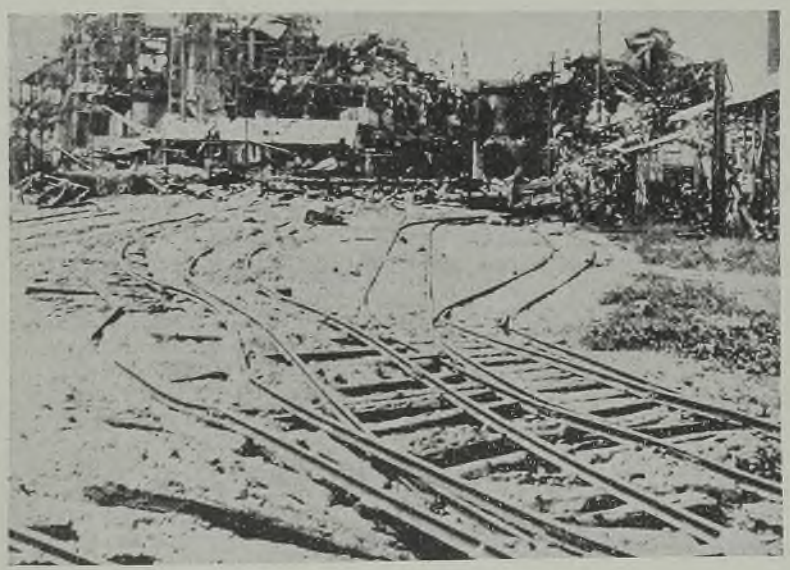
"Of the remaining seven demands," Mr. Appert said, "all but one—the demand in respect of the check-off—would involve substantial additional costs to the industry, but it is not possible on the basis of available data to estimate the amounts of such additional costs." The demands included in the estimate were those for a 17 cents per hour wage increase, establishment of a fund for steelworkers in the armed forces, guaranteed annual wage, increased vacations with pay, sick leave with pay, shift premium and group insurance.

The statement estimated the cost of a general wage increase of 17 cents per hour to the industry based on a total number of man-hours worked by wage earners in January, 1944, as $220,300,000. These figures, it was pointed out, do not take into account additional payroll costs which would result if corresponding general wage increases should be granted to salary employes, etc.

The costs of the seven demands to the industry and to the companies before the panel were summarized as follows:

	Steel Industry	Companies Before Panel
	(Millions of Dollars)	
General wage increase	220.3	202.7
Establishment of a fund for steelworkers in the armed forces	10.4	9.5
Guaranteed wage	283.3	260.6
Increased vacations with pay	25.1	23.1
Sick leave with pay	41.0	37.6
Shift premiums	41.4	37.9
Group insurance	55.3	50.8
Total	676.8	622.2
Plus additional social security and unemployment compensation taxes	14.6	13.5
Total increase in employment costs	691.4	635.7
Average cost per man-hour	58.0c	58.0c

These figures do not cover demands for severance pay, premium pay for certain holidays, rate establishment and adjustment, establishment of uniform rates of pay for mechanical and maintenance occupations, rates of pay for learners and elimination of geographical wage differential.



"SWEET MESS": Guns and planes of the American fleet made a total wreck of this Japanese sugar mill on Saipan, prior to landings by American infantrymen. This scene is typical of the reconstruction problems being created by the war. NEA photo

Increase in Steel Export Tonnage Seen

Lend-lease shipments declining but shippers anticipate larger third quarter movement under direction of FEA

NEW YORK

WHILE the trend in lend-lease shipments is down and is expected to continue so over the remainder of the year, steel exporters anticipate an improvement in the movement of tonnage under the general direction of the Foreign Economic Administration. In fact, they anticipate a larger movement in third quarter than in the 3-month period just ended, both quota and ex-quota tonnage. According to some trade estimates these shipments will run 275,000 to 300,000 tons, as against possibly 250,000 in second quarter.

Lend-lease shipments are now averaging around 100,000 tons a month, it is estimated. Last year at times these shipments averaged close to 200,000 tons. In the last half a rather substantial decline is expected in the movement of iron and steel to Great Britain, and while improvement is expected in the movement of steel to Russia (possibly 200,000 tons in the last half) it will fall far short of offsetting the drop in certain other directions, Great Britain notably.

Russia To Buy More

Many exporters anticipate a continued increase in the movement of steel to Russia from now on well into the postwar period. Russia, they say, will be by far the outstanding buyer of American steel for at least several years after the war ends. They say that devastation of Russian industry over the past two years, or since she was attacked by Germany, is far greater than generally realized and that this, combined with the ambitious industrial program Russia contemplated before the war, will make her by far this country's leading customer and in machinery and other manufactured products as well as in iron and steel.

Moreover, they believe that Russia will be able to supply sufficient credit in one form or another to make her requirements attractive. This will not be so, they point out, in connection with certain other countries which will have heavy demands, but will have little to offer in the way of credit. China is cited as one case in point.

Bids were taken recently by the War Department in Washington and St. Louis on a heavy tonnage of structural steel for export. The tonnage is for warehouses, bridges and viaducts principally, and, according to some trade estimates, amount to approximately 175,000 tons. This, along with a substantial program in prospect for the Navy, will tend to further tighten the shape situation.

At present shape deliveries are the most extended they have been in some months. Most producers of standard shapes are quoting October delivery, while certain producers of wide flange sections are quoting November. This extension in deliveries is ascribed in part to diversion of steel to other purposes, primarily heavy shell work, and to the fact that shipbuilding requirements are at least being sustained, which is contrary to some expectations earlier in the year.

Domestic building construction shows little improvement, although there are several sizable jobs in prospect, including new storage depots for the Navy at some eastern points, each involving a few thousand tons.

MINE FLAIL: The "Scorpion," Britain's flail tank, sees action in Normandy. The tank is equipped with chains which extend from a boom and revolve rapidly beating the ground in front of the tank and detonating buried mines. NEA photo

Permits Use of Aluminum In Manufacture of Cans

About 7,000,000 pounds of aluminum will be made available on application during the third quarter of this year for experimental use in the manufacture of specified food and nonfood cans, the War Production Board said last week.

Specified products that may be packed in the aluminum cans are: Baking powder (2 pounds and up); lard (50-pound size); malted milk powder (5 pounds and up); tobacco (8-ounce and 16-ounce only); snuff; tooth powder; cereal beverages and soluble coffee; cocoa; ointment and salve boxes; tablet boxes; pretzels, crackers, biscuits and potato chips (12⅜ x 14½ inches and larger).

Direction 4 to can conservation order M-81 establishes this new use of aluminum and also provides that container manufacturers, who wish to make aluminum cans for some product not specified, may apply to WPB for an aluminum allotment.

Application to make aluminum cans for any product, specified or nonspecified, must be made before July 10.

As moderate quantities of aluminum are now relatively more available than sheet steel, the third quarter of 1944 is considered a suitable time to permit some experimentation with aluminum cans, WPB said. Production will not be authorized in any case where it would interfere with war production.

Cement Makers Ask Court To Reverse ICC Order

Seventy-five portland cement manufacturers, against whom the Federal Trade Commission issued a restraining order in 1943, have appealed to the United States Circuit Court of Appeals for the Seventh Circuit in Chicago to reverse this and other orders issued by the commission.

Marquette Cement Mfg. Co. had filed a motion with the commission, charging the commission with prejudgment of the issues and bias and prejudice against the industry, and seeking to have the commission relinquish further handling of the case. The commission refused to receive the twenty-three exhibits containing published statements of the commission relied upon by Marquette to prove its charges of disqualification of the commission. Recently, attorneys for Marquette sought permission of the Circuit Court of Appeals to put these twenty-three exhibits, which are now on file with the court, into evidence to support its appeal from the order of the commission refusing to disqualify itself.

Schedules for Heavy Artillery Sizes To Be Increased Sharply

Army expected to call for 400,000 tons a month by next January, with Navy advancing demands moderately. Producers anticipate dislocations in distribution, with rails, structurals and large bars being cut back to make room for shell material

PITTSBURGH

AS MORE facts become known on the magnitude of the new shell program, considerable speculation is arising in steel circles as to the effects of this new demand on distribution of steel products.

The principal problem involved is one of dislocation, since it is evident that if the proposed program follows its indicated schedule, which calls for a peak output in January, 1945, other products must give way to provide the necessary steel. As yet there has been little if any indication as to just what products will suffer and in what degree as the heavier shell tonnages begin to fill steel manufacturers' books.

By January, 1945, the Army program is reported to call for production in excess of 400,000 tons per month, while the Navy program holds steady with a possible increase of 5000 tons per month.

As the program was initially established, the heavy impact would not hit until August. In July the increase in tonnage would increase moving upward rapidly in August, tapering somewhat in September and then moving up steadily through January. Shell sizes involved run from 75 mm. to 240 mm., with the largest increase in the 155 mm. program.

Other Products To Suffer

In order to provide for this tremendous demand, other products will have to give way. The effects undoubtedly will be felt in structural, rail and large bars. Since schedules of these items are full now, there must necessarily be cutbacks in some programs in order to make room for the shell tonnage. At the moment confusion reigns in the steel markets, primarily because it has not yet been determined which programs will be affected and to what degree. Furthermore, the actual production schedules on the shell program have not been established to the point where exact steel specifications can be given. Thus the mills do not know what percentage of the tonnage will come in the larger forging billets and what percentage in the smaller and therefore cannot set up definite mill schedules to meet the requirements. It is obvious that mills which produce round-cornered squares suitable for forging 240 mm. shells are not the same facilities which will be used to produce the 75 mm. shell program.

There must also be some correlation between government agencies and industry. While these steps are not necessary in the initial stages of the program, such measures must be taken if the peak output is to be reached. WPB has indicated it may be necessary to reactivate some mills not now in production in order to increase the flow of steel required in meeting the demand. The OPA has indicated that any concern which, because of ceilings on shell components, forging billets or other necessary parts of the program, is unable to produce economically stands a good chance of obtaining price relief if it can prove its case. As an illustration of this possibility, OPA points out that one company has recently been granted relief of $13 per ton on this basis.

Most of the steel involved in the program is straight carbon with high manganese content. Since a high quality steel is necessary, the obvious answer is the use of hot tops throughout the program. However, the tonnage of hot top steel available is necessarily limited and any increase in the use of this high grade steel for the shell program means a corresponding cut on high quality steel requirements for other programs. Furthermore, if the magnitude of the program requires throwing substantial tonnage of the shell steel into non-hot topped ingots, a heavy crop will be required, which in turn will cut down the tonnage of raw steel produced.

In some quarters it is believed the magnitude of the program will be in a large measure dependent on the conduct of the invasion. Obviously the shell program has been established in anticipation of a heavy shooting war ahead. If our success in the European theatre indicates that cessation of hostilities may be expected before the end of this year, it is not impossible that a portion of the shell program will be cut back. Steel producers. however, cannot bank on any such possibility.

This leaves the producers two alternatives—either to cancel a substantial number of orders now on the books or to push back certain orders for later delivery. It is probable that there will be a determined effort to get some agencies to cancel some tonnages.

Large Shell Contract Awarded to Budd Mfg.

Contract involving several million dollars for heavy ammunition has been awarded to Edward G. Budd Mfg. Co., Philadelphia, at the company's Bustleton, Pa., plant. This plant was originally established to assemble stainless steel cargo planes, only to have the great bulk of this work canceled. Retooling the plant will not be completed before November, and at peak operation will employ about 3500 persons.

The company will do the finishing and special treatment of the shells, with forgings to be made at a government financed plant to be erected near Johnstown, Pa., and operated by Bethlehem Steel Co.; and at another plant now under construction at Midland, Pa., to be operated by Crucible Steel Co. of America. The Johnstown plant will produce forgings for 8-inch shells, while the Midland plant will make forgings for 240-millimeter shells.

Artillery shells have been assigned a top production priority.

Foundries on Urgent War Work on No. 1 List for Labor Recruitment

GRAY Iron Foundry Industry Advisory Committee, meeting in Washington recently, heard that foundries engaged in urgent programs and listed on jointly-approved lists of the War Production Board and the War Manpower Commission, are now on the No. 1 list for labor recruitment.

Harry L. Leyda, industry specialist in the industrial allocations division of WMC, reported that the current importance of foundries on the WPB-WMC list will determine the referral to them of available manpower.

William Munger, chief of the raw materials section, Office of Labor Production, pointed out that the War Labor Board has full realization of the importance of foundries in the war effort. WLB is making an especial effort to handle foundry cases expeditiously.

Mr. Munger suggested that companies which contemplate making applications for wage adjustments should confer with their local War Labor Board representatives beforehand, and be assisted in the proper method of preparing and filing such applications, since cases properly prepared can be processed promptly.

Representatives of the local WPB Office of Labor Production can often be helpful in preparing such applications, Mr. Munger further suggested.

To meet the heavy truck program, special priority assistance will be granted by WPB, W. B. Murphy, deputy vice chairman for production told the committee. This aid will cover the manufacture of certain castings that are short in supply and are retarding the program.

Lukens Steel Co. Celebrates 134th Birthday

Family ownership and management have been uninterrupted. Organization marked founding of Coatesville, Pa.

LUKENS STEEL CO., Coatesville, Pa., on July 2 observed the 134th anniversary of its founding. The anniversary marks not only a record of continuous making of iron and steel under an uninterrupted line of family ownership and management, but also commemorates the anniversary of the founding of Coatesville.

Lukens dates back to the "Brandywine Iron Works and Nail Factory" founded on the banks of the Brandywine creek near the early Federal turnpike from Philadelphia to Lancaster and Carlisle on the farm of Moses Coates, for whom this city was named, by Jesse Kersey, of New York, Quaker school teacher, molder and missionary. His partner was Isaac Pennock, another Quaker, and a successful iron master who had owned and operated the Federal Slitting Mill at Buck Run, a few miles from Coatesville. Actual date of the establishment of the new town and the new business was "seventh month, second, 1810." Pennock was criticized severely by friends and relatives for giving up a rich 300-acre farm in Chester county to "enter the hazardous iron business, when wheat was selling at $3 a bushel and the influence of Great Britain was detrimental to the success of the iron industry."

Dr. Charles L. Lukens, son-in-law of Isaac Pennock, became junior partner in 1813, having married Rebecca Pennock, the eldest daughter. In 1825 Dr. Lukens died, and his widow, at 30, became the outstanding woman-executive of her time in the United States when she was left the responsibility of operating the mill.

When Dr. Charles Lukens died, he had just "commenced the boiler plate business and secured sufficient workmen to carry it on. This was a new branch in Pennsylvania and he was sanguine in hopes of success."

On its 134th birthday, Lukens' facilities cover 350 acres, exclusive of the properties of the Bethlehem Steel Co. at Coatesville which company has just acquired to take care of expanding business needs. It employs 6442 people, including the personnel in its two subsidiaries, By-Products Steel Corp., organized in 1927, which specializes in sheared, blanked, flame-cut, pressed and bent steel plates for many uses, and Lukenweld Inc., founded in 1930, fabricator of weldments for such equipment as diesel engines, ship turbines, railroad frames and heavy machinery.

TRUNDLE CO. MARKS 25TH ANNIVERSARY

Trundle Engineering Co., Cleveland management engineering organization, celebrated its twenty-fifth anniversary with a two-day meeting of its entire staff, July 1 and 2, at the Carter hotel, Cleveland.

George T. Trundle Jr., who founded the company in 1919, came to Cleveland in 1899 when he was 14 years old. His first job was trucking nails at the American Steel & Wire Co. While working there, he completed a course in mechanical engineering at the International Correspondence School. In addition, he attended night school at the YMCA and Central Institute.

He left American Steel & Wire Co. for the engineering department of the C. L. & W. railroad in order to confine his working periods to daytime, thus giving more time for night school, and taking special tutoring in mathematics and engineering.

He did his first engineering work at the Otis Steel Co., which also permitted continuing his studies. In 1902 he accepted a position as a draftsman at the Royal Motor Car Co. In 1903 he went with the Peerless Motor Car Co. as a designer.

From 1904 to 1907 he was an experimental engineer at the National Adding Machine Co.

In 1907 Trundle went to the American Multigraph Co. as tool designer, later becoming chief engineer and adviser on production during World War I. This experience, Mr. Trundle says, taught him the significance of the outside point of view in management problems and led to his decision to found his own management engineering company in 1919.

GEORGE T. TRUNDLE JR.

Starting with a personnel of only three people, the organization today has 151 employes, 135 of whom are engineers. Branch sales offices were opened in Chicago in 1939 and in New York in 1940. The company, one of the largest in its field, acts as consultant upon practically any phase of management problems.

During its 25 years, the company has had some 1100 clients and fulfilled some 5500 contracts.

AWARDS . . . .

Additional war plants honored with Army-Navy-Maritime emblems for outstanding achievement in the production of war materials

Air Reduction Co. Inc., Ohio Chemical & Mfg. Co., Heidbrink division, Minneapolis.

Associated Spring Corp., Wallace Barnes Co., Rolling Mill division, Forestville, Conn.

Bechtel-McCone-Parsons Corp., Birmingham Modification Center, Birmingham, Ala.

Coleman Lamp & Stove Co., Wichita, Kans.

E. D. Etnyre, Oregon, Ill.

Ford Motor Co., Ford Glider plant, Iron Mountain, Mich.

General Motors Corp., Detroit Transmission division, Detroit.

Hercules Powder Co., Badger Ordnance Works, Baraboo, Wis.

International Harvester Co., Wisconsin Steel Works, Chicago.

Johnson & Johnson, Industrial Tape Corp., New Brunswick, N. J.

Kimberly-Clark Corp., Ordnance division, Neenah, Wis.

Lofstrand Co., Silver Spring, Md.

Monarch Engineering Corp., Indianapolis.

Murray Co., Dallas, Tex.

Owens Illinois Can Co., McKees Rock, Pa.

Pittsburgh Coke & Iron Co., Carnegie, Pa.

Standard Stoker Co. Inc., Erie, Pa.

United States Rubber Co., Bristol, R. I., and Hogansville, Ga.

United States Steel Fabricators Inc., Wooster, O.

Wilmot Castle Co., Rochester, N. Y.

Westinghouse Electric & Mfg. Co., Manufacturing & Repair department, Buffalo, N. Y.

Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., awarded "M" pennant.

American Can Co., Forest Park, Ill.

Wodack Electric Tool Corp., Chicago.

Pacific Screw Products Corp., South Gate, Calif.

International Steel Co., Evansville, Ind.

Erie Forge Co., Erie, Pa., awarded "M" pennant.

International Business Machines Corp., Endicott, N. Y., adds second white star.

American Bridge Co., Elmira, N. Y.

Infilco Inc., Chicago, adds white star.

Caterpillar Tractor Co., East Peoria, Ill., adds white star.

American Machinery Corp., Marine division, Beresford, Fla.

Andersen Corp., Bayport, Minn.

G. Barr & Co., Chicago.

Burgess Battery Co., Freeport, Ill.

Burnham Boiler Corp., Zanesville, O.

Geneva Plant's Production Rises

West Coast shipyards taking bulk of Utah plant's production, estimated at 25,000 tons in June. Labor shortages prevent capacity operations

GENEVA, UTAH

PLATE production for West Coast shipyards is being stepped up steadily by Geneva Steel Co. here, built and operated by Columbia Steel Co. for Defense Plant Corp.

Tonnage figures, issued for the first time since rolling started last March 23, indicate that output in June was more than 25,000 tons, a new high for the first three months of operation. Although maintenance of the June rate, or even a small increase, would bring production to only about 50 per cent of the 700,000-ton annual mill capacity, Geneva managers are hopeful of more favorable performance in future months barring further deterioration of manpower availability and certain material supplies.

Two of the three blast furnaces now are in operation at Geneva and three of nine open hearths are being worked. Total iron capacity is 1,149,150 tons annually and the open hearths are rated at 1,300,000 tons.

Most plates are being moved to West Coast shipyards, with small tonnages going to warehouses in Utah, Idaho and on the Coast under WPB directives. Shipments in April totaled 6718 tons, 17,485 in May and 5926 in the first week of June.

Coking Ovens Short on Labor

Inability of the Geneva plant thus far to attain a greater proportion of capacity chiefly reflects the serious shortage of manpower in its coking ovens. Partly responsible, too, is that quality of coal being recovered from the mines at Columbia, Utah, is below average. This factor was not unexpected and generally is encountered in new workings. As mining goes deeper, the quality is expected to improve. The 252 coking ovens now are operating at less than half of their million ton annual capacity.

The labor situation, both at the ovens and in the mill, has improved slightly recently, but the need for additional workers remains acute. More than 600 men are required immediately—mostly as laborers and labor trainees to work into operating jobs. Skilled maintenance men, such as machinists, pipe fitters, etc., also are urgently needed. Altogether, upwards of 2000 must be found to man the plant over the next three or four months. Recently the War Manpower Commission extended Geneva's recruiting privileges to Montana, Oklahoma, Arkansas and Kansas, with a limit of 400 workers set for the latter three states.

The scrap situation at Geneva is labeled "adequate." Some material has been coming from Pacific Northwest shipyards, but effort to obtain supplies chiefly is concentrated on the surrounding states of Utah, Idaho, Nevada and Oregon. Some demolition scrap from the Pacific war area has been going to Geneva, but none is being used now.

Geneva's scrap situation differs from other plants because of the high ratio of pig iron to scrap, with approximately 70 per cent pig iron going into the open hearth charge. Scrap stockpiles which have been assembled in the past and which are being built up now are being used to get the plant in operation. When operations reach reasonable capacity, sufficient salvage material should be available to meet open hearth scrap needs from croppings, etc., without dependence on continued scrap purchases.

Women in Some Areas Under Manpower Referral System

National program to require that all male labor must be hired through the United States Employment Service or such channels as it may designate was made effective July 1 by the War Manpower Commission.

Women as well as men have been brought under the priority referral system in many communities.

POSTWAR PREVIEWS

CONSTRUCTION— Building industry expected to be one of first to be reactivated after peace comes. Supplied average prewar demand for more than a million tons of concrete bars. See page 51.

IRON ORE WAGES— Industry spokesmen warn union's demands threaten underground and high-cost mines, thereby reducing employment possibilities in many communities. See page 54.

EXPORTS— Russia expected to be a major buyer of United States steel for several years after the war for rebuilding of devastated industry. See page 56.

PLANNING— Invasion and growing expectations for early collapse of Germany intensify interest in legislation and plans for contract termination and reconverting industry. Only one important postwar bill approved by Congress before recess. OPA officials believe necessity for price controls will extend over into peace period. See page 60.

AUTOMOBILES— Postwar "dream cars" debunked by industrial designer at meeting of Society of Automotive Engineers. See page 67.

WEST COAST— Los Angeles surveys possibilities for utilizing expanded steel-producing and metalworking capacity. Finds consumption exceeded prewar production of many finished metal products. Many new industries started since war. See page 77.

"SEA MULE"— Small, powerful work boat developed by southern shipbuilder expected to play important role in postwar shallow water transportation. See page 78.

CANADA— Control Board chairman warns some wartime restrictions to be extended into postwar period. See page 80.

METAL STITCHING— Comparatively new method of making metal-to-metal joints by metal stitching no longer limited to nonstressed applications. Improvements in wire and machines put lightly loaded structures within scope. Further expansion predicted because of high physical properties and excellent service. See page 84.

WELDED DESIGNS— Return of competitive conditions should give fabricators of weldments who are familiar with variety of shapes available for welded designs a good start in the race. See page 88.

CORROSION-PROOFING— Recently developed thermo-chemical treatment for steel sheets or strip provides one answer to problem of corrosion during protracted storage prior to processing. Ability of surface to stand up under drawing, spinning or shaping makes coating a likely "bet" for postwar use. See page 90.

European Invasion Gives Fillip To Postwar Economic Planning

Landing of troops on Continent and growing belief in early victory over Germany emphasize that "the time is now." Congress recessed with only one reconversion bill adopted. OPA officials convinced of necessity for postwar price controls

POSTWAR economic planning since the start of the European invasion has entered a new phase in which the element of timing is seen as a more urgent factor.

Earlier postwar planning was viewed generally as an activity to be pursued at leisure. For many months Congress and various executive agencies rambled all over the lot in examining all the angles of the postwar reconversion problem. So slowly did Congress proceed that when it recently recessed for the summer it had enacted only one of its important postwar economy bills, S. 1718, covering contract terminations. It recessed without acting on two equally important bills, S. 1730 which would establish an Office of Postwar Adjustment to supplant and carry forward into the period of peace the work of the Office of War Mobilization, and S. 1823, the Kilgore postwar adjustment bill aimed at taking care of "human" angles in the demobilization process.

Aid for Small Plants

Several months ago much interest was evidenced in reconverting small industry to peacetime pursuits before the war ended. In Congress there was concern over the effect of cutbacks and cancellations of war contracts on small companies. Many of these, it was believed, might be driven out of business unless they were permitted to have work to take the place of the contracts or subcontracts that had been terminated. Attention was addressed to the possibility of diverting limited quantities of materials to the small companies so that they might switch to the manufacture of civilian goods. The Smaller War Plants Corp. has been particularly active in endeavoring to furnish such aid.

Now, with our troops actually on European soil, the realization is gaining in Washington that the war in Europe is entering its final phases and that the time has come to step up the job of preparing for reconversion on a wholesale basis to prevent an undue amount of confusion and delay when victory actually arrives.

Accordingly, a lot of planning is being done, a lot of studies are being intensified with a view to outlining policies which can be put into effect when the time of need is here.

Unfortunately, this planning is being done in the individual war agencies. There is no one place in the administration where responsibility for the overall problem of reconversion has been accepted.

Some highly placed administration officials place the blame for this situation on James F. Byrnes and his Office of War Mobilization. They charge the Byrnes organization with a lack of imagination, initiative and foresight. They hold that in restricting its activities largely to adjudicating differences between the various war agencies this organization is overlooking the planning job it might undertake. It is their feeling the Byrnes organization could properly serve as an Office of Postwar Adjustment without waiting for Congress to enact S. 1730.

In the absence of overall direction, a number of the agencies are proceeding independently and propose to get ready for the reconversion period as best they can.

One of these is the Office of Price Administration which, now that its existence has been continued for another fiscal year, is arranging for an intensive study of postwar price controls. In meetings with industry advisory committees in recent months OPA officials have found that the average manufacturer and business man is vitally concerned over whether he can look forward to receiving government price support after the war, or whether he will be left to sink or swim.

Outspoken Chester Bowles, OPA administrator, makes no bones about expressing a firm conviction that in looking forward to the immediate postwar period "we must provide the measures now to protect and support the level of prices and wages. These," he explains, "will be the peacetime counterparts of our wartime measures placing ceilings over prices and wages."

It will be no easy matter to pull $78 billion of government spending out of our markets without precipitating a collapse of prices, incomes and production, says Mr. Bowles. This can be done only if government war spending, which is today providing about half of our jobs, can be replaced by the pent-up demand of consumers.

It is a long step from pent-up demand to orders on the books, reasons Mr. Bowles. He recalls that collapse has followed every war in the past "and everywhere today there is deep misgiving that history will repeat itself. Unless this fear can be dispelled," he says, "consumers and business men alike will hold back their orders after the war to await developments. Prices and employment will fall off. Civilian demand far from expanding to fill the gap left by the decrease in war spending, will itself decline, feeding the forces of cumulative deflation. If collapse after the

MONETARY CONFERENCE OPENS: Secretary of the Treasury Henry Morgenthau Jr. addresses the opening session of the National Monetary Conference, held at Bretton Woods, N. H., to discuss postwar plans for the reconversion of industry and the encouragement of international investment. Delegates from 44 nations attended the conference. NEA photo

who dares to talk to them about a THIRD WORLD WAR?

They were at Tarawa.
Many of them now wear empty sleeves, or bandages where their eyes were. And a thousand and twenty-six will rise up never from the sands of Tarawa Island.

They couldn't hear it. In the roar of that tornado, as they fought and fell, so far from the hills of home, they couldn't hear the words: "*. . . history repeats . . . and what will we get out of it but . . . how the hell can we police . . . the next one will be against . . . already sowing the seeds for . . . and twenty years from now, brother . . . the Third World War . . .*"
In elevators, on the street, in plush chairs that let you down easy, in columns and editorials and from the political stump.

What is the matter with us? Can't we at home at least go into peace with some spark of their courage and determination that this war is not another mockery, not just another World War? Let no man give voice to that weak and deadly cynicism. Let him stand up and think straight and have the courage to call the lie to any man in public or private life who fails to do the same.

And let each of us do everything humanly possible to help win this war sooner . . . buy War Bonds—give blood—boycott the black market . . . and plan ahead now for a *better* America than we had before.

Today, the engineers of the machine tool industry can greatly help the post-war planners of government and business management. One of these is a Bryant man . . . We invite you to send for him.

BRYANT

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD, VERMONT, U. S. A.

war is to be prevented, therefore, it seems to me inescapable that we must banish the fear of collapse."

Only government, Mr. Bowles believes, can do this. Only government can provide the assurance, the guarantee, that postwar collapse will be prevented. He is firmly convinced that the size and scope of the job will require much more than a program of limited action. On the contrary, he says, the government must be prepared to take whatever action, however broad and far-reaching it may turn out to be, that is necessary to sustain a high level of industrial and farm activity.

"I fully share the view that the role of government must be greatly reduced after the war," adds Mr. Bowles. "I yield to no man in my attachment to the free enterprise system. I am persuaded that no other system could serve us as well, either in terms of physical production and the standard of living, or in terms of opportunity for the development of the individual and the achievement of the good life for us all.

"But I am profoundly concerned lest in our eagerness to shed ourselves of wartime government and give free rein to initiative and enterprise after the war we conceive the role of government too narrowly and cut the scope and powers of government too sharply.

Cites Inherent Danger

"For, if there is one thought that is borne in upon me by my experience in Washington it is that if we are unprepared to accept enough government, we invariably end up with too much. It may be paradoxical, but it is true. If we are reluctant to grant our government enough power to meet its essential tasks, the unsolved tasks overtake us, and in the ensuing crisis we are obliged to go far beyond what would have been necessary in government control had we taken steps sooner."

In general, Mr. Bowles believes the price policy in the reconversion period must be a flexible one which will foster full production and full employment at high wage rates. "As quickly as supply in each field now covered by price control comes into line with demand, price ceilings must be eliminated. In the final analysis it is only through adequate supplies that we can hope to eliminate the forces which seek to push prices upwards."

In many industries, Mr. Bowles believes, price ceilings in the reconversion period will have to be adjusted upwards. "There are many industries whose peacetime goods have been out of production for two years or longer, and in many cases these goods cannot profitably be brought back into production at the same prices which prevailed in 1941 or 1942," he says. "Costs have not stood still and prices cannot ignore the movement of costs. If we were to insist upon holding to the prices of 1941 or 1942 for these goods, there is no question but that production would be hampered, unemployment increased, and wage rates lowered.

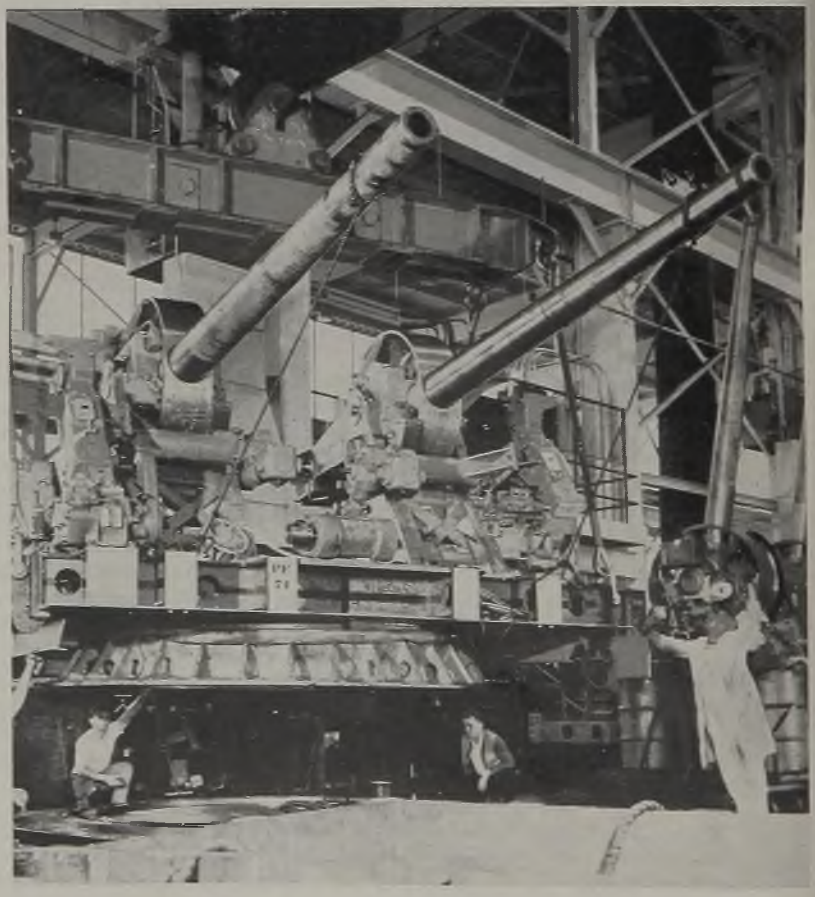
"Let me take a somewhat more difficult case. There are many industries which are operating today under very favorable profit conditions largely because of the war business they receive. The wide margins on these war items enable these industries to operate with low margins on civilian goods. Sometime or other these industries must convert back to peacetime production. When they lose their profitable wartime output, prices of their civilian-type items must be increased. If this is not done, the result will be powerful deflationary pressure upon wages and upon prices of raw materials purchased by these industries.

"In this case our position is quite clear. There will, of course, be some question as to exactly when the adjustments must be made and just how much prices are to be increased. But when the time comes, we must move to adjust prices where necessary and to avoid bringing positive deflationary pressure to bear upon prices and wages."

Mr. Bowles sees certain areas where inflation will continue to be a serious threat. "I am thinking," he says, "of consumer durables, such as vacuum cleaners, washing machines, and automobiles, where supplies for a considerable period will be running far behind. If price controls are removed too quickly from these items we would soon see a repetition of the dangerous inflationary boom that we experienced in 1919, perhaps on a far greater scale.

"I am also thinking of the building industry where millions of citizens with substantial savings accounts will be only too willing to bid high for the materials and the equipment to create the homes to which they have long looked forward. In other words, I see in this period a system of selective price control in certain areas with relatively rapidly decreasing controls on easy-to-produce consumer items and on rent."

Mr. Bowles cautions industry that it is a primary requirement of our economy of mass production that industry price its output low enough to tap the mass markets, "for it is only these markets that can keep our vast productive capacity in operation. Unless industry follows this policy vigorously, there is very little prospect of maintaining the level of national income and production whatever we may do in other directions. This will take courage and vision on the part of industry, but it is utterly essen-



TWIN DESTRUCTORS: These two 5-inch guns are mounted on a single base and are designed for action both against surface vessels and aircraft. They are shown on the production line at the Naval ordnance plant operated by Westinghouse Electric & Mfg. Co. at Louisville, Ky.

tial. If industry as a whole, or any significant industrial sector, is going once again to price on the basis of breaking even at 50 per cent of capacity, we are going to find ourselves operating at just about 50 per cent of capacity. I think we are all agreed that that is an intolerable condition and one which the country will never accept."

In other words, Mr. Bowles envisions a reconversion price control in which manufacturers and business men will receive adequate protection against ruinous price fluctuations in either direction, but one sufficiently flexible to enable them to make price adjustments that will stimulate demand for their products.

To appreciate the significance of this thinking by Chester Bowles it may be pointed out that he has arrived at his conclusions after many conferences with industrialists and with a number of administration officials, and that in the main they think as he does.

Reconversion planning in the War Production Board has been hampered by the fact that the war still is going on. Chairman Donald M. Nelson has been in agreement with the concept that the war effort cannot be helped by allowing plants to become idle and workers unemployed. He and his associates have encouraged reconversion to civilian production when that was possible without interfering with the war effort. WPB at all times has had to maintain flexibility so that shifts in Army and Navy demands could be met promptly on production lines. Just recently, Mr. Nelson warned the next three months would be a critical period during which industry generally would be held at the disposal of the war production effort on a 100 per cent basis.

Because of this situation, reconversion programs so far authorized by the War Production Board have been of a limited character. The volume of civilian goods production authorized has been held down in these programs to meet minimum essential demands. In many cases proposed removal of limitation orders has been held up due to scarcity of needed components.

But the War Production Board is devoting a lot of attention to reconversion problems, both in inside discussions and in conferences with industry advisory committees, and out of these discussions some sort of a pattern is expected to issue by the early fall months at latest. Chief interest at present is centered around reconversion program of the automobile industry which Mr. Nelson recently characterized as the No. 1 peacetime employer.

"Very few people," he said, "realize the extent of the effect of automobile production in our whole economy, in textile fabrics, glass, and collateral products of all kinds, in gasoline, and dealers throughout the country, and service organizations. It is the primary employer in the United States."

Because of this fact, the reconversion plan of the automobile industry is regarded as of outstanding importance.

The automobile industry has been asked to submit its reconversion plan to the War Production Board on July 14 at a conference in Washington. This plan is expected to include such details as the anticipated demand for automobiles and trucks, the availability of such components as bearings, forgings and castings, the equipment needs of the industry for reconversion, the problem of disposing of surplus war inventories and the problem of making plant space available for the manufacture of automobiles. The plan is expected to comprise a pretty comprehensive treatment of the problems which to a greater or less extent will be encountered by all industries in the reconversion period.

One department in which there definitely is a lack of co-ordination is that which includes public work to be done after the war. All government thinkers are in favor of moving now to prepare a shelf of public works—federal, state and local—so that these projects may be available at the proper time and in whatever volume may prove necessary. There has been a great deal of talk about road construction, soil protection, flood control, irrigation, housing, development of inland waterways, airport construction, the employment of our merchant marine, the disposition of government-owned surplus property in such a way as to help rather than shock the economy, etc.

But this talk has been centered in individual administrative agencies of the government, or in congressional committees, and there has been no attempt at co-ordination so as to make all the different programs mesh in with all the others when peace comes.

In many places in Washington it is felt that it would be feasible right now, within a period of a few months at most, to formulate some sort of an estimate as to the rate of ingot production at which the steel industry could be expected to operate during the immediate postwar period. If the Byrnes Office of War Mobilization, for example, were to launch a comprehensive inquiry, it probably would be able to get some sort of an idea as to the number of automobiles and motor trucks the automobile industry expected to make and sell within a period, say, of six months to a year after demobilization-day, and it could make an estimate of the tonnage of steel required for such production. It could get an idea of the requirements of the railroads in the postwar period. It could get a fairly good forecast of housing construction from the National Housing Agency. It could get an estimate of road and bridge building requirements from the various states, counties and municipalities. It could ascertain what materials other manufacturers would consume in a given period in the postwar era.

They Say:

"Great social change never comes clear cut and crystal clear. It is brought in confusion and in the dust and tangle of conflict. But as we look into that confusion today we see the basic question is whether men are going to continue to live as free individuals, competing actively one with another, enjoying the rewards of their own diligence and thrift, or whether they are going to be protected, coddled, ordered and driven and regimented and compelled by their rulers."—**Robert M. Gaylord,** president, National Association of Manufacturers.

* * *

"People think that labor leaders will not discipline members of their organization because they are afraid of losing membership, and that they are more interested in power than in the individual welfare of their members. They think that organized labor is shouting for rights while shirking responsibilities. . . . Ownership is the foundation of free enterprise. So if the leaders of labor are in favor of free enterprise, which implies private ownership, they must give more attention to ownership in the enterprises which employ labor."—**Edward E. Chase,** president, New England Council.

* * *

"Severe jolts in the way of contract terminations and lack of planning can produce sufficient chaos to have peace followed by a bitter anti-climax that can wreck our economy for years to come."—**Alvin E. Dodd,** president, American Management Association.

* * *

"Within ten years after the end of the war, thousands of persons will be employed in the manufacture, erection and operation of television stations. More thousands of persons will be employed in the manufacture and distribution of receivers. Additional thousands will be employed in the advertising end of the business which will support the telecasting networks and stations. Some day, television will be a billion dollar industry."—**J. H. Rasmussen,** commercial manager, Crosley Corp., Cincinnati.

Iron and Steel Price Regulation, No. 4, Issued in Simplified Form

Major changes are: Establishment of basing point prices for several grades; adjustment in preparation fee differentials between scrap rails in random lengths and short rails; one set of specifications for cast iron, new basing points for railroad scrap

REVISION of the price schedule covering iron and steel scrap so as to provide the industry with one regulation giving in simplified form all applicable provisions of the original schedule, together with amendments and official interpretations issued to date, has been announced by the Office of Price Administration.

In its new form, regulation No. 4 has been arranged so that each section deals with one specific subject. Thus, whenever a problem relating to a specific pricing question arises, the buyer or seller can find the solution in one clearly defined section. Although a few price changes have been made, they are all minor. No basic change in either price levels or the method by which maximum prices for scrap are computed is made.

The four major changes are as follows:

(1) Basing point prices are established for several grades of scrap previously priced by letter.

(2) An adjustment is made in preparation fee differentials between scrap rails.

(3) Separate specifications that covered cast iron scrap of railroad origin and cast iron scrap of dealer and industrial origin have been combined so that one set of specifications covers cast iron scrap regardless of origin.

(4) Railroad basing points have been eliminated and the basing points for steel scrap of dealer and industrial origin have been established as basing points for steel scrap of railroad origin.

The grades of scrap for which the regulation establishes basing point prices, where previously they had been priced by letter, include welding rod butts, shafting, No. 1 railroad cast steel, and wrought iron.

The regulation establishes for prepared wrought iron scrap a price of $6.50 per gross ton above the dealer No. 1 heavy melting steel base price. This is $3 per gross ton higher than the price previously authorized. The increase is made by the regulation in preparation fee differentials is to provide a higher charge for preparation of shorter length rails.

The fee for cutting rails to lengths of 18 inches or under is increased from $2.50 to $3.25 per gross ton. This increase has been accomplished by reducing the price of scrap rails in random lengths and rails 3 feet in length 50 cents per gross ton and increasing the price of rails 18 inches in length, 25 cents per gross ton. The fee for cutting rails to three-foot lengths remains the same, because the 50-cent reduction in price applies both to scrap rails and rails three feet in length. The grade of rails 2 feet in length has been eliminated.

The regulation combines two sections of RPS 4 which dealt separately with cast iron of dealer and industrial origin and with that of railroad origin. Each section contained specifications for seven grades. The regulation now provides one section with one set of specifications. Ten grades of cast iron now cover all those previously contained in the two sections.

Applies to All Cast Iron Scrap

The prices established by this new section for the various grades of cast iron scrap in this section apply to all sellers, regardless of the origin of the material.

The regulation eliminates the former dual basing point system under which 25 basing points covered railroad scrap and 38 covered dealer and industrial scrap. In the interest of simplification and to eliminate several inequities in price, the former railroad scrap basing points have been eliminated and the previous 38 dealer and industrial scrap basing points now cover all scrap regardless of origin. As 21 of the former 25 railroad scrap basing points were identical with 21 dealer and industrial scrap basing points, this action, in effect, adds 17 new basing points for railroad scrap. The other four railroad basing points (Philadelphia, Wilmington, Del., Kansas City, Mo., and Wheeling, W. Va.) have been eliminated.

The historical price relationship by which the railroad scrap basing point price is $1 higher than that of dealer and industrial scrap is not changed by this step.

In a few cases, railroads may get increased prices for their scrap as some of the new dealer and industrial scrap basing point prices will give them a higher net return. However, only an insignificant tonnage of scrap will be thus affected.

Several other changes made by the regulation are as follows:

(1) Certain unlisted grades of scrap formerly classified by interpretation as one of the listed grades are now included in the specifications for those listed grades; for example, bundles weighing less than 75 pounds per cubic foot, hand-baled cotton ties and machine gun clips.

(2) The specifications for certain grades, such as machine shop turnings, chemical borings and shovelling turnings have been changed to show more clearly the types of material included. Specifications for the new grades for which basing point prices are established have also been included.

(3) Two grades—briquetted shovelling turnings and briquetted alloy free turnings—have been eliminated. Should any necessity arise for briquetting these turnings they may be classified and sold as grade No. 27—Briquetted Turnings.

(4) The brokerage provisions have been modified. An interpretation relating to the passing on to a consumer of discounts received from the seller by the broker has been included; an interpretation permitting the payment of brokerage fees when a broker purchases scrap from a producer on a "where-is" basis has been revoked, and a condition that persons receiving a brokerage commission be regularly and primarily engaged in the business of buying and selling iron and steel scrap has been added.

(5) The trucking provisions have been simplified by elimination of the requirement that a trucking certificate be filed where the transportation charge is at the allowable minimum of $1 per gross ton. The charges for delivery in a truck owned and controlled by the shipper are now defined as the highest established rail carload freight rate for shipping scrap from the rail siding nearest the shipping point to the rail siding nearest the point of delivery.

(6) An interpretation has been included clarifying the freight charges which may be added to the maximum on-line prices for iron and steel scrap of railroad origin.

(7) Provisions relating to the use of vessel rates in computing shipping point prices have been clarified by redefining the conditions under which such rates may be used and the areas to which they will apply.

(8) The intransit provisions have been amended to permit the intransit preparation of cast iron No. 2 (charging box cast) and the intransit briquetting of either cast iron borings or steel turnings.

Howard Young Resigns from War Production Board Post

Howard I. Young has resigned as deputy vice chairman for metals and minerals, War Production Board. He is returning to St. Louis to devote full time to the affairs of the American Zinc, Lead & Smelting Co., of which he is president.

James Douglas, formerly director of the Zinc Division, has been appointed deputy vice chairman for metals and minerals, replacing Mr. Young. The Zinc and Tin-Lead divisions are being consolidated under the direction of Erwin Vogelsang, formerly director of the latter division.

PRIORITIES–ALLOCATIONS–PRICES

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

INSTRUCTIONS

SECONDARY CONSUMERS: Secondary consumers of controlled materials, in making returns of unused allotments to claimant agencies or WPB industry divisions, should make separate returns for each different item they are manufacturing and for which they have unused allotments. Each item is identified by a different abbreviated allotment number and separate returns should be made for each, regardless of whether such return is being made on form CMP-32 or by letter, both of which methods are permitted under the rules governing such returns of allotments.

REPAIRMEN: Procedures established for use by repairmen under CMP regulation No. 9A in obtaining materials may be used to procure only three types of copper or copper-base alloy tubing or pipe from brass mills or brass mill warehouses. A quarterly limit of 2000 pounds of copper tubing has been imposed on amounts of this material which one distributor may sell to another distributor.

The three types are: Seamless copper tubing, soft, in coils or in straight lengths of an outside diameter, gage and type commonly sold as automotive tubing; seamless copper tubing, soft, in coils in gages 0.032-inch and 0.035-inch and of an outside diameter and type commonly sold as refrigeration tubing; and seamless copper tubing soft in coils ½-inch or ⅜-inch outside diameter by 0.049-inch gage for oil burner service. Orders which bear the allotment symbol V-3 (assigned to repairmen) may not be accepted by any mill or warehouse unless they are for one or more of these three types of pipe or tubing. When a distributor buys from another distributor for the purpose of reselling to a repairman, his order must so state. No distributor may purchase more copper tubing under provisions of direction 1 to CMP regulation No. 9A than 6000 pounds a quarter, unless he is specifically authorized to do so by WPB. This limit applies to distributors regardless of whether they obtain their tubing from other distributors or from mills or producers.

EXCESS MATERIALS: A procedure has been established under which a person who has excess materials or products on hand may obtain permission to use them himself, rather than sell them under the procedures for special sales. The procedure applies (1) to controlled materials and class A products and (2) to other materials and products.

Persons who have (1) controlled materials or class A products which they obtained through the use of an allotment or (2) other materials or products which they obtained through the use of preference ratings, may apply by letter to their nearest WPB field office for permission to use such materials for other purpose than those for which they were originally acquired, if such materials cannot be used for such original purposes.

Authorizations which may be granted under the terms of these directions to CMP regulation No. 1 and Priorities regulation No. 1 will not be exceptions to the provisions of any E, L, or M order or any direction issued under such order.

PREFERENCE RATINGS: When a preference rating is being applied, other than a blanket rating, or when any rating is being extended for some purpose other than to replace inventory, it may be done only within a reasonable time (usually less than three months) after the rating was received. The mere fact that a person has not been able to get his rated order accepted by a supplier does not lengthen the time within which he may use his rating.

INDEX OF ORDER REVISIONS

L ORDERS

WATT-HOUR METERS: Authorization for the manufacture of domestic watt-hour meters will be granted now by WPB on form GA-1850. Persons wishing to manufacture such equipment or repair parts should apply for authorization by letter, addressed to Radio and Radar Division, WPB, reference L-151. Applicants needing controlled materials to produce the equipment should send an application for them on form CMP-4B with their letter. Provisions in the order that permit the use and delivery of existing parts for the conversion of domestic meters from one to another type remain in force. (L-151)

FOOD PROCESSING MACHINERY: Production quotas and restrictions for the fiscal year ending Sept. 30, 1945, for the manufacture of food processing machinery have been established. In all instances, manufacturers will be permitted to continue production at rates which are now permitted and under restrictions now in force. Types of machinery which are covered by the quotas and restrictions are: Dairy machinery and equipment; bakery machinery and equipment; canning machinery and equipment; egg and poultry processing machinery; sugar processing machinery; flour, grain and feed milling and processing machinery and equipment; meat canning, meat packing and meat processing machinery; and brewing, winery and beverage machinery and equipment. (L-292)

M ORDERS

CHROMIUM: Use of chromium metal is now prohibited to make nickel-chrome resistance wire. Delivery of such wire for use in domestic or commercial electrical appliances also is prohibited. (M-18-a)

GENERAL SCHEDULING: Allocation control has been placed on the following machinery and equipment for the first time: Concentrators, precipitators, salt processing evaporators, crystallizers, columns and the following types of machines: Capsule, pellet, pill powder filling, tablet, vapor solvent degreasing, glass manufacturing, weathering and plastic molding. Glass lined equipment essential for DDT and penicillin programs is also added to table 15 of order M-293. The following types of plastics molding machinery are now under control of the order: Compression, extruders, injection, laminators, laminating process and preformers. The following types of paint machinery and equipment are also allocated now: Roller, ball pebble, colloid, and stone mills, mill pulverizers and paint driers. Allocation of crushers, grinders and driers is now confined to the following types: Those needed to produce wet, dry, paste or granulated products, bone crushers, crushing rolls, crystaller combinations and diamond type hogs. Form WPB-1319, the general application form for machinery and equipment for order M-293, now replaces form WPB-2586. (M-293)

PRIORITIES REGULATIONS

MRO: Blanket maintenance, repair and operating supplies preference ratings may be used for the purchase of woodworking machinery selling for $350 or less. Prohibition against purchase of light power-driven tools with blanket MRO ratings has been removed. Use of blanket MRO ratings is prohibited for purchasing woodworking machinery costing more than $350. (PR No. 3)

PRICE REGULATIONS

MACHINES AND PARTS: A maximum price by written order now may be established where a seller or machinery service supplier does not compute his maximum price as required by the regulation covering machines and parts, and machinery services. The 7 per cent figure has been removed from the adjustment provision and now for purposes of comparison base period profits will be adjusted on the basis of the percentage of net worth that the applicant was earning during the base period. (No. 136)

BARIUM COMPOUNDS: Specific dollars-per-ton prices have been issued for technical grades of barium carbon precipitated, barium chloride, and barium nitrate. New prices represent an increase over previous prices for carbonate and chloride, and a reduction under the level of the general maximum price regulation for nitrate. The new price for sales of barium carbonate precipitated by the producers who account for about 90 per cent of total sales of the product is $60 a ton, f.o.b. plant. A maximum price of $70 a ton, f.o.b. plant, is established for the high cost producer in order to aid in securing the necessary supply of carbonate. A maximum price of $73 a ton, f.o.b. plant, is provided for all producers of chloride crystals. The price for anhydrous chloride remains unchanged at $105 a ton. All above prices are in carload lots and in bags. Prescribed differentials may be applied to prices of carbonate and chloride for sales of less-than-carload lots, and for sales in barrels.

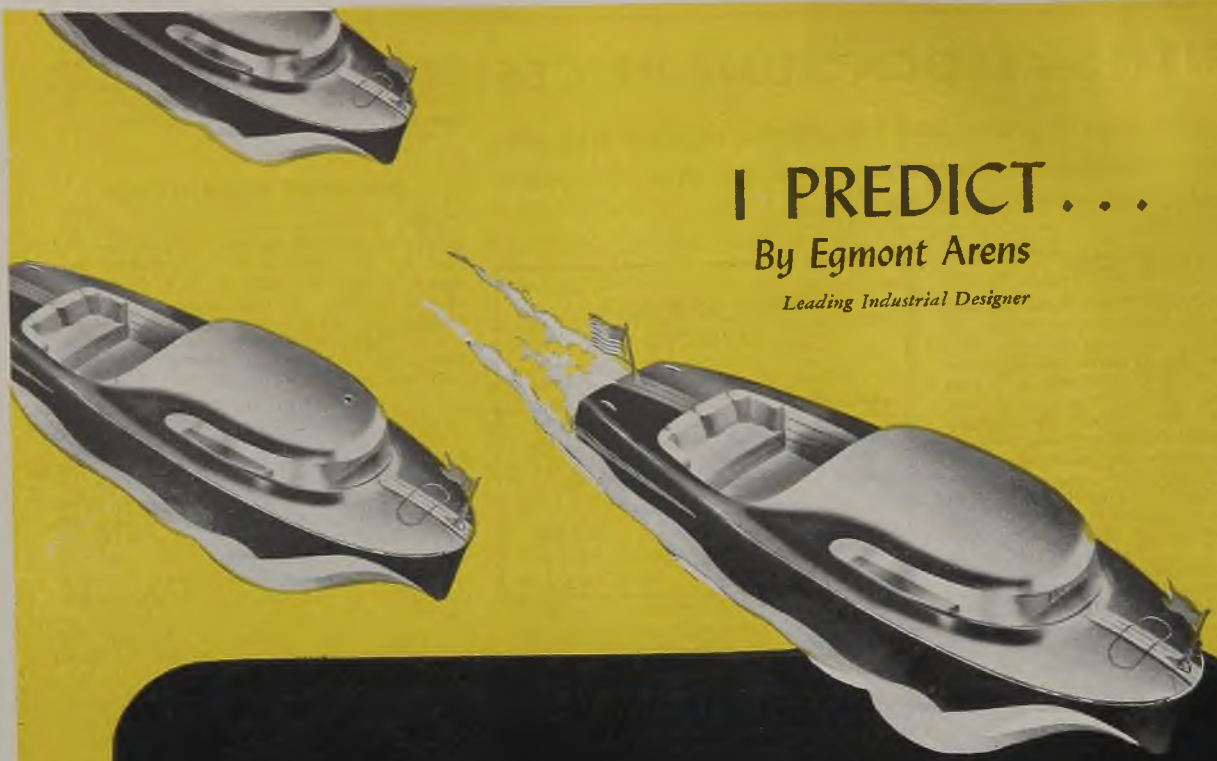
The new regulation contains an adjustment provision based on maintenance of essential supply and also a provision that will expedite the establishment of prices for technical grade or types of carbonate, chloride and nitrate for which no specific prices are provided in the new schedule. (No. 543)

Refrigerator and Canner Production Quotas Revised

Domestic refrigerator production quotas, totaling 128,175 units for the third quarter of 1944, have been assigned to 21 manufacturers, the War Production Board has announced.

Quotas assigned to individual manufacturers are established in schedule VIII to limitation order L-7-c, under the terms of which each manufacturer must make his allotted quota in his own plant and at the location designated in the schedule.

Production quotas previously assigned to two of six manufacturers authorized to produce aluminum pressure canners in 1944 have been increased to the extent of a reduction in the quotas of two other manufacturers, who are unable to produce their full quotas without interfering with war work. The overall total, 400,000 canners is unchanged.



I PREDICT . . .

By Egmont Arens

Leading Industrial Designer

I predict quantity production, right after the war, of unsinkable boats with continuous skins, tougher and lighter than wood, hull and top sides molded in one piece of Co-Ro-Lite, a new molding material consisting of plastic bonded rope fibres. Scale models of such boats are now being tested under a variety of conditions, and hulls of similar construction up to 32' have already been successfully molded. Light weight, speed and low cost will be overall outstanding features. The skin-stressed monocoque construction produces a light weight hull and top. An aluminum aircraft-type engine, housed out of the way in a small space under the aft deck, will provide speed and low operating expenses. Production by molding assures low initial cost, and a one-piece hull, eliminating yearly overhaul and caulking, means low upkeep. Thus motor-boating will be a pleasure everyone can buy with their War Bonds when Peace is restored.

* * *

Note: The Weatherhead Company, one of the oldest and most important manufacturers of parts for the aviation, marine, automotive and other key industries, looks forward to the day when its four plants will be contributing to peacetime needs.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

FREE: *Write on company letterhead for "Seeds Of Industry"—a history of The Weatherhead Company, its many facilities and diversified products.*

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Debunking of "postwar dream car" by representatives of the professional designing profession well received at recent Society of Automotive Engineers' meeting. The term "functional streamlining" is held to have been greatly overdone

COMMENDABLE debunking of the "postwar dream car" was dished out for the Society of Automotive Engineers at its recent meeting here by a representative of the industrial designing profession which has been largely responsible for the "dream boats" thus far assaulting the public eye from magazine pages. The latter fact made all the more surprising the observations made by the speaker, Brooks Stevens, Milwaukee designer, and his remarks drew general agreement from the listening engineers.

Particularly appropriate was Stevens' deprecation of the term "functional streamlining" as having been greatly overdone. As he said, progress through the years in automotive body design undoubtedly has brought improvements in resistance of the frontal area of a car through the absorption of individual elements such as headlights, fenders and flat radiator cores into one mass, but the actual percentage of improvement over the average automobile of the early thirties, as offered by the average automobile of the forties, he held to be negligible other than as a visual selling medium. Looking at the matter realistically, the speed necessary to provide this percentage of improved performance is so high that most automobiles are never driven fast enough consistently to result in any money saving at the end of a given period.

Streamlining Only Visual

Quoting Stevens further: "In fact, when comparing some of the current vehicles, equipped with what we jokingly refer to as 'flower-box fenders,' with the more graceful, long sweeping front fenders of the early thirties, which seem to produce an easier air flow, we are inclined to feel that the flower-box types have produced actual air pockets because of their open wheelhouse and underbody. We feel this is proof of the fact that visual streamlining is as far as automotive body styling has gone. If these cars were completely closed underneath, the question of drag might be improved, but again let us not be carried away by the aerodynamics necessary to aircraft performance when we are interested in selling ground transportation to a consumer who probably should not be allowed the dangerous choice of hundred-mile-an-hour speeds.

"Summing this all up, I fear the greatest contribution of the rear-engine type car, from the standpoint of the stylist, is the ability to obtain the teardrop silhouette—the single aerodynamic mass that is supposed to personify the zenith in automotive body design. When we have arrived at this magic contour, how will we then distinguish any one make from the other? Where will we obtain any individuality or identity of design? We may merely be able to look forward to a regimented industry of 'beetle-producing' manufacturers who must put their styling counsels to work on nameplates only for recognizable identity. This, of course, is the extreme outcome, but entirely possible.

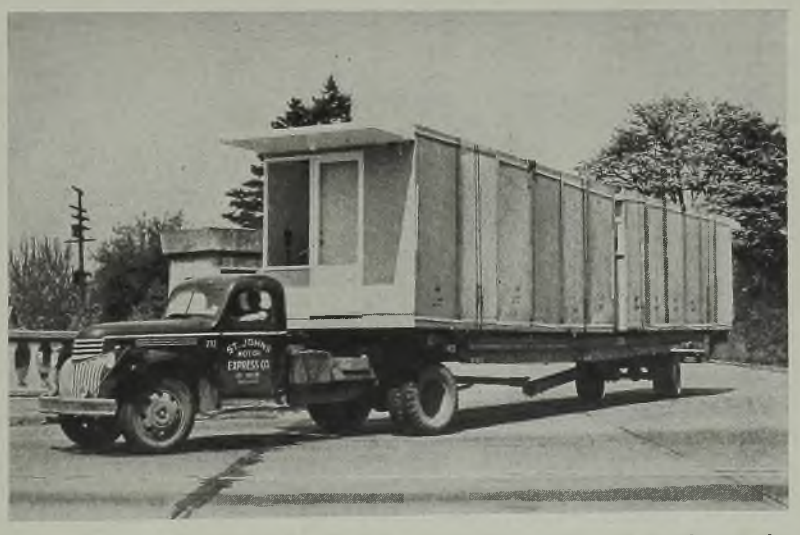
"Seriously, if the consumer is propagandized into thinking that this war and the amazing strides in war materiel production have somehow meant that we could bridge a design decade in the passenger car, we may have a disillusioned body of people to whom we must make these all-important postwar sales in an effort to maintain to some degree the high level of employment now enjoyed."

Mr. Stevens was talking right down the engineers' alley with this sound reasoning. And he went on with some down-to-earth thoughts on the use of molded plastic panels and fenders to replace steel: "The plastic enthusiast extols the desirable qualities of his material from the standpoint of never having to worry about a paint job. The colors will be all the way through. The smooth, gleaming surface will never require polishing, etc. My fear is that complete consideration as to how these body elements would be molded is seldom explained. The average consumer, of course, with a limited knowledge of plastics and molding methods, envisions huge injection molding presses, into which are poured molding powders, and at the flick of a button a completely molded body jumps out of the press. Experiments have been made with other methods, using plasticized jute binders and other impregnated fibers. These methods, however, are not to be compared with the speed of executing steel stampings; nor can we compare the use of steel at 3 cents a pound with possible plastic prices ranging from 45 to 90 cents a pound.

"Looking beyond the more or less doubtful methods of manufacture, consider our consumer living with his new plastic car. If the breadwinner's wife backs her present car out of the garage, with very little consideration for the meeting of her rear fender with the door post, she still has the opportunity of dashing downtown and leaving her car with an obliging body repair man to hammer out the dent, lead in the file marks, and finish off with a quick-drying paint job so that she may return from her luncheon and bridge party with her automobile intact (not these days, Mr. Stevens!—Ed.).

"The plastic fender will not give like the steel fender; even though somewhat resilient, it is more likely to shatter, requiring a new one. For the most part, the postwar plastic prophet includes no unsightly seams between elements on his dashing 'Buck Rogers Special'."

Scheduled to appear on the same program with Stevens, W. B. Stout, automotive imagineer and head of the Stout Research Division, Consolidated Vultee



SPEEDS HOUSING PROJECT: A fleet of 20 Chevrolet trucks with greatly extended semitrailer platform bodies is working around the clock to speed a new war housing project at Richland, Wash. The units are hauled from factory to project site, two to a truck, and stop off in Portland, Oreg., to be completely equipped with furniture. Upon arrival at the site, they are unloaded, bolted together, utilities installed, furniture rearranged, and are ready for occupancy

Aircraft, had to dash off to San Diego at the last minute, but his observations on the practical postwar car were read by a friend. Stout held out hope for companies which may now be planning to "have a go" at the automobile manufacturing business in the postwar era. Although they may not be able to operate on a small scale at the start and compete in the price field with established auto companies, they still can compete in the "ingenuity field" with a new product for a new appeal, creating new desires on the part of the car-buying public. Such progress, he maintained, will have to be based on engineering—better design, more economy, more luxury, better appearance and new performance and pride values.

Said Stout: "In this approach the present motor car companies have given the newcomer every opportunity. Their engineering is frozen, their engines, transmissions, bodies, axles, frames, steering gears, all are standardized into types. Service and sales and distribution are definitely jelled. Interior arrangements and appearance and functionalism of the motor car are established, and in the motor car business itself there will be no change until it is forced by some outside competitor.

New Techniques Developed

"However, since the war started, we have learned a tremendous number of things. The airplane business has brought new materials to make lighter structures, and yet much stronger, and has at the same time learned how to make them at low cost. Airplane materials that were expensive before the war should be inexpensive in the postwar era. Before the war, there was but one method of mass production in the automobile business—from steel dies, gages, templates, blueprints and engineering approaches. Each one of these items has been completely revolutionized, largely in the airplane business.

"The airplane business has, therefore, learned how to make simple replaceable dies, has developed cheap production practices. While the automobile business must think in terms of 2,000,000 cars a year, the airplane business can produce a fraction of that number of units, but with no more die cost per car and, therefore, can start with new models every few weeks if necessary until they hit the one that takes the public eye. Minor changes can be made quickly at little expense.

"Whereas it costs $500,000 for the fender dies of a modern car, this new car may be designed so that it needs no fender dies, or, in fact, any dies at all. There is no reason why the automobile business should do these things, but if the smaller companies throughout the U. S. are going into the automobile business or into small production with a new-type ingenuity-basis car, then these lessons of the airplane industry are most important."

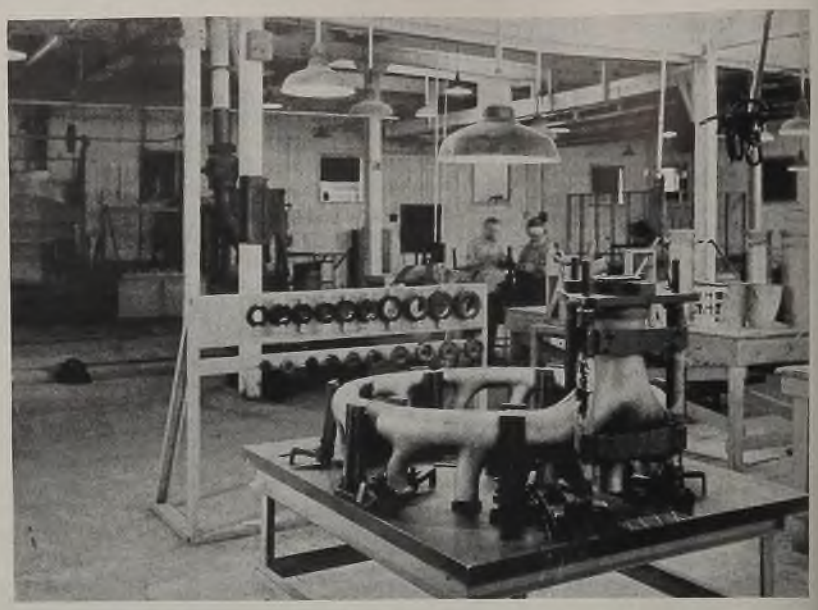
Peering into the future of automotive design, Bill Stout perceives great development in electric drives, not by the old system which had more complications in controls than in power lines, but in a new simplified arrangement. He emphasized what he considered one fundamental of engineering which must come into all design from now on, and that is simplification.

"Instead of adding to, we must take things off," he said. "We must drop unessentials which we have had with us all the time on cars and which are not needed. We must throw away those things on the car which make for deficiencies in its design. We must do away with 'investing in rubber gloves for leaky fountain pens.'"

Thus, in substance, run two more contributions to the literature of the postwar car. Neither comes from the well-known "feedbox," but each is backed with appreciable ability in the field of design. When all is said and done, the real postwar car will be a gradual evolution from what has been produced in recent years, each succeeding model adding a few more improvements and innovations in design and appearance, the goal continuing to be more value for the money, within the limits of the economic level of the country. Why expect more?

Sources close to the aluminum industry are forecasting that automotive pistons will go to the forged type instead of the permanent mold cast design. Better strength properties are said to be inherent in the forged piston, and machining cost may even be slightly under that of the permanent mold type, it is said.

It is a reasonable expectation that many new applications for aluminum forgings may find their way into automobiles. Motor companies, Dodge and Chevrolet for example, are getting intimate acquaintance with aluminum forging technique in production of aircraft components.



MASTER INSPECTION FIXTURE: Quick checking of every dimension of a finished collector ring for aircraft engines is made possible by this master inspection fixture at the American Central Mfg. Corp., Connersville, Ind., a subcontractor for Consolidated Vultee Aircraft Corp. The gages in the background are kept in a convenient rack and used to check section openings—part of the job of "holding stove pipe to tolerances of 0.005 inches," as one workman puts it. American Central normally produces kitchen sinks and other stamping work

"Ducks" Play Important Part in Invasion Plans

From secret weapon to veteran invasion vehicle in a year, that's the outstanding record of General Motors Corp.'s seagoing truck, the "Duck."

First reported in action in the South Pacific in June, 1943, it has played an important part in amphibious operations from Anzio to Arawe. Now it is being prominently featured in the invasion of the French coast.

Work on the pilot model of the "Duck" got under way in the GMC drafting rooms the latter part of April, 1942. In just 38 days, this first amphibious vehicle was completed. It was then put through exhaustive tests on land and in the water which led to a number of refinements in design, including a change from cab-over-engine to the standard 2½-ton, six wheel drive chassis. Since the start of the "Duck's" manufacture, more than four hundred improvements in design and construction have been made.

The Harper organization devotes its energies and facilities exclusively to non-ferrous and stainless fastenings. It manufactures bolts, nuts, screws, washers, rivets and specials of Brass, Bronze, Copper, Everdur, Monel and Stainless. It produces nothing in common steel or iron.

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WING TIPS

Aircraft engine builders adapt special machines and production methods to meet volume demands. Build skill into equipment to relieve pressure on the training of employes. Automotive industry methods applied

AIRCRAFT engine builders have been compelled to meet the demand for vastly expanded production facilities and improved production methods in a variety of ways, nearly all of which fortunately have been highly successful. At Wright Aeronautical Corp. there has been a two-phase approach to the problem—establishment of a Technical Production Unit plus a well-co-ordinated training program.

Duties of the Technical Production Unit were to study the problems of quantity production and recommend any action required to achieve increases. The automotive industry, over a period of years, had developed the best mass processing methods known in this country. For years automobiles had been produced in large quantities, with a high degree of precision being maintained where necessary. The methods which were successfully applied to automotive practices were closely studied, and formed the basis for much improvement in aircraft engine manufacture. The Technical Production Unit, however, went further than to transplant automotive practices into aircraft engine plants. A review of general industrial practice also was made. New equipment was studied, new processes and practices were investigated and current methods restudied with a view toward possible adaptation to aircraft engine manufacture.

All Design Proposals Studied

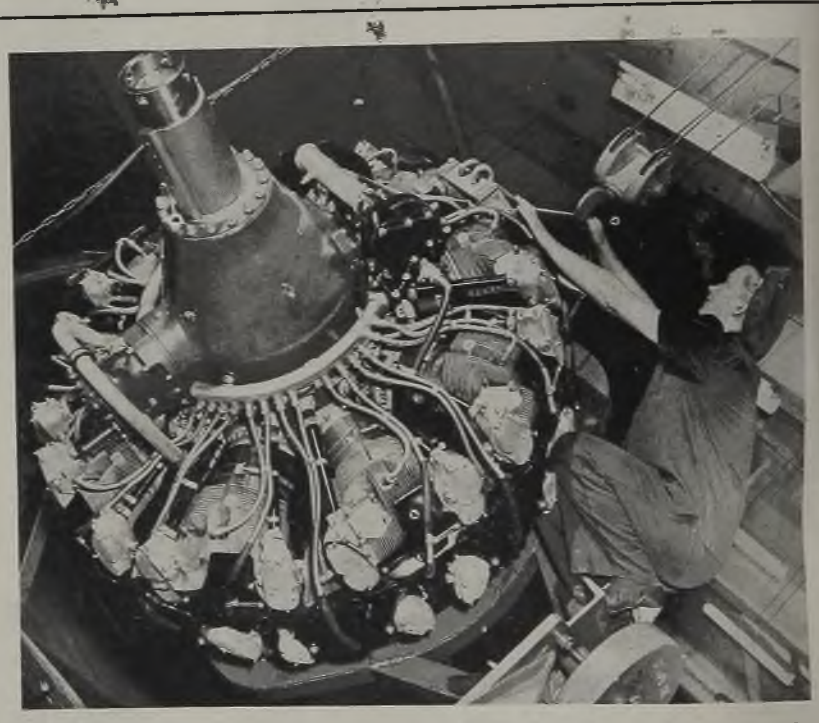
These activities were carried on with the maximum amount of open-mindedness, lest prejudice cause some worthwhile developments to be overlooked. All new engine design proposals were studied to see how parts could be fabricated using current or proposed future processing methods. Suggestions for design modifications which would simplify processing, or make possible the use of multi-operation machines, were made to the Engineering Design group. In many cases these suggested design modifications were acted upon with good results.

The training program, as established, was effective and, with the possible exception of an error in training many young draft-age men, has operated in an extremely efficient and satisfactory manner. Many thousands of men and women have been employed in the aircraft engine industry since 1937. Each of these men and women had to be trained. This training varied somewhat with the background of the individual. In general, it is safe to say that the work was different from what newcomers had done before, regardless of background. The work tolerances required were generally smaller, the finishes better, the care in handling greater, and the inspection procedures employed were more complex and exacting. The worth of this training program can best be measured by the fact that employment figures at Wright are roughly 25 times the 1937 figure, and key men for the staffs of several new plants have been taken from the original nucleus. These expansion figures are somewhat distorted because no account is taken of vendor plant expansion and employment. The training of unskilled men and women and their ability to become, in a relatively short time, members of a team producing aircraft engines is a tribute both to training program and to the sound production methods employed.

The fact that quantity demands for engine parts were being made, and would continue to be made, is responsible for the machine tool developments herein outlined. The need for large numbers of precision parts influenced the design and type of machine tool that would be needed to process those parts. The factor of a scarcity of skilled operators dictated that the maximum amount of automaticity and skill be built into the machine since it must make up for the lack of mechanical knowledge and training, possessed by skilled operators. To face both, a scarcity of skilled operators and a quantity demand for engines coincidentally called for the use of them ingenuity than facing either of them separately.

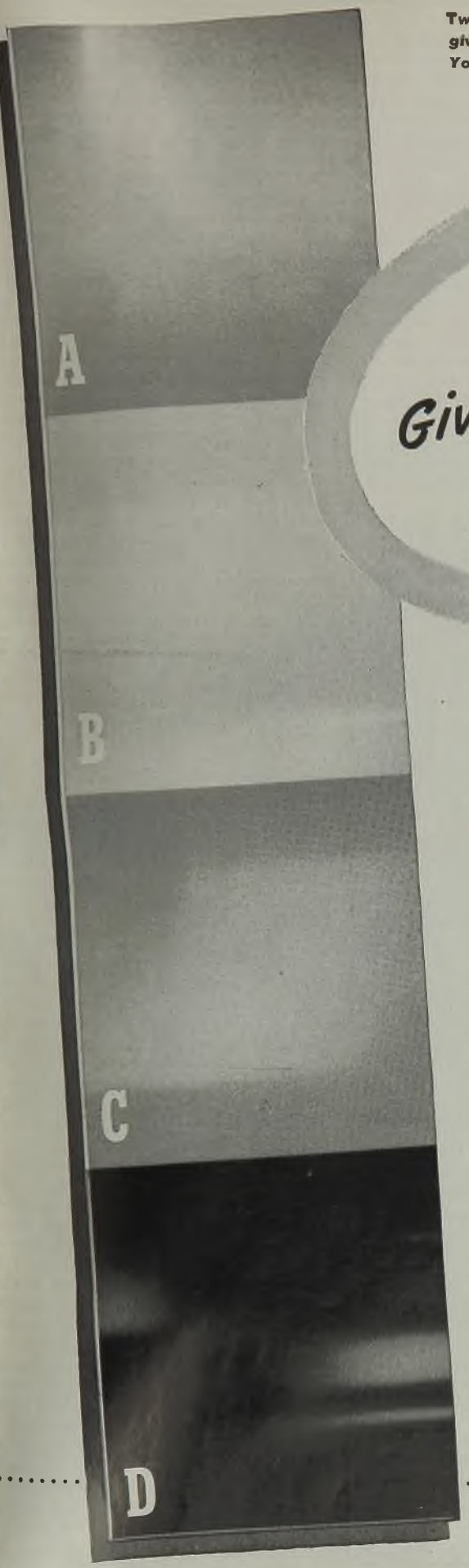
A specific instance where skilled hand labor was replaced is in the Cam-O-Lap automatic machine used to lap cam tracks. At one time the cam track was machine ground and polished, and then hand stoned to remove the "fuzz." With the help of the Norton Co., a machine was developed to process the camtracks in a manner which left no "fuzz." Each of these machines replaced 14 skilled hand stoning operators. The completed cam track as processed now, has a uniform surface finish of 13 micro-inches or less, where formerly the surface finish varied over a considerable range and was as high as 30 micro-inches. Since its development, this machine is finding universal application throughout the aircraft engine industry for finishing cam tracks.

The success enjoyed with the use of semi-production machine tools, and the resulting reduction in the number of skilled operators necessary to produce satisfactory engine parts, soon led to the procurement of special purpose quantity production machine tools. In each instance where semi-production or quantity production machine tools were recom-



POWERS SUPERFORTS: Power unit for the B-29 Superfortress is this Wright Cyclone engine of 2200-horsepower. Four of these engines in the B-29 give it almost double the power of the B-17. Twenty such units could drive a battleship of the IOWA class at 33 knots

Abstracted from an address delivered by Martin M. Holben, project engineer, Wright Aeronautical Corp., Paterson, N. J., before National War Materiel meeting of the Society of Automotive Engineers in Detroit recently.



Two of the three surface treatments are mill-applied. The base metal (A) is given an electrolytic "flash" of zinc (B) and then Bonderized (C) at the mill. You can apply paint in any shade of any color without chemical treatments (D).

THIS
Surface-Treated Sheet Steel
Gives you 5 Big Advantages

From Armco Research comes another new specially surface-treated sheet metal—ARMCO Cold Rolled PAINTGRIP.

This special grade of steel can eliminate a number of costly operations from your fabricating practices. The reason: It is mill-treated—given an electrolytic "flash" of zinc and then Bonderized. This zinc-phosphate surface is an integral part of the sheet.

Weigh these five important advantages:

1. EASY TO FABRICATE. ARMCO Cold Rolled PAINTGRIP will draw, form, weld and solder readily.

2. NO "AFTER-TREATMENTS." The special surface treatment remains intact during fabricating. Bonderizing after fabrication is eliminated. The sheet can be painted immediately.

3. SMOOTH FINISH. ARMCO Cold Rolled PAINTGRIP is ideal where a uniformly smooth surface is essential.

4. NO RUSTING IN STORAGE. Under normal conditions sheets or coils will not rust during shipment or while in storage, either as sheets or in semi-finished parts.

5. CHOICE OF BASE METALS. Although cold rolled steel is standard for this grade, other base metals can be obtained on large orders.

This specially surface-treated steel is well suited to such uses as kitchen cabinets, bathroom cabinets, refrigerator wrappers, furnace casings, metal furniture, filing cabinets, auto body parts, vending machines, and painted hospital equipment.

Write for more information about ARMCO Cold Rolled PAINTGRIP. You'll appreciate its cost-saving, product-improving possibilities. The American Rolling Mill Company, 2151 Curtis Street, Middletown, Ohio. EXPORT: THE ARMCO INTERNATIONAL CORPORATION

PAINTGRIP ★ ARMCO ★ COLD ROLLED STEEL

THE AMERICAN ROLLING MILL COMPANY

mended for an application, it became increasingly desirable to reduce the amount of bench work required to completely process highly stressed engine parts. Every effort was directed toward manufacturing parts which were as completely machine finished as possible, in order to minimize the human element which always resulted in part to part variation.

Development of the forged aluminum cylinder head forms an interesting study in comparison with the cast aluminum cylinder head. Forged aluminum cylinder heads had been manufactured in limited quantities prior to 1937, by the Bristol Engine Co. of England. The forged aluminum cylinder heads at that time exhibited some properties which made them desirable from an operational standpoint. However, to produce usable cylinder heads from a forged billet, and compete with established manufacturing practices used in the production of cast aluminum cylinder heads, was an assignment of no small magnitude. Studies of current practices were made which revealed the forged cylinder heads as produced were essentially tool room jobs. After considerable study by production and design engineers, Wright purchased the first cylinder head forging dies in 1938.

Forging processes were successfully worked out to produce an acceptable billet weighing approximately 65 pounds. An exhaustive study of heat treating cycles was made to provide maximum possible uniformity of metal structure. As the experimental work on fin cutting progressed, the necessity for a uniform material structure became more and more apparent because slight metal condition differences caused an appreciable effect on cutter life at the speeds and feeds employed in machining the fins. Special equipment and machines were designed and built to profile the valve pockets. Profiling the intake and exhaust ports was considered early in the development, and provision was made with companies manufacturing machine tools to furnish the necessary profile milling equipment.

The experimental work on these processes was extremely costly and of necessity had to be performed on modified standard machine tools. For instance, to machine fins on the forged billet, a standard knee-and-column type of milling machine was modified to relieve the friction load on the lead screws to less than 5 pounds. Two Keller attachments were then connected to the table to control the horizontal and vertical travel of the table in order to cause it to follow a master profile. The first experiments in fin cutting were made using gang milling cutters without much success, due to severe vibration of the work and the work table. Standard milling saws were also tried with no better results being obtained. The vibration conditions were eliminated by the use of specially designed cutters 13 inches in diameter, incorporating nine carbide tipped teeth, carefully ground and honed to a fine finish. When operated at a surface speed of 4500 feet per minute and a feed of 70 inches per minute, these cutters produced a fine surface finish on the sides of the fins.

CLUSTER BOMBS: Seen through the open-bay doors of a B-17 Flying Fortress, this formidable array of 20-pound cluster bombs is being loaded for a test installation by an AAF Materiel Command technician. These fragmentation bombs are used against troops, parked planes and ground installations

Experiments With Coolants

The selection of a coolant for use in cutting the fins was a difficult problem because the high centrifugal speeds of the cutter tended to throw the coolant off. Compressed air and tallow were the first successfully employed coolants. The tallow was injected into the work by intermittent blasts of compressed air. Sufficiently low temperatures were maintained to permit handling of the work without difficulty. Experiments with liquid coolants have now progressed to the point where they may soon be used in production, as the compressed air and tallow are difficult to confine and considerable difficulty is experienced in the cleaning of the cylinder head and the machines used to cut the fins.

As now produced in quantity, the forged cylinder head has the intake and exhaust valve pockets and ports machine formed on special Snyder machines built to Wright specifications, and special three-spindle high-speed Cincinnati Hydro-Tel milling machines. The cylinder heads are handled one at a time in the Snyder machines and three at a time in the Hydro-Tels. The fins are milled on Cincinnati milling machines designed specially for this job. The machines were developed from the experimental unit previously described. After forming the valve pockets and the intake and exhaust ports and milling the fins on the head, the condition of the head approximates that of a cast head. Therefore, machines similar to those used to produce the cast

(*Please turn to page* 174)

MEN of INDUSTRY

JOHN G. FARRAR

L. F. MITCHELL

F. E. CURTIS

F. P. BIGGS

John G. Farrar, formerly acting comptroller of General Electric Co., Schenectady, N. Y., has been elected comptroller of the company. He has been associated with General Electric since 1907.

—o—

Thomas F. Hamilton has been elected president of Hamilton Aero Ltd., Los Angeles, formerly Hardman Aircraft Products Inc. Prior to becoming general manager of the company late in 1941, Mr. Hamilton had been a vice president and director of United Aircraft Corp., New York.

—o—

Robert M. Hendrixson has been appointed sales promotion manager of Nash service and parts and will direct the Nash dealer service program. Previously, Mr. Hendrixson was with Ford Motor Co., Dearborn, Mich., and the Chevrolet Motor division, General Motors Corp., Detroit.

—o—

Edgar B. Karns has been appointed manager, Street and Aviation Lighting Application section, Cleveland Lighting division, Westinghouse Electric & Mfg. Co., Cleveland. Mr. Karns helped design the lighting for the New York World's Fair, Shibe Park in Philadelphia, Comiskey Park, Chicago, Washington National Airport and numerous United States naval air bases.

—o—

A. R. McKay has been elected treasurer and a board member of V. L. Graf Co., Detroit. During the past ten years Mr. McKay has held various executive positions in the Detroit office of Reconstruction Finance Corp.

—o—

Norris H. Schwenk, formerly divisional vice president of the Baldwin Locomotive Works, Eddystone, Pa., has been appointed president of the Busch-Sulzer Bros.-Diesel Engine Co., St. Louis, succeeding **Edward B. Pollister,** resigned.

—o—

John J. Prochaska, for several years Cleveland district manager for Cleveland Automatic Machine Co., Cleveland, has been appointed general sales manager, succeeding **George A. Collier,** who has resigned to devote his time to personal interests. **V. J. Hannon,** formerly chief of general accounting for the company, has been named Cleveland district manager.

—o—

Lester F. Mitchell has been named manager of engineering, Addressograph-Multigraph Corp., Cleveland, and **Franklin E. Curtis** has been appointed chief engineer.

—o—

J. F. Wolfram, for the past 16 years associated with the engineering department of the Oldsmobile division, General Motors Corp., Lansing, Mich., has been appointed chief engineer, succeeding **H. T. Youngren,** resigned. Mr. Wolfram first entered automotive engineering in 1921 with Chandler and in 1928 joined Oldsmobile as assistant experimental engineer.

—o—

Arthur E. Schanuel, formerly secretary of the National Electrical Manufacturers Association, has become executive secretary of the Indoor Climate Institute, Detroit.

—o—

Richard C. Carr has been named manager of institutional advertising for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Before joining the company in October, 1943, Mr. Carr was manager of the War Housing division, Libby-Owens-Ford Glass Co., Toledo, O., and prior to that he was a contract and general agency man for the Sun Advertising Co.

—o—

H. P. Smith, formerly president of the George Chemical Co., and **Thomas T. Schulten,** previously with General Chemical Co., New York, have been appointed field representatives of the New York office of Mathieson Alkali Works Inc., New York.

—o—

Anthony Haswell, president, Dayton Malleable Iron Co., Dayton, O., has been elected president of the Malleable Founders' Society, and **K. M. Smith,** president, Lancaster Malleables & Steel Corp., Lancaster, N. Y., has been elected vice president of the society. **Haldwell S. Colby** fills the newly-created office of executive vice president. Mr. Colby, a former divisional vice president of Baldwin Locomotive Works, Eddystone, Pa., recently served on the War Production Board in connection with the foundry and forge program.

—o—

Fred P. Biggs has been appointed vice president in charge of sales, Brake Shoe and Castings division and Southern Wheel division, American Brake Shoe Co., New York, and **Stephen S. Conway** has been named assistant vice president, Brake Shoe and Castings and Southern Wheel divisions. Mr. Biggs' headquarters are in New York and those of Mr. Conway are in Chicago.

—o—

E. F. Lazar has been named manager of "Special Electronics", a new department of Sperry Gyroscope Co., Brooklyn, N. Y.

—o—

James F. O'Meara has been appointed procurement manager, Steel International division, Middle West Export Co., Chicago. Previously, Mr. O'Meara had been affiliated with various steel com-

CLINTON E. SWIFT

Who has joined Eutectic Welding Alloys Co., New York, as assistant manager of the engineering and research department, noted in STEEL, June 12, p. 85.

D. J. DeBOER

FRANK L. ROSS

EUGENE CALDWELL

HAROLD T. YOUNGREN

panies, and recently he was active on the War Production Board and in the Mid-Central Procurement District, Army Air Forces.

—o—

D. J. DeBoer has been appointed director of the Copper Wire Engineering Association, St. Louis. Mr. DeBoer's experience in the field of electricity includes affiliation with General Electric Co., Schenectady, N. Y.; Sargent & Lundy Inc., Chicago engineers; Harza Engineering Co., Columbus, Neb. From 1936 to the present time he served as chief electrical engineer for the Loup River Public Power District, Columbia, Neb.

—o—

A. G. Budd has been appointed mill supply products salesman in the Cleveland and Pittsburgh areas for the Bristol Co., Waterbury, Conn.

—o—

M. J. Gregory has retired as factory manager of the Foundry division, Caterpillar Tractor Co., Peoria, Ill. Mr. Gregory had joined that company in 1929 with the assignment of creating a foundry from the ground up. Previously, he had maintained his own offices in Cleveland as a consultant, and prior to that he had been associated with General Motors Corp., Detroit. He has been an active member of the American Foundrymen's Association, serving for several years as a director of the association.

—o—

Frank L. Ross, manager of the Eastern division, Hyster Co., Portland, Oreg., and **Eugene Caldwell**, general manager of the company, have been elected vice presidents. Mr. Ross, whose headquarters are in Peoria, Ill., also has been named a director.

—o—

Samuel D. Lemmon, research metallurgist, Lukens Steel Co., Coatesville, Pa., has been appointed assistant engineer of tests for the company.

—o—

Ralph A. Shelly, formerly merchandising manager of the Chrysler Corp. of Canada, has joined Perfect Circle Co., Hagerstown, Ind., as replacement sales manager, Manufacturers division.

—o—

Edward M. Thomas, for the past two years director of the Refractories Section, Office of Price Administration, and previously associated with Niles Fire Brick Co., Niles, O., for more than 15 years, has joined the Refractories division, Permanente Metals Corp., Permanente, Calif.

—o—

Harold T. Youngren has been appointed director of engineering development, Borg-Warner Corp., Chicago. He has held the position of chief engineer with Oldsmobile division of General Motors Corp., Lansing, Mich., since 1933, and prior to that he was executive engineer in charge of passenger car chassis design for Studebaker Corp., South Bend, Ind.

—o—

Col. Edwin W. Rawlings, administrator of Aircraft Scheduling Unit and chief of the Resources Control Section at Wright Field, O., has been awarded an Honorary Doctor of Business Administration degree by Hamline University, St. Paul, Minn.

—o—

LeRoy Tucker, formerly associate professor of mechanics at Ohio State University, Columbus, O., has been named to the staff of Battelle Memorial Institute, Columbus, where he will be engaged in production research.

—o—

Jean Wynkoop, formerly assistant research librarian at Union Oil Co., Wilmington, Calif., has been appointed to the Los Angeles organic research staff of Turco Products Inc., Los Angeles, Chicago and Houston, Tex.

—o—

J. S. Henderson has been appointed co-ordinator of rural electrification for the industry departments of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

—o—

Max Powell has been appointed vice president in charge of technical research, Harvill Corp., Los Angeles. Mr. Powell retains his former duties as head of standard controls and chief metallurgist.

—o—

Thomas W. Hall, formerly sales promotion manager, Carborundum Co., Niagara Falls, N. Y., and **Redfern Hollins**, formerly assistant advertising manager, Worthington Pump & Machinery Corp.,

HERMAN M. BROWN

Who has been made general manager of the Huntington Works of International Nickel Co. Inc., New York, noted in STEEL, June 26, p. 78.

MAURICE R. CALDWELL

Who has been elected president of the American Electroplaters' Society, as reported in STEEL, June 19, p. 57.

Harrison, N. J., have joined Elastic Stop Nut Corp., Union, N. J., as sales promotion manager and assistant sales promotion manager, respectively.

—o—

R. T. E. Bowler has been appointed superintendent of the Homewood plant, manufacturing and repair department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

—o—

Martin A. Moore, controller of Hyatt Bearings division, General Motors Corp., Harrison, N. J., has been elected president of the National Association of Cost Accountants.

—o—

Harold M. Switzer, formerly comptroller and personnel director, Earl A. Thompson Mfg. Co., Detroit, has been appointed treasurer and comptroller of Eureka Vacuum Cleaner Co., Detroit.

—o—

George W. Black has resigned as manager of the Construction Machinery Division of the New York regional office, War Production Board, to return to his previous position as sales manager of Smith Tractor & Equipment Co., construction machinery distributor, Irvington, N. J. His WPB post will be filled by **T. D. Harter.**

RICHARD H. TURK

Who has been elected president of the Porcelain Enamel Institute, as announced in STEEL, June 19, p. 59.

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Richard V. Chase has been appointed works manager and **Walter F. Weissinger** has been named superintendent, Pullman-Standard Car Mfg. Co.'s Osgood-Bradley plant, Worcester, Mass. Previously, Mr. Chase had been superintendent of the plant and Mr. Weissinger was assistant superintendent.

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Harold K. Work, manager of research and development, Jones & Laughlin Steel Corp., Pittsburgh, has been elected chairman of the Industrial Research Institute.

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H. I. McConnell, formerly manager of the Virginia division, Westinghouse Electric Supply Co., New York, has been appointed central district manager, with headquarters in Detroit.

OBITUARIES . . .

Raphael Lavin, 85, founder and chairman, R. Lavin & Sons Inc., Chicago, died there June 26. Coming to the United States from Lithuania in 1882, Mr. Lavin founded the company for refining and smelting nonferrous metals 12 years later. He was active in the business until he became ill six months ago. Mr. Lavin was well known for his philanthropic work in art and theology.

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William H. Herbert, 53, assistant secretary-treasurer, Michigan Steel Tube Products Co., Detroit, died June 22 in that city.

—o—

Stanley W. Sparks, 69, formerly consulting engineer with Bridgeport Brass Co., Bridgeport, Conn., and an inventor who is credited with valuable contributions to manufacturing processes of munitions in World War I and the present war, died June 27 in Norwalk, Conn. At the outbreak of World War II Mr. Sparks organized the Sparks Machine Tool Corp., producing an automatic lathe used in production of shells.

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Linden A. Thatcher, 55, chief engineer for Pitney-Bowes Postage Meter Co., Stamford, Conn., died June 26 in that city.

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Phillip E. Yolles, 64, president of the Master Lock Co., Milwaukee, died June 26 in Miami, Fla. Mr. Yolles was one of the founders of the lock company, and had been its president 26 years.

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Oscar W. Kirsten, 53, president, Doelger-Kirsten Co., Milwaukee, died June 30 in that city. Mr. Kirsten, son of one of the founders of the company, learned the machinist's trade in his father's factory, became superintendent of the plant, and upon the death of the elder Mr. Kirsten was made president.

—o—

Joseph W. Harrison, 82, founder and president of the Harrison Steel Castings Co., Attica, Ind., died June 27. Mr. Harrison, who was born in England, learned the molder's trade after becoming a foundry apprentice at the age of 14. He came to the United States in 1888 and in 1890 founded his company in Converse, Ind., later moving it to Attica.

—o—

Benjamin J. Harlan, 50, general manager of the Lone Star Steel Co., Daingerfield, Tex., died there June 27. Prior to joining the Lone Star Steel Co. last year, Mr. Harlan had been associated with Bethlehem Steel Co. for 22 years, 14 of which he spent as superintendent of blast furnaces at Bethlehem's Lackawanna plant in Buffalo.

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Otto E. Goldschmidt, retired New York consulting engineer who had served as a specialist in used machinery and equipment with the War Production Board since 1942, died June 29 in New York. He was a former president of the Consulting Engineers' Society of New York.

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Ralph R. Bostic, 54, airplane parts manufacturer and former Mid-Continent Oil Co. official, died June 27 in Los Angeles.

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Carolina Crook, 51, recording secretary of the board of directors, American Society of Civil Engineers, died June 30 in New York. Miss Crook joined the society more than 30 years ago.

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Lawrence B. Abrams, 54, general sales manager, Ingersoll-Rand Co., New York, died June 30 in Orange, N. J. Mr. Abrams, who had been associated with the company since 1912, was a member of the American Society of Mechanical Engineers, American Society of Naval Engineers, and the American Society of Military Engineers.

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John C. Fierbaugh, 72, former assistant to the president, American Steel & Wire Co., Cleveland, died June 28 in LaGrange, Ill. He had retired six years ago, having served 44 years with the company.

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Jonathan W. Brown, 58, general superintendent, Pidgeon-Thomas Iron Co., Memphis, Tenn., died June 14 in that city.

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Lloyd M. Chapman, 70, an engineer for Powers X-Ray Products Inc., New York, and a former associate of the late Thomas A. Edison, died July 2 in Glen Cove, L. I. Mr. Chapman had charge of the design and construction of the first generating plant for the electrification of the New York, New Haven & Hartford railroad.

—o—

William J. Gregory, 59, president, Thomas Gregory Galvanizing Works, Queens, N. Y., died June 28 in Great Neck, L. I. Mr. Gregory had been associated with the company 40 years, becoming its president in 1934.

—o—

Hiram E. Manville Sr., 71, former president and chairman of the board of the Johns-Manville Corp., New York, died June 27 in Pleasantville, N. Y. Mr. Manville had retired as chairman of the company in 1939 because of ill health.

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Winfield S. Snowberger, 80, who retired 12 years ago as superintendent of the Cleveland plant of American Brake Shoe Co., New York, died recently in Toledo, O.

Los Angeles Sees Opportunities For Postwar Industrial Expansion

Enlarged steelmaking capacity in the West viewed as making for increased production activity in all types of finished products, greatest opportunities being indicated in 17 specific fields. Accounted for only small percentage of 1939 output.

LOS ANGELES

STUDY recently made of possible industrial postwar expansion in this area, by the Industrial Department of the Los Angeles Chamber of Commerce, indicates that great opportunities exist to expand production of iron and steel products.

Presence of steel mills in the West makes possible the increased manufacture of virtually all types of iron and steel products, but the greatest opportunities lie in seventeen special fields of industrial operations, states the chamber.

These fields have been selected by the planners on the basis of low percentage of production in the eleven western states in the last prewar year as compared with national production, together with other favorable factors.

In this study, the seventeen groups listed, were automobile stampings, blast furnace products, bolts and nuts, cast iron pipe, cutlery, firearms, iron and steel forgings (not made in rolling mills), hardware, heating and cooking apparatus other than electric, malleable iron castings, screw machine products and wood screws, stamped and pressed metal products other than autos, steam and water heating apparatus, steam fittings, tools, wire drawn from purchased rod, and wire work.

Made Disproportionate Share

Government statistics for 1939, the last normal year, show that the eleven western states produced only 3.9 per cent of all the products manufactured nationally by 39 groups of industries engaged in making iron and steel products other than machinery.

On the other hand consumption of these same iron and steel products in the eleven western states was between 10 and 15 per cent of total national consumption. The West purchased 12.8 per cent of the nation's total purchases of industrial, commercial and construction machinery; 13.1 per cent of the nation's automobiles; 14.4 per cent of the hardware; 15 per cent of all household electric and gas appliances.

Of the seventeen industrial groups making iron and steel products in this study, wire work holds the leading place in western manufacture with a value in 1939 of $10,366,000 which was 6.5 per cent in value of national production. Of this amount, factories in the Los Angeles area produced $4,697,000.

In this same year, there were 336 establishments fabricating steel products in Los Angeles county, employing 7235 men and turning out products valued at $52,500,000 annually. Industrial leaders are confident that the postwar years will see the expansion of iron and steel product output to many times that figure.

The war has now made Los Angeles county the third greatest industrial area in the United States. Since 1940, at least thirty new industries have commenced operations. Four hundred and ten million dollars have been invested in new plants and plant expansions.

Among the most important of these new industries are synthetic rubber using petroleum as a base and the new process for high octane gasoline extraction.

Before the war, this area had nine predominant industrial groups. Wartime expansion has not been in airplane and shipbuilding only. More than half of wartime factory growth has been in new industries which have increased the number of factories in this area to more than 7000.

Postwar plans call for the production of goods from western raw materials. In many lines, the finished products have been supplied the West by eastern industrial centers using western raw materials. It is pointed out that many products used in western industry come from the East that could well be made on the Pacific Coast. Furniture nails are made in New England and shipped to Los Angeles furniture manufacturers.

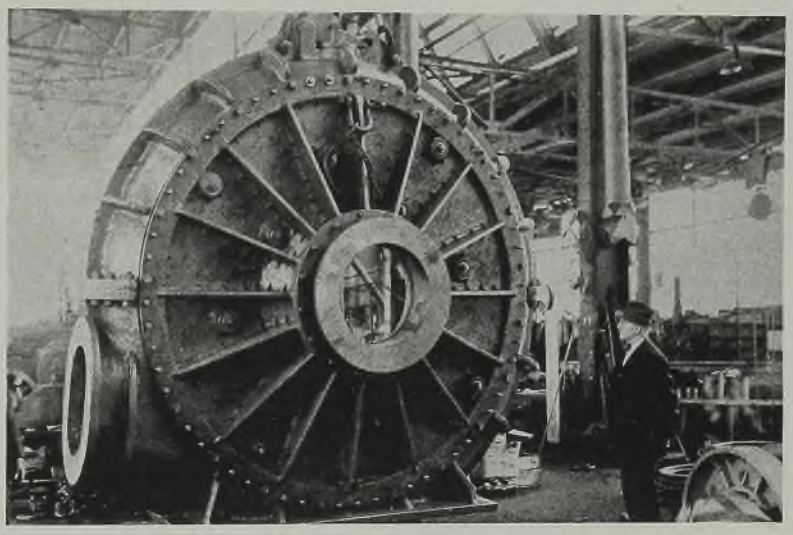
The Industrial Department of the Chamber of Commerce has determined that there are 98 basic materials available to industry in this area. It is feasible to bring 33 other domestic materials here by rail and water. From foreign countries 24 more essential materials are available. This is a total of 155 resources with which industries can be founded.

Labor is not expected to be a problem; estimates of the postwar labor force range from one half to a million trained workers. Surveys among workers disclose that the great majority in war work will stay in this area after the war if employment can be found.

In the months following the cessation of war work, public work projects are expected to take up a large part of the employment slack. The projects city, county, state and federal call for expenditure of hundreds of millions of dollars and the employment of many thousands of workers.

The city council of Los Angeles has approved a plan of the city engineering department calling for an expenditure of $142,000,000 and the employment of an average of 70,000 men in the first six years after the war in civic building.

In an effort to alleviate present labor shortages, the War Manpower Commission has ordered that eight of Southern California's 11 counties will not be permitted after July 1, to have on their payrolls more male workers than they had in their employ on June 15. Furthermore employers in Los Angeles county must not employ a total of male and female workers in excess of the highest number employed on any one day during October 1943.



DREDGE PUMP: This 30-inch suction pump with 27-inch discharge is one of many designed by Simon Engineering Co., Seattle, and built by the Washington Iron Works, Seattle, for dredging work at Pacific bases. Casing of pump is built up of meehanite castings

Powerful Small Tug Being Built

Gasoline-powered work boat undergoes trial run and inspection by representatives of British, Russian and Chinese governments. Expected to play important role in war and postwar shallow water transportation

THE "SEA MULE", a new and powerful marine tug being built at the Pascagoula, Miss., yard of the Ingalls Shipbuilding Corp., recently underwent trial runs for the benefit of representatives of the British, Russian and Chinese governments and for United States Army and Navy officers.

Possessing maneuverability, speed, ease of operation and power, the new work boat is designed for war duties and is expected to be widely used for river and other shallow water navigation in the postwar period.

The "Sea Mule" was built by Ingalls in collaboration with Chrysler Corp. which has constructed thousands of workboats of similar design for use of the Army in combat zones all over the world.

Chrysler supplied the engines, four of them in a twin-engine arrangement, for the powerful workboat. The Sea Mule, only 40 feet long, 15 feet wide, with a draft of 6 feet, boasts a total of 572 horsepower, with each of the two propellers (60 inches in diameter with a 48-inch pitch) receiving 286 horsepower from Chrysler royal twin marine engines.

Novel Methods of Manufacture

Of heavy all-welded steel plate construction, the tug is built in four sections, which may be assembled or "knocked down" in only a few hours to facilitate shipment on railroad flatcars or gondolas, on highway truck-trailers or on cargo ships. The first Sea Mule was shipped from Birmingham, Ala., to Pascagoula on gondolas in two sections, plus the control tower, eliminating two steps in the assembly of the workboat at her destination. However, the Sea Mule may be divided into four sections (each weighing 10 short tons or less) when smaller shipping units may prove more adaptable to the means of transportation available. Each of the compartments is a watertight unit which may be repaired in case of damage without affecting the others. Numerous savings are made possible through novel methods of manufacture of the units which are completed in a fabrication shop.

The workboat may be bolted together if further shipment is planned, so that she may be easily "knocked down." For permanent use in a harbor or on a river or lake, the workboat may be welded together.

Nicknamed the "harbor jeep," the tug is expected to replace the present-day tugs in harbors, cost being an important factor. The new workboat also can be used for towing or pushing barges on inland waterways and, for long hauls, bunks and other facilities could be installed so that the crew could remain aboard at all times.

Maintenance of the new-type tug will amount to a fraction of that for a conventional tug, its builders claim. A crew of two, instead of five or six, can operate it under any circumstances, and one man is capable of handling her in "light traffic."

The first Ingalls Sea Mule is powered with gasoline engines. Either gasoline or diesel engines may be used. There are two gasoline tanks holding 800 gallons each, enough for 50 hours' operation.

A major feature of the tug is the automatic hydraulic steering and engine control. Her conventional steering wheel does not connect directly with the rudders, but exerts impulses which set the hydraulic system in motion; therefore, only slight pressure on the wheel is necessary. The forward and reverse gears also are hydraulically controlled through clutches in the control tower, slightly aft of amidship on the center line. Any one or all of the engines may be started or stopped. The rudder is of the remote control hydraulic reversible type, too.

An improved pushing knee is employed on the tug. It is similar to the conventional heavy oak beam with one outstanding exception: an 8 x 10-inch strip of rubber in the center reduces shock and wear on vessels being pushed.

New uses for the work boat are expected to be developed in the near future.

It could serve as a fire-fighting unit, with the deck holding six water throwers delivering 90,000 gallons per minute. Equipped with gasoline engines, the tug would take no time to warm up and she could get to a fire faster than a larger boat.

Use of the tug as a fire-fighting unit offers possibilities in wartime when many harbors are inadequately protected on account of the shortage of appropriate equipment and manpower.

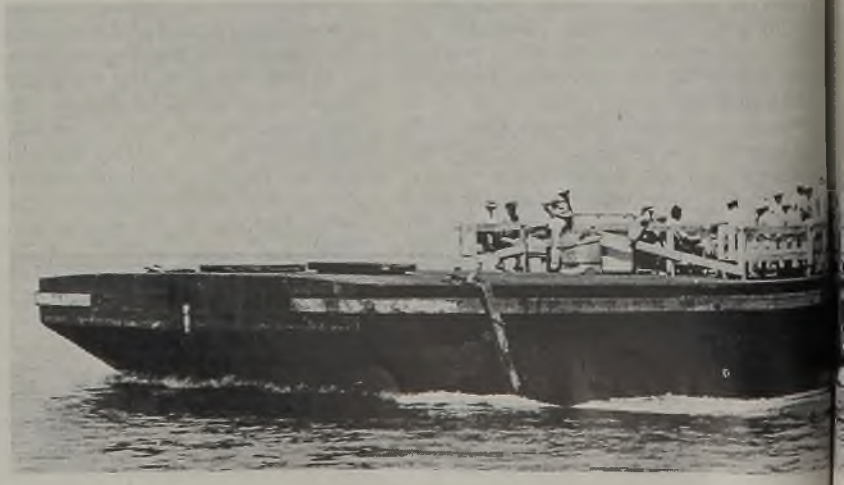
With her shallow draft, the tug can push barges into island ports where harbors will not accommodate sea-going cargo ships. The ships will unload cargo barges which would be towed into the docks.

Wide Postwar Possibilities

One advantage claimed for the tug by its builders is that it can be built in larger or smaller versions, with more or less power, to fill specified needs. Its sponsors believe it can be well adapted to postwar river transportation. Ingalls shipyard at Decatur, Ala., is on the Tennessee river system which already has been developed considerably as an inland waterway and which holds promise for further development after the war.

Another use for the work boats is expected to develop in South American river transportation, which, it is believed, will play an important role in the postwar exploitation of the natural resources of the republics below the Rio Grande.

Ingalls has been a pioneer in the all-welded method of ship construction and has emphasized prefabrication of plates, structural members, weldments and subassemblies. Much of this prefabrication work is done at its Birmingham, Ala., works, and the subassemblies shipped to the company's yards at Decatur or Pascagoula. This system has the advantage of having the subassemblies built at a



Bu n South

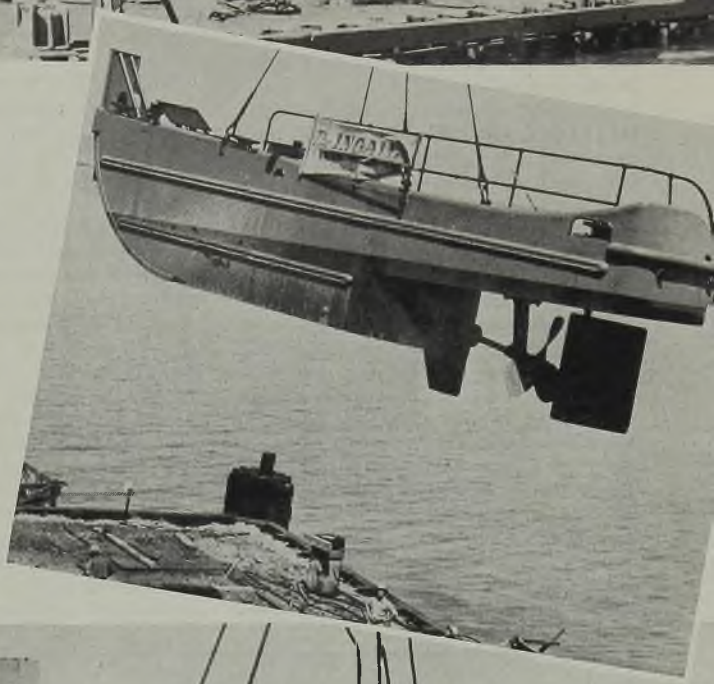
point where steel, fabricating facilities and trained workmen are available. The system was inaugurated in the construction of a variety of peacetime vessels, including barges, towboats, tankers and dredges.

When the Pascagoula yards were opened and the company received contracts to build a large fleet of cargo ships, aircraft carriers, transports, net-layers, submarine and seaplane tenders, the prefabrication system was adopted and huge subassemblies shipped 350 miles south by freight cars. Some of these prefabricated sections weigh 28,565 pounds. Eighty per cent of the steel used in these vessels is fabricated at Birmingham.

Anticipates Peacetime Construction

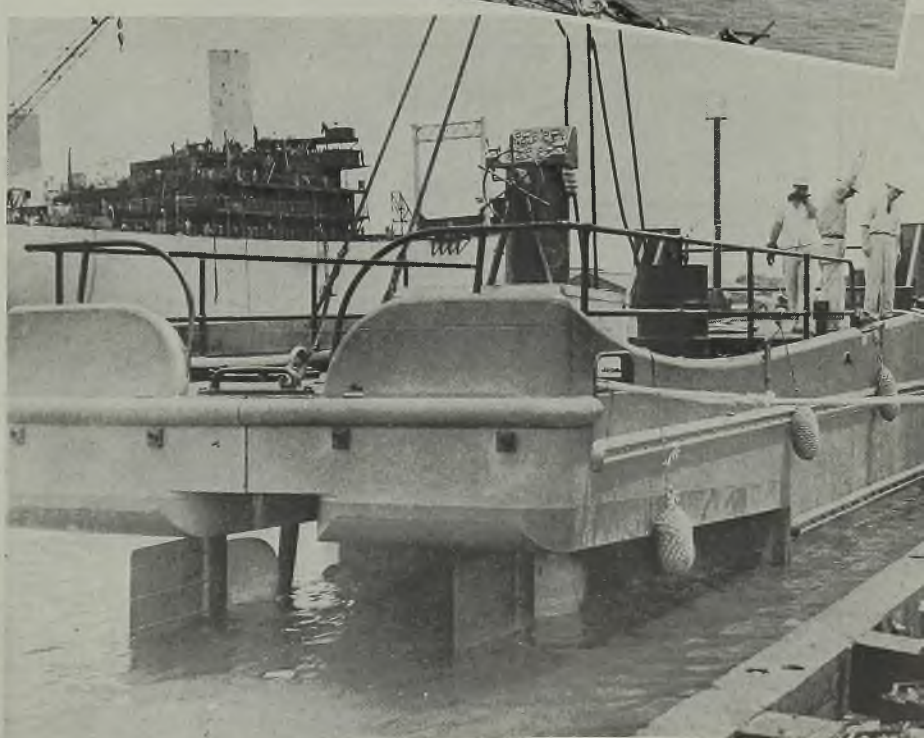
While now heavily engaged in building vessels for war uses, Ingalls is looking forward to reconversion to peacetime construction and anticipates that many of its facilities will be used in the postwar period.

In preparation for the after-the-war era, the company has designs for a streamlined pleasure liner for the Tennessee river; yachts for private use which incorporate a number of unusual features; and other similar vessels.



Ingalls Sea Mule may be shipped on gondola cars in two or four sections. Above, one of the tugs arrives at Pascagoula, Miss., from Birmingham

Half section of tug, right, is hoisted by crane to dock where the sections will be assembled



The sea mule is launched vertically, lower right. Crane lifts the tug from the assembly dock and lowers it to the water

Below, the tug's four engines churn the Pascagoula river into a white wake as it pushes a barge loaded with Army and Navy officers

Dominion Held Not Likely To Lift Wartime Production Controls Soon

Control Board chairman tells manufacturers some restrictions may be continued into postwar period. Farm machinery tariffs removed as of July 1. Steps being taken to eliminate duties on materials used in agricultural implement manufacture

CANADIAN manufacturers recently were told by J. Gerald Godsoe, chairman, Wartime Industries Control Board, that there is little prospect in the immediate future for resumption of certain civilian goods production.

He said current wartime controls will not be lifted in the near future, and some restrictions will have to be continued after the war "to bridge the gap between war and peace."

Speaking on some aspects of wartime control in Canada, Mr. Godsoe said there are bound to be increasing demands upon Canada for raw materials, munitions and men for the armed services as the invasion in Europe is speeded up. The new tightened construction policy will have an effect on practically all types of building, he declared.

"With the recent tightening in the steel supply position, we are no longer able to authorize any projects requiring structural steel unless they are immediately essential to the war effort," he said. "In fact, because of the steel picture, I am afraid that many holders of licenses previously issued may find they are unable to secure materials for their projects. Last year we were well off for structural steel. To-day we are as short as we have ever been.

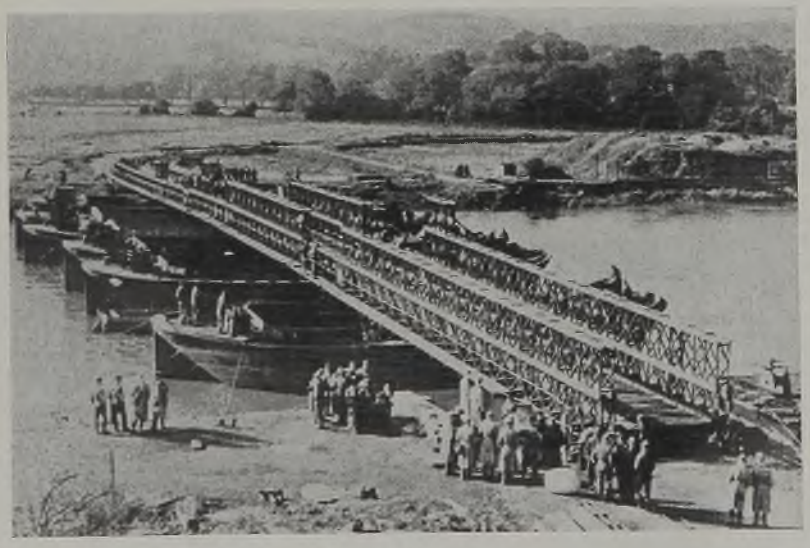
"A change in military strategy stemming from the experience our men at this moment are gaining in France might well create entirely new demands."

H. J. Carmichael, co-ordinator of production and chairman of the Production Board, reports that Canada's aircraft production will reach an all-time peak in value in 1944-45 by an increase of approximately 10 per cent over the previous year.

Effective July 1, tariffs on farm machinery were eliminated to assure postwar agriculture that "costs of production should be at the lowest possible level." These changes are accompanied with removal of the 10 per cent war exchange tax on farm implements.

In announcing that the war exchange tax of 10 per cent ad valorem was removed from imported agricultural implements and machinery the finance minister admitted that at present there is a catch in the new policy which removed the tax and permits 87 classifications of farm machinery and implements to come into Canada free under the intermediate tariff. Supply of such implements coming in from the United States will not be increased, he said, "because they are subject to restricted allocations."

Steps are being taken to remove duties on materials used in the manufacture of agricultural implements.



BAILEY BRIDGE: Here is the first photo released of the new Bailey bridge, which Gen. Sir Bernard L. Montgomery credited with much of the Allied successes in Tunisia and Sicily. It will span any stream up to 240 feet, and sections fit together like a jig-saw puzzle. NEA photo

The nickel chromium content requirement for duty-free entry of bars and rods for the manufacture of electric resistance wire is reduced from 60 to 50 per cent.

The tariff reductions on agricultural implements, indicate the direction in which the government is shaping its postwar trade policy.

A duty of 5 per cent on imports from the United States, or any other most-favored-nation country, on articles which enter into the cost of manufacture of almost all agricultural implements and machinery in the list affected has been eliminated when imports are for manufacture of articles of that type.

A duty of $1 a ton on pig iron and $2.75 a ton on iron or steel rods or bars used in the manufacture of agricultural implements also has been eliminated.

Items previously subject to a 5 per cent intermediate tariff which now will be free are: Chain for agricultural implements; spraying and dusting machines; bulb sterilizing apparatus; fruit testing apparatus; pruning hooks; pruning shears; animal dehorning instruments; fruit and vegetable grading machines; fruit and vegetable grating machines; fruit and vegetable washing and wiping machines; fruit and vegetable bagging and weighing machines; machines for topping vegetables; machines for bunching and tying nursery stock; machines for bunching and tying cut flowers; machines for lidding boxes; egg-graders and egg-cleaners and complete parts of these articles.

Previously 7½ per cent and now free: Harvesters, mowing machines, reapers, harvester combines, plows; rollers, farm, field, lawn or garden; soil packers, cultivators, harrows, seed-drills, horse rakes, horse hoes, scufflers, manure spreaders, weeders, hay loaders, hay tedders, hay presses, potato planters, potato diggers, fodder for feed cutters, ensilage cutters, grain crushers;

Grain or hay grinders, post hole diggers, snaths, stumping machines, scythes, sickles or reaping hooks, hay or straw knives, edging knives, hoes, pronged forks, rakes, incubators for hatching eggs, brooders for rearing young fowl, fanning mills, peaviners, corn-husking machines, threshing machine separators, windmills, complete parts of these articles and agricultural implements and machinery, not otherwise specified.

Previously 10 per cent and now free: Milking machines, centrifugal machines for testing butterfat, milk or cream, certain equipment for farm lighting plants and complete parts of such machines.

Previously 12½ per cent and now free: Cream separators, steel bowls for cream separators; complete parts of cream separators.

Previously 15 per cent and now free: Portable engines with boilers for farm purposes, horse powers, aluminum parts for egg graders; complete parts such equipment.

Previously 25 per cent and now free: Grain loaders or elevators (capacity not more than 40 bushels per minute); complete parts.

Steelmakers Use 313 Million Tons Of Raw Materials

1943 total, exclusive of ferroalloys and alloying elements, equals five tons for each ton of finished steel produced

IN 1943, the steel industry consumed electricity enough to supply 17,178,000 families for 12 months; fuel oil sufficient to heat 1,406,000 homes for a year; coal equivalent to a year's consumption in 12,986,000 houses; natural gas for 14,470,000 residences for a year, according to the American Iron and Steel Institute.

All told, the industry charged into blast furnaces and steelmaking furnaces 313,364,000 tons of raw materials in 1943, exclusive of ferroalloys and alloying elements. This represented consumption of nearly five tons of raw materials for each ton of finished steel produced.

Fuels consumed by the industry, exclusive of coal, totaled 226,784,000 gallons of tar and pitch; 2,109,425,000 gallons of fuel oil; 868,172,000,000 cubic feet of natural gas and 18,380,000,000 kilowatt hours of electric power.

Of its total consumption of 90,905,000 tons of coal last year, the industry used 84 per cent in production of coke The remainder was used to produce steam, generate electricity and as a general-purpose fuel.

Blast furnaces consumed 64 per cent of the total of 313,364,000 tons of raw materials used in 1943. The principal materials going into these furnaces included 108,025,000 tons of iron ore; 56,701,000 tons of coke; 24,248,000 tons of limestone; 7,152,000 tons of cinder and scale; 3,694,000 tons of scrap.

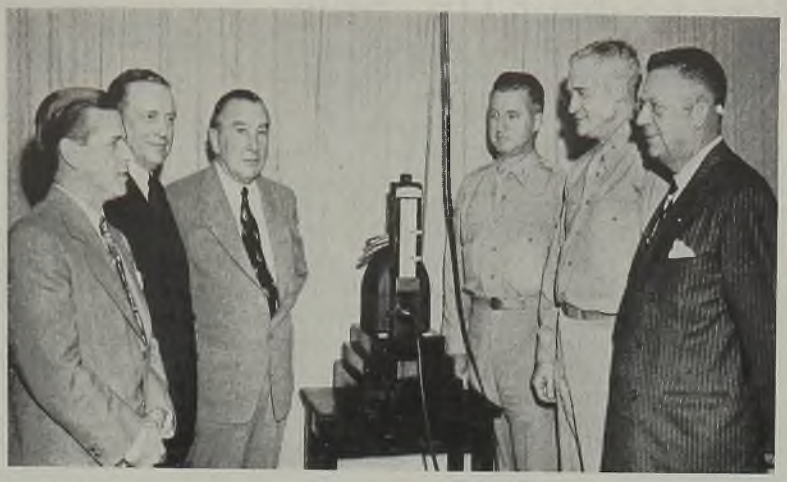
Materials charged into the steelmaking furnaces included 51,956,000 tons of pig iron; 47,106,000 tons of scrap; 7,385,000 tons of ore; 6,534,000 tons of fluxes and 563,000 tons of cinder and scale.

Katzinger Co. Changes Its Name to Ekco Products

Edward Katzinger Co., Chicago, on July 1 changed its name to EKCO Products Co., the new name incorporating the "Ekco" trademark with which the company has been associated for many years.

"This name change is only the first visible step in a program of increased postwar activities we are now planning," states Lee B. Thomas, president of the company.

Beyond a change of name, no other changes are being made in the company personnel or method or operation.



GENERAL RECEIVES GAGE: Louis Polk, left, president, Sheffield Corp., Dayton, O., recently presented Brig. Gen. H. F. Safford, representative of Maj. Gen. L. H. Campbell, chief of ordnance, with a Precisionaire gage, a replica of those used in inspection of internal diameter and rifling of gun barrels. The presentation was made at ceremonies following inspection of the company's plant by a group of Army officers. Left to right in photo are: Mr. Polk; S. C. Allyn, president of the National Cash Register Co.; E. F. Johnson, vice president of General Motors; General Safford; Brig. Gen. James Kirk, chief of small arms branch; E. R. Godfrey, general manager of the Frigidaire division of General Motors

BRIEFS . . . .

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

Ampco Metal Inc., Milwaukee, has built and completely equipped a plant at 30 East Burbank boulevard, Burbank, Calif. The new plant will produce Ampco metal by both the centrifugal and sand cast processes.

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Fostoria Pressed Steel Corp., Fostoria, O., is shipping basic component parts of Fostoria products to Newmac Co., San Francisco, which company assembles to standard specifications and provides service through Fostoria industrial service centers located in Los Angeles, San Francisco and Seattle.

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Martins Ferry division, Blaw-Knox Co., Pittsburgh, producer of the Bofors anti-aircraft gun, has been advised of the second renewal of the Army-Navy "E" award.

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Quickwork division, Whiting Corp., Harvey, Ill., has issued a bulletin, featuring the applications and operation of quickwork stamping trimmers.

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Titeflex Inc., Newark, N. J. has acquired the manufacturing and sales licenses to the patents held by Edward Schreyer. These patents cover the electric steam iron and the dry electric iron.

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Tivit Products Inc., Torrance, Calif., has purchased the Torrance Steam Cleaner Co. and moved its main offices to the Torrance factory at 1026 Engracia avenue, Torrance, Calif.

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Reading Chain & Block Corp., Reading, Pa., announces the appointment of J. R. Kindig, Atlanta, Ga., as representative for its products in the states of North Carolina, South Carolina, Virginia, Georgia, Louisiana, Florida, Alabama, Mississippi, Tennessee, and Arkansas.

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H. M. Harper Co., Chicago, has been granted its fourth Army-Navy award for excellence in war production. The company produces nonferrous bolts and nuts and was the first company in the industry to receive a fourth award.

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Sinko Tool & Mfg. Co., Chicago, has changed its name to Santay Corp.

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Formica Insulation Co., Cincinnati, is spending $150,000 for expansion and modernization of its power plant.

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Westinghouse Electric Mfg. Co., East Pittsburgh, Pa., has announced that as much as 50 per cent reduction in weight of electric equipment is possible where design limitations are based on insulating temperatures by using new silicon insulating varnishes.

War Output Up; Still 1% Behind Schedule

SOME of the weapons most vital to the invasion made a particularly good production showing during May. Aircraft, landing vessels, naval ships and heavy artillery were all encouraging features of the month's production.

But in spite of the 1 per cent gain in munitions output during May, some of the most urgent production programs failed to come up to requirements while overall output closed the month one per cent below schedule, reports the War Production Board. Critical manpower shortages and supply problems traceable to lagging output in industries producing essential parts, are the chief obstacles preventing certain programs from meeting schedules.

Aside from the need to solve specialized manpower shortages in some munitions programs, the greatest problem in the months ahead will be to combat the assumption that the war production job is now practically completed, Donald M. Nelson, chairman, War Production Board, states. Cutbacks and program adjustments must be clearly understood in proper perspective. The relatively few war workers who are freed by program adjustments, will, in the great majority of cases, be shifted at once to either the expanding programs or those falling behind schedule.

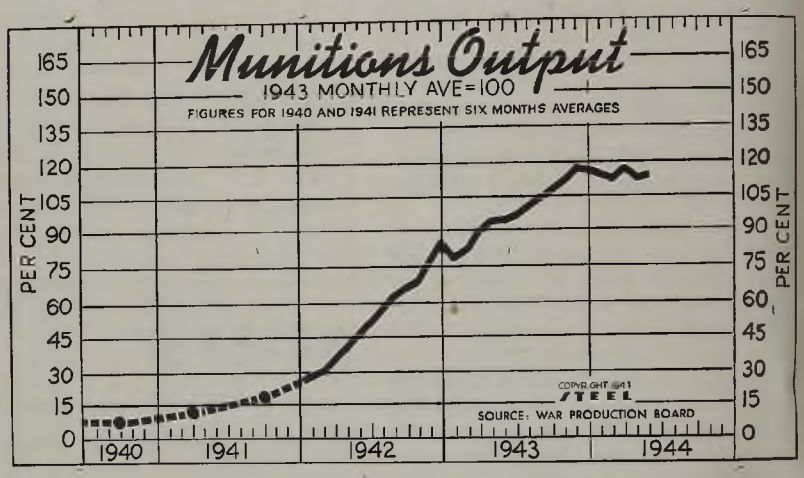
Indicating the production job ahead, Mr. Nelson pointed out that the total size of the munitions program is due to increase some 13 per cent during the next six months.

NAVAL CONSTRUCTION — May was the biggest month in naval construction history. Shipbuilding reached an all-time high of over 400,000 displacement tons, or almost 100,000 over the previous peak of last November, and was 3 per cent ahead of schedule. Total construction by the Maritime Commission, at 1,545,000 deadweight tons, was 3 per cent below April but 1 per cent over the May schedule.

ORDNANCE — Output came through about as planned. Production declined generally, but ran ahead of schedule, except for automotive vehicles and small arms. Urgently needed heavy artillery (over 105-millimeter) ran 26 per cent over April production as scheduled. All types of big guns shared in the gains—not one fell short of the goal. The amphibious truck output was again on schedule. Communications and electronic equipment dipped 2 per cent below April production and missed the schedule by 5 per cent.

Munitions output for the army, which totaled $1.8 billion in May, must be increased to a monthly rate of $2.2 billion by autumn if the 1944 requirements are to be met, the War Department has notified WPB.

WPB's MUNITIONS INDEX—On the revised basis, munitions output rose 1 per cent during May to 114, comparing with the high this year of 117 recorded during March and peak of 118 registered in November last year. The new index is made up by weighting output data of over 3500 separate munitions items by a fixed list of unit prices, generally those of August, 1943.



War Production Board's Munitions Index
(1943 Monthly Average = 100)

Month	1940	1941	1942	1943	1944
January	–	–	29	78	114
February	–	–	31	82	112
March	–	–	36	90	117
April	–	–	42	95	113
May	–	–	47	95	†114
June	–	–	52	97	
July	–	–	58	101	
August	–	–	64	105	
September	–7*	–18*	67	108	
October	–	–	69	113	
November	–	–	76	118	
December	–	–	84	117	

*6-Month average. †Preliminary.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96.0	97.5	98.5	92.0
Electric Power Distributed (million kilowatt hours)	4,300†	4,325	4,144	4,111
Bituminous Coal Production (daily av.—1000 tons)	2,000	2,047	2,088	768
Petroleum Production (daily av.—1000 bbls.)	4,590†	4,583	4,523	4,008
Construction Volume (ENR—unit $1,000,000)	$34.5	$28.0	$23.2	$60.1
Automobile and Truck Output (Ward's—number units)	19,335	19,385	16,950	18,645

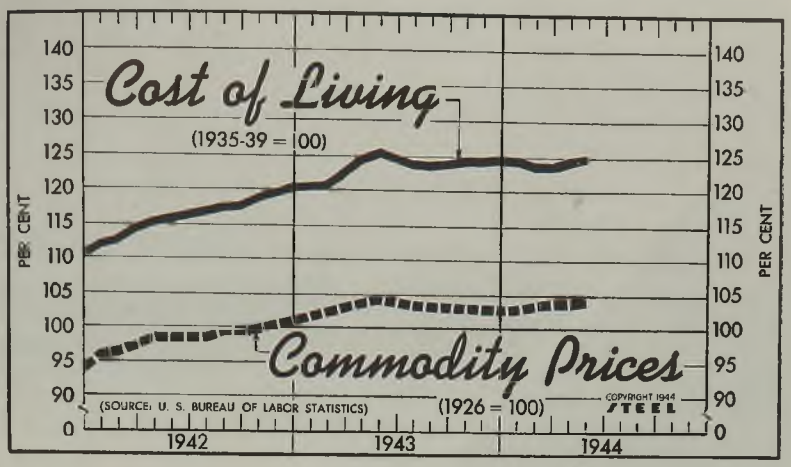
*Dates on request.

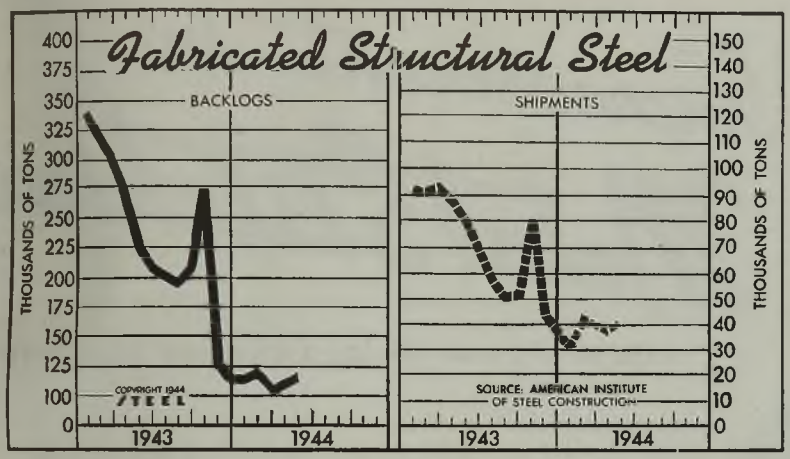
TRADE				
Freight Carloadings (unit—1000 cars)	885†	881	811	852
Business Failures (Dun & Bradstreet, number)	36	25	22	66
Money in Circulation (in millions of dollars)‡	$22,421	$22,293	$22,112	$17,420
Department Store Sales (change from like week a year ago)‡	+3%	+2%	+15%	+28%

†Preliminary. ‡Federal Reserve Board.

Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926 = 100)			—Living Costs— (1935-39 = 100)		
	1944	1943	1942	1944	1943	1942
Jan.	103.3	101.9	96.0	124.2	120.6	112.0
Feb.	103.6	102.5	96.7	123.8	120.9	112.9
Mar.	103.8	103.4	97.6	123.8	122.8	114.3
Apr.	103.9	103.7	98.7	124.5	124.1	115.1
May	104.0	104.1	98.8	125.0	125.1	116.0
June	....	103.8	98.6	....	124.8	116.4
July	....	103.2	98.7	....	123.8	117.0
Aug.	....	103.1	99.2	....	123.2	117.5
Sept.	....	103.1	99.6	....	123.9	117.8
Oct.	....	103.0	100.0	....	124.4	119.0
Nov.	....	102.9	100.3	....	124.1	119.8
Dec.	....	103.2	101.0	....	124.4	120.4
Ave.	....	103.2	98.8	....	123.5	116.5





Fabricated Structural Steel

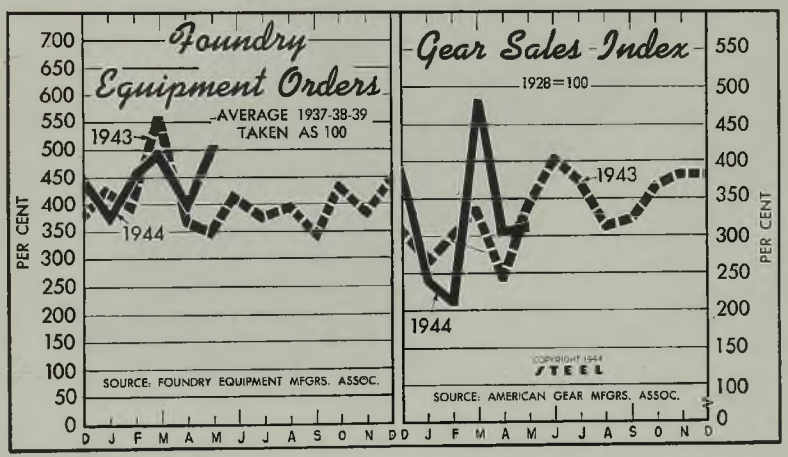
(1000 tons)

	—Shipments—			—Backlogs—		
	1944	1943	1942	1944	1943	1942
Jan.	33.9	91.9	167.8	113.1	339.1	704.4
Feb.	41.5	90.8	164.6	117.6	321.0	706.7
Mar.	39.9	94.0	191.3	106.3	299.8	777.7
Apr.	39.0	86.6	187.2	111.2	272.5	772.4
May	40.6	78.9	184.2	116.3	220.6	843.8
June	....	68.4	182.7	.....	207.1	869.8
July	....	56.8	189.9	.....	201.3	808.6
Aug.	....	50.2	173.9	.....	195.6	783.5
Sept.	....	51.8	169.8	.....	208.1	716.0
Oct.	....	80.1	152.9	.....	274.0	617.7
Nov.	....	42.7	130.4	.....	134.6	566.6
Dec.	....	39.6	145.3	.....	113.0	523.5

Source: American Institute of Steel Construction. Figures for 1943 to date cover members' reports only; for other years they are estimates for entire industry.

Foundry Equipment and Gear Sales

	Monthly Average (1937-38-39=100)			—Index— (1928=100)		
	1944	1943	1942	1944	1943	1942
Jan.	378.3	429.8	532.7	246	268	288
Feb.	456.8	399.5	567.9	214	303	353
Mar.	498.4	562.7	1122.4	485	334	455
Apr.	385.7	362.7	1089.3	303	240	378
May	503.9	348.9	653.6	305	342	421
June	.....	413.6	774.0	...	401	373
July	.....	379.4	800.8	...	374	344
Aug.	.....	390.4	510.8	...	312	380
Sept.	.....	346.6	446.4	...	320	351
Oct.	.....	436.6	540.6	...	368	263
Nov.	.....	388.0	338.8	...	387	359
Dec.	.....	442.8	382.5	...	387	300
Avg.	.....	440.3	646.7	....	336	355



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,322	$11,362	$7,491	$8,494
Federal Gross Debt (billions)	$200.2	$190.5	$188.0	$140.8
Bond Volume, NYSE (millions)	$46.2	$53.4	$52.6	$65.1
Stocks Sales, NYSE (thousands)	9,932	8,644	4,393	5,277
Loans and Investments (millions)†	$51,152	$50,405	$50,240	$46,147
United States Government Obligations Held (millions)†	$37,832	$37,259	$37,184	$33,295

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	248.9	249.8	250.8	243.3
Industrial Raw Materials (Bureau of Labor index)‡	113.2	113.1	113.6	114.2
Manufactured Products (Bureau of Labor index)‡	101.1	101.0	101.1	99.7

†1931 = 100; Friday series. ‡1926 = 100.

Improvements in Metal Stitching

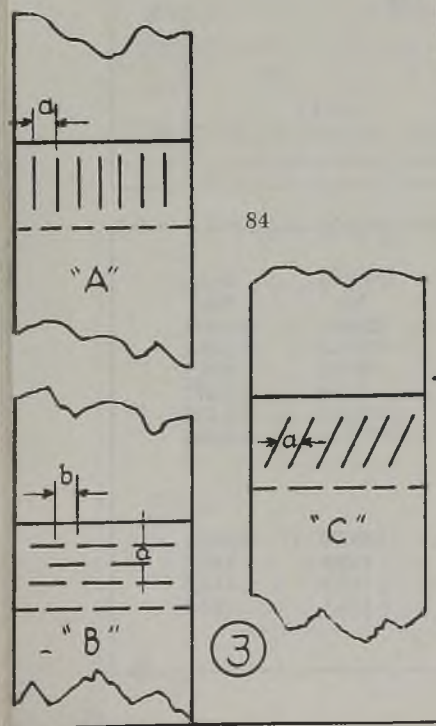
extend its use to load-bearing structures

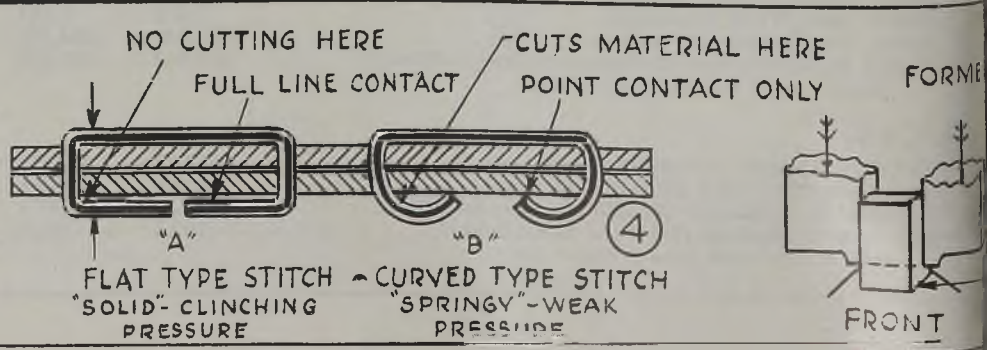
Stitching wire and stitching machines now available no longer limit this comparatively new method of making metal-to-metal joints to use only in non-stressed applications. Already extension of the process to semistressed and lightly loaded structures is a reality.

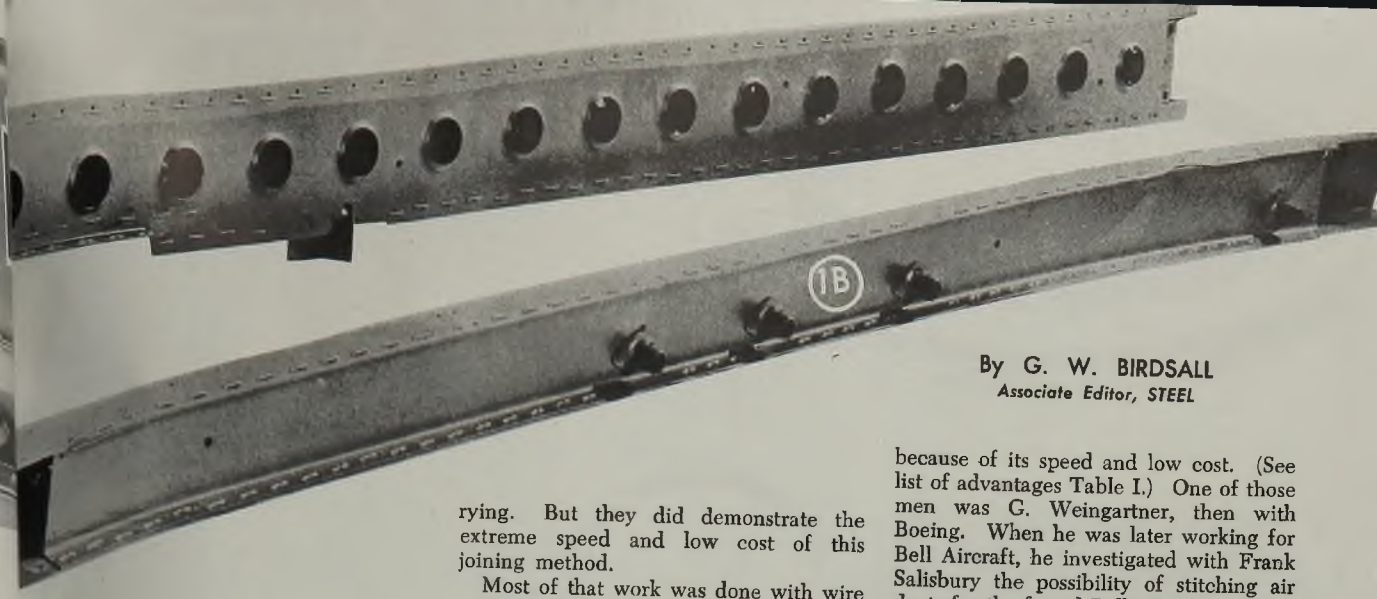
Further important expansion in joining primary structures is predicted because of uniformly high physical properties now obtainable and because of excellent performance shown in service

Fig. 1—Closeup ("A") and overall view ("B") of engine cowl formers made by stitching formed aluminum channels. Approximate length is 60 inches. These are truly structural sections. These parts are undergoing Navy tests for final approval. Curtiss-Wright photo

Fig. 2—Stitched shelf assembly bracket as designed for use in Navy's famous Helldiver dive bomber by Curtiss-Wright Corp., Columbus, O., plant







By G. W. BIRDSALL
Associate Editor, STEEL

STAPLING and stitching have been used for some 50 years for joining paper, fabrics and the like. Perhaps the first stitching of metal (stapling employs preformed fasteners; stitching cuts length of wire from coil and forms each fastener as stitch is made) was assembly of gaskets of sheet metal and nonmetallic materials in 1915.

But it remained for the automobile industry to develop the method and about 8 years ago it came into extensive use in that industry as a means for assembling moldings and other parts as well as fastening sheet metal to such nonmetallics as rubber, asbestos, fabrics, plastics and the like. All these applications were nonstructural, involved no load carrying. But they did demonstrate the extreme speed and low cost of this joining method.

Most of that work was done with wire of 260,000 pounds per square inch tensile strength or less (230,000 p.s.i. was common for some time), which was sufficient to fasten a heavy felt strip to a single thickness of 20-gage low-carbon steel (of about 75,000 pounds per square inch). Approximately 5 years ago, wire became available with the required ductility yet with an increased tensile strength of 290,000 pounds per square inch. This allowed penetration sufficient to stitch felt to 18-gage low-carbon steel sheet. That wire was generally hot tinned after drawing, not particularly with any thought as to its corrosion resistance.

When the aircraft industry was in the throes of getting into mass production 3 or 4 years ago, several men began to think of putting wire stitching to work because of its speed and low cost. (See list of advantages Table I.) One of those men was G. Weingartner, then with Boeing. When he was later working for Bell Aircraft, he investigated with Frank Salisbury the possibility of stitching air ducts for the famed Bell Airacobra. Later Mr. Salisbury went to Wright Field in 1941 to get approval on this application, taking with him J. D. A. Whalen, president of Bostitch Inc., makers of the stitching machines used, and C. W. Meyers, special aviation representative of American Steel & Wire Co., Cleveland, manufacturers of the stitching wire.

Before stitching could be approved, there were several problems that had to be worked out.

"Square" Stitch vs. "Round" Stitch: Up to this time, stitching had been used on applications where little or no structural strength was required and the "round" stitch (see Fig. 4) was entirely satisfactory. However, for maximum strength the stitch must exert a firm clinching pressure. Curved type stitch at B, Fig. 4, holds sheets together by pressure exerted at "points" on the legs of the stitch. Vibration quickly causes "knee" of stitch to dig into metal on curved side, decreasing strength of fastening and allowing "play". This type of stitch simply is not satisfactory for stressed applications, especially where considerable vibration is encountered.

This necessitated use of the "square" or "flat" stitch, shown at A, Fig. 4, and a special machine to make it, for this type of stitch is produced in a different manner. It is designed to have sharp 90-degree angles at all four corners, resulting in a full "line" contact on both sides and avoiding "point" contacts. The square stitch provides positive pressure between the parts joined, the amount of pressure being adjustable over wide limits by varying the clinching action and die pressure during stitching.

This type of stitch has considerable

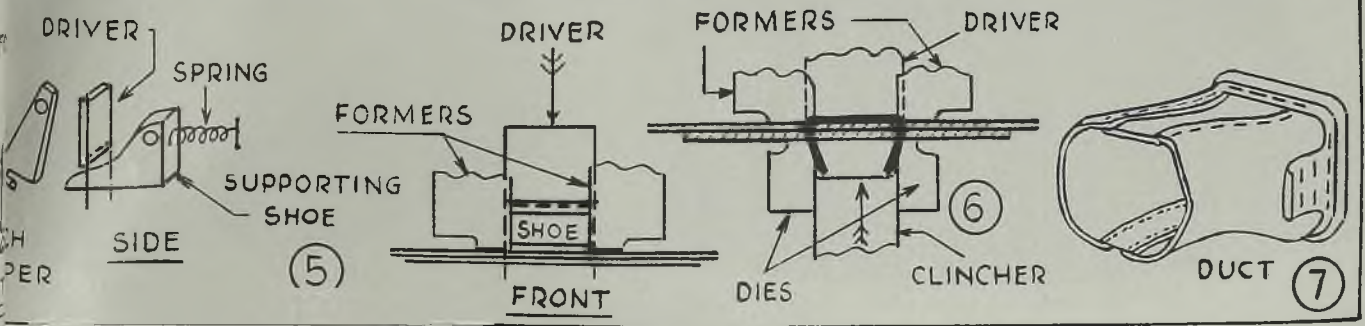
Fig. 3—At "A" is the so-called "vertical" scheme of locating stitches—in direction of shearing stress. This arrangement is used primarily for joining things together, not for strength since this has lowest shear strength of any arrangement. "Horizontal" arrangement at "B" is employed mainly where small flange distance is important; shear strength is greater than vertical stitches. Diagonal arrangement at "C" is strongest, having greater shear strength than either "A" or "B"; is used where maximum strength is wanted

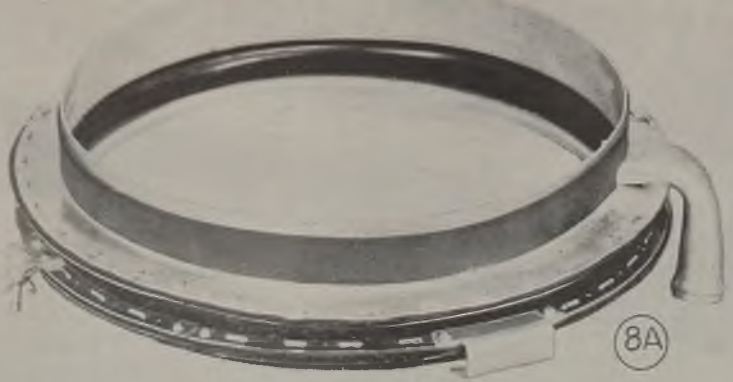
Fig. 4—At "A" is shown square or "flat" type stitch. This type exerts solid clinching pressure, does not cut into metal sheets, provides full line contact entire length of stitch on both sides of work. Curved stitch at "B" provides only point contact, cuts into work at "knee" of curve, thus does not have strength of square type

Fig. 5—Length of wire is formed into stitch by bending legs down. Driving action employs "supporting shoe" with "formers" and "driver." See text for full explanation

Fig. 6—Clinching mechanism is heart of stitcher, for upon its action depends tightness of stitch and its strength. Here driver has punched stitch through the work, and dies below working with clincher are completing stitch

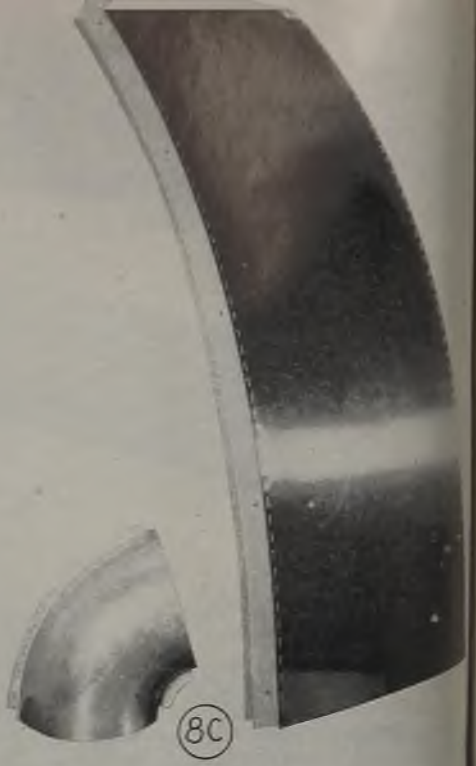
Fig. 7—Portion of sheet metal air duct showing typical design for metal stitching





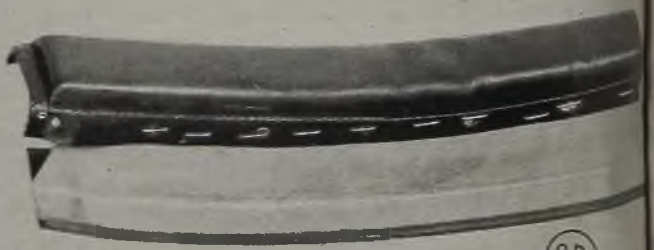
8A

8B

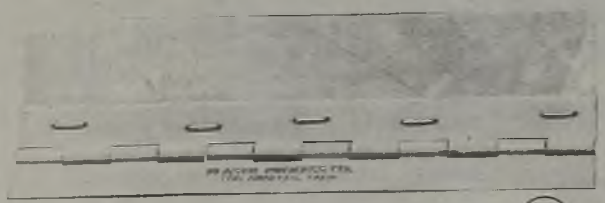


8C

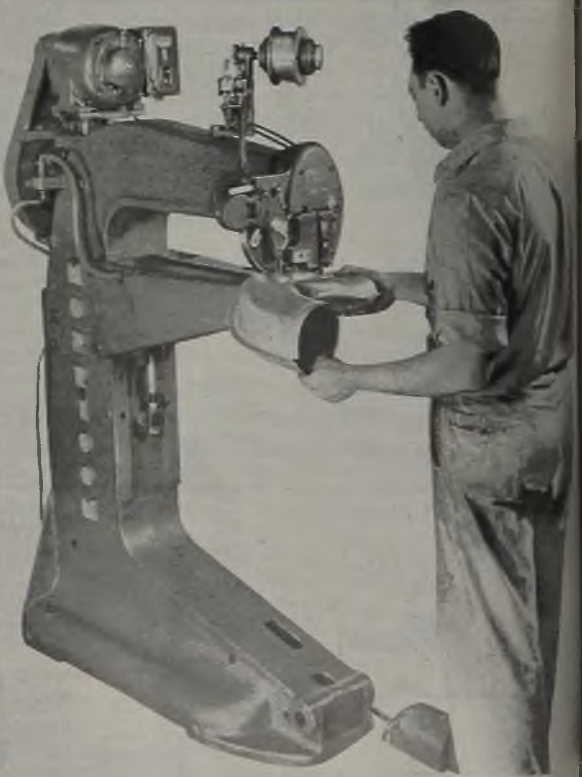
9A

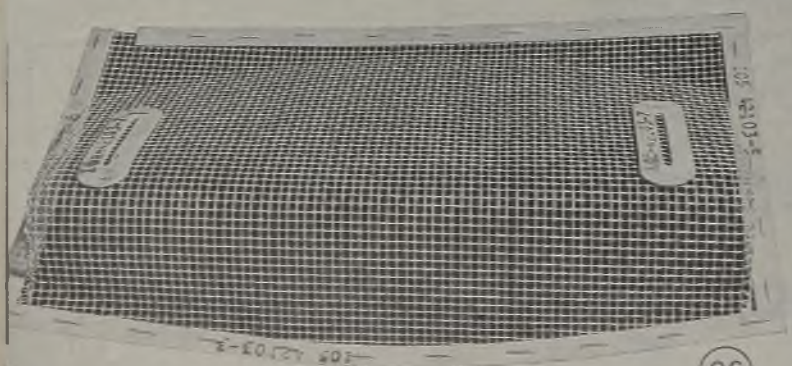


8D



9B





9C

)

structural strength, as has been shown by Wright Field tests described in report No. ENG-51/AD978, Add 2, June 19, 1943, "Tests of Harris-Seybold-Potter Stapled Joints Fabricated From Thin Aluminum Alloy Sheets". Data from this report are presented here in Tables III, IV, V and VI.

Principal problem in adapting machines to produce a square stitch that would meet aircraft requirements was to get sufficient rigidity in the former head arms. (See explanation of stitcher operation page 136.) Also difficulties in holding upper and lower dies in alignment had to be overcome. The answer appeared to be in heavier dies and more power. Machines developed by Bostitch Inc., East Greenwich, R. I., and Seybold Division, Harris-Seybold-Potter Co., Dayton, O., are being used with excellent results in making the "square" or "aircraft" stitch.

Licks Corrosion: Second important problem to be overcome was corrosion. The ordinary tin coating did not have sufficient corrosion resistance, especially where planes are operated in the tropics and exposed to the very worst salt-water corrosion conditions; something better was needed. The answer was found in a specially galvanized wire, now standardized upon for aircraft stitching work.

Engineers of American Steel & Wire set about to provide a wire that not only would have better corrosion resistance

(*Please turn to Page* 132)

TABLE I—STITCHING ADVANTAGES

Extreme Versatility: Joins metal to metal, or metal to fabrics, rubber, wood, asbestos, plastics, etc. without backing strip. Readily produces "sandwiches" of rubber, fabrics, asbestos, etc. between two sheets of metal. Combinations almost unlimited.

High Output: Operator speeds of 80 to 100 stitches per minute are obtainable. Average production increase of 700 per cent reported. Stitches applied as fast as operator can locate work. Machine makes complete stitch in less than ⅕-second.

No Skill Needed: Operator need only locate work, facilitated by clamping work to notched template, notches then being indexed around pin fixed on stitcher. Or optical setup throws spot of light on stitching point to guide operator.

Ample Physical Properties: Stitch has about ⅓ strength of ⅛-inch rivet. Shear and tensile strengths are ample for many structural purposes, as well as non-stressed and lightly loaded joints.

High Fatigue Resistance: Vibration resistance is high, due to tight joint produced by wire making its own hole and by effective clinching action, restricting movement of parts joined. Clean punching action avoids any notch effects that might lead to fatigue failure. No sheet cracking, even under most severe vibration. Stitched joints withstand 100-hour vibration tests.

Good Corrosion Resistance: Improved zinc coating on wire does not spall in forming stitch. Cut ends protected effectively by electrochemical action of adjoining zinc covered surface. Cut ends do not corrode until all zinc on clinched legs has been consumed.

Quick, Easy Setup: Since there are no drilled holes or other items to line up for stitching, clamping and mating of parts to be joined is greatly simplified.

Fast Inspection: Skill and time required for inspection is reduced.

Protect Joined Surfaces: Surfaces joined can be painted before stitching when it is desired to protect them in that manner.

No Cleaning: No preparation of the surfaces to be joined is involved. Elimination of cleaning operations can be great cost saver.

Reduced Clearances: Flange distances can be reduced to ¼-inch on all gages of stock. This may be important, especially on the heavier gages where ⅜-inch is not unusual for two 0.051-inch sheets.

No Distortion: A stitch or row of stitches has no tendency to distort the work, even in thinnest of sheet materials. Nor does it impair the temper of the sheets joined.

Simple Operation: A green workman can become an expert "stitcher" in a few days, as quality of joint is not dependent upon operator's skill. He merely locates work in the machine.

Low Maintenance: Stitching machines are not complicated, have few wearing parts, therefore experience little "down" time for maintenance. Operator's entire time can be devoted to production work.

Economical: Stitching machines have low power requirements, so low in fact that they can be operated almost anywhere off of available circuits without any special wiring. First cost of a stitching machine is only a fraction of that for other machines to do equivalent work by other methods. Stitching setups require much less floor space than usually involved in joining operations. Wire consumption is low, a 5-pound coil making some 10,000 stitches. And the machine can be loaded with another coil in a minute and a half.

Incipient Failures Indicated: An important advantage of a stitch is that it loosens up gradually on overstressing, affording a warning of impending failure. Thus complete and unexpected failures are avoided. Also there is no tendency for a row of stitches to "tear" if a seam separates, as strength of a stitch in tension is 30 to 50 per cent of its normal shear strength.

Disassemble, Re-assemble: A stitch can be removed by bending back the clinched legs several times until they break off, followed by punching or drilling out the remainder. It then is possible to drive another stitch in the same holes.

Disadvantages: These might include: Inability to produce a flush joint, or to handle heavy stock, less accessibility in tight corners and sharp radii, difficulty in producing an airtight seam (now being overcome by use of double seams and fillers). Work on making stitches flush is now in process, Mr. Barbe of Curtiss-Wright informs us.

Fig. 8—These show first types of stitching applications—joining nonmetallics to metals and in nonstressed metal-to-metal joints: "A"—Dural air duct assembly with Neoprene bellows; "B"—parking harness at left involves 0.025-inch Alclad and two thicknesses of canvas, made in 2.7 minutes by stitching against 30 minutes previous method; heating system gasket at right in "B" needs only 2 minutes when stitched, formerly required 8.5 minutes; "C"—left is stove pipe section for aircraft heating system, right shows heating duct made by stitching Panelyte to Alclad channels; "D"—rubber air seal for bulkheads formerly required prepunching, aligning and application of fastener. Now two large aircraft manufacturers have standardized on stitching for this job. "A" and "D" Bostitch photos, "B" and "C" Curtiss-Wright photos

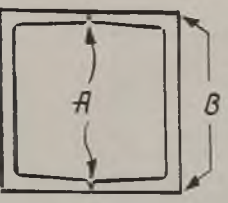
Fig. 9—North American Aviation finds wire stitching more satisfactory than other methods for attaching phenolic fiber cover doors to aluminum alloy hinges as shown at "A". The attaching of aluminum doors to plastic hinges as at "B" is likewise another lightly loaded structural application, Bostitch photo: North American also finds stitching excellent for attaching reinforcing framework to wire screen in making air intake screens for the P-51 Mustang fighter, as shown at "C"

Fig. 10—Morrison stitcher assembling heating ducts by stitching outside flanges, a typical application of this joining method

Fig. 11—This Bostitch stitching machine has been equipped with an optical attachment at upper left which throws a spot of light on the work to indicate where the stitch will be made. This greatly facilitates positioning the work, increases output. Lockheed photo

Special Shapes for welding

By W. J. CONLEY
Consulting Engineer
Lincoln Electric Co.
Cleveland



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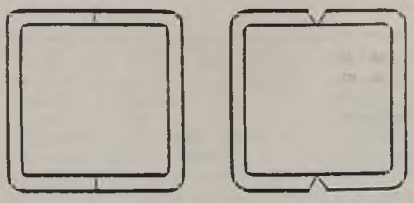

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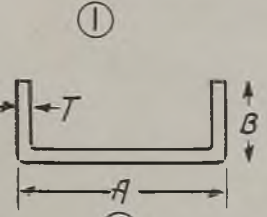
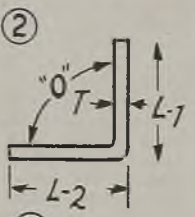


④

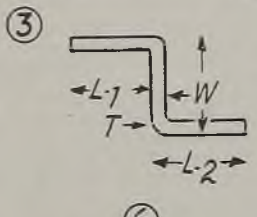
A	B	T
INCHES		
14	6½	½
10	5	½
9½	4	½
8	3½	7/16
10	3½	⅜
8	3	5/16
6	2	¼



⑤

L-1	L-2	T
INCHES		
5	4	½
5	3½	½
4½	2½	⅜
15	3	3/16
8½	5	3/16

Angle O may be made greater than 90°



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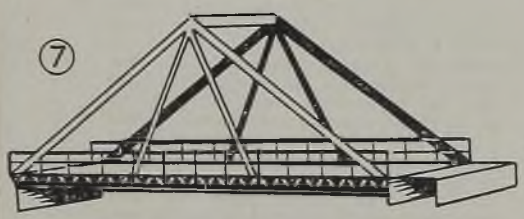
L-1	L-2	W	T
INCHES			
6	6	4	½
5	5	4	⅜
6	4	3	¼



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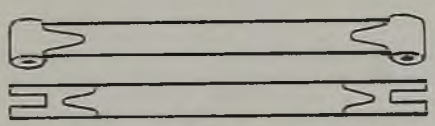

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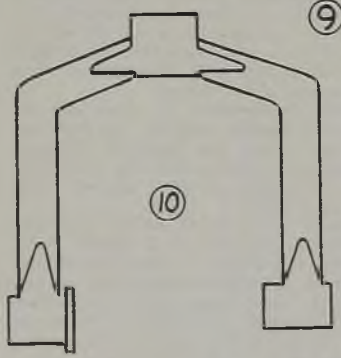

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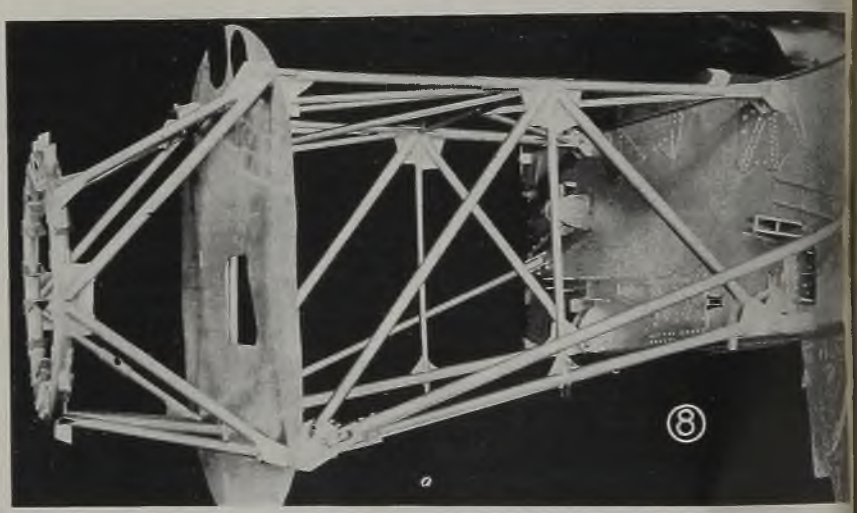

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Fig. 1—Box section formed by welding two structural channels

Fig. 2—Box section of cold formed steel plate

Fig. 3—Box section of hot rolled plate showing joints properly prepared for welding

Fig. 4—Channel section with table of suggested stock sizes

Fig. 5—Angle section with table of suggested stock sizes

Fig. 6—"S" section with table of suggested stock sizes

Fig. 7—Design for welded bridge structure using either standard piping or tubing

⑪

⑫

Production of steel shapes such as sheets and plates, bars, structurals, piping and tubing in forms more readily adaptable for fabrication into assemblies by welding are advocated. Typical range of sizes suggested

esigns

ALTHOUGH arc welding has been widely recognized as a process for improving the design and functional requirements of metal structures, the availability of the most suitable steel shapes used for such fabrication has not kept pace with the progress made in this direction.

This opinion has been confirmed by many leading executives, engineers, designers and production officials in a national survey to determine whether steel shapes, as supplied under normal peacetime conditions, were applicable for the most effective use of material.

Despite the greatly expanded use of arc welding, its advancement has been retarded by the failure to recognize that most of the present structural shapes were designed for conventional methods of construction. They do not permit the utilization of the most simplified methods of fabrication with proper distribution of steel for the resistance of stresses.

When designing for welding, standard materials readily available should be specified whenever practical to facilitate the designing and fabricating of structures for greatest economy and efficiency. Such items are sheet and plate stock, bars, structural shapes, piping and tubing. However, structural shapes and piping were not produced with welding applications in mind.

This is strikingly illustrated in Fig. 1 which is a box section, formed by welding structural channels. The fillets at "A" are curved in the wrong direction, not allowing best welding technique. The sharp corners at "B" contain material which does not receive uniform stressing, and in addition tends to set up nonuniform stress in the side at some distance from the corners.

Many factors produce similar channel sections by forming steel plate cold to give a cross section like that shown in Fig. 2. This design will perform much better especially for torsion loading. However, for relatively short radii of curvature, especially for heavy plate, cracks that are readily visible or not may form at the outside of the bend, thus a lower limit is placed on the radius of the bend for cold formed shapes.

These cracks then become stress raisers so that the part will not perform with full efficiency. This is accentuated under loadings which produce rapidly repeated or shock stresses. Hot rolled sections from the mill will remedy this defect. At the same time, it would be possible to shape the heavier pieces during the hot forming, so that they would have joint edges properly prepared for welding as shown in Fig. 3.

These same statements will apply for any of the structural shapes.

Despite handicaps, structural shapes are worked into welded designs but it can be readily appreciated that the section with rounded corners, especially rolled edges, will be far superior from the point of view of performance under load. This will allow a further reduction in weight of structures, due to better stress distribution, thus making it possible to efficiently stress a maximum of a given cross section.

Designers could be easily educated to use a series of stock sizes, if they were available, such as suggested in Figs. 4, 5 and 6, with accompanying tables. Shapes having square edges and rolled to form a natural bevel, when fitted together will eliminate the cost of edge preparation and facilitate welding to allow lower costs.

Fig. 4 shows a channel section, the accompanying table containing suggested stock sizes. Fig. 5 gives the same setup for angles. The third series of sections, Fig. 6, would find many useful applications for structures, such as machine bases. With the legs vertical, such a section could be used in making the transition from one width to another, or with one leg vertical and on the outside, an oil pan will be formed.

Piping lends itself readily to welding design but is not essentially made for this application. The walls are relative-

(*Please turn to Page* 130)

Fig. 8—Airplane engine mount of welded design

Fig. 9—Two examples of connection design utilizing tubing

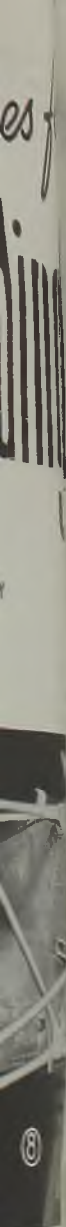
Fig. 10—Example of adaptability of tubing shapes in assembly for aeronautical design

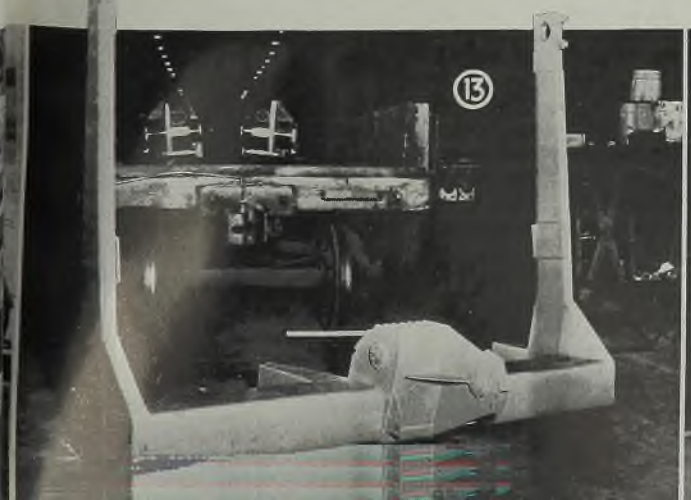
Fig. 11—Welded two-wheel scraper showing construction details of frame and drawbar

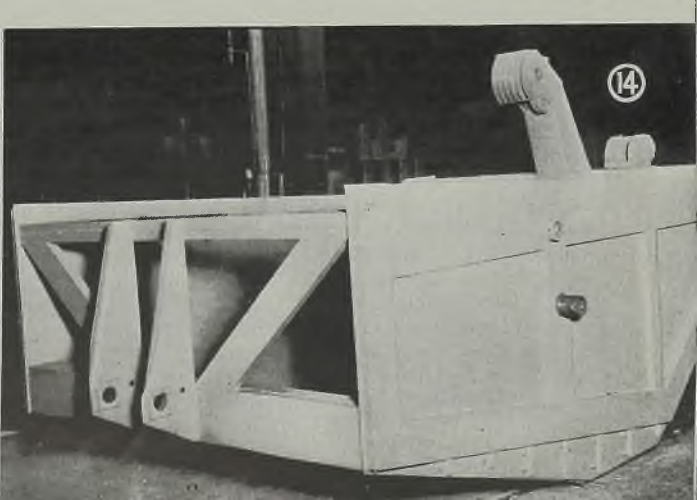
Fig. 12—Earth moving scraper of four-wheel welded design

Fig. 13—Welded rear truck assembly of four-wheel scraper

Fig. 14—Main body of scraper, showing standard hot rolled channel construction, as contrasted to cold bent plate fabrication







New Process for CORROSION-PROOFING STEEL SHEETS

Thermo-chemical treatment for mild steel sheet or strip stock held capable of giving protection against corrosion for protracted periods in storage or during processing. Material coated may be drawn, spun or shaped without harming surface

By O. E. BROWN

WHENEVER a product is designed to be made of steel, the manufacturer is confronted with the problem of rusting. Precautions must be taken not only with the finished product, but also with the raw stock and the parts in process of being manufactured. The processes to eliminate rust and corrosion during storage and fabrication will involve at least two of the following: Degreasing, washing, pickling, rinsing, sandblasting, regreasing, painting, dip-coating and electroplating. Even though these operations are mainly preventive, they naturally increase both time to produce and cost of finished article.

A partial solution to the problem of corrosion resulted from the widespread adaptation of the material called "stainless" steel. In its various grades and types, this material practically eliminates difficulties arising from room-temperature corrosion during manufacture. But due to cost and, to a greater extent, limited availability, general use of stainless steels is not always possible. Therefore, it is with considerable interest that the engineer and manufacturer approach the new corrosion-resistant treatments for carbon steel.

When first brought to the attention of the Vega Aircraft Corp., Permyron—a coating produced by process developed at Permyron Laboratories, Rockefeller Center, New York — aroused the usual engineering questions.

Today such examination generally proceeds along lines as follows: 1—What is it? 2—How does its corrosion resistance compare with stainless steel and with the current protective finishes? 3—How workable is the metal? 4—How adaptable is it to assembly operations? 5—What does it cost? 6—Is it available?

It was with the idea of obtaining the answers that a series of tests were run in the engineering laboratories of Vega. Results are summarized here:

Nature of Coating: It is a protective surfacing which may be applied to carbon and low-alloy steels. It has a black, lustrous appearance not unlike that given by the various patented oxide treatments. While Permyron is inorganic in character, its corrosion resistance is of a higher order than that offered by either oxide or phosphate-treated surfaces. Neither grease nor rust-inhibiting oil is needed in conjunction with it in order to realize full corrosion protection. The material tested had a very thin film of wax which was applied for the purpose of facilitating drawing operations.

This finish is obtained by a process the details of which cannot be exposed during the war. It can be stated, however, application does require a chemically clean surface which is treated hot under controlled conditions. The heat employed is not enough to temper and soften cold-rolled or other work-hardened steel. Since the surfacing is applied to any low or medium-carbon steel, it can be used on sheet, strip, bar or other raw stock. It is also adaptable to castings or forgings within certain limits. In the latter applications, it should be used as a final protective coating rather than during manufacture. Since it is in protecting sheet and strip that the most interesting possibilities appear, it is this type of application which is stressed in the present article.

Corrosion Resistance Compared: In order to get a comparison rating of corrosion resistance, tests were run using samples of SAE-1010 steel sheet with the finish, and other pieces of the same 1010 sheet given the various types of oxide and phosphate treatments now widely used for corrosion protection. Certain of the tests were also applied to stainless steel of the 18-8 (nonstabilized) variety as indicated in the data.

Since information was desired on the reaction of the finish to processes used in the manufacturing of airplanes, some of the tests were improvised and are of value on a comparative basis. The results of these corrosion tests are as follows:

1—*Salt Spray:* Two hundred fifty hours of salt spray had no effect. It was originally the intention to continue the test until rust appeared. When circumstances made it necessary to release the spray cabinet for other work, the test was discontinued a few hours beyond 250.

For this test, some of the panels had raw sheared edges, while others had the edges coated with wax. On the sheared edges some, but not full protection was given by the coating. For the duration of this test it was found rusting of the edges even after 250 hours was slight.

All of the phosphate and oxide coatings began to show rusting as soon as the rust-preventive oil was washed from the surface. Samples of plain cold-rolled sheets, and sheets with oxide or phosphate treatment and no oil, rusted within 5 hours. A coating of zinc chromate primer gave full protection only if unmarred. Stainless steel showed corrosion after approximately 10 hours.

2—*Degreasing and Salt Spray:* After a thorough vapor degreasing, 250 hours of salt spray had no effect on the finish whatsoever.

All other carbon steel samples rusted at approximately 5 hours (See Table). Stainless steel showed corrosion in about 10 hours.

3—*Washing and Salt Spray:* Using a hot soap solution and then salt spray, the results were the same as given under No. 2.

4—*Accelerated Corrosion:* The standard test as given in Specification AN-QQ-H-186, employing a solution of sodium chloride with hydrogen peroxide added, had no effect in three successive periods of 24 hours each. The solution was renewed at the end of each 24 hours. No other finish was run in this test.

5—*Strong Acids:* Mixtures of mineral acids were applied to the surfaces simply for comparison. Nitric, hydrochloric, sulphuric and mixtures of these, both concentrated and in the proportions used for pickling solutions, had the following effects:

A—Phosphate coatings—removed and strong attack began in 4 to 10 seconds.

B—Oxide coatings — removed and strong attack began in 3 to 8 seconds.

C—Zinc chromate primer—attacked and action began on metal in from ½ to 1½ minutes.

D—Stainless steel—etched immediately by some combinations such as nitric-hydrochloric acid, as is generally known.

E—Permyron—unaffected by 10 minutes of most acid mixtures. Sulphuric-hydrochloric mixture lifted the thin wax film which adds luster (and corrosion resistance) to the surface, but beyond this had no effect in 10 minutes.

6—*Alkali Resistance:* While it is true that alkalis do not corrode even bare steel, there is some promotion of rusting in dilute solution. Alkalis do tend to emulsify rust preventive oils and greases used in conjunction with oxide and phosphate treatments. Such action greatly lessens the effectiveness of these protective coatings.

The new finish was untouched by diluted or concentrated alkali solution

to help you

get the most out of STAINLESS STEEL

. . . Your engineers can use this information to take advantage of the high strength-weight ratio, corrosion resistance, wear resistance and permanence of Carpenter Stainless Steel. Of course, all Carpenter Stainless Steels could not be shown on a table of this size, so if you would like more information on the working properties of the various grades—or additional technical data—get in touch with us. Your nearby Carpenter representative will be glad to keep you in close touch with our Metallurgical Department, and supply helpful fabricating data.

TYPE OF PRODUCT	Carpenter Stainless Used and Analysis	Properties Provided by Stainless Grade—for a range of applications	RANGE OF PHYSICAL PROPERTIES*					OTHER RECOMMENDED USES
			TENSILE STRENGTH lbs. per sq. inch MAX./MIN.	HARDNESS MAX./MIN.	SPECIFIC GRAVITY	SCALING TEMPERATURE (Max. for continuous service)	IS IT MAGNETIC?	
SCREWS BOLTS RIVETS	**No. 1** (Type 410) C. .10 Cr. 13.00	This stainless provides fair machining and good cold heading properties. It contains just enough chromium to yield truly "stainless" properties. It resists the corrosive effects of fresh water, gasoline, crude oil, alcohol, ammonia, etc.	190,000 / 80,000	Brinell 387 / 179	7.78	1200° F	Yes	Carpenter Stainless No. 1 is also used for springs, valve trim, pump shafts, and many heat treated parts. Available in forging billets, bars, wire, and strip.
COMBUSTION ENGINE PARTS	**No. 2** (Type 420) C. .30 Cr. 13.00	Where extra hard stainless is needed for wear resistance, this grade is excellent. It is used for tempered parts that must be harder and stronger than parts made from No. 1. Its corrosion-resisting qualities are similar to those of No. 1.	260,000 / 90,000	Rockwell C 52 / 196 Brinell	7.75	1200° F	Yes	Used only in fully hardened condition for surgical and dental instruments, ball bearings, gears, shafts, cams, ball check valves, etc. Available in same forms as Carpenter Stainless No. 1.
CHEMICAL PROCESS EQUIPMENT	**No. 3** (Type 442) C. .15 Cr. 20.00 Cu. 1.00	This stainless is easy to form, bend, blank or punch. In addition to providing corrosion resistance to salt water, practically all organic chemicals and acids, it has excellent heat resistance properties.	125,000 / 90,000	Rockwell C 28 / 187 Brinell	7.69	1600° F	Yes	No. 3 does not become embrittled by grain growth at high temperature — used for scale resisting purposes. Furnace parts, soot blowers, ladles for molten non-ferrous metal, etc. are made from it. Available in bars, forging billets, strip, wire and welded tubing.
OIL FIELD EQUIPMENT	**No. 4** (Type 302) C. .10 Cr. 18.00 Ni. 8.00	This tough and ductile stainless responds easily to deep-drawing, blanking and forging. It has all the corrosion resistance of No. 1 and No. 3, plus resistance to dyes, foodstuffs, most organic chemicals and a wide variety of inorganic chemicals.	225,000 / 85,000	Rockwell C 43 / 160 Brinell	7.93	1600° F	No	Used extensively in form of cold rolled strip for stampings, springs, etc.—and in the form of wire for woven screens, dipping baskets, etc. Available in bars, forging billets, strip and wire.
INSTRUMENT PARTS	**No. 5** (Type 416) C. .10 Cr. 13.50 S. .30	No. 5 machines in automatic screw machines about like SAE 1120. Cutting speeds between 125 and 200 surface feet per minute are common. This stainless resists the corrosive action of mercury, steam, crude oil, sugar solutions, mine water, etc.	164,000 / 80,000	Brinell 351 / 187	7.77	1200° F	Yes	A Free-Machining grade for parts made on automatic screw machines or machined from forgings—such as valve trim, pump shafts, hexagons for nuts, capscrews, and other hexagonal parts. Available in forging billets, bars and wire.
MOLDING and TRIM	**No. 6** (Type 430) C. .10 Cr. 17.00	This stainless is extremely ductile for forming, drawing and stamping and lends itself readily to complicated press work. No. 6 resists the same corrosive elements as Carpenter Stainless No. 1—but with a greater factor of safety.	125,000 / 70,000	Rockwell C 25 / 150 Brinell	7.71	1300° F	Yes	Used in the form of cold rolled strip for making stampings, etc. In the form of cold drawn wire for woven screens, screws, bolts, rivets, and other cold headed products. Available in bars, forging billets, strip and wire.
SCREW MACHINE PARTS	**No. 8** (Type 303) C. .10 Cr. 18.00 Ni. 8.00 Se. .25	When machining is involved, this stainless is generally used instead of No. 4. This type provides the same general corrosion resistance properties, and is Free-Machining.	150,000 / 85,000	Rockwell C 35 / 160 Brinell	7.93	1600° F	No	A Free-Machining grade for use in automatic screw machines or forgings to be machined. Recommended for parts requiring greater corrosion resistance than Carpenter Stainless No. 5. Available in same forms as No. 6.

NOTE: Physical properties depend upon form, heat treatment or cold working. Slightly wider ranges of properties are possible in certain forms. Take up your special problems with our Metallurgical Department.

For further design-engineering and fabricating information, ask for a copy of "Working Data for Carpenter Stainless Steels". This 98-page book is made available to help you select the best Stainless for today's or tomorrow's products. A note on your company letterhead will start your copy on its way. Drop us a line today.

THE CARPENTER STEEL COMPANY • 139 W. BERN ST., READING, PA.

Carpenter **STAINLESS STEELS**

when used in either hot or cold applications.

7—*Weathering:* No corrosion resulted from 250 hours exposure in the Weatherometer. All other samples showed some effect, even the stainless steel being discolored.

8—*Heat:* Heat offers a special problem in corrosion. With coatings which depend upon the action of corrosion-inhibiting oils and greases, the effect of heat is to remove the oil or grease, thereby opening the way to corrosion. The finish will stand temperatures which destroy any organic substance on the surface of steel. When heated to a dull red, a general disintegration of the film takes place, but this leaves a thin coating of modified oxide which still affords a measure of protection against atmospheric corrosion.

Before leaving the subject of corrosion resistance of surfaces, a brief statement must be added concerning certain protective coatings which were omitted from this test. The most important of the omissions are vitreous enameling, electroplating, and both air-drying and baking paints. Since the purpose of the test was to compare materials suitable for the manufacture of airplanes, it was not considered worthwhile to include other materials. Enamel, for the most part is considered too heavy and lacking in formability for aircraft use. Electroplating is generally expensive, and, in addition, would not be permitted in this period of metal shortage. Although paints are most satisfactory for many finished parts, they cannot be applied economically to raw stock, and so leave unsolved the problem of corrosion during processing. However, a final paint finish could still be used as with any of the other types of surfacing.

While not complete, workability tests will serve to indicate what may be expected:

Single Bends—The surface on 0.025 and 0.040-inch sheet was intact after 180 degree bends at 2t radius of bend. However, wiping action during bending, such as given by close-fitting dies, caused rupture of the coating.

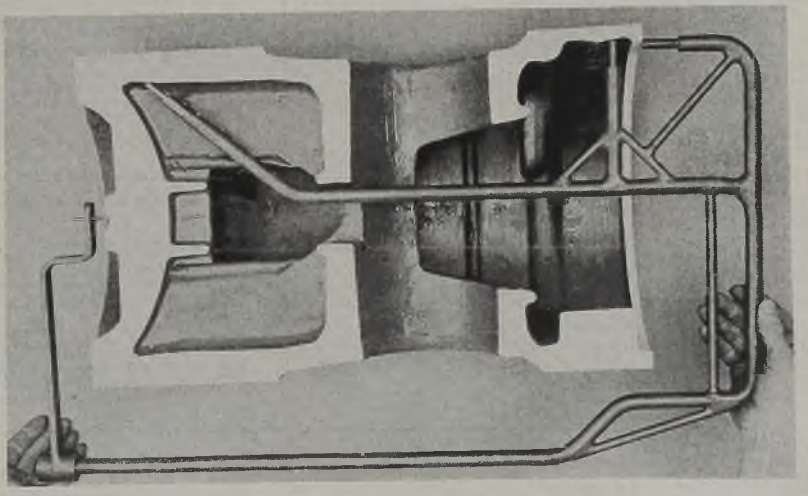
Stretching—In stretching of sheet, the coating peeled off when the metal was elongated 30 per cent in a 2-inch gage length. No evidence of failure was found at 20 per cent elongation. While corrosion tests were not run on elongated sheet, microscopic examination revealed no break in the surface at 20 per cent elongation, and it is felt that this can be recommended as an upper limit.

Adaptability: Coating a piece of steel with the new finish does not change the dimensions to an extent which can be measured with a micrometer. With such a thin coating, the question of handling care arises. The answer is that resistance to scratching is a function of the base metal hardness, since this resistance is not appreciably lessened by the coating. It follows that there is no problem in drilling, reaming, blanking or shearing.

Welding: Spot welding through Permyron can be done, but results are uncertain and cannot be recommended. In most cases the voltage needed to penetrate the film will be far too much for a good weld. Arc or gas welding are inefficient for this purpose, since the coating must first be fluxed off. If welding must be employed, the surface treatment should follow, not precede, this operation.

Cost: Cost per square foot depends on the quantity to be treated, the gage, size of individual pieces, and other factors, including type of treatment required. Present cost compares very favorably with other protective steel treatments.

Types: Sponsors of the treatment state that the process lends itself to variations within certain limits so as to produce results best suited for particular requirements as to the properties of the product. Samples tested were produced for obtaining a reasonable compromise between corrosion resistance, wear resistance, ductility, and cost. Any of the technical properties may be enhanced at the expense of some other property or of costs. Also a still higher corrosion resistance than shown by the described tests may be obtained if so desired and higher costs permit.



Jig Insures Uniform Piston Wall Thicknesses

A SIMPLE JIG which overcomes the problem of producing engine pistons with consistently uniform wall thicknesses won the first prize award for John V. Shaffer, a machinist in Cooper-Bessemer Corp.'s monthly suggestion contest at Mount Vernon, O.

The jig enables a lathe operator to save considerable machining time and to produce a piston with an outside diameter that is concentric with the inside core. The tool was constructed of several pieces of tubing welded together in the form shown in the accompanying illustration. The end of the jig is inserted through the narrow opening at the bottom of the piston core so that it contacts the wall inside the cored chamber. By revolving the jig around the outside circumference of the piston, and inscribing marks at intervals on the outside surface by means of a sharp pin in the outside end of the jig, the true center of the casting is designated at the point where the inscribed lines intersect.

The jig is being used in the production of all trunk pistons included in the company's line of diesel and gas engines.

Cable Splicing Sleeve Saves 250 Hours Weekly

The Glenn L. Martin Co., Baltimore, is saving more than 250 hours per week by using a cable splicing sleeve in its plant to replace the old method of hand splicing and wrapping. In addition to the time-saving feature, inexperienced workers can now perform operations which formerly required skilled men.

The copper sleeves are oval-shaped to accommodate a double thickness of required diameter cable, and can be used for splicing two cables together or for forming an eye loop in the end of a cable. The latter application is used most generally. The sleeves are not used on control cables where swaged fittings now are used almost universally.

The cable is fed through the sleeve, looped around the thimble and back through the sleeve in the other direction. Two different types of tools are used for crimping the sleeve—one a hand-operated tool similar in principle to a pair of pliers, and the other a set of dies operated by a foot lever. The interior of the sleeve is coated with a brittle metal which breaks up under the crimping action and bites into the cable forming a tight bond. Tests have shown that the splice is stronger than the cable itself and the cable breaks before it slips in the sleeve.

Another advantage of the new sleeve is the saving in cable inasmuch as the cable is cut exactly to length and there is no scrap.

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Shapes Parts for Aircraft

. . . . at new speed and economy by unusual method

LONG A PIONEER in construction of lighter-than-air ships, Goodyear Aircraft Corp. has had extensive experience in working with aluminum.

Company engineers, cognizant of the set which is obtained by combining stretching and bending, developed a method called Roto Stretching, said to form aircraft parts at a speed and economy never attained before. It is a development of J. S. Nielson, manager of experimental tools and equipment, and C. B. Mitchella, supervisor of experimental tool and equipment design.

Eliminating costly handwork required by other methods, parts are formed without wrinkles. First installation at Goodyear is reported to have paid for its development and cost in a single week.

Strips, extrusions and bent-up sections of any cross-sectional configuration are formed into smooth contours of predetermined shape by stretching the stock material and at the same time winding it around a forming die. See accompanying illustrations.

In the setup, a base mounts a revolving table and hydraulic cylinder. To this cylinder is attached a continuous chain between a sprocket secured to the turntable and an idler sprocket. As the table rotates, this cylinder moves forward or away from the turntable, de-

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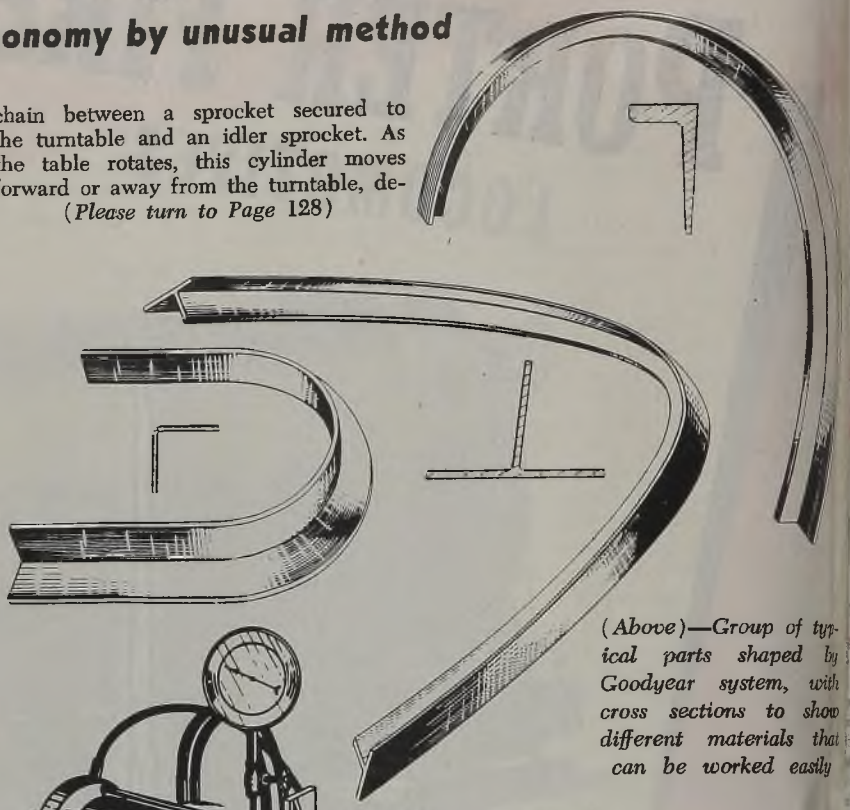
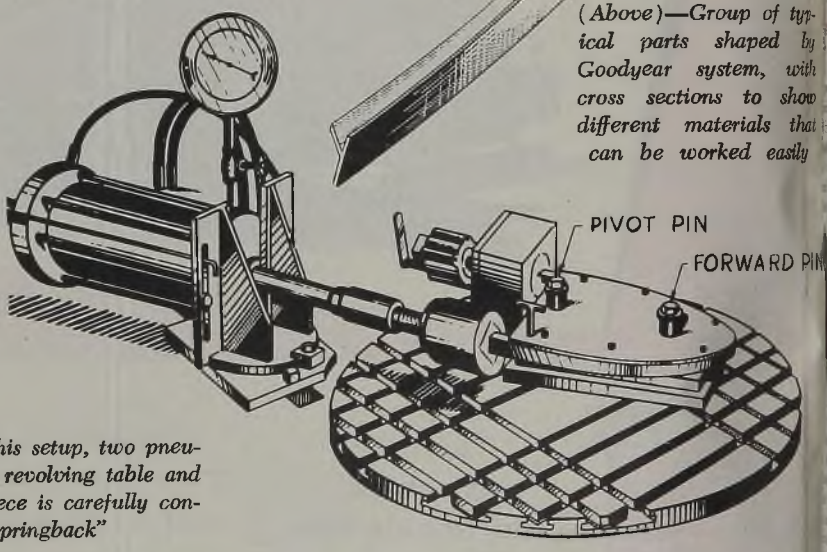
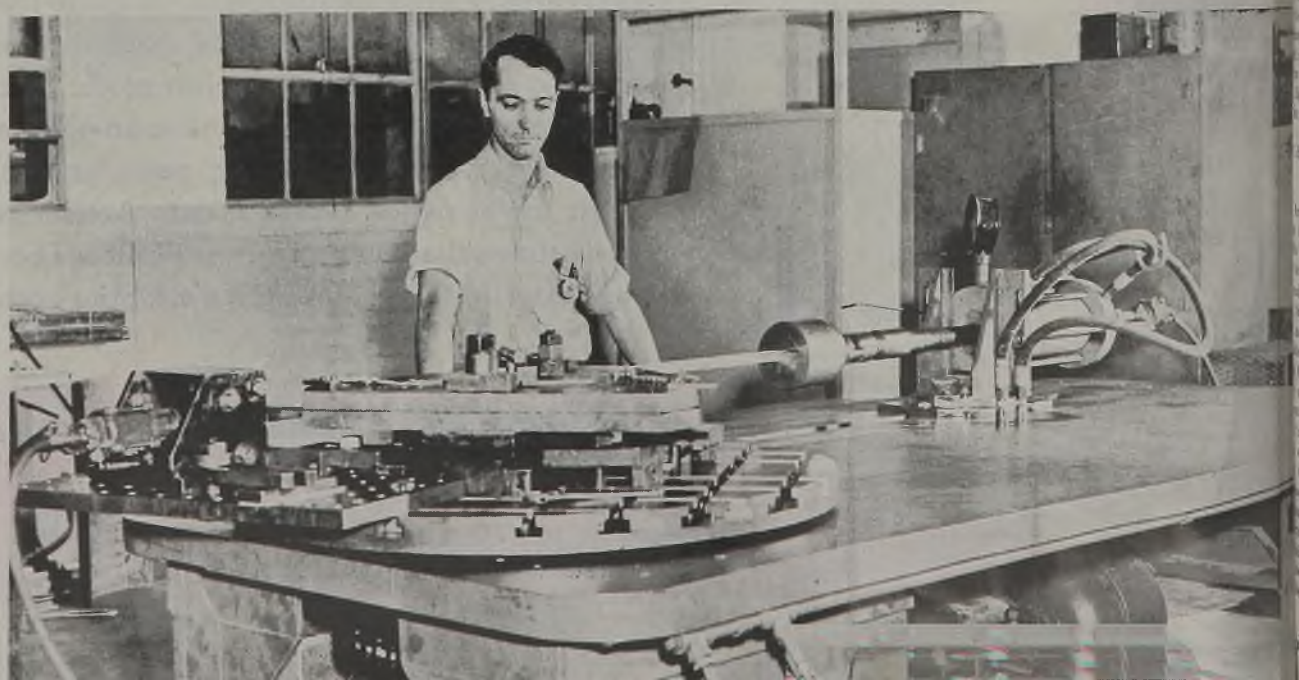


(*Above*)—*Group of typical parts shaped by Goodyear system, with cross sections to show different materials that can be worked easily*



(*Right*)—*Schematic diagram showing arrangement of work in a typical setup on the revolving table with pneumatic cylinder to "stretch" the material around the form block*

(*Below*)—*View of actual operation. In this setup, two pneumatic cylinders are employed, one on the revolving table and the second stationary. Tension in work piece is carefully controlled to reduce or eliminate "springback"*



ALIEN PATENTS

Available to Industry

STEEL is presenting a list of enemy patents of interest to the metalworking industries. Many of these are available on a nonexclusive royalty-free basis under simple licensing terms. Copies of any patents listed may be obtained by addressing the Commissioner of Patents, United States Patent Office, Washington 25. Include 10 cents for each patent, specifying serial number.

These patents are classified by types of operation, such as metal founding, metalworking, metal rolling, metal bending, metallurgy, metal treatment, metal forging and welding and the like. Included are enemy patents, patents pending and patents in enemy-occupied countries.

CLASS NO. 29—METALWORKING

LIST OF ENEMY PATENTS

DESCRIPTION	PATENT NO.
Portable work bench	1901790
Apparatus for briquetting metal shavings	2118205
Cold working metal bar	2233869
Method of forming projectiles	1895207
Method for the production of flap sliding buckles	1795559
Apparatus for regenerating bulky waste metal	1647871
Method of and apparatus for disintegrating bulky scrap metal	1665806
Apparatus for the utilization and treatment of hard-to-manage waste material	1687886
Method of manufacturing forged pressed or rolled work pieces especially crank shafts	1994863
Goldbeaters foil	1621502
Means for separating adhering rolled metal sheets	1749075
Means for separating adhering rolled metal sheets	1923264
Method for manufacturing metal sheets and strips	1701889
Process for rolling out sheet and hoop or band iron	1792377
Method of making plaquets for spectacles or eye glasses	2065098
Apparatus for trimming and grooving electrotype plates and the like	1947843
Drilling and riveting machine	2216403
Machine for making bolts, screws and the like	1771833
Machine for making indented taper pins	1858414
Combined drilling and milling machine	1915708
Lathe	2249146
Machine for finishing armor plate piercing shell	2018123
Lathe with horizontal faceplate	2135640
Machine for manufacturing pins	1659216
Method and apparatus for manufacturing tin openers	1715812
Method and device for making ribbed tubes with smooth ribs	1775555
Machine for fastening reeds without rivets on the sound plates of reed instruments	1860758
Device for the production and insertion of the wire spirals into the ring sleeves of snap rings	1887885
Machine for manufacturing dry cells	1899114
Automatic machine for producing spring ring casings	1910214
Machine for working wheel roller and like blanks	1924962
Tube drawing apparatus	1936790
Machine for drawing and cutting stock	1970205
Machine for straightening drawing and polishing rods	1976357
Machine for applying wear resistant plating	2190611
Machine for preparing pneumatic tires for retreading	2258378
Machine tool	1922751
Device for coring dividing and condensing ingots of cruciform cross section	2078702
Ingot for press piercing and shaping arrangement therefor	2268472
Multispindle turret lathe	1716532
Turret bearing for automatic multispindle turret lathes	1964213
Multiple spindle turret lathe	2054521
Drilling, milling and like machine	1719238
Multiple spindle automatic screw machine	1870724
Control device for machine tool chucks	2268135
Controlling device for machine tools	2271583
Automatic single spindle turret lathe	2094816
Screw cutting device for automatic lathes	1805998
Screw cutting appliance for lathes	1844191
Automatic turret lathe	2094817
Automatic turret lathe	2235073
Lathe	2124216
Machine tool with reciprocating carriage turret lathe or the like	1915375
Tool holder	1895057
Turret centering and locking mechanism	2135639
Multiple tool holder	2202117
Apparatus for indexing turret heads	1988675
Blank transferring device for machine tools	1737208
Automatic lathe	2042687
Lubrication for screw making and turning lathes	1629451
Screw making and turning machine	1643635
Controlling means for automatic lathes	1853074
Automatic lathe	2028362
Lathe	2113668
Clutch releasing mechanism for automatic lathes	2179744
Lathe	1858754
Device for feeding the guide sleeves for spring rings to the points for working	1856951
Device for feeding bar stock to machine tools	1954964
Stock feed	1636406
Work piece feed for machine tools	1725492
Machine tool	1910574
Machine tool for bar stock	2167308
Speed changing cam driving mechanism	1574786
Automatic control mechanism	1667062
Method of disintegrating or cutting to pieces or demolishing wrecked ships or the like	1615223
High speed friction saw	1640832
Device for removing finger rings	1867342
Pipe cutting appliance	1912058
Sawing apparatus	2079974
Hydraulically operated hacksaw	2182289
Rail machining device	1759325
File with double cut	1725686
File	1884185
Grinding wheel for soft materials	2183082
Tube cleaning device	2165120
Auxiliary device for assembling airships	1651754
Apparatus for assembling knives	1687978
Assembling and repairing flying machines	1740021
Manufacture of internal combustion engines	1743031
Method of manufacture of squirrel cage rotors for electric machines	1762017
Commutator	1907561
Mirror wheel	1912731
Bearing cage	2017772
Method of erecting collapsible gasholders	2105080
Process of assembling packings, linings and the like	2176816
Tongs for removing and putting in place the key rings of typewriting machines and the like	2037223
Stripping press	2096345
Closing band for piston rings	1918426
Device for stressing springs	1890415
Method and apparatus for making lantern wheels for clocks and other purposes	1634906
Method of binding insulated electrical conductors	1748765
Device for inserting the piston pin in the piston and the piston rod	1955048
Apparatus for making embossing cylinders	1945935
Surface treating section metal	2125825
Apparatus for making artificial hartshorn scales for pocketknives	1567739
Process for the mechanical working of metals	1707279
Cutting tool	1756516
Tool	2256847
Elastic holder for cutting off tools and the like	2065966
Tool holder	2078820
Adjustable tool holder	2238675

LIST OF ENEMY PATENTS—(Continued)

DESCRIPTION	PATENT No.
Cutting disk for high speed friction saws	1630945
Metal cutting tool	2053392
Rotary cutting tool	2111887
Milling cutter	1898782
Milling cutter	1676719
Saw	1755717
Method of uniting radioactive material with a metallic carrier	1718899
Method of finishing the ends and fixing ropes	1894389
Method for reducing the extension in wire ropes	1906782
Process for manufacturing machine parts	1945302
Method for manufacturing metallic materials by rotating rolls or wheels containing a molten metal between them	2008626
Method of producing mirror wheels	2042018
Aluminum disk suitable for use in manufacturing circular articles	2156439
Method of working thermally hardenable beryllium containing alloys	2257535
Method of making ferroconcrete reinforcing elements	2260779
Method of making molds	2120881
Method of manufacturing seamless wrought iron annealing boxes	1623059
Method of welding	1834444
Steel vessel and method of producing the same	1860292
Method of reinforcing thin walled metal articles	1886396
Steel vessel and method of producing same	1900988
Conducting wire	1939552
Method for the production of fusion welded hollow bodies	2025922
Process for the manufacture of thin walled light containers	2062910
Method of joining together metal bodies	2115840
Method for the production of hollow bodies closed at one side by punching of four edged blocks	2215943
Production of ball races and the like	1971083
Bearing and method of making same	2170039
Method of making bushings	2177584
Method of making copper lead bearings	2212473
Method of making bearing bushings	2230637
Method of making piles	1689678
Method of producing clamping plates	1735776
Method of making double boomed sheet pile	1988864
Method of making sheet metal piling	2093208
Method of making structural elements of sheet metal	2244847
Method of making control elements for direction finder compensators	1932627
Process for making electrical contacts	2154288
Manufacture of highest pressure conduits	1685402
Process for the manufacture of rings and especially of wheel tires	1956618
Method of producing seamless drawn tubes and other tubular articles	2002415
Production of preliminarily shaped annular blanks	2058007
Machining of engine cylinder liners	2118317
Method of manufacturing piston rings	1666343
Method of manufacturing metallic rings for packing purposes	1705643
Method of manufacturing piston rings	1849467
Manufacturing method of the piston ring operative on every part of the cylinder with balanced compression	2171831
Method of making valves for explosion engines	1904430
Method of fixing turbine blades in place	2038670
Method of shaping hollow bodies	1941094
Method of making valve bodies	2122957
Undulated tube and method of making the same	1918417
Heat exchanger and method of making same	2151540
Process for connecting pipes	2077641
Pressing vehicle wheel	2042754
Disk wheel and process of producing the same	2050641
Method of coring dividing and condensing ingots of cruciform cross section	2115893
Method for the manufacturing of snappers for snap rings	1682074
Process for working guide sleeves for spring rings	1856952
Method of producing perforated metal sheets	2169937
Method of producing holes in thin sheets of metal or glass	2266349
Wear resistant plating	2190125
Process for the production of iron sleepers	2061861
Method of making spinning bobbins	1848786
Method of manufacturing bobbins particularly film bobbins	2006281
Process for fabricating metal bobbins for automatic looms	2052773
Flat spring and method of making the same	2002399
Method of making splined shafts	2110275
Material of construction for aircraft	1591474
Enameled ware	2109487
Compound metal stock	1904241
Corrosion resistant age hardenable aluminum composite metal	1927945
Coated aluminum product	2106259
Veneer plate of aluminum alloy	2208186
Centrifugal cast iron pipe	2016674
Method of manufacturing composite materials and shaped bodies thereof	2148040
Method of plating metals	2267665
Method of applying a plating of aluminum to iron and steel sheets and bands	1667787
Method of plating metals with aluminum	1679308
Process for preparing maleic anhydride and maleic acid	1956482
Process for the production of aluminum plated zinc sheet	1985784
Method of plating iron with aluminum and product of such method	1991994
Method of welding	2064684
Composite structural product and method of making the same	2096924
Cinematograph or like projection surface and method of making same	2177573
Production of plated sheets etc.	2199321
Process of shaping metals	2088523
Multiple spindle machine tool	1797729
Device for cutting punching and drilling section iron	1988551
Apparatus for continuous machining of work pieces and particularly in housings for axial bearings of rear vehicles	2028001
Multiple spindle automatic lathe	1880681
Feed and traversing motion for lathes	1665158
Method for producing structural members by welding and the structural members obtained thereby	1973591
Sawing or cutting off machine for cutting rods into pieces	1727427
File and rasp	2103491
Process for scaling tubes	2004422
Method and device for grinding cooperating faces of friction members	2318804
Hob	2146232
Milling cutter	1948648
Tool for cutting curved tooth bevel gears	2127779
Method of making shafts, connecting rods and the like	1693838
Method of jointing tubular members	1693839
Coating of bodies with metal	1823869
Method for the production of light metal flasks with thickened neck parts	2130699
Method for sheet metal construction	2264897
Precision bore and method of producing same	1695017
Method of producing bearings	2088389
Porous bushing for bearings and method for making same	2100159
Method of pressing wheel naves and similar articles	1756160
Method of protecting cut surfaces of pieces of wire	2247829
Riveted plated aluminum article	1949112
Method of manufacturing laminated metal bands	1985783

LIST OF PENDING PATENT APPLICATIONS

DESCRIPTION	SER. NO.
Hydraulically operating gears or transmitting devices	238,270
Milling Planar with swingable tool spindle	262,291
Method of manufacturing hollow valves	272,716
Piston rings and method of making same	275,082
Securing the heads to the cylinders of internal combustion engines	275,357
Process and installation for the manufacture of shaped metal products	278,768
Wheels	290,911
Method for repairing roll passes	308,727
Blades for exhaust turbines and the method for the manufacture thereof	314,204
Driving device for machines for the continuous automatic mass production of workpieces	326,822
Metal sawing machines	352,616
Multispindle automatic lathe with feeding spindle-drum and box-shaped, mutually staying upper works	370,078
Multispindle automatic lathe with feeding spindle drum	370,079
Tool with hardmetal cutting edge	376,570
Process for protecting aluminum alloys	377,048
Process for protecting aluminum alloys	377,049
Process of producing metal fibers	377,251
Feeding and clamping device for multispindle automatic lathes for the treatment of rod-shaped material	379,184
Method of manufacturing hollow poppet valves	385,760
Magnetic circuit comprising a laminated coiled core	392,514
Producing thread	394,870
Device for cutting threads sidewise with automatically withdrawing tool	402,042
Block for carrying the tool carriages or tool holders, shiftable on the side faces of the block on one-spindle or multiple spindle turret lathes	409,398
Construction of welded tanks and other structures	430,822
Methods of assembly of tanks and the like	430,823

Making strong the things that make America strong

Toughening a Tractor's Muscle . . . Making a Sewing Machine Hustle

A TRACTOR runs the gamut of stresses and strains as it does its annual chores . . . tilling the soil . . . reaping the harvest . . . powering the equipment that pumps irrigation water, saws the wood, loads the silo . . . and so on. Its bolts and nuts must be tough enough to take punishment from every direction.

A sewing machine hits its rough spots chiefly in its manufacturing stage, where assembly speed can pay extra dividends. Its numerous fastenings must be accurately made to prevent the fumbling get-away and halting run-on which result from mismating or poor threading.

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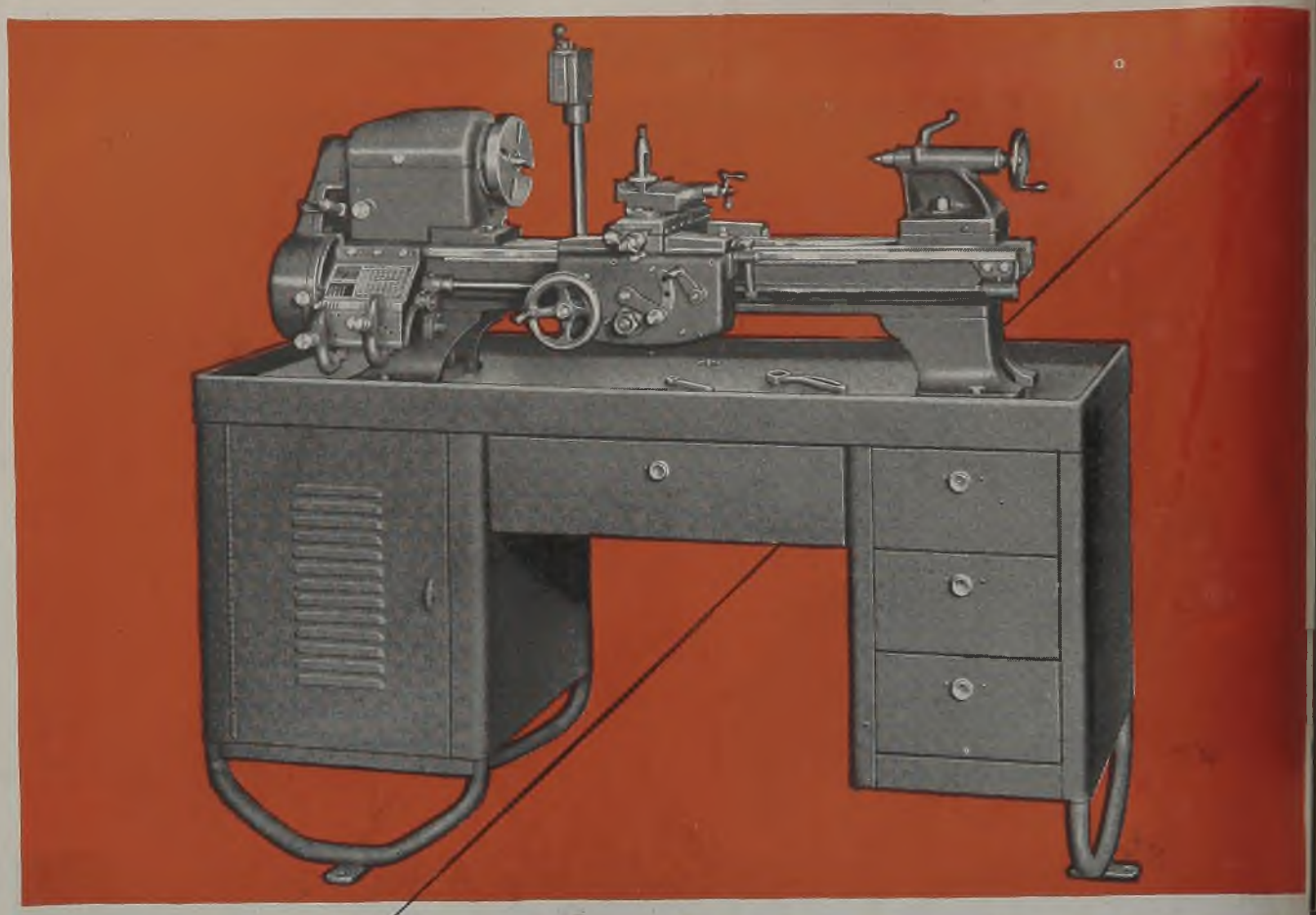

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With Automatic Apron

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UNDERNEATH DRIVE: Completely self contained and enclosed in left compartment of cabinet. For easy side belt changing, the lever (indicated by white arrow) is pulled outward to release flat belt tension. Adjustments of both flat belt and V-belt tensions are easy to reach. Multiple V Belt Drive transmits power from cone pulley to spindle.

BRIEF SPECIFICATIONS: Swing over bed, 10⅛" . . bed length, 43⅛" . . spindle hole, ⅞" . . precision ground ways: 2 prismatic V-ways 1 flat ways . . 12 spindle speeds, 30 to 1450 r.p.m. . . . worm drive from lead screw spindle for power feeds . . . friction clutch on power feeds . . longitudinal feed .0015 to .1000" per spindle revolution . . . cross feed 2/3 times longitudinal feed . . . half nut drive from lead screw for thread cutting . . Threads, 48 selections R.H. or L.H. 4 to 224 per inch . . . self lubricating bronze bearings at 40 separate points.

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CHICAGO 30, ILLINOIS

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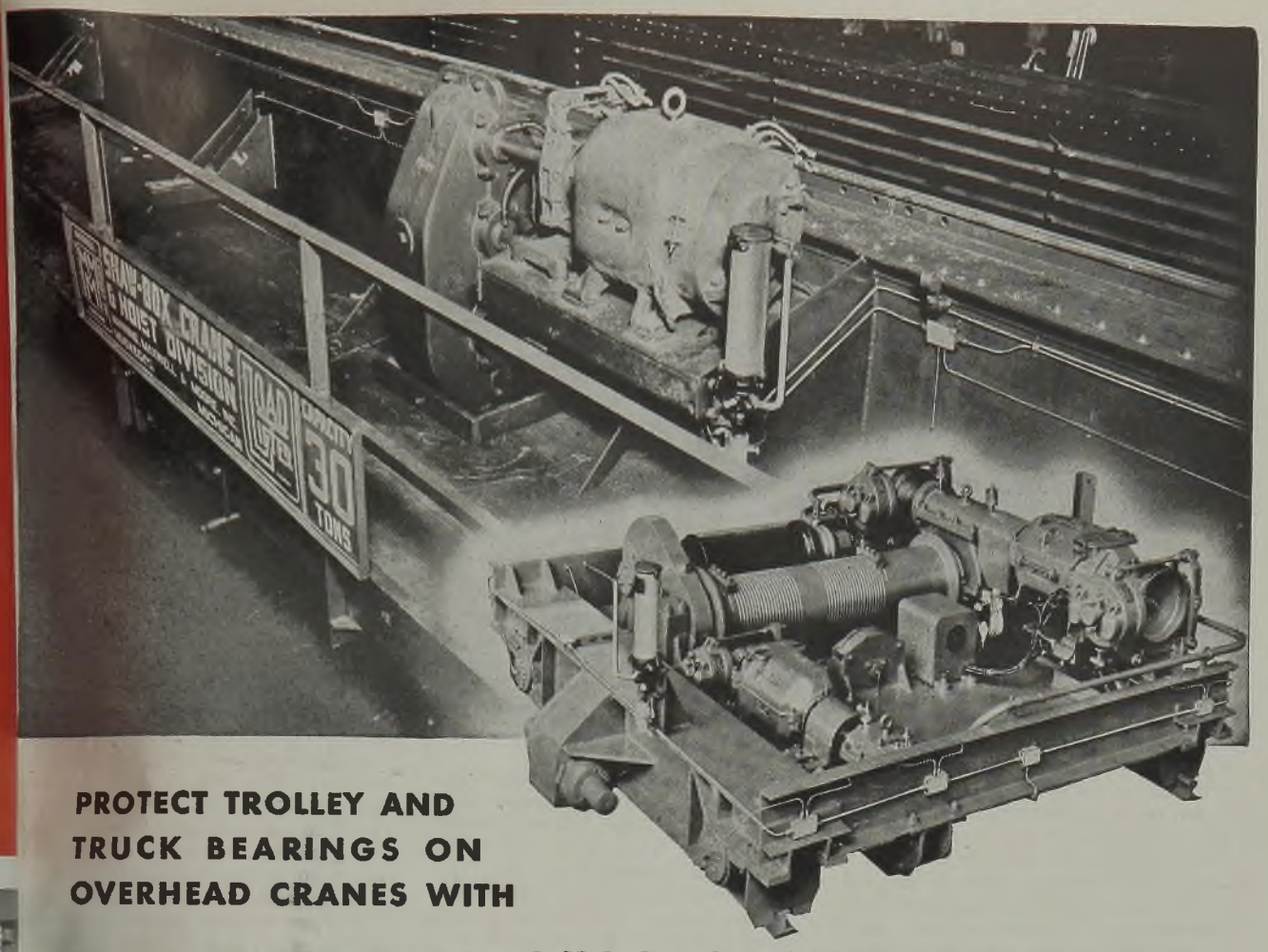

PROTECT TROLLEY AND TRUCK BEARINGS ON OVERHEAD CRANES WITH

TRABON LUBRICATING SYSTEMS

prevent injuries and tie-ups . . . get longer, more dependable bearing life

"Striking the floor with a sickening thud, a crane operator in Buffalo met sudden death a short time ago. He'd been lubricating his crane — a routine operation — slipped and fell — leaving a grief-stricken family — and more than $18,000 compensation charges."

These accidents are unnecessary! That $18,000 would have equipped 8 to 10 cranes with automatic lubrication—and saved the man's life—because Trabon lubrication makes absolutely certain that every connected bearing, whether large or small, moving or stationary, receives just the desired amount of lubricant, *while the machine is running.* Trabon avoids costly downtime while a man crawls around lubricating each bearing individually,— the breakdown if he misses one,— the lost time, and costs, of accidents,— makes the bearings last longer.

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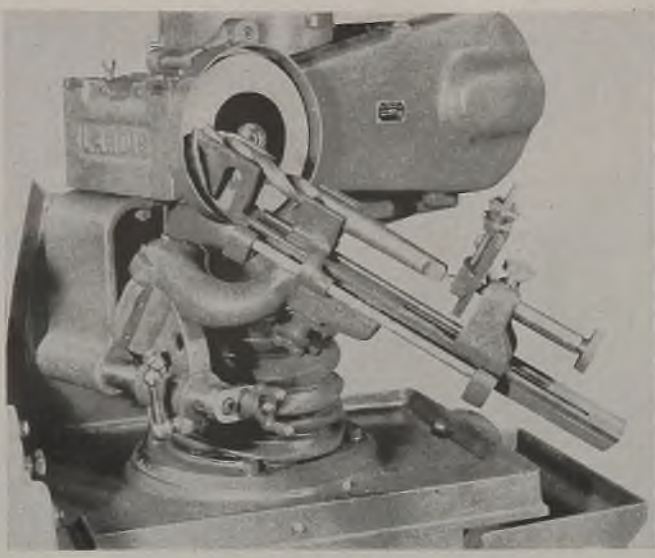
1818 *East* 40*th Street* ◆ *Cleveland, Ohio*

INDUSTRIAL LUBRICATION EXCLUSIVELY SINCE 1922



(Above, left)—Drill grinding attachment which is held in position by two bolts at front of wheel head

(Above, right)—Surface grinder showing simplicity of operation

the way they perform the functions enumerated. And that depends to a large extent on the manufacturing process—the care, skill and experience going into the design and the extent to which the manufacturer can supply the proper grain, grade, shape, size and bond for the particular grinding operation at hand. Contrary to some opinion, there is a vast difference in grinding wheels.

Put in its simplest definition, the modern grinding wheel is a mixture of artificial abrasive grain and a retaining agent known as a bond, pressed, baked, and trued to a desired shape and size. Some wheels are soft; others are hard. Some contain coarse grain; others contain fine grain. Some are made with aluminum oxide grain; others with silicon carbide grain. Some have vitrified bonds; others have resinoid bonds. Some even have shellac, silicate or rubber bonds although the vitrified and resinoid types are most generally employed.

Vitrified Vs. Resinoid Bonds

Both aluminum oxide and silicon carbide are products of the electric furnace. Aluminum oxide is softer than silicon carbide and also is tougher and less brittle. Silicon carbide, being harder, less tough and more brittle than aluminum oxide, is best used on extremely hard, brittle materials. Aluminum oxide, on the other hand, is more efficient when employed on softer, tougher and less brittle materials.

As pointed out previously, vitrified and resinoid bonds are the two predominant bonds in use today and between the two the vitrified type enjoys the more common use. There has been and still is some disagreement among abrasive engineers as to the respective capabilities of these two types when applied to certain operations, particularly to high-speed steel work. In the writer's opinion vitrified wheels are superior to resinoid wheels for such work. Vitrified bonds are ceramic products, looking much like glass or porcelain after being subjected to high temperatures. Vitrified wheels remove stock rapidly, hold their shape well and are not affected by lubricating oils or water. Vitrified wheels, however, generally are limited to wheel speeds under 6500 surface feet per minute. Resinoid bonds, as the name implies are made with synthetic resins and are safely capable of wheel speeds up to 9500 surface feet per minute or over. Coarse grained resinoid wheels are best suited to tasks involving heavy stock removal where finish is relatively unimportant. Resinoid bonds, for instance, are used advantageously in snagging, billet and cutoff wheels although the same type bond, employing a fine grain, can be used for smooth-finish, precision work.

Previously we have referred to the two basic abrasives, aluminum oxide and silicon carbide, and detailed the type of material against which they are most effective. Size of the grain selected is equally if not more important than the type of grain. The wheel user, therefore, should consider the physical properties of the material to be ground, the amount of stock to be removed and the finish required. Normally the practice is to use coarse grain for soft material and heavy stock removal, fine grain for fine finishing and light stock removal and medium grain for hard material and medium stock removal. Extremely coarse grain will run from sizes 8 to 14, coarse grain from 16 to 30, medium grain from 36 to 60, medium fine grain from 70 to 100, fine grain from 120 to 240 and superfine grain from size 280 to 600.

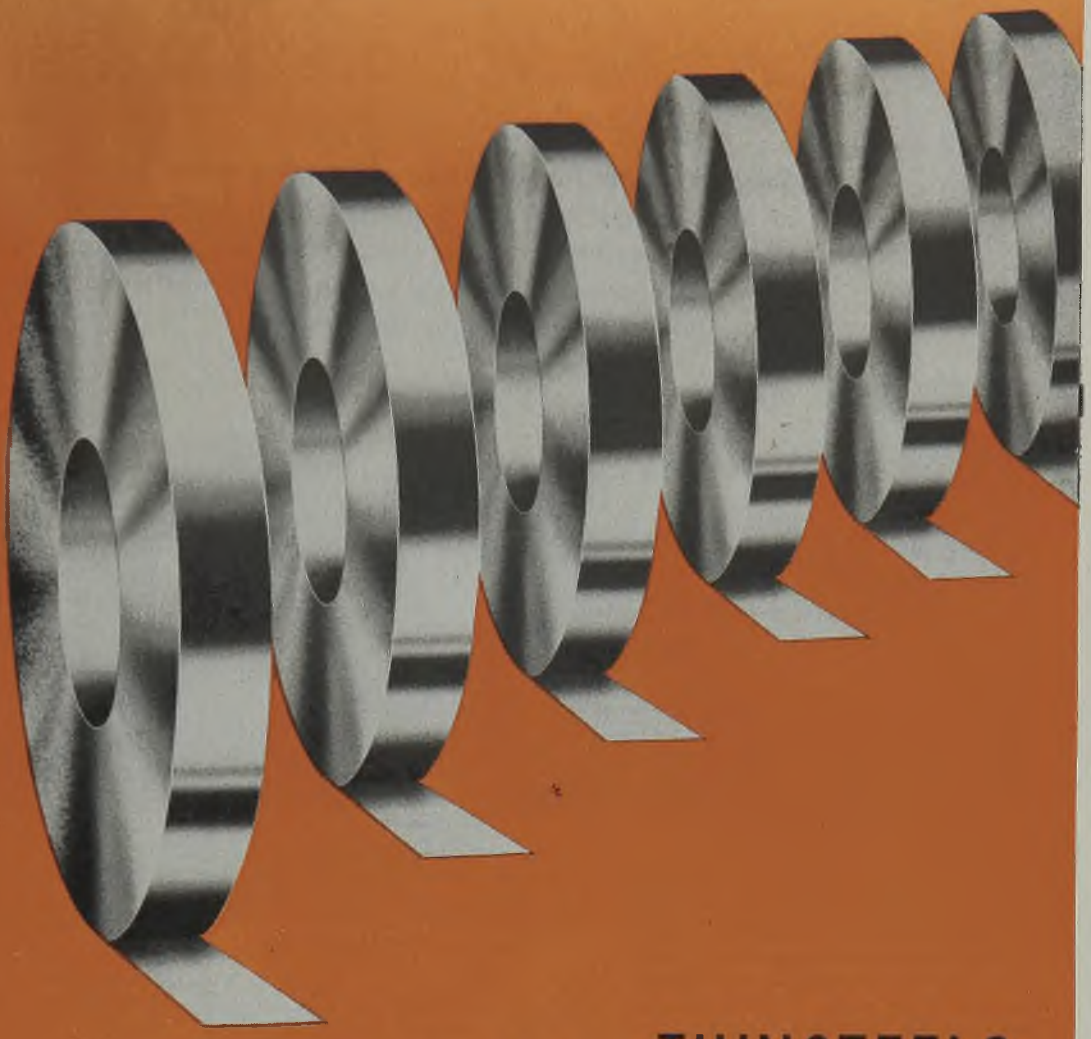
Two additional factors to consider in selecting a grinding wheel for a given job are the wheel's grade or hardness and its structure. The grade of a wheel is determined by the quantity of bond employed to hold the abrasive grain in position, the more bond the wheel contains, the harder the wheel will be. Grades generally are classified in three major groups: Soft, medium and hard, although some manufacturers feature a hard classification. Structure of a wheel is not to be confused with the type or quantity of bonding material going into it. Structure has to do with the spacing of the grain within the wheel and it is as vital to efficient operation as any other single factor to be considered. Soft wheels have an open structure. Hard wheels have a dense structure. There are a number of variations of structure, ranging from very open to very dense. Each grade of wheel and variation of structure has a definite application in which it is more efficiently operative than another grade or another structure. The rule is to follow the normal dictates of the material to be ground.

Identifying Information on Wheels

How is a user to know whether a wheel has an aluminum oxide or a silicon carbide grain? Whether its grain is course, medium or fine? Whether its grade is soft, medium or hard? Whether its structure is open, medium or dense? Determination of those qualities is a confusing task unless the prospective user familiarizes himself with the manufacturer's markings on the wheel. All wheels, of course, are marked to show the grain type, grain size, grade, structure, safe wheel speeds and other identifying information.

Much has been said and written relative to the type of grinding wheel best suited to grinding high-speed tools. The fact is that any of several different types may be used with satisfactory results—if the wheel used is selected with reference to the work to be done and the proper conditions are maintained. However, it does not follow that all are equally efficient. The objective desired is that the wheel shall remove stock as rapidly as possible, leave a sufficiently smooth finish and, most important of all, not overheat the tool. A coarse, natural abrasive wheel ordinarily will cut faster than a fine, excessively soft one such as a sandstone. In the case of artificial abrasive wheels, a coarse, soft wheel will cut faster than a fine, hard one. The ease with which artificial abrasive wheels can be modi-

(Please turn to Page 114)



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Same appearance, same gauge, same width but still a wide differential — an important differential because only one is Thinsteel — tailored for the specific precision job. That's a CMP specialty — providing unusual physicals, tempers and extreme accuracy for stringent specifications. Yes, you could only pick out Thinsteel by comparison — by putting it on-the-job. Then you learn all the many fabrication advantages of CMP cold rolled strip. And you learn the advantages of doing business with the *pioneer* — *the* specialist in precision cold rolled strip steel. Worth thinking about? Better yet — worth investigating now.

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Widths up to 24"
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Extremely close tolerances.
Standard and special tempers.
Standard finishes.
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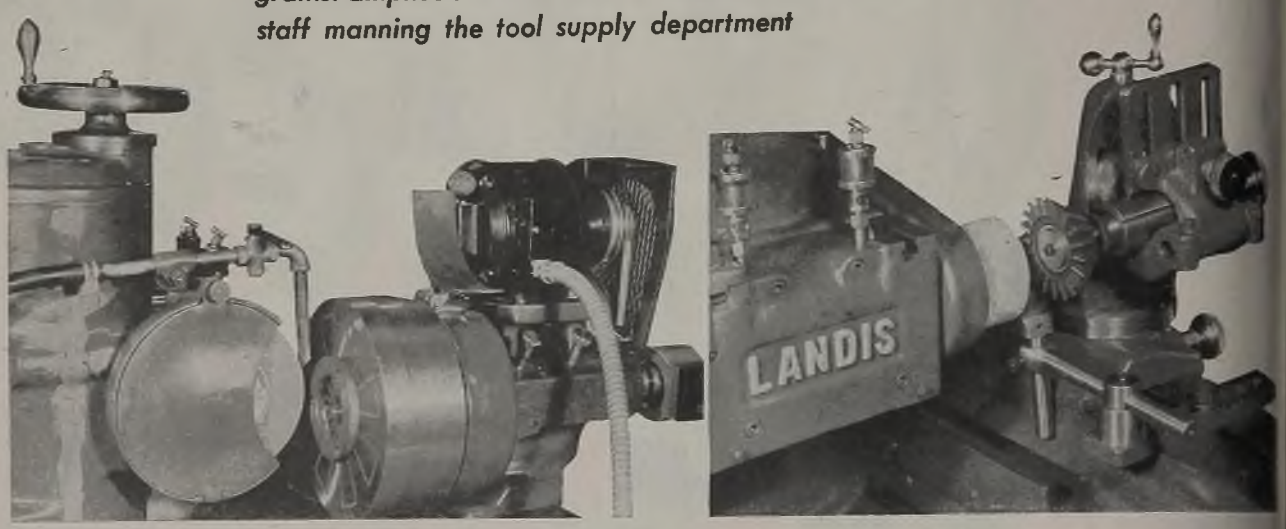
CMP STRIP STEEL
PRECISION COLD ROLLED

GIVES MAXIMUM PRODUCTION PER TON

Grinding High-Speed Steel Tools

Selection of the proper grade of grinding wheel as to type of abrasive and bond for a specific job is highly important. Care is required to prevent glazing the surface of the abrasive grains. Emphasis is laid on tool standardization as well as the staff manning the tool supply department



(Above, left)—Face grinding with the aid of a high-speed chuck

(Above, right)—Grinding the teeth of an angular cutter

EFFICIENCY is the prime objective in machine and tool design. One production tool is preferred over another because it does its work more economically while not sacrificing the accuracy or quality specified in the work. Efficiency, therefore, may be considered to mean the maximum production of satisfactory quality in a given object at a minimum cost.

In most instances the principal cost of any object is labor, which is to say, time. To assume that the tool or machine performing a given job in the shortest elapsed time is the most efficient is not always true. There are other considerations which frequently are equally as important as time and should never be sacrificed to favor time. One such consideration, for example, is the proper hardening and tempering of a high-speed tool. Unless the steel is given the treatment best suited to the required application the finest of high-speed steel will fail to perform at peak efficiency or, perhaps, to perform with any efficiency whatever.

Another vital consideration to keep in mind when aiming at maximum efficiency is the machine in which and the material upon which the tool is designed to operate. Both of these factors affect its relative efficiency. Other important factors include the design and shape of the tool and the nature of its cutting edge. The technique of grinding high-speed steel tools is so important that the efficiency of a cutting tool will rise or fall in almost direct proportion to the efficiency shown in the proper selection and proper use of the grinding wheel used to sharpen it.

Many grinding rooms today are plagued with manpower problems and inexperienced help. However, the grinding room is one department of the plant where inexperience should not be treated lightly for too much depends upon the quality of work performed there. A great deal of importance is attached to the selection of grinding wheels for specified grinding jobs and to the skillful use of that wheel once it is selected. Grinding cutting tools, especially high-speed steel tipped cutting tools, should never be turned over to inexperienced workmen. If today's emergency necessitates "greenhorn" help in the grinding room, care should be taken to insure that such workmen operate only under the closest scrutiny and supervision of competent grinding room operators.

Assuming then, that grinding high-speed steels is a specialized work requiring a considerable amount of care and skill and assuming that selection of a wheel to do a given job is of utmost importance, let's consider these matters in their proper continuity.

A grinding wheel is a cutting tool having many thousands of cutters in operation simultaneously and additional hundreds of thousands of cutters ready to replace them the instant they are needed. The perfect wheel would be one whose abrasive grain or "cutting tool" always remains uniformly spaced, uniformly sized and uniformly sharp, never becoming dulled, never breaking away from the wheel, never "scratching" the work and never "loading up." That is the perfect wheel and as such has not been built nor ever will be built.

While not attaining perfection, grinding wheel manufacturers have designed and built the "ideal wheel" which may be described as almost perfect. Assuming that the grain in the ideal wheel is of the right type and size for a given job on specified material and that the grade or hardness of the wheel is suited to the hardness and physical characteristics of the work material, the ideal wheel will remove stock at a satisfactory speed, cause no scratches and leave a relatively smooth finish. The bond or retaining agent holding the wheel's abrasive grain will be hard enough to hold each grain until it has served its full purpose, soft enough to wear down and release the grain when the grain has ceased to serve as a cutting tool, and porous enough to insure against the generation of excessive heat which can be damaging to cemented tool tips.

Those are the basic virtues claimed for the modern grinding wheel. The essential difference between one manufacturer's wheel and another manufacturer's wheel, assuming they are both designed for the same type of work, is the difference

By N. A. MALONE
Industrial Engineer
Mid-West Abrasive Co.
Detroit

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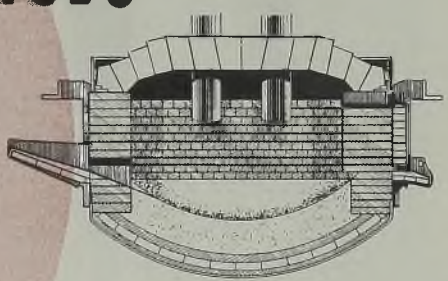
"MT" Lectromelts of the top charge type are daily pouring 25 ton heats of quality steels and irons. The rapidity and dependability that characterize their operation are helping produce greater tonnages of vital war steels.

Top charge Lectromelts are available in sizes from 100 tons to 250 pounds. We will gladly forward additional information upon request.



★ Lectromelt's patented spheroidal furnace bottom keeps scrap moving down as melting progresses and permits heavy loads and more rapid melting. Lectromelt furnace bottoms are correlated to the angle of furnace tilt so as to insure complete drainage.

PITTSBURGH LECTROMELT FURNACE CORPORATION

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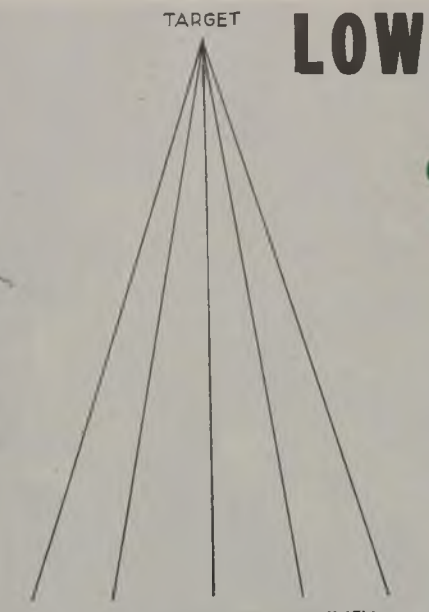
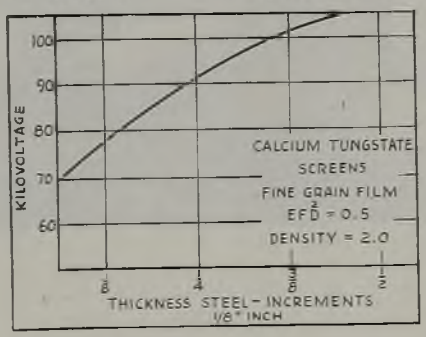
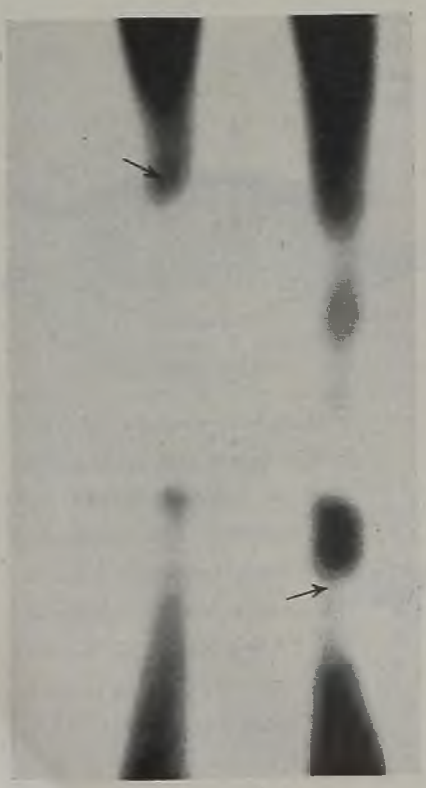
LOW-POWERED RADIOGRAPHY of Thin Steel Sections

By ROBERT TAYLOR
Department of Mechanical Engineering
State College of Washington
Pullman, Wash.







WHEREAS X-ray units rated to operate at 250 to 1000 kilovolts are ideally suited to radiography of steel, they are not always available.

Confronted with the problem of radiographically examining the subsurface continuity of welders' test plates, it is often expedient to alter certain technical factors and perform the examination with such equipment as is available for use rather than waiting to send it elsewhere simply because the X-ray machine available is low powered.

In conjunction with a light metal foundry wherein radiographic inspection was required on magnesium and aluminum alloys, a recent combination radiographic and fluoroscopic machine was designed to meet the exacting demands of inspecting the lighter alloys.

Quite recently it was decided to determine the suitability of this equipment for examining metals of higher atomic number, i.e., to inspect some ¼-inch steel fillet welds, in conjunction with certain student activities.

The material to be examined consisted of mild steel and stainless steel, both of which are considered radiographically as dense materials. Ideal equipment would be of such design that 200-kilovolt output could be used in conjunction with lead foil antimony screens. However with a 100-kilovolt machine as the only available equipment, it was decided to ascertain its suitability. Certain techniques were changed to meet the requirements for low-powered radiography of steel.

Agfa Superay A film was placed in contact with two industrial calcium tungstate intensifying screens and the specimens positioned over the film; 98 kilovolt was selected as a satisfactory penetrating factor; and exposure factor (milliamperage multiplied by time of exposure) chosen to give a film density of 2. The density of the processed film was determined by matching the radiographs with strips of film, the density of which had been predetermined by densitometer readings. Exposure factor was figured at focus film distance squared equals 0.5 (or $FFD^2 = 0.5$).

The resulting radiograph revealed good sensitivity and the welds were shown with clarity. Pending substitution of higher powered equipment it was determined that with the aid of calcium tungstate intensification screens, low-powered X-ray equipment could be suitably substituted in the X-ray inspection of thin steel sections from ⅛ to ⅝-inch in thickness.

Whereas it is common knowledge that calcium tungstate screens detract from definition by producing a halation over the entire film area, it was found that this was appreciably reduced when using a fine-grain industrial X-ray film. It has been a practice to use only a specified type of film in conjunction with calcium tungstate screens and one possessing a more coarse grain. Manufacturers have not recommended fine-grained industrial film for use with these screens and therefore this study makes some departure from orthodox procedures; but with very good results.

In this connection it would be entirely unfair in failing to mention the type of X-ray tube used, which was a water-cooled General Electric X-P, 1-4 type utilizing dual focal spots. The extremely fine focus did, of course, tend to improve the clarity recorded in the film.

It may be concluded therefore that when inspection must be facilitated and when higher powered equipment is not available, suitable radiographs can be secured by utilizing lower powered units in exposures with calcium tungstate intensifying screens. *The film used must possess a fine grain structure; the intensifying screens must have fine crystal structure; and the tube must have as fine a focus as possible to obtain. Good film screen contact must be maintained* or the definition recorded will be impaired.

Both welds radiographed were defective and possessed fine cracks as illustrated in the film. That sensitivity sufficient to record cracks of such magnitude was secured is but further proof that the detail recorded was of very high quality.

These studies were sponsored by the Engineering Experiment Station, State College of Washington.

(Top to bottom)—

Fig. 1—Diagram of exposure setup using two calcium-tungstate intensifying screens with film between them

Fig. 2—Graph plotted to show thickness of steel in increments of ⅛-inch against kilovoltage required for adequate penetration

Fig. 3—Reproduction of radiograph showing two fillet welds in test plates of mild steel and stainless steel, each ¼-inch thick with fine hair-line cracks

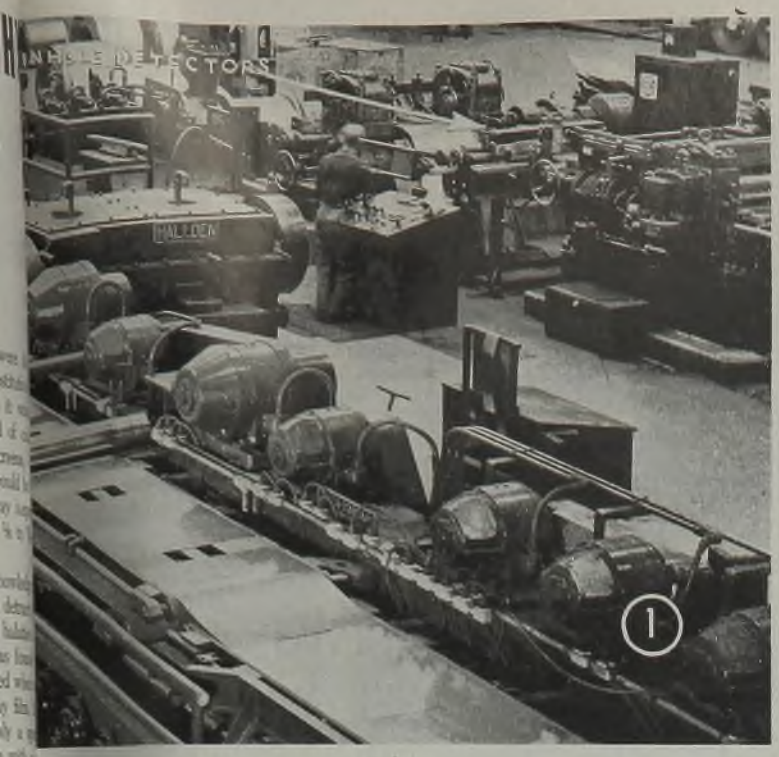


Fig. 1—Pinhole detectors and sheet counting device on tin plate shear line

switch application is encountered, the photoelectric relay should be considered as a possible solution.

PHOTOELECTRIC PYROMETERS. Another interesting and successful application of the phototube and associated electronic equipment is the photoelectric pyrometer. This equipment consists essentially of a phototube which "looks" at the hot body from which the temperature indication is desired, and auxiliary equipment for amplifying the output of the phototube in the conventional way; the amplified signal is used to operate an indicating or recording instrument, or to operate a magnetic relay to provide automatic control of some processing equipment. These pyrometer equipments can be used successfully where the temperature of the hot body is within the range of 1400 to 3000 degrees Fahr. A partial list of pyrometer applications is:

1. Indication and automatic control of furnace temperatures.
2. Indication of the temperature of steel during hot rolling operation. Fig. 2 shows a plan view of an installation of a pyrometer equipment on a mill rolling large structural shapes. The users of this equipment have stated that it actually allows them to roll shapes to closer tolerances than would otherwise be possible without incurring losses from underweight shapes.
3. To provide automatic stopping control on centrifugal casting machines. (Fig. 3)
4. Pyrometer installations for determining the color and intensity of the flame from the bessemer converter. To a large extent these have removed the guess-work from the bessemer process.

Fig. 4 is a schematic diagram of a simple photoelectric pyrometer circuit.

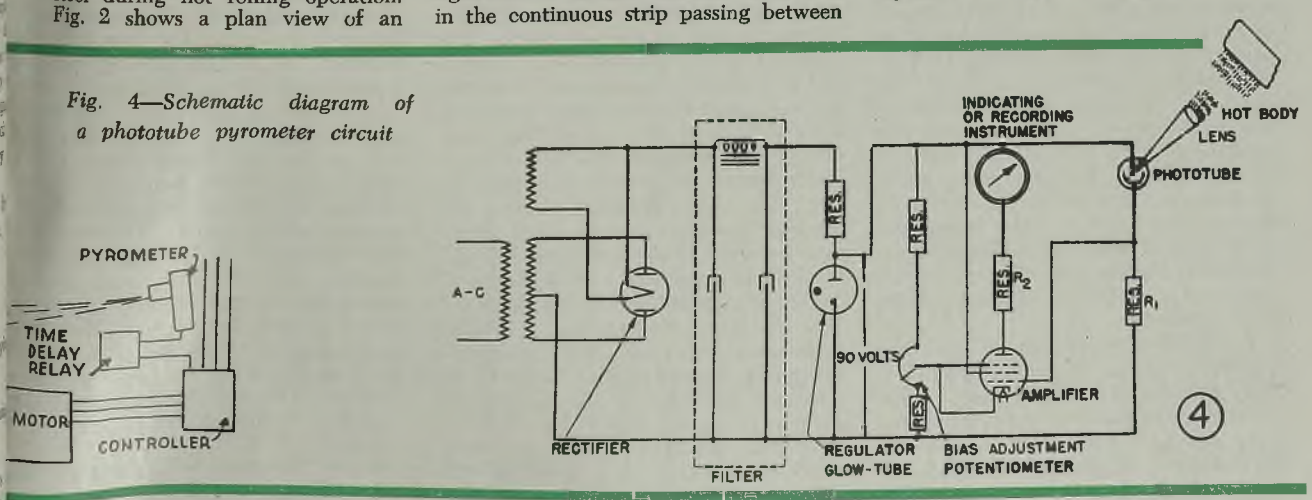
PHOTOELECTRIC INSPECTION. One of the most successful equipments for automatic inspection is that for detecting pin holes in tinplate strip. This equipment consists of a large number of phototubes with a system of lenses on one side of the moving strip, and an equal number of light sources on the other side. Any hole in the continuous strip passing between the light and the photocells allows a small flash of light to get through, setting up a minute electrical impulse, which is amplified in the conventional way and used to operate a marker which marks the edge of the strip at that point. In conjunction with a suitable timer, the equipment also can be used to operate a diverter gate, and to remove the defective sheets after the shearing operation. Fig. 1 shows a tinplate shearing line with the pin-hole detector and a photoelectric sheet counter in operation.

At present, photoelectric scanning equipment is being installed to determine the "flow line" on electrolytic tinplate which is being brightened by electrical means, and to control automatically the power input in relation to this "flow line". This equipment makes use of the difference in reflectivity between "unbrightened" and "brightened" tinplate.

MOTOR SPEED CONTROL. For small drives at the present time, and perhaps eventually for large ones, there is available an electronic control for direct current motor which is known as the "Thymo-trol". This equipment is sold only as a complete motor and control drive, since rather careful application is required. The drive takes power from an alterating current source, which it rectifies and supplies to the direct current motor armature and field circuits as required This control can be obtained to cover a wide speed range, for either constant-torque or constant-horsepower applications; it can be provided with a definite current-limit setting, so that neither the motor nor the driven equipment can be damaged on stalling, and with a number of other attractive features as well. These equipments have been built as large as 20 horsepower, and shortly will be available in still larger sizes.

Other types of installations for which electronic equipments are used to automatically control the speed of a direct current motor, by regulating its field current, are the "photo-thyratron loop control", and the variable reactor loop control. The former is used on tinplate strip processing lines. This type of equipment is now

Fig. 4—Schematic diagram of a phototube pyrometer circuit



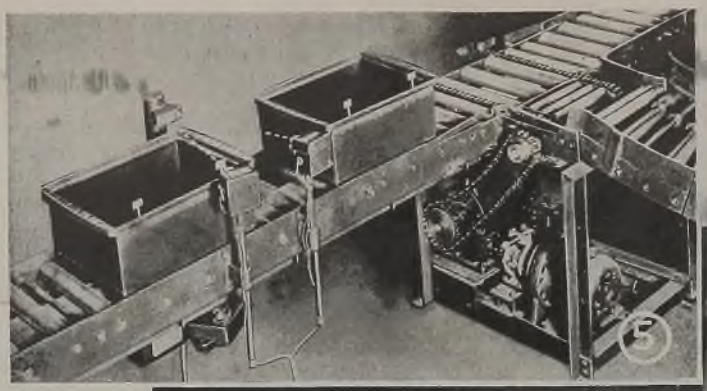
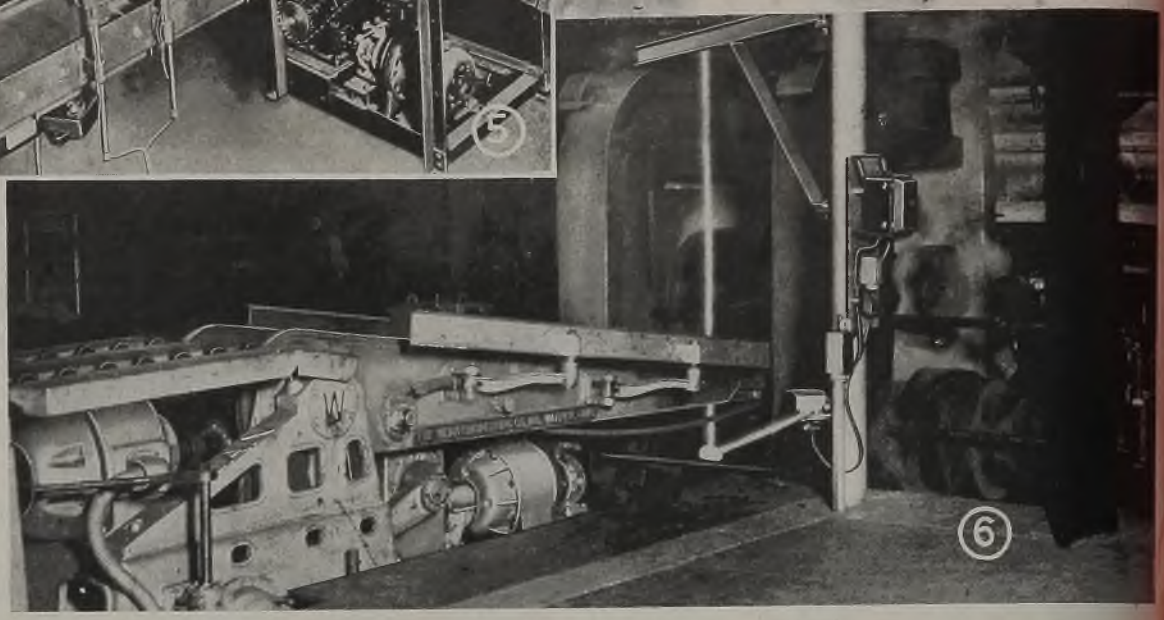


Fig. 5—Preselective conveyor dispatching system showing photoelectric relay and light sources

Fig. 6—Automatic sheet catcher under control of photoelectric unit



in successful operation on high-speed cleaning lines and on side trimming and shearing lines. It can be used to compensate for cold build-up or build-down, and thus eliminate the conventional rider roll rheostat. The "Variable reactor loop control" makes use of the so-called "floating-roll" principle. It operates by virtue of the fact that an alternating current solenoid changes its impedance and power factor as the position of its plunger changes. This provides a convenient means for shifting the phase of the alternating current grid supply on a thyratron panel, thus regulating the output from this panel, which is used to control the field of a direct current motor.

Application of Electronics to Resistance Welding. When extreme accuracy of control of resistance welding is required, only electronic control will do the job. The reasons for this are that the timing accuracy obtained by electronic means is better than that obtained by other means, and that electronic tubes have no moving parts, allowing them to accomplish a tremendous number of "on" and "off" operations without requiring any maintenance. Electronic welding equipments have been widely used, in fabricating steel products and various steel alloys, and in welding a number of the nonferrous metals. The widespread acceptance of resistance welding by industry has already revolutionized the designs and manufacture of many of the metal products.

Power Rectifiers. In the past few years mercury arc power rectifiers have been installed in large numbers. Most of these are in the light metals industries, but a few have gone into steel mills and local mines. At present about 10 per cent of the total power generated in the United States eventually goes through mercury arc rectifiers. The power rectifier is usually of the ignitron type.

Electronic Frequency Changers. A 20,000-kilowatt, 25 to 60-cycle nonsynchronous frequency changer which can pass power in either direction has been put into operation by a large company.

Side Register Control. A recent and successful application of electronic equipment in steel mills is the "photoelectric-amplidyne" type of control used on a number of the new electrolytic strip tinning lines to assure the winding of coils with smooth ends. The use of this equipment in conjunction with a winding reel on a sliding base, eliminates the necessity for the loop which is conventionally maintained just before the back tension device for the purpose of guiding the strip, thereby saving one complete drive on the line. The dynamic scanning head at the edge of the strip gives the signal for the reel to shift in the proper direction to keep the edge of the coil square. The impulse from the scanning head is amplified in a suitable vacuum-tube amplifier, and the output from this panel is used on the control field of an amplidyne generator which furnishes the power for a direct current motor used in shifting the reel. The high amplification factor and the high speed of response of the amplidyne generator, make it an extremely useful tool in conjunction with electronic devices in applications of this nature.

Automatic Screwdowns. Another combination electronic and amplidyne equipment, was recently put in service for automatic operation of the screwdowns on a reversing hot mill.

Timers. Electronic timers find many applications, either in conjunction with other electronic equipment or with magnetic control. These timers make use of the fact that it takes a definite amount of time to charge or to discharge a capacitor through a fixed resistor. They are readily adjustable, are accurate over their range (up to about 2 minutes) and are extremely useful on a rapidly repeating duty cycle which would wear out industrial timing devices of the conventional type.

Battery Chargers. Many battery chargers for station batteries in power generating stations of large industrial plants are of the electronic type. These chargers are somewhat more efficient, and in general require less maintenance and cost less than conventional rotating machines.

X-Ray Thickness Gage. An interesting new development on which there has been delay in making an actual installation because of the war, is the X-ray thickness gage for measuring the thickness of metal strip. This equipment is designed primarily for measuring the thickness of rapidly moving hot strip a job for which we have had no satisfactory device heretofore. The equipment makes use of the fact that the number of X-rays from a constant source which penetrate a piece of metal are directly proportional to the thickness of the metal. Therefore, it is only necessary to provide equipment capable of continuously and instantaneously measuring and indicating the intensity of the X-rays after they have passed through the strip. This problem has been solved by the use of electronic devices. One of the important advantages of this equipment is that it operates without touching the strip.

Flow Brightening. Another new

(*Please turn to Page* 127)

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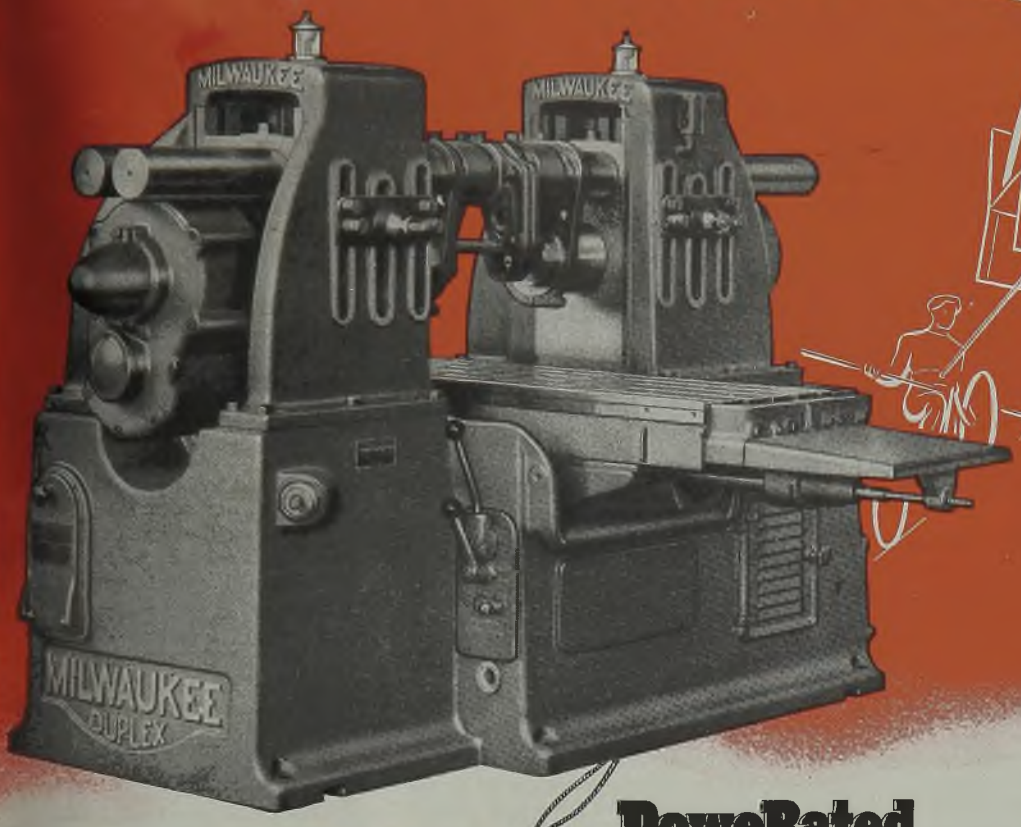

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ELECTRONICS

..Its Steel Plant Uses

Photoelectric relays while differing in operating characteristics and physical construction are finding increased application in rolling mills particularly where a difficult limit-switch application is encountered. Pinholes in tinned strip as well as flow lines on electrolytic tin plate are detected by electronic equipment. Many mill problems are solved by use of electronic devices

By J. H. HOPPER
Industrial Engineering Division
General Electric Co.
Schenectady, N. Y.

MANY SUCCESSFUL installations of electronic equipment are in service in steel mills and other industries, and the list is growing steadily. New uses of electronic devices in industry must be justified on their own merits. Electronic equipment should be applied only where it can do the job better, faster, or more economically than other types of equipment. A number of electronic applications in industry follows:

PHOTOELECTRIC LIMIT SWITCHES. The photoelectric relay has many advantages over ordinary mechanical limit switches: It requires no operating force, it can operate at extremely high speeds, and it will stand a great many more repetitive operations. Usually these devices are used so that they operate in response to the presence of some object which is either too light, too fragile, too hot, too highly polished, too fast moving or too often repeated to permit satisfactory operation with mechanical limit switches. Of course, the various applications of photoelectric relays differ greatly in operating characteristics as well as in physical construction. Also, some of these applications required that the photoelectric relay be combined with auxiliary equipment, such as time-delay relays, which may or may not be electronic.

Photoelectric relays, vary from the simple form of relay which operates directly from an alternating current circuit to the extremely sensitive high-speed relays, which are capable of operating from variations in the light source lasting only 0.0001-second. Special enclosures are provided for relays which must operate under particularly adverse conditions, such as dirty or wet locations. In other applications where a great deal of extraneous light is present, special light shields are used to exclude the effect of the extraneous light as much as possible. When the light beam must pass through a dusty or smoky atmosphere, or through some material which absorbs some light (such as glass or water), the normal distance between the light source and the relay must be decreased to insure sufficient illumination on the phototube.

Whenever correctly applied, photoelectric relays have been found to be satisfactory and dependable devices. Some of the applications on which they have been used successfully are:

1. Counters, such as sheet counters on shearing lines or sheet processing lines: (See Fig. 1).
2. Automatic sheet catchers.
3. Rod mill shears.
4. Runout table kick-offs.
5. Automatic diverter on skelp mills.
6. Limited form of loop control on strip processing lines.
7. Power-driven conveyors in numerous industries, to perform various functions such as starting or stopping the conveyor, or sorting the material being handled. Fig. 5 shows a typical installation.

Whenever a difficult or unusual limit-

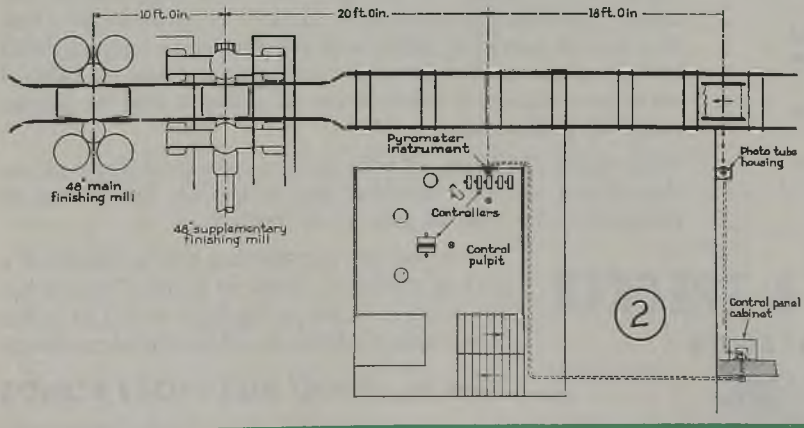
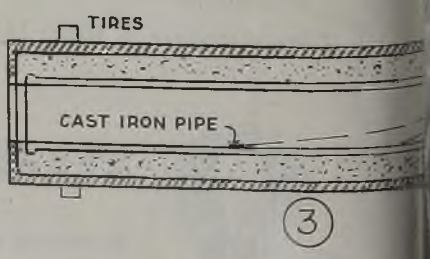


Fig. 2—Plan view of pyrometer equipment installed on structural mill

Fig. 3—Automatic stopping control for centrifugal casting machines



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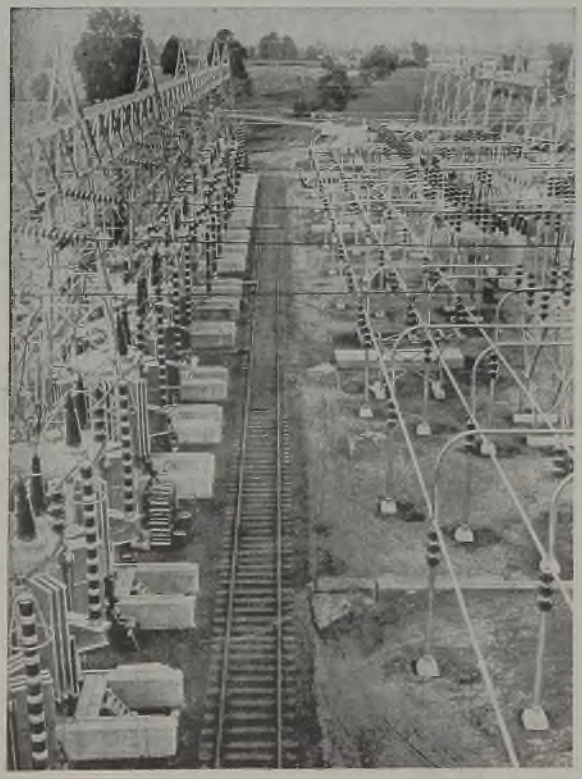
LIST OF PATENTS FROM ENEMY-OCCUPIED COUNTRIES

DESCRIPTION	PATENT NO.
Apparatus for producing hooping effects in metal tubes of great strength	1578751
Apparatus for the application of hydraulic pressure to the interior of a tube being shaped by the self hooping process	1583162
Self-hooping of metal tubes	1602282
Manufacture of cartridge case cups	2028996
Method of making metal cases from a tubular piece	2079102
Production of tubular metal cases such as cartridge cases	2183637
Apparatus for making metal cases from tubular pieces	2089912
Machine for the manufacture of fishhooks	1691534
Device for the manufacture of fishhooks	1792556
Automatic machinery for making fishhooks	1892120
Machine for working printing machine cylinders particularly copper cylinders in copperplate printing machines	2076773
Universal and automatic machine tool	1633714
Universal and automatic machine tool	1744809
Apparatus for the manufacture of cups from which cartridge cases can be cold drawn	2029797
Means for the automatic manufacture of threaded nuts	1961868
Turret lathe	1644566
Reciprocating saw machine more particularly for the sawing of metals	1651101
Machine for sawing under water	1806013
Metal sawing machine with arcuate cut	1810746
Filing, sawing and grinding machine	1660887
Percussive tool	1992703
Apparatus for replacing spark plugs	1736561
Method of mounting single and double row ball bearings	1762891
Manufacture of hollow bodies	1885406
Process and apparatus for assembling and fitting the elements of needle or roller bearings	2034534
Apparatus for removing the piston rod of locomotives and other engines from piston crossheads	1575620
Film gophering cylinder	1703026
Tool for engraving rollers applicable for the treatment of photographic films	1730942
Apparatus for burnishing silver plate	1812909
Tool holder	1776335
Cutting tool	2171694
Milling cutter with helical teeth	2124818
Cutting tool	2297445
Strapping material for binding or securing boxes, bales, parcels and other packages and process for manufacturing the same	Re 21903
Method of making loosening stretchers for cables, rods and the like	1877370
Method for producing flat blanks for aluminum cooking vessels	2119088
Strapping material for binding or securing boxes, bales, parcels and other packages and process for manufacturing the same	2122856
Method of constructing metal doors	2142438
Process for the manufacture of metal containers	1966713
Method of connecting hollow bodies	1994210
Construction of fuselages, vehicle bodies and the like	2121670
Method of manufacturing gas bottles	2200162
Process of manufacturing cages for ball or roller bearings	1650852
Process of manufacturing cages for ball or roller bearings	1650853
Process of manufacturing cages for ball or roller bearings	1650854
Process of manufacturing bearing cages	16995[illegible]
Resilient joint and method of making	173265[illegible]
Bearing member and process for manufacturing it	192854[illegible]
Method of treatment of friction pieces comprising an exuding substance	196130[illegible]
Method for coating cylindrical members with a hard material	1971433
Method of producing compound cast bearings	2297385
Method of manufacture of light front axles for motor vehicles	1592755
Method of producing iron girders and very large T section iron	2201071
Method of making piping	1733455
Manufacture of seamless tubes	2023727
Process of forging hollow metal blanks	2070589
Method of making valves	2113316
Process for the manufacture of aerial metal propellers	1670345
Method of making hollow metallic air screws	1890747
Method of making bent pipe elements	2134859
Process for making heat exchangers and the like	2117880
Manufacturing high pressure boilers	1736610
Process for manufacturing belt pulleys	1748452
Method of manufacturing seamless rims and wheel disks	1623881
Method of constructing metal wheels	1627953
Method of making wheel rims	1587022
Process for manufacturing steel tires and the like by forging and pressing ingots	1896704
Process of swaging dental plates	1833411
Process for the production of iron sleepers	2023827
Process of manufacturing bimetallic appendixes for nonmetallic balances	1982728



Wrought Iron Pipe Suitable For Current-Carrying Mains

Engineers of the Bonneville Power Administration in Washington have discovered the ability of wrought iron pipe to serve as current-carrying mains. This is expected to eliminate further need of borrowing from the government's supply of silver.

The use of wrought iron pipe as electrical buses is found to be well within its efficient current carrying capacity at 115 and 230 kilovolts, the largest size required being 4-inch pipe standard weight. Current-carrying capacity may be increased further by slotting the pipe along its length to break the ferrous loop, and by coating the pipe with a dull, black paint to increase its heat emissivity.

Wrought iron has a high modulus of elasticity permitting long spans, particularly with ice and wind loading, thus saving on insulators, fittings and supports. It has good corrosion-resisting properties, and paint gives it additional protection. Welding is a simple, quick and economical method of joining the pipe into whatever bus arrangement is desired, eliminating all clamp type fittings. Welded buses reduce corona formation and wrought iron expands less than copper or aluminum, necessitating fewer expansion joints.

The wrought iron buses at Bonneville were finished by first removing the protective asphalt varnish from the pipe, cleaning it with an abrasive and then by applying a coat of synthetic red lead and two coats of aluminum paint.