



Street scene in San Francisco, long the hub of activity on West Coast. Page 82

STEEL

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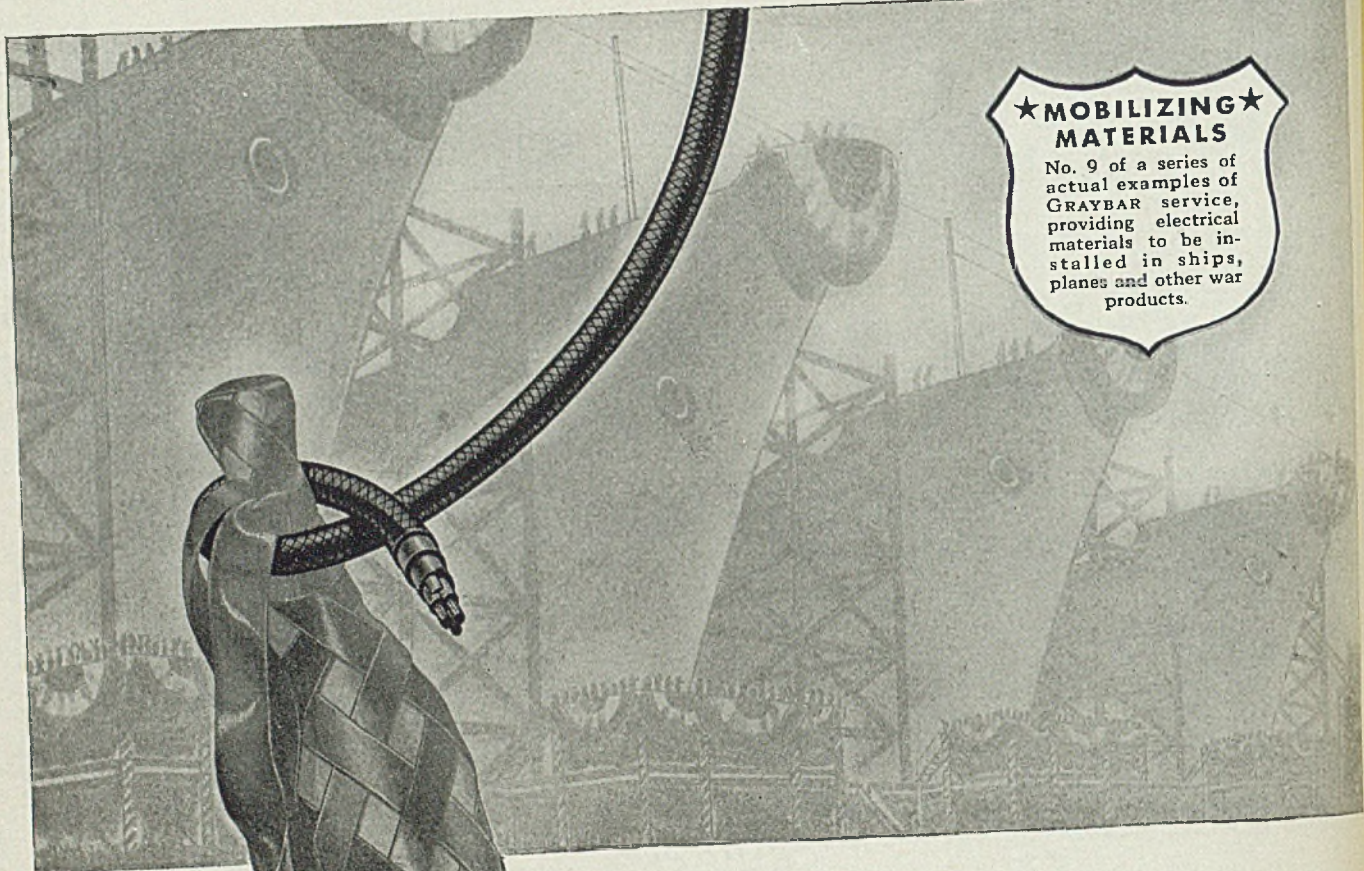
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MATERIALS
No. 9 of a series of actual examples of GRAYBAR service, providing electrical materials to be installed in ships, planes and other war products.

When a **launching date hung by**
BASKET WEAVE CABLE...

A shipyard was "stumped" for a quantity of basket-weave electrical cable urgently needed to complete a group of tankers. Unless the cable could be delivered on the job within 24 hours, construction schedules would bog down, launching dates would not be met.

Feverish activity in the yard's purchasing department failed to turn up a single foot of cable. One of their calls went out to GRAYBAR. But even GRAYBAR'S knowledge of

cable manufacturers served only to verify that none of the missing "basket-weave" was to be found in stock.

Then Graybar ingenuity swung into action. A call to the GRAYBAR office in a neighboring city revealed that a shipyard there had received a shipment of cable of the type required. Upon explanation of the urgent need, arrangements were made for this customer to "borrow" enough to meet the emergency. Before the one-day deadline was up, the

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Complacency Begins at Home

No one disputes the possibility that recent developments in the battle zones may shorten the duration of the war. But Washington fears that current favorable news will bring on a wave of over-optimism which will interfere with the war effort. In fact, some authorities already are attributing the lag in certain phases of the war production program to complacency caused by a belief existing in some quarters that victory is just around the corner.

Every sane American will agree that this is no time for a let-down in any part of the war effort. On the contrary, now is the time when a real all-out performance would be most effective. The logical time to hit hardest is when the opponent is on the ropes.

Unfortunately, this nation has not yet and will not now hit as hard as it could or should hit. It will continue to fight "under wraps", so to speak, because we have not learned the meaning of real "all-out" production. We have not learned it because our government itself has not demonstrated that it is solidly in favor of "all-out" production.

If our government were sincerely concerned about "all-out" production, it would set an inspiring example of unified all-out zeal for war in the government agencies. It has not set this example. Nor can it set such an example as long as it continues to permit about a million of its civilian employes to pursue nonwar boondoggling activities in wartime, as long as it allows our vice president to go barnstorming about the country trying to pick synthetic fights with American business, as long as its attorney general interprets the anti-strike law passed by Congress so as to encourage stoppages of war work and as long as almost every agency in government spends a sizable portion of its time and effort trying to undo the work of other agencies.

When a government spokesman tells us war output is lagging because we are too optimistic about encouraging war news, he doubtless is speaking honestly and sincerely. But, unconsciously, he is using a doubtful alibi which cloaks the greater menace of the continued apathy of numerous government agencies and bureaus toward the war effort.

Complacency born of favorable war news is nothing compared with complacency arising from the miserable example set by our government.

WAR ACCENTUATES TREND: In reading the series of articles on developments in the Pacific Coast states, the first of which appears in this issue, it will be well to keep in mind as background information the fact that the so-called "second gold rush" is not 100 per cent a war condition.

A definite, strong, upward trend in population and in industrial expansion on the West Coast was in progress long before the war started. In the two decades from 1920 to 1940, the population of California, Oregon and Washington increased 75 per

cent compared with a gain of only 25 per cent for the entire country. Industrial activity in the Pacific area expanded more rapidly after the depression than in many other industrial sections of the nation. Thus, the terrific spurt resulting from the war—while spectacular and impressive—in reality is an intensification of a strong movement which had been in progress for some time.

The pertinent question now is to what extent the experience gained by West Coast industrialists in their airplane, shipbuilding and light metal contribu-

tions to the war effort can be put to effective use in manufacturing peacetime products. In short, what margin of benefit will accrue from the war, over and above the gains already assured by the long-term trend of growth on the West Coast? —p. 82

TO PREVENT SCORING: Now that it is common practice to machine some parts of machines to extremely close tolerances, it is more than ever disconcerting to a machinery or equipment builder to find that dirt or grit loosened from the inside of a housing has found its way into gears or onto highly finished surfaces and has scored them.

One machine tool builder has practically eliminated this difficulty by flushing out all parts of his machine tools with oil under 40 pounds pressure. After 15 minutes of flushing, the flushing oil is drained off and clean machine oil is applied to all moving parts and interior surfaces. The machine is kept in operation during the application of the flushing and machine oils.

This simple but effective precaution against damage to highly finished parts and surfaces can be used to advantage not only by the builders of machines and equipment, but also by many users of precision machinery. —p. 98

SPREADING WAR WORK: Government agencies are launching a new drive to distribute war work more widely. The objective is three-fold—first, to increase output; second, to shift more orders to areas where manpower shortages do not exist; and third, to place new orders in shops where machines and manpower have been released by cut-backs or cancellations of old war contracts.

The move is a renewed attempt to distribute work according to the ability or capacity to handle it. It is a logical step, but one in which success can be achieved only by mastery of intricate detail. —p. 59

UNCLE SAM'S PLANTS: In a short time this nation will have capacity for producing 2,100,000,000 pounds of aluminum annually. About half of this capacity will be in plants owned by the government and operated by the Aluminum Co. of America, a third will come from plants owned and operated by this leading private producer and the remainder—a sixth—will be in publicly or private-

ly owned plants operated by other private producers. This means that well over half of the aluminum capacity will be owned by the government. A somewhat similar situation will exist in connection with capacity for some other materials such as chemicals, explosives, synthetic rubber, etc.

On the other hand it is estimated that when the present steel expansion program is completed (75 per cent completed now) only about 7 per cent of the steel capacity will be government-owned.

On the basis of these figures, the steel industry should experience less difficulty in postwar adjustments in ownership than some other important industries. —pp. 60, 70

STEEL FOR HOME FRONT: On the basis of present figures, the chances of diverting steel to civilian needs before sometime next year appear to be pretty slim. Claimant agencies have asked for 4,000,000 more tons of carbon steel for the fourth-quarter than will be available. The railroads will be allocated some material in that quarter, but little tonnage will be forthcoming for other essential nonwar uses.

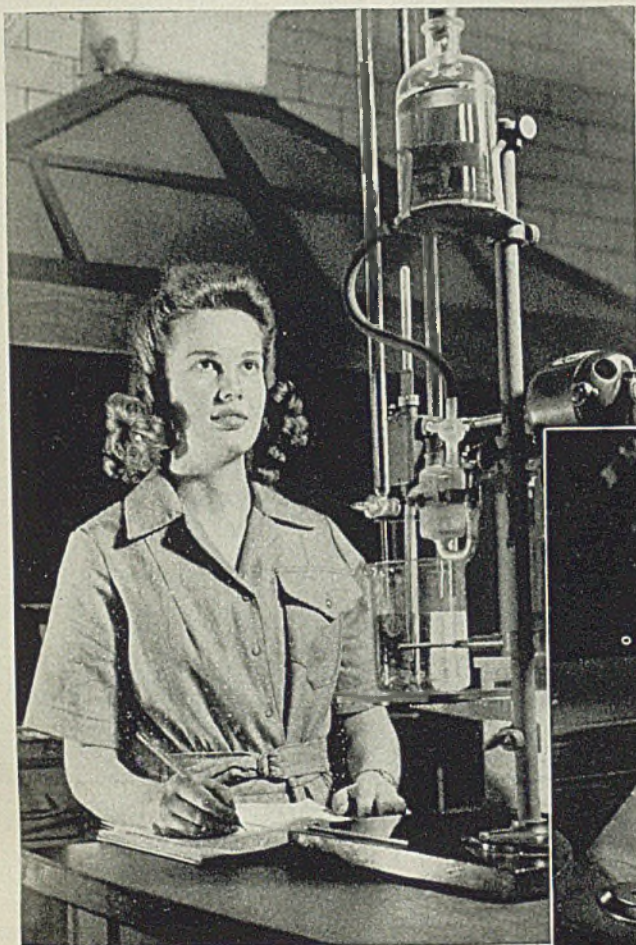
This continued tight situation in steel in the face of unprecedented production arises chiefly from the tremendous demand for direct war and lend-lease shipments. The situation causes the military authorities to challenge sharply every request for steel for nonwar use.

Those in Washington who see the need of keeping the home economy in working order cannot argue too strongly against the military experts. For one thing, figures show that the people at home have fared pretty well during the war. Consumer expenditures of the public were 62 billion dollars in 1939, 65 billion in 1940, 70 billion in 1941 and 69.6 billion in 1942.

These figures, of course, are not conclusive evidence of the need of civilian steel, but they do show that the civilian standard of living is high for a nation supposed to be all-out for war. —pp. 58, 69

E. L. Shaner

EDITOR-IN-CHIEF



There are many types of employment open to women — machine operation, welding, stenography, laboratory work, etc. The need is so great that a woman should be able to find exactly the type of work for which she is best suited.



Perhaps Joan Could Help, Too!

Have you stopped to consider there is a place for your sister, your daughter—yes, even your wife—in the great effort the metal working industry is making to help win this war?

Through your everyday conversation the women in your family realize the need for more production. They know about the shortage of workers. They know that it is patriotic to work, but because their place has been in the home, many of them are timid about going to work in an office or factory.

You, as a worker in America's great metal industry, can dispel that timidity

by telling them about the many kinds of jobs open to women. Let them know that they are as safe in the factory as in the home; that modern American factories are clean; and that factory associations are interesting.

Talk to Joan, Helen, Barbara this evening. In years to come they will be proud of the work they did to help keep America's homes safe and free.



Check your local help wanted ads for specific needs in your area, or ask the local U. S. Employment Service.

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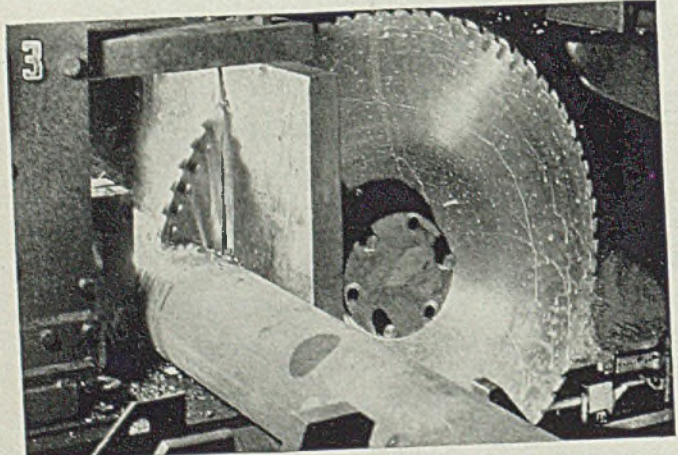
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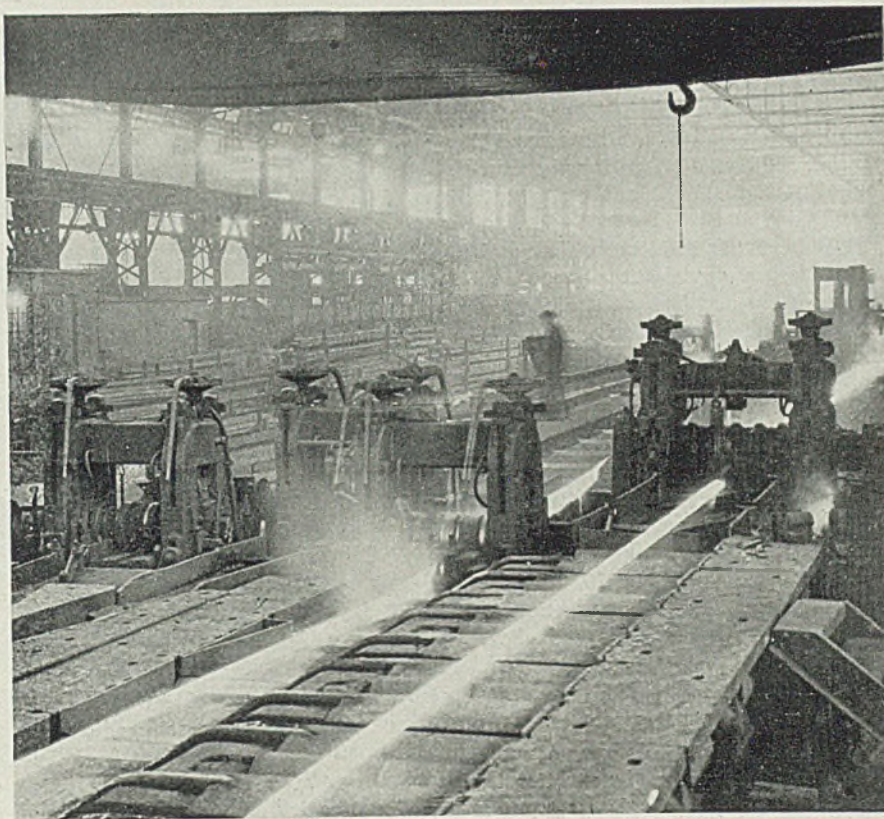
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STEEL

WAR PUTS PRESSURE ON BARS

Most versatile of products head consumption list in first half of 1943. . . Even faster pace in prospect with demand in most directions unabated



By B. K. PRICE
Associate Editor, STEEL

This 14-inch mill rolls steel bars which are leading other steel products in their application to the war effort. Flats, angles, and tees are also rolled on this same mill

THE MOST versatile of heavy rolled steel products, bars, tonnage-wise, are currently heading all steel products in their application to the war effort. At the end of the first half of this year they were even running slightly ahead of plates, whose performance has been little short of sensational. Bars have maintained this fast pace despite drastic decline in reinforcing steel production in recent months.

Last year, out of a total of approximately 12,400,000 tons of bars, reinforcing steel accounted for 1,800,000 tons, but in the first six months of this year output fell to about 260,000 tons, for an average of approximately 43,000 tons monthly, and a further drop is in prospect. Until a week or so ago at least, certain large producers had less than 100 tons of reinforcing bars scheduled for September rolling. Trade predictions now are that reinforcing steel output this year will not exceed 400,000 tons, if that. This decline in reinforcing bars, of course, is due to the completion of much highly rated war construction and the rigid restrictions on construction of all other character.

Meanwhile, plates, if anything, are going to be required on an increasing scale. In the first half about 6,400,000 tons were produced, or at a rate of 12,800,000 tons annually, and with the ship program still expanding it may run even a shade higher.

By way of a memorandum, plates are

by far the major steel item in ship construction with shapes a poor second and bars third.

On the basis of overall performance since this country entered the war, bars are lagging behind plates. In 1942, the full year of participation, bars fell substantially behind plates, after the latter's sensational rise from the year before, which was made possible not only through increased plate mill capacity, but more importantly through the diversion of continuous strip mill capacity to the production of plates.

Draws Comparative 1941 Figures

In 1941, plate production, as reported to the American Iron and Steel Institute by companies producing more than 97 per cent of the country's ingot production, amounted to 5,890,837 tons; bar output, 11,170,095 tons. Interestingly, sheet and strip production in that year, as reported by these same companies, reached a total of 16,662,039 tons, and shapes, the fourth major steel item, 4,960,822 tons. Last year (1942), sheet and strip production, it is reliably estimated fell to around 11,000,000 tons, while shapes increased 200,000 or 300,000 tons.

To go back to the outbreak of the war in Europe in September, 1939, it is interesting to note that in 1940, according

to figures submitted to the institute by companies representing more than 98 per cent of the year's steel output, bar output was 7,863,990 tons, plates 4,085,791 tons, sheets and strip 12,841,931 tons and shapes 3,366,475 tons; and that in 1939, as reported by companies with more than 95 per cent of steel capacity, bar production was 6,319,263 tons, plates 2,817,107 tons, sheets and strip 10,764,778 tons, and shapes 2,544,515 tons.

Thus it is seen, and with such indications as are available for 1943, that bars and plates have gained appreciably, with bars as well as plates probably gaining somewhat this year despite the drop in reinforcing bar output; that sheets and strip soared in 1941, only to drop sharply last year, but probably make a modest gain this year; and that shapes increased steadily, with a substantial decline in prospect for the current 12-month period.

But to focus particularly on bars: First, since the end of 1941, when this country entered the war, capacity has increased from around 12,700,000 tons to 14,700,000 tons, a figure, interestingly, closely comparable with the capacity in 1933, ten years ago. This increase of the past year and a half of 2,000,000 tons is attributed to several factors. Certain new units have been installed, perhaps par-

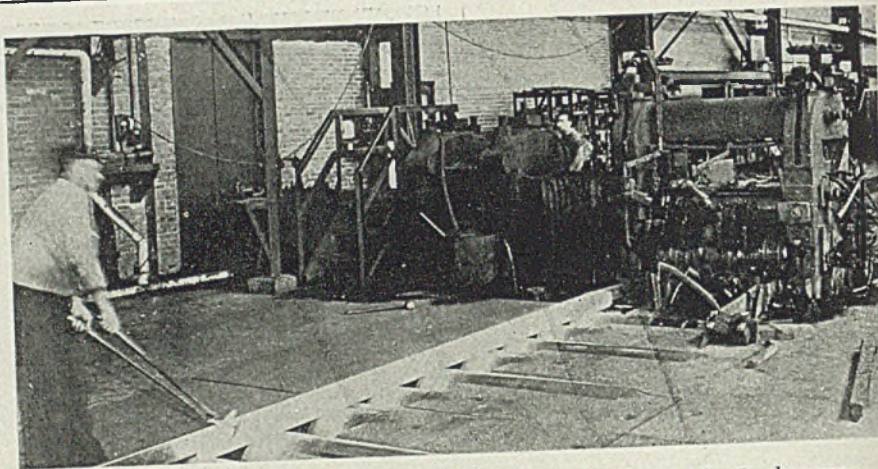
STEEL CONSUMPTION

ticularly to meet the sharp increase in demand for alloys. Incidentally, some new capacity is still to be brought in. Moreover, some mills which had become regarded as antiquated have been brought into use, and there has been some conversion of structural and rail capacity to bars.

At present the greatest bottleneck is in the larger specifications—rounds 3 inches and up and heavy flats. Much of the larger round tonnage goes into shells, with certain of the larger sizes for this purpose really falling into the billet category.

Also a particularly tight situation has prevailed in cold-drawn bars, with production of cold-drawn carbon bars alone in the first six months of the year running close to 900,000 tons, which was about the estimated capacity in 1940. Last year, it is estimated that production of cold-drawn bars both carbon and alloy, exceeded 1,600,000 tons, compared with more than 1,400,000 in 1941, and this year a new peak appears assured.

Bessemer steel has been drawn upon to some extent to relieve the situation in open hearth steel, and only last spring the War Department revised many of its specifications so that bessemer could be used more freely for shell components and other items. Cold-drawn bar producers were given larger quotas of hot steel, provided they could take it in bessemer and jobbers benefitted by this freer policy. The Navy, in the main, has held more rigidly to its original specifications, although the Maritime Commission has permitted the more liberal use of bessemer above decks, for radio shacks, runways, handrails, and other purposes for which bars as well



This view shows the entrance side of the 16-inch rougher at the Lackawanna plant of the Bethlehem Steel Co.

as sheets and wire are used.

Alloy bar demand since the beginning of the war has represented more of an addition to than a shift from the carbon grades in the opinion of trade leaders. Where a shift has really been made, they declare, has been in the change from the higher alloys to the leaner NE steels. It is reliably estimated that the NE steels now represent substantially more than 50 per cent of the alloy bars being consumed, with the percentage in bars, incidentally, being perhaps a little higher than in most other products.

Processors Large Bar Users

One of the consistently large outlets for bars has always been the converting and processing industries, such as the forgers, bolt and nut manufacturers and wire drawers. In 1941 this group took more than 2,000,000 tons, only to take possibly 200,000 tons still more last year,

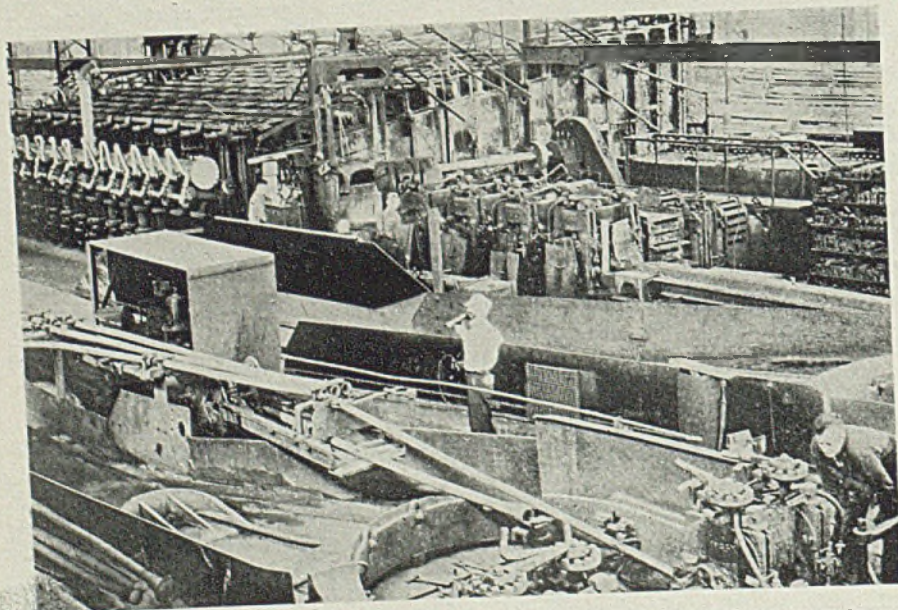
and then to carry on so far this year at a still higher rate of consumption.

However, after eliminating this and various other outstanding groups, there remain many miscellaneous outlets which in the aggregate consume a large total and which combined with exports, on which figures are now censored, comprise today perhaps the largest single classification. Last year this group accounted for close to 3,000,000 tons, compared with more than 1,400,000 in the preceding year. Carbon bars comprise the bulk of this tonnage, as is usually the case, but the percentage of alloy bars to the total in this miscellaneous and export classification is unusually high.

Up to this year, owing to the heavy demand for reinforcing bars, the construction industry has been an important major outlet. Last year close to 2,000,000 tons were taken, against 1,800,000 the year before. In both years far more than half were reinforcing bars, so with the sharp drop this year in demand for reinforcing steel, to say nothing of the overall drop in construction, this industry as a consumer of bars should fall well down the list.

When the automobile industry stopped making pleasure cars early in 1942, the effect on bars soon became evident. In 1941 the automotive and aircraft industries combined took around 1,800,000 tons, according to the American Iron and Steel Institute. The following year, however, saw a drop of almost 1,000,000 tons, it is estimated, as needs of the group centered principally on aircraft. At the same time, the ratio of alloy bars to carbon, which was in rather close balance in 1941, increased to a point where more alloy tonnage was being consumed than carbon.

With still further emphasis on aircraft this year this trend is likely to be further reflected, and the overall tonnage for the group is likely to be larger, because of the expansion in aircraft which now for



Observer takes the temperatures as bars are rolled on the 10-inch mill at the Johnstown, Pa., plant of Bethlehem Steel Co. Photos by courtesy of Bethlehem Steel Co.

the past many months has dominated this particular classification. Needless to say, once the war is over and the automobile industry assumes normal life, the flow of bars in this general channel will greatly increase, despite the letdown in aircraft construction.

While ship requirements increased almost 200 per cent last year to more than 600,000 tons, and are still climbing, ma-

chine tool needs have tapered. In 1941, the total was around 650,000 tons, dropping to approximately 500,000 tons last year and, apparently, is still on the decline. The trend in railroad equipment needs likewise has been downward, owing to wartime limitations on cars and locomotives for domestic lines. Last year bar requirements were off perhaps 200,000 tons from the 550,000 tons or so of the

preceding year. However, substantial lend-lease purchases, especially of locomotives, is believed to have caused some leveling off in the trend this year. Accumulated needs of domestic carriers are expected to bolster demand after the war.

While running a poor third in the shipbuilding industry, bars have been moving in substantially heavier volume for ship work. Last year the tonnage is estimated to have been around 650,000 tons, against more than 225,000 tons in 1941, and this year with the ship program still expanding, a new peak in bar consumption for this work is expected.

As previously indicated, a new peak this year in cold-drawn bars is virtually assured—despite a possible further decline in tonnage to warehouses and machine tool builders. Last year there was an appreciable drop in both instances, although some estimate that this year there may not be as much of a decline in tonnage going to jobbers as to machine tool builders.

Present, Past and Pending

■ TIMKEN PRODUCING OVER 6000 GUN BARRELS A MONTH

CANTON, O.—Timken Roller Bearing Co. is manufacturing over 6000 gun barrels a month for .75 and .40 millimeter guns, in place of the 300 barrels a month considered good production at the outbreak of war. Present output is made possible by use of seamless steel tubing and a newly perfected Timken process.

■ AIRCRAFT PLANTS NEED 700,000 NEW WORKERS IN YEAR

WASHINGTON—The aircraft industry will require 700,000 new employes in the next twelve months, according to a survey by Bernard M. Baruch, special adviser to War Mobilization Director James F. Byrnes. Main difficulty has not been the draft, but employes' quitting jobs for various reasons.

■ DPC LOANS REPUBLIC \$500,000 FOR SPONGE-IRON PROGRAM

WASHINGTON—War Production Board has authorized Defense Plant Corp. to loan \$500,000 to Republic Steel Corp. for continuance of its efforts to make sponge iron at Warren, O., by the Brassert-Cope process (STEEL, Dec. 7 issue). First sum used for this program was \$450,000.

■ AMERICAN, BALDWIN, LIMA BUILD INVASION LOCOMOTIVES

NEW YORK—American Locomotive Co., Baldwin Locomotive Works, and Lima Locomotive Works have been ordered to halt tank construction so they can build 900 locomotives required for military invasion purposes, says WPB. Though work is expected to be completed in third quarter, necessary 60,000 tons of sheared plates have not yet been allocated.

■ G-E TURBINE PRODUCTION SEVEN TIMES THAT OF 1941

SCHENECTADY—During 1943 the General Electric Co. will produce steam turbine propulsion equipment for the Navy and Maritime Commission with a total capacity of 11,000,000 horsepower, or seven and a third times more than was manufactured in 1941. These modern turbines have a fuel consumption rate 25 to 40 per cent less than those for the same type of vessels in World War I.

■ STEEL INDUSTRY EMPLOYS THOUSANDS OF WOMEN

NEW YORK—Almost 37,000 women now are working in steel plants, according to the American Iron and Steel Institute. In addition, approximately 27,000 women are employed in steel company offices. Women account for about one-tenth of total employes in the steel industry.

■ STEEL MILLS PROVIDE HUGE FREIGHT TONNAGE

NEW YORK—Almost one out of every four tons of freight hauled by American railroads in 1942 consisted of either raw materials for steel mills or was steel shipped from the mill to the war industries. Railroad freight going to and from steel plants filled nearly 6,400,000 cars.

■ NEW CARGO PLANE AS EASY TO LOAD OR UNLOAD AS VAN

BALTIMORE—A cargo plane which can be loaded and unloaded as easily as a motor van is announced by the Glenn L. Martin Co. for postwar service. Radically new features include a loading door under the tail surfaces; a collapsible ramp running to the ground or direct to a truck; built-in winches, and adjustable jacks for relief of strains on the plane itself.

Metal Producers Allowed Advance Premium Payments

Producers operating "zero quota" properties under the premium price plan for copper, lead and zinc, may obtain, in addition to the base price for ore and concentrates, from the smelter an advance of 90 per cent of the premium payable on their "zero quota" production, effective on August deliveries. Advance payments will be paid by various smelters and mills acting as agents for Metals Reserve Co. under the premium price plan.

Scrap Dealers To Buy MRO Supplies Under P-136

Use of preference ratings by scrap metal processors for maintenance, repairs, and operating supplies is now controlled by order P-136 instead of CMP regulation No. 5. Order P-136, as revised, now provides in part that processors must obtain a certificate and serial number before they are eligible to use the AA-2 priority rating for the purchase of MRO supplies. It restricts minor capital additions obtainable under the order to \$250.

Steel Landing Mats Made Of 10-Gage Strip

In the story on steel landing mats appearing on page 112 of the Aug. 9 issue of STEEL it was incorrectly stated that quarter-inch plate is used in the production of these mats. These landing mats actually are fabricated from 10-gage strip steel.

Optimist: A Man Who Anticipates More Steel for Home Front Soon

OCR does not intend to reopen substantial manufacture of consumer items, says WPB Vice Chairman Whiteside, but will meet minimum essential needs. . . Shortage of critical metals against fourth-quarter requests is reported

INCREASED allotments of critical metals for manufacture of civilian goods seem to be out of the question for at least the remainder of 1943. This contradiction of a current belief is justified by the prevailing war materials situation and the War Production Board viewpoint predicated on those circumstances. To summarize, the conditions are:

Carbon steel requests from claimant agencies for the fourth quarter total 4,000,000 tons more than the available supply. These include 940,000 tons of rails and other maintenance necessities for the nation's railroads. Output of munitions and aircraft is lagging. War fronts are all going strong—but the production sector back home is not providing what it takes to win wars.

Total requests from claimant agencies for carbon steel for use during fourth quarter amount to slightly more than 19,500,000 tons compared with an estimated supply of a little under 15,500,000, representing a deficit of about one-fifth.

Requests of the Army, Navy, Aircraft Resources Control Office and Maritime Commission for carbon steel, taken together, were reduced by about 9 per cent in the allotments just made by the Requirements Committee, War Production Board. All other requests, including those for export, were reduced about 17 per cent. The steel allotments are final and the committee will not, as in the past, entertain requests for supplemental quantities during the quarter.

Fourth quarter allotments of controlled materials, made it clear that military and essential civilian demand for other critical metals also continues to outrun available supplies.

"Although carbon steel supplies were the controlling factor in making allotments of copper, aluminum, and alloy steel, the latter are still extremely tight," Donald M. Nelson, WPB chairman, said last week. "Copper production particularly, is adversely affected by current serious manpower shortages."

The fourth quarter "pie" was divided among the 16 claimant agencies representing military and civilian requirements, lend-lease and other exports. More realistic production programming is reflected by the fact that the overall re-

duction of the claimants' requests amounted to only 13 per cent, J. A. Krug, chairman of the Requirements Committee, pointed out. In making third quarter allotments last spring, it was necessary to lop off a total of 25 per cent to keep production schedules within available supplies.

Office of Civilian Requirements received a somewhat larger allotment than was made for its purposes in the third quarter, and an earmarked account in the lend-lease allotment is reserved for the manufacture of farm machinery to be used as needed by the Office of Foreign Relief and Rehabilitation in occupied countries.

"In the face of such shortages, the degree of essentiality of an individual product, whether it be a gun or a cook stove, is the measure by which allocations of critical materials are made," Mr. Nelson said.

"It is of equal importance to maintain the health and welfare of the soldier on the fighting front and the worker on the home front. Production of goods



ARTHUR D. WHITESIDE
Seeks to aid civilian economy without hampering military effort

for both is the responsibility of the War Production Board."

It is the function of the Army, Navy, Office of Civilian Requirements and other claimant agencies to determine the quantities of their programs. These determinations are matched against each other by the Requirements Committee which determines the essentials.

"That is the basis of the program," Mr. Nelson continued. "If it becomes necessary to produce a given quantity of cook stoves or farm machinery or whatever, to maintain civilian health and welfare, we are going to produce them regardless of the scarcity of the materials involved."

"That is the policy of the War Production Board and a policy with which the leaders of the interested agencies of government are in complete agreement. We have no intention of deviating from it."

Reflection of this policy is found in WPB Vice Chairman Arthur D. Whiteside's statement regarding the tentative program presented by the Office of Civilian Requirements for production of essential consumer goods. Because of critical materials required, OCR does not intend to reopen substantial manufacture of many civilian items, said Mr. Whiteside. He continued:

"By wise use of about the same quantities of materials that have been made available for civilian production during recent months, essential civilian services and the production of essential civilian goods can be maintained. The needs of the war at present permit no other course."

"The civilians of this country realize that a continuing drop in the quantities of goods which formerly made up their standard of living must be expected during a total war, and that every possible resource must be directed toward military victory. Our objective is to provide the

(Please turn to Page 137)

AUTO REPAIR PARTS

Sufficient new and reconditioned automotive parts will be made available to keep the nation's essential automobiles rolling through 1944. War Production Board said last week. Even the country's 5,000,000 vehicles 10 years and older will be provided for in the parts replacement program.

A portion of this supply will originate with scrap dealers and auto wreckers who must save usable or reconditionable parts from cars which they dismantle. Buyers of new or reconditioned parts must turn in the corresponding part being replaced.

Production of over \$400,000,000 worth of new parts for civilian cars a year will be in addition to the automotive industry's huge output of military goods which reached an annual rate in June of \$8,700,000,000.

Moves Initiated To Spread Out Available Work

Government agencies ask prime contractors to subcontract in less critical labor areas. . . Tool builders discuss conversion

BROADER distribution of available war work in an effort not only to step up output to meet projected production schedules, but also to utilize as far as possible facilities of shops which have been adversely affected by contract cut-backs and cancellation of orders, is seen in moves being initiated by the various government agencies.

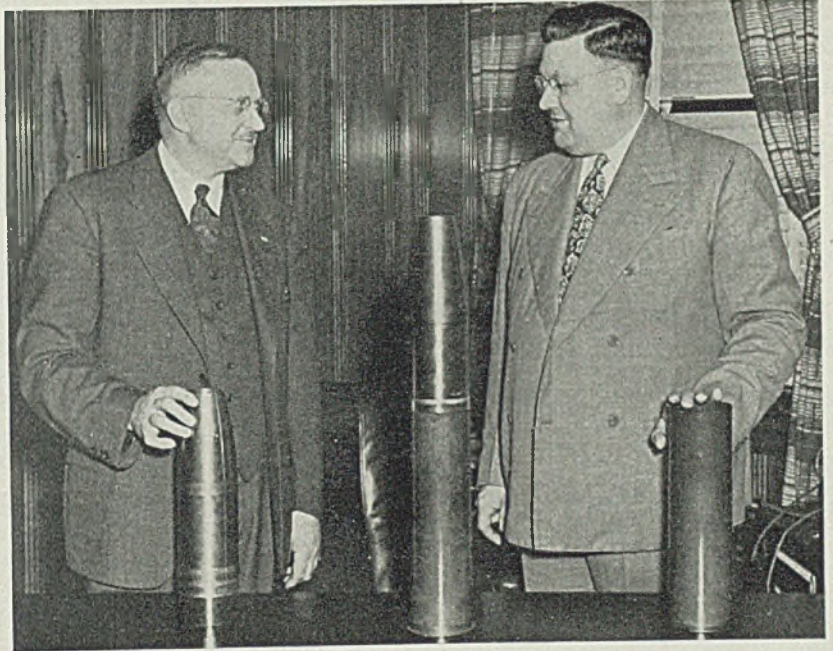
Last week, due to the increasing shortage of manpower in certain critical areas, approximately 1000 prime contractors with order backlogs totaling \$5,000,000 or more each were requested to place subcontracts for fabrication of products in the less critical war areas. The request, which was called "vital to the war effort," was contained in a letter signed by Chairman Donald Nelson of the War Production Board, Chairman Land of the Maritime Commission, Under Secretary of War Patterson, Under Secretary of Navy Forrestal and Clifton Mack, director of the Procurement Division, Treasury Department.

In effect the letter urged prime contractors to follow the same policy in placing subcontracts which the federal government observes in placing prime contracts. For months federal agencies have been making every effort to place prime contracts in non-critical labor areas.

Manufacturing industry has been affected over a wide area in recent months through the cancellation of numerous Army contracts; these cancellations stemming from changes necessitated by developments on the battle fronts. Within the past ten days cancellation of a \$60,000,000 order for tanks was disclosed by the War Department. Brig. Gen. Albert J. Browning said this was one of the largest contract terminations which the War Department had ordered, but he withheld details. Nearly 5000 subcontracts were involved in this cancellation.

Further contract cancellations and cut-backs are expected as the war proceeds, though it is not indicated that any sharp or radical additional revisions are now in prospect.

Indicative of what is being done to



ALL-STEEL CARTRIDGE: Fast dwindling stock piles of brass necessitated redesigning cartridge cases using steel as a substitute. Here Howard Kulas, vice president in charge of operations, Mullins Mfg. Corp., Salem, O., is shown left inspecting the new cases with Harry Heckathorn, vice president at the Youngstown Pressed Steel Division, Mullins Mfg. Corp., Warren, O. The new all-steel cartridge is in mass production for the Army

meet the situation resulting from the cancellation of contracts, the Machine Tool Industry Advisory Committee of the Tools Division, War Production Board, at its meeting in Washington last week discussed plans for conversion of unused machine tool capacity to the production of other war material with a minimum expenditure of additional machine and manhours.

Discuss Direct War Items

The meeting brought out that production of direct war items by the industry could not be expected to approach the difference between its machine tool production rate in 1944 and its maximum rate, as the maximum rate was made possible by a substantial volume of subcontracting and by high production of its items for which the equipment and skills of each plant were best adapted.

The committee recommended that a subcommittee be appointed to report further at an early date on the level of operation to be expected from the machine tool industry in production of machine tools and of war goods during coming months.

The operation of WPB directive 23, requiring the screening of preference rating certificates for machine tools in regional and district WPB offices, was reviewed, as this important regulation is designed to get existing machine tools

into use and to hold down expenditure of additional machine and manhours for new equipment.

The present net new order position in the machine tool industry ran only slightly more than one-third of shipments for the month of June, the committee was informed. It is recognized that the majority of unfilled orders should be produced and shipped at the earliest possible date with consequent rapid reduction in shipments expected as the year draws to a close.

The effect on machine tool production of the discontinuance of pool orders, which were a substantial factor in providing adequate supplies of machine tools during the period of peak needs, was considered by the meeting. Issuance of new pool orders for machine tools has been discontinued following a recent policy decision by the armed services and WPB. It was emphasized by committee members that discontinuance of such orders would inevitably force down production, as machine tool builders without pool orders will be forced to operate within their firm order pattern.

Reports were given on expected programs and there was considerable discussion as to the extent of possible retooling of present programs to save manhours and the probable extent of economical replacement of old equipment with new in war production.

242,929 tons of steel was produced, about 1,562,000 tons more than in the corresponding months of 1942.

During July the industry operated at an average of 96.4 per cent of capacity, rated as of the first of this year. By comparison, production in June represented 94.6 per cent of capacity, while in March operations reached full 100 per cent when production totaled 7,670,187 tons. In July, 1942, operations averaged 94.5 per cent.

Steel Corp. Shipments At Better Rate in July

Finished steel shipments in July by subsidiaries of the United States Steel Corp. totaled 1,660,762 net tons, an increase of 108,099 tons over June movement of 1,552,663 tons but were the lowest for that month since 1941. The decline from July, 1942, was 104,987 tons and from July, 1941, it was 5905 tons.

U. S. STEEL SHIPMENTS

(Inter-company shipments not included)
Net Tons

	1943	1942	1941	1940
Jan.	1,685,992	1,738,893	1,682,454	1,145,592
Feb.	1,691,592	1,616,587	1,548,451	1,009,256
Mar.	1,772,397	1,780,938	1,720,366	931,905
Apr.	1,630,828	1,758,894	1,687,674	907,904
May	1,706,543	1,834,127	1,745,295	1,084,057
June	1,552,663	1,774,068	1,668,637	1,209,684
July	1,660,762	1,765,749	1,666,667	1,296,887
7 mos	11,700,778	12,269,256	11,719,544	7,585,285
Aug.	.....	1,788,650	1,753,665	1,455,604
Sept.	.....	1,703,570	1,664,227	1,392,838
Oct.	.....	1,787,501	1,851,279	1,572,408
Nov.	.....	1,665,545	1,624,186	1,425,352
Dec.	.....	1,849,635	1,846,036	1,544,623
Total	.....	21,064,157	20,458,937	14,976,110
Adjustment	.....	*449,020	*42,333	†37,639
Total	.....	20,615,137	20,416,604	15,013,749

†Increase. *Decrease.

Ingots Rate Rises 1/2-Point to 98 1/2%

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended		Same Week	
	Aug. 14	Change	1942	1941
Pittsburgh	100.5	+0.5	93	100
Chicago	99.5	+1.5	101	100
Eastern Pa.	95	+2	92	95.5
Youngstown	98	None	94	98
Wheeling	94	None	80.5	93
Cleveland	92.5	-1.5	97.8	89.5
Buffalo	90.5	None	90.5	90.5
Birmingham	95	None	95	90
New England	97	None	95	90
Cincinnati	87	-2	89	85.5
St. Louis	89	None	98	98
Detroit	90	+3	90	94
Average	98.5	+0.5	97	95.5

*Based on steelmaking capacities as of these dates.

Carnegie-Illinois Steel Corp. blows out Youngstown stack for relining. Rate above last year

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced 1/2-point to 98 1/2 per cent of capacity. A year ago the rate was 97 per cent; two years ago it was 95 1/2 per cent, both based on capacities as of those dates.

Carnegie-Illinois Steel Corp. blew out its Ohio No. 3 blast furnace Aug. 9 for relining. Pittsburgh Coke & Iron Co. stack at Sharpsville, Pa., is still down for repairs.

Mahoning river water temperature at Youngstown ranges much lower than last year because of supply from Berlin reservoir, holding flow more even. This aids steel processes by larger volume and more cooling effect.

Some labor trouble is hampering finished steel production at certain mills, principally at Buffalo currently.

Automotive War Production Continues To Score Gains

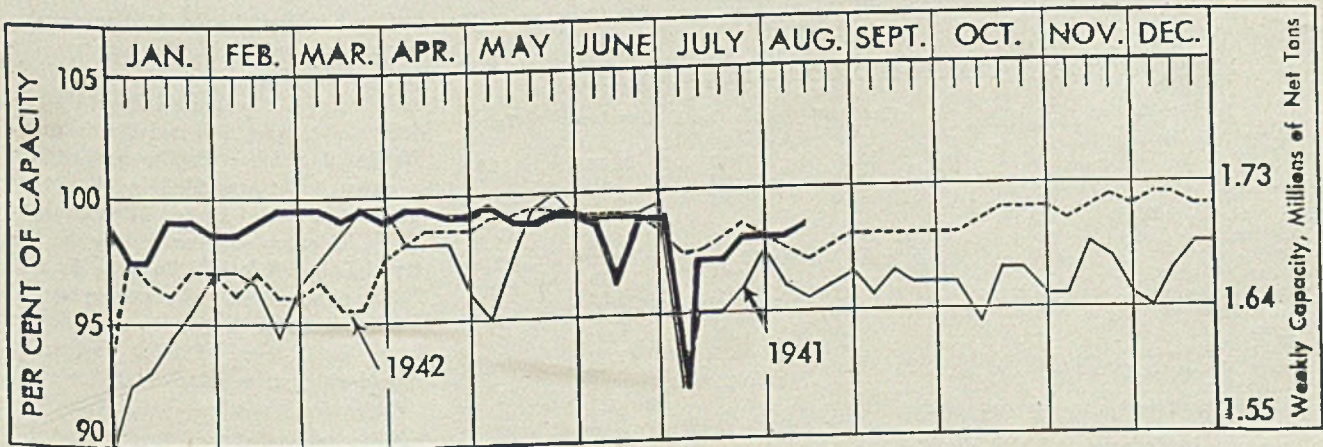
Automotive plants, steadily increasing their productive capacity, at present are delivering war goods totaling around \$725,000,000 per month in value, or at an annual rate of well over \$8,000,000,000. The figures are compiled by the Automotive Council for War Production.

Absorption in the problems of war production has not halted numerous analyses of the industry's postwar prospects. Executives believe postwar America will want from 20,000,000 to 25,000,000 new cars in five years.

New Electric Furnace Placed in Operation

Adding 65,000 tons annually to the nation's capacity for production of aircraft steels, a new electric furnace has been placed in operation at the South Chicago works, Carnegie-Illinois Steel Corp.

Comparative Steel Ingot Operations



STEEL INGOT PRODUCTION BY MONTHS

	Net Tons, 000 omitted											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,526	7,679	7,374	7,545	7,027	7,376	7,333	7,067	7,584	7,184	7,303
1942	7,112	6,112	7,892	7,122	7,363	7,012	7,148	7,333	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,967	6,811	7,236	6,960	7,150

	Net Tons, 000 omitted											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	5,194	4,766	5,314	5,035	5,178	4,836	5,051	5,009	4,937	5,236	5,083	5,201
1942	4,983	4,500	5,055	4,896	5,073	4,836	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,840	4,596	4,531	4,766	4,784	4,721	4,860	4,707	5,014

Fifth Regional War Labor Board Issues Foundry Wage Schedule

Going rates for key job classifications in approximately 45 labor market areas in Ohio, Kentucky and West Virginia set. . . Represent maximums which may be approved except in cases requiring special consideration

SOUND and tested going rates for key job classifications in the foundry industry in approximately 45 labor market areas in Ohio, Kentucky and West Virginia were announced last week by the Fifth Regional War Labor Board, Cleveland. They are, in effect, "ceiling" rates.

These rates represent the maximum which the regional board may approve, except in accordance with the Little Steel formula or in rare and unusual cases in which the critical needs of war production require that special consideration be given.

Specific rates were determined for Cincinnati, Columbus, Cleveland and Toledo, O., each of which maintained a 5-cent differential over the other in that order.

Employers do not have to meet the rates, Lewis M. Gill, regional WLB chairman, explained, and any adjustments proposed in accordance with these rates still require approval of the board before they can be put into effect.

Minimum sound and tested going rates for common labor have been established as follow:

60 cents in Bucyrus, Crestline, East Palestine, Findlay, Galion, Lancaster, Leontonia, Lisbon, Marion, Piqua, Portsmouth, Salem, Troy, and Zanesville, O., Covington and Newport, Ky., Parkersburg, W. Va.;

65 cents in Alliance, Ashland, Columbus, Elyria, Fostoria, Hamilton, Ironton, Mansfield, Middletown, Newark, Sandusky, and Sidney, O., Huntington, W. Va., and Ashland, Ky.; 67½ cents in Springfield, O.;

70 cents in Akron, Canton, Dayton, Kent, Lorain, Ravenna, Steubenville, Warren, and Youngstown, O.

In cities for which common labor rates have not been announced the regional board is using a tentative rate of 50 cents in Kentucky (except Louisville, 55 cents), 55 cents in West Virginia, and 60 cents in Ohio.

Try Four Plans for Ending Aircraft Production Slump

The manpower bottleneck now handicapping aircraft production is to be broken by concentration on certain aircraft

types, blanket draft deferments, wage-incentive plans, and labor priorities.

Airplane construction will be concentrated on types that "hit the enemy hardest." In this group are the B-17 Flying Fortress, B-24 Liberator, P-38 Lockheed Lightning fighter, and P-51 Mustang fighter-bomber.

Sixty-day blanket draft deferments are being issued for all West Coast aircraft workers, and these may be extended indefinitely. One wage-incentive plan would involve wage increases throughout the plant on the basis of definite production increases. The labor-priorities system would give preference to the industry which carries the highest rating.

Railroad Wage Terms Are Reported Agreed Upon

An understanding for the settlement of the wage dispute between 1,250,000 non-operating railroad employes and the railroads was formulated last week. While terms of the agreement were not revealed, it was reported that the management group acceded to the demand that the railroads approve an award of 8 cents an hour, or \$204,000,000 a year, originally recommended by a Presidential emergency board but disapproved subsequently by Director of Economic Stabilization Vinson.

Murray Can't See Eye-to-Eye with Biddle on Anti-Strike Law Ruling

INTERPRETATION of the strike provisions in the Smith-Connally act by Attorney General Biddle is protested by Philip Murray, president, Congress of In-

dustrial Organizations, in a letter to President Roosevelt which was made public last week.

The interpretation by Biddle was made in connection with the case of two Springfield, Ill., plants of the Allis-Chalmers Mfg. Co. where on Aug. 4 a majority of employes voted for a strike. Notice of a labor dispute and call for a strike ballot was filed by district 50 of John L. Lewis' United Mine Workers. The CIO group was certified by the National Labor Relations Board in June of 1942 as the collective bargaining agency for employes of the plants. The Labor board had asked Biddle whether it should conduct a strike on notice from a "minority group."

"The opinion of the attorney general," wrote Murray to the President, "could not possibly reflect the intent of Congress, and its result is sheer chaos."

According to Murray, Biddle's ruling would permit any group of employes in a plant, however small, to furnish notice for a strike ballot and be entitled to the same even though in that plant a union

MINIMUM SOUND AND TESTED GOING FOUNDRY RATES*

Job Classification	Cincinnati	Columbus	Cleveland	Toledo
Molders (A & B)				\$1.25
Floor	\$1.10	\$1.15	\$1.20	1.15
Bench	1.00	1.05	1.10	1.05
Machine	.90	.95	1.00	
Coremakers (A & B)†				1.25
Floor	1.10	1.15	1.20	1.15
Bench-Complex	1.00	1.05	1.10	.95
Bench-Simplex	.80	.85	.90	1.10
Machine	.95	1.00	1.05	1.10
Cupola Tenders	.95	1.00	1.05	1.05
Furnace Operators	.90	.95	1.00	1.05
Chippers	.90	.95	1.00	1.05
Grinders (Portable)	.75	.825	.875	.925
Grinders (Stationary)	.85	.90	.95	1.00
Shakeout Men				
Helpers (charger, cupola tender, core-up man, bench molder)	.775	.825	.875	.925
Miscellaneous (packer, core sand mixer, shoveller, pour-off, equipment mover)	.725	.775	.825	.875
Foundry Labor (sweeper, clean-up, core sand mixer helper, core box painter)	.675	.725	.775	.825
Common Labor (janitors)	.60	.65	.70	.75

*Issued by the Fifth Regional War Labor Board, Cleveland, for ferrous and nonferrous foundries. Rates for special cases, such as may arise in connection with certain types of nonferrous foundries, will be determined in relation to special circumstances.

†Where separate rates are desired for grades A and B, the rate for grade A may be set at a point somewhat above the single rate specified in the table; the rate for grade B may be set at a point somewhat below.

may be the certified bargaining agency and have a collective bargaining agreement with the employer which by its terms forbids strikes.

The effect of this ruling, according to Murray, is to confront such unions, certified by the Labor board as collective bargaining representatives and having agreements with employers, with the threat that any small number of disgruntled employes in a plant may as a matter of right submit a notice calling for a strike ballot.

"Organized labor, determined to prevent for the duration of the war any stoppage of work, is faced with the ugly opinion of the attorney general which actually encourages stoppages of work," Murray asserted. "This is a very serious problem, created by the attorney general through his interpretation.

"I respectfully submit that the seriousness of the situation warrants the resubmission of the entire matter to the attorney general and that an opportunity be afforded to organized labor to present to him the problems in the situation in the hope that an interpretation may be obtained more consistent with both the intent and desire of Congress and the war needs of the country."

Steel Production Hampered By Strikes at Buffalo

BUFFALO

Seven unauthorized work stoppages by members of the United Steel Workers, CIO, were staged in less than a week in the local area.

All operations were suspended at the Wickwire Spencer Steel Co.'s River Road plant when approximately 1400 workers left their jobs in a dispute over the wages of 60 workers.

The steel conditioning department at the Republic Steel Corp. was virtually idle when about 300 men walked out, protesting the docking of two crane operators for one hour each.

A number of mechanics and repair men walked out in the blast furnace department of the Bethlehem Steel Co.'s Lackawanna plant because the company refused to discharge a worker who had declined to join the union.

Protesting the delay of the War Labor Board in handling an application for increase of wages, about 1800 workers walked out at the J. H. Williams & Co.

Walkout of approximately 360 at the Sloan plant of the Lake Erie Engineering Corp., was experienced and the discharge of an "incompetent" worker led to a walkout of about 150 workers at the Spring Perck Co. in Lackawanna. A walkout of about 425 Crosby Co. workers



STRIKE BALLOT: First strike vote under the Smith-Connally act was taken at the Allis-Chalmers plant, Springfield, Ill., to settle conflicting claims of the CIO Farm Equipment Workers and the United Mine Workers local. The ballot read, "Do you wish to permit an interruption of war production in wartime as a result of this dispute?" Acme photo

was attributed to WLB delay on a wage-increase petition.

Buying Procedure on Warehouse Orders Revised

All orders for merchant trade products placed with a producer or another warehouse for delivery to warehouse stock on or after Oct. 1 must be accompanied by form WPB-2444 which replaces CMP-11. This change in procedure was announced by the War Production Board last week.

Orders for such products placed with producers or other warehouses prior to that date must be handled in accordance with order M-21-b-2, amended June 15.

Form WPB-2444 may be used in connection with merchant trade products through Sept. 30 but only to replace material sold from warehouse stock during the preceding 90 days on authorized controlled material orders. It may not be used prior to Oct. 1 to replace merchant trade products sold from stock on orders approved by CMP regulation No. 4.

Steel Construction Items Reclassified Under CMP

Steel shapes, plates, bars, concrete reinforcing bars, and wire products used for reinforcing concrete, in controlled material form, which have been formed, bent, punched, welded, riveted, bolted, or painted, by the fabricator, or which have been cut to specific size or length for a specific construction project by the fabricator, are to be treated as class A products instead of as controlled materials. This ruling was contained in direction No. 24 to CMP regulation No.

1, issued by the War Production Board.

Fabricators now are permitted to accept orders for all steel items going into construction as if they were class A products. All of the items covered by direction No. 24, however, must be treated as controlled materials by the customer of the fabricator in computing permitted inventories under CMP regulation No. 2.

The direction does not apply to that portion of the fabricator's operation which is subject to any order or regulation governing distribution of steel from, or the procurement of steel for, warehouse stocks.

Industry Urged To Provide More Training Facilities

Regional directors of the War Manpower Commission have been instructed to urge managers of war plants to provide more training facilities for persons already on their payrolls. This action was taken because reports received by the Commission's Bureau of Training show a steady decline of enrollments in pre-employment courses, particularly in communities where labor shortages have become acute.

"Share the Steel" Campaign Brings in 1,000,000 Tons

One phase of the Steel for Victory Drive—the "Share the Steel" campaign—has already resulted in a gain of more than 1,000,000 tons of steel for use during the last half of this year, it was announced last week by Donald M. Nelson, chairman of the War Production Board.

Disappointing Chat

POSTWAR planning businessmen did not get much encouragement from President Roosevelt's most recent address to the nation. He did not say a thing on the subject of increasing job opportunities by enabling industry to thrive. The plan to take care of returning soldiers, sailors and other service men and women that the President roughly outlined contains six points. They would receive large mustering-out pay, unemployment insurance, educational training at government expense, government credit in various forms, government insurance in various forms, liberalized hospitalization, medical care and pensions. Businessmen who have read the address carefully view it as a new, big spending plan for the peacetime era.

Copy Slants

Advertising managers and advertising salesmen will be interested in a new booklet which informs them how to aid the present campaign aimed at conserving the supply of high-speed cutting tools. It contains information on copy slants that are keyed directly to the war program. It is of value particularly in providing copy themes for many advertisers perplexed by the problem of preparing copy due to war conditions. Copies of the booklet may be obtained by writing the WPB Information Division, Conservation Section, 11th and H streets, Washington.

Political Dynamite

Several months ago Donald M. Nelson called Ernest Kanzler to Washington and asked him to make a digest of all government postwar planning proposals and submit it along with recommendations. Recently Mr. Kanzler completed this assignment. The digest, with recommendations, now is on Mr. Nelson's desk but due to his preoccupation, and that of other WPB top officials, over the urgencies of stepping up war production to maximum capacity, he does not expect to divert any time at the present to the matter. Later, when war production is a less urgent problem, he expects to give proper attention to the postwar outlook. In the meantime no publicity is being given to Mr. Kanzler's findings or recommendations.

While nobody has said so officially, Mr. Nelson's decision to devote no time at present to postwar planning also took into consideration the fact that the subject is complicated by the need for overhauling many laws now on the statute books and for overhauling administration policies. Hence, WPB recommenda-

tions might result in worsened relations with the government—a situation which might have a depressing effect on war production and on morale. There is much political dynamite in the postwar planning problem.

Uniform Policy—Maybe

One of the subjects long under debate in the Department of Commerce is the fact that whereas the department is sup-

LOOKING AHEAD

Several steel companies, in connection with their postwar planning, are taking into consideration the possibility the long-sustained government campaign for elimination of basing points may result in a universal system of f.o.b. mill prices on steel products. As a result, they are studying all possibilities for postwar expansion of steel consumption in and close to the communities in which their mills are located.

Relocation of consuming plants is likely to occur to some extent. Plans already have been made in a tentative way to shut down certain plants. Thought is being given to utilization of certain steelmaking facilities for other purposes.

posed to be the friend of industry, other government agencies, such as Justice, Treasury, Federal Trade Commission, function as policeman, tax collector and monitor and that they regard business with a cold and fishy eye and are always on the alert for an opportunity to strike out at it. Nothing ever has been done about this lack of a uniform government viewpoint toward business; it just is not cricket for Mr. Jones, as head of Commerce, to tell Francis Biddle how to run Justice. Now that the Department of Commerce has decided to take business under its wing, there appears to be a chance of creating some sort of an interdepartmental committee to consider establishment of an all-over, uniform government attitude toward business.

Rooms at Last

For the first time in years Washington hotel managers report a surplus in rooms. Not only is Congress in recess but a lot of lobbyists and other people whose jobs depend on congressional activities are out of town. Renewed congestion can be expected when Congress reconvenes on Sept. 14.

Unpredictable John

Unpredictable John L. Lewis never was more surprising than when he recently appeared before the National War Labor Board to ask for approval of the portal-to-portal pay agreement with Illinois coal mine operators. He employed a complete change of tactics and he paid marked respect and courtesy to the board members whom he only a short time ago referred to as "puny little men inflated by a sense of their own importance." So effective was his conduct that after the hearing the board members surrounded him and there was considerable conversation featured by smiles and jovial remarks. Only exception was in the case of the board chairman, William H. Davis, who took part in the group but somewhat on the stiff side. Incidentally, Mr. Lewis did not allude to portal-to-portal pay as an increase in pay. Rather, he referred to it as something morally and rightfully due the coal miners.

Not Many To Go

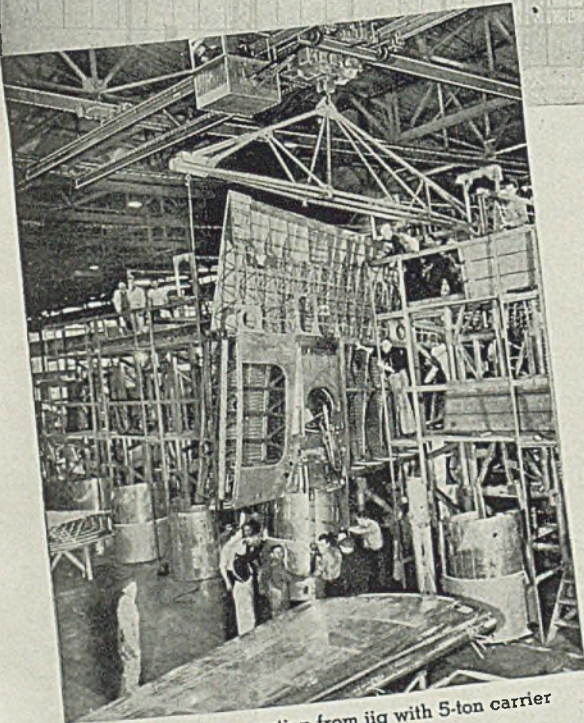
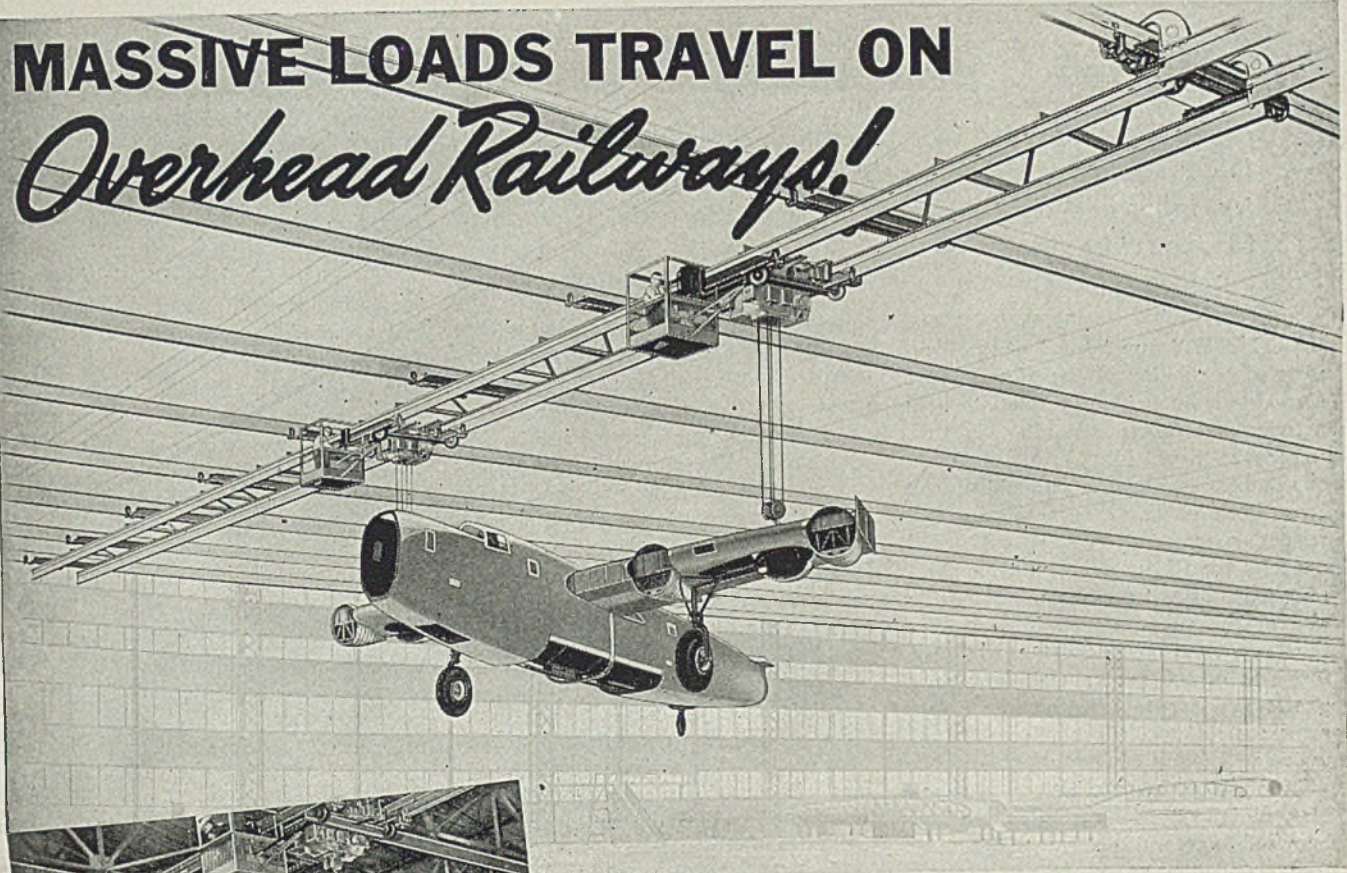
Close observers do not believe the congressional "anti-professor" mandate to the Office of Price Administration will be carried out to any notable degree. The ruling that this mandate need be applied only to section heads means that only about four more officials may go. The clique that stymied Administrator Prentiss Brown from getting better results continues almost intact.

Business Gets Break

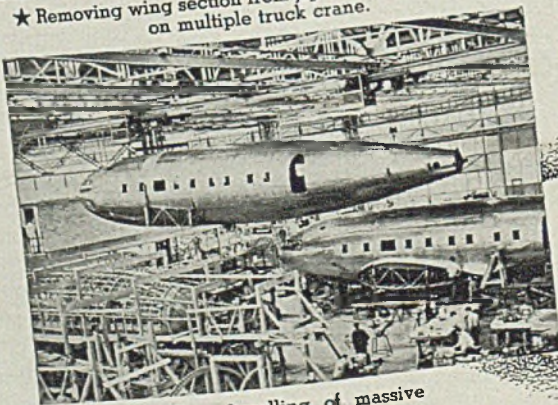
Immediately after Henry Wallace launched his bitter attack on Jesse Jones for alleged slowing down of the Board of Economic Warfare's procurement program, Mr. Jones received many complimentary letters from business leaders all over the nation. All these letters set Mr. Jones' mind at work as to what could and can be done for the welfare of private enterprise. He decided the Department of Commerce, long supposed to be the fighting champion of business and industry, but actually not doing much that would come under this head, should function from here on as industry's friend and intercessor.

He has reorganized the Bureau of Foreign and Domestic Commerce, putting it in charge of three of the department's most competent and best-liked men, with instructions as to policy. Dr. Amos Taylor, formerly in charge of the Financial Division, is the new director of the Bureau of Foreign and Domestic Commerce. Assistants to the Director are Ray Miller, formerly assistant to Undersecretary Wayne Taylor, and O. P. Hopkins, up to now acting director of the bureau.

MASSIVE LOADS TRAVEL ON *Overhead Railways!*



★ Removing wing section from jig with 5-ton carrier on multiple truck crane.



★ Up and Over handling of massive hull with Overhead Railway System.

THE problem of "up and over" movement of massive loads in the mammoth bomber plants now turning out Flying Fortresses and Liberators was solved by American MonoRail engineers.

So efficient is the operation of these "Overhead Railways" that they have become standard equipment in the Boeing, Consolidated, Martin, Douglas and Ford bomber plants, in fact, wherever 4-motor bombers are built.

Nationally known architects who built these plants recognized early in their plans the advantage of calling upon American MonoRail engineers for highly specialized recommendations. This service is available in connection with war production now or for plant conversion in the future. Early consideration of handling problems often saves valuable time and needless building cost. Call your nearest American MonoRail representative or write us today.

THE AMERICAN MONORAIL CO.

13102 Athens Avenue

Cleveland 7, Ohio



What Will Congress Do?

Legislators confronted by difficult task assembling all the facts in developing picture into coherent whole. . . Business, industry, labor and agriculture will be asked to assist in planning for the future

WASHINGTON

RECENTLY appointed Postwar Planning subcommittee of the House Ways and Means Committee is slated to hold a series of hearings soon after Congress reconvenes Sept. 14.

Members of the full committee long have been confused over the fact all major government departments and agencies have been doing postwar planning jobs of one type or another and the aim of the subcommittee is to call in the representatives of the different branches of the government, hear their stories and try to assemble them into some sort of a coherent picture out of which will ensue adequate legislation.

In addition, representatives of business, of industry, labor, agriculture will be asked to present their views and make recommendations as to what sort of legislative assistance they will need to contribute toward a healthy economy. They can get their names on the witness schedule by writing to the clerk of the Ways and Means Committee.

The subcommittee is keenly aware that it cannot reach intelligent conclusions by taking short-cuts. It proposes to make a thorough analysis of a highly complicated problem. For this reason it is expected the hearings will stretch out over a number of months and that the subcommittee will not be ready with its report until some time in 1944.

H. R. 2783 Due for Attention

Chairman of the subcommittee is Representative Walter A. Lynch (D. N. Y.). Other members are Representatives Jere Cooper (D. Tenn.), A. Sidney Camp (D. Ga.), Noble J. Gregory (D. Ky.), Daniel A. Reed (R. N. Y.), Donald H. McLean (R. N. J.), Richard M. Simpson (R. Pa.).

Chief concern at the start of the hearings will be over H. R. 2783, "a bill to provide for postwar planning, and for other purposes." Originally introduced by Mr. Lynch on Feb. 18, it was changed to incorporate certain suggestions made by President Roosevelt. It was reintroduced in its present form on May 24. The bill is cited as the "Federal-Aid Planning Act of 1943." This is the bill under which public works projects would be carried on by the individual states with funds donated or loaned by the Treasury.

It would provide for annual appropri-

tions, beginning with the fiscal year June 30, 1944, of a sum "not less than \$10,000,000, which shall be used for making payments to the states which have complied with the provisions of section 103 of this act." The purpose is that of "encouraging, co-operating with, and giving financial assistance to the states, and the political subdivisions thereof, in establishing and supporting agencies to prepare, revise, and maintain comprehensive plans and programs for their development."

Provides Funds for Surveys

Section 103 provides for the establishment of state planning agencies and defines procedure to the end that federal funds advanced to the states are used for the desired purposes.

The bill also provides for an appropriation of not more than \$75,000,000 for advances by the President, through existing federal agencies, to the various states to be used in making "examinations, surveys, investigations, and architectural and engineering plans and specifications for specific public works and improvement projects as may be necessary to facilitate and expedite the selection and inauguration of such works in the postwar period."

In other words, the Lynch bill has only one factor in mind—that is, the use of public works projects in providing employment.

But that does not mean such factors as the effects of labor laws and the treatment of investors will be ignored.

As one spokesman puts it, "We will start out by considering H. R. 2783 and then will feel our way along. What we have in mind is to provide jobs for our boys when they come home from the war, and we are going to examine into all the ways in which that objective can be attained. We do not want our soldiers and sailors selling apples after this war."

If the hearings are carried out in this spirit, therefore, it seems assured that employers' recommendations will receive adequate consideration.

Three other bills that were referred to the Ways and Means Committee are worthy of comment because they reflect some of the present congressional thinking on the subject of postwar planning. They are H. R. 372, H. R. 1952 and H. R. 3058.

H. R. 372, introduced by Representative Jerry Voorhis (D. Calif.), would "provide financial credit for national defense in time of war without incurring public debt." It would "prevent postwar depression" and "provide for an orderly transition from a war economy to a peace economy."

Financial credit loaned by banks commonly fulfills all the functions of money, states the bill's preamble, and is therefore money in the sense of article 1, section 8, of the Constitution of the United States, which states that "The Congress shall have power to coin money, regulate the value thereof, and of foreign coin."

The custom of the government in borrowing financial credit from the banking system increases the public indebtedness, the preamble goes on. This is all wrong because "the financial credit thus lent to the government is in reality based upon the real credit of the people, which belongs to them and not to the private banking system."

H. R. 372 would authorize the Secretary of the Treasury to issue United States currency notes in the amount of congressional appropriations for military purposes, minus certain net increases in revenue that would result from levying "such wartime surtaxes as will cause an increase in gross revenue as nearly as possible equal to the rate of consumption of war supplies, so that replacements of war supplies consumed may be paid for by tax revenues, while any increase in the total of supplies involving a rising curve of physical production will be paid for by further issues of United States currency notes." Such surtaxes would be repealed after the war.

Refunds Are Termed "Bonus"

The currency notes would get legal tender in payment of all debts, public and private, but would not be eligible to be used as cash bank reserves, except as a 100 per cent reserve against an equivalent total amount of deposit liabilities. Upon the conclusion of the peace the Secretary of the Treasury would pay pro rata shares of the unexpended balance in the national defense credit accounts, in twelve monthly installments, to every American citizen aged 21 or older. These monthly payments would be known by the title "The Citizens' Victory Bonus."

Representative Voorhis introduced his bill on Jan. 6, 1943 and so far he has not got far with it. His plan to revolutionize the monetary system is one that not many congressmen can understand. The bill is a brain-tickler and anyone in search of diverting mental exercise will do well to write to the House Documents room for a copy.

H. R. 1952, introduced by Representa-

tive L. Mendel Rivers (D. S. C.) in February, is aimed at helping states and local subdivisions to begin accumulating financial reserves now to facilitate postwar expenditures for public works. It would authorize the issuance of special war savings bonds for purchase solely by the states and their political subdivisions, under attractive discount features. They would be redeemed on an annual interest basis of not less than 4 per cent, and would mature in not more than five years.

H. R. 3058, introduced June 25 by Representative Melvin J. Maas (R. Minn.) as "The Municipal Postwar Project Act of 1943," would encourage public works projects by means of federal loans. The projects visualized include construction

appointed two subcommittees which are getting ready to go into action soon after Congress reconvenes. One of these is the Subcommittee on Postwar Studies and is headed by Senator Joseph C. O'Mahoney (D. Wyo.), the other members being Charles L. McNary (R. Ore.) and Scott W. Lucas (D. Ill.). The other is a one man Subcommittee on Highways and Navigation; Senator Carl Hayden (D. Ariz.) heads this subcommittee which probably will be enlarged.

It will be the immediate concern of these subcommittees to study H. R. 2795, already passed by the House, and which was referred to the Senate Committee on Expenditures in the Executive Department. The other is H. R. 2959. These

Hayden (D. Ariz.), Joseph C. O'Mahoney (D. Wyo.), Claude Pepper (D. Fla.), Scott W. Lucas (D. Ill.), Charles L. McNary (R. Ore.), Arthur H. Vandenberg (R. Mich.), Warren R. Austin (R. Vt.) and Robert A. Taft (R. O.).

It is quite likely that as soon as the Senate and House groups arrive at a better understanding of postwar legislative needs a joint Senate-House committee will be set up. With the war news more favorable, Congress as a whole is expected to recognize the urgency of setting up a postwar plan before war ends.

Special Government Bureau To Work with Associations

Establishment of a special unit in the Bureau of Foreign and Domestic Commerce to work with the 2000 national trade associations has been completed. The unit will consolidate existing functions of the bureau in the trade association field, and will not include any expansion of personnel or expenditures.

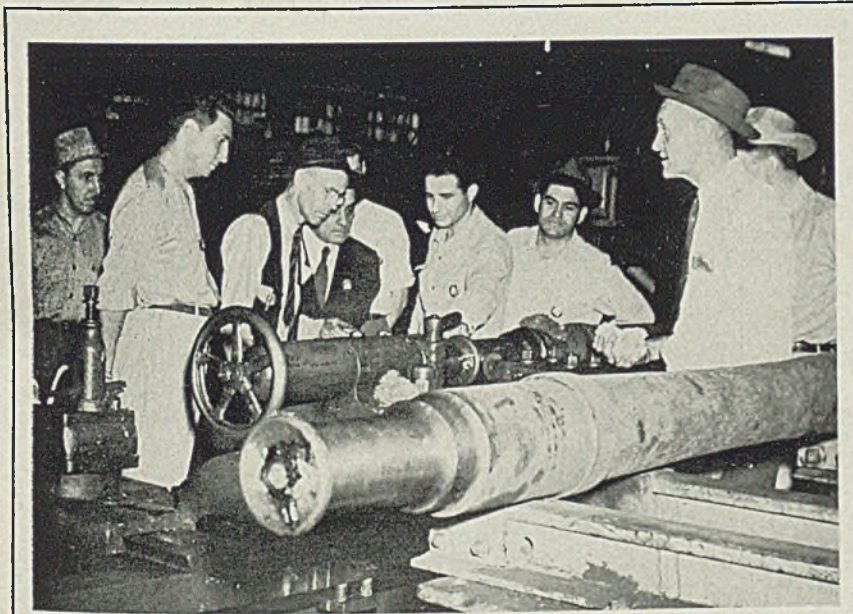
In addition to national or regional trade associations, there are 7000 state and local associations, a large number of which are in regular contact with the Commerce Department. The ever increasing problems incident to the war, the bureau points out, have borne heavily on these organizations' executives, especially where they have been drawn into the war effort on behalf of their industries, and it is believed the co-operation offered by the bureau's new unit can be helpful in meeting them.

The unit will be headed by C. J. Jenkins, who has been in immediate charge of trade association work for the Commerce Department for over ten years.

Group Appoints Committee To Study Renegotiation Act

Illinois Manufacturers' Association has appointed F. N. Bard, president, Barco Mfg. Co., Chicago, chairman of a special committee to make a thorough study of the renegotiation of government contracts. The association has expressed the conviction that excess profits should be recovered through the revenue laws and that war agencies should not be acting as tax collectors.

Among other members of the committee are: H. M. Dudley, Pullman-Standard Car Mfg. Co.; M. Keck and G. P. F. Smith, Borg-Warner Corp.; R. D. Wood, Mississippi Valley Structural Steel Co.; W. W. Miller and W. Reetz, Stewart-Warner Corp.; S. S. Sager, Chicago Hardware Foundry Co., and Fred H. Johnston, Goodman Mfg. Co.



FOR OVERSEAS STEELMEN: A group of men from all parts of the world has been brought to this country by the United States Steel Export Co. to familiarize them with United States Steel Corp. plants, products, and export procedure. Here foremen at the Homestead Steel works, McKees Rocks, Pa., demonstrate the burnishing of axles. In the picture, left to right, are: P. M. Reis and W. S. Saenger, of Brazil; Frank Allison, lathe shop foreman; S. G. Tsamis, of Egypt; J. R. Bert, of New York; W. J. Aranda, of Chile, and Harry Klinger, general foreman of the plant's inspection and shipping department

or repair of municipally owned buildings, airports, water systems, sewage disposal plants and so on. This bill would appropriate \$25,000,000 annually, beginning with the fiscal year ending June 30, 1944, so that municipalities would be encouraged to prepare construction programs and have them ready immediately after the emergency is over. The bill specifically reserves the right of Congress and the administration to authorize future distribution of government construction funds.

In the Senate, the Special Committee on Postwar Economic Policy and Planning (STEEL of July 26, p. 50) recently

bills (STEEL of July 19, p. 84) are aimed at distribution of government-owned goods, including aircraft, in the postwar era in an orderly way and with least shock to the economy. These Senate Subcommittees, as is the case with the House Postwar Subcommittee, will feel their way along and they hope within a few months to have outlined a broad program as to legislation needed to guarantee jobs in the postwar period.

Full membership of the Senate Special Committee on Postwar Economic Policy and Planning includes Senator Walter F. George (D. Ga.), chairman, and Senators Alben W. Barkley (D. Ky.), Carl

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ALUMINUM PRODUCTS: Producers must refuse orders for delivery of aluminum products, including authorized controlled material orders and orders covered by aluminum-magnesium (AM) authorization numbers, unless he expects to be able to make delivery in the month specified in the order. They must refuse orders covered by their production directives when total orders scheduled for delivery in the month requested equal 110 per cent of the amount of such product authorized on their production directives. Orders not covered by a production directive must be refused when the producer's total orders for the product equal 105 per cent of his total expected production for the month in which delivery is requested. After accepting orders for delivery of aluminum products, if a producer finds he is unable to make delivery in the calendar month requested, he may fill the order at any time during the calendar quarter or during the first month following the calendar quarter without reporting the fact to WPB or receiving another allotment number.

If a producer is unable to make delivery during this period, he must notify the Aluminum and Magnesium Division of this fact by the last day of the quarter for which the order was accepted. The notification must include (1) allotment number, (2) name of the customer, (3) material covered by the order, (4) a statement as to when the producer can schedule the order for delivery. The producer then may fill the order for the products even after the end of the first month following the quarter in which delivery was requested without requiring a new allotment number.

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A customer still has the right to cancel his order for failure to deliver on time.

MRO SUPPLIES: Many purchasers of medical, surgical and dental goods are incorrectly applying ratings assigned under CMP regulations 5 and 5A to items covered by priorities regulation No. 3. MRO supply ratings cannot be applied to items appearing on lists A and B of priorities regulation No. 3. Items appearing on list A can be procured or sold regardless of any preference rating. Suppliers must not require a rating as a condition of sale for those items. List B covers a number of items which may be MRO supplies but which cannot be purchased with ratings authorized by CMP regulations 5 and 5A or any other blanket MRO rating. The only ratings which have validity are those authorized on WPB forms giving the specific item and quantity to be purchased. These are PD-1X, PD-1A, PD-200, PD-3A, and section A of PD-405.

CMP REGULATIONS

TESTING STEEL: Purchases now are permitted to receive for testing purposes sample orders of steel up to 1000 lb. of any one composition or a total of 3000 lb. of all compositions. This applies to all types of steel except stainless, tool steel and steel castings. Sample order delivery requirements for testing purposes on all other controlled materials, including stainless steel, tool steel and steel castings, continue to be limited to 1 per cent of minimum mill quantity which is prescribed with respect to the various types of controlled materials in schedule IV of CMP regulation No. 1 (CMP No. 1)

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Steels, Tool and Alloy	M-21-h
Strapping, Metal	M-261

Price Regulations

Aluminum, Secondary	No. 2
Furnaces	No. 188
Machines	No. 136
Silver, Scrap	GMFR

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GAGES: Schedule VI to order L-272 limits sizes of welding apparatus gages to 2-inch and 2½-inches diameter. Manufacturers now are prohibited from putting his customer's name or trademark on the dials, thus simplifying distribution. (L-272)

BROOMS: Use of metal in production of brooms is limited as follows: Amount of metal in case is limited to 2 ounces with 4% ounces permitted when 20 ounces or more of broom corn or other fiber is used; metal hangers or caps on all brooms and whisk brooms are banned; in case of so-called "metal cap brooms", no more than 5¼ ounces of metal may be used in the cap except that 6¼ ounces are permitted for brooms containing over 20 ounces of broom corn or fiber; number of turns of wire holding the fiber to the broom are limited. (L-283)

KETTLES: Kettles using steam at working pressures less than 90 lb., regardless of end use, are covered by order L-182 (Commercial Cooking and Food and Plate Warming Equipment) while those designed to operate with steam at working pressure of 90 lb. or over are controlled by order L-292 (Food Processing Machinery). (L-182)

M ORDERS

TOOL AND ALLOY STEELS: Limitation on use of vanadium by tool steel producers

in the manufacture of hot-work steels and certain other alloy steels, except high speed steel, has been eased. Two classifications of high-speed steel have been redefined, setting formulas on each. Melting of high-speed steel, except within the specifications prescribed, is prohibited and quarterly melts are limited to 35 per cent of class B by weight to total high-speed steel melted during that quarter. A similar proportionate limit is placed on deliveries of class B steel but this limit on orders does not apply to placement of orders for high-speed steel with warehouses. (M-21-h)

METAL STRAPPING: Reinforcement metal edging on returnable cases, such as are used for delivering bottle beer, bread, etc., are not classified as metal strapping under the order covering strapping for shipping containers. (M-261)

P ORDERS

CIVILIAN AIRCRAFT: Assignment of preference ratings and the allotment of controlled materials necessary for the operation of commercial air liners, planes of the War Training Service, and Civil Air Patrol aircraft is now permitted. Means are also provided by which aircraft components, including controlled materials, may be directed to the operators properly entitled to receive equipment which has been set aside for them by the Aircraft Resources Control office and the Joint Aircraft committee. (P-47)

REAGENT CHEMICALS: A standard form of certification as to the uses of reagent chemicals ordered by research and other laboratories is provided by order P-135-a. The order also provides that each laboratory shall be entitled to the full small order exemption. Under the standard form, the purchaser certifies to the seller and to WPB "that the reagent chemicals called for by this order will be used, or resold for use, in a laboratory for one or more of the following purposes: analysis, testing control, educational or research." (P-135-a)

PRICE REGULATIONS

SCRAP SILVER: Ceiling price for scrap silver sold under the WPB order M-199 as Treasury or domestic silver casting metal is established as the seller's March, 1942, price plus 36.125 cents per fine troy ounce of contained silver. Previously the maximum price was the seller's highest price charged in March, 1942, plus 9.634 cents per fine troy ounce of contained silver. (GMFR)

SECONDARY ALUMINUM: Sellers of aluminum scrap under contracts entered into prior to June 23 of this year may make delivery until Aug. 23 at the old higher maximum prices in effect prior to June 23. Secondary aluminum ingot also may be delivered at the old higher prices until Aug. 23 under contracts entered into before Aug. 1. (No. 2)

MACHINES: Price control over replacement units and assemblies for mechanical refrigerators of domestic type has been transferred from the general maximum price regulation to the overall machinery price regulation. Only manufacturers' and wholesalers' sales are covered by the action. The items are placed in appendix B of regulation No. 136 which provides a formula method of computing prices reflecting prices in effect on March 31, 1942. (No. 136)

SAFETY EQUIPMENT: Services involving equipment used for the protection of property against the hazards of fire and theft are specifically subject to price ceilings as established by the services regulation. Included among this equipment are fire alarms, sprinkler systems, watchman boxes, burglar alarms, and other similar devices for detection of, or for protection against loss or damage by fire, theft, burglary or sabotage. (No. 185)

PLASTICS AND FLINT FIRE CLAY: OPA regional offices now are authorized to adjust ceiling prices for crude and processed plastic and flint fire clay in cases of local shortages. The provision covers only the fire

clay delivered within 100 miles of the point of production and was effective as of Aug. 12. (No. 188)

FURNACES: Manufacturers of cast iron coal-fired warm-air furnaces are permitted to increase their present ceilings and lowest current published list prices by 9 per cent, effective as of Aug. 4. A dollars-and-cents adjustment to the extent of increased cost also may be made at the jobber and retail levels. (No. 188)

Management Consultant Division Set Up in WPB

Management Consultant Division has been established within the War Production Board.

The new division was organized with John W. Nickerson of Manchester, Conn., as director to advise on broad management practices to promote effectiveness in war production. It will collaborate with the Labor Production office in finding ways to raise output through better industrial relations and improved management practices.

Appointments-Resignations

Roy W. Johnson has been appointed director of the Facilities Bureau, succeeding Charles E. Volkardt. Mr. Johnson had been deputy director of the bureau since the first of July. John B. McTigue has been appointed deputy director of the bureau.

John F. Skillman has been appointed acting deputy chief, Materials Branch War Production Board. He also will continue in his capacity as chief of the Ferrous Metals Section of the Materials Branch. He has been associated with WPB since June, 1942, and previously was the Detroit manager of the Bergen Mfg. division, Republic Steel Corp.

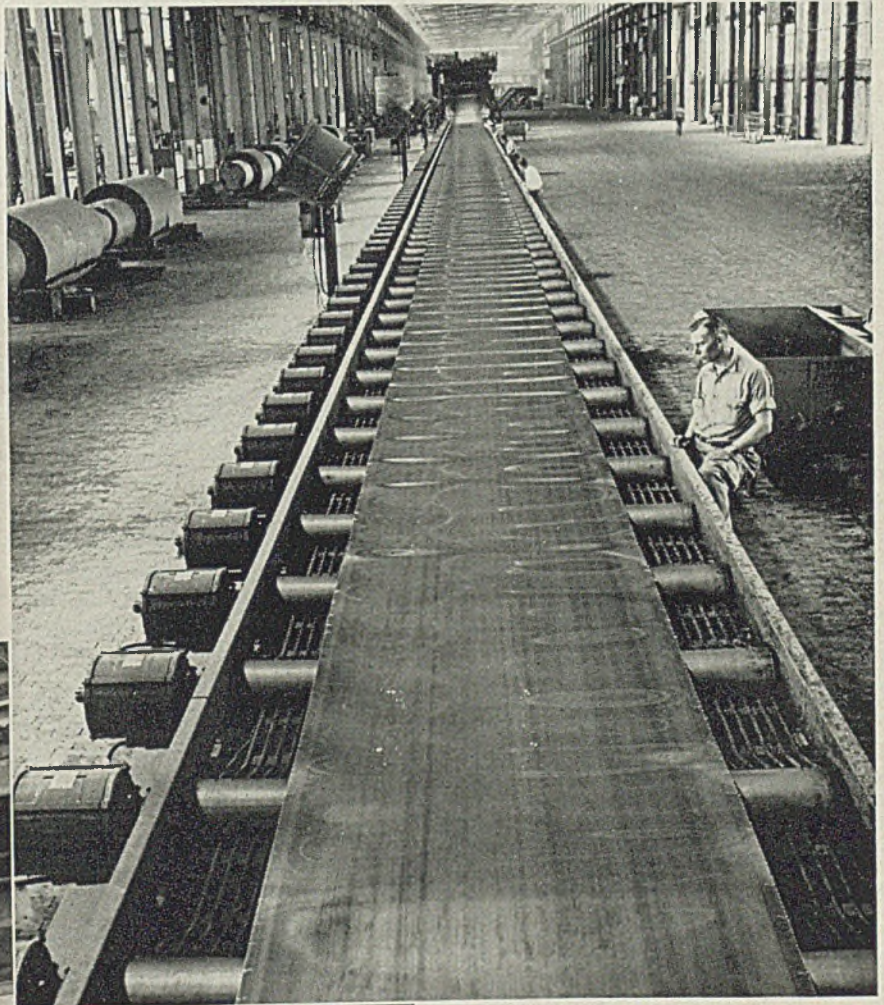
William S. Hammersley has been appointed director of the Consumers Durable Goods Division, WPB, succeeding Dudley P. Felt. Mr. Hammersley was formerly associated with New Jersey Zinc Co., and Reynolds Metals Co.

Dexter M. Keezer, has resigned his position as deputy administrator of the Office of Price Administration in charge of professional services. He has joined the Office of Lend-Lease and will work with the Harriman mission in London.

Robert M. Hatfield has been appointed acting director of Production Scheduling Division, Production Controls Bureau WPB. He was formerly chief of the Boiler Section, Power Division of the Office of War Utilities. Harry Zellmer former director of the division will continue with the Production Controls Bureau in a consulting capacity.

aluminum will annually require more electric power than the total consumed in 1940 in 27 of the 48 states. In fact, the amount of current required to make one pound of aluminum would light the

average American home for ten days. And for every pound of aluminum manufactured nine pounds of other materials—bauxite, cryolite, carbon, etc.—are required.



Above, run-out table for the huge "continuous mill" which rolls aluminum sheet for aircraft "skins" at the Aluminum Co. of America's new Chicago works. Aluminum sheet can be rolled over fifty times faster in this plant than with pre-war equipment. The strip of aluminum sheet shown is more than a city block long

To the left is shown the large hot mill at the Aluminum Co. of America's new Chicago works. This mill rolls aluminum alloy ingots into slabs preparatory to manufacture into sheets for the "skins" of airplanes. The Chicago works was built and is being operated by the Aluminum company for the Defense Plant Corp.

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have a capacity for producing aluminum at an annual rate of more than 2,100,000,000 pounds—more than seven times production of 1937. Each of the several new plants will be able to make more aluminum than the entire nation produced at the World War I peak.

Four price reductions since the war started have brought the price of aluminum ingot down from 20 cents a pound to an all-time low of 15 cents.

American industry is, by itself, producing more aluminum today than it is believed the Axis powers will be able to produce in combination. And the aluminum production of our allies swings the balance overwhelmingly in the United Nations' favor.

Government Owns Many Plants

In connection with the overall situation, it is of interest to know how much of the capacity to produce aluminum in the war-winning effort is coming from government-financed projects. In a censor approved statement, C. C. Carr, in charge of public relations, Aluminum Co. of America, Pittsburgh, announced at the inspection of the new Chicago works that of the more than 2,100,000,000 pounds aluminum metal production capacity which will be available in the United States within a few months, the government-owned plants built and operated by the Aluminum Co. will account for more than half of this capacity, company-owned plants will provide for one-third of it and the balance will come from other private industrialists with their own or government financing. These figures are for aluminum metal alone and do not include efficient fabricating plants, such as the new Chicago works and others elsewhere.

Mr. Carr also announced for the first time that actual production shows the same relative picture as capacity. Commencing with the last week in July, he said, production of aluminum in government-owned, Aluminum company-operated plants exceeded the metal produced by the company's own plants.

Most recent estimates show 75 per cent of the average weight of a war plane is made up of various aluminum parts. Of this, approximately 48 per cent is aluminum sheet; 13 per cent is wire, rod or bar; 3 per cent is forgings; 7 per cent is sand castings; and 1 per cent miscellaneous other aluminum parts.

More than 4000 pounds of aluminum go into the fabrication of the average pursuit plane; 11,000 pounds are required to make a medium bomber; and it takes 3,000 pounds on the average to manufacture a heavy bombing plane. Aluminum also is vital to the war in countless other ways. Below the decks

in a battleship it will be found in many applications. In the sleeping quarters on many new ships, berths and lockers are often built of aluminum. In the ship's galleys, aluminum equipment is used for food preparation. It is used for many structural purposes also on ships.

In addition, a battleship may well employ over a million pounds of aluminum and the metal also is widely used for ordnance, map making, military camera equipment, field kitchen equipment, pontoon bridges, ration packaging, and for scores of other purposes vital to the prosecution of the war.

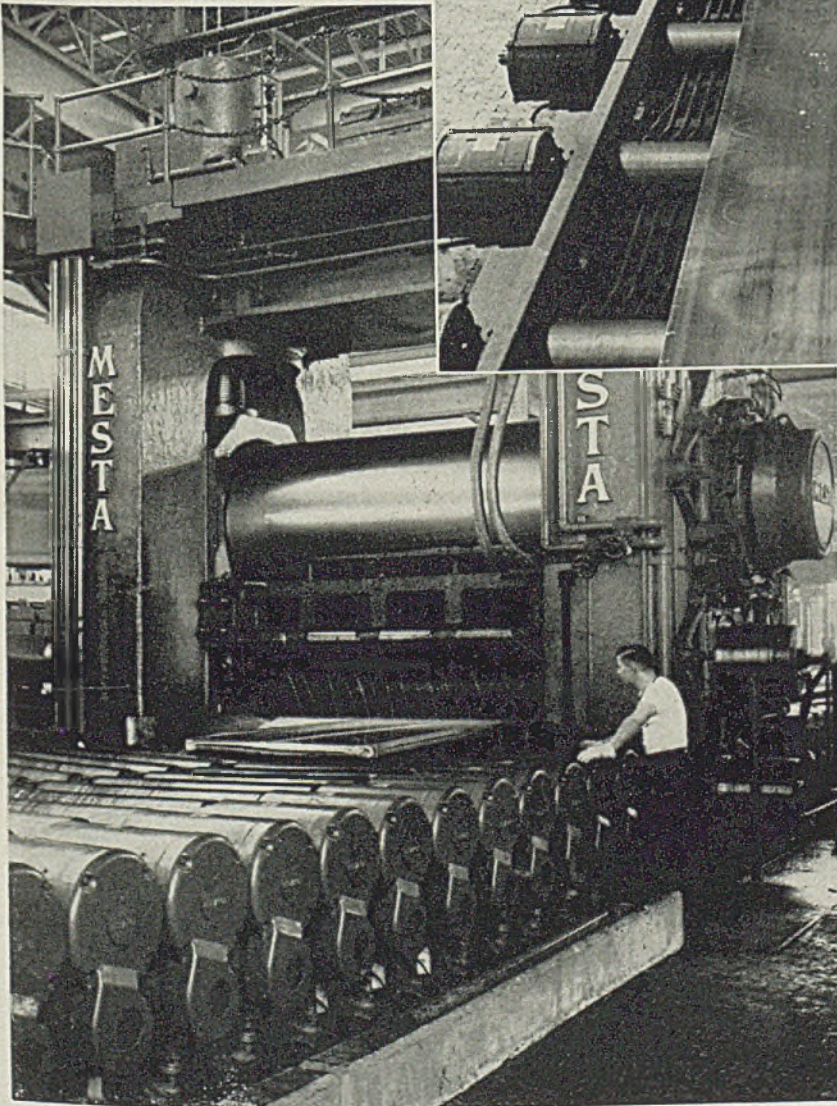
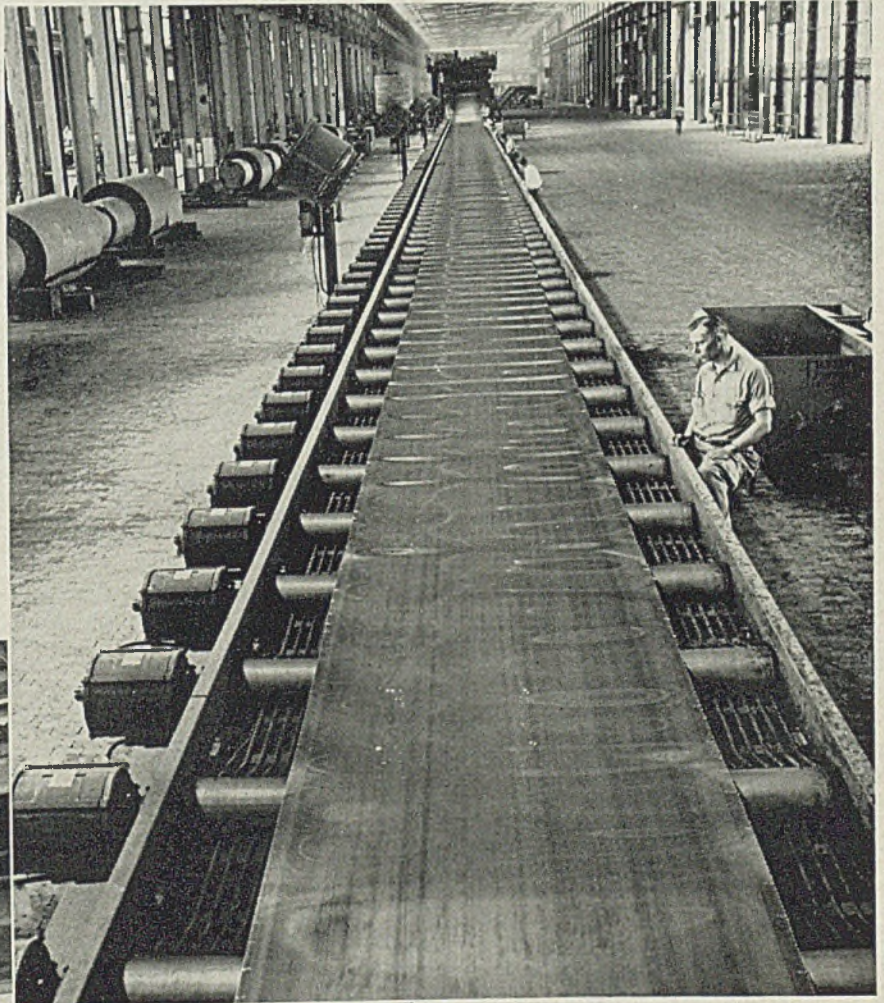
Landing boats used by the Army and Marine Corps are powered by engines with aluminum pistons and cylinders, heads as well as other important parts. Tank treads frequently are made of aluminum. Machine guns often are mounted on aluminum tripods. Many of the mess kits, canteens and field kitchens provide wartime aluminum applications.

These are only a few of the applications in which aluminum travels to the battle fronts in global war.

Production of 2,100,000,000 pounds of

aluminum will annually require more electric power than the total consumed in 1940 in 27 of the 48 states. In fact, the amount of current required to make one pound of aluminum would light the

average American home for ten days. And for every pound of aluminum manufactured nine pounds of other materials—bauxite, cryolite, carbon, etc.—are required.



Above, run-out table for the huge "continuous mill" which rolls aluminum sheet for aircraft "skins" at the Aluminum Co. of America's new Chicago works. Aluminum sheet can be rolled over fifty times faster in this plant than with pre-war equipment. The strip of aluminum sheet shown is more than a city block long

To the left is shown the large hot mill at the Aluminum Co. of America's new Chicago works. This mill rolls aluminum alloy ingots into slabs preparatory to manufacture into sheets for the "skins" of airplanes. The Chicago works was built and is being operated by the Aluminum company for the Defense Plant Corp.

MEN of INDUSTRY

Walter G. Hoffman, manager of the alloy department, Manganese Steel Division, American Brake Shoe Co., New York, has been named president of the company's recently acquired subsidiary, Electro Alloys Co., Elyria, O. W. C. Whyte, former president of Electro Alloys, continues in much the same executive capacity with the title of vice president.

—o—

Adolfo Alvarez, vice president, Compania Westinghouse Electric International, has been appointed general South American representative, Westinghouse Electric International Co., New York.

—o—

Charles T. Ruhf, executive vice president, Mack Trucks Inc., Long Island City, N. Y., since the death of E. C. Fink last January, has been elected president of the company.

—o—

John B. Lawson, former controller, Ferracute Machine Co., Bridgeton, N. J., has been elected vice president.

—o—

H. E. Cable, welding engineer, Lincoln Electric Co., Cleveland, has been appointed Pittsburgh representative for the company, assisting W. R. Persons, Pittsburgh district manager.

—o—

Millard H. Ronzone, former controller, steel division, Copperweld Steel Co., Classport, Pa., has been elected treasurer of the company, succeeding Thomas F. Troxell, resigned. Mr. Troxell continues as a board member.

—o—

Wilmer H. Cordes, advertising manager, American Steel & Wire Co., Cleveland, has been appointed head of the company's newly created sales research and development division.

—o—

R. H. Hathaway, formerly assistant chief engineer, Hammond Machinery Builders, Inc., Kalamazoo, Mich., has joined Packer Machine Co., Meriden, Conn., as sales and service engineer.

—o—

Ralph G. Rogers, on leave of absence from Servel Corp., Evansville, Ind., of which he was general superintendent, has been appointed factory manager, Evansville plant, Republic Aviation Corp., Farmingdale, N. Y.

—o—

William D. Stansil has been appointed executive manager, Manufacturers' Association, Racine, Wis.

—o—

G. W. Thomson has been appointed abrasive engineer, Norton Co., Worcester, Mass., for the territory of Oklahoma, Arkansas, western Tennessee, and the northern sections of Louisiana, Texas and Mississippi. Henry L. LeMay



WALTER G. HOFFMAN

has taken over Mr. Thomson's former territory in northern Illinois. J. P. Landers has been assigned to field engineering work in New York and New Jersey.

—o—

Walter S. Jackson, former manager of the Sharon works, Sharon Steel Corp., Sharon, Pa., has been appointed general manager of the Lowellville, O., plant and the Sharon plant.

—o—

Roger M. Bury has been named manager, Cleveland office, International Business Machines Corp.

—o—

Walter J. Murphy, editor of *Industrial and Engineering Chemistry*, and *Chemical and Engineering News*, publications of the American Chemical Society, has been appointed a member of the National Research Council, Division of Chemistry and Chemical Technology, for a period of three years.

—o—

Adolph G. Schroeder has been appointed manager, machinery department, Iron & Steel Products Inc., Chicago, succeeding A. E. Waleski, resigned.

—o—

Oliver Fraser Jr., formerly associated with United States Steel Corp., Pittsburgh; Aluminum Co. of America, Pittsburgh; Bell Aircraft Corp., Buffalo; and North American Aviation Inc., Inglewood, Calif.; has been appointed industrial engineer, Ryan Aircraft Corp., San Diego, Calif.

—o—

Capt. George R. Gottschalk has been appointed general manager, Hunter Arms Co., Fulton, N. Y.

—o—

Page N. Hamilton, former New York area representative, Harshaw Chemical Co., has resigned to open an office at 205 East 42nd street, New York, to engage in a general chemical business, and will represent W. B. Lawson, Inc.,



R. M. BURK

Cleveland, in northern New Jersey, metropolitan New York and New England.

—o—

R. M. Burk, former assistant to the vice president, National Supply Co., has been appointed sales manager, seamless products, Spang-Chalfant Inc., Pittsburgh, subsidiary of National Supply Co.

—o—

John Easton, former chief of the technical development division, Civil Aeronautics Administration, has joined the Whiting Corp., Harvey, Ill., as director of development and standardization activities, succeeding A. J. Brown, who has been appointed manager of the company's Pacific Coast branch.

—o—

E. H. Howell has been named manager, meter and instrument division, General Electric Co., Schenectady, N. Y., succeeding W. F. Howe, who has resigned but continues as consultant. Succeeding Mr. Howell as manager of General Electric's Toledo office is S. J.



MILLAR BRAINARD

Who has been appointed president, G & N Division, Cleveland Automatic Machine Co., Cleveland, noted in STEEL, Aug. 9, p. 66.



EARL L. RAMSEY



JAMES J. NELSON

Tombaugh, former sales engineer in Cleveland. I. J. Kaar and G. W. Nevin have been appointed managers of the receiver and tube divisions, respectively, of General Electric Co.'s electronics department.

Earl L. Ramsey, manager of the Diesel Division, Ex-Cell-O Corp., Detroit, has joined the staff of the War Production Board, Washington. Mr. Ramsey, who had served with Ex-Cell-O Corp. for 17 years, is associated in his new position with R. L. Vaniman, director of WPB's Automotive Division.

Ray F. Ellis has been appointed assistant general sales manager of the industrial, mill and export sales department, E. C. Atkins & Co., Indianapolis, Ind. Mr. Ellis will assist K. W. Atkins, vice president and general sales manager.

Russell B. Barnett, former Philadelphia district manager, Peter A. Frasse & Co. Inc., New York, has been appointed vice president in charge of sales. John D. Drummond succeeds Mr. Barnett as Philadelphia sales manager.

Val Hansel has been appointed New York sales manager.

William B. Griese has been named plant manager, Spencer Heater Division, Aviation Corp., Williamsport, Pa. Formerly, Mr. Griese had been plant manager of the Liquid Cooled Engine Division, Toledo, O.

James J. Nelson, former sales manager, Cramp Brass & Iron Foundries division, Philadelphia, subsidiary of Baldwin Locomotive Works, has been named general manager of the division.

Charles E. Stemmle, former assistant personnel manager, Ohio Crankshaft Co., Cleveland, has been appointed personnel director, succeeding Robert R. Hamilton, resigned.

Gordon Cole has been appointed to the newly created position of director of advertising, Can Manufacturers Institute, Inc., Washington.

E. R. Weitzel, former co-ordinating manufacturing manager, Murray Corp. of

America, Detroit, has been appointed factory manager at Murray's new plant in Scranton, Pa., and E. Kruger, former superintendent of P-47 assembly at Detroit, has been made production superintendent at Scranton. Frank McGary, formerly engineering and mechanical division head in Detroit, is manager of the new plant.

John P. Mullen has been appointed educational director, Gray Iron Founders' Society, Cleveland. Mr. Mullen will be located in the society's Washington offices.

Joseph R. Krause has been elected advisory vice president, National Bronze & Aluminum Foundry Co., Cleveland. Clarence Swallow was appointed controller and assistant treasurer.

Hudson W. Reed Jr., former safety director, American Welding & Mfg. Co., Warren, O., has been appointed director of personnel and safety.

Howard Howie has been elected president and general manager, Knoxville Iron Co., Knoxville, Tenn., succeeding H. W. VanBenschoten, retired.

Lester D. Chirgwin, general manager, Buffalo plant, Farrel-Birmingham Co. Inc., Ansonia, Conn., has been elected a director of the company.

Alfred M. Wilson, assistant to the president, Minneapolis-Honeywell Regulator Co., Minneapolis, has been elected vice president.

Homer S. Burns, assistant vice president and power superintendent, Freeport Sulphur Co., New York, will retire Sept. 1, after 31 years in the sulphur industry.

OBITUARIES . . .

William Greif, 87, founder, Greif Bros. Cooperage Corp., Cleveland, and at one time identified with 27 Cleveland corporations, including the Fanner Mfg. Co., died Aug. 8 in that city.

John Spalding, head of the Spalding Foundry Co., Atlanta, Ga., died recently in that city.

David W. Dunlevy, 76, retired president, Colonial Steel Co., Pittsburgh, died there Aug. 4.

Samuel J. Eberwein, 47, for the past

20 years assistant superintendent, Electric Furnace Co., Salem, O., died recently in that city.

O. J. Mulford, 74, president of the Gray Marine Motor Co., Detroit, and also president of the Michigan Street Car Advertising Co., Detroit, died there Aug. 3.

Walter L. Rous, for 53 years cashier, Tonawanda Iron Corp., Tonawanda, N. Y., died Aug. 2 in Buffalo.

Wilmer H. Reincke, 55 for 20 years structural and sales engineer, Wisconsin Bridge & Iron Co., Milwaukee, and more

recently a steel products sales representative, died in Milwaukee Aug. 7.

Lucius Carroll, former treasurer, American Car & Foundry Co., New York, died recently in San Francisco while attending a war conference there.

Allan Seymour, Philadelphia district manager for the abrasive division, Norton Co., Worcester, Mass., died recently.

George A. Mohr, vice president, Boye & Emmes Machine Tool Co., Cincinnati, died there recently.

Suggestions on salt bath operation



Information supplied by an Industrial Publication

Properly used, the salt bath is a very effective means of preventing decarburization of high speed, carbon, and alloy steels during heat treatment. The following suggestions are offered as an aid to effective high speed tool steel heat treatment.

1. Clean work thoroughly. 2. Immerse in a pre-heat salt at 1500-1650° F. 3. Transfer to high heat bath at 2150-2250° F. 4. Immerse in quench bath at 1100-1200° F. After cooling to room temperature, wash in a hot alkaline cleaner, then reheat in salt to 1100° F.

To secure maximum pot life, (up to 3 years) use salts that are chemically neutral with refractory

pots, and desludge bath periodically. Molten salt seals off all atmosphere, therefore decarburization, carburization, pitting, etching, or other surface defects can be avoided by using a suitable chloride salt and adding an acid rectifier. Several preparations are available containing rectifiers.

Adequate circulation in the bath is necessary to insure uniform temperature and prevent overshooting. Externally heated pots are not practical at high temperatures, so internally heated electrode baths, preferably with automatic, or electromotive, circulation are regarded as the most effective for mass production.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.



MOLYBDIC OXIDE, BRIQUETTED OR CANNED FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Mo-lyb-denum Company
500 Fifth Avenue • New York City

Flying automobile, for years the subject of popular fancy and speculation, appears nearer actuality with William B. Stout actively working on several designs of small transport vehicles for Consolidated Vultee Aircraft

FOR MANY years the subject of popular fancy and speculation, the combination automobile-airplane now appears a little closer to actuality, with the news that the Stout Research Division, Consolidated Vultee Aircraft Corp. here, under direction of the visionary William B. Stout, is preparing several designs for an air-auto. Stout has enlarged his staff of designers and engineers and has as his principal assignment the planning and development of possible postwar vehicles for Convair.

The air-auto is not exactly new, for a number of them were built six years ago by Waldo E. Waterman, Santa Monica, Calif., aeronautical enthusiast, one of his designs being pictured herewith. This vehicle was called the Arrowbile and was flown and driven in various sections of the country in 1937 and 1938, making an appearance at the Cleveland National Air Races among other places. Waterman is now working with Stout at his Dearborn research headquarters and is redesigning the Arrowbile rather completely.

The original version was a steel tube framework covered with fabric. Wings were also fabric covered and were attached to the fuselage by means of tapered pins on the top and pins in struts at either side fitting into clevises on the fuselage. No tail assembly was involved, rudders being incorporated with the wing tips as shown. Power was supplied by a 6-cylinder Studebaker automotive engine mounted at the rear and driving a pusher propeller. A small plant was established by Waterman in Santa Monica and a number of Arrowbiles were built, but the whole project eventually was washed out by acute financial anemia.

Taking up where the Arrowbile left off, Stout Research now is projecting three types of small transport vehicles. The first is the Aerocar or flying auto-

mobile, weighing about 1500 pounds, with 60-inch wheel tread, three standard tires, 35-foot wingspread and capable of doing about 70 miles an hour on the road and 100 in the air. Designed primarily as an automobile, the Aerocar has a detachable wing and tail assembly which is left in the airport hangar while the vehicle is used on the road. Type of construction now being worked out is a steel tubular frame, covered with plastic panels.

The second vehicle which Stout's staff is dreaming up is a roadable airplane weighing about 800 pounds and with 30-foot wingspan. It will be designed for 400-mile range with speed around 120 miles per hour. Idea behind this creation is that in inclement weather the plane can be set down on landing strips alongside highways, the wings folded back and the journey continued on the road.

Experimenting With Helicopter

Third project is a new type of helicopter known as the Helicab, measuring about 25 feet in length, 6 feet in width and 8 feet in height. Rotor spread is around 33 feet. The cabin, seating up to five persons, will have a rounded plastic nose; fuselage will be of steel tube and duralumin construction, covered with plastic panels. Working with Stout on this development is E. Burke Wilford, authority on rotating wing aircraft. About three months of engineering work have been expended so far on the helicopter, but it will be another nine months before one will be ready to fly. Engine for the first model will be supplied by Air Cooled Devices, Syracuse, N. Y.

The first model of the Aerocar has been built, and a model of the roadable airplane will be ready in a couple of months. Both, of course, are far from being fully tested and approved, and it will likely be at least a year before they

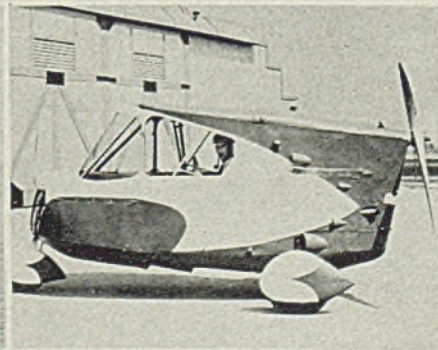
emerge from the chrysalis stage.

Stout is continuing research on his new engine design which originally was planned as a 100-horsepower unit weighing 100 pounds, but has now been revised to develop 150 horsepower and weigh 150 pounds. It is the plan to use this motor eventually in all three vehicles in process of development. It is not Stout's intention to undertake any manufacturing program on these units since his job is just to develop and engineer post-war ideas, after which they can be turned over to some of the Convair manufacturing facilities if it is determined that the market is waiting.

Army engineers have expressed interest in the plans and are said to have asked Stout to engineer a model using low-alloy steel for frame and fuselage skin. It remains to be seen whether this is practical. Stout at one time was planning to use a thin-gage stainless steel for the skin of his Skycar, small airplane which antedated the Aerocar and which was destroyed by fire last fall before it was delivered to the Army. Inability to develop sufficient strength because of the thin gage of the material led to its abandonment in favor of steel tubing and dural. Now Stout is talking about making a fuselage out of a new plastic, without any supporting framework. This will be a nice trick if he can do it.

One of the most amusing hoaxes ever engineered on Detroit newspapermen occurred about a week ago when one

The Arrowbile was built in 1938 by Waldo E. Waterman, aeronautical engineer (shown below in the road model), and was flown extensively at that time. Top air speed was 120 m.p.h., with road speed around 70 m.p.h. Though now obsolete, the Arrowbile was the predecessor of the road-air vehicles which the Stout Research division of Consolidated Vultee Aircraft Corp. is now developing at Dearborn, Mich. Mr. Waterman is now associated with that organization



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John Cunningham arrived in town and announced that he was vice president in charge of production for Henry J. Kaiser Co. and had just completed a deal for the purchase of a local stamping plant employing 400, in which parts were to be produced for the army vehicle which designers here have developed for Kaiser. All three papers carried front-page stories of the event which proved to be a total surprise for Mr. Kaiser when he learned of it, because he does not even have a John Cunningham on the payroll, much less a vice president by that name.

Later when confronted by outraged reporters at 4 a.m. Cunningham admitted the whole thing was just a brainstorm of his, that he had no connection with the Kaiser organization, that there was no stamping plant being purchased, that he was sorry about the whole thing. The curious part of the hoax is that the original news report was entirely plausible, because the Kaiser vehicle is about ready for manufacture if the Ordnance Department orders some, and manufacturing facilities are needed. The mystery is how Cunningham could have known all this inside information and why he should have gone to all the trouble to pull his hoax.

Kaiser Speculation Continues

There has been speculation locally over the possibility of Kaiser and his crowd of West Coast builders and contractors buying a controlling interest in Willys-Overland at Toledo. Present owners probably would stand to realize a nice profit by disposing of their holdings at current market levels, and by acquiring the plants at Toledo Kaiser would have a spacious though somewhat over-age automotive manufacturing setup in the Midwest.

Delegates to the UAW-CIO General Motors Council, representing union groups in 100 GM plants, voted recently to explore the possibilities of setting up a co-operative insurance plan to replace the Metropolitan Life Insurance Co. system now in effect in these plants. In a resolution supporting the move, the union delegates declared, "It is possible and probable that the corporation and Metropolitan both make large profits out of the premiums paid by the workers, and also control the investments of the money paid by the workers." This appears to be another sorry example of unions trying to smear benefits which employes are obtaining at almost insignificant cost, just for the sake of having something to discredit.

Ternstedt Division of Fisher Body has received contract for remote reading compass indicators and transmitters to be installed in aircraft. Designed and built by Bendix Aviation, the compass and indicator contains 206 parts, most of them

small and made to close tolerances. Minuteness of some of the operations involved in producing the instrument can be gaged from the fact that one coil with diameter no greater than a thimble comprises 2050 windings over 20 laminations of metal. Before winding, these laminations are heat treated in sealed containers which are filled with hydrogen and welded airtight after inserting the part.

Several personnel changes have been announced in the local War Production Board office. A. C. Ryan, active with WPB since last November and recently executive assistant in Washington to E. C. Kanzler, Curtis Calder and Donald Davis, successively, has been named deputy director of the production service division. Since May he has been assistant to Hugo A. Weissbrodt, who recently returned to his post at International Harvester. In his new post Ryan will supervise the production, facilities and salvage departments, material redistribution and the power section; and also will direct activities in district offices in Grand Rapids and Toledo.

John D. McGillis has been appointed new WPB salvage manager for Michigan, succeeding P. H. Sheridan who is returning to his own business after 13 months with WPB.

Shipments of Rolls-Royce aircraft engines and marine engines for PT boats in the first six months of this year totaled \$160,622,308, according to announcement from Packard, comparing with \$86,435,663 in the same period a year ago.

However, net earnings dropped from \$3,966,151 to \$1,974,489. The sharp drop is occasioned by the fact that the figure for the first half of 1942 did not reflect proportionate excess profits taxes or provision for contract renegotiations, adjustments made later in the year. These items for the first half of 1943 totaled \$9,968,151, or over five times net earnings.

Industrial Expansion at Chicago Still Heavy

Plant expansion and other industrial activity in the Chicago area in July aggregated \$26,440,000. According to the industrial department, Chicago Association of Commerce, these developments bring the total sum involved in expansion programs to a figure of \$110,329,937 for the period of seven months of the year, and to a grand total for war and defense expansion in the area since July, 1940, to \$928,984,937.

July Airplane Output Sets New Monthly Record

July airplane production set a new record, on the basis of WPB preliminary figures, with a gain of four per cent in number and a like percentage gain in weight over the June figures.

Total output last month amounted to 7373 military airplanes, Charles E. Wilson, executive vice chairman, War Production Board announced.



GOING "OVER": These Chevrolet military trucks, some four-wheel-drive and others two-wheel-drive units, are awaiting boxing for overseas transport at a seaboard export plant. To conserve shipping space the trucks will be torn down and boxed in compact weatherproof containers especially designed for the purpose

The **BASIC** Part of this Tool shall Remain for Peace!

Fundamentally, this BAKER 26-HO hydraulic feed machine is just about the last word in clean-line, engineered design—fabricated symmetry in metal. The model shown is a standard unit equipped with a special heavy duty 2-spindle multiple head. It serves one of the country's largest radial-type aircraft engine builders in the drilling and core-drilling of wristpin hole in master rod; the left spindle used for drilling from solid in rod, the right spindle used for rough boring wristpin hole but one of the versatile set-ups permitted with this vertical drill.

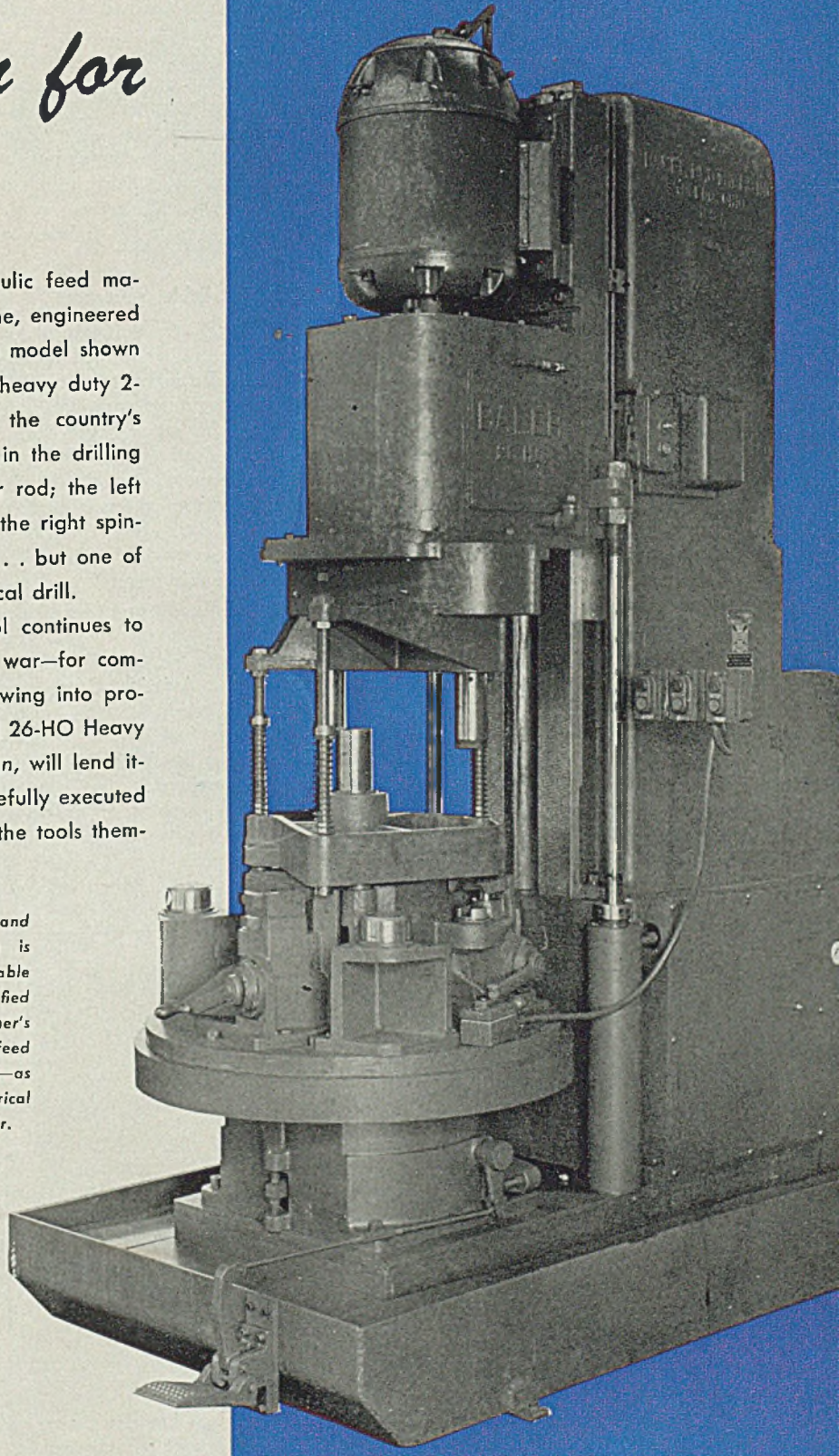
Whether the owner of this machine tool continues to manufacture aircraft engines following the war—for commercial planes—or whether the plant will swing into production of a general commodity, this BAKER 26-HO Heavy Duty Drill, as with all tools of BAKER design, will lend itself for rapid conversion—because of its carefully executed basic design Bulletins, as modern as the tools themselves, will be mailed upon application!

Model 26-HO Vertical Cleanline Heavy Duty Single and Multiple Spindle Drill—Hydraulic Feed. Machine is equipped with a standard 3-station hand index table with special work holding fixtures; fixtures of simplified design, but built with accuracy for securing customer's required limits. Operation of all BAKER hydraulic feed machines is made easy from operator's standpoint—as machines are semi-automatic in cycle, with all electrical control push buttons mounted convenient to operator.



FOR EXCELLENCE

On March 20th the loyalty, skill and diligence of the employes of Baker Brothers were recognized with an Army-Navy Award for excellence in production.



BAKER **BROTHERS**
OLEDO, OHIO, U.S.A.
Incorporated

WING TIPS

Boeing establishing branch subassembly plants in move designed to ease severe labor shortage. . . Republic Aircraft Products Detroit plants report 25 per cent output gain in first half of year. . . Douglas dedicates new plant

CONCERTED efforts, individual and civic, have somewhat relieved the manpower shortage at plants of the Boeing Aircraft Co., Seattle, and the threat to withhold additional contracts from other plants in the Pacific Northwest, including wood shipbuilding and small sub-contract shops has not materialized.

At one time Boeing was said to be short 9000 workers. Boeing was up to schedule until June, according to P. G. Johnson, president, when the manpower shortage became acute.

Through branch plants for subassembly work, Boeing plans to ease the situation and already has established such branches at Grays Harbor, Chehalis, and Tacoma, with a third planned for Bellingham and still others proposed.

President Johnson advocates stabilization of wages on an area-wide basis, attributing some of the present difficulties to varying wage scales. He stated there is no reason why shipyard labor should be paid higher wages than aircraft labor, both being drawn from the same labor market. He added the average base wage at Boeing's is 99½ cents an hour with overtime at \$1.13.

In remodeling branch plants, he stated, the company is prepared to spend \$400,000 and expects to have 4000 workers in these outside factories. The proposed 10-hour daily shift has been rejected by the union but negotiations are still in progress along lines making for greater output. Mr. Johnson said the company

is producing four times as many planes as the present plant was laid out to produce.

Boeing has placed an experimental plan into effect for granting time-off to employes having compelling personal reasons. Each employe's immediate foreman or supervisor is now authorized to excuse him for a few hours, a half or even a full day when the reason for the plant absence is imperative or unavoidable.

List Justifiable Absences

No time-off will be granted for errands which can be performed outside working hours. Justifiable absences will include these situations: Employe's inability to reach his ration board during its office hours; death or serious illness of an immediate member of the family. Application for excused absences must be received at least one day in advance. Authorized absences will not be held against the employe's record.

Production of aircraft propeller blades during the first six months of this year by American Propeller Corp., Toledo, O., subsidiary of the Aviation Corp., was nearly two and one-half times greater than in the last half of 1942, it was announced last week by William F. Wise, executive vice president.

The company's backlog of orders is now almost twice what it was a year ago.

Three models of the hollow steel type

propeller blade manufactured exclusively by American Propeller at Toledo are now in production, Mr. Wise said, compared to the single model being made when the company opened its new plant in May, 1942. Other types are under development and the company's rate of production during the last half of 1943 is expected to be substantially increased.

Production for the first half of 1943 fiscal year by the two Detroit plants of Republic Aircraft Products Division of the Aviation Corp. showed an increase of more than 25 per cent over the production for the last half of 1942 and was almost double the output in the first half of last year.

At this rate of increase it is anticipated that by Oct. 1 Republic's monthly production of precision parts for aircraft propellers and engines will be equivalent to almost the total production for the first quarter of last year. Backlog of unfilled orders as of June 30 was three times the backlog a year ago.

Formal dedication of the new \$33,000,000 plant of Douglas Aircraft Co. in Park Ridge, Ill., took place July 30 in ceremonies which included a test flight of the first C-54 Skymaster cargo plane assembled in the plant.

The plane is the army's largest transport plane, with four engines, a wing spread of 117 feet 6 inches, and a fuselage 93 feet 10 inches long. It weighs nearly 65,000 pounds fully loaded. Carrying capacity is 15 tons or 50 fully equipped men.

Saves Critical Steel

Completed in 10 months on what was formerly a cornfield, the plant was built by the Austin Co., Cleveland. A feature of the plant is its construction with laminated wood columns and trusses to save critical steel and other materials. It is said to be the largest wood industrial building in the world.

Several additional buildings, including a large final assembly structure and a new office and engineering building, are under construction at the Ryan Aeronautical Co. plant site on Lindbergh Field, San Diego, Calif., and will soon be ready for use in meeting increased production schedules.

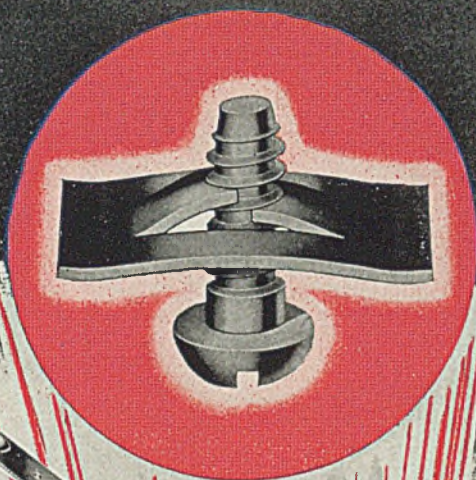
The new final assembly building is adapted to the manufacture of much larger aircraft and assemblies than Ryan has built in the past. It will have 200-foot span trusses with clearance under them 35 feet, to permit cranes to lift completed assemblies vertically from one production fixture to another.

Adjoining the final assembly building will be additional first aid rooms with extensive medical facilities. Another feature of the new layout will be a



LARGER TALONS: The new external bomb racks give America's war eagles larger talons for heavier bomb loads. This recent photograph of a Boeing B-17-F Flying Fortress shows the forklike fingers of the two additional racks at the fuselage bottom near the wheels. The device permits much heavier bomb loads for limited-range operations

Exploding old assembly methods..



with the Speed Nut System



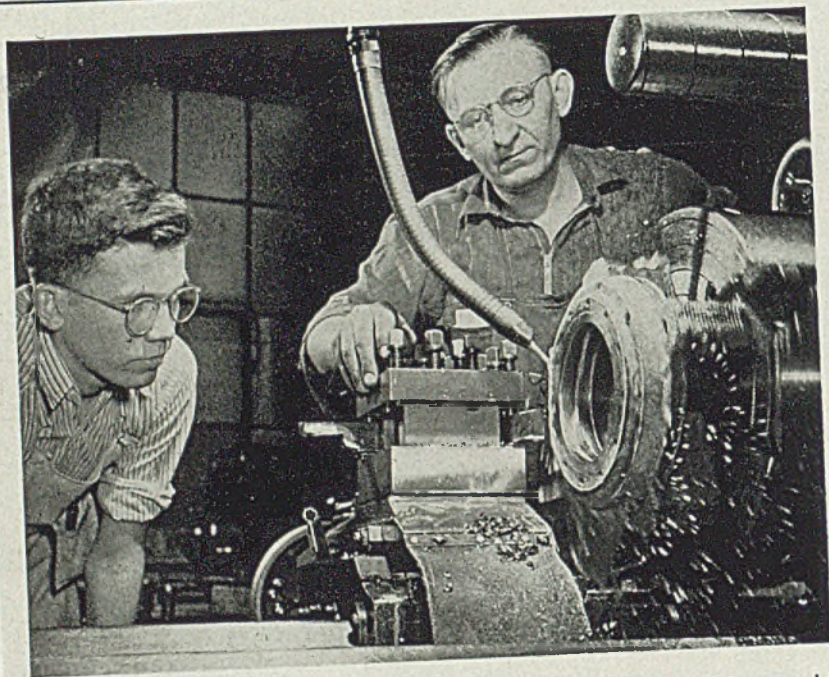
The spring tension principle of the SPEED NUT SYSTEM has revolutionized assembly methods everywhere. Now, in many cases, one SPEED NUT performs multiple functions, reduces number of parts, eliminates handling operations and drastically cuts weight and production costs.

For example: Our complete line of SPEED NUT angles combines the angle bracket and fastener into a single part. Self-retaining SPEED NUTS for all types of conduit clamps speed up assembly by eliminating unnecessary handling of parts. SPEED NUT retainer rings cut riveting operations to a minimum and save both in material and weight. SPEED NUT strips replace extruded gang channels. And our triangular nut plate for attachment of running lights, cuts riveting operations from 6 to 1. These are only 5 out of dozens of SPEED NUT designs that have virtually exploded conventional assembly methods. Write for our new summary catalog No. 185.

TINNERMAN PRODUCTS INC. • 2039 **Fulton Rd., Cleveland, Ohio**
IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ontario IN ENGLAND: Simmonds Aerocessories, Ltd., London

Speed Nuts

FASTEST THING IN FASTENINGS!



TRAINING PROGRAM: Machine tool instructor shows this 16-year-old boy how to operate a turret lathe for a steel plate facing job at the Westinghouse transformer division, Sharon, Pa. The youngster is a member of the first group of 20 boys selected for training. By alternating two weeks in the shop and two weeks in school, they graduate from high school in the customary four years

service building for the company's automotive equipment.

When the present program is completed, the Ryan plant site, including factory and office buildings and paved areas, will cover 38 acres. Large parking lots and other surfaced areas are part of the new construction program, which also includes emergency water supply and fire protection facilities.

Many improvements to the present plant are also planned or under construction. Among these are the installa-

tion of overhead conveyors to facilitate the handling of dies and materials.

Engine design as related to airplane power, with particular reference to performance at varying altitudes, is the subject of a new 80-page non-technical booklet issued in preliminary form by the customer research staff of General Motors Corp., Detroit.

Liberal sprinkled with sketches and charts, the discussion is a creditable effort to couch in simple phrases, readily understandable by the layman, some of

the intricacies behind the design and operation of aircraft engines and superchargers. Seven general types of superchargers are reviewed—single stage with only one speed; single stage, two speeds with mechanical clutch; single stage with variable speed hydraulic clutch; two stage with mechanical clutch; two stage with variable speed hydraulic clutch; two stage, variable speed with aftercooler, and turbo exhaust-driven with intercooler. Comparable characteristics of each are shown by chart and text.

An appendix presents a glossary of technical terms and definitions commonly used by engineers in connection with aircraft engines.

Copies of the booklet titled *Airplane Power* may be obtained by addressing General Motors, Room 11-230, Detroit 2.

United Aircraft Shipments Score 39 Per Cent Gain

A 39 per cent increase in dollar volume of shipments of aircraft engines, propellers and Navy fighter planes during the first half of 1943, represented almost entirely by production for the government was registered by the United Aircraft Corp., mid-year statement reveals.

Accelerated production, marked by the virtual disappearance of foreign sales, which accounted for 86 per cent of its production in 1942, was revealed in the company's report of shipments for the quarter ended June 30 of \$174,628,901. Shipments for the six months period amounted to \$333,798,454, as against \$242,708,318 for the corresponding period of 1942.

During the last quarter, officials explained, the Navy Department elected to make lump-sum payments of approximately \$35,000,000 due on plant facilities heretofore completed.

—They Say:—

"The burden of any tax or anti-inflation proposal should be as equitably distributed as possible, not only between upper and lower income groups but by recognizing that in any income group there may be people who need to be protected against the impact of tax increases."—Representative Robert L. Doughton, chairman, House Ways and Means Committee.

"In the first World War we provided one piece of artillery for every 1100 soldiers. Today there is one piece for every 46. Since the outbreak of the war America's armament industry has turned out nearly 160,000 large-caliber artillery, nearly 1,300,000 machine guns, and 5,000,000 rifles and submachine guns. We have made 165,000,000 rounds of artillery ammunition. Our ordnance plants have produced 22,000,000,000 rounds of small-arms ammunition.—Representative Sam Rayburn, speaker of the House.

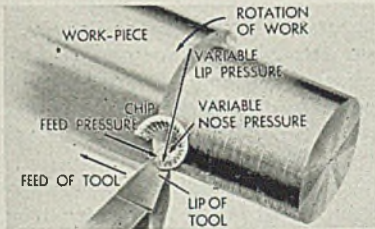
"There is no more excuse for granting rate favoritism to one section than to another. Equalization of industrial opportunity for all sections of the country requires a re-examination and revision of the freight-rate structure."—Interior Secretary Harold L. Ickes.

"Only the people can hold down inflation, and they are smart enough to do it if the way is prepared and consistently sold them. The formula is simple: Don't Spend, Save."—Henry Bruere, president, Bowery Savings Bank.

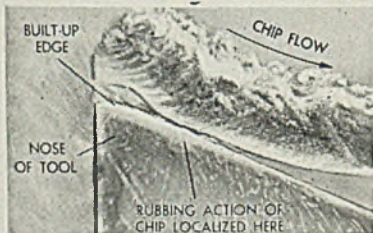
"After the war let's get people to live so they can pass moderate physical examinations when they are over thirty, and let's not have a third of those rejections caused by their being crazy."—Maj. Gen. Lewis B. Hershey, National Director, Selective Service.

How Cutting Oil Can Increase Your Production:

1 FACTS ABOUT METAL CUTTING



The lip of a tool is an *extreme-pressure* area where the great pressures of the chip are exerted. At the tool nose and directly below the cutting edge is a *boundary area* which intermittently contacts the work-piece as the tool is deflected by the varying pressure of the chip. These microscopic vibrations create minute openings permitting a properly selected cutting oil to reach the pressure areas.



The *built-up edge* (see above) protects the cutting edge of the tool from frictional heat and excessive wear. An excessive build-up, however, results in its sloughing between tool and work-piece, thus marring the finish.

2 WHAT CUTTING OILS MUST HAVE (FOR GENERAL MACHINING)

PRESSURE RESISTANCE

Adequate pressure-resisting property in a cutting oil prevents excessive heating and wear of cutting tool and promotes smooth chip flow. **RESULT:** *Maximum feeds and cuts... minimum vibration... satisfactory finish.*

ANTI-WELD

Correct anti-welding property prevents excessive amount of built-up edge which can slough between tool and work, but fosters the necessary slight build-up which protects the cutting edge. **RESULT:** *Satisfactory finish and long tool life.*

LUBRICITY

Correct lubricity protects the boundary area of the tool from excessive wear. **RESULT:** *Long tool life... accurate size... smooth finish.*

COOLING ABILITY

Maximum cooling ability to remove frictional heat. **RESULT:** *Maximum speed... long tool life.*

3 PRODUCTION BENEFITS FROM USING S/V CUTTING OILS:

S/V Cutting Oils are the highest quality obtainable for the service for which they are recommended. They have a correct balance of essential cutting oil properties and their use results in...

✓ MAXIMUM CUTTING SPEEDS, FEEDS, CUTS —

i.e., a maximum amount of metal removed per minute.

✓ MAXIMUM PRODUCTIVE MACHINE TIME —

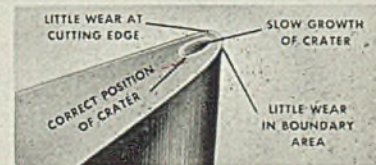
i.e., minimum shut-downs for tool replacements.

✓ MINIMUM REJECTS —

due to poor finish or off-size.

Plus

✓ TOOL CONSERVATION



The picture above shows the best position of the crater on the lip of the tool. It results in the need for removing only a minimum of metal per grind. If finish and tool life are satisfactory, this is the ideal condition.

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION



SOCONY-VACUUM OIL COMPANY, INC. — Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Division • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California

USE S/V CUTTING OILS

S/V VACSUL • S/V SULTRAN • S/V VACMUL



WEST'S INDUSTRY REMINISCENT OF

Area bristles with activity as expanded airplane plants, shipyards, steel and light metal manufacturing industries beckon thousands of workers from the East. . . San Francisco, long the hub of a vast territory, teems with war activity

Westward the course of Empire takes its way,
The first four acts already past;
A fifth shall close the drama with the day:
Time's noblest offspring is the last.

—George Berkeley, Bishop of Cloyne, in the early 1700's

TWO HUNDRED years have made little difference in the significance of the Bishop's quatrain. West of the Rocky Mountains "Time's noblest offspring" in the space of a short three years has become a lusty infant even now ringing out an industrial challenge to the rest of the country; in fact, to the world itself.

In attempting to make a general appraisal of industry on the western rim of the United States, it is well to keep two things in mind: First, as Milton Silverman in the *San Francisco Chronicle* puts it, "The second gold rush has hit the West Coast"; and second, the term "West Coast" covers one hell of a lot of territory.

War, of course, has brought the gold rush. Airplane plants, shipyards, the light metals industries—these are the three war babies which have beckoned literally hundreds of thousands of workers and their families. And the workers have been pouring into the West since 1940 at a rate of something like 1000 a day, an influx which is still under way but at a somewhat reduced rate.

As far as distance is concerned, it is not generally realized, at least by easterners, that from San Diego to Seattle is a trek of nearly 1500 miles, a lot of it over pretty rough country. That's farther than from New York to Kansas City. So when you begin to talk about the West Coast, you have to localize your thinking a little first, because while it is true that the whole strip of the coast has felt the "needle" of war production, the character of the change is different in one section than in another; the people themselves are different.

In Portland, they call Los Angeles the Southland, much as people in Buffalo refer to Birmingham, Ala., as Dixie. True, they call Los Angeles and its inhabitants a lot of other things besides, but the thing to keep in mind is the vast stretches of country involved—125 miles from San Diego to Los Angeles; 470 miles from Los Angeles to San Francisco; 718 miles from San Francisco to Portland; 183 miles from Portland to Seattle; and another 165 miles on up across the border to Vancouver, British Columbia.

Mileage is not the only measure of the distances involved, because in mountainous terrain your train or your automobile, for example, may move toward your destination only 10 miles while you actually travel 50, in process of winding up or down over a mountain range to get into the next valley. The contrast is remarkable to someone who may have spent most of his life traveling the "water level" between Chicago and New York.

Particularly in southern California is the matter of distance am-

By A. H. ALLEN
Associate Editor, STEEL

EXPANSION OLD RUSH DAYS

plified far beyond what your easterner or middle westerner is used to. Consider, for example, the city of Los Angeles, sprawling over a mere 451 square miles, while Los Angeles county stretches out over 4171 square miles. The market area represented here is calculated by the *Los Angeles Daily News* to cover territory equivalent to the state of Delaware, to embrace a population approximately that of Minnesota, Virginia or Kentucky; and to be pouring its retail sales dollars into cash registers to the tune of over a billion and a quarter dollars annually—a stupendous total when you realize it is exceeded by the totals for only nine entire states of the country.

In its sprawling development, Los Angeles wrapped itself entirely around other incorporated cities as well as popu-

lous unincorporated areas of the county. So unwieldy did the district become from a statistical standpoint that back in 1940 a regional planning commission decided to break it down into 16 "census of business" areas. These are as follows, after each district being given an eastern or middle western city of comparable size:

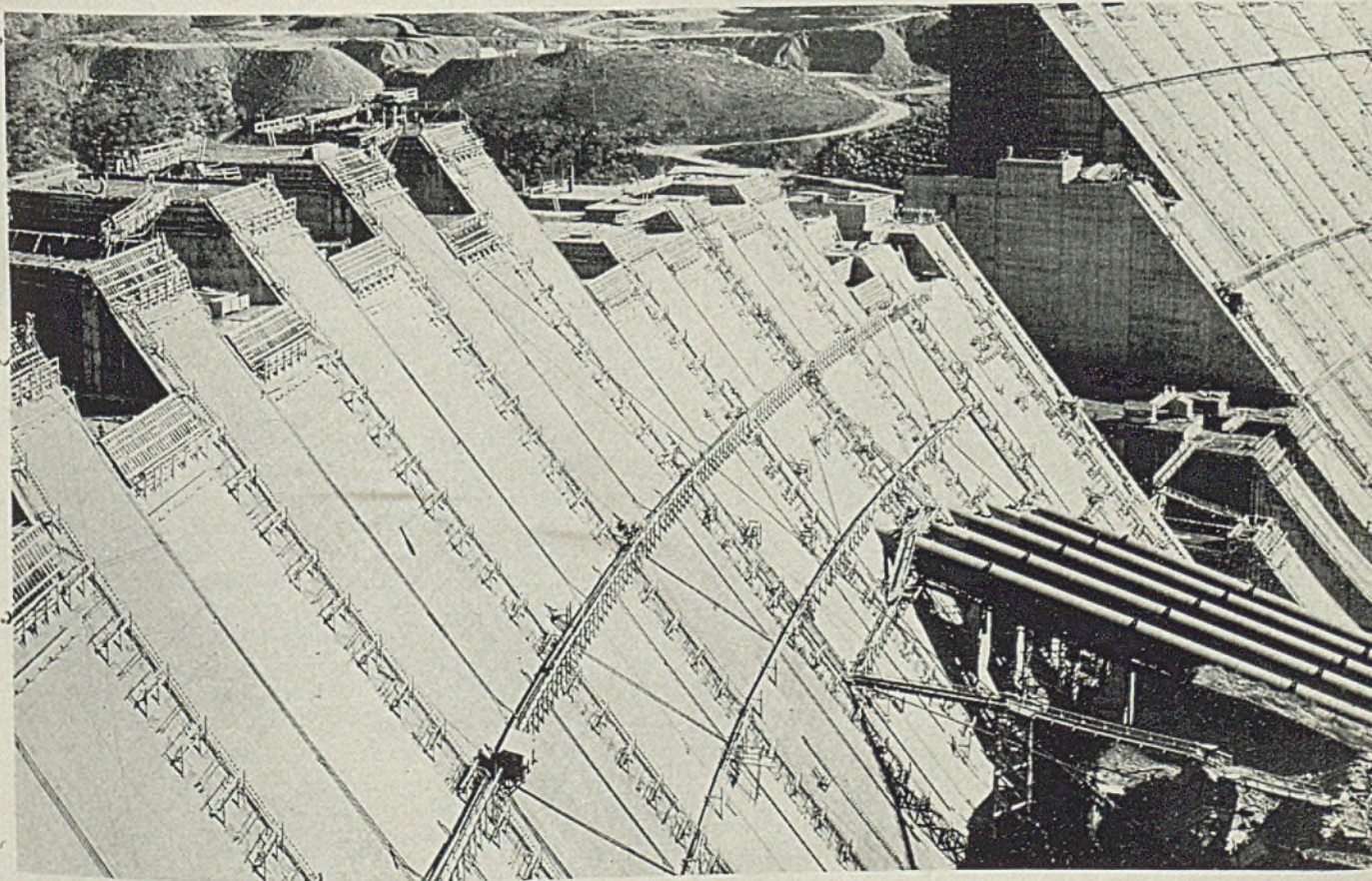
Area	Comparable City
San Fernando Valley	Flint, Mich.
Glendale	Des Moines, Iowa
Pasadena	Eric, Pa.
Rural Foothill	Chattanooga, Tenn.
Alhambra-South Pasadena	Utica, N. Y.

Northeast	Springfield, Mass.
Eastside	Syracuse, N. Y.
Central (downtown)	Trenton, N. J.
Wilshire	Tulsa, Okla.
Hollywood	Grand Rapids, Mich.
Beverly Hills-Westwood	Jackson, Mich.
Santa Monica-West Coast	Salt Lake City, Utah
Southwest	Indianapolis, Ind.
Southeast	Columbus, O.
Whittier-Norwalk	Springfield, Ill.
South Coast-Harbor	Omaha, Nebr.

This compilation was made on the basis of 1940 figures which of course have changed appreciably. Population of the area jumped from 2,765,569 in 1940 to 3,112,171, an estimate for October, 1942, increase of 12.5 per cent. Population of the city of Los Angeles proper was 1,504,277 in 1940, and soared to an estimated 1,700,000 as of the first of this year.

Wage earners in manufacturing industries in Los Angeles county tell the real story of what has happened to West Coast industry in recent years—126,000

Typical of the power projects in the West which are providing industry with the necessary electricity for producing munitions is Shasta Dam pictured here. These power plants are playing a vital role in the war effort and are expected to be even more valuable in the postwar era when industry concentrates on peacetime production. NEA photo



in 1939 and 420,000 now. The same thing holds true on up the coast. Manufacturers in the San Francisco area employed 261,500 in March of this year, against 80,000 in 1939. The Portland area witnessed the almost unparalleled expansion of industrial employment from a mere 20,000 in 1940 to something like 160,000, not counting the 34,000 more who will be working in Kaiser's Vancouver, Wash., yards when it hits its peak. Seattle registered a 325 per cent gain in industrial employment from 1940 to the present figure of 121,000. Tacoma and Spokane were other Washington cities whose industrial employment has been inflated by the pressure of new war industry.

To get any kind of sensible appraisal of the entire West Coast it is necessary to break it up into the three sections—Los Angeles, San Francisco-Oakland, Portland-Seattle-Tacoma-Spokane—to see what makes each one tick and to examine how each has been affected by war and at the same time to suggest the contribution which each makes to overall West

Coast industry at the present time.

First it may be apropos to make one point. It is this: Traditionally, San Francisco has considered itself the hub of the entire West Coast as far as management and finance were concerned—and rightly so. As recently as 1940, the balancing of six basic market factors of economic development—bank debits, manufacturing, agriculture, wholesale trade, commerce and livestock—showed the average for the Washington-Oregon area 27 per cent of the total for the Coast; the Southwest (Los Angeles) area 30 per cent, and the Central (San Francisco) area 43 per cent.

Mellowed By Tradition

The skyscrapers along Montgomery street in San Francisco have long been touted as the homes of the management brains of the West, the foci from which the directing strings to all manufacturing enterprise up and down the Coast were pulled taut or slacked. Down south in Los Angeles was just a bunch of playboys lolling in the sun, while up north it

was just a bunch of rugged lumberjacks. Only San Francisco had come of age, had been sufficiently mellowed by tradition and experience to lead West Coast industry.

After all, San Francisco had been tested by earthquake and fire in 1906 and had come through. It could look back with amusement on the days when an anonymous poet wrote after looking at a building demolished in the carnage:

*Put me somewhere west of East Street
Where there's nothin' left but dust;
Where the lads are all a-hustlin'
And where everything's gone bust.
Where the buildin's that are standin'
Sort of blink and blindly stare
At the damnedest finest ruins
Ever gazed on anywhere.
Bully ruins—brick and wall—
Through the night I've heard you call
Sort of sorry for each other
'Cause you had to break and fall.
From the Ferries to Van Ness
You're a God-forsaken mess
But the damnedest finest ruins—
Nothin' more, nothin' less!*

The facts are that San Francisco's glory as the Paris of America and the New York of the West has dimmed considerably in the hectic years since war broke in Europe. The skyscrapers still cast their shadows in Montgomery street; the old electric cars still rumble up and down the four tracks on Market street to and from the piers and the Bridge Terminal; the Key System still shuttles its thousands daily across the magnificent Bay bridge to bustling Oakland. But to the outsider, San Francisco appears restless and troubled, even in the face of all-time highs in business indices. It may be resentful of surrendering a measure of its control over industry to vast new undertakings both in the south and in the northwest, or of being virtually shut out of the aircraft industry which swells payrolls in the Los Angeles and Seattle areas, or of the disruption to its normal way of life which 300,000 newcomers have brought, or of the enormous job involved in handling the embarkation of men and supplies to the Pacific military and naval fronts. At any rate, San Francisco is not happy, if indeed any city on the West Coast is happy these days.

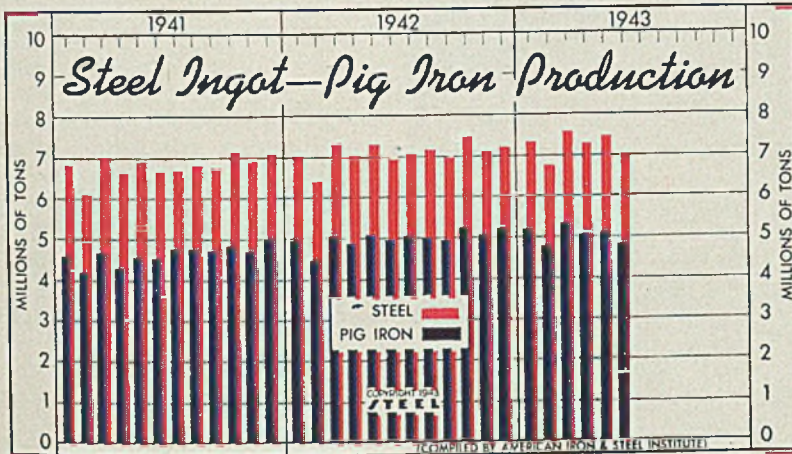
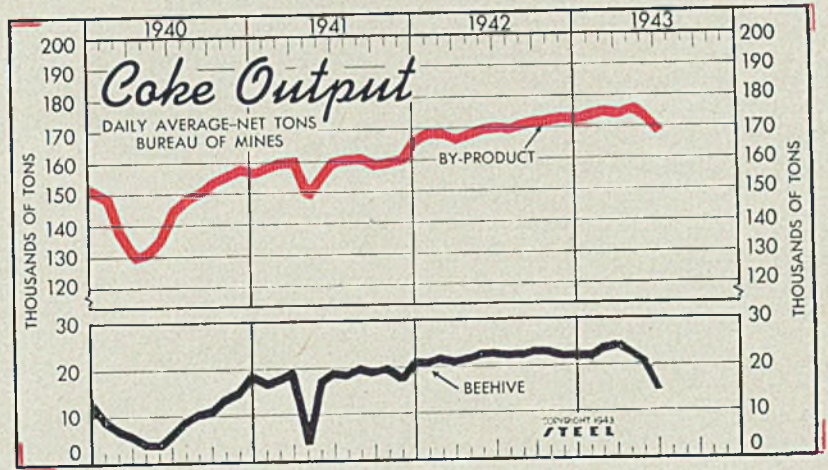
Perhaps one potent reason for San Francisco's uneasiness is wrapped up with cost of living figures. February index for San Francisco was 124.6, compared

This is a general view of one of the main business arteries in busy wartime San Francisco, long considered the hub of the West Coast



Coke Output
Bureau of Mines
(Daily average—Net tons)

	By-Product		Beehive	
	1943	1942	1943	1942
Jan.	174,044	168,508	21,440	20,874
Feb.	175,107	168,414	23,991	21,771
Mar.	175,051	167,733	24,369	21,032
Apr.	175,857	168,960	22,932	21,843
May	174,240	170,187	21,270	22,571
June	168,735	170,593	14,283	22,487
July		170,244		22,197
Aug.		171,443		22,333
Sept.		172,110		23,106
Oct.		172,211		23,148
Nov.		173,029		22,106
Dec.		173,163		22,000
Average		170,549		22,122

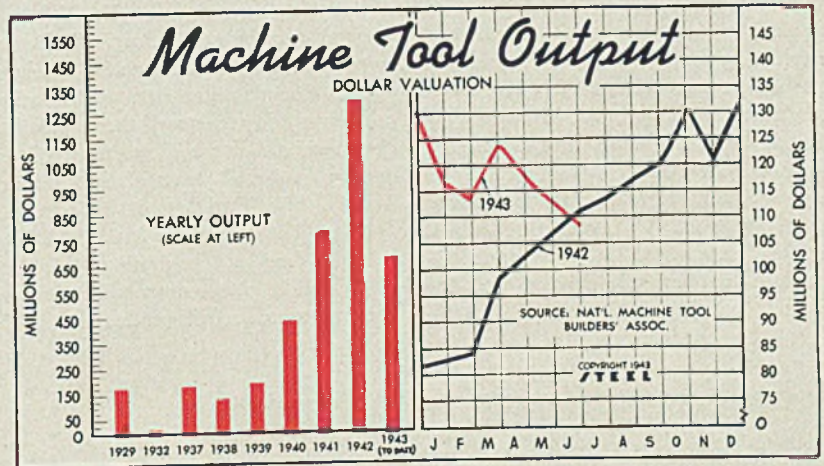


Iron, Steel Production
(Net tons—000 omitted)

	Steel Ingots		Pig Iron	
	1943	1942	1943	1942
Jan.	7,424	7,112	5,194	4,983
Feb.	6,826	6,512	4,766	4,500
Mar.	7,670	7,392	5,314	5,055
Apr.	7,374	7,122	5,035	4,896
May	7,545	7,382	5,178	5,073
June	7,027	7,015	4,836	4,935
July	7,376	7,148		5,051
Aug.		7,233		5,009
Sept.		7,067		4,937
Oct.		7,584		5,236
Nov.		7,184		5,083
Dec.		7,303		5,201
Total		86,061		59,959

Machine Tool Output
(000 omitted)

	1943	1942	1941
Jan.	\$117,384	\$83,547	\$50,700
Feb.	114,593	84,432	54,000
Mar.	125,445	98,358	57,400
April	118,031	103,364	60,300
May	113,859	107,297	60,800
June	108,689	111,090	69,070
July		113,596	63,019
Aug.		117,342	74,069
Sept.		119,883	74,906
Oct.		130,008	84,178
Nov.		120,871	81,320
Dec.		131,960	81,435
Year			
1942			1,318,897
1941			775,300
1940			450,000
1939			210,000



FINANCE

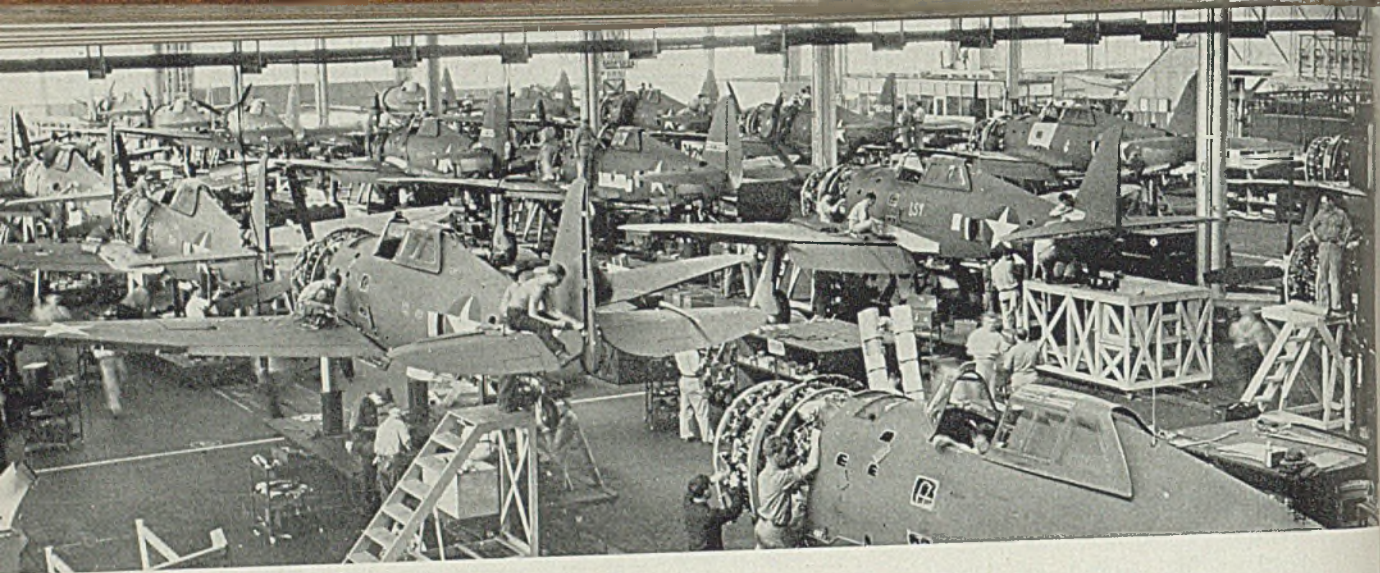
	Latest Period°	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	\$8,598	\$7,936	\$7,558	\$6,875
Federal Gross Debt (billions)	\$146.4	\$144.8	\$141.3	\$82.1
Bond Volume, NYSE (millions)	\$46.5	\$70.1	\$52.0	\$29.3
Stocks Sales, NYSE (thousands)	4,730	8,162	4,163	1,450
Loans and Investment (millions)†	\$46,482	\$46,612	\$45,843	\$33,512
United States Government Obligations Held (millions)†	\$32,347	\$32,510	\$31,414	\$17,352

†Member banks, Federal Reserve System.

PRICES

	Latest	Prior	Month	Year
STEEL's composite finished steel price average	\$56.73	\$56.73	\$56.73	\$56.73
Spot Commodity Index (Moody's, 15 items)†	245.2	243.8	243.1	203.6
Industrial Raw Materials (Bureau of Labor index)†	113.0	113.3	114.0	100.5
Manufactured Products (Bureau of Labor index)†	99.8	99.8	99.7	98.3

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



Republic Aviation Does Outstanding Job of Adapting
Automotive Mass Production To Manufacture of

FIGHTING AIRCRAFT

By G. ELDRIDGE STEDMAN

NOW THAT Republic Aviation Corp.'s Indiana Division is reaching quantity production, part of the story of one of America's greatest war achievements can be told . . . for the first time anywhere, it is believed. On April 7, 1942, General Manager George A. Meyrer slithered into a cornfield north of Evansville and in the raw, rainy weather lifted an oozy spadeful of earth to break the ground for R. A. C.'s immense Indiana Division hangar and factory. Close behind him tumbled pile drivers, bulldozers and "cats".

On his first official visit from the corporation's Farmingdale, N. Y., headquarters on June 11, Ralph S. Damon, president of Republic Aviation, declared: "We'll turn out the first plane on schedule—one day sooner than possible". And they did, for on September 19, employees gathered to see the "Hoosier Spirit", first Thunderbolt P-47 built in Indiana, hurtle itself in trial flight. Now, a year from its beginning, this huge plant and its attendant modification center are nearing full production. What

went on inside the plant rhythmically paralleling the advancement of plant construction, is the subject of this article.

Alexander Kartveli, R. A. C. vice president and chief engineer . . . P-47 designer . . . came from Tiflis in the Caucasus; a wizard mathematician, trapeze artist, test pilot. Kartveli literally broke his neck working for the Bleriot Co. in France. Associated with Levine, Fokker and Seversky (which became Republic Aviation Corp.) his first pursuit design became the P-35 and then a series of others, ending with the famed Thunderbolt. Of it, Lieut. Leroy Ista, Army Air Corps, completing his final training at Langley Field, Va., stated in a War Department release: "That 2000 horsepower Pratt & Whitney engine is a terrific power plant. That, together with its turbo-supercharger and Curtiss propeller, hurl the Thunderbolt at speeds and ceilings which no other fighter, Allied or enemy, can attain." Weighing 13,000 pounds and capable of efficient maneuver at 35,000 feet altitude, the Thunderbolt is accredited as being the finest interceptor-fighter in the world.

War is the great magnifier . . . of problems, of quantities, of design and processing requirements. War won't wait. Neither did Republic. It has done one of the most outstanding jobs of adapting progressive assembly methods used by the automotive industries



Fig. 2—Upper fire-wall drill jig being checked by Chief Tool Engineer H. W. Norton, Factory Manager William Dubusker and Assistant Tool Engineer Sam Hyatt

Fig. 1. (Left, opposite page)—View of final assembly showing planes on conveyor moving to detail stations

Fig. 3. (Top, right)—Deep drawing section of wing fairing is completed in one operation here

Fig. 4. (Center, right)—Subassembly of lower firewall progresses in these three fixtures. Note simple yet extremely substantial jigs

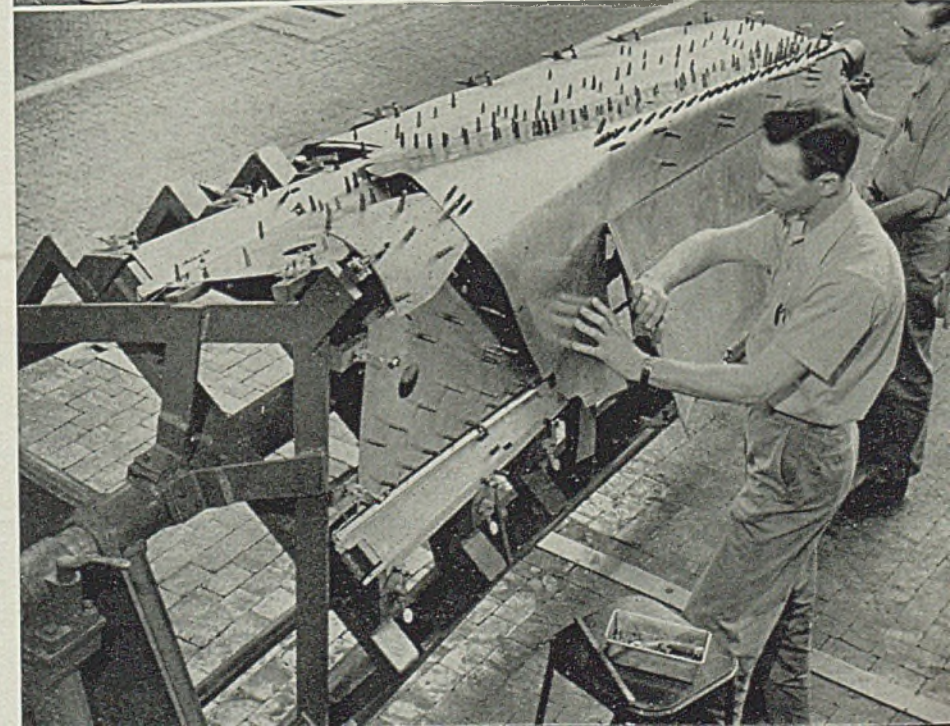
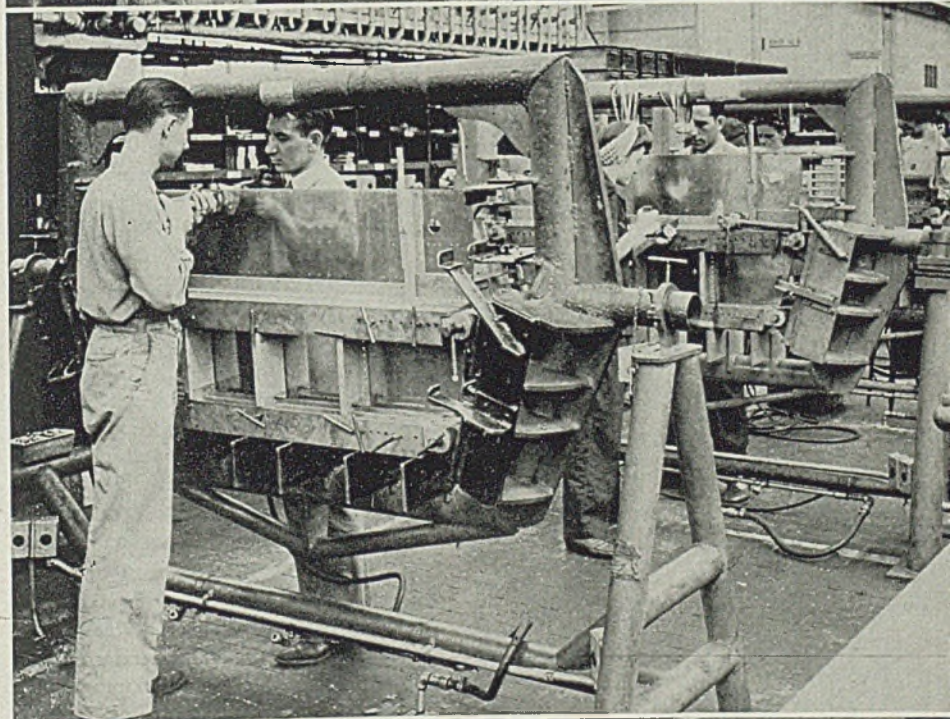
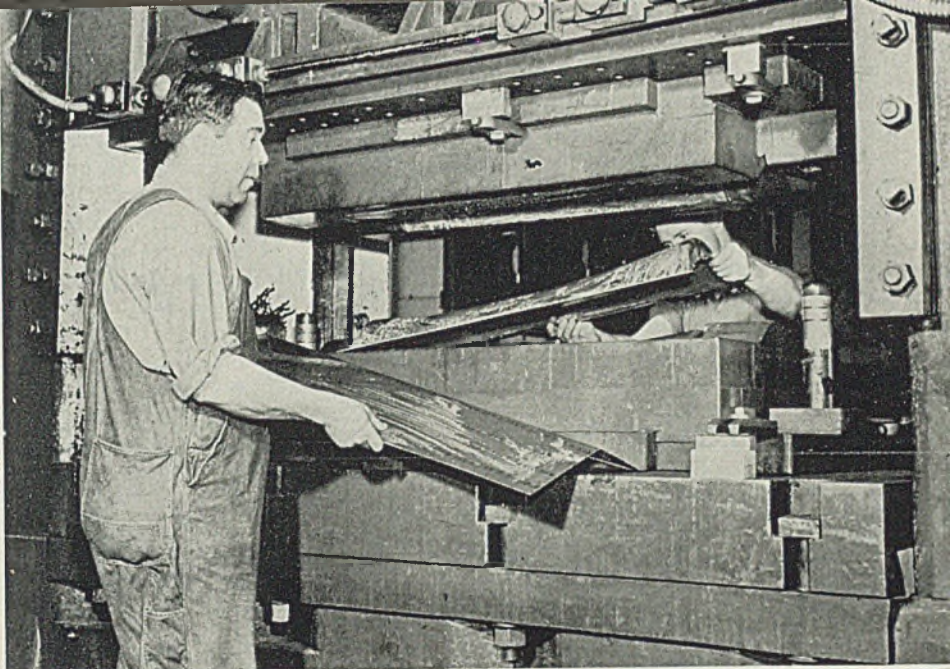
Fig. 5. (Bottom, right)—Upper section of fuselage is made as a complete subassembly here from prefabricated parts. All items in this assembly have full size holes, need no fitting, go together fast

so they can be employed in aircraft construction. Republic Aviation's Indiana Division plant represents a uniquely successful accomplishment in this field. Because of this, its production ability in relation to man-hours has enlarged in a manner that is destined to make history in war and in the peace thereafter.

Until the advent of war, from 100 to 200 units of a model represented a whale of an order. Now, 1000 units are regarded as a small contract. In the old days, 60 to 70 per cent of fabrication was accomplished by experienced mechanics, largely by hand.

William Dubusker, factory manager, at the Indiana Division, knew that he faced all these problems when management assigned him the responsibility of tooling up for midwest production. He determined to whip them by converting the tooling technique to make fullest use of automotive methods. Eight years now with RAC, Dubusker has ably served Keystone, Curtiss, Great Lakes. In his experience he has been foreman, inspector, purchaser of equipment, machinery superintendent, and general superintendent in these various aircraft plants. Much of RAC Indiana Division's record rush into mass production is credited to him . . . and to H. Norton, chief tool engineer, and his assistant, Sam Hyatt, who was in charge of the Detroit office.

"When management told me I was elected to tool this Midwest plant, the question was: 'How am I going to put experience into the heads and hands of the thousands of green workers we must recruit' ", Mr. Dubusker told me. "I knew we would have to employ workers who had never even seen a plane close-up, and with 99 per cent of them inexperienced in aircraft construction, and the majority of these having never previously worked in any plant. I decided to follow automotive methods completely. The policy decided upon was to



tool up 100 per cent to remove the human factor entirely—to take all guess-work away.

"We surveyed the labor situation and found that we would have to rely upon female labor. Our plant here will soon be operating with 70 per cent of the employes women. Recognizing that women workers require maximum tooling, we decided to tool up so completely that fool-proof fabrication could be ac-

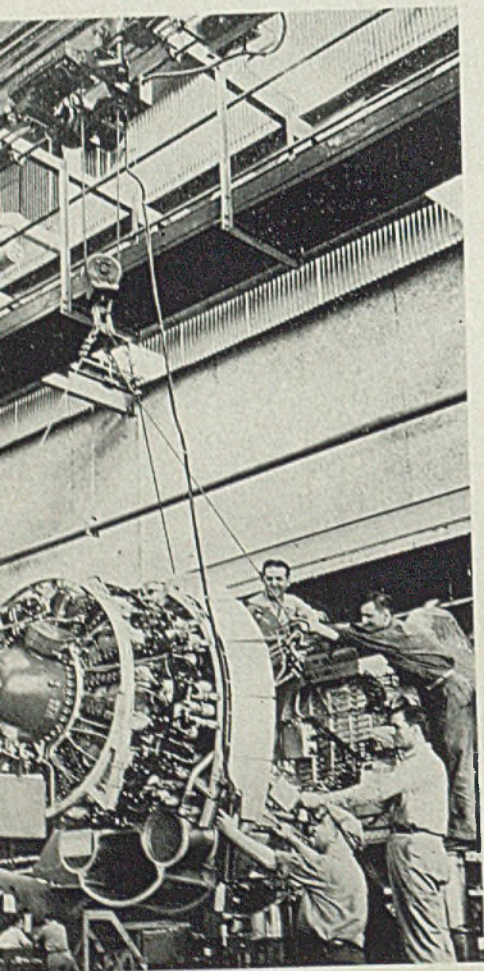


Fig. 6—A job for experts . . . assembling the power plant into the fuselage in final assembly section. Notice crane is operated by man on floor through pendent push-button station

complished by the greenest workers with but little training. This we have now accomplished."

The requirement was to tool the complete plant both properly and swiftly. It had virtually to keep pace with the speed of plant construction. To accomplish this, Dubusker arranged to move the basic functions of tool design and expediting to Detroit. He placed responsibility for tool design and processing in charge of Allen Engineering Co. there. H. Norton, Indiana Division, chief tool engineer, lived on the job in

Detroit, 24 hours a day. Tools were built completely in Detroit.

Under Allen Engineering Co., tool and die work was parcelled out to: Arrowsmith Tool & Die Co., Cadillac Tool & Die Co., Congress Tool & Die Co., Dettary Engineering Co., Donnelly-Powers Engineering Co., Dynamic Tool & Die Co., Douglas Tool & Die Co., Federal Engineering Co., Great Lakes Tool & Die Co., Godin Tool & Die Co., Heidrich Tool & Die Co., Heidrich Engineering Co., McReynolds Die & Tool Co., Northfield Engineering Co., Mid City Tool & Die Co., Oregon Tool & Die Co., Pedersen Tool & Die Co., Pryde Tool & Die Co., Ramco Products, Ridge Tool & Die Co., Teppert Tool & Die Co., and Wayne Tool & Die Co.

Initial procedure was to divide the fuselage into 25 items such as front section (upper deck), crash protector, bulkhead, side panels, fire wall, etc. Two full-scale model fuselages were built at Farmingdale for tooling design purposes. These were designed and built to this sectional plan. Their parts were bolted together rather than riveted to permit each section to be disassembled and explored. These 25 design units for fuselage tooling were then assigned among the companies named.

Four Elements To Speed Work

The Indiana Division of R. A. C. is the only organization to have supplied the tool shop with the four vital elements of (1) complete loft data, (2) bolted model sections, (3) complete drawings, (4) tool expeditors, ready to answer any question.

The loft data came through on templets of duraluminum, steel and lately of fiber with full standards accurately established thereon photographically. This process was described by the writer in "Templet Making Shortcuts", STEEL, Nov. 23, 1942. Mr. Dubusker says that such loft data photographically expressed on fiber keeps properly within tolerances specified.

Provided with these bolted model sections, tool makers could see at a glance what tool requirements were. They did not have to start cold from the drawings. These proved better references than even isometric drawings . . . for they had the actual unit in full dimension as reference. Complete tool drawings were provided. As tooling progressed, added information was supplied by R. A. C., Farmingdale. Expeditors, one to each tool plant and clearing through Mr. Norton, were instantly at hand to smooth out all problems without delay.

The result has been that Thunderbolt fuselage construction resembles assem-

bling Erector sets. Holes are pierced full size. There isn't a solitary part that is not tooled. Blanking, forming, piercing dies cover everything. Parts are 100 per cent interchangeable. There is little routing, no burring or filing. In assembling, the part is matched to pre-pierced full-size holes and riveted. R. A. C. was the first to attempt this complete tooling, and it is 100 per cent.

While this program was going along, the Indiana Division began to build hand tooled models in the new plant. It brought supervision from Farmingdale and production was started, using such facilities as were at hand, the new tooling being brought in and installed as fast as completed.

Aimed at Something New

Mr. Dubusker made a ten-strike in selecting Allen Engineering Co. "The old aircraft designers love their old ideas, and we were aiming at something new. It would have been hard to pull them away from rutted ideas. No matter how impossible, it had to be done. We wanted a clear-minded, neutral type of engineering that was unencumbered by tradition, that was aware of all the newest in automotive tool design, and who realized our new responsibilities. The result shows the wisdom of this viewpoint," Mr. Dubusker remarked.

Elimination of all hand work in fitting, trimming and burring when tooling is completed will effect important reductions in labor cost. Resort to older methods for first production and training caused continuance of hand methods until tooling was complete. The entire plant is conveyORIZED; both in the manufacture of fuselage parts and assembly. Engine and assembly storage cabinets are at the stations on the progressive assembly lines within arm's reach. Full craneways serve all lines.

There are over 2800 tools involved in fuselage parts. Each tool had to be specially designed. The tool storage is a huge department containing scores of unusual shapes, odd forms, unusual dies, which indicate many tooling accomplishments that hitherto had been considered impossible.

The principle is to assemble from sub-assembly to main assembly; throwing as many people around the first as possible to keep workers out of each other's way on the final conveyor lines. All forms are pressed, blanked, pierced to size. There is no skin filing or hand work. Thus the assembly is very simple, merely co-ordinating to full sized holes and riveting. Fixtures are all quick-acting and designed for swift assembly. Every known automotive device has been used—levers, tread suspension, precision

(Please turn to Page 132)

PRESENT scarcities of replacement parts and materials coupled with extremely severe operating conditions have placed an added burden on industry in maintaining its production facilities at peak efficiency.

In many cases it is practically impossible to obtain replacement parts or only after extremely long delays and therefore many companies have found it expedient to resort to other measures.

The process of spraying molten metal on worn surfaces has proved to be one practical solution for this difficult maintenance problem, having the advantages of effecting substantial savings in the cost of replacing parts and, more importantly, making possible the placing of equipment back in operation after comparatively brief shutdowns. In fact, the process may be regarded as a standard maintenance "tool" rather than an expedient keyed to the present national emergency.

In this article, operations in the Newark, N. J. plant of Public Service Co-ordinated Transport will be described as an outstanding example of the way in which the metallizing process is being utilized in maintaining equipment. Of course, the process is just as adaptable to

HERE'S HOW To "Keep 'em Running"

With repair parts impossible or extremely difficult to obtain, metal spraying proves a most valuable "tool" in rejuvenating worn equipment. Some rebuilt parts actually last longer than new ones

industrial equipment, such as lathe and drill press parts, motor shafts, pistons, turbine parts, bearing housings and the like.

Inasmuch as the public carriers of New Jersey are located in the center of one of the most important war plant areas in the nation they are faced with the most gigantic transportation job in their history. Public Service, largest interest, serves 375 municipalities with 3500 motor vehicles and 246 street cars. In rush hours every one of these vehicles not undergoing repairs must be pressed into service and it means that repair time must be held at a minimum and at the same time use of replacement parts and materials must be restricted.

The company began using the metallizing process for salvaging worn parts in a small way about two years ago but today is employing it extensively. Moreover, it now is being used for rejuvenating reciprocating and rotating bus and street car parts which previously could not be repaired by any method.

Bus wheel hubs are one of the large items of maintenance, the points of wear being the inner bearing surfaces. These surfaces are prepared for spraying by first turning in a lathe with a rough cut-

Fig. 1. (Right)—Parts regularly rebuilt by metallizing and shown here are generator housing, wheel hub, clutch shaft and lever assembly, ball bearing cage and transmission shaft. All photos courtesy Metallizing Co. of America

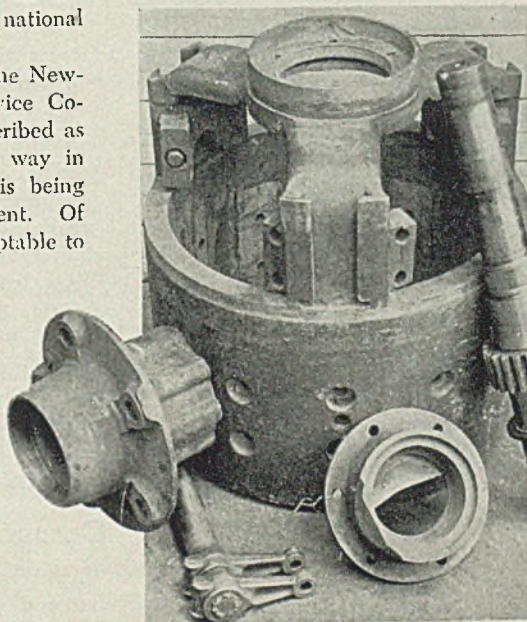


Fig. 2. (Lower left, center)—Bus parts in various stages of metallizing, including air compressor crankshafts, drive shaft yokes, clutch throwout shaft and lever assembly, transmission shaft, differential pinion shaft and universal joint crosses

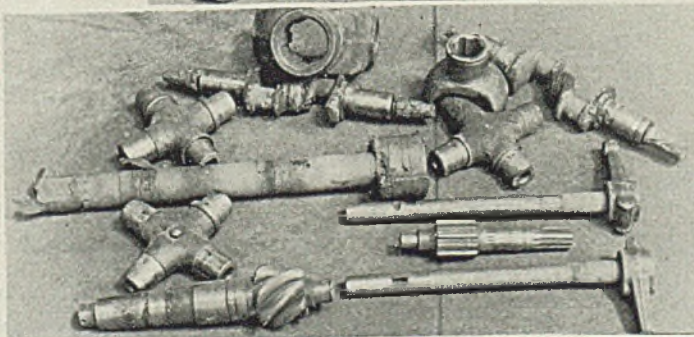


Fig. 3—(Directly below) Spraying steel on worn bearing surfaces of bus wheel hubs

Fig. 4. (Directly below) —Grinding metallized crankshaft bearing surfaces down to required diameters

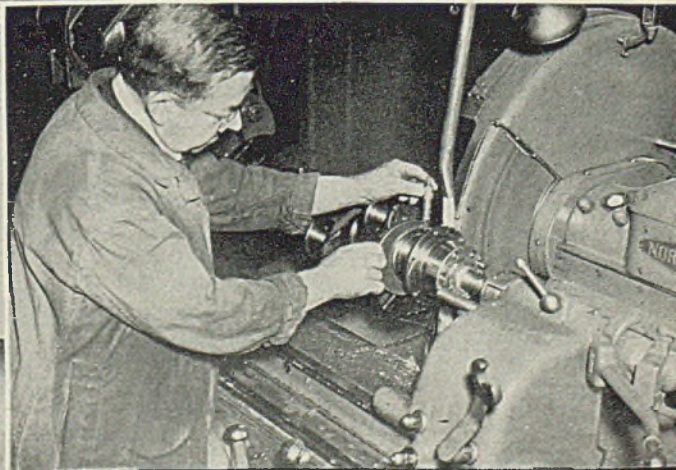
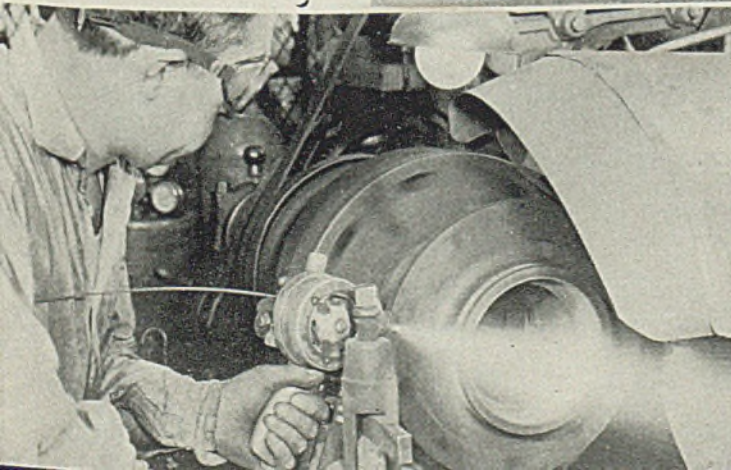
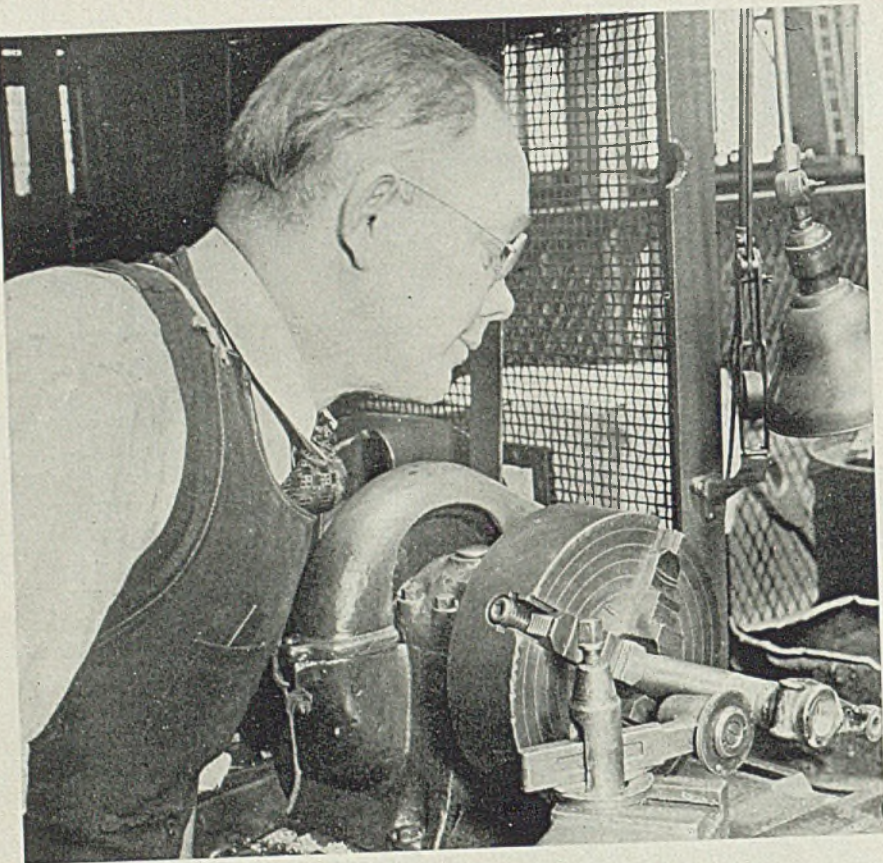


Fig. 5—Rotary tool being used for roughing surface of bus clutch throwout shaft and lever assembly prior to metallizing



ter after which the surfaces are roughened further with a rotary shaft tool. Spraying with steel is the next step while the hub is being rotated slowly in a lathe, conventional commercial equipment being used. In the final operation, a Carboloy tool is used for turning down the inner surface to the proper dimension.

Public Service finds it particularly advantageous to rebuild wheel hubs, since the operation may be performed in a minimum of time and at less than replacement cost even if the hubs were freely available from parts manufacturers. An added advantage is the fact that the hubs may be rebuilt a number of times, thus entailing further savings.

Salvage Clutch Parts

Bus clutch throwout shaft and lever assemblies are salvaged in somewhat the same manner although fewer operations are required. In the case of these assemblies, the end at the opposite end of the lever is placed in a lathe and the bearing surface roughened with a rotary shaft tool. Steel then is sprayed on the surface which subsequently is ground down to proper diameter with a Norton grinder using a 3846/K5/BE wheel.

In rebuilding air compressor shafts, Public Service finds it advantageous to build up the two bearing surfaces extra thick so they may be reground three times while in service and before respraying again is necessary. In order to allow for the thicker coating and because of the toughness of the base metal,

an extra deep cut is made by grinding in preparing the shaft for resurfacing. Following the grinding operation, the shaft is grit blasted. It then is sprayed and ground down to fit the connecting rod bearings.

As previously noted, the bearing surfaces may be ground down two additional times and refitted to the rod bearings before respraying is necessary, thus providing the advantage of additional economies.

Bus engine crankshafts are restored for further service in somewhat the same manner as compressor shafts except, of course, there are more bearing surfaces requiring processing. Extra deep undercuts are made so that the three regrinds may be made during the period the shaft is in service and prior to the next spraying operation.

After the undercuts are made, the surfaces are prepared for metal spraying with steel by grit blasting. Bearing surfaces then are ground to size on a Norton grinder. Experience has shown that these crankshafts stand up well in service.

Plant operators will find that the bearing surfaces of shafts for practically any type of service may be built up in a similar manner with the attendant advantages of reducing down-time of equipment and savings on cost of replacement parts.

Many operators also faced with the problem of maintaining equipment in other respects probably will obtain some

practical hints from Public Service's experiments with reconstruction of bus transmission cases. These transmission cases have two bearing surfaces which are subjected to considerable wear and it was found that welding and other methods of building up the worn surfaces usually resulted in warping or cracking the cases because of the heat applied.

The company now follows the practice of building up the surfaces with sprayed steel. But, in order to properly anchor the added material, a dovetail is made in the original bearing surface, leaving a slot which is nine-tenths the width of the surface. After the steel is sprayed on it is machined down to proper size on a lathe using a Carboloy tool mounted on a boring bar.

As will be noted from the accompanying illustrations, Public Service has extended the spraying process to rebuilding quite a number of parts, including transmission shafts, differential pinion shafts, universal joint crosses, driveshaft yokes, ball bearing races and the like, in addition to the parts discussed specifically. Those encountering similar maintenance problems, especially in these difficult times, will find many inherent advantages in the process.

Founders Group Publishes Occupational Rating Plan

An occupational merit rating system prepared by Gottfrid Olson, foundry engineer, was published recently in booklet form by the National Founders Association, Chicago, under the heading "Occupational Rating Simplified for Foundries."

A plan is offered by which an equitable wage structure may be built. Details are clearly set forth and summarized in an occupational rating schedule which makes it unnecessary to wade through a maze of figures.

The booklet is divided into ten brief sections containing principally a definition of occupational rating; rating as a tool in production control; rating factors and their interpretation; determination of values and basis for wage differentials; discussion of the "going rate" bogey; occupational rating schedule and classifications by factors.

A section with graphs effectively illustrates schooling and training requirements; skill, versatility and job knowledge studies are graphed, as are degrees of responsibility, working conditions and wage group classifications.

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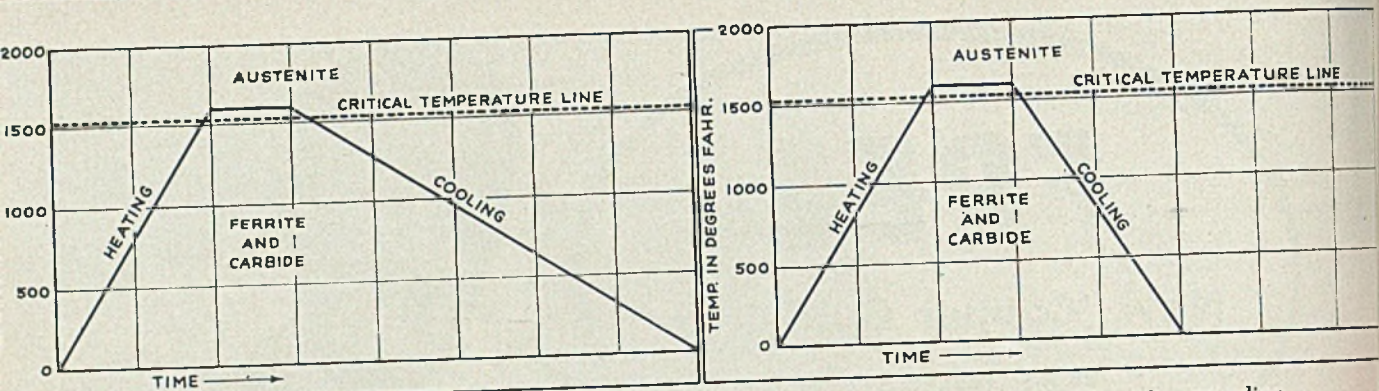


Fig. 1. (Left)—Typical heat-treating conditions for annealing
 Fig. 2. (Right)—Typical heat-treating conditions for normalizing

STRESS RELIEVING

In Welded Construction

What is stress relieving; how does it differ from annealing or normalizing; where does tempering come in; what is the significance of these treatments and what are the purposes and advantages of each?

ARMAMENT designs have brought some strange steels into the welding scene. Many of these are of such chemical composition as would ordinarily put them outside the pale of weldability. Still the needs of the armed forces have to be satisfied, leaving no choice for the welding engineer but to learn how to weld and heat treat his structures.

Quenching and tempering are used in a limited number of weldments while stress relieving is specified for many articles of ordnance. And the effect of the stress relieving cycle brings many problems, because a narrow range of tensile properties must be satisfied after the stresses have been reduced by heat treatment.

For the sake of proper orientation, stress relieving will be considered in its relationship to other heating methods that are in common use to lower residual stresses. There are four basic processes—annealing, normalizing, stress relieving

and drawing. Each will be discussed in detail.

Annealing, or full annealing, as it is sometimes called, is a heat treatment

By HAROLD LAWRENCE
 Metallurgist and
 Welding Engineer

that brings steel above the critical or recrystallization temperature, followed by slow cooling. This cycle is illustrated in Fig. 1. The original structure consisting of ferrite and carbide is heated slowly to a point about 100 degrees Fahr. above the critical temperature line. Below this line the steel is magnetic while the iron is in a form that can hold little

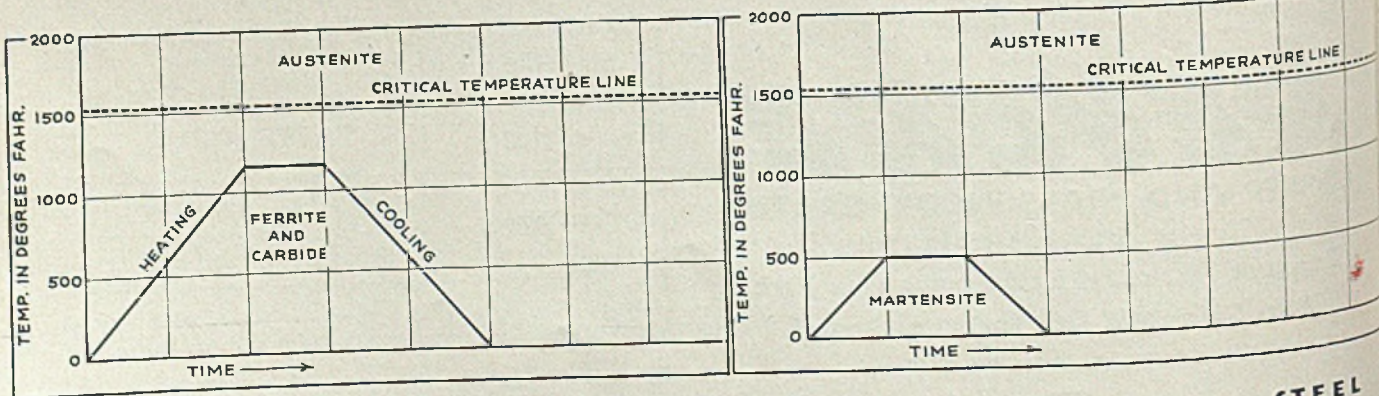
carbon in solution. Above the line the iron is in a non-magnetic state while the crystal form is one which allows considerable carbon to be held in solid solution. The high-temperature crystal formation of steel is called austenite. Thus annealing means the transformation upon heating to a temperature above the critical of one crystalline arrangement to another.

Slow cooling, almost always done in a furnace, permits the re-establishment of new crystal containing ferrite and carbide but characterized by a substantially stress-free condition. Annealing, in addition to removing internal stress, results in a steel of lower strength and higher ductility.

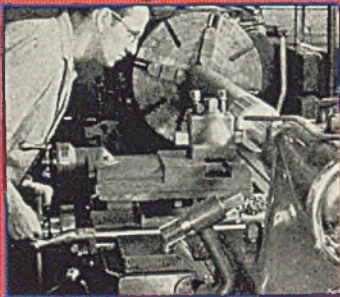
Normalizing, shown in Fig. 2, is quite similar to annealing. Both the heating and the holding periods are identical with those for annealing. The only difference is the rate of cooling, for cooling in still air rather than in a furnace means the formation of smaller crystals. The more rapid cooling associated with

Fig. 3. (Left)—Typical heat-treating conditions for stress relieving. Compare with Figs. 1 and 2

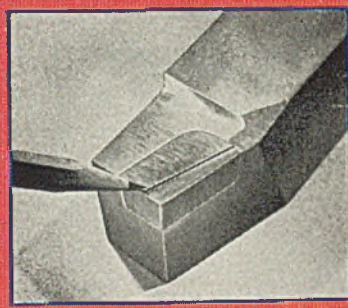
Fig. 4. (Right)—Typical heat-treating conditions for tempering or drawing operations



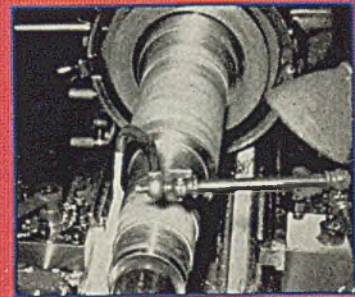
6 STEPS TOWARD TOP PERFORMANCE, WITH CARBIDES, WHEN YOU CUT STEEL



CUT AT HIGH SPEEDS—For top performance on the average steel-cutting job, don't cut at speeds less than 200 feet per minute. Slow speeds often cause failure.



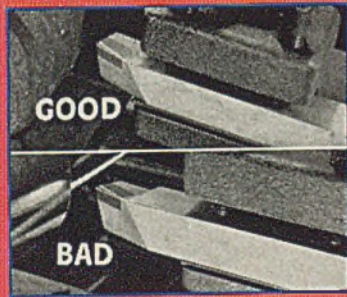
USE CORRECT CHIP BREAKER—When you break chips, break them right. Fit breaker to the job. The ground-in step-type shown is usually best.



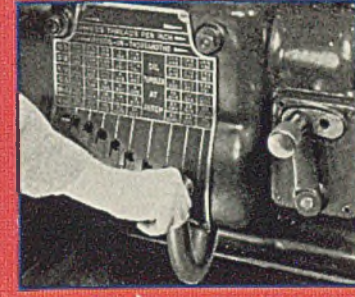
COOLANT—If you use a coolant, provide a heavy, continuous stream, preferably under pressure. If you can't provide ample coolant, it is better to cut dry.



KEEP TOOLS SHARP—Avoid running tools until excessively dull. This causes breakage or drastically shortened tool life. Grind tools at regular intervals for best results.



PROVIDE RIGID SET-UP—Keep tools at absolute minimum overhang necessary to clear work. Chuck part firmly. Rigidity is important with carbides.



FEEDS—For medium and heavy cuts on steel, use feed not less than .010" per revolution and preferably .015" to .025". Light feeds "rub" tool, causing rapid dulling.

● Important in getting top performance, when cutting steel with carbides, are the six steps shown above. When correctly applied, carbide tools produce results far surpassing the performance of ordinary tools. They operate at machine speeds as high as 4 to 5 times faster than ordinary tools, stay sharp up to 10 times longer, and increase output often as much as 300%.

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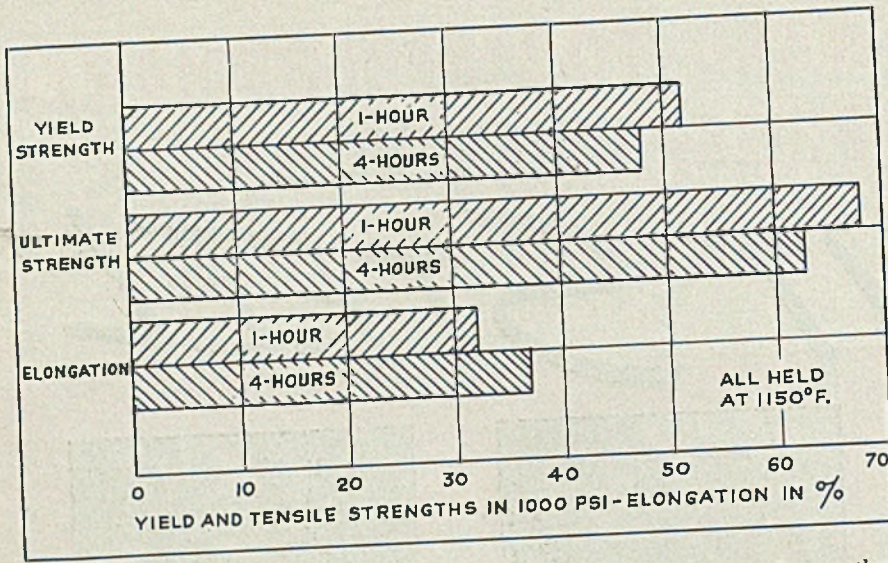


Fig. 5—Effect of holding times on physical properties of welds. Note all were held at same temperature —1150 degrees Fahr.

fore a 5-degree angle had been reached. Obviously something was wrong. Microscopic examination revealed martensite in the heat-affected zone.

The whole cylinder was loaded into a furnace and normalized. Subsequent microscopic examination showed a ferrite and carbide structure that is known to be ductile. The second bend specimen which had been heat treated with the cylinder bent 180 degrees. Thus was heat treating used to remedy a poor structure that had resulted from an improper welding procedure.

normalizing yields a structure with greater strength and less ductility than is the case with annealing.

Often normalizing is specified on heavy steel sections as part of the manufacturing process at the steel mill. The finer grained product is desired for its better impact strength as measured by the Charpy and Izod tests.

Stress Relieving: In Fig. 3, the third heat-treating process, stress relieving is shown. This treatment, which will be described in greater detail later, consists in slowly heating a weldment to 1150 degrees Fahr. within plus or minus 25 degrees Fahr. without introducing any recrystallization. Sometimes stress relieving is loosely spoken of as stress relieving annealing. This practice ought to be discouraged as metallurgists prefer to reserve the term *annealing* for heating that is carried out above the critical temperature line. Stress relieving lowers the strength and increases the ductility of carbon steels but may have a noticeably different effect with the low alloy group.

Tempering: Fourth and last of the treatments used to relieve stresses is tempering or drawing. The term *tempering* is preferred. Tempering is used to improve the ductility and toughness of those structures that have been quenched to form martensite. Martensitic structures are unstable because of cooling at a rate that prevented the carbide from separating from the ferrite as it normally would do.

Tempering, see Fig. 4, is carried out far below the critical temperature. Because of the heating, carbon is allowed to free itself from the supersaturated, unstable martensitic state and will be found in small spheroidal form. A tempering operation reduces the hardness and strength of the steel but imparts ductility and toughness in a degree that makes the steel serviceable. For example a chisel used for chipping welded structures would be too brittle to withstand the impact of the pneumatic hammer unless both the shank and the point are given suitable tempering. Often the shank is tempered at 600 degrees Fahr. for one hour while the point is tempered at 400 degrees Fahr. for one hour.

Before going into the discussion of stress relieving, mention might be made of the use of normalizing to save a weldment that might otherwise have had to be scrapped. A large cylindrical section of alloy steel had been welded and X-rayed before an attached test plate was tested. The X-ray showed a perfectly sound structure without any hint of gas, slag or cracks.

Upon testing, the bend specimen broke in two with a brittle fracture be-

Many present day weldments are stress relieved to aid the machining operations that follow the welding. If stress relieving were not practiced, the structures would distort during the machining. The effect might be disastrous if such distortion were on a welded diesel engine frame which had been fabricated to extremely close tolerances for the purpose of eliminating excess machining.

In some types of service, stress relieving is necessary to avoid premature fatigue failure. What rules establish the need for stress relieving are rather well understood by designers. That residual welding stresses and welding sequence are of fundamental importance was re-emphasized in the case of the SCHENECTADY break-up, although these factors are kept in line with good control. But this article is not so much concerned

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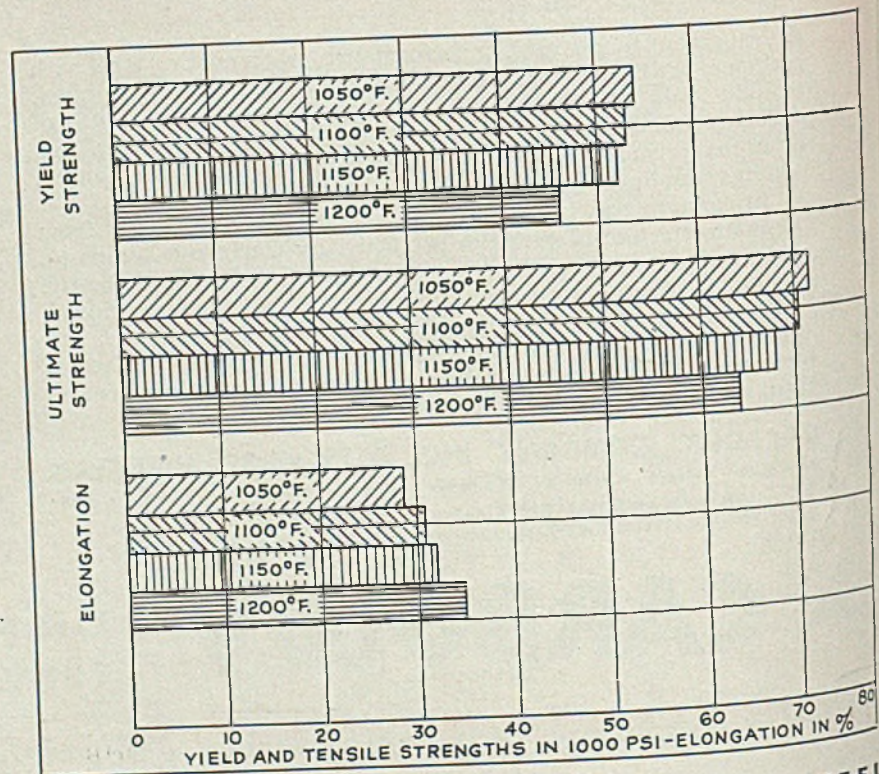
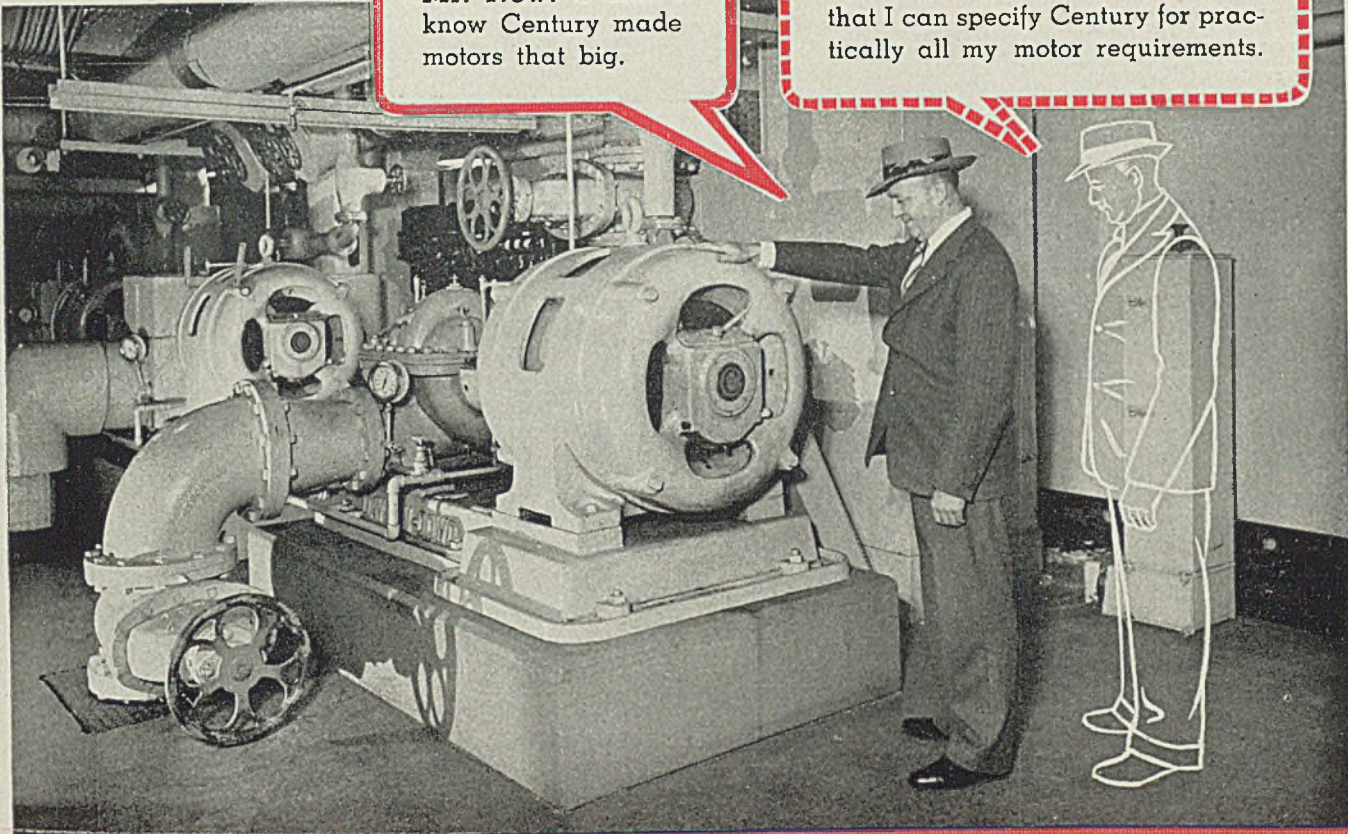


Fig. 6—Effect of different holding temperatures on physical properties of welds

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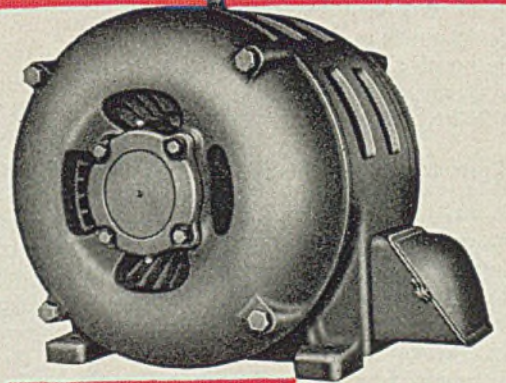
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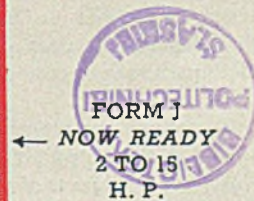
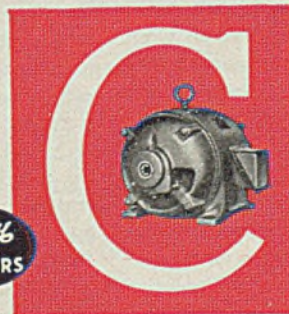
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By C. H. HOCHMUTH
Assistant Works Manager
Kearney & Trecker Corp.
Milwaukee

CLEAN INSIDE, TOO

AFTER MUCH time and money have been spent in grinding and machining many of the parts of a machine tool to extremely close tolerances, it is annoying to find that scratches or rough spots have developed on these surfaces, owing to the presence of dirt that has come from the inside of the machine housing or some other part of the machine during handling or shipping.

Having experienced this condition many times, we decided that all housings and other voids in the machine should be thoroughly cleaned so that dirt or grime would not be present anywhere, even in those places where it could not be seen. This would make it easier to keep the bearings, gears, and other precision-made parts in perfect condition.

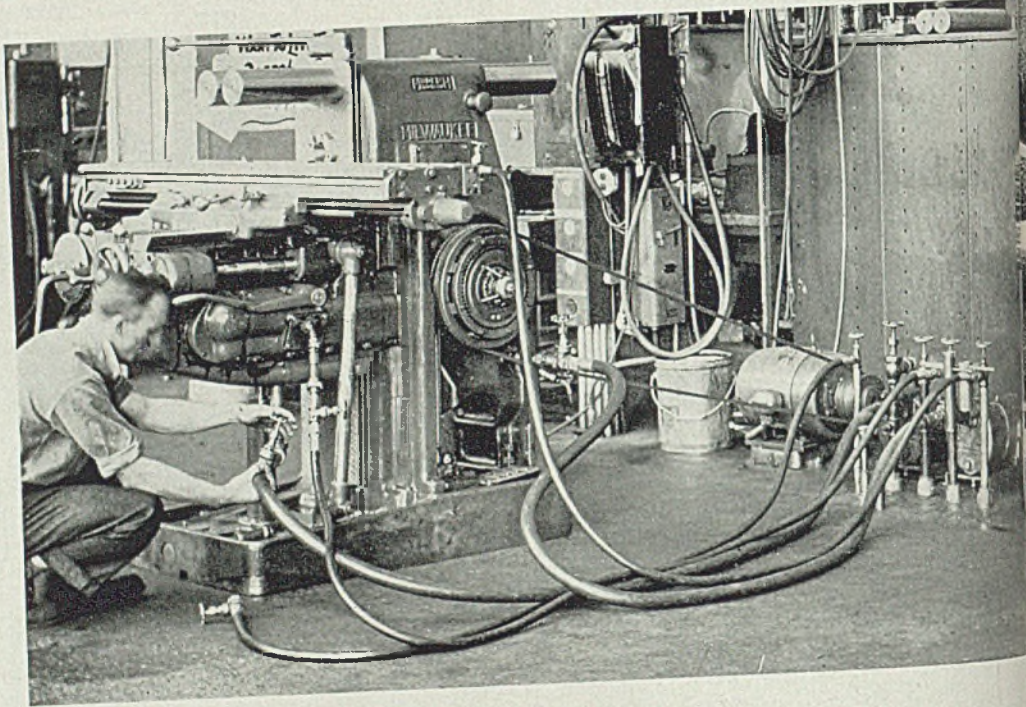
Machine tools must turn out work of extremely high accuracy, so all sliding surfaces as well as surfaces holding the work must be gaged to close tolerances and polished. The same is true of the many gears, cams, bearings and other parts. Many such surfaces are ground to tolerances of less than a thousandth of an inch, and deflections with applied loads must be kept within limits measurable only with very sensitive tools.

Scoring of these surfaces by the presence of dirt contributes to inaccurate work, inasmuch as damage of this nature, even though slight, may increase a tolerance of, say, 0.0004-inch to several times that figure.

Protected by Flushing with Oil

To maintain extremely close tolerances, great care is exercised in gaging and testing all precision-made parts and in handling parts and assemblies. Polished surfaces are protected by using soft rope slings. Where wire rope can be used, only preformed rope is employed since it is not so inclined to "barb" when worn and therefore it does not puncture the cloth pads used as cushion between it and the load.

To insure protection of all surfaces, we have eliminated all dirt and grit by flushing out all parts of the machine with oil under pressure, which is then followed by the application of clean machine oil to all moving parts and interior surfaces. Since adopting this method, we



Flushing station includes facilities for operating the machine being cleaned, several flexible hose lines with connectors, storage tank and motor-driven pumps. Note push-button control station at extreme right

have virtually eliminated all trouble caused by dirt or grime working its way into bearings, gears, and the like from the inside of the machine.

The clean flushing oil is pumped from a tank and forced into the machine under 40-pounds pressure, then is returned to a settling tank, from where it passes through a centrifuge and on to the clean-oil tank, thus completing the circuit. After 15 minutes of this operation, the flushing oil is drained out of the machine and is replaced with clean machine oil.

During the application of the flushing oil and the machine oil, the machine is kept in operation. The flushing oil first passes through the bearings and the internal gearing, as well as through the hydraulic control unit on machines equipped with this device. The working parts throw the oil against the sides of the housing, washing all dirt and grime into a settling pocket. From here the oil, carrying all sediment and moisture out of the machine, flows through a pipe into the settling compartment of the settling tank. This compartment is separated from the remainder of the tank by a vertical partition, over which the oil flows into the second compartment. A clean-out is provided at the bottom of the settling compartment.

On the way to the tank of cleaned oil,

the oil passes through the centrifuge, which is located between the two tanks. Alongside the cleaned oil tank is the tank of machine oil.

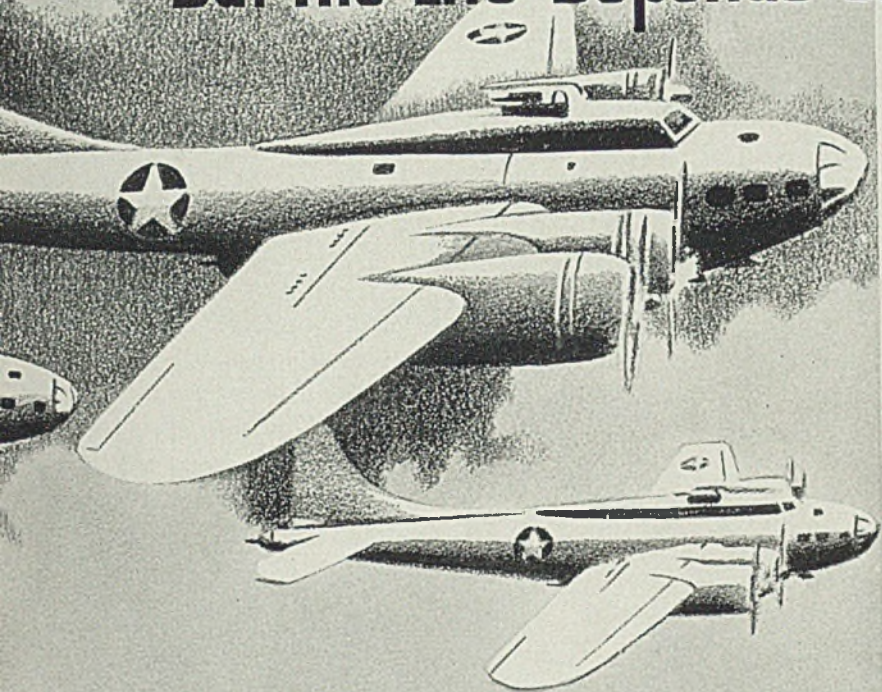
Tanks Cleaned Every Four Weeks

The piping from all tanks leads under the floor to two flushing stations, allowing two machines to be flushed at the same time. At the flushing stations the pipes emerge from the floor and are provided with control valves and with nozzles for attaching 1½-inch neoprene hoses. The pipe from the tank of cleaned flushing oil is broken for the insertion of the pump that forces the oil through the machine.

Every four weeks the flushing oil tanks are thoroughly cleaned out and the sediment removed from the settling compartment. Though our plant is operating 24 hours a day, 7 days a week, we generally find that changing the oil, which requires 4 or 5 hours, can be accomplished on Sundays without upsetting our production schedule. At each change, 12 barrels or about 650 gallons of fresh flushing oil is required, to which is added 10 gallons of pine oil. The tank of machine oil is filled every week, using about a barrel or 55 gallons at each filling.

The adoption of this method of flushing
(Please turn to Page 134)

Gunner Gates Never Heard of These Men... But His Life Depends on Their Work!



Cutting Tool Industry Meets "Impossible" Demands of a Fighting America!....

It took plenty of the right kinds of cutting tools to get America's war production where it is today! Cutting tools for the machine tools that turn out deadly guns, fast planes, mighty tanks, avalanches of hard-hitting weapons. The stuff victory is made of.

Producing plenty of the right kinds of cutting tools . . . *right on time* . . . posed many an "impossible" problem. Substitute materials had to be found . . . Production facilities had to be expanded tremendously. Then there was the man-power shortage; and serious engineering problems also presented stumbling blocks.

The engineers of the cutting tool industry found the answers fast by tapping rich resources of years of know-how experience. Typical of these "combined" operations is the meeting of Barber-Colman engineers pictured at left. Out of just such conversations came war vital achievements.

For instance Barber-Colman engineers developed a series of special taper cartridge chambering reamers and a fixture for mechanically sharpening them which saved hundreds of man-hours. Hand stoning was banished and total sharpening time reduced from as much as 6 hours to approximately 30 minutes.

Doing the impossible has become a habit with the men and women of Barber-Colman. Today, we're proud to be turning out many times more and finer cutting tools for more war industries than ever before. Tomorrow, this same kind of performance shall be yours to command in solving problems of production for life after victory.

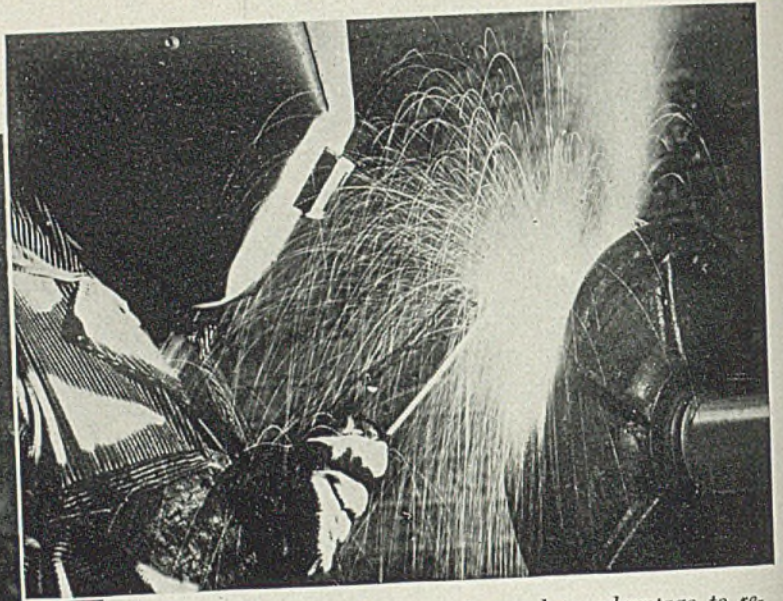
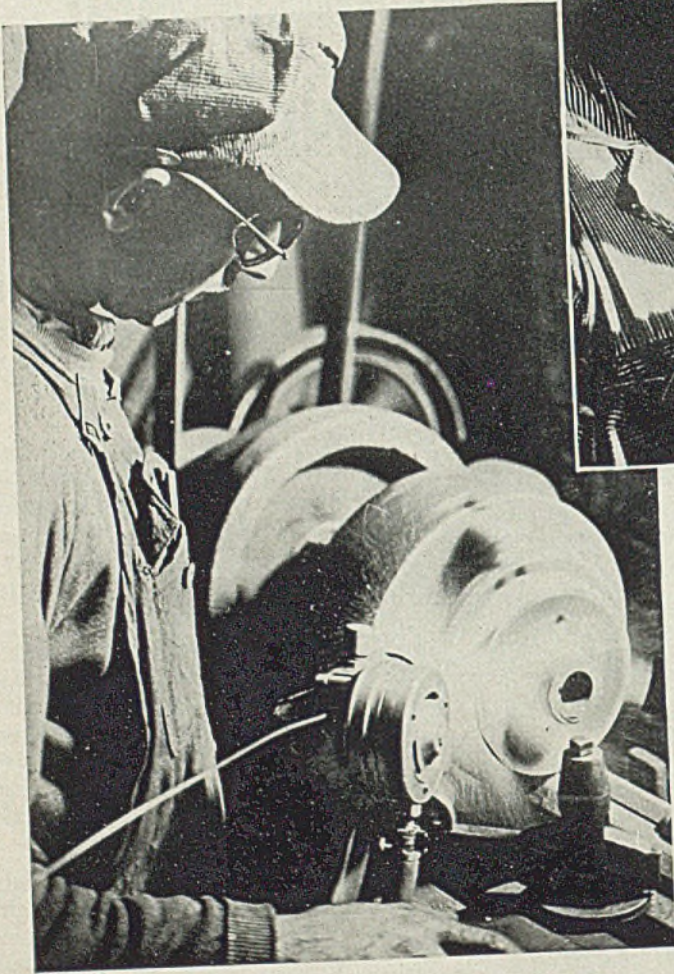


Barber-Colman Company

GENERAL OFFICES AND PLANT • 204 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

Complete Cutting Tool Service • Engineering • Manufacturing
Hobs • Milling Cutters • Reamers • Special Tools • Sharpening Machines

By F. L. SPANGLER
Mechanical Engineer



Above—Arc welding can be used to advantage to rebuild worn sheaves regardless of how badly they have been damaged

Left—Metal spraying is one way to deposit metal for building up worn sheaves

Reclaiming WORN SHEAVES

SINCE STEEL or iron sheaves are not easily obtained these days, it behooves everyone to make all cable sheaves or drums last as long as possible. Frequently old sheaves can be reclaimed and kept in use by building up the worn grooves. A common method for building up worn sheave grooves is to deposit metal in the worn grooves by either arc welding or by metal spraying. Where the sheave groove is badly worn, flat spots or places of uneven wear can be built up by welding and then the welding arc, or the metal spraying gun, used to apply the final layer over the entire wearing surface.

The use of too soft a material, such as cast iron, is often the cause of undue wear of sheaves. Originally soft sheave grooves built up with a hard metal have given as much as five times the original wear. Hence, the reclaimed sheave might be a decided improvement over the new. Here, too, is proof that harder sheaves, such as manganese, might well be economical in the long run. A long-wearing sheave saves more steel than is at once apparent, for in addition to saving precious sheave metal, it is much easier on the rope than is a

sheave constructed of softer material.

However, wire rope in itself can be a needlessly destructive element to sheaves. Ropes which tend to twist, squirm or rotate as they pass over sheaves cause far more rapid sheave-groove wear than where such twisting is absent. Because of the elimination of torsional stresses in preformed rope, this type of rope does not tend to twist or rotate in sheave grooves and thus reduces groove wear as well as rope wear. It has long been recognized that the use of hard sheaves, with preformed wire rope, will effect pronounced savings in replacement or reclamation.

Approved methods of building up worn sheave grooves by arc welding and by metal spraying with advantages of each process can be briefly stated as follows:

Arc Welding

How to Apply:

—Use an electrode that is suitable for depositing on the particular metal of which the sheave is made, and where practical, select an electrode that will give a hard surface without heat treatment. With a steel sheave use a man-

ganese-steel electrode or a self-hardening electrode, deposited in a layer not more than $\frac{1}{8}$ -inch thick. Where the wear is greater, fill in with a carbon-steel electrode before depositing the final layer of hard metal.

—Apply the metal by the skip weld method to minimize distortion.

—Finally, true up the groove.

Advantages:

—Can be applied to sheaves having even or uneven wear.

—Can be performed without removing the sheave, if necessary.

—Many users of wire rope are equipped to build up sheaves by welding.

—Deposit is very dense, contributing to long wear.

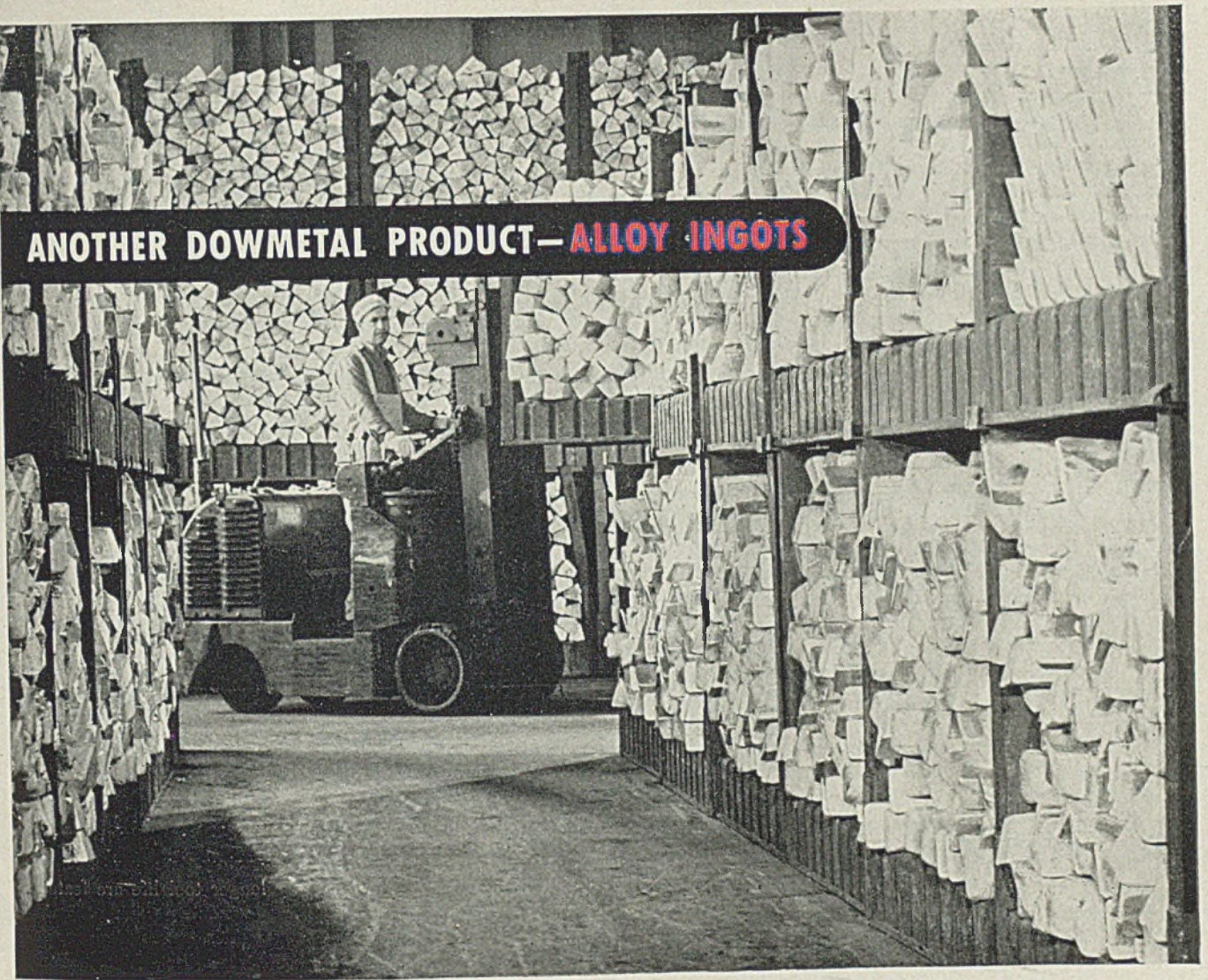
Metal Spraying

How to Apply:

—If uneven wear is present, build up to uniform contour by welding or by truing up on lathe.

—Prepare surface by blasting with sharp steel grit. After blasting keep surface clean. Do not allow hands to come into contact with the surface.

—Apply metal by rotating sheave in



ANOTHER DOWMETAL PRODUCT—ALLOY INGOTS

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Twenty-seven years of research and experience go into every Dowmetal magnesium alloy ingot so that you who are entrusted to make vital sand, permanent mold and die castings can forget your alloy problems when you buy ingot from Dow.


All alloy ingots are made under close metallurgical

control and furnished in a wide variety of compositions with certified analyses to meet strictest government and industry specifications. Dow also has available a complete line of fluxes and protective agents to meet your every melting problem.

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MAGNESIUM

PRODUCER SINCE 1916



FROM INGOTS TO FINISHED PRODUCTS

INGOTS • CASTINGS • FORGINGS • SHEET • STRIP • PLATE • EXTRUSIONS

lathe with spray gun attached to tool post. Use 1.2 carbon wire.

Advantages:

—Can be used to give hard surface to cast iron sheaves as well as steel sheaves.

—Does not distort sheave if applied as directed above.

—Requires no truing up of sheave groove after application.

—Deposited metal is capable of absorbing rope lubricant, thereby retaining oil film on surface.

—Wearability of hard deposit increases life of sheave and rope.

Wet Belt Grinding Methods Are Described in Book

Under the title, "A New Precision Grinding Method," Porter-Cable Machine Co., Syracuse, N. Y., recently published a 32-page brochure covering many applications of the highspeed "wet-belt" abrasive system of finish machining without preliminary roughing.

Through development of a new type of specially processed cloth belt to which the abrasive grains are plastic bonded, it is possible to use coolant. This keeps work and belt from heating, eliminates flying grinding dust, and keeps the abrasive surface cleared of metal chips. This belt, which is skived on a basis and vulcanized together so as to give no "bump" at the joint, is backed up by a precision surface plate which makes it possible to grind parts directly "from the rough" to

a high degree of accuracy and flatness as well as to fine finish. Because of the coolant, no heat distortion occurs.

The brochure, which is fully illustrated, describes a wide variety of operations, including free hand, table supported and fixture-held work on various materials, including plastics and ceramics as well as metals. The system is dealt with not only as a primary machining method, but also as supplementary to pressure casting, band sawing, shearing and pressing, forging and rotary cutting off in lathes and screw machines. Numerous examples illustrated and described will serve to guide in the setting up of other jobs of the same general characteristics.

Copies of this book are available free of charge to executives, engineers and production men who request it on their companies' letterheads.

Granular Silica Gel Protects Overseas Cargo

A quick-packaging technique for guns, planes, and machinery that prevents rusting and corrosion damage during the weeks and months these metal war implements lie in freighter holds and dockyards is described in *Chemical and Engineering News*, publication of the American Chemical Society, by Henry H. Wilkinson of Permutit Co., New York.

The technique is made possible by development of a chemical that not only sucks half its weight in moisture out of the damp cargo space air, but also signals

workmen when the humidity inside a package reaches the point where rusting occurs.

The chemical is granular silica gel. It protects inside as well as outside surfaces of aircraft engines, machine guns, or other metal parts because the relative humidity of the entire package is kept below 20 per cent—at which range the chemical action of corrosion cannot take place.

According to the publication, silica gel granules do not swell, dissolve, or show any visible effects of the absorbing process. Their water-absorption is a simple physical action.

One of the advantages of the silica gel method, it is reported, is the elimination of guess work as to the "corrosion-proofness" of the package. Visible from the outside, enclosed in the package is a humidity indicator—a card containing cobalt-impregnated silica gel, which changes color as the air within the package changes in humidity.

When the air is dry, the impregnated granules are a deep blue, but as the humidity of the package increases, the granules change through violet to pink.

New Rotary Burring Tools Cut at High Speeds

Reduced burring time per part and considerably longer tool life are features of the new cemented-carbide burring tools, or rotary files, called Carbur, developed by Carbur Inc., Lincoln Park, Mich.

The result of five years of research and development work, the tools are said to be the first ever produced—having cutting teeth which are ground from the solid on special machines designed and built for the company.

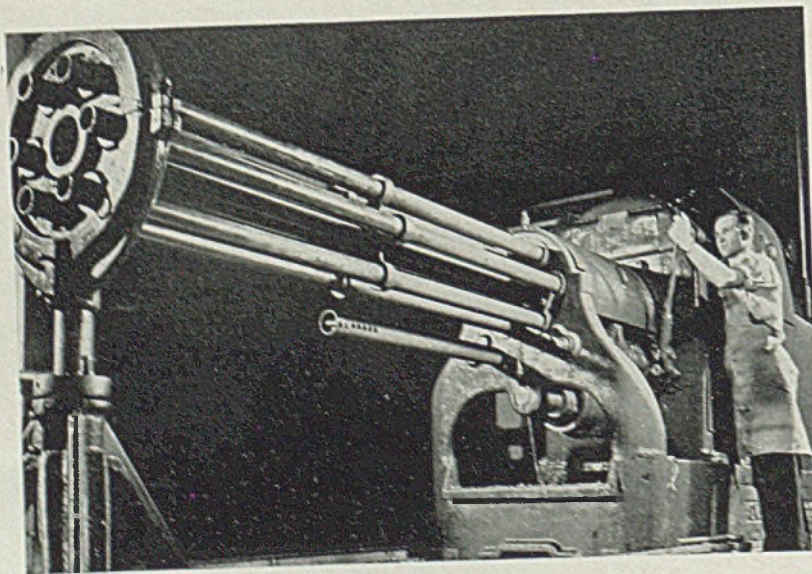
The cemented-carbide beads are securely attached to the steel shanks by a new process employed by Carbur.

Providing a sharp cutting edge over a long period of time, the tools reduce burring time per part and generally increase efficiency in burring operations in all types of production.

Among other advantages of the tools, less replacement is necessary and inventories can be reduced considerably. Tool sharpening is reduced in proportion to the life of the tool. In addition the new tools can be run at high speeds.

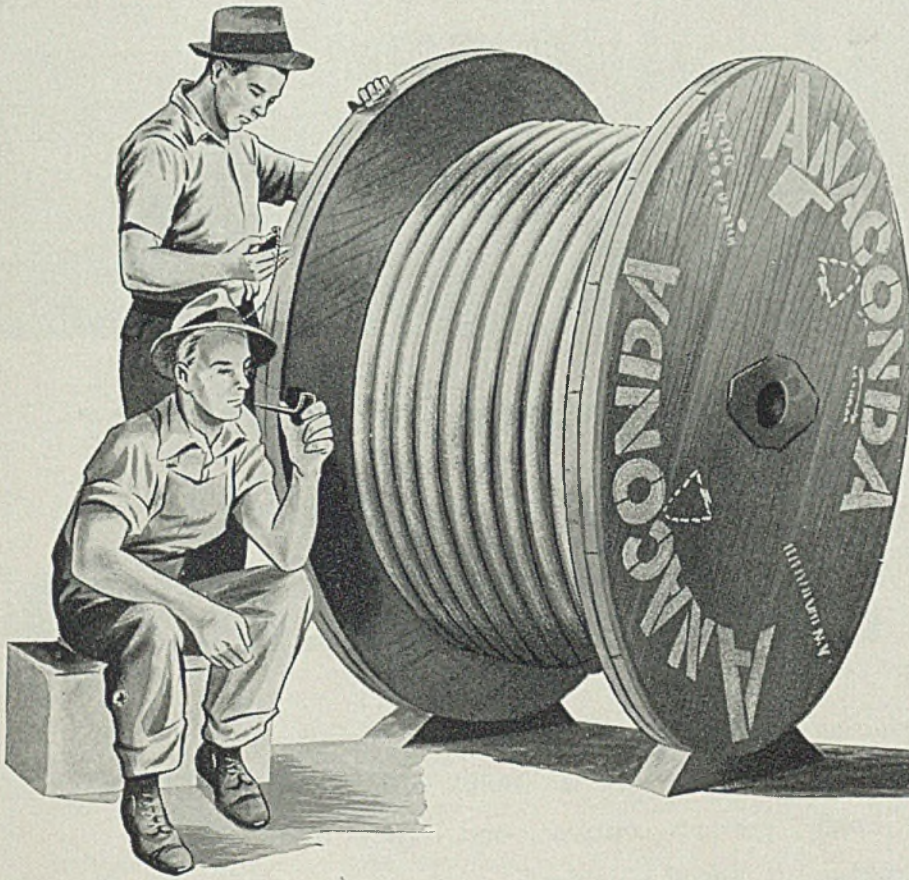
At present, the tools are being manufactured only in ball-end types in $\frac{3}{8}$ and $\frac{1}{2}$ -inch sizes. The shanks are 0.250-inch diameter and the burring tools are $\frac{3}{4}$ inches over-all.

Other sizes and shapes are now under development and will be announced as production tests are completed, according to the company.



INDUSTRIAL ACK ACK: This automatic machine tool at the Mansfield, O., Westinghouse plant, in appearance resembling an automatic military weapon, belches out threaded aluminum rings that go into Army binoculars. Aluminum rods loaded into the machine's six "barrels" change into rings the size of napkin holders when automatic drills, threaders and cutting tools go into action. The "ammunition" is fed into the tube openings shown at the left, and the finished parts come out at the right. Each part is so perfect it checks to 0.0007-inch

War Time is Priceless!



**ORDER ACCESSORIES
WHEN YOU ORDER
CABLES AND AVOID
WIRING DELAYS**

EVEN before the war, the common practice of waiting to order cable accessories until the cable for the job had been shipped frequently caused days of delay.

Today, however, it may even take a month or more before an accessories order can be approved and materials started on their way.

This holds up the wiring job unnecessarily. In the meantime, workers may be idle—and not just electricians alone, for other workers all along the

line may be affected. Today, if never before, follow this wartime-saving practice:

- 1** Order accessories and cable at the same time —for delivery together.
- 2** When ordering unit package jointing material, include your order for terminals and potheads. If buried cables, remember joint boxes. 43287

Every Anaconda unit package contains instructions and all materials required for the particular job. When ordering, please specify number of unit packages needed, operating voltage, size, number and shape of conductors, thickness and kind of insulation, thickness of lead sheath of cable.



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DURAPEX COMPOUND #607 RUST INHIBITOR

an Economical 2 Purpose Product for
Cold Rolled Strip Mills . . . Acts as a
COOLANT and RUST PREVENTIVE

MAXIMUM production of cold rolled steel demands a coolant possessing a high specific heat of conductance. DURAPEX COMPOUND #607 will conduct heat rapidly, prevents corrosion, and is now being used successfully in the cold rolled reduction of steel.

DURAPEX COMPOUND #607 is a light, free flowing product readily miscible with water . . . the resultant coolant and rust inhibitor is a permanent emulsion which will not clog circulating systems nor become impaired by continued use. It will not corrode or stain either rolls, sheets or strips . . . contains no excess of alkali or other injurious chemicals, and is free from toxic vapors. DURAPEX COMPOUND #607 is a non-lubricant . . . thereby offers the added advantage of being nontaxable.

WRITE today to arrange with our technical department for an actual demonstration of DURAPEX COMPOUND #607 in your mill.

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TUNGSTEN is one of the strategic metals, being produced chiefly from ores imported from China. Since tremendous quantities of it are used for cutting tools and other purposes, it is essential that all scrap be reclaimed. The process described here is now being used in the Aircraft Engine Division of Ford Motor Co. to recover or reclaim tungsten carbide tools tips that have served their normal purpose.

The first step is the removal of the carbide tip from its steel shank. This is accomplished by holding the tool for one hour in a bath of concentrated nitric acid at a temperature of about 150 degrees Fahr. It is then removed from the acid bath and washed in water, and a slight tap then will loosen the carbide tip. The tips usually are slightly contaminated with iron and brazing material, which are removed in a bath composed of equal parts of nitric acid, hydrochloric acid and water.

Next the tips are washed in a caustic bath. Titanium and tantalum carbide tips must be separated out and this is accomplished by passing the tips through a hydrogen-atmosphere furnace at 240 degrees Cent., in which the titanium and tantalum carbide tips acquire a brownish color, while the tungsten carbide tips retain their light gray color. This allows the former to be readily recognized and separated out.

The tungsten carbide tips are next pulverized in a 100-pound Bradley

power hammer, which operates at approximately 250 strokes per minute. A hardened steel mortar and a pestle are used on this hammer. The pestle reciprocates through a packing gland that prevents the escape of carbide dust. The carbide is fed into the mortar through an iron stand-pipe, and the pulverized product is drawn off by the air current of a centrifugal exhauster, through a cloth filter, The dust settles in a trap from which it is recovered. A cross section of the die and the collecting mechanism is shown in the accompanying illustration.

The pulverized tungsten carbide is now put into carbon boats and placed in a hydrogen-atmosphere furnace at 1500 degrees Fahr. for 20 minutes to reduce any oxides that may be present. The powder is then put through a 400-mesh sieve, and the portion that passes through is ready for further use. The part that does not pass through is fed back into the power hammer and repulverized. A binder consisting of a 3½ per cent

solution of paraffin wax in trichloroethylene is added to the powdered carbide, and this mixture is dried in an oven at 140 degrees Fahr. for approximately 2 hours.

It is now ready for forming into shapes, and the mixture is compressed in suitable steel molds under a pressure of from 5 to 20 tons per square inch. While the higher pressure gives a somewhat higher density, it also tends to cause lamination, and for that reason it is necessary to use the lower pressure range in most cases.

The tungsten carbide thus compressed is placed in carbon boats and covered with aluminum oxide. After careful preheating to drive off the wax, it is "soft-sintered" at 1600 degrees Fahr. for 20 minutes. After this soft-sintering process, the carbide is "chalklike" and may be cut to any shape with a saw, file or grinding wheel. The stock is cut 17 per cent oversize in all directions to allow for the shrinkage which occurs in the final sintering operation. This final sintering is done in carbon boats, in which the carbide shapes are covered with flake graphite and passed through a hydrogen-atmosphere furnace at 2760 degrees Fahr. for 20 minutes at heat. The tungsten carbide shapes are now ready for brazing to tool shanks, into die holders, etc.

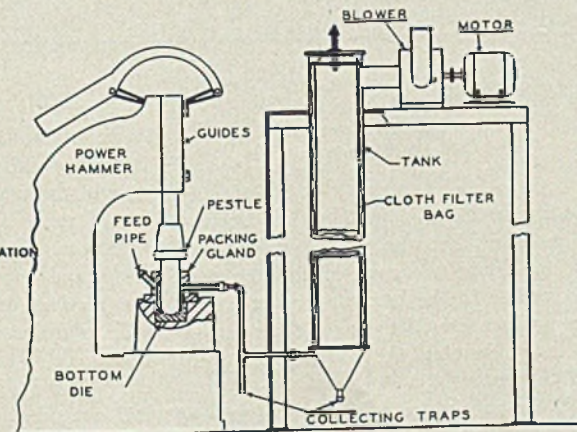
Note reclamation is practically 100 per cent for any carbides cut away during shaping of the new tool can be powdered and re-sintered. There is no need to lose any of the tungsten carbide material.

From Automotive and Aviation Industries.

Reclaiming CARBIDE TOOL TIPS

... by reducing to powder and re-sintering affords almost 100 per cent recovery of valuable tungsten carbides in tool tips no matter how badly tools are worn

Diagrammatic layout showing equipment and pulverizing die for reclaiming scrap tungsten carbide from tool tips



How To Burn Fuel Oil

Fuel Oil and Its Combustion, Fabrikoid, 45 pages, 5 x 7½ inches; published by North American Mfg. Co., 2910 East Seventy-fifth street, Cleveland 4, for \$1.50.

This booklet was prepared by the company's research department for users of fuel oil. After a definition of the term as used in industry the writer proceeds to a discussion of crude oil con-

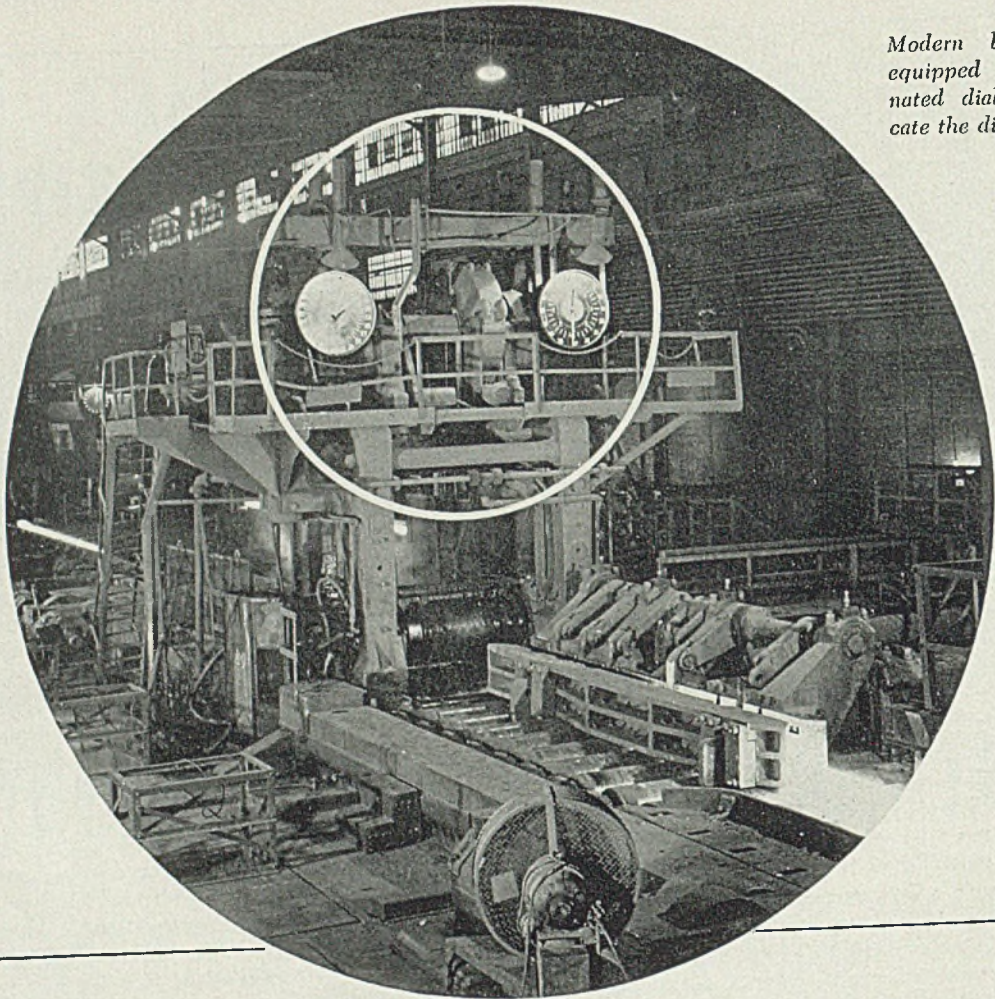
stituents and classification, processing of crude oil and thermal properties of fuel oils.

The work then takes up the combustion of fuel oils and various factors that produce various results in the combustion process. These include grade or type of oil, atomization, degree of air-oil mixing, furnace temperature and type of burner block.

Aim of the booklet is to stress the

necessity of knowing the combustion result desired and then proceeding in a logical way to select the type of fuel and combustion equipment that will give that result. Desired combustion results are becoming more exacting as to furnace atmosphere and temperature control, making it imperative that proper equipment and oil be used.

The book is practical and valuable to all users of oil fuels.



Modern blooming mill equipped with illuminated dials which indicate the distance between rolls

COUNTING DEVICES

Find Wide Use in Steel Industry

By S. H. FULLER
Pittsburgh Representative
Veeder-Root Inc.
Hartford, Conn.

USE of counting mechanisms in the steel industry begins with the ore. After the ore is dumped in the huge piles that ordinarily can be seen near blast furnaces, it is transferred to the stock-house bins and thence to skip cars which operate on an incline, and dump the charge in the top of the furnace. As these cars are unloaded, they are counted on a magnetic counter. This record serves two purposes: First, it measures the activity of the furnace and second, it enables a perpetual inventory of ore on hand to be kept with a reasonable degree of accuracy. Each car contains a definite amount of ore and it is an easy matter to determine the tonnage used by multiplying the number of cars dumped by the weight of each car.

Another application is at stripper building where a counter actuated by a grid-glow tube registers the number of ingots turned out. The light from the hot steel itself operates the

counter, and again the idea is not only to measure the amount of work done, but to obtain a record of the tonnage produced. In the blooming mills, counters again are used to count the number of ingots leaving the soaking pits and fed to the rolls.

In the process of rolling, counters are probably used more than anywhere else in the mill. The gap between the rolls must be maintained with a high degree of accuracy, and this spread is made visible to the operator by means of counters. These are operated by a synchronous motor, wired in series to the motors operating the screwdowns on the heavy rolls. This installation is so accurate that the operator can read in 0.001-inch, on the face of the counter, the distance between the rolls, controlling the thickness of the steel. Two of these devices usually are installed on

each roll and other such counters in a centralized location to indicate the thickness of the piece being reduced by each set of rolls.

In some cases it is necessary to remove scale and cracks from the surface of the product coming from the blooming mill in order to prevent defects in the commodities to which they are converted. The slabs or blooms usually are laid out side by side in a yard and carefully inspected. The inspector has a device that marks the defect, measures its length on a counter, and accumulates this total so that the amount of work necessary to clean up these defects is determined. After this inspection, men with air chisels follow the places marked by the inspector; in some mills the men are paid by the number of feet of chiseling they do.

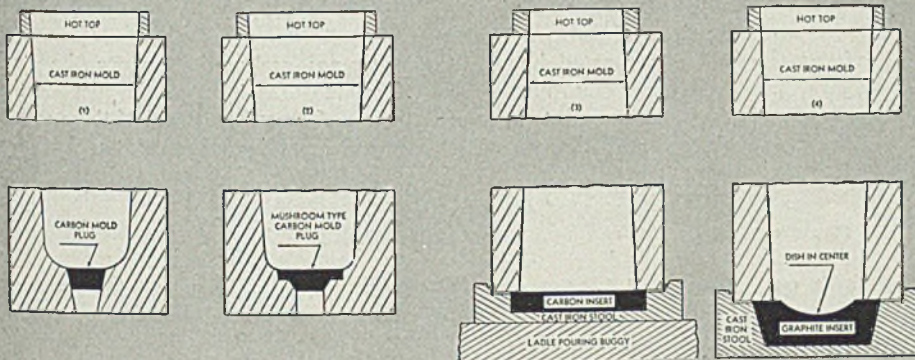
Where shapes are being rolled for construction purposes counters indicate the number of feet passing through the mill, both for the purpose of checking on

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Use Carbon and Graphite

EXPERIENCE HAS PROVED THE STABILITY AND EFFECTIVENESS OF "NATIONAL" CARBON AND GRAPHITE PRODUCTS WHEREVER SEVERE THERMAL SHOCK IS ENCOUNTERED.

STRENGTH . . . MINIMUM OF CRACKING, SPALLING AND STICKING . . . FREEDOM FROM INCLUSIONS OF FOREIGN MATERIALS . . . LIGHT WEIGHT . . . LONG LIFE . . . LOW COST



Standard tapered carbon mold plug.

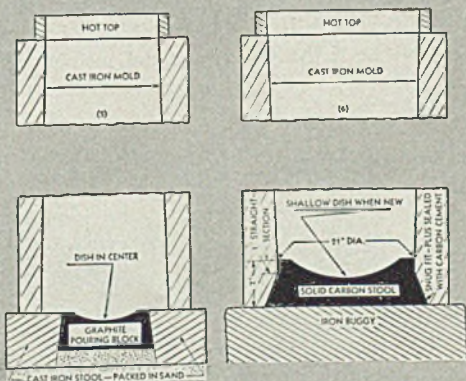
Mushroom type carbon mold plug.

Replacing metal and ceramic plugs.

Carbon or graphite slab as stool insert. Replacing cast iron.

Carbon or graphite stool insert with dished surface. Replacing copper.

"National" Carbon, Graphite and "Karbate" products are successfully meeting many mechanical, electrical and chemical requirements in the metallurgical and process industries. They are available in many sizes and shapes, such as brick — beams — blocks — pipe, fittings and valves — for the fabrication of tanks — tank linings — pipe systems — heat exchangers — towers and other equipment for handling or processing corrosive materials. Write for complete information.

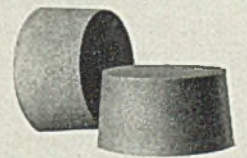


Graphite pouring block. Replacing cast iron and steel.

Solid carbon stool. Replacing cast iron and steel.

are important advantages offered by these materials in such applications as ingot mold plugs, stool inserts, stools and pouring blocks (see sketches of typical applications). Mold and stool life have been prolonged and other economies made possible.

STANDARD TAPERED MOLD PLUGS



Standard tapered mold plugs are available in two sizes:

$5\frac{13}{16}'' \times 5\frac{1}{4}'' \times 3''$
 $5\frac{15}{16}'' \times 5\frac{9}{16}'' \times 3''$

Other sizes and shapes of mold plugs, as well as stool inserts, stools and pouring blocks can be supplied to meet any desired specification.

The words "National" and "Karbate" are trade-marks of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

CARBON PRODUCTS DIVISION, CLEVELAND 1, OHIO

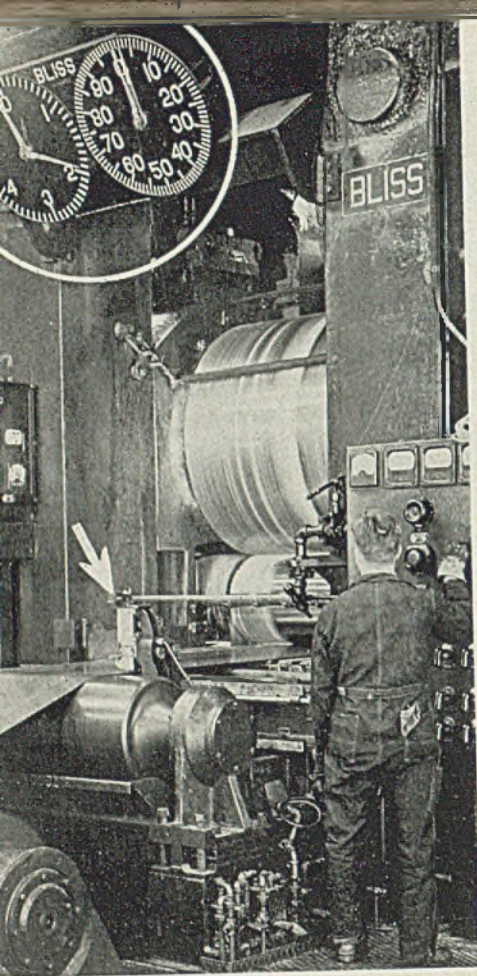
General Offices: 30 East 42nd St., New York, N. Y.

Branch Sales Offices: New York

Pittsburgh

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San Francisco



Reversing 54-inch cold strip mill. Micrometer gage is equipped with counting device indicated by arrow

men working and to prevent overruns of any particular size or shape. Shapes are cut to certain specified lengths by steel saws and counters register the number of cuts, providing a check both on the life of the saw and the work of the men operating the saw.

In both hot and cold rolling mills counters are used to measure the distance between the rolls, as has been indicated in blooming mill practice, but here in addition, the counters are attached to flying micrometers, which enable the roller to have visually before him the gage of the steel being rolled. In reversing cold mills, the steel is wound on reels as it passes back and forth between the rolls. This operation is repeated until the steel is the proper gage and texture. The number of wraps on a reel is measured on a counter, to assist the operator, reversing the rolls to know exactly how many wraps will come off that reel. By this arrangement he avoids the necessity of rethreading the piece in rolls if he should run the steel completely out.

When the steel is run through a fin-

Reeling machine equipped with dials, the one to the left indicating the number of feet of strip in the coil

ishing roll and wound on a reel as a finished product, the number of feet in the coil is measured by a counter that rides the surface of steel as it goes between the rolls, thus giving an accurate record. A ticket usually is placed in the coil showing the number of feet contained therein.

In making up shipments of various sizes, large coils of this steel first are sheared to width and then to length. Flying micrometers again are used in this process and, connected with the micrometers, are magnetic counters that indicate the number of sheets produced and the number of rejects, both over and under size. This micrometer-control operates three separate counters, showing the total sheets produced, the total under and over gage.

Indicates Tube Output

In the making of tubes, either drawn or welded counters are used to indicate total production, and on the cooling tables to count the number of pipes of any particular size. Skelp used in making welded pipe is counted both as to total production and the number of pieces. Counters are used to measure the speed of the rolls through which the steel passes.

Pipe is tested by means of water pressure. The pressure gage is set to the number of pounds desired, and when that point is reached by the water in the pipe, a contact is made that sets in operation a dash-pot that holds the pressure for a predetermined number of seconds. When the last contact is made, a magnetic counter is energized and counts the pipe, thus insuring a correct test and also recording the exact number of inspected pipe. If the pipe fails in the test it is not counted, or if the pressure is not maintained for the length of time required, the pipe is

not counted. Payment is made on the basis of the counter register.

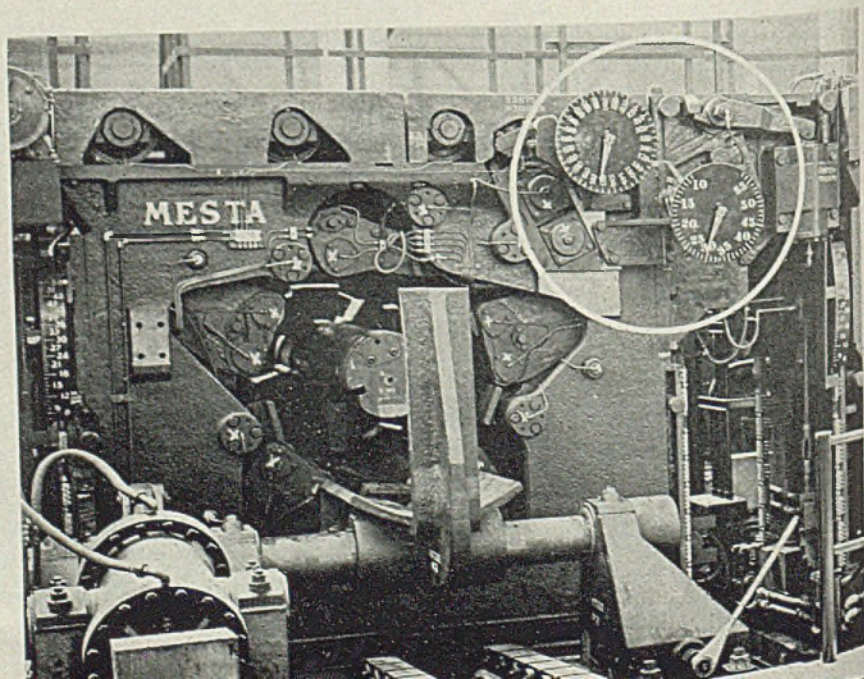
In wire mills many of the same applications as previously mentioned are found, and in addition, predetermining counters are used to determine the weight of each reel of wire, so that heavy reels of wire, of the same gage, weigh exactly the same. Prior to the use of counters, this weight would vary to such an extent that it was necessary to weigh each reel separately. The use of predetermining counters provides automatic control of this weight, that does not vary. In loading these reels, they are carried by conveyor either to warehouses or railroad cars, and counted automatically as they go, thus providing a record of the number of reels and the tonnage. Counters also are used in measuring wire through galvanizing units; in welding the copper to the steel cores of trolley wire; and to count the weight of ingredients in the processing of wire steel and sheets.

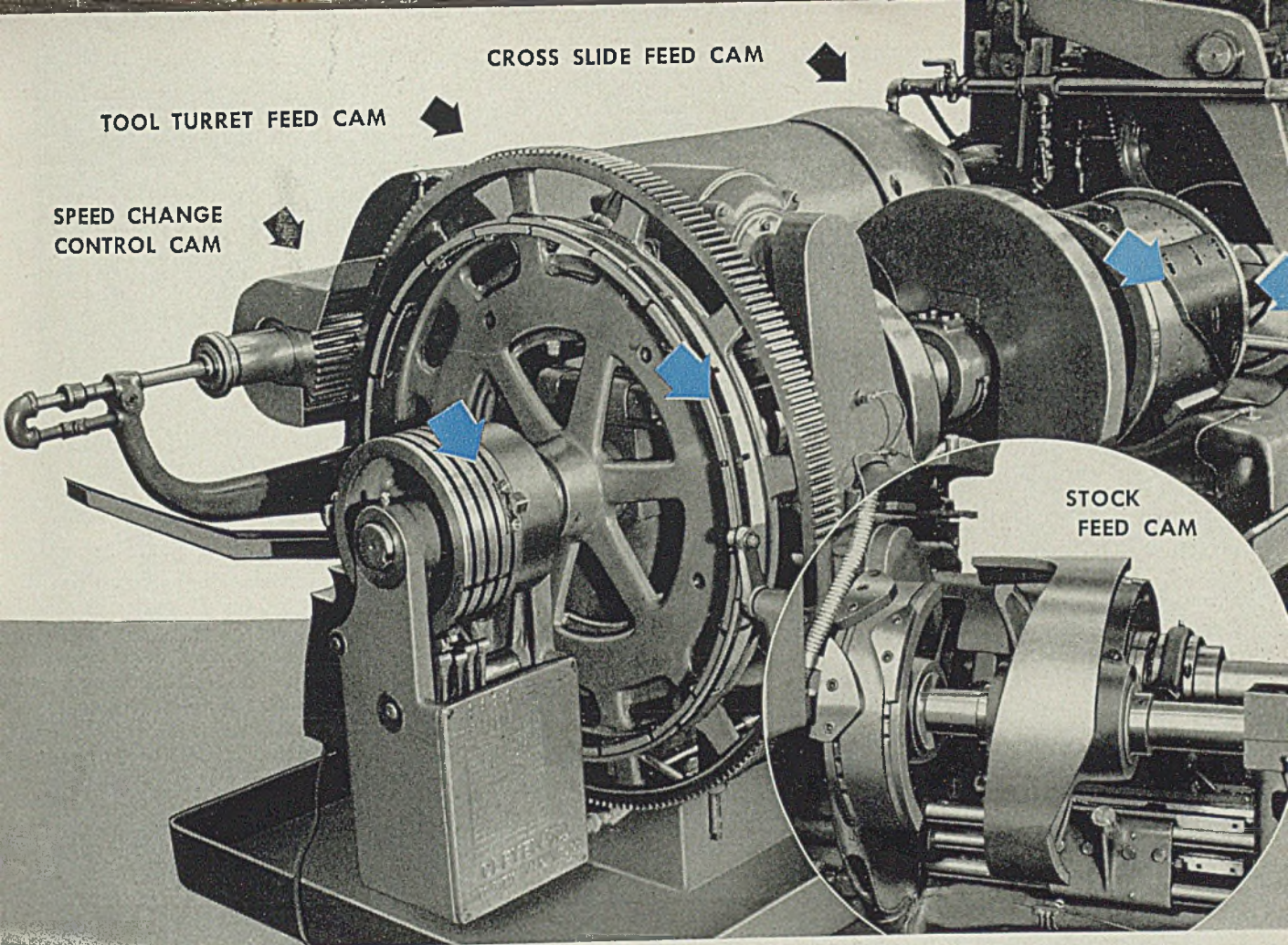
Measures Crane Travel

Cranes are used to move the steel from the time it enters the plant in the shape of ore. The travel of these cranes is measured by counters; travel of the rope used by the lift also is measured. It enables a check to be made on the life of the rope, so that replacements can be made before a break occurs. The record of the travel of the crane is measured as to its efficiency, as against other cranes of similar size. In some cases incentives are added to wage pay scales, based on records obtained from these counters. Industrial trucks are used on the floor for a multitude of purposes and are checked as to their travel by counters installed in the hub of a wheel, showing the distance traveled.

Electric current for the large motors

(Please turn to Page 134)





CLEVELAND UNIVERSAL CAMMING HELPS IN SOLVING YOUR MAN-POWER PROBLEM

MODERN production, be it on munitions or "civilian goods", constantly faces the need to make time savings on each operation on every machined part, to give each man *the power to produce more*, both for the assembly line and for himself. Clevelands help to solve such problems, not merely because they are fully automatic, but also because of exclusive Cleveland production speeding features. A good example is universal camming, which greatly reduces the time required for set-ups and adjustments.

Every operation on a Cleveland Single Spindle Automatic is controlled by standard cams. Quick settings are made possible by this Cleveland feature, and

**THE CLEVELAND AUTOMATIC
MACHINE COMPANY**
CLEVELAND, OHIO

CHICAGO: 20 North Wacker Drive, Civic Opera Building, Room 1408
DETROIT: 540 New Center Bldg. CINCINNATI: 1315 American Bldg.
NEWARK: 902 American Insurance Bldg.

when a set-up is made, the Cleveland speed of production on multiple operations is such that savings commence within a very few pieces after the run starts. That's another reason why Clevelands have a wide reputation for . . .

1. Maximum sustained production on long runs, with minimum down time for adjustments.
2. Profitable economy on small lot, short run jobs.

Just Remember, Clevelands Cut Costs

CLEVELAND
Single Spindle
AUTOMATIC

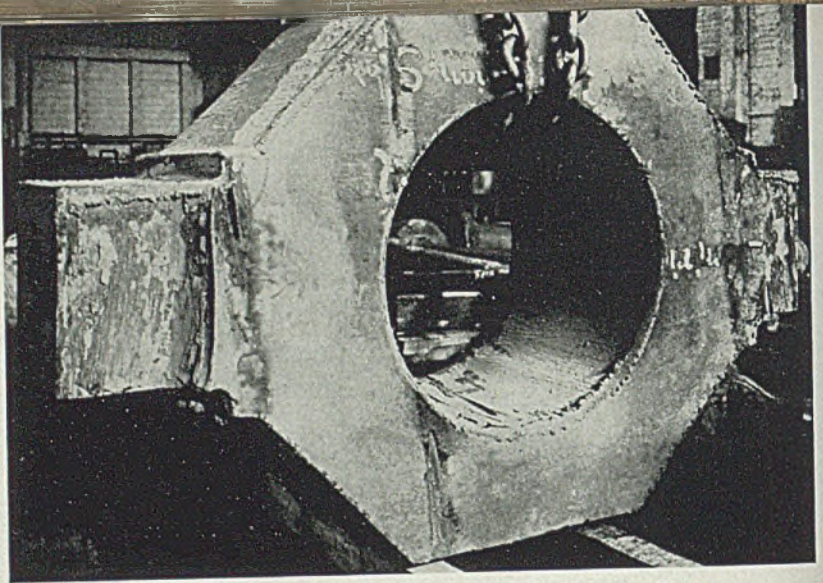
MODEL A—Built in 1/8-inch to 9 1/2-inch capacity
MODEL B—Built in 1/8-inch to 2 1/2-inch capacity

Institute Issues Two More Revised Steel Manuals

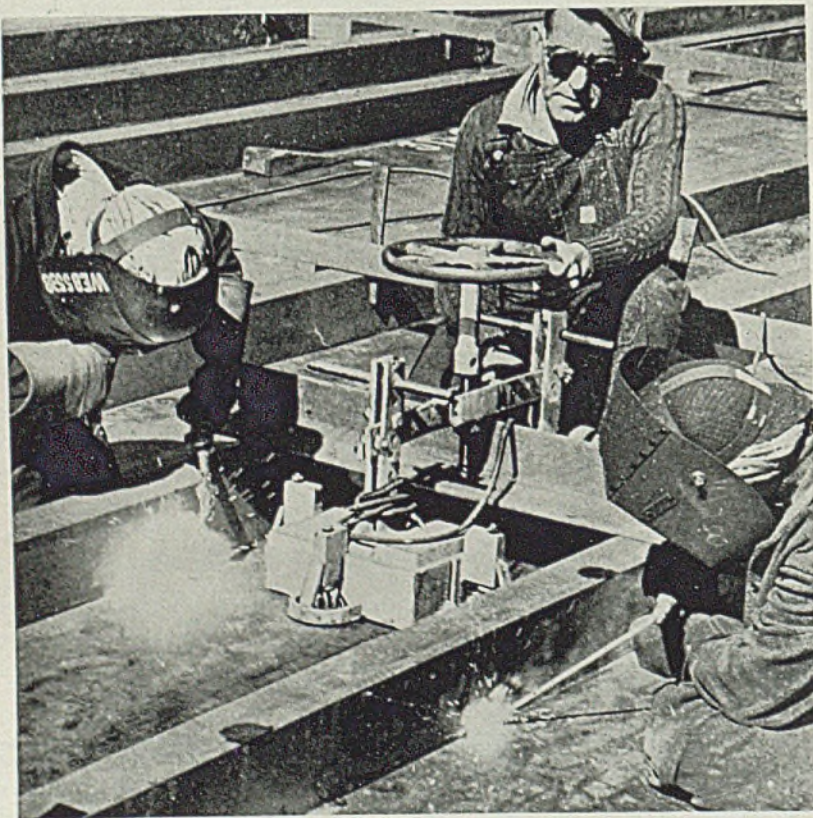
Steel product manuals on carbon steel semifinished products and cold-finished steel bars and shafting, sections 2 and 9, respectively, revised as of June of this year were recently issued by American Iron and Steel Institute, 350 Fifth avenue, New York.

The publication on carbon steel semifinished products embodies definitions, quality classifications and manufacturing practices. It also describes standard steels and system of identification, chemical limits and ranges for nonstandard steels and standard methods of sampling for check analysis.

The other manual on cold-finished steel bars and shafting discusses methods of manufacture, definitions and manufacturing practices, shafting, special shapes, standard tolerances, standard carbon and alloy steels, ranges and limits for nonstandard steels, methods of sampling and permissible variations for check analyses. A chapter also is devoted to packaging and loading.



"THE BIGGER THEY ARE THE _____": Size was no factor when a Montreal structural steel plant adapted an Airco Planograph flame-cutting machine, whose normal cutting range is 24 x 72 inches, to the task of "whittling" down and shaping a 7-ton steel slab into a mammoth crosshead measuring 42 x 65 inches. Cut in "installments," the slab was preheated to 400 degrees Fahr., and cutting proceeded with a water-cooled torch. Cuts were of a depth of 20 inches at a speed of 3 inches per minute, the piece being repositioned several times to present the various faces into the motion range of the torch. Total setting up and cutting time was 3 hours



TIME SAVER: Two stiffeners are firmly held to deck plate for tack welding in this shipyard operation by a Sweetland type B magnetic clamp which enables a flanger to keep two welders busy without the aid of saddles or other devices requiring temporary welds. The device, made by Glenn-Roberts Co., Oakland, Calif., is equipped with retractable ball-bearing wheels working on a ball bearing swivel to facilitate movement. It operates on alternating current with a 12-ampere rectifier, on 80-volt direct current or on power supplied by a motor-generator welding set

Huge Generator Capable of Lighting a Million Bulbs

Sixty-five million watts of electricity is being produced for the Bureau of Power and Light at Los Angeles Harbor, by a huge turbo-generator said to be one of the largest of its type ever built

The shaft of the turbine turns at 3600 revolutions per minute, and is rotated by jets of steam bombarding the blades thousands of times a minute.

The turbo-generator, built by Westinghouse Electric & Mfg. Co. cost more than \$1,000,000.

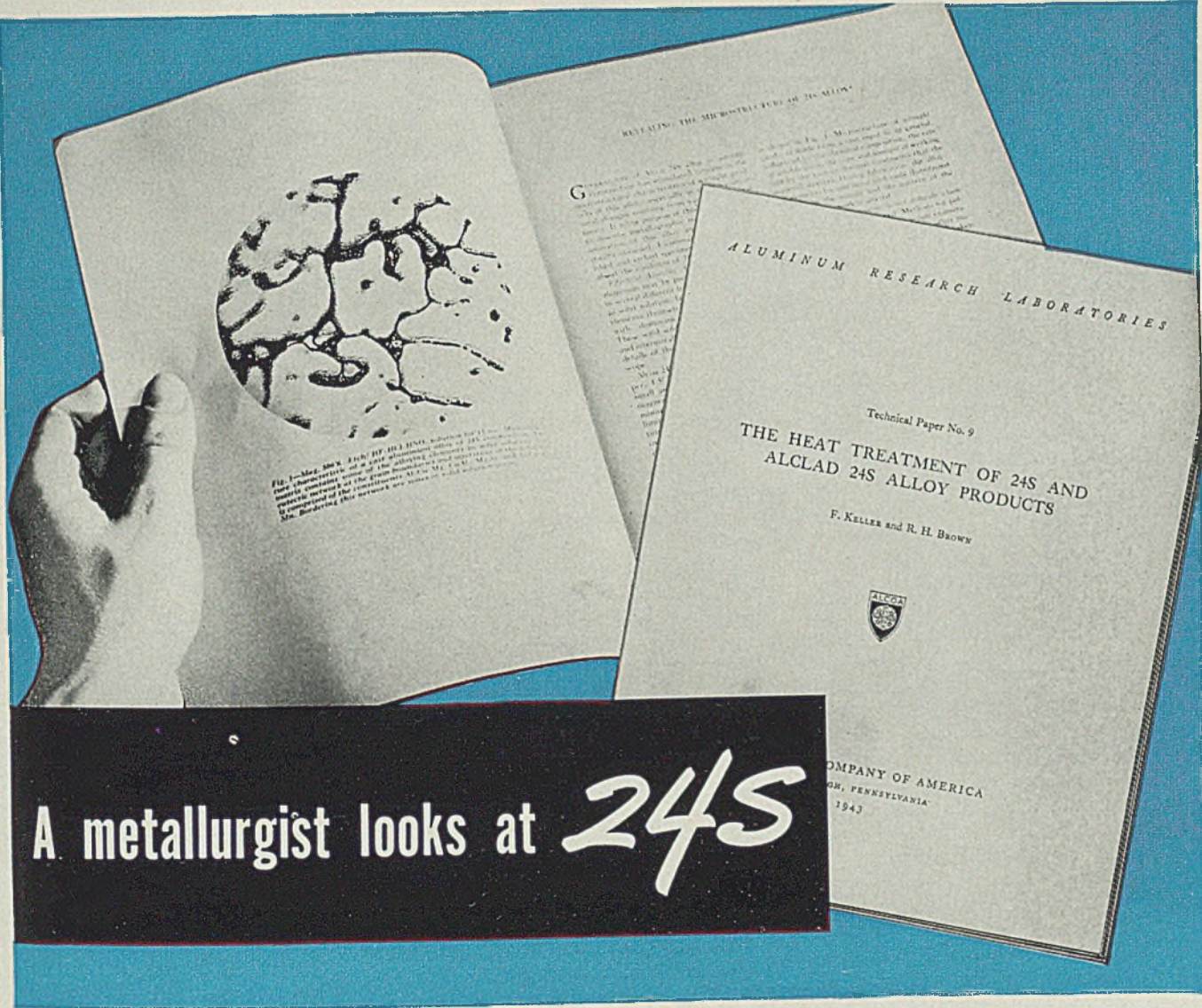
Electrically, it produces enough watts to light more than 1,000,000 standard 75-watt incandescent Mazda lamps simultaneously.

The steam used to rotate the blades is heated to 900 degrees Fahr. and exerts a pressure of 850 pounds per square inch on the blades.

Various devices record operating efficiency of the new machine and warn against possible failures. Electro-magnetic devices guard against trouble in the rotating part of the huge machine—a 43-ton piece about 65 feet long.

Because of the high heat developed from rotational losses, cooling is vital.

Hydrogen gas, which acts much like a sponge, is passed at the rate of 400,000 pounds per hour through the coolers built around the generator. The cooler has a capacity of 63,000 cubic feet per minute.



A metallurgist looks at 24S


Aluminum alloy 24S is used in aircraft construction for parts subjected to high stress; 24S and Alclad 24S sheet and strip for airplane skin and structural members, 24S wire for rivets. Parts made of this alloy are hardened and strengthened by heat treatment.

Technical Papers No. 8 and No. 9, pictured above, tell how you can check the effectiveness of heat treatment. Metallographic methods of examination and the results obtained are outlined. You can detect variations from standard practices by comparing samples taken

from your production with those pictured in these papers.

Practices described have been used at Aluminum Research Laboratories and in the industry for many years. When these methods are followed closely, and the proper skill attained, it is possible to determine many pertinent facts about 24S from metallographic examinations. Your metallurgist should have these two booklets.

For copies of Technical Papers No. 8 and No. 9, write ALUMINUM COMPANY OF AMERICA, 2112 Gulf Bldg., Pittsburgh, Pa.

ALCOA  **ALUMINUM**

How To Prevent

WEIGHT-LIFTING INJURIES

WITH OUR need for unflagging production, with the growing shortage of workers, what employer would knowingly take a chance on any one of his employes being laid up from 7 to 19 weeks—of being permanently disabled or even killed? With his services more essential to his country than ever before, what worker would deliberately expose himself to such a risk?

Yet the record indicates that year after year many thousands of workers and their employers took just such a chance—and lost! Unsafe lifting methods and practices lead to injury and most lifting injuries are strains, sprains, and hernias. Statistics from three leading industrial states indicate that strains, sprains, and hernias constitute about one-quarter of all industrial accidents; that about one-half of these may be attributed to lifting and carrying weights.

The causes of weight-lifting injuries are known. The methods of eliminating the hazards are definite and practical. They are set forth here as a guide to management and supervisors, to be used for the purpose of cutting down the lost production, wasted manpower, the human suffering, which result from disabling injuries. And that is only one side of the story. Safe methods of lifting and carrying are more efficient—they boost production by speeding the handling of the materials involved.

Most lifting injuries are the result of undue strain on certain muscles and tendons brought into play by the task. Such strain can be caused by any one of the following factors:

—Lack of lifting and conveying equipment.

—Over taxing physically fit workers—through the worker's failure to use or the supervisor's failure to require the use of available mechanical equipment, or through management's failure to set a reasonable limit on the weight

of objects to be lifted or carried, and to control the pace and duration of the work.

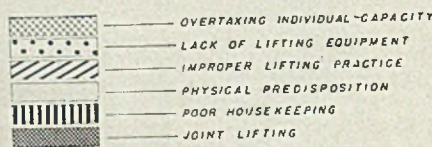
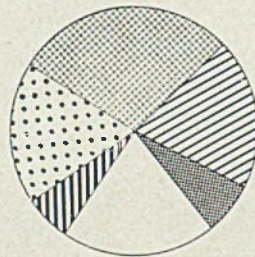
—Lifting the wrong way, which results in undue strain on certain muscles and ligaments—notably in the back and groin.

—Lifting by employes not physically capable of handling the job.

—In team lifting—lifting by two or more workers—the uncoordinated ef-

Immediately below—Causes of weight-lifting injuries—strains, sprains, hernia and the like

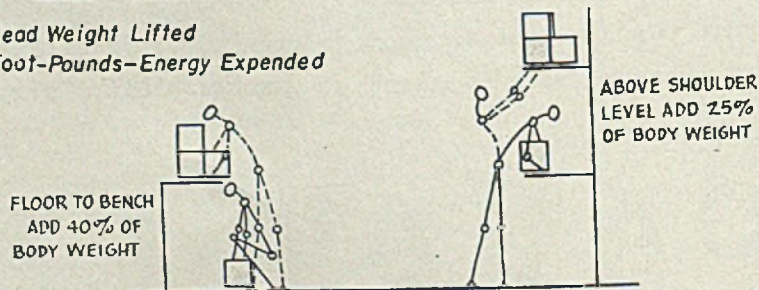
Bottom—In computing energy required for lifting, multiply distance in feet by weight in pounds to obtain foot-pounds of energy expended. When weight is lifted from floor to bench, add 40 per cent of body weight. When lifted above shoulder level, add 25



Eliminating Lifting Hazards

$$\text{Weight} \times \text{Distance (in feet)} = \text{Foot-Pound-Energy Expended}$$

Dead Weight Lifted
 Foot-Pounds—Energy Expended



forts of the team members, resulting in too heavy a burden upon one or more.

—Poor housekeeping, resulting in insecure footing and tripping and slipping hazards.

Relative importance of these causes will vary from plant to plant. For example, the highly mechanized plant may find that no injuries are due to lack of lifting and conveying equipment, although poor supervision may result in injuries from failure to utilize existing equipment. Fig. 1 represents the composite result of correlated studies in lifting injuries in a number of plants requiring heavy work. It is reproduced to serve as a guide to management in attacking the problem of weight-lifting injury.

Four Factors for Control

The elimination of hazards in lifting and conveying demands careful attention to four primary factors: (1) Over-all planning of process and work methods; (2) selection of physically qualified employes for manual lifting and carrying jobs; (3) careful training of employes in correct methods of manual lifting and uses of mechanical equipment; and (4) continuing supervision to make sure that manual lifting instructions are followed, and that equipment is properly used.

Overall planning of process and work methods is a management job. It includes:

—Analysis of all lifting and conveying problems to determine the type and amount of work to be performed in the workday.

—The installation of mechanical lifting and conveying equipment wherever practicable.

—Controlling the amount and pace of the work to be done by individual employes.

Management must lay down the general rules; supervisors must adhere to them. Realistic treatment of this problem calls for:

—Classification of all employes as to their suitability for manual lifting.

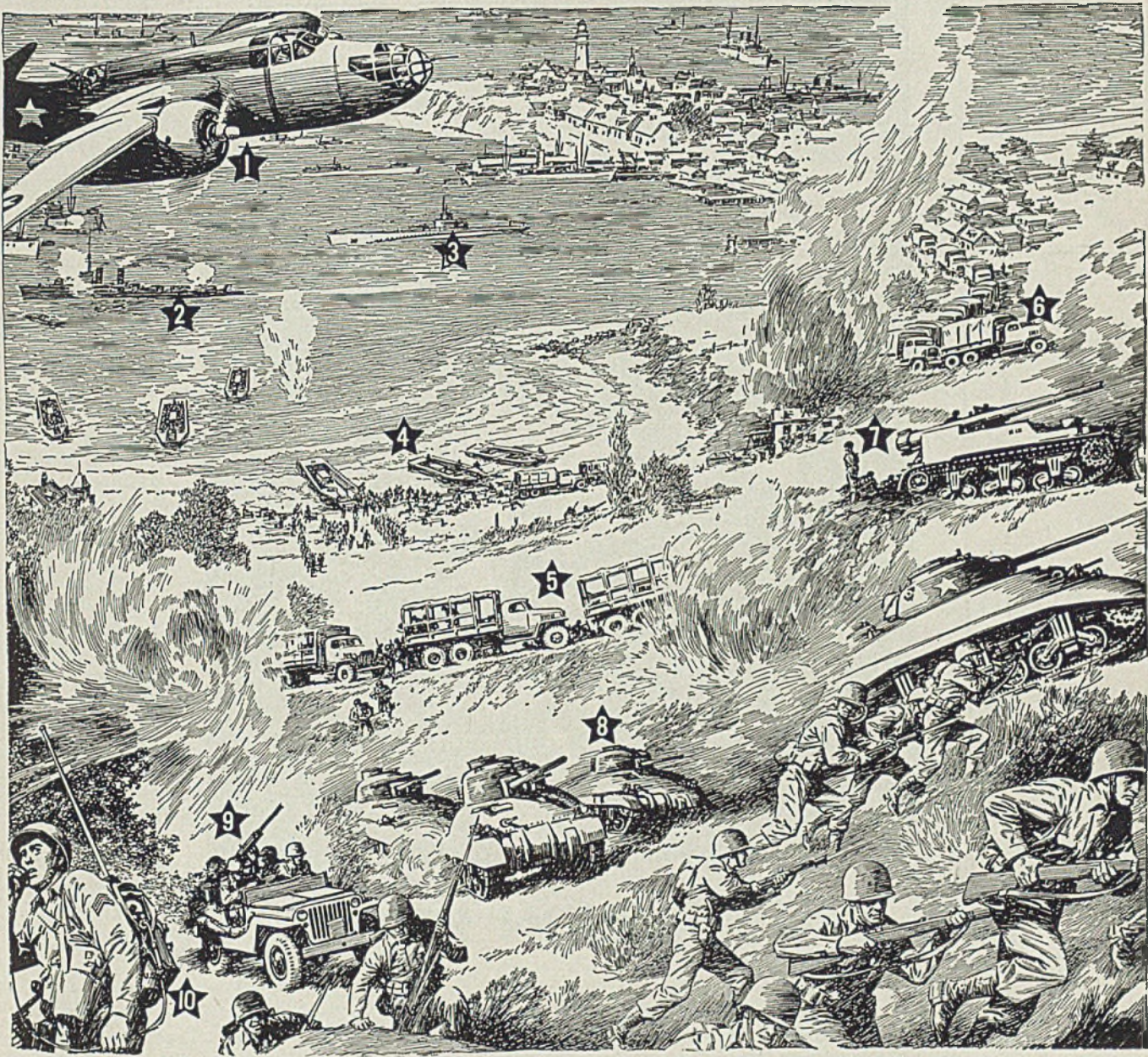
—Careful selection of those workers assigned to jobs requiring heavy or repetitive lifting.

—Selection of workers of like stature and physique for "team" lifting.

No employe should be permitted to lift or carry weights until trained in correct methods and practices. In "solo" lifting the employe should:

—Face the object with feet far

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8. Tanks 9. Jeep 10. "Walkie-talkie" Communications

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our armed forces. Significant of our part in the war effort are the Army-Navy "E" pennants, with two stars, that fly over our plants in Philadelphia.



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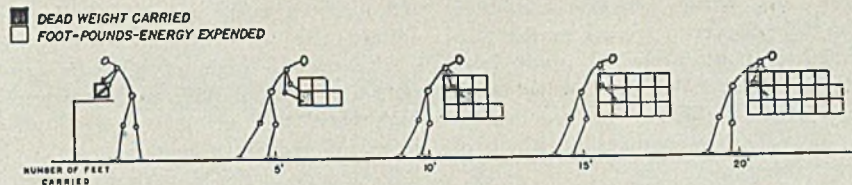
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STEEL

Energy expended in carrying can be computed by multiplying distance by weight carried, no addition being necessary for body weight as in lifting



enough apart (the length of the shoe is a good guide) to give a good base of operation without placing undue strain on the abdominal muscles. Adopt a stance which is comfortable and which will permit one to lift the job as nearly straight up as possible.

—Get down to the job by bending his knees, keeping his back erect.

—Raise the weight gradually (a sudden effort invites strain) by straightening his legs, taking the brunt of the strain upon his leg and shoulder muscles.

Heavy work should be done with mechanical equipment where available; otherwise with the assistance of fellow workers assigned by the supervisors.

In "team" lifting, the efforts of the various workers must be completely coordinated, with directions being given by one, and only one, member of the "team".

Continuous and careful supervision is fundamental in accident-free lifting and conveying. Available mechanical devices should always be used for heavy or repetitive work. Manual lifting should be done only by those who are qualified by physique and training. Workers should always lift in accordance with instructions. Unless the supervisor makes sure that the work is done with the proper equipment, by the right workers, in the correct manner, the overhead planning and the selection and training of workers may be of little value.

Good Housekeeping An Aid

Good plant housekeeping is as essential in safe lifting and carrying operations as it is in all phases of accident prevention. A firm which takes all of the steps outlined above but fails to keep a clean and orderly workplace will have workers injured while lifting and carrying. Aisles should be well marked and clear of obstructions. Floors and stairways should be kept in good repair and free from oil, grease, water, and debris. The entire plant, including stairways and ramps, should be well lighted.

Mechanical equipment helps to reduce injuries due to strain by eliminating manual lifting and carrying. Such equipment also results in more efficient production, performing heavy or repetitive jobs much more rapidly than is possible solely with manual labor.

Mechanical equipment need not always be complicated or costly. Often the solution of the lifting or conveying problem is as simple as a rope hoist, a wood-

en chute, a hand truck, or a home-made gravity conveyor. Where conditions justify the expenditure, it is well to provide such equipment as electrically powered trucks which load, convey, and stack, or powered horizontal or vertical conveyor systems. These latter lead to more efficient production, but the simpler "gadgets" are often very effective in eliminating manual handling.

Three Major Considerations

There are three considerations to be taken into account in the control of manual lifting and carrying. They are (1) the distance over which it must be raised or carried; (2) the weight, size, and shape of the object to be lifted or carried; and (3) the pace and duration of the heavy work during the course of the day. At first thought the weight of the object seems the primary and, perhaps, the important consideration. But remember—the tired worker, the worker who carries even moderate loads over long distances continually throughout the day, is not only less productive, but also is more likely to strain, sprain, trip, and lose balance.

Distance is particularly important where lifting or carrying is an integral part of the job and must, therefore, be repeated frequently in the course of a workday. It is important that daily work limits in such cases be established upon the basis of the energy expended. The energy expended on any one job is measured in terms of "foot pounds," and is calculated by multiplying the weight of the object by the number of feet over which it is raised or carried. The daily expenditure of energy by any worker is the total "foot pounds" of energy expended on all of the jobs performed by him during the day. Figs. 2 and 3 show the proportionate increase in terms of foot pounds energy required in lifting and carrying weights over given distances.

Load carrying up or down stairways or inclined ramps calls for more exertion than carrying on level surfaces. Stairs increase the danger of stumbling; the ramp is generally safer. However, stairs and ramps call for approximately the same expenditure of energy, so that the hazards of strain and fatigue induced

solely by the weight of the load are about the same in either case.

The actual number of pounds which may be lifted by a worker depends eventually upon the worker himself. The physical qualifications of the individual worker, the training and experience in lifting—these are the actual criteria of how much he or she can safely lift. But, since war production demands the handling of thousands of employes, constant attention to each weight-lifting job and the individual involved is not practical. It is well to have some rule of thumb to serve as a general guide. The following limits are recommended for consideration in setting over-all limits for employes in general:

Male workers—50 pounds in compact form;

Female workers—25 pounds in compact form.

Give Workers "Break" Periods

Certain employes whose physical characteristics make it unsafe for them to handle the above weights should not be permitted to do such work. Other employes who are qualified by general physique, training, and experience to do heavier work should be assigned to such jobs on an individual basis.

It is essential that workers engaged in continuous lifting and carrying of weights be given "break" periods—periods free from strenuous physical exertion. This is important, not only because of the fatigue factor, but because continuous strain upon the muscles and tendons incurred in constant and rapid carrying of even moderate loads can build up to a similar type of injury incurred in the sudden effort of lifting. Where the work is heavy and continuous and the pace rapid, it is recommended that employes spend no more than half the day on such work, and at least half the day on some lighter work.

The shortage of available industrial manpower is calling into industry many persons who are unused to or physically unfit for heavy work, or who are "rusty" at such jobs as the handling of heavy objects. These war workers have an essential part to play on the industrial front; they must not be needlessly exposed to injury.

For general control purposes it is advisable to classify all workers as to their suitability for manual lifting as

From "A Guide to the Prevention of Weight-Lifting Injuries", published by United States Department of Labor, Division of Labor Standards.

there are many physical conditions which predispose a worker to the type of injury most likely to result from heavy strain. Persons having such conditions should not be required to do heavy lifting—perhaps no lifting of any consequence.

Best known of such predispositions is the tendency of hernia. The hernia problem was summed up as follows in "The Causes of Everyday Factory Accidents" a recent publication of the British Ministry of Labour and National Service: "Hernia, however, is not caused solely by lifting. It has two causes: First, a natural tendency to it must exist. Secondly, a strain which finds out that tendency."

Certain structural defects, such as short legs, overweight, underweight (particularly in tall persons), and deformities of the spine make some workers much more likely to experience strain from lifting. Again, workers who have arthritis or who have sustained previous injury to their joints are likely to experience "flare-ups" of the disease or of

old injury if called upon to do heavy lifting.

The over-all strain of lifting is dangerous to persons with weak hearts or high blood pressure, and to those who have suffered from lung disease.

Pregnancy results in marked variations in such factors as breathing, pulse rate and the composition of the blood, as well as a lessening of muscular power. Furthermore, the physical condition of the pregnant woman changes from month to month. All of these factors must be taken into account in assigning work to pregnant women.

Many of the defects or conditions listed above will come to light, or their exact effect upon the abilities of the worker will be discovered, only through a thorough physical examination.

Heavy or repetitive work should be done only by employes especially selected upon the basis of physical qualifications, training, and experience.

"Team" lifting can be a fertile source of injuries if certain fundamental considerations are overlooked. All workers

in a "team" should be of the same general stature and physique. They must know the fundamental of "solo" lifting. In addition it is important that they are trained or experienced in working with others on lifting jobs. The efforts of the group should be under the direction of one, and only one, of its members, who will give all orders. These factors must be taken into account to assure the co-ordination necessary to prevent accidents.

Further Precautions Necessary

Training and supervision are essential to the safe and efficient performance of all industrial jobs. They are particularly necessary in the case of lifting because easily injured portions of the body—the back and the abdominal muscles—will bear the brunt of the physical strain if lifting is done incorrectly. Before a worker attempts to lift manually he should make sure that both his hands and the object to be lifted are free of oil or grease, so that he may obtain a firm grip; the floor is free of debris, oil, or water, in order that he may be sure of firm footing; and the weight is not too heavy for his unassisted efforts. The last two factors are primarily the responsibility of good management and supervision, which will maintain good housekeeping and guard against assigning a worker too-heavy work. Some firms have found the stamping of the weight on small but heavy objects helpful. However, the worker should check both the condition of the floor and the weight of the object for his own protection.

The primary differences between a safe and an unsafe lift are described here. The worker in correct position has his knees bent, his back erect. The worker bending from the waist takes the brunt of the burden upon his back, inviting injury.

Heavy Loads Entail Same Hazards

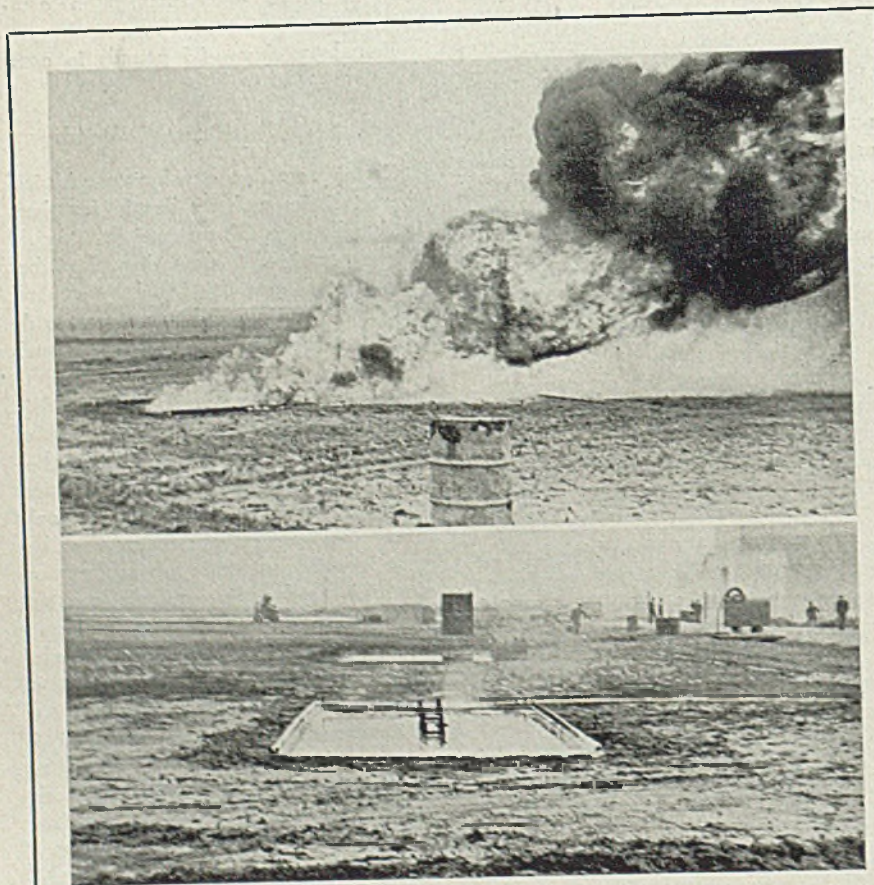
Carrying heavy loads, or sustained carrying of even moderate loads, exposes the worker to the same injury hazards as the sudden effort of weight lifting. Where practicable, the need for manual carrying should be eliminated by the use of mechanical devices—trucks, conveyors, chutes, elevators etc. Safe manual carrying, as outlined by this authority, requires:

—That the load be close to the body and as near the worker's center of balance as possible to prevent too-heavy strain in one portion of the body, and throwing the worker off balance.

—That the worker have unblocked vision ahead.

—That the load interfere as little as possible with the worker's movement.

(Please turn to Page 135)

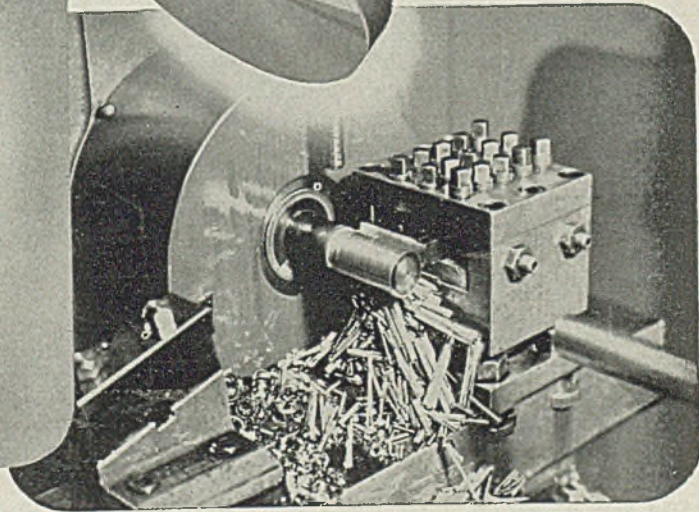
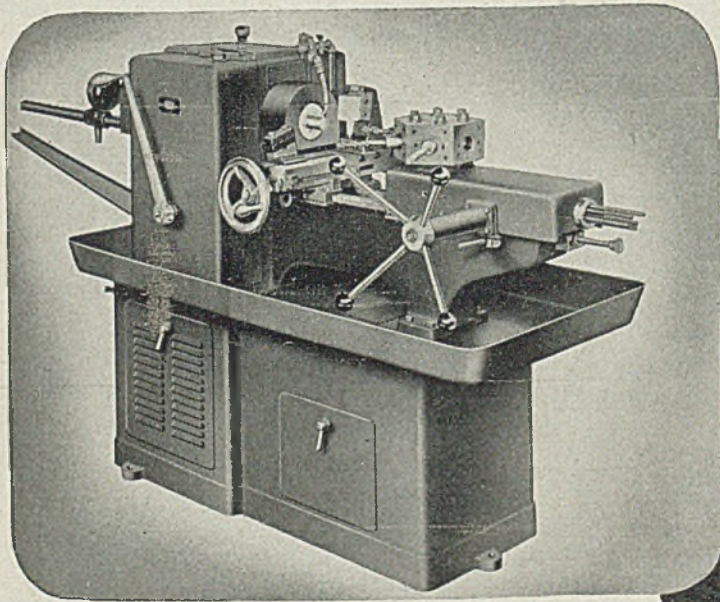


"OUT" IN 31 SECONDS: Views above present the "before and after" story of a recent demonstration of the use of carbon-dioxide snow developed by Cardox Corp., Chicago, for fighting quenching-tank fires. The metal sided 10 x 20-foot tank was fired and allowed to burn for over a minute—long enough to heat the side walls as well as a few metal parts placed in the oil. Thirty-one seconds after the linear nozzles on two sides of the tank went into action the fire was out. Reignition is prevented by cooling characteristics of the CO₂ snow

*This part produced in
ONE forming cut by the*

OSTER NO. 601

"RAPIDUCTION" TURRET LATHE



The part illustrated is one of numerous examples of heavy forming cuts obtained with the SIMPLIFIED Oster No. 601 "RAPIDUCTION" Turret Lathe, equipped with WORM DRIVE.

The hardened and ground steel worm, like the spindle, is mounted in ball bearings. A smooth, even flow of power is transmitted through a bronze worm wheel to the spindle. This smooth flow of power makes possible exceptionally heavy forming cuts

with absence of chatter. (For high speed work on small diameters and non-ferrous materials, a DIRECT DRIVE is provided. Spindle speeds up to 3000 R. P. M. are obtained.)

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★ O.K. Oster. We're interested in the No. 601 machine. () Send Catalog No. 601. () Ask your nearest distributor to see us at once. (Check either or both of above requests.)

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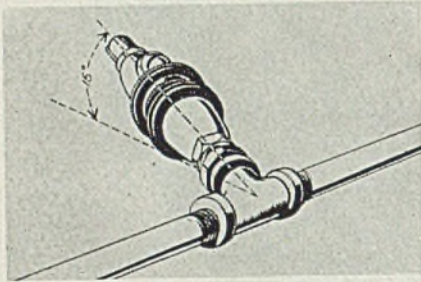
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INDUSTRIAL EQUIPMENT

Automatic Lubricator

Filters Inc., 1515 Gardena avenue, Glendale, Calif., announces an automatic light-weight Air-Lube lubricator for feeding a regulated oil mist into air



tools. It is offered for use in the air hose from 1 to 6 feet from the tool, or it may be used in air pipes for larger air-driven stationary or semi-portable tools. It also is adaptable for air passages in a machine.

A positive feeding action in the unit provides a regulated amount of oil, but feeds oil only when the tool is operating.

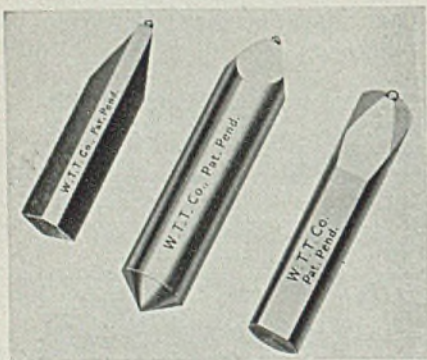
The oil reservoir holds enough oil for more than a week under normal usage.

Installation of the lubricator in the hose near the tool eliminates the deterioration of rubber hose lines. Positive regulated wicking action with an automatic shut-off prevents flooding.

Dressing Tool

Wheel Trueing Tool Co., Detroit, announces a dressing tool reported to provide production increases up to 500 per cent and reductions in production cost of as much as 75 per cent.

The tool uses the hard characteris-



tics of the natural uncut diamond, yet it is of a shape that permits not only straight dressing but angle, radial and multiple form dressing as well.

Because the tool produces exceptionally clean cuts, forms are obtained quickly and held longer, it is said. As these cleaner cuts permit more work to be ground between dressings, machine down

time is reduced greatly. Another advantage, according to factory officials, is the tool can be made and reserviced on a production basis. It may be used for dressing the wheels that grind Whitworth, buttress, Acme or any other standard or special thread.

Welding Shield

Davis Emergency Equipment Corp., 55 Halleck street, Newark, N. J., announces new model Huntsman acetylene and arc welding shields designed for comfort and complete protection.

Each shield features a patented locking device and an adjustable headgear. The locking device holds the shield in the correct position before the face to in-



sure the line of vision passes through the lens at right angles to the surface of the glass. It also holds the shield firmly above the head while the welder is preparing, chipping or surveying his work.

When welding is resumed, a slight nod of the head will lower the shield into the correct working position. The locking device automatically adjusts the shield to the same position each time.

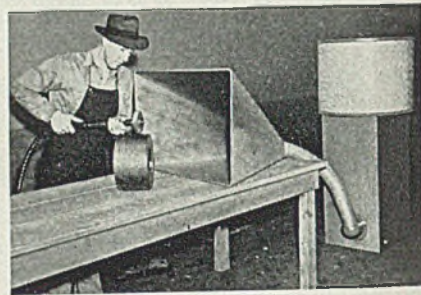
The shields weigh from 1 to 1½ pounds and are being offered in six models.

Dust Collector

Aget-Detroit Mfg. Co., 2040 Book building, Detroit, announces a combination of Dustkop dust collector with metal hose and dust concentrating hoods in a single unit which can be used for flexible shaft grinding, sanding, die finishing, buffing and polishing operations. The outfit is entirely self-contained and needs no sheet metal work or connection with any existing dust collecting system. Portable and compact, the Dustkop machine is shipped ready for operation, with a flange to fit the 6-foot length of 4-inch diameter flexible metal hose. Increased lengths of hose are also used when the hood is to be suspended over the work. Handles on the hood permit ready moving about and allow it to be used as a guard

against heavy pieces of work thrown off from the grinding operations.

Suction for the unit is provided by a 1½-horsepower continuous-duty motor driving a multiple-blade fan which gives

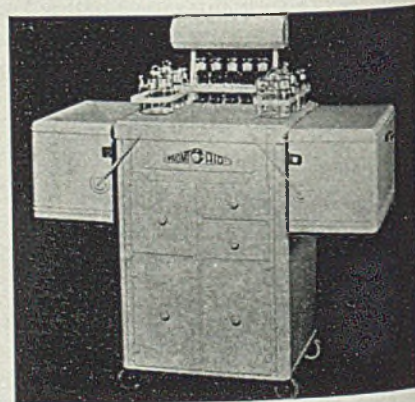


6500 feet per minute air velocity at a volume of 1250 cubic feet per minute when a 4-inch hose is used. The dust-laden air is drawn away from the work through the flexible metal hose and into the cyclone separator. The cleaned air is then returned to the working space through a drum-shaped, spun glass filter, which forms the upper portion of the machine. Dust and dirt are deposited in a glass jar so located as to be easily seen.

First-Aid Station

Medical Equipment Division, J. E. Erback Co., 1170 Broadway, New York, recently introduced a mobile first-aid station called the Prompt-Aid cabinet especially designed for quick use in emergencies. It is built to accommodate essential medical accessories. Large ball-bearing casters, allow it to be easily moved right to the injured person.

One of the unit's features is it requires little floor space when not in use,



yet opens up to provide large working area.

Among the accessories included with this senior model are four, 4 x 4-inch glass dressing jars, five 4-ounce solution bottles, four 2-ounce solution bottles, one container for 12-inch adhesive plaster, or other size tape, two cover locks, one

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

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This test helps to solve combustion problems, reveals how fuel can be conserved, and the quantity and quality of the product increased.

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It is to these plants that Cities Service Oil Companies now offer, *without charge or obligation*, a complete combustion control test with the unique, new Cities Service Industrial Heat Prover. This service is available on request in most of the important industrial cities East of the Rocky Mountains.

The Cities Service Industrial Heat Prover has been thoroughly tested on practically every type of combustion equipment in this country and with every kind of fuel.

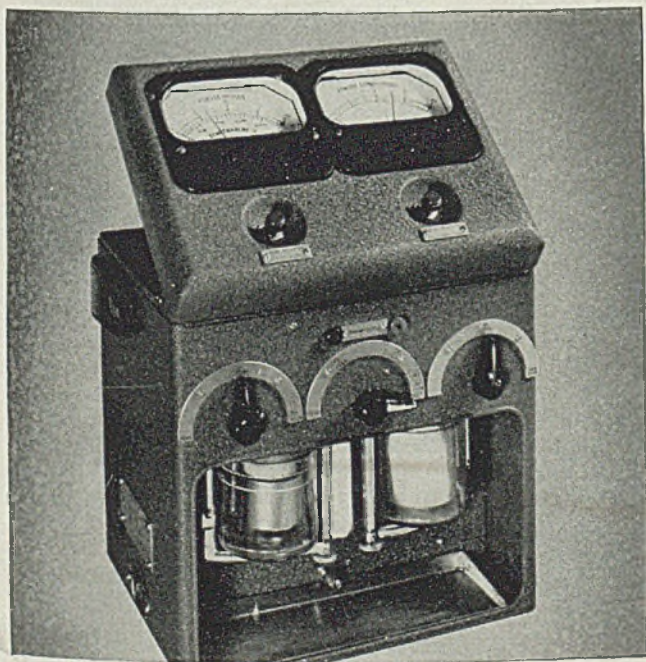
It has been adopted by users of steam power plants, open hearth furnaces, cement kilns, heat-treating

apparatus, crucible furnaces and internal combustion engines.

Accurate combustion analysis made as a result of the Cities Service Industrial Heat Prover tests have resulted in considerable savings in fuel costs, have reduced repairs and replacements on furnace linings, crucibles and refractories due to flame corrosion . . . and have led to increased production of better and more uniform products.

Wire or phone your nearest Cities Service office or mail the coupon today—for a Cities Service Industrial Heat Prover test in your plant.

A member of the Cities Service engineering staff will then visit your plant at your convenience and make a Heat Prover analysis of your combustion processes. This engineer has been carefully trained for the purpose, and has at his command extensive information gathered by the Cities Service Research Division from power, metallurgical and chemical fields.



THE CITIES SERVICE INDUSTRIAL HEAT PROVER—a new, accurate combustion analysis instrument—developed by the Cities Service Research Division to enable those engaged in the oxygen control of furnace atmospheres to achieve greater combustion efficiency at less cost.

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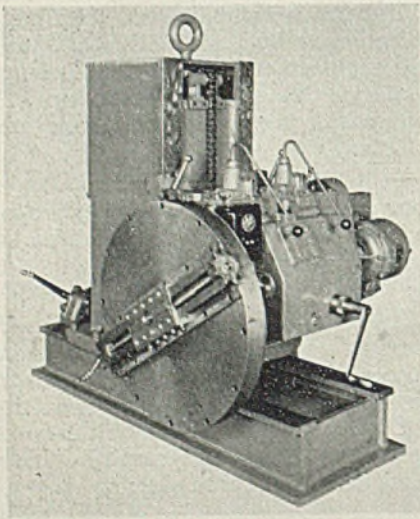
instrument drawer, three supply drawers and one 2-door, storage compartment.

Overall dimensions of the first aid unit with covers closed are 20 x 17 x 42 inches—working surface, with cover open 42 x 17 x 42 inches.

Boring-Facing Machine

General Engineering & Mfg. Co., 1523 South Tenth street, St. Louis 4, announces a new portable boring and facing machine for performing boring, turning, and facing operations on large work pieces, such as lathe beds and press frames, too large to be machined on standard machine tools. According to the company, application of the portable machine is simple and is accomplished with speed and accuracy.

It is built of welded steel, is rigid and

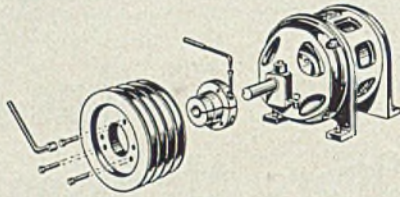


simple in construction. The machine proper is mounted on a heavy base on which it may travel by spindle action for 36 inches. Automatic or crank-operated horizontal travel of spindle housing is 19 inches, and crank-operated vertical travel, 24 inches. Seven spindle speeds are featured. These range from 7 to 100 revolutions per minute. Also provided are four horizontal spindle housing feeds ranging from 0.009 to 0.0063-inch. Diameter of the face plate is 33 inches. The gravity oiling system is pump operated.

Sheave

Pyott Foundry & Machine Co., 328 North Sangamon street, Chicago, is offering a new QD Sheave, feature of which is the ease, speed and safety with which it is attached to or removed from the shaft. In installing the sheave a tapered, split hub is slipped on the shaft in line with the keyway. Then the headless cap screw shown is tightened down with an inserted key, clamping the hub firmly—producing a virtual press fit, even on un-

dersized or oversized shafts. Next step is attachment of the sheave on the tapered hub. Actual tightening of the sheave on the hub is accomplished by



inserting pull-up bolts. These bolts protrude through the sheave and engage with threaded holes in the hub. Removal of the sheave is equally simple. After unscrewing the pull-up bolts, two pull-up bolts are inserted in special tapped holes in the sheave and tightened down. As they emerge through the opposite side of the sheave the pull-up screws act as jack screws to force the sheave away from the hub, without hammering or rough handling. The entire force is exerted on the Pyott hub.

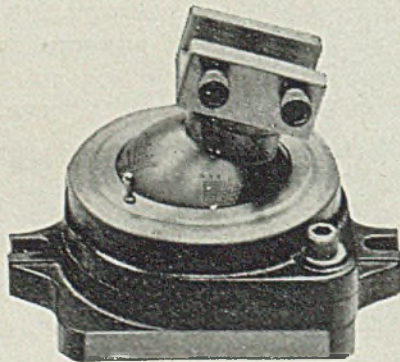
Fluorescent Light

Fostoria Pressed Steel Corp., Fostoria, O., recently introduced a flexible arm fluorescent unit, known as FLB, for localized lighting. It accommodates two 14-watt fluorescent lamps, and features a reflector 15 1/16 inches long, 9 inches wide and 5 5/8 inches high.

The unit, according to the company, provides an output of 100 footcandles. It is equipped with lamp ballast and is completely wired with switch mounted on top of the housing.

Ball Joint Vise

Wall-Colmonoy Corp., 720 Fisher building, Detroit, announces a new Strickland universal ball joint vise which provides quick and accurate settings by



matching the ball joint vertical degree graduation with the horizontal degree graduation required. A clamp wrench locks the vise rigidly. The range consists of a 30 degree arc through the

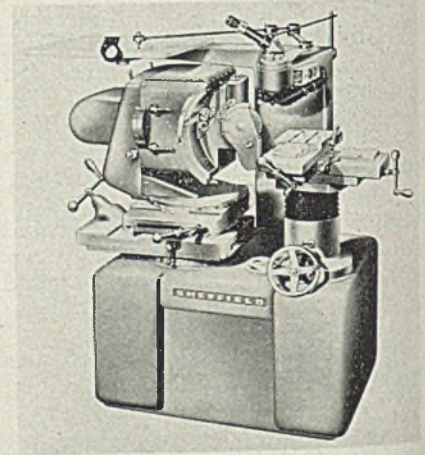
horizontal plane. The ball joint vise is 5 1/4 inches wide and 4 3/4 inches high. The ball and socket are protected by an adjustable leather dust apron. It is recommended for holding chip breakers, curlers and cutting tools while grinding at predetermined angles.

Profile Grinder

Sheffield Corp., Dayton, O., is offering a new Micro-Form grinder which by means of a 50:1 pantograph and a microscope finish grinds accurately every desired profile within its range directly from the drawing.

The machine is especially suited for the grinding of both circular and flat form tools, templets, profile gages, cams, dies, etc., from hardened materials including tungsten carbide.

A layout drawing made to a scale of 50:1 is placed on the drawing table of



the pantograph which has a microscope mounted on a short arm. Following the lines on the layout drawing from point to point with the pantograph stylus, moves the microscope equipped with crosshairs exactly according to the profile to be ground. The operator feeds the grinding wheel so that its cutting edge always works toward the point marked by the crosshairs which corresponds to the position of the stylus.

An accuracy of 0.0003-inch is easily obtained in the grinding operation, the company reports. Still closer limits can be held after the operator has become reasonably familiar with the machine.

The grinding wheel can be set at a desired angle to move in any direction by means of the unusual arrangement of cross and circular slides and other adjustments which give the effect of a double universal joint.

The layout size is 20 inches square, which makes possible grinding an area 0.400 x 0.400-inch in one setting. Profiles greater than 0.400-inch in area can be handled by other methods with the



When Someone Yells "FIRE!" WHO MAKES THE NEXT MOVE?

What happens, if fire strikes in your plant?

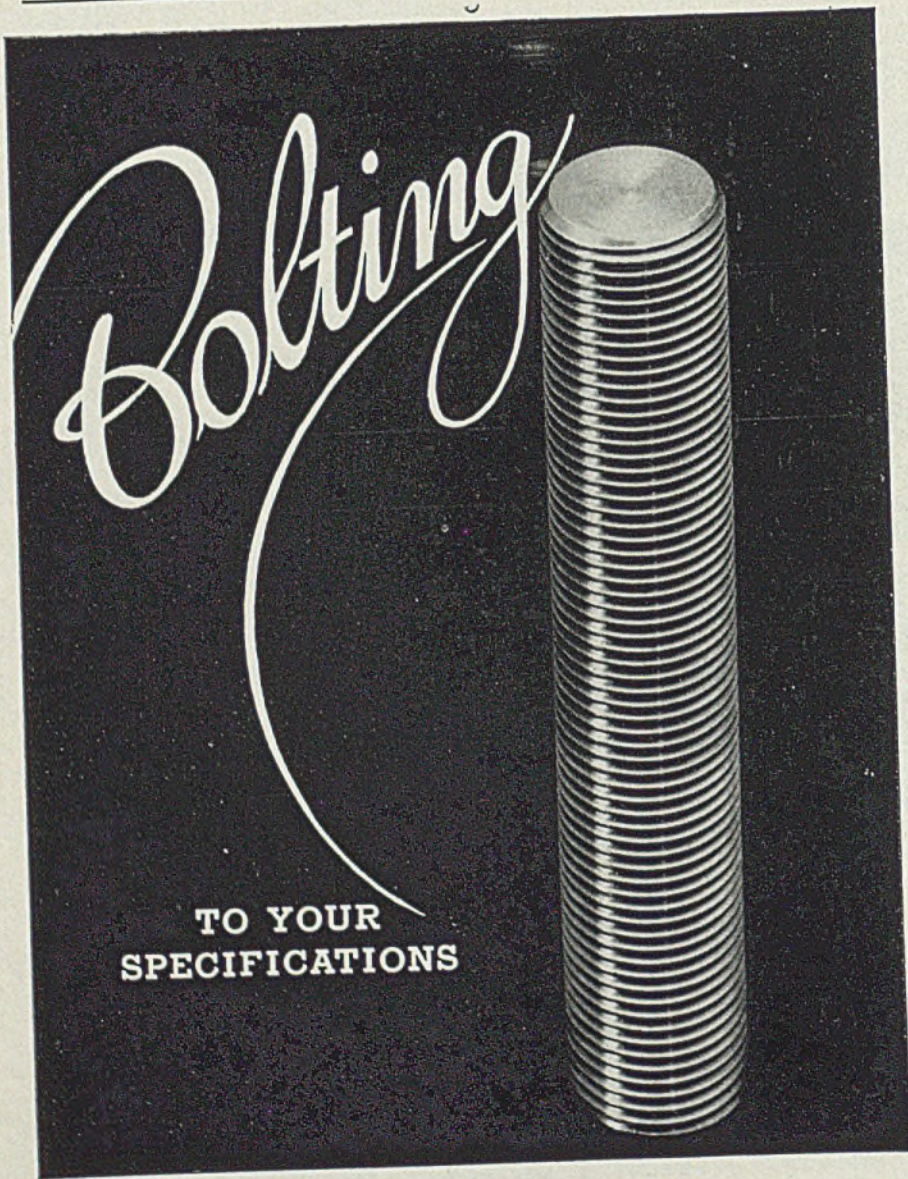
Who grabs an extinguisher and hits the blaze hard, without panic, without fumbling? Who understands fire-fighting and the weapons with which fires are quickly snuffed out? *How many of your employees know how to handle an extinguisher?*

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Erie Alloy Studs are manufactured in diameters from $\frac{1}{2}$ " thru $2\frac{1}{2}$ " in lengths to order, either continuous threaded or threaded each end. These are made to customer specification of material—heat treating and thread fit. Wherever pressure temperature or corrosion are determining factors in bolting we invite your request, for our experience is in this specialized type of bolting and any other out-of-the-ordinary type of bolt, stud or nut.

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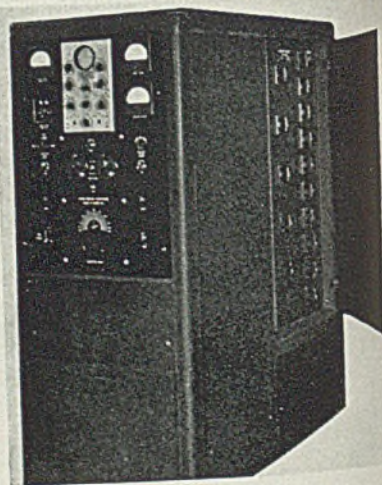
same equipment. Work may be accommodated up to 10 inches wide and 4 inches thick. Stock can be stacked to a height not to exceed 2 inches to produce several identical parts at one operation.

The machine also can be used in reverse for making 50:1 layout drawings from parts with unknown profiles and for checking parts against the layout drawings.

Electrical Source Unit

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, announces a new electrical source unit for spectrographic analysis. It not only combines the functions of the conventional direct current arc, alternating-current arc and high voltage condensed spark units, but it goes beyond in providing precisely controlled excitation suitable for all types of analysis.

With this unit the three factors of an electrical circuit, resistance, in-

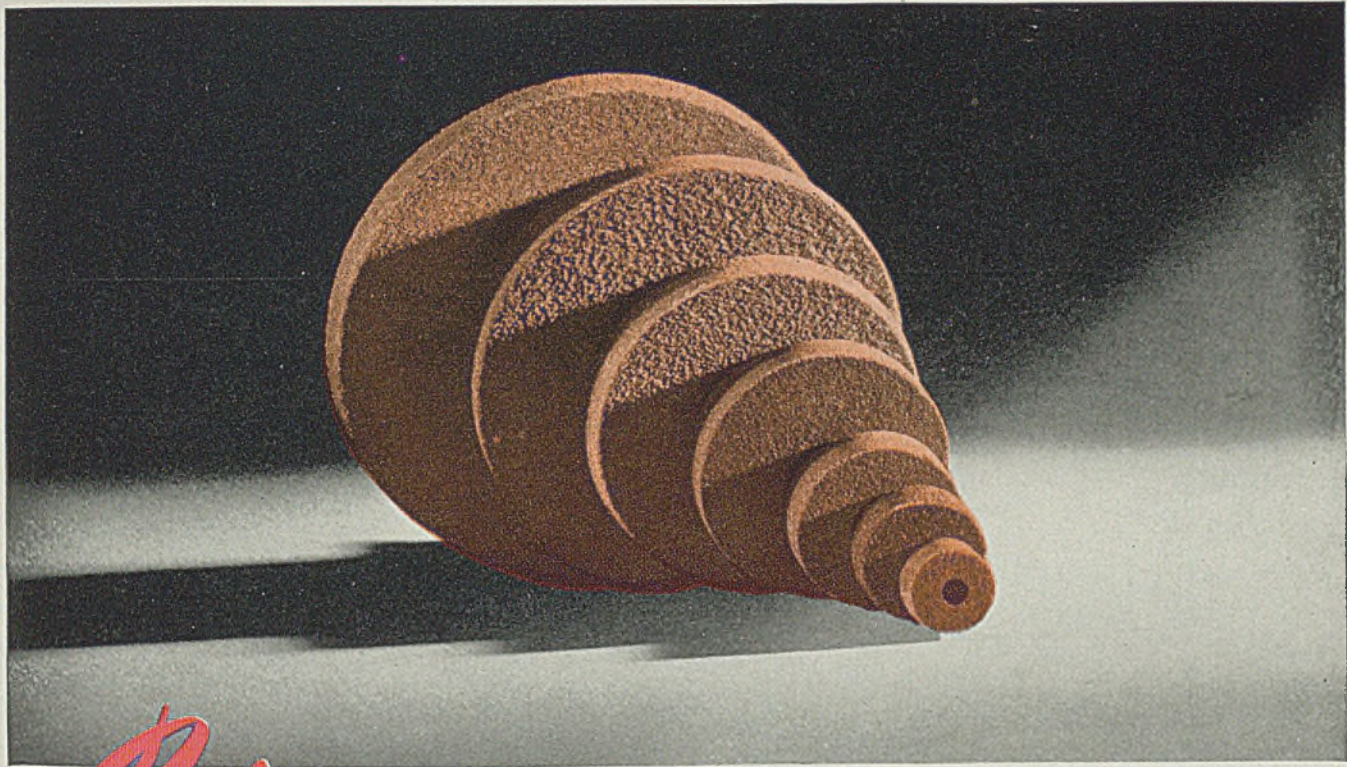


ductance, and capacitance, may be set and precisely controlled to selected values over wide ranges.

The unit consists of a main control panel mounted at the front, and a selector panel mounted at the side. The selector panel is equipped with pull knobs which allow selection of the conditions of discharge. Seven knobs at the front of the condenser section allow the selection of capacitance values from 1 to 60 microfarads in steps of 1 microfarad. Ten knobs allow the selection of resistance values from 1 to 400 ohms in steps of 1 ohm, while five knobs on the inductance section allow values from 25 to 400 microhenries to be utilized.

Switching is all done behind the panels by means of heavy insulated knife switches. The main panel is supplied with an oscillograph so that the current duration and waveform of an average, individual discharge can be studied. Besides this indicator, an ammeter is fur-

STEEL



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No holding up vital jobs while you wait for your grinding wheels or mounted wheels*.

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Any shape, grain and grade, any size up to 3" in diameter. From this army of wheels you can select one custom built for your job.



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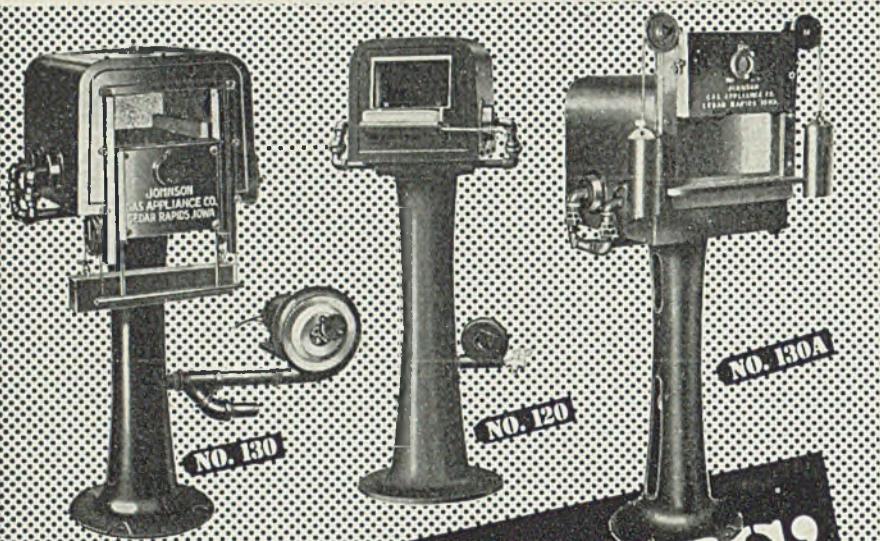
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Mounted Wheels Address

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NO. 130 HI-SPEED STEEL HEAT-TREATING FURNACE

Consistently develops 2300° F. in just 22 minutes. Use it for speedy, clean heating of all types of steel and for brazing carbide tool tips. Firebox 13" wide, 13½" long, 5½" high. Lined with hi-temperature insulating refractory. \$248.00.

NO. 120 HI-SPEED STEEL HEAT-TREATING FURNACE

Reaches 1500° F. in 5 minutes. Excellent for heat-treating hi-speed steels. Compact, powerful and remarkably economical to operate. Widely used for hardening punches, dies and tools. Firebox 13½" long, 7¾" wide, 5" high. Insulating refractory lined. \$129.50.

NO. 130A HEAT-TREATING FURNACE With 4 or 6 Burners

Use the 6-burner unit for heat-treating hi-speed steels, at temperatures from 1800 to 2400° F. The 4-burner unit offers 1400 to 2000° F. Counterbalanced door opens upward, so tools can be placed or removed without fully opening door — preventing temperature drops. Firebox 7" high, 13" wide, 16½" long. 4-burner — \$295.00; 6-burner — \$325.00.

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nished to check the power consumption of the unit and a voltmeter to check the consistence of the voltage across the condensers before discharge.

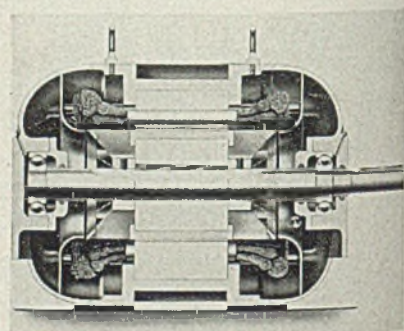
Another voltmeter indicates the difference between the input voltage and regulated voltage so that the instrument can be adjusted to account for extremes of line voltage variations, thus preventing any decrease in accuracy on this account. A phase control knob, coupled directly to the synchronous gap, provides the necessary adjustment of the ignition point of the discharge.

An adjustable, zero to 2-minute synchronous timer allows the total time of operation to be precisely controlled. All necessary switches for starting and adjusting the unit are also provided on this panel.

The unit is housed in a large spot welded metal case 63 x 28 x 50 inches. It is subdivided into a series of sub-assemblies, each of which can be inspected and serviced by pulling out a panel at the front or side. Casters allow the unit to be moved easily.

Induction Motor

Lima Electric Motor Co., Lima, O., is offering an RS drip-proof induction motor designed to give maximum protection against chips and filings, dripping or splashing liquids. It is adaptable to



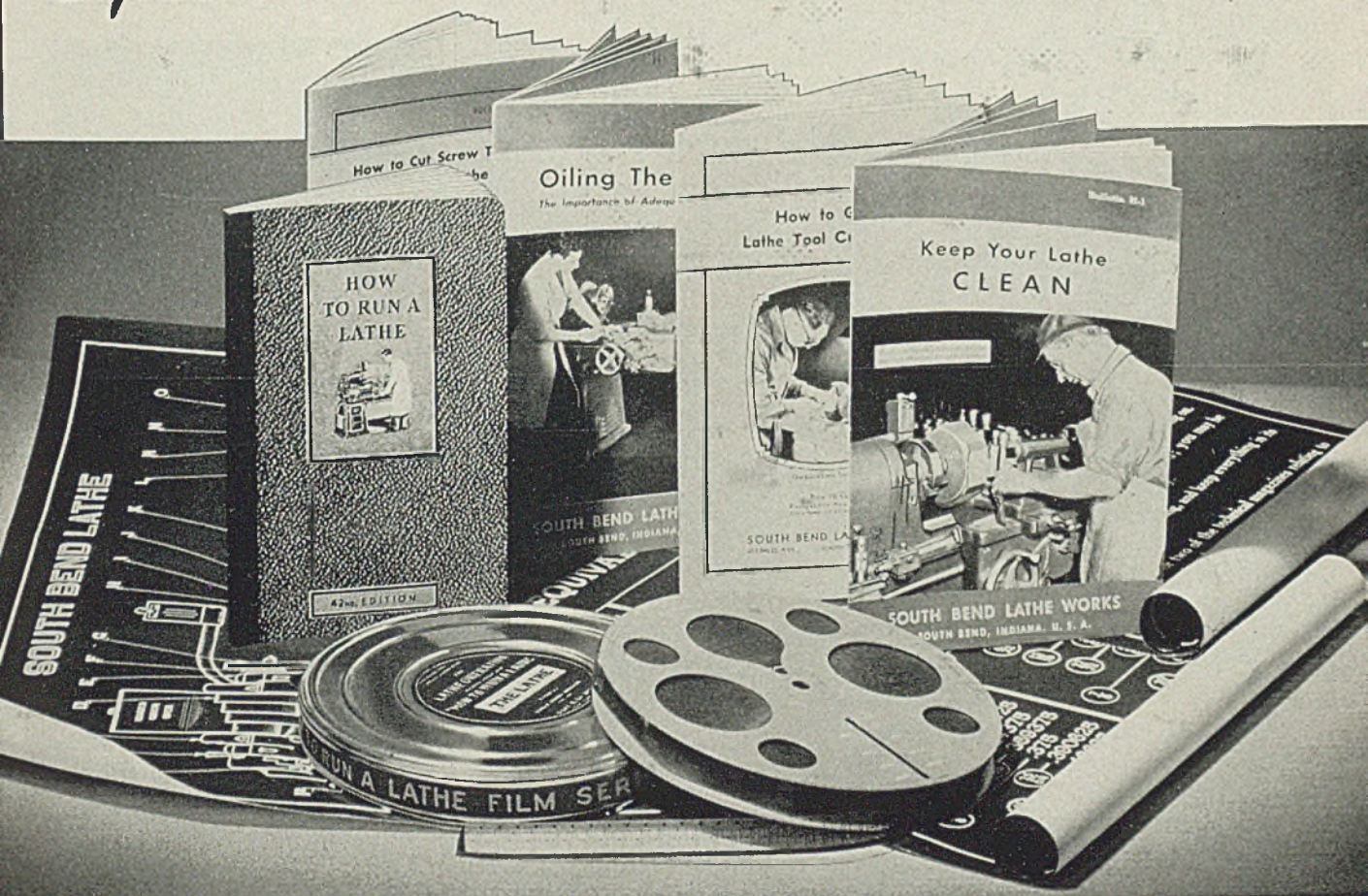
machine tool and production equipment and other uses where a totally enclosed motor is not especially needed.

An alternating current unit, the motor is available in ½ to 75-horsepower sizes. It is equipped with heavy-duty ball bearings, dynamically balanced rotor and heavy rugged frame.

Tap Grinder

Edward Blake Co., 634 Commonwealth Avenue, Newton Centre, Mass., is introducing a new No. 2 tap grinder for sharpening the chamfer on taps from 0 to 2 inches, and up to 14 inches long. The machine is similar in construction to the company's No. 1 tap grinder except that the bed casting is longer to accommodate longer taps. The segment under the wheel head slide is wide

Speed WAR PRODUCTION TRAINING



USE THESE BOOKS AND FILMS ON LATHE OPERATION

One of the most serious problems confronting management today is the training of new employees to replace thousands of skilled technicians who have been called for service with the armed forces. With inexperienced workers, production goals must be increased and standards of precision and quality must be maintained. To accomplish this, a vast army of

men and women must acquire new skills in the shortest possible time.

To help you train new lathe operators, we offer the practical aids listed below. These books and films of lathe operation have proved effective in hundreds of apprentice training schools, including Army and Navy training stations.

Write for Information on These Practical Training Helps

MOTION PICTURES—"The Lathe" and "Plain Turning"—two 16 mm sound films in color on lathe operation. Available on a free loan basis for apprentice training. Showing time 20 minutes each. Write for circular.

HOW TO GET THE MOST OUT OF YOUR LATHE—Specialized service bulletins on the care and operation of engine lathes. H-1, "Keep Your Lathe Clean"; H-2, "Oiling the Lathe"; H-3, "Installing and Leveling the Lathe"; H-4, "Keep

Your Lathe in Trim." Sample copies mailed on request.

HOW TO RUN A LATHE—A practical 128-page operator's handbook. 360 illustrations. Written in simple, non-technical style easy for the beginner to understand. Used as a shop text book by the Army, Navy and Air Corps. Price 25c. Sample copy free to apprentice supervisors.

THREAD CUTTING—21-page book, "How to Cut

Screw Threads in the Lathe." Shows how to set up a lathe for cutting various pitches of screw threads; setting cutter bits; screw thread formulae; metric threads, etc. Price 10c. Sample copy free to apprentice supervisors.

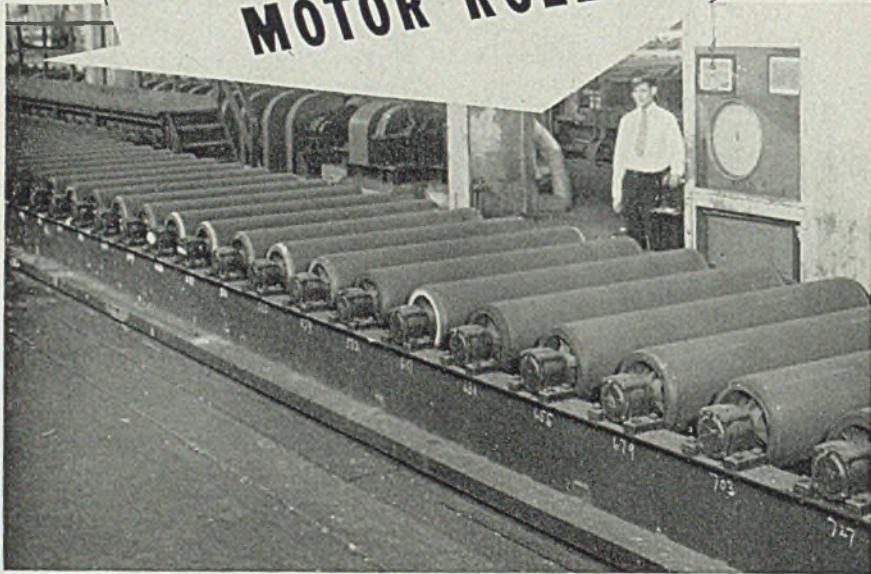
GRINDING CUTTER BITS—12-page book of grinding lathe tool cutter bits. Covers identification and application of various bits, methods of grinding, correct angles, etc. Price 10c. Sample copy free to apprentice supervisors.

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The squirrel cage motor, contained within the roller, and with no electrical connection to the rotor, represents the simplest piece of apparatus for converting electrical energy into mechanical work.

Mechanical design of the "Motor-Roller" with anti-friction bearings and a minimum number of rotating parts reduces operating and maintenance costs and avoids delays.

Scale tables, such as those illustrated above, provide flexible operation under start—stop—reversing service and possess the advantage of free access along both sides of the table.

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ENGINEERING CORPORATION

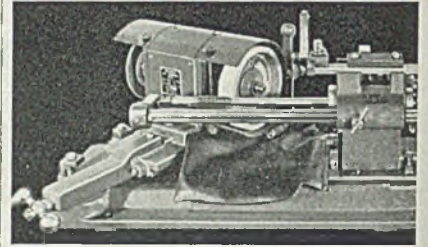
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enough to allow the head to be swiveled for chamfer angle, advantageous when sharpening shell type taps, or taps with long pilots, as the work must clear the wheel head yet be rigidly supported.

The No. 2 machine is equipped with a longer feed screw for clearing the bed



when the wheel head is swung to the extreme rear position. Change gears are provided for sharpening 2, 3, 4, 5, 6, 8 or 10 flutes, right or lefthand. Taps can be held in bushings for rapid operation or in collets or between centers, if user prefers these methods. All three ways are available.

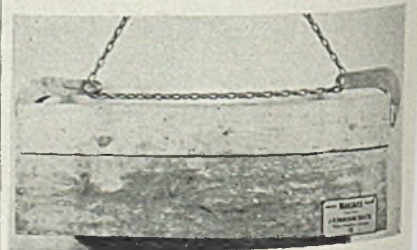
Safety Sleeve Holder

M. E. Cunningham Co., 172 East Carson street, Pittsburgh, is marketing a safety sleeve holder designed to leave a clear, even impression in marking on small, round and square pieces. It is said to be especially adaptable for marking gun barrels, small tubes and also for numbering stock in warehouses or storerooms. Outside frame of the holder is sturdy and the legs to the frame are grooved for use on small rounds. The top section, surrounding shank of type holder, is knurled for positive grip, and a special pin, easily removed for quick change of steel type inserts, holds the holder in place.

The device is being offered to handle any size or number of characters.

Versatile Grab

J-B Engineering Sales Co., New Haven, Conn., is offering a new type 1067 Mansaver grab for handling boxes of varying lengths. It consists of two comparatively light gripping ends with



pointed gripping face.

Lifting and gripping are by means of a chain. The illustration shows the grab handling one size box. For handling narrower boxes the chain length may be

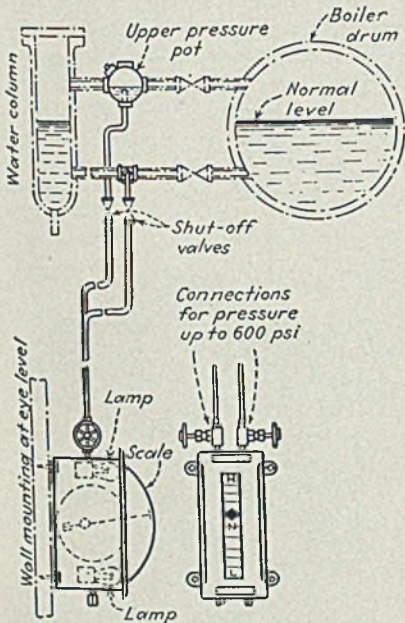
STEEL

shortened by hooking on to the attachment shown on the grab ring. The grab is being offered in sizes of 1/2 to 10 tons. One or more may be used on a spreader bar for handling wide, long crates, the company states.

Water-Level Indicator

Yamall-Waring Co., Philadelphia, is offering a new water-level indicator which shows the water level in a boiler drum. Instrument is operated by differences in pressure in connecting tubes which is merely the difference in head between fixed water level in the upper pressure pot and varying water level in the boiler drum.

Pressure differential acts on Neoprene diaphragm. Pin transmits net diaphragm force to spring-metal deflection plate, moving powerful permanent magnet along tubular well containing spiral arma-



ture of magnetic material. Thus rotation of armature and, corresponding greatly-magnified motion of pointer, is in direct proportion to movement of diaphragm, actuated by changes in static head.

Magnetic principle permits complete separation of pressure parts from non-pressure parts without stuffing boxes. Thus magnet and deflection plate are in pressure chamber, whereas, the jeweled-bearing armature in the tubular well operates freely without packing and at atmospheric pressure.

Magnet and spiral armature are equivalent to a worm wheel driving a steep-pitch worm except that normal tooth friction between wheel and worm is eliminated.

Balanced black pointer, attached to armature and revolving with it, registers changes in boiler water level on illumi-

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4	125	1029	.495	.275	202
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2	200	1666	.560	.335	295
1	250	2156	.625	.400	373
1/0	300	2646	.675	.440	450
2/0	375	3381	.750	.490	570
3/0	450	4284	.815	.545	705
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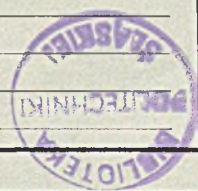
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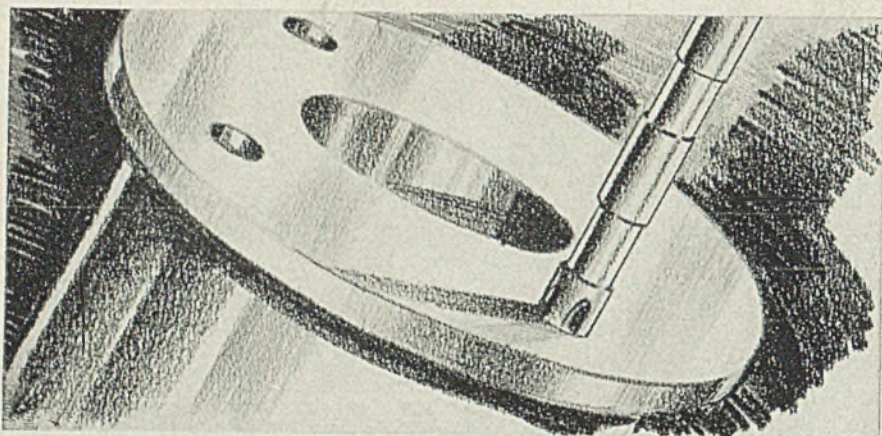


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Example: Bronze Alloys Co. of St. Louis replaced their wet tumbling process with a 20 x 27" Wheelabrator Tumblast for cleaning bronze and aluminum castings. The improvement in tool life in machining Wheelabrated castings was quickly noted by their customers, with the result that a Wheelabrated finish is now specified on practically all casting orders received.

Of equal importance was the fact that the Wheelabrator cleaned out cracks and fissures which previously had not been visible on inspection. Unfortunately such defects were not discovered until subsequent machining operations. Now, imperfections are revealed before the castings leave the foundry, and it is seldom that a Wheelabrated casting from Bronze Alloys is rejected as imperfect by a customer.

The full story about these and other profitable advantages of the Wheelabrator are yours for the asking. Why not write us about them today?



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FOUNDRY EQUIPMENT CO.

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nated scale that shows green for normal operating range and red at high and low levels.

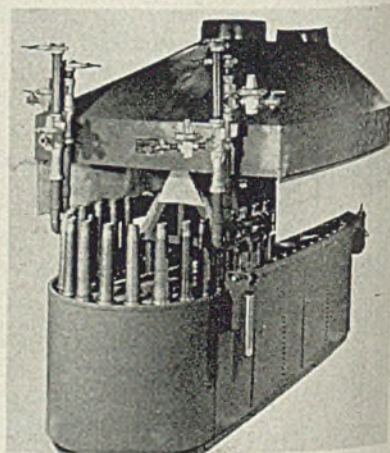
Annealing Machines

Morrison Engineering Co., Cleveland, announces three new flame-type mouth and body annealing machine models for steel cartridge cases. These handle cases of 37, 40, 57, 75, 90, and 105 millimeters, including 3-inch cases.

Model 3740 will handle all 37 and 40 millimeter cases. The 57, 75 and 105 millimeter cases are handled by the model 5710, and model 390 takes care of the 90 millimeter and 3-inch antiaircraft cases. All three units are basically of the same design—the difference being size.

Production capacity of the various machines, it is reported, is arranged to balance with the average steel cartridge case production line.

The equipment includes a steel conveyor chain placed on its side and driven by a variable-speed drive through a totally enclosed worm gear reducer. The chain carries double row, ball bearing mounted spindles every pitch. These, in the form of a V-belt pulley, are rotated by a V-belt backed up by adjustable



ball-bearing wheels or, in certain models, the spindles are sprocket equipped and driven by an adjustable steel roller chain. The spindle rotating mechanism is driven by a separate motor which is provided with its own variable speed unit and a totally enclosed worm gear speed reducer. Work holder adaptors which are interchangeable for different size cases are bolted on top of the rotating spindles.

The burner equipment is of the blast line type with zero governors and proportional mixers provided for each burner. Manometers also are provided for each burner.

By operating at comparatively high mixture pressures, and by rotating the work from 60 to 100 revolutions per min-