Light articles with large surface area usually are galvanized by hand, as shown above. Page 110

STEEL

The Magazine of Metalworking and Metalproducing

MARCH 13, 1944

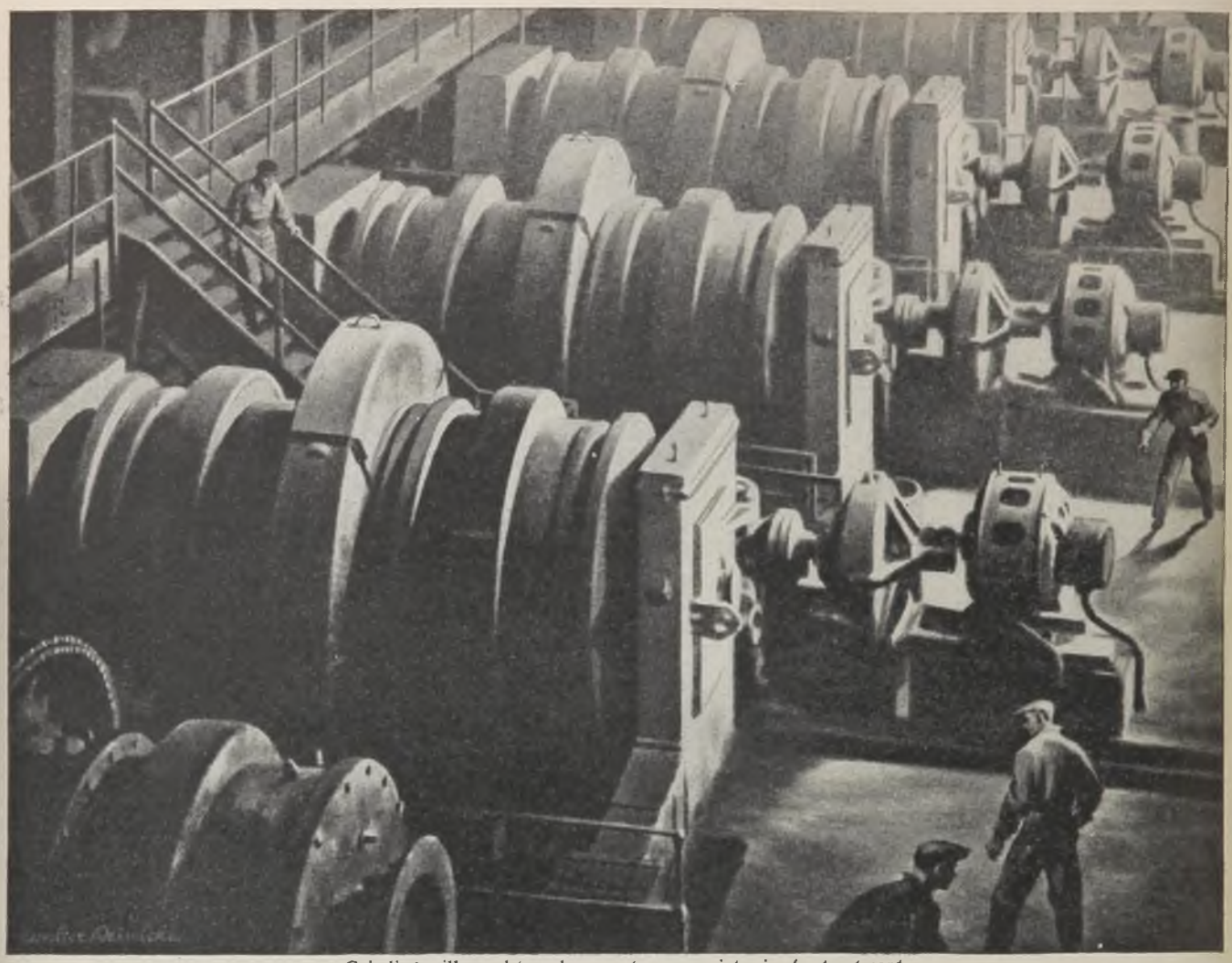
Volume 114—Number 11

NEWS

TECHNICAL

FEATURES

MARKETS



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STEEL
March 13, 1944

Too Much Change of Pace

According to the War Manpower Commission, the requirements of the armed services, business, industry and agriculture, now figured at 61,200,000 men and women, will mount to 65,700,000 by July 1, 1944. The increase of 4,500,000 in the labor force envisions a net addition of 800,000 to the armed services, an increase of 3,400,000 persons engaged in agriculture and slight gains in employment in transportation, fuel, utilities, food and textiles. It also takes into account anticipated decreases in the labor force required for trade, service, government, and the construction industries. No change is expected in employment in federal war agencies or in munitions production.

The first result of this latest analysis of manpower requirements was a series of statements from Washington predicting a general tightening-up of the selective service machinery. This was followed almost immediately by indications throughout the country that draft boards are more reluctant to grant occupational deferments and are in the process of reclassifying those called for service.

How drastically this new wave of drafting activity will affect the nation's capacity to produce remains to be seen. Employers in some industrial areas are worried because they feel that a ruthless drive, unless accompanied by a fair consideration of all circumstances involved, may hurt war production at a time when it is functioning more smoothly than at any previous time in this war.

They are particularly disturbed by the widely publicized action of Selective Service in turning down 238 out of 245 requests for deferment of "key men" in the War Production Board. If this ratio were to be applied to requests for the deferment of key men throughout industry, the result would be disastrous.

No one should object to a "tougher" attitude on the part of Selective Service, provided the sterner attitude is based upon real need and is accompanied by justice and reason in deciding who shall go to war and who shall be deferred. But for the government to start a crusade of "toughness" now—after conducting a "soft" war too long—may lead to dangerous discrimination and unnecessary impairment of the war effort.

Most informed persons see nothing in the latest analysis of the manpower situation to justify panicky measures on the part of the government. The required men and women can be recruited equitably by orderly processes.

Why this hot and cold, soft and tough change of pace? Why can't we have a fixed policy and an orderly procedure?

CRUTCHES AND CLUTCHES: Philip Murray's proposal to WPB to "save small steel" by permitting the government to sell pig iron from Defense Plant Corp. blast furnaces and battlefield scrap to 20 small semi-integrated steel producers at below OPA ceiling prices but above cost is bound to attract widespread attention. This is because it deals with a problem that is long overdue for solution.

Murray's argument is that 14 of the 20 companies already are enjoying exemptions from OPA price regulations equivalent to an aggregate subsidy of more than $5,000,000 per year, that employes in these companies work for less than the prevailing wage and thus contribute a further subsidy of $5,000,000, and that now that the OPA exemptions are becoming less effective it is the responsibility of the federal government to take further steps to "save" these companies.

(OVER)

The difficulty is that once subsidies are employed, there is no turning back. The Murray plan would pile subsidy upon subsidy, with attendant additional complications in federal control and restrictions. Most of these companies would prefer freedom and opportunity to any number of subsidies. The problem is not how to provide crutches for them but how to free them of government clutches so that they can stand on their own feet. —p. 58

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SUGGESTIONS GALORE: War has revived interest in the old suggestion box idea. Donald Nelson's promotion of labor-management shop committees has done much to stimulate the flow of suggestions from employes; in fact WPB reports that the volume of "usable suggestions" has tripled in the last six months.

But aside from these committees, there are numerous companies which have resorted to the simple expedient of asking their employes to write out suggestions and place them in a "suggestion box." A Pittsburgh manufacturer who has tried this method is enthusiastic over the results. He has proof that the system has promoted efficiency.

One detail in his suggestion program deserves special emphasis. Suggestions are collected in boxes in the usual way, but they are considered, not by the employe's immediate superior, but by a committee consisting of the chief engineer, shop superintendent, general foreman, secretary and president.

This subtle refinement in the make-up of the reviewing board may have a lot to do with the success of the system. —pp. 82, 84

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PLEA FOR COST-PLUS: Attacks against certain features of cost-plus war contracts have caused Congress to review the subject. Appearing before a subcommittee of the Senate Military Affairs Committee, WPB Chief Nelson sanctioned the elimination of cost-plus in many contracts but asked for flexibility in writing agreements so that special conditions can be dealt with sensibly.

On production work where costs have been fairly well established by previous experience there is little excuse for a cost-plus contract. But on new work, or on work where extensive changes are likely to be made, considerable flexibility is afforded by the cost-plus device.

In cases of uncertainty, cost-plus would seem to be preferable to a fixed price which might subject the contractor to a loss or to a profit excessive enough to entail renegotiation. —p. 62

SUPER SUCCESS STORY: A year ago when the Boeing Aircraft Co. was trying to step-up the production of B-17 Flying Fortresses, it was hampered seriously by manpower and housing shortages in the vicinity of its principal plants in Seattle. To overcome these handicaps, it decided to decentralize certain operations by establishing "feeder" plants in smaller communities.

How these auxiliary plants were obtained, equipped, manned and developed into efficient units is a success story of unusual interest. Today production from plants in Aberdeen, Tacoma, South Tacoma, Chehalis, Bellingham and Everett is flowing steadily to the assembly lines in Seattle. Part of the Everett operations is carried on in a structure which once served as a longshoremen's hall. The South Tacoma plant was once a winery. At Bellingham the plant is a bank-like building which formerly housed a department store. The Tacoma branch Boeing plant is a converted exhibition hall.

Tying in these units with the main plants looks like a super-feat of co-ordination. —p. 74

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JAPAN'S ACHILLES HEEL: Representative Albert Thomas, ranking majority member of the House Appropriations Committee, says that figures furnished by the United States Navy indicate that Japan's steel ingot production is about 10,500,000 tons annually. If this is reasonably accurate, then it can be assumed that Japan's output of finished rolled steel is about 7,350,000 tons.

Japan's most pressing need for steel, one would think, would be for ships. In 1943, 19.1 per cent of the American output of finished steel, or 11,432,813 tons, went into ships. A like proportion of Japan's finished steel output would provide only 1,403,850 tons for shipping.

In 1943 American shipyards turned out 1896 vessels with a deadweight tonnage of 19,238,626. On the same basis, Japan's 1,403,850 tons of steel for shipping would yield 235 vessels aggregating 2,370,100 deadweight tons.

The Associated Press lists 950 Japanese naval and merchant vessels destroyed up to Dec. 4, 1943. These losses, coupled with the apparent low capacity for replacement, point to inadequate steel supplies as one of Japan's critical weaknesses. Congressman Thomas probably is right in saying that steel is Japan's Achilles heel. —pp. 61, 65

E. L. Shaner

EDITOR-IN-CHIEF

"Ducks" Made of Inland Steel

Our fighting men call this 2½-ton amphibian truck the "duck", because it travels equally well either on land or in the water. Its water-tight steel hull encases the frame assembly below which are mounted the springs, brackets, and wheels—it is a motorized boat on wheels. In the water the "duck" is driven by a rear mounted propellor.

At battle fronts these seagoing trucks serve our fighters by establishing beach heads and bridge heads, by carrying men and supplies from ocean freighters—across beaches, lakes and rivers to inland depots. They are used in reconnaissance work in coastal waters, and over land where roads and bridges do not exist. They can often be seen pulling artillery into position.

Inland Steel Co. supplies thousands of tons of plates and sheets used in the construction of these unique amphibian trucks—or "ducks." Other large tonnages of flat rolled products move daily from the Inland mills to builders of many types of transport, such as ships, trucks, barges, etc.

When the war is won steel from Inland will again be used to fill the peacetime transportation needs of the country.

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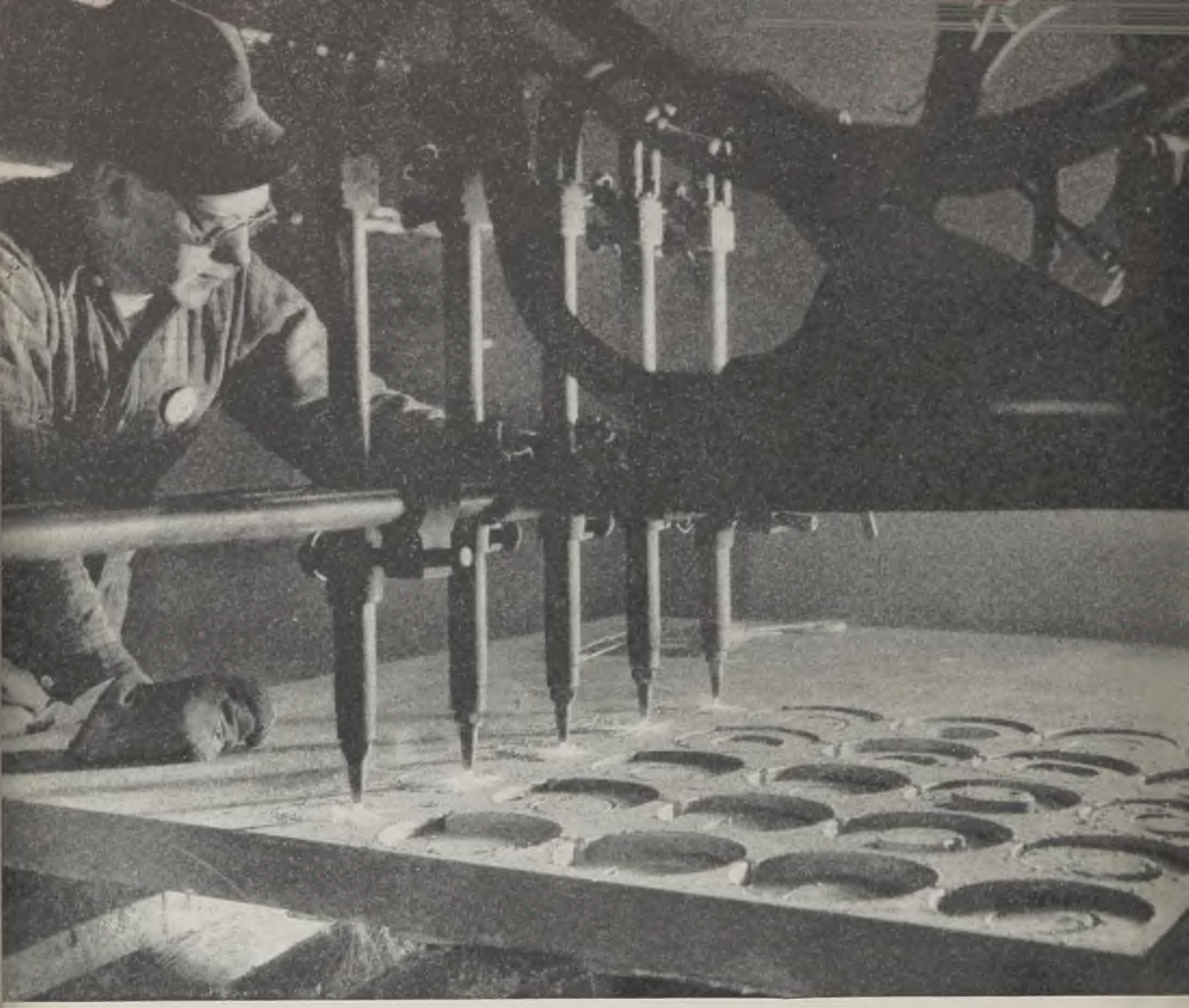

Intricate Shapes Quickly Cut by Flame

Short Cuts and Economies Developed . . . Time Saved

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Whenever you need flame-cutting service, call Ryerson. You'll get immediate action—prompt delivery. If there is any question, we will review your specifications or estimate any job you have at hand. Get in touch with the nearest Ryerson plant.

Joseph T. Ryerson & Son, Inc., Steel-Service plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Pittsburgh, Philadelphia, Jersey City.

RYERSON

Labor Requirements To Increase Sharply

Armed services to be expanded by 800,000 by July 1, and 600,000 others will be required for replacements. Shortage now acute in many critical industries. "The manpower job has not been cut back"

MANPOWER requirements of the armed services, industry and agriculture will be increased by 4,300,000 persons by July 1, according to the War Manpower Commission.

First call for the manpower available will be from the armed services which are scheduled for a net expansion of 800,000 during the first six months of the year, exclusive of an estimated 600,000 that will be required for replacements for discharges and battle casualties. The net drain of manpower from the civilian labor force will not be so large as this total because many of the discharged veterans will become available for civilian employment.

Quantitatively, the largest single increase in total labor requirements will be in agriculture where seasonal demands will increase by 3,400,000 to a total of 12,100,000. This seasonal increase largely will be met by persons not normally on the labor market, such as members of farm families and school youth.

Labor requirements of the munitions industries are expected to hold fairly constant at 9,800,000. Although changes in the munitions program are likely, the War Manpower Commission expects that reductions in some programs will be offset by increases in others. For example, aircraft, landing craft, communications and electronic equipment and ship repair are scheduled to increase while production of ammunition, small arms, antiaircraft artillery and tanks are scheduled to decline.

No significant changes, other than seasonal, are expected in the nonmunitions employment. Increases totaling 400,000 are expected in transportation, textiles and food industries. A decrease of 300,000 is expected in construction, trade, service and self-employed groups.

Employment requirements in the nonmunitions industries and the changes expected during the first half year are:

Federal war agencies: Civilian employment in the war agencies, exclusive of Navy yards and manufacturing depots, will remain at 1,500,000, with increases in some agencies offset by decreases in others.

Transportation, fuel and utilities: Additional requirements of 100,000 to a total of 4,500,000 by July will reflect a record volume of industrial and agricultural activity at the 1944 mid-year.

Food industries: Food processing is expected to require 200,000 additional workers by July—a total of 1,500,000 as against 1,400,000 last July and 1,300,000 at the beginning of the year.

Textiles, clothing and leather: An increase of perhaps 100,000 workers is indicated to a total of 2,700,000. Employment in this group has decreased in recent months, primarily because of labor shortages, and current textile output is below the desired volume.

Construction: Further decline in building trades employment will result from the curtailed construction program and shortage of materials for non-war construction programs. The total in this group is expected to drop from 800,000 to 700,000.

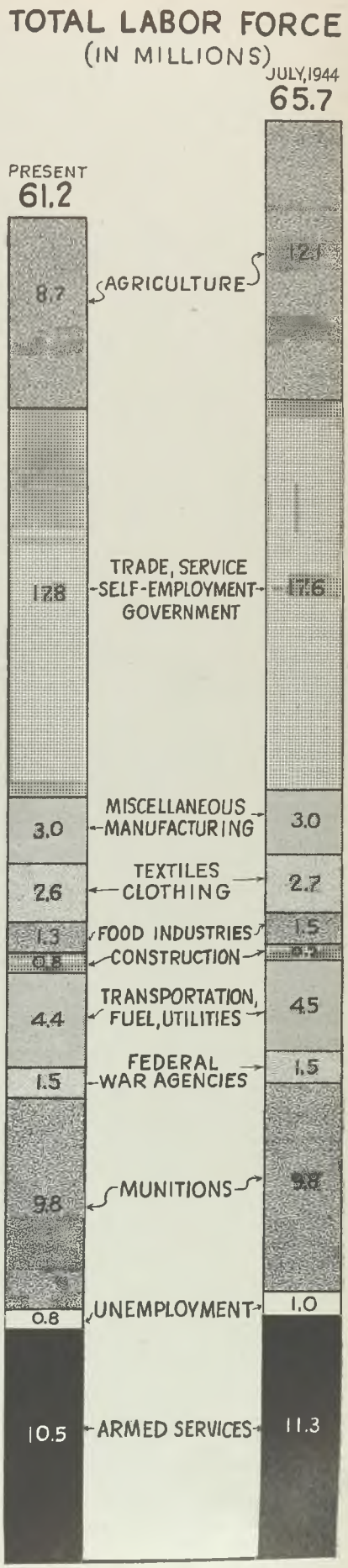
Trade, services and self-employed: Further small declines in this group reflect a lack of available manpower. The indicated declines are not expected to be of such magnitude as to impair civilian capacity to maintain war production.

Extremely Serious Situation

WMC Chairman Paul V. McNutt said the labor shortage in a number of highly critical industries is extremely serious. These include railroad transportation, ball bearings, foundries, meat packing and radio tubes. Coal mining employment now is down to 465,000, a decline of 45,000 during the past year, and the minimum level at which the 1944 production goal of 622,000,000 tons of bituminous and 66,700,000 tons of anthracite can be produced. These industries have not received the same wide attention as aircraft and shipbuilding, but all are connected with the flow of materials to the fighting fronts.

War Manpower Commission officials are concerned over the tendency of workers in war industries to seek jobs in non-war factories for the sake of permanent postwar employment. This tendency has been accented by cutbacks in war contracts.

Commenting on the difficulty of further increasing the labor force, Mr. McNutt says: "We do not have reserves of unemployed to draw from. The women who were readily available for employment have already been drawn into the labor market. Workers no



longer are being made available for transfer by declining civilian activities; as a matter of fact the trend is the other way. From now on we will have to operate within a fixed and limited manpower budget.

"Our manpower resources are strained. We have never before in our history had so many people at work. Our only remaining substantial labor reserve consists of women; but the number of new women entering the labor market barely compensates for those who are returning to their homes. Nonagricultural employment of females has remained relatively constant over the past six months. About eight women leave the labor market for every ten who enter it.

"The bulk of our war production is carried on in labor shortage areas—those in groups I and II. It is in these areas that the strain on our labor resources will be hardest. Despite the spread of vigorous and effective local manpower programs, very few major group I areas have been able to move out of this category.

"The manpower job has not been cut back."

SELECTIVE SERVICE TOUGH ON WPB OFFICIALS

Indicative of the inroads of the draft on manpower is the experience of the War Production Board. Out of 245 officials whose deferments were requested by WPB as "key men", all but seven have been turned down.

The 245 names submitted by WPB from among its 17,000 employes were culled from a group of 700 proposed by bureau and division heads. The WPB has gained a reputation as being one of the "toughest" agencies in Washington in requesting deferments for its employes.

Among those whose deferments were rejected was Vice Chairman J. A. Krug, in charge of production programs, chairman of the powerful WPB requirements committee, and director of the Office of War Utilities.

Another was E. A. Locke, assistant

J. A. KRUG

to Chairman Donald M. Nelson and accounted one of the most influential of WPB policy officials.

Labor Priorities System Introduced in New York

A system of labor priorities giving preference in the placement of workers to the most essential war plants has been introduced in New York by the War Manpower Commission and the War Production Board.

Acting on instructions from the Washington headquarters, regional officials of the two agencies are setting up a program which is an adoption of the Buffalo Referral Plan and a similar plan in effect on the West Coast.

Lake Vessel Men To Seek Employment Stabilization

The Office of Defense Transportation last week announced approval of a self-help program prepared by the Lake Vessel Committee aimed at centralization of Selective Service requests, employment stabilization and recruitment.

Because of the short time remaining before the opening of the season and the importance to the war effort of employment stabilization on the Lakes, the bulk carriers' plan was endorsed as an expedient, ODT officials explained. They said that attempts of the ODT, the Recruitment and Manning organization of the War Shipping Administration and the War Manpower Commission to bring all branches of Great Lakes transportation together under a single industry-wide manpower stabilization program have been unsuccessful.

The Lake Vessel Committee, acting as a central organization, plans to request deferments for seamen of member companies to avoid "confusing duplication by individual companies and to keep local boards more accurately informed of the manpower needs of the fleet." Deferments will be asked for licensed officers; seamen over 22 years of age certified according to federal law and employed in skilled ratings as able seamen (wheelsmen, watchmen and deck watchmen), oilers and firemen; and pre-Pearl Harbor fathers over 26 years old, with the ratings of cook, tunnelman, and gateman.

Individual companies will continue recruitment through their own personnel offices, but the Lake Vessel Committee will co-ordinate and supplement their programs by group advertising, radio programs, and field representatives in the Great Lakes area in order to obtain the necessary and experienced manpower to operate their ships.

Occupational Deferments Reviewed

Detroit area draft boards reclassifying men in 18-38 age group with occupational or dependency deferments into 1-A. Causes considerable disturbance in war plants

IMPORTANT change in selective service procedure, made in the light of the recent presidential order citing deficiencies in manpower supplies for the armed services, has caused considerable disturbance in industrial plants employing large numbers of men in the 18-38 age group who have had occupational or dependency deferments up until the present time.

While not announced publicly, the policy of draft boards now is to place all 2-A, 2-B, and 3-A registrants whose deferments are for 120 days or less automatically in class 1-A, even though occupational deferments may have been granted within the last few weeks, then to order physical examinations for all these men so that the physically unfit can be screened out prior to reconsideration of deferment eligibility or appeal therefor.

This of course will save some clerical work by local and appeal boards, since they will not have to consider deferment applications of those who have been determined physically unfit for service, but the change in policy has caused some consternation among those who have held occupational deferments, and particularly in companies hiring essential men in these groups to fill highly skilled war jobs.

Employers should immediately file a letter of appeal with local boards where deferred employes have now been reclassified into 1-A. Their best procedure is to address the boards, point out that reclassification notices have been received, request consideration of deferment applications made previously, or filed at the present time. However, local boards will not consider such applications for appeal of reclassification until physical examinations have been concluded.

Policy Revised On War Steel Contracts

Escalator clause considered too broad by Procurement Board. Changes up or down to be based on costs

WASHINGTON

MORE than ordinary interest attaches to a new policy just worked out by war procurement agencies affecting contract prices paid for steel and several other basic raw materials.

Up to now the steel industry has had an escalator clause in its contracts under which OPA ceiling prices were applied. The prices charged by the steel companies changed immediately and automatically in accordance with any change by OPA.

Recently, however, the Procurement Policy Board of WPB decided that the escalator clause was too broad and ruled that in the event OPA changes prices on any of the products in schedule 1 of CMP regulation 1, then the contractor, that is the steel company, must take the matter up with the government procurement agency which will go into the matter of costs and determine whether an increase or a reduction in price is warranted.

In other words, each individual case will be analyzed separately.

The new arrangement, it is understood, applies to four basic raw materials, steel, lumber, coal and oil.

Full significance of the new arrangement is not clear. However, it was said in government circles last week that for some time past some steel has been moving on government contracts below ceiling prices, reflecting the easier supply situation of the past several months.

Steel Industry Payrolls Increase in January

Steel industry payrolls in January rose to $141,794,000, according to the American Iron and Steel Institute. This total compares with $140,203,000 in December and $129,760,000 in January, 1943.

For the first time, the January report represents the average number of employes at work throughout the month. Previous reports had shown the total number of employes carried on payrolls, regardless whether they had worked one day or the full month.

In recent months when the turnover of employes has been high, the total number of employes has not constituted an entirely satisfactory index.

In January the industry had an average of 583,000 on payrolls. That figure, however, is not directly comparable with the previously published total employment of 605,000 in December and 637,000 in January, 1943.

Wage earners earned an average of 116.5 cents per hour in January against 116.1 in December and 110.7 in the like month of 1943. Wage earning employes worked an average of 45.7 hours per week during January, 43.2 hours in December and 39.8 hours per week in January of the preceding year.

War Production Conference To Be Held at Chicago

By request of the War Production Board, a Chicago War Production and Related Problems Conference will be held March 30 at Hotel Stevens, Chicago. Similar to the 1943 War Production Clinic, one of the most successful throughout the country, the program will encompass 32 panel sessions, a luncheon and dinner. Under the keynote "Ideas for Victory", the conference will deal with many problems still facing war production—some carried over from last year and a share of new ones—and problems ahead in reconversion.

Conference is sponsored by 37 technical organizations in co-operation with the Army, Navy and WPB.

John Collyer, president, B. F. Goodrich Co., Akron, O., will address the luncheon on "America's Rubber Outlook", and Rear Admiral Arthur S. Carpender, commandant, Ninth Naval District, Chicago, will speak at the dinner on "Course of War in the Pacific".

Panel sessions will cover machine shop practice, foundry practice, nondestructive testing, welding, metallurgy, management, plastics, synthetic rubber, electronics, packaging and instrumentation.

Present, Past and Pending

■ INDUSTRIAL DIAMOND SALES GAIN

WASHINGTON—Sales of industrial diamonds in 1943 are estimated at 10,000,000 carats, compared with 7,883,000 carats in 1942 and 3,563,000 carats in 1941.

■ EXPERIMENT IN CLEANING BLAST FURNACE GASES

PITTSBURGH—An experiment in cleaning blast furnace gases is now under way, using a cyclone dust collector and a specially designed electrostatic precipitator.

■ SECOND QUARTER TIN PLATE SCHEDULE REVISED

WASHINGTON—Tin plate production in the second quarter will be 75,000 tons more than the War Production Board's first estimate of 750,000 tons.

■ GENERAL ELECTRIC EMPLOYMENT, PAYROLLS HIGHER

NEW YORK—General Electric Co.'s employment rose 22 per cent in 1943 over 1942, and payrolls increased 23 per cent.

■ STAMPINGS NOW COVERED BY MPR 136

WASHINGTON—Metal stampings have been added to coverage by MPR-136. Included are stamped or pressed metal products mechanically produced by dies except forgings, brass mill products, steel mill products for which the manufacturer has issued a price list.

■ ARMY SEEKS TO SPEED ROLLING STOCK OUTPUT

WASHINGTON—To expedite the production of railway cars and locomotives for domestic service, field officers from Army Transportation will visit producers to ascertain whether aid in upgrading priorities can be granted.

■ SLOAN NAMED TO U. S. STEEL FINANCE COMMITTEE

NEW YORK—George A. Sloan has been elected a member of the finance committee of the United States Steel Corp. to fill the vacancy caused by the recent death of William J. Filbert. Mr. Sloan has been a member of the board since January, 1937.

■ REPORT LEHMAN BROS. SELL ANDREWS STEEL HOLDINGS

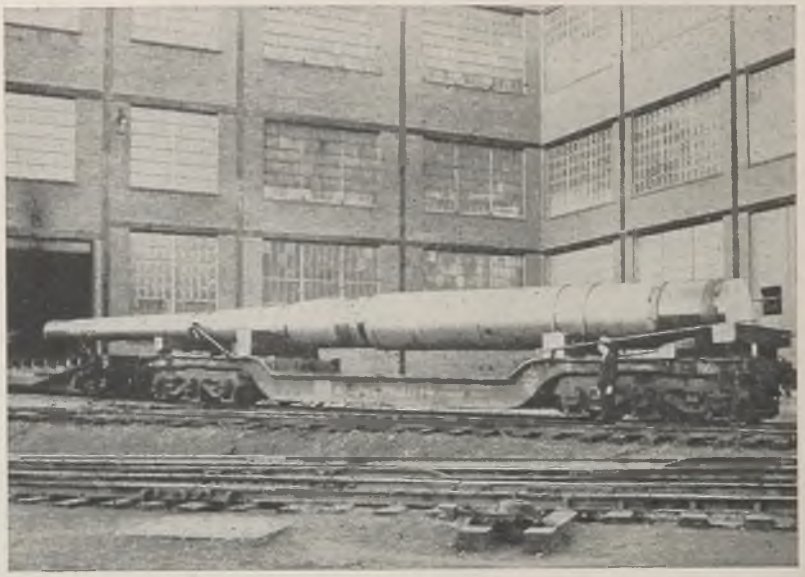
NEWPORT, KY.—Lehman Bros. are reported to have sold their holdings in the Andrews Steel Co. and its subsidiaries, including the Newport Rolling Mill, to Charles H. Stamm, who has been president of the company since last June.

■ BALL BEARINGS NO. 1 PRODUCTION PROBLEM

WASHINGTON—Ball bearings now are the No. 1 production problem, Donald M. Nelson, War Production Board chairman, said last week. Twenty to thirty industries producing durable consumer goods are being handicapped by a critical shortage in components, including bearings, fractional horsepower motors, heavy castings.

Urges Aid for Small Steelmakers

Steel union chief suggests government sell pig iron and scrap to semi-integrated producers at below ceiling prices



BAD NEWS FOR ENEMY: Large factor in America's arsenal is the Bethlehem Steel Co. Not only did it build many of the warships for the United States Navy, but it also produces guns, and ammunition to arm them. Above is a heavy rifle leaving a Bethlehem plant, soon to be installed on an American warship. Acme photo

WHAT he describes as "a practical plan to keep 20 small steel firms in business, preserve the livelihood of 30,-200 steelworkers, prevent the deterioration of a dozen thriving communities into ghost steel towns, stop further concentration of steel production in the huge steel corporations, and save more than 5,500,000 annual tons of steel-producing capacity for the continued prosecution of the war and for postwar use," was suggested to the War Production Board last week by Philip Murray, president, United Steelworkers of America (CIO).

Under the proposed plan, the federal government through a "Small Steel Commission" would operate five newly constructed Defense Plant Corp. blast furnaces, selling the pig iron output of these stacks to the small semi-integrated steel producers at below OPA ceiling prices, but not below cost of production. Also the federal government would sell returned battlefield scrap below ceiling prices to these small producers who "after receiving pig iron below OPA ceilings, are still non-competitive with the huge steel corporations."

In its press release the union says, "Twenty small semi-integrated steel producers are presently confronted with disaster and bankruptcy as a result of wartime distortions of the economy." The companies are listed as follows:

Andrews Steel Co., Newport, Ky.; Atlantic Steel Co., Atlanta, Ga.; Central Iron & Steel Co., Harrisburg, Pa.; Connors Steel Co., Birmingham, Ala.; Continental Steel Corp., Kokomo, Ind., and Louisville, O.; Empire Sheet & Tin Plate Co., Mansfield, O.

Follansbee Steel Corp. Toronto, O. and Follansbee, W. Va.; Granite City Steel Co., Granite City, Ill.; Judson Steel Co., Emeryville, Calif.; Keystone Steel & Wire Co., Peoria, Ill.; Kilby Steel Co., Anniston, Ala.; Knoxville Iron Co., Knoxville, Tenn.; LaClede Steel Co., Alton, Ill. and Madison, Ill.; Lukens Steel Co., Coatesville, Pa.

Northwestern Steel & Wire Co., Sterling, Ill.; Pacific States Steel Co., Niles, Calif.; Phoenix Iron Co., Phoenixville, Pa.; Wickwire Brothers, Cortland, N. Y.; Wickwire Spencer Steel Co., Buffalo, and Worth Steel Co., Claymont, Del.

Summarizing the steps that should be taken, Murray said:

1. The federal government has already invested over sixty million dollars in five DPC blast furnaces all of which are scheduled to be shut down. These furnaces have an annual pig iron capacity of 2,115,000 net tons.

2. The federal government should sell pig iron to the small semi-integrated steel producers at below OPA ceiling prices, but not below cost of production, so that they can continue in business.

3. The federal government should sell returning battlefield scrap iron and steel below OPA ceiling prices to those small semi-integrated producers who, after receiving pig iron at below OPA ceilings, are still non-competitive with the huge steel corporations.

Proposes Creation of Commission

Murray proposed creation of a Small Steel Commission to administer the plan, consisting of three persons, one each from the federal government, the steel industry and the United Steelworkers.

"Of the 20 small steel producers confronted with disaster," he said, "one is on the verge of suspending steel producing operations. Another is operating at only 40 per cent of capacity, and several others are confronted with having to abandon operations before the war is won.

"Few, if any, are operating at capacity. Together, these 20 companies produce 5,678,000 tons of steel ingots a year."

In addition to the 20 companies specifically studied, Murray said there are 10 other small semi-integrated steel producers with 13 plants "that may also be confronted with disaster and bankruptcy." These 10 small producers have a combined steel producing capacity of 842,-000 net tons of ingots a year and employ 9000 employes.

"Whether any of these small producers should be permitted to purchase pig iron and battlefield scrap at below OPA ceiling prices should be determined by the Small Steel Commission," he suggested.

Many of these small firms Murray pointed out have price relief from OPA —averaging around $2 a ton—paid for, in the main, by the government through Lend-Lease and war contractors who have had to purchase the products of these firms at above OPA ceiling prices, he said.

"These conditions, beginning in December 1943, ceased to prevail," Mr. Murray told the WPB. "The acute shortage of all steel products came to an end. As a consequence, the steel consumers who had been paying above OPA ceiling prices to these semi-integrated producers were no longer compelled to do so by economic circumstances.

Consumers turned to the larger steel corporations who can sell for ceiling prices. Even the Treasury Department which had bought considerable Lend-Lease steel from these small producers are now buying from large steel corporations, he said.

Mr. Murray said workers in these 20 companies have been giving their companies an annual wage subsidy of $4,-

348,000—the difference between their straight-time hourly earnings of 94 cents as compared with straight-time hourly earnings in entire steel industry of $1.02.

"It has been only by the most intensive effort that these small steel producers have been able to keep sufficient manpower in their plants," he said, due to the difference in wage rates. "These workers are no longer able, due to the rising living costs, to continue the subsidy they are now giving their employers."

The five DPC blast furnaces which Murray says are due to shut down as they are completed and the DPC agent are:

Republic Steel Corp., at South Chicago, Ill.; Inland Steel Co. at Indiana Harbor, Ind.; Pittsburgh Steel Co. at Monessen, Pa.; Lone Star Steel Co. at Daingerfield, Tex.; and U. S. Steel Corp. at Geneva, Utah.

At the War Production Board last week it was said that two DPC stacks have been completed and are in operation at Geneva, Utah; one stack is being completed at Daingerfield, Tex., but a market for the pig iron has not been found; one stack at Monessen, Pa., is almost completed but further work on it has been revoked; one stack at Indiana Harbor is completed and operating and a second stack at this point is almost completed but work on it has been revoked; one stack at South Chicago completed but is not in operation.

Reaction in steel industry and War Production Board circles to Murray's plan was not immediately clear. In an open letter to the press, Edwin C. Barringer, president, Institute of Scrap Iron and Steel, charged that the scrap supply situation had been distorted by Murray in presenting his plan.

Meanwhile, there was uncertainty as to how the plan would be accepted in other quarters since no expression was forthcoming from WPB steel officials or even from the semi-integrated steel producers whom Murray seeks to help. In WPB quarters, however, it was indicated that the feeling is the plan is decidedly impractical and that there are many obstacles to its being put into effect. At least one semi-integrated producer is understood to have said it was not interested in the plan in any way.

Restrictions on Great Lakes Coal Shipments Suspended

Office of Defense Transportation has suspended until May 15 all restrictions on coal movements on the Great Lakes. This action was taken to permit the unrestricted movement of coal until the iron ore traffic reaches its full stride for the 1944 season.

ODT officials said that the relatively mild winter on the lakes this season should make it possible for an early opening of navigation.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies	Number of weeks in mo
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	
Based on reports by companies which in 1942 made 88.3% of the open hearth, 100% of the bessemer and 87.6% of the electric ingot and steel for castings production										
1944										
Jan.	6,776,733	97.3	439,424	85.4	379,045	83.6	7,595,202	95.7	1,714,493	4.43
Feb.	6,408,879	98.4	409,786	85.2	369,817	87.3	7,188,482	96.9	1,736,348	4.14
1943										
Jan.	6,576,524	97.8	478,058	85.9	369,395	95.4	7,423,977	96.8	1,675,841	4.43
Feb.	6,031,363	99.3	447,843	89.1	344,532	98.6	6,823,738	98.5	1,705,934	4.00
March	6,787,630	100.9	503,673	90.5	381,219	98.5	7,672,522	100.0	1,731,946	4.43
1st qtr.	19,395,517	99.3	1,429,574	88.4	1,095,146	97.5	21,920,237	98.4	1,704,529	12.86
April	6,510,563	99.9	481,810	89.4	382,532	102.1	7,374,905	99.3	1,719,092	4.29
May	6,669,436	99.1	483,024	86.8	398,057	102.9	7,550,517	98.4	1,704,406	4.43
June	6,202,640	95.2	453,599	84.1	384,645	102.6	7,040,884	94.8	1,641,232	4.29
2nd qtr.	19,382,639	98.1	1,418,433	86.7	1,165,234	102.5	21,966,306	97.5	1,688,417	13.01
1st hlf.	38,778,156	98.7	2,848,007	87.6	2,260,380	100.0	43,886,543	98.0	1,696,426	25.87
July	6,556,531	96.8	466,288	90.6	393,342	94.0	7,416,161	96.3	1,677,864	4.42
Aug.	6,699,850	98.7	484,957	94.0	407,224	97.1	7,592,031	98.3	1,713,777	4.43
Sept.	6,646,702	101.4	480,635	96.4	391,241	96.6	7,518,578	100.8	1,756,677	4.28
3rd qtr.	19,903,083	99.0	1,431,880	93.6	1,191,807	95.9	22,526,770	98.4	1,715,672	13.13
9 mos.	58,681,239	98.8	4,279,887	89.5	3,452,187	98.5	66,413,313	98.1	1,702,905	39.00
Oct.	6,891,753	101.6	513,521	99.5	413,787	98.7	7,819,061	101.3	1,765,025	4.43
Nov.	6,542,942	99.6	440,941	88.2	390,564	96.2	7,374,447	98.6	1,718,985	4.29
Dec.	6,509,923	96.2	390,930	75.9	364,924	87.2	7,265,777	94.3	1,643,841	4.42
4th qtr.	19,944,618	99.1	1,345,392	87.9	1,169,275	94.0	22,459,285	98.1	1,709,230	13.14
2nd hlf.	39,847,701	99.0	2,777,272	90.8	2,361,082	94.9	44,986,055	98.3	1,712,450	26.27
Total	78,625,857	98.9	5,625,279	89.1	4,621,462	97.4	88,872,598	98.1	1,704,499	52.14

The percentages of capacity operated in first six months of 1943 are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,150,880 net tons, bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, bessemer 6,074,000 net tons, electric 4,935,960 net tons. Data from American Iron and Steel Institute.

Percentages of capacity operated in 1944 are calculated on weekly capacities of 1,572,755 net tons open-hearth, 116,182 tons bessemer and 102,350 tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944, as follows: Open-hearth 82,223,610 net tons, bessemer 6,074,000 tons, electric 5,350,880 tons.

February Ingots Set Record for Short Month

Tops prior high made in 1943. Industry operated at higher rate than in January, exceeding average weekly output

PRODUCTION of steel ingots and steel for castings was highest for any February on record, totaling 7,188,482 net tons, according to the American Iron and Steel Institute. The best prior record for the month was 6,823,738 tons in February, 1943.

Allowing for the shorter month, production in February represented a higher rate of activity than in January. The average production per week in February was 1,736,348 tons, against 1,714,493 tons in January. Peak weekly production was in October, 1943, when 1,765,025 tons were made. In February, 1943, weekly production averaged 1,705,934 tons.

During February the steel industry operated at an average of 96.9 per cent of capacity. In January production of 7,595,202 tons represented 95.7 per cent of capacity. In February, 1943, operations averaged 98.5 per cent of capacity.

Republic Operates 103.5% Of Capacity in February

Operating at 103.5 per cent of capacity for February and 102.9 per cent of capacity for the year to date, Republic Steel Corp., Cleveland, in two months of 1944 produced a total of 1,427,020 tons of steel ingots, compared with a previous high of 1,348,056 produced in the same period last year.

The Warren, O., blast furnace exceeded its all-time monthly record with a production of 42,414 tons of pig iron, exceeding the December total by 112 tons.

Weirton Steel Sets Average Daily Production Record

All time plant records for average daily production of finished steel for shipment, strip mill production and blooming mill production, were established in February by the Weirton Steel Co., Weirton, W. Va.

The new daily average record for production of finished material of 5196 tons compares with the previous record of 5103 tons. Strip steel was produced at the rate of 4116 tons per day in February against a previous record of 4023 tons. Average daily blooming mill production was 4859 tons, compared with a previous record of 4715 tons.

Sustained Operations Indicated

Producers' backlogs mount as orders for new munitions programs are placed. Truman committee finds war contractors' orders equal 12 months' production

PROBE SHIP MISHAPS: Meeting in New York to investigate Liberty ship mishaps, members of the Truman committee are shown during a session in federal court. Left to right, around the table, are: John Lyle Wilson, assistant chief surveyor of the American Bureau of Shipping, who testified before the committee; H. G. Robinson, investigator; Sen. Harry S. Truman, Missouri; Rudolph Halley, assistant counsel; Sen. Harley M. Kilgore, West Virginia; Sen. M. C. Wallgren, Washington. NEA photo

MAXIMUM steel production, at least through the first half of this year, appears assured by the well-filled order books of producers, who now expect first half output to exceed 45,000,000 tons.

The decline in backlogs, caused by cutbacks and other changes in war contracts around the end of the year, has been reversed and bookings for most products extend well into the third quarter.

While shifts in the munitions program at various times have caused concern over continued high demand for steel, new programs have appeared to replace those cut back. A new ordnance steel packaging program recently launched will require more steel of the particular gage involved than was used by the automotive industry in its peak year. The landing barge program will continue to expand through the first half and additional plate producers have been enlisted to supply light armor plate for this program. The Navy budget for 1945 recently submitted to Congress by the President calls for more than three billion dollars than did the 1944 budget.

Any of these programs may be subjected to sharp cutbacks in the event of unexpected military successes. If, however, reconversion to production of civilian products is prompt, as was recommended by the Truman committee, accumulated demand for such products may sustain steel operations for a considerable period.

The Truman committee, in reporting on the progress of the war production effort, estimated that war contractors have an overall backlog of 12 months' production. The 71 largest corporations from which it received reports have backlogs equal to 14 months' production, medium size companies have a 12-month backlog, and the smallest contractors average five months.

However, it pointed out that owing to the advanced stage of the production program, cutbacks or cancellations of existing contracts may within a few months be expected to exceed in volume the new contracts awarded. The committee urged that contractors be informed by the procurement agencies as soon as possible when it is likely their contract will be terminated so that they can prepare for the return to civilian goods manufacture.

The committee argued for the syphoning as much as possible materials and manufacturing capacity into the civilian economy. Curtailment of the civilian production, the members held, constitutes a "threat of inflation." The more goods available to meet pentup demands the less will be the likelihood of consumers bidding up the prices of scarce commodities.

Cites Adequacy of Supplies

"If cutbacks and cancellations are carried far beyond the point presently expected, and if and when Germany falls, we could provide materials for a very substantial war production program and still have a supply for a modest but important civilian program."

The Truman report took sharp issue with the theory, emanating largely from the War Department, that idle plants and labor are a good thing because when plants are held in a stand-by capacity their labor naturally drifts to where it is more urgently needed. Many fallacies in this theory were pointed out, as follows:

"First, many women and older men who were not employed before the war would be lost to the labor force because they would be forced to stop work and would not be willing, or in many cases able, to move to areas where additional manpower was needed for war production.

"Second, many workers, even in areas of manpower shortage, would quit their present employment because inability to obtain civilian goods destroys a large part of their incentive to work. This tendency to quit employment in war industries is already one of the most important single factors in the manpower situation. If industry were permitted to employ workers in areas where there are no manpower shortages to make civilian products from surplus materials, the availability of such products for purchase by war workers would tend to reduce the rate for war workers in areas of manpower shortage.

"Third, we must understand that we are dealing with the entire United States and that the sudden ending of employment in one area does not mean that those who are thereby deprived of the means of livelihood can or will be transferred instantly to an area where employment and shelter will be available to them. The country is too vast, our economy is too complex, and the knowledge by workers of conditions in other areas too fragmentary to support any such expectation.

"The futility of strictly withholding additional contracts from small plants in tight labor areas is evidenced by the fact that even on the West Coast, where large labor shortages exist, pockets of unemployed workers are reported, and it has been found difficult, if not impossible, to induce them to shift to the large plants needing workers even when they are capable of undertaking the work proposed.

"Moreover, it is essential for the maintenance of our basic economy that small industries shall not be shorn of workers to supply the needs of large plants. The small firms cannot remain idle for long without serious financial embarrassment. If they are sucked dry of workers they will probably disappear, to the permanent injury of the economy."

Shipbuilding Gains as Steel Consumer; Further Gains Probable

SHIFTS in the distribution of finished steel to consuming industries during the past four years are illustrated in the table below. Prodigy of the war has been the shipbuiding industry whose consumption increased from 940,000 tons in 1940 to more than 11,000,000 tons in 1943. The Navy budget for fiscal year 1945 calls for more than three billion dollars more than in 1944, and, with a well-sustained merchant ship program, indicates that shipbuilding will remain the leading steel consumer.

At the other end of the picture is the automotive industry (which now is combined with the aircraft industry) which consumed 7,233,000 tons in 1940, and only 2,486,000 tons in 1943.

"Miscellaneous shipments and exports", which include products going into war uses such as ordnance, projectiles, tanks and exports to allied and friendly nations, increased from 10,234,000 tons in 1940 to 14,158,000 tons in 1943.

Figures below are from the American Iron and Steel Institute.

Net Tons	1943	1942	1941	1940
1. Steel Converting and Processing Industries				
(a) Wire drawers and wire product mfrs.	695,628	631,288	535,741	503,694
(b) Bolt, nut, and rivet manufacturers	1,096,801	1,047,417	1,160,767	707,958
(c) Forging manufacturers		1,162,420	1,144,442	574,478
(1) Automotive and Aircraft	605,588			
(2) All other	900,454			
(d) All other steel plants and foundries	1,812,209	1,451,838	1,956,853	1,142,712
Total	5,110,680	4,292,463	4,797,803	2,928,842
2. Jobbers, Dealers and Distributors				
(a) Oil and natural gas industry	358,166	284,724	1,018,371	653,936
(b) All other	6,451,372	5,677,344	8,181,440	6,032,598
Total	6,809,538	5,962,068	9,199,811	6,686,534
3. Construction Industry				
(a) Public (Municipal, State, National)	84,020	245,371	518,555	
(b) Highways	135,629	294,285	708,613	
(c) Railways	71,717	76,233	102,294	
(d) Automotive and Aircraft	215,577	657,644	406,463	
(e) Utilities	223,465	423,475	515,003	
(f) Bldg. trim, accessories and builders' hdwe.	297,689	403,838	1,020,109	
(g) All other	3,533,223	6,559,392	4,856,652	
Total	4,561,320	8,660,238	8,127,889	4,967,984
4. Shipbuilding Industry	11,432,813	9,440,182	2,733,413	940,124
5. Pressing, Forming and Stamping Industry				
(a) Metal furniture and office equipment	128,001	305,488	676,944	470,373
(b) Hardware and household equipment	294,726	457,207	1,746,810	949,855
(c) Automotive	1,222,539			
(d) All other	838,857	1,954,133	3,897,782	739,487
Total	2,484,123	2,716,828	6,321,536	2,159,715
6. Container Industry				
(a) Oil and natural gas industry	501,116	497,334	437,367	
(b) All other	3,072,460	3,168,354	4,052,043	
Total	3,573,576	3,665,688	4,489,410	2,985,338
7. Agricultural, Incl. Impl. & Equip. Mfrs.	713,023	570,423	1,153,678	919,502
8. Machinery and Tools				
(a) Machinery and tools, not incl. elect. equip.	1,742,802	1,623,194	1,569,712	1,108,463
(b) Electrical machinery and equipment	784,740	916,384	1,301,275	776,945
Total	2,527,542	2,539,578	2,870,987	1,885,408
9. Automotive and Aircraft Industry	2,485,643	2,121,866	6,392,202	7,233,345
10. Railroad Industry				
(a) All railroads	3,189,875	3,088,252	3,533,866	2,575,181
(b) Car and loco. builders and parts mfrs.	1,336,131	1,230,010	2,146,935	1,202,196
Total	4,526,006	4,318,262	5,680,801	3,777,377
11. Oil, Natural Gas and Mining Industry				
(a) Oil and natural gas, incl. pipe lines	1,173,450	1,089,927	1,735,983	990,876
(b) Mining, quarrying and lumbering	204,772	238,322	249,157	141,325
Total	1,378,222	1,328,249	1,985,140	1,132,201
12. Miscellaneous Industries and Export	14,157,967	14,848,429	8,731,492	10,234,455
13. Total (Items 1 to 12)	59,760,453	60,464,774	62,484,162	45,850,825

Shipyard Deliveries Increase

FIRST of the Maritime Commission's new Victory ships, the UNITED VICTORY was among 134 vessels of 1,372,864 deadweight tons delivered by Maritime Commission shipyards during February, 1944, the Maritime Commission announced last week.

Despite a decline in manpower and loss of construction time because of conversion, shipyards succeeded in delivering 10 more vessels and 168,134 more deadweight tons in February than in January.

Indications are that production will continue to rise during the next few months as yards get under way on the Victory ship program, and complete conversion of facilities for building various military types of ships requested by the armed services, the Maritime Commission said.

Increased emphasis on construction of long-range types of vessels was reflected in the delivery of 18 standard C-type cargo ships. Liberty ships, however, continued to be the major type, with 77 delivered. The rest of the 134 vessels delivered during February were: One Victory cargo, two concrete cargo, 15 standard tankers, two Naval tankers, two emergency tankers (converted Liberty ships), three coastal tankers, one seagoing tug and 13 special craft for the armed services.

West Coast shipyards delivered 57 vessels, including the Victory ship and 36 Libertys, of 589,344 deadweight tons or 42.9 per cent of the total production for the month. The East Coast produced 48 ships of 528,101 deadweight tons, which was 38.5 per cent of the total. Gulf Coast shipyards delivered 26 ships, of which two were concrete cargo ships, to reach 252,419 deadweight tons or 18.4 per cent of the production. Great Lakes yards delivered three special type for a deadweight tonnage of 3000 tons or 0.2 per cent of the new tonnage.

Cost-Plus Elimination Favored By Nelson with Some Exceptions

WPB chief tells Senate Military Committee flexibility is desirable especially to cover work with which there has been no previous experience. Cites reasons why procurement agencies should be permitted to buy on cost-plus basis

WASHINGTON

DONALD M. NELSON last week told the Murray subcommittee of the Senate Military Affairs Committee that he approves of the objectives of S. J. Res. 80, recently introduced by Senator Homer J. Ferguson (Rep., Mich.) to eliminate cost-plus-fixed-fee contracts excepting when they cover work with which there has been no previous experience and where costs, therefore, are still unknown." But he thought the bill should allow more flexibility than would be permitted by its present wording.

Mr. Nelson did not agree that costs necessarily are increased due to cost-plus contracting alone. There can be out-of-line costs even under fixed-price contracts. This matter of ascertaining costs, he declared, is a most difficult one. Even with the help of the best cost experts in the United States he had great difficulty, for example, in determining costs of producing guns.

"We have analyzed about 10,000,000 cost items under prime and subcontracts," he said, "and the cost of about 46 per cent of these items has come down to about half the original cost. One of the big troubles at the start was the lack of supervision. The companies in the aircraft industry were small and were forced to multiply their capacity many times. On top of that, security reasons compelled us to locate new plants at inland points—and that resulted in a further dilution of the small amount of supervisory ability available. Each day we are getting better supervision all through the war production program. As we get the know-how and encourage competition costs come down rapidly."

There are a number of reasons why the procurement agencies should be permitted to continue to buy on a cost-plus-fixed-fee basis, said Mr. Nelson.

"Take airplanes," he said. "Many planes are turned out without battle experience. As a result of lessons learned in battle, many modifications have to be made in the planes, many changes. If we had to stop and figure out the cost of each modification on a fixed-price basis there would be a great reduction in aircraft production. Many times, when you see people standing around in an airplane plant, there is a perfectly sound reason.

"Then, it would be impossible to place fixed-price contracts covering repair of aircraft, ships and other armament damaged in battle. We have to start repairing a damaged plane before it is unloaded from the ship. We cannot stop to estimate costs; it is essential that the plane be gotten back into fighting condition as rapidly as possible and the only way to handle such business is on cost-plus-fixed-fee contracts."

It might even be desirable under certain conditions to change a fixed-price contract to cost-plus-fixed-fee. Where contracts are cut back, for instance, the smaller volume results in higher unit costs so that a price previously acceptable would not be sufficient, said Mr. Nelson.

Would Promote Efficiency

The provision of the revised Contracts Renegotiation Law under which the incentive to produce efficiently is to be rewarded is a good one, said Mr. Nelson. Previously the renegotiation principle had nullified to some extent the urge to get costs and prices down. On the other hand, said Mr. Nelson, few contractors are deliberately inefficient. There is a keen realization among them, especially in the aircraft industry, that the post-war world will be a keenly competitive one, so that they are very much aware of the need to emerge from the war in a state of efficiency.

In response to a question by Senator Ferguson, sitting with the subcommittee by invitation, Mr. Nelson said great improvement has been made in utilization of labor in the aircraft industry. "The WPB Urgency Committee, in co-operation with the War Manpower Commission," he said, "now has a pretty good understanding of how much labor is required in production of aircraft."

Frank L. Yates, assistant comptroller general, who appeared in the absence of his superior, Lindsay Warren, took substantially the same view about S. J. Res. 80 as Mr. Nelson. The law should be so written as to encourage contracting officers to place fixed-price contracts whenever it is to the advantage of the government to do so, but at the same time allow the contracting officer to award whatever type of contract he believes best. Auditing experience shows, he said, that contracting officers in many instances have been too liberal in authorizing payments on cost-plus-fixed-fee contracts. At the same time, costs in many instances are lower under such contracts than they are under fixed-price contracts.

One of the objections to cost-plus-fixed-fee contracts, said Yates, is the vast amount of work entailed in auditing settlements under such contracts. By contrast, the auditing of fixed-price contracts is simple. In all its auditing, the Government Accounting Office has found only four cases of fraud—which have been reported to the Department of Justice and the Truman committee.

Says Steel Wage Demands Attack Government Stabilization Policy

SIX-MAN panel of the War Labor Board is not the proper forum in which to decide on a change in the government's stabilization policy, John A. Stephens, vice president, United States Steel Corp., Pittsburgh, told steel labor panel last Wednesday at the opening hearing on the United Steelworkers of America's demands for wage increases.

Charging that the CIO steelworkers' request for a 17-cents an hour pay increase constitutes an attack on the stabilization policy, Mr. Stephens said, "We do not believe this is the forum in which to determine a change."

He termed the wage increase demands "extortionate" and added, "many groups and interests not here represented should be heard on that point and the ultimate decision made by representatives of all the people."

His statement was attacked by CIO President Murray as "a lot of professional bunk." Murray said he was "shocked" at the steel official's statement because union representatives had come prepared to assist in determining procedure to govern hearings on the merits of the issue.

Wednesday's meeting was to determine merely the procedure for hearing the union's demands, it was announced. However, the union's demands were conceded to go beyond the "Little Steel" formula, which was the point Mr. Stephens stressed.

Discover Rich Cobalt Ore Deposit in Oviedo, Spain

A cobalt ore deposit just discovered in the Province of Oviedo, Spain, is said to be the richest in the country, according to the Department of Commerce.

A recent analysis showed that the ore yielded 5.90 per cent cobalt but extraction has been difficult because of the presence of an arsenical composition. A method of extraction has been found and it is estimated that production may reach as high as 200 tons a month.

War Production Board Expected To Set Up New Reconversion Body

Top policy decisions to be made by Donald Nelson and executed by C. E. Wilson. German collapse will permit release of large part of nation's resources to normal production. Orderly transition to be sought

THE WAR Production Board is expected to announce within the next week a new reconversion setup. In informed quarters a Production Planning and Adjustment Committee under the direction of WPB Vice Chairman Charles E. Wilson will be established.

Top policy decisions, it is said, will be made by Donald Nelson and determinations under these decisions would be made by Wilson who would work closely with industry advisory committees in directing resumption of peacetime manufacture.

Addressing some 200 industry advisory executives last Wednesday night, Mr. Nelson said the collapse of Germany will enable the government to return a large part of the nation's resources to peacetime production, but he warned that time is still distant and that "efforts to beat the gun on the return to civilian business will be unavailing and will only slow up war production."

Nelson also cautioned against expecting over-night relaxation of controls, asserting that "a sharp and sudden return to large scale civilian production would throw the economy off balance. The public interest demands that the return be programmed to safeguard employment and living standards. From the time of the Nazi collapse to the resumption of large scale civilian production a period of months is bound to elapse. It may be as much as six or eight months. Every concern that has a readjustment problem like every worker who has an employment problem will have time to act to insure its position in peacetime industry."

The War Production Board chairman emphasized that he was advocating retention of controls only for the transitory period, stating, "I certainly would strenuously oppose any attempt to put the postwar economy in a totalitarian straitjacket."

It was learned Nelson has decided against any general regulation barring new manufacturers from the market during the reconversion period because of the volume of governmental control that would be required but that he is prepared to keep new producers out of the durable goods field as long as materials and components are critical to avoid giving new entrepreneurs an unfair advantage over established manufacturers.

The Reconversion Committee like the War Production organization, will have representatives of the armed services, the Office of Civilian Requirements, the Smaller War Plants Corp., Office of Labor Production, and the Office of Manpower Requirements. Possibly representatives also will be named from other agencies such as the War Manpower Commission and the Department of Agriculture.

Postwar Trade with Near East and Orient Studied

A special series of studies into postwar prospects for trade with the Near East and the Orient is being undertaken by the National Foreign Trade Council, New York city, with the initial project relating to commercial intercourse with China.

A special division, known as the Far East Committee of the Council, national in scope and representing every branch of foreign trade activity, has been formed.

Among companies which have already accepted membership on the Far East committee are Ingersoll-Rand, Guaranty Trust, Republic Steel, Pan American Airways, Bristol-Myers, Firestone Tire & Rubber, Goodyear Tire & Rubber, General Motors, American & Foreign Power, B. F. Goodrich, U. S. Rubber, Armco International, International General Electric, U. S. Steel, Monsanto Chemical, Sullivan Machinery, William Hunt & Co., California-Texas Oil Co., American Trust Co., Miller & Phipps Ltd., Chase National Bank, National City Bank, Textile Export Association, American Maritime Council, International Telephone & Telegraph, Shanghai Power Co., California Packing, Standard-Vacuum Oil Co., Dodge & Seymour Ltd., Norton Co., William M. Warner & Co., Frazar & Co., Westinghouse Electric and International Business Machines.

POSTWAR PREVIEWS

RECONVERSION—War Production Board will announce new reconversion setup soon. Top policy decisions will be made by Chairman Donald M. Nelson and C. E. Wilson, executive vice chairman, will direct the unit. See page 63.

FOREIGN TRADE—National Foreign Trade Council is making a series of studies into the possibilities of postwar trade with the Orient. See page 63.

CONTRACT TERMINATION—Senate committees drafting termination bill in final form. Congress hopes to pass measure before adjournment for Republican and Democratic conventions. See page 65.

AUTOMOBILES—Increasing decentralization of manufacture likely when production is resumed—now expected to be about July, 1945. See page 71.

SCRAP—Supplies of secondary materials in immediate postwar and reconversion period will be substantial, but demand will be reduced. See page 81.

UPSETTER FORGING—Progressive piercing of forging quality steels in the upsetter, aided by war conditions, comes into its own. Ability to control flow of steel and reorientation of grain for best results in six-stage punch and die operation merits greater attention now being paid to possibilities of process. See page 90.

SILVER SOLDERS—Intricate multiple parts, accurately machined components, difficult assemblies and mass production of metallic materials to be carried over to peace present great opportunity to silver solders being widely used for their joining. See page 94.

HIGH-SPEED MACHINING—Wartime developments in tool engineering, i.e., air turbines and superspeed electric motors as power units for milling cutters, foreshadow important changes in machine tool design. See page 100.

MARKETS—Postwar demand for cast iron pipe in the Pacific Northwest will be heavy; many sanitation projects scheduled. See page 168.

WINDOWS of WASHINGTON

More Trouble Brewing

EMPLOYERS are due for a lot of trouble because of the new Selective Service policy of drafting men under 26 who heretofore have been deferred because of essential occupations. Local draft boards have been instructed to act fast on the new directive and many of these men will be inducted in the next two or three weeks. Many are wanted for their training as supervisors; the Army is short of men who qualify as leaders. Investigation reveals that young men during the war have won promotions in industry in one year that in ordinary times are made in three years or more. Many youths of 22 are serving successfully as supervisors in industry. It is those men whom the Army is most anxious to get.

Seeks To Cut Accidents

As part of an overall effort to reduce the high accident frequency in the war production effort, a new pamphlet has been prepared by the National Committee for the Conservation of Manpower in War Industries. Entitled "Men, Minutes and Victory," copies may be had by addressing the Division of Labor Standards, United States Department of Labor, Washington 25, D. C.

Keynes' Views Criticized

So highly does the Chamber of Commerce of the United States regard the criticism by Dr. L. Albert Hahn of the economic principles advocated by John Maynard Keynes, British economist, that it has put it in printed form as "Bulletin No. 8—Postwar Readjustments." In 1920, antedating Keynes, Dr. Hahn published a book espousing the essential Keynes' ideas, but further experience has convinced him—that well-developed industrial civilizations are constantly short of sufficient private investment opportunities to absorb the money savings of society, and that the correctives are reduction of the interest rate to zero, high taxes on large incomes, vast governmental expenditures through borrowing and with fiat money if necessary, and by enormous public works, useful or useless—are unsound. Copies of the pamphlet may be obtained by writing to the chamber headquarters in Washington.

New Industry Possible

A new industry appears to be on the point of being created—that of producing alcohol from sawdust. Following thorough tests in a pilot plant the War Production Board has been assured that alcohol from sawdust can be made at a cost possibly as low as 20 cents a gallon, also that American wood yields about 10 per cent more output that the Germans are able to get from their wood. Each ton of sawdust, it has been found, contains half a ton of sugar; 50 to 60 gallons of alcohol can be made from a ton of sawdust. WPB now is considering a proposal to build a commercial alcohol plant near Eugene, Oreg., where 13 sawmills are located within a radius of five miles. War Food Administration has recommended 43 other locations in the West and South where such plants could be operated on almost unlimited supplies of sawdust. Estimated cost of a plant with 1,000,000 gallons annual capacity is $500,000 to $600,000. The product would be the same as grain alcohol—nonpoisonous and potable. The remaining lignin, it is believed, would be a source of chemicals; this phase of the investigation now is in process.

STEEL SURVEY

Cost sheets for the alloy steel survey by OPA are being sent to the industry. It is expected that it will take two or three weeks before these sheets are returned. They are being sent to ten or eleven mills.

OPA officials are still discussing with the industry results of the carbon steel survey. Whether results of the survey are ever made public depends entirely on whether or not OPA acts on the result of the current survey. It will probably be two or three weeks before it decides if any action is to be taken. Pending action on these studies, OPA officials will not discuss them in detail. OPA experts are having frequent meetings with the OPA General Steel Advisory Committee.

Review Patent Bills

The Patent Office is preparing, at the request of the House Patents Committee, a report of its views on nine contemplated bills which would revise the American patent system. The bills are based on last year's recommendations by the National Patent Planning Commission (STEEL, Nov. 22, 1943, p. 49).

Fears Relieved

Last year many manufacturers feared that bans on cross-hauling might destroy the value of trade-marks and brand names which had won national acceptance as a result of investment of huge amounts of money in advertising and promotion. Office of Defense Transportation passed the cross-hauling buck to the War Production Board which, in turn, was chary about taking drastic action. One of the few orders it issued governed cement distribution, cutting the country up into 73 zones. WPB now is preparing to lift the cement order, which is taken generally to mean that no further bans on cross-hauling will be placed in operation from here on.

Wide Acceptance

Taking account of the industry acceptance of radiographic and magnaflux examination of steel castings, the Office of Price Administration, in a recent amendment to RPS 41, has added allowances for the special services involved in the sale of steel castings, subject to rejection by such examinations. These examinations are used by foundries to improve or check the quality of their castings, and as specifications by purchasers. Scarcely used prior to 1940, today more than 30 foundries have installed such equipment, and in other cases, it has been found that purchasers of foundry products were utilizing magnaflux tests.

Social Security

Copies of "Social Security in America" may be obtained from the Chamber of Commerce of the United States, Washington. It is a 103-page volume containing the text of addresses at the recent National Conference on Social Security in which all phases of the subject received attention.

Sound Foundation

Testifying before the Boykin Steel Shortage Subcommittee of the House last week, Dr. R. S. Dean, United States Bureau of Mines, said there now is a sound foundation on which to establish an industry in California to produce iron, chromium, manganese alloy steels and he was inclined to believe it would meet existing competition due to savings in freight from eastern and midwestern plants.

California, he said, has good iron ore in quantity and methods have been developed for producing electrolytic manganese and chromium from West Coast ores. Both electric power and natural gas are available. He implied what he had in mind was a comparatively small plant at least at the start.

More Postwar Planners

Now in process of formation is a new postwar planning committee or division to be composed of prominent officials of the War Production Board. It will consider problems of conversion of individual manufacturers and whole industries back to peacetime production. It is expected to work closely with the numerous industry advisory committees whose recent meetings have been featured by considerable concern over reconversion from war to peace.

The Postwar Economy

Copies of a revised bibliography of books and pamphlets having to do with postwar economic problems may be obtained by writing to the Chamber of Commerce of the United States, Washington. Listed are 160 selected items.

Some Opposition to Clayton as Surplus Property Chief Develops

Considerable criticism of appointment encountered in labor and leftish circles but whether it will break into the open is uncertain. Congress seen favoring War Production Board as agency for executing reconversion policy

IN LABOR and in leftish circles there is considerable criticism of the appointment of Will L. Clayton as administrator of the Surplus War Property Board. Whether it will break into the open remains to be seen since Clayton is one man whose record appears to be unassailable. He shares the tremendous prestige of the Reconstruction Finance Corp.

On his record Clayton can be counted on to adhere to the Baruch-Hancock plan for disposition of surplus government property and he will not be swayed by political considerations.

What can be expected is indicated by Clayton's selection of competent businessmen to his staff. Assistant to the administrator is Col. Joseph P. Woodlock, released from the Army for this new assignment. In private life Colonel Woodlock directed all warehouse business of the Crucible Steel Co. of America.

Deputy administrator is G. Temple Bridgeman, prominent mining engineer before the war, identified with Guggenheim Bros., New York.

The board's secretary is John B. McNamara who enjoys a reputation for doing a topnotch personnel and organizational job for the Collector of Internal Revenue.

Clayton does not expect to make many more staff appointments as he wants a small organization. He proposes to fix broad, overall policies, and will supervise the procurement agencies through liaison men from these agencies.

Dominating congressional sentiment is that the agency that should actually execute the national policy in reconverting from war to peacetime production is the War Production Board. That is the WPB would not formulate policy but would carry out the policy as formulated by Congress and administered by the Baruch-Hancock office or any successor. General conviction is that the WPB is the only organization competent to carry out the difficult unscrambling job.

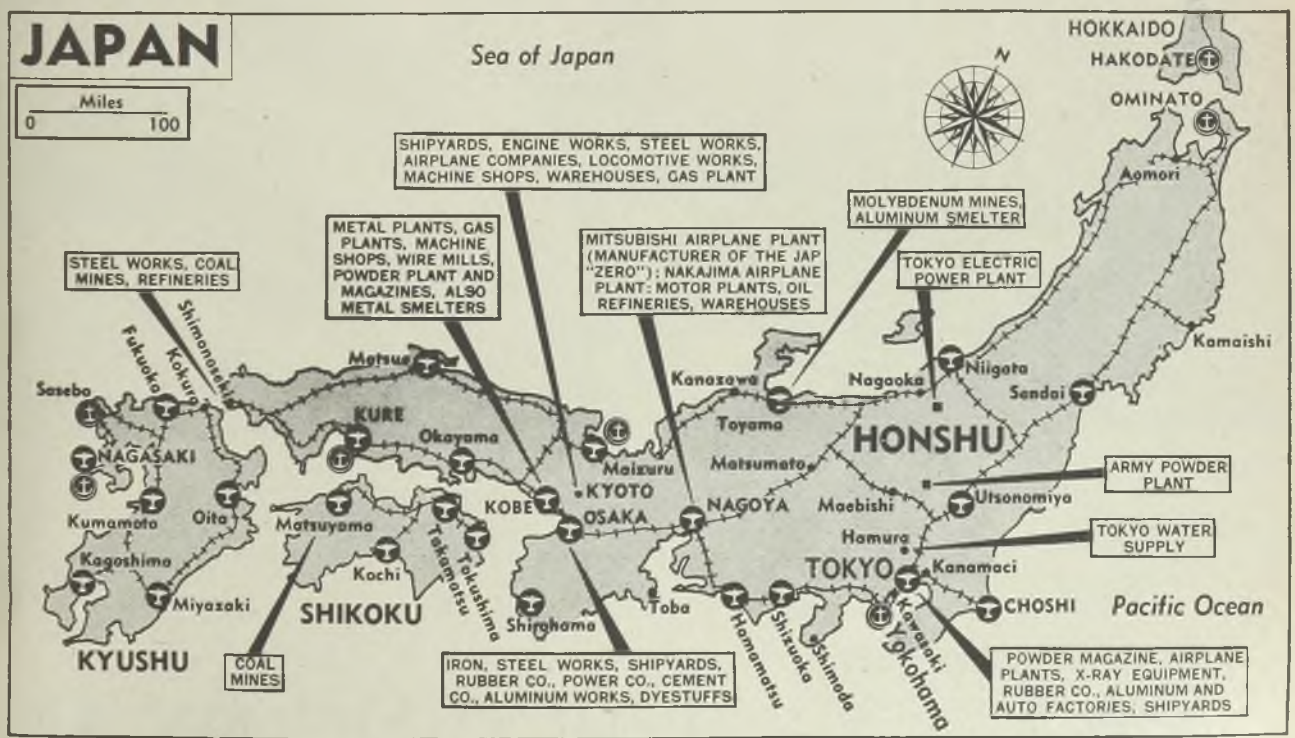
Members of the Senate Special Committee on Postwar Economic Policy and Planning and the Murray subcommittee of the Senate Military Affairs Committee are holding executive sessions to determine the final wording of the proposed senate contracts termination bill. The task is a difficult one since a number of features that at first were regarded as sound have been found on further examination to be undesirable. Intention is to write a bill that Congress can enact into law before adjournment for the Republican and Democratic conventions. In the meantime there is general congressional approval of the contract termination policies that have been formulated by the Baruch-Hancock office and which are being applied by the procurement agencies.

Congressman Says Steel Japan's Achilles Heel

Japan's Achilles heel is steel, according to Rep. Albert Thomas (Dem., Tex.), who, as ranking majority member of the House Appropriations Committee reflects current Navy thinking.

"Japan has supplies of oil, light metals, food and crude rubber but she doesn't have enough steel to win this war; she may not have enough steel to carry on much longer," says Representative Thomas.

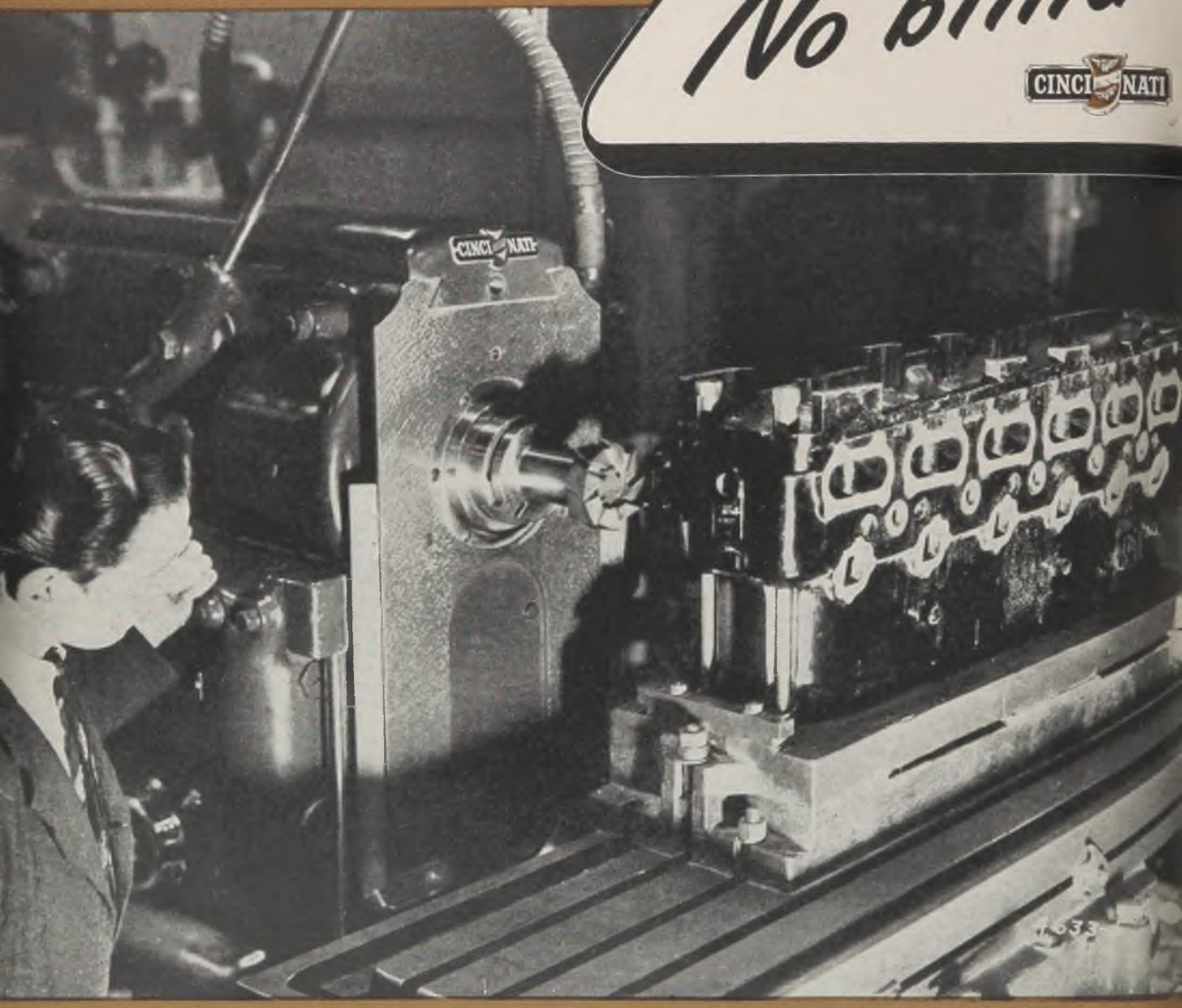
"Our steel production has gone steadily up, from about 84,000,000 tons in 1941 to perhaps as much as 97,000,000 tons in 1943. But figures furnished to me by the Navy show that Japan's production is only about 10,500,000 tons. We've got an advantage of eight or nine to one. Even in the face of our allocations of steel to the European war, our edge over Japan is enormous.



Principal bombing targets in Japan are shown on the above map of Honshu, the main island of the yellow men's empire. Shown are some of the larger steel production centers, naval and air bases and war production industries. Japan now is estimated to have a steel production capacity of 10,500,000 *tons annually. NEA map*

No blind

CINCINNATI



Somewhere in England. Milling an aircraft engine block on a CINCINNATI Dial Type Milling Machine. Notice how easily the operator controls the machine from the rear, the only place where visibility is unobstructed.

Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded February 23, 1943, and the third star September 27, 1943.

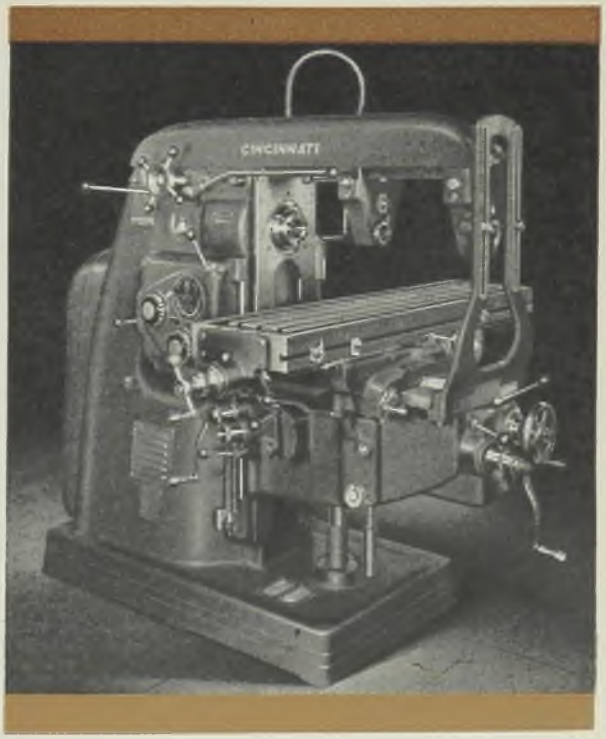
THE CINCINNATI

MILLING MACHINES

spots— when you use a CINCINNATI DIAL TYPE

Many types of work obstruct the normal view of the cutter as effectively as a stone wall. And if all the controls are at the "normal" or front operating position, the operator finds himself at a distinct disadvantage in turning out his best work. He has a ready excuse for spoiled work and broken cutters, for he can't possibly see the cutting action without leaving his control station. It's unnecessary and unfair to expect perfect work from any operator under these conditions. ¶ CINCINNATI Dial Types overcome this difficulty. Complete Dual Controls, including those for *power speed and feed changes*, are responsible for: (1) Maximum visibility. (2) Far less spoilage . . . it would be just too bad if the operator, because he couldn't see, spoiled a workpiece such as the one illustrated. (3) Greater accuracy. (4) A reduction in operator fatigue. (5) Increased production . . . actual time studies show that Dual Controls cut set-up and handling time as much as 50% on certain operations. ¶ So, one good reason why you should buy CINCINNATI Dial Type Millers for your manufacturing and general shop use is Complete Dual Controls. Another reason is Power Rapid Traverse in three directions. There are plenty of others because all features of these unusually versatile milling machines will prove beneficial. ¶ Talk over your problems with the engineers here at Milling Headquarters. Put the knowledge and experience of this group of authorities to work for you NOW!

At the right is a CINCINNATI No. 3 Plain Dial Type Milling Machine. Complete specifications are given in catalog M-970-2. Copy will be sent on request. For a brief description of the entire CINCINNATI Line, we suggest you look in Sweet's Catalog File for Mechanical Industries.



MILLING MACHINE CO. CINCINNATI, OHIO, U. S. A

BROACHING MACHINES • GRINDING MACHINES • LAPPING MACHINES

PRIORITIES–ALLOCATIONS–PRICES

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

INSTRUCTIONS

CLASS Z PRODUCTS: Interpretation No. 1 to general scheduling order M-293, which clarified application of the class Z product delivery date control procedure, has been revoked. Class Z product procedure, which was designed to assure realistic delivery statements by users of certain critical components and parts, has been eliminated from general scheduling order under the Feb. 10 amendment which became effective March 1. As a result, interpretation No. 1 to that order is no longer applicable and has been revoked.

SCHEDULING: Purchase orders which have been frozen under provisions of priorities regulation No. 18 remain frozen in the delivery sequence that is established for them, regardless of the fact that general scheduling order M-293 has been modified. The same rule applies to deliveries of Class Y products for which purchase authorization has been granted by WPB.

Persons desiring to purchase class Y products are required to obtain specific authorization from WPB to place orders for them and for producers of such products to accept such orders. A product which has been frozen under priorities regulation No. 18 remains a part of a frozen schedule despite the fact that the product itself may be removed from control of the order under which it originally became a part of the frozen delivery schedule.

Tables appended to order M-293 will remain in effect under the amended procedure until such time as they are revised to conform to the new rules. However, direction No. 2 indicates that products which have been class Z will become unclassified products for the purpose of the amended regulation.

It is also provided that where a manufacturer has in the past filed a form for class X products, he may continue to file the same form in the future for those purchase orders already reported, despite the fact that the required reporting form may be changed by order M-293.

L ORDERS

ZINC: Use of zinc in the manufacture of certain closure items has been authorized by WPB. The action is intended to promote the conservation of manpower in the production of those items. No increase in production of any closure is authorized by the amendments. Zinc now may be used in the manufacture of button backs and tack capping shells of buttons used on coated fabric garments. Provision is made also whereby steel used in the production of slide fasteners shall be made to required specifications at the steel mills instead of from additional inventories, as heretofore. Other amendments clarify the order by changing its form and clarifying provisions for the use of zinc as a protective coating on all the closure items. (L-68)

HOUSE TRAILERS: Production of 3000 house trailers during the four months ending June 30 has been authorized to provide housing for migratory workers in essential activities. Participation in the production program is limited to manufacturers who produced house trailers between Jan. 1 and Sept. 30, 1942; these manufacturers must obtain specific production authorization from WPB. Expansible mobile houses may be built only to fill specific purchase orders by specified government agencies.

Not more than 410 pounds of iron and steel may be used in a house trailer and not more than 480 pounds may be used in an expansible mobile house, exclusive of running gear, heater, stove, ice box, water bucket, plumbing equipment and movable furniture. Copper and copper-base alloys are subject to the limitations of order M-9-c and may in any case not exceed four pounds per unit in house trailers and five pounds per unit in expansible mobile houses.

Specific WPB authorization is required for the purchase of house trailers manufactured after July 15, 1943. Application is made by the seller on WPB form 3538. (L-205)

PACKAGING MACHINERY: Control over purchase and use of packaging and labeling machinery has been removed from provisions of limitation order L-83 since control over this type of equipment is now covered by a new order, L-332.

The new order covers all operations in handling this type of equipment, including the manufacture, transfer, sale or lease. Priority rating required has been set at AA-5 or better. All deliveries of new and used container machinery, including packaging and labeling, can

INDEX OF ORDER REVISIONS

Subject	Designations
Electrical Connections	U-1-i
Laboratories	P-43
Machinery, Packaging	L-83, 332
Petroleum	P-98-b
Trailers, House	L-205
Zinc	L-68
Price Regulations	
Castings, Steel	No. 41
Magnesium	No. 314

closing, can making, glass jar and bottle making and cleaning or reconditioning equipment are subject to the regulations of L-332. Monthly operations reports now must be filed by all manufacturers of this equipment to assist WPB in calculating trends on the demand for this type of equipment and the ability of producers to supply such demands without interfering with their war orders. (L-83, 332)

P ORDERS

LABORATORIES: Priority ratings assigned by order P-43 now may be used to get materials for development of products designed primarily for future civilian markets only if such activities will be carried on without diverting any manpower, technical skill, or facilities from war work. Laboratories that have been assigned serial numbers by WPB may not use their AA-1 preference rating for activities connected with future civilian markets.

Experimental models or test runs of materials may be made, but only the number or models or minimum size test needed to determine the suitability for commercial production. The items may not be distributed to promote sales or create consumer demand. If designed primarily for future civilian markets, such experimental models or materials may not be exhibited to the public.

Restrictions on the quantity of aluminum that may be obtained under the order have been removed.

Priorities assistance assigned under P-43 may be used for construction jobs costing not more than $500 without applying for permission to start construction under L-41. The laboratory's cost of labor and of equipment required for laboratory activities need not be included in computing the cost of a construction job.

Hand tools and safety equipment bought by a laboratory for resale to its employes for use in the laboratory's activities may be obtained under the order.

Allotment number V-9 now is used instead of MRO-P-43 for obtaining controlled materials. A new procedure for obtaining class A products is set up and described.

Even though machinery or facilities include new features or developments, material for their production cannot be obtained under the order if they are intended for use in the manufacture of commercial products. (P-43)

PETROLEUM: Tool joints now may be ordered from suppliers without obtaining preference ratings. The right to use an AA-3 rating has been extended to oil operators who provide maintenance and repair service to retail and customer outlets. (P-98-b, e)

U ORDERS

ELECTRICAL CONNECTIONS: Extensions of electric power to water pumps that serve to irrigate at least 5 acres of land each are now provided for. Conditions under which such electrical connections may be made are set forth in order U-1-i, as amended. A limitation of $1500 is imposed on any extension of service which may be made. Other restrictions confine new connections to consumers owning electrically driven irrigation pumps of at least 25 gallons per minute capacity and to those who can obtain such a pump without priority assistance or to whom a preference rating of AA-5 or better has been assigned for the delivery of one. (U-1-i)

PRICE REGULATIONS

STEEL CASTINGS: Ceiling prices have been established for radiographic and magnaflux examination of steel castings as follows: (1) For producing a casting which is subject to inspection, regardless of whether the producer performs the inspection or not, he may add to his maximum base prices the following: For radiographic inspection, additions of from 12½ to 30 per cent of the base price of the casting, according to examination specifications; for magnaflux inspection, from 15 to 30 per cent of the base price, according to amperage required; where castings are subject to rejection on the basis of both radiographic and magnaflux inspection, only the radiographic or the magnaflux extra may be charged, whichever is higher; (2) if the producer of the casting performs the inspection himself, in addition to the foregoing production cost extra he may add the following: For radiographic inspection with a 200,000 to 300,000-volt capacity machine, $17 per hour; 300,000 to 500,000-volt capacity machine, $21; 1,000,000 and over volt capacity machine, $25; for radium inspection, capacity of 10 to 500 milligrams, an extra of $5 per hour may be added.

Where inspection is not performed by the producer, but is let out to an independent laboratory, the producer may add to his maximum base price the actual inspection cost to him plus 10 per cent.

In no case where the producer performs the inspection, need the inspection cost extra be less than $10 on a single order.

Producers of steel castings who perform special services which are not specifically provided with ceiling by OPA, such as galvanizing, may submit proposed prices for such services to the price agency for approval. (No. 41)

MAGNESIUM: Magnesium powder, magnesium dust, and similar magnesium materials have been placed under the coverage of price regulation No. 314. Ceiling prices for these items will continue to be the highest prices individual sellers charged during March, 1942. (No. 314)

Appointments-Resignations

Anthony A. Mulac has been appointed an assistant director of the Tools Division, WPB, in charge of the Industrial Specialties branch. From Aug. 19, 1941,

to September, 1943, he devoted his time largely to cutting tool problems. Since the latter date he has been chief of the Industrial Specialties branch, which includes sections handling abrasives, chain, cranes, and hoists, metal cutting tools, foundry equipment and supplies, gages and precision measuring tools, heat treating equipment, portable electric and pneumatic tools, and other industrial supplies.

* * *

Stanley M. Cooper has been appointed an assistant director of the Tools Division, WPB, to handle problems relating to antifriction bearings. He is vice president of the Fafnir Bearing Co., New Britain, Conn.

* * *

James C. Derieux, former OPA regional administrator at Atlanta, has been appointed deputy administrator for field operations in the national headquarters of OPA in Washington. Alexander Harris, former assistant regional administrator at Atlanta succeeds Mr. Darieux as acting regional administrator.

* * *

Charles D. Wiman has been appointed director of the Farm Machinery and Equipment Division, War Production Board. He succeeds George Krieger who becomes a special assistant to Donald M. Nelson in charge of co-ordinating the requirements and supplies of farm equipment.

Mr. Wiman was president of Deere & Co. until June, 1942, when he was commissioned a colonel in the Army. He will serve in civilian status, having been placed on inactive duty by the Army, at the request of the WPB.

* * *

Brig. Gen. A. J. Browning has been appointed chairman of the Procurement Policy Board, War Production Board. He succeeds Frank M. Folsom, formerly assistant chief in charge of procurement of the Navy Department. General Browning will continue as director of purchases, War Department.

* * *

Frederick F. Stephan has been appointed assistant director of the statistics division and chief of the general statistics staff, Bureau of Planning and Statistics, WPB.

French Named to New Post In Steel Division, WPB

H. J. French has been appointed assistant director for Raw Materials and Facilities of the Steel Division, War Production Board. Mr. French has been serving as chief of the Metallurgical and Conservation branch.

He succeeds Carl W. Meyers who has resigned to return to his former position with the Republic Steel Corp., Massillon, O. Mr. Meyers came to the Steel Division on Jan. 14, 1943, and has served as a member of the Production Directive Committee, in addition to his duties as assistant director.

Procedure Revised for Obtaining Construction Authorizations

Blanket warrants now will be issued only in cases where filing of individual project applications would interfere with the war effort or cause extreme hardship to the applicant. . . Will permit builder to do miscellaneous routine construction

BLANKET authorizations, which have been used to permit owners of substantial industrial and commercial establishments to carry on miscellaneous routine construction during a fixed period, will no longer be issued generally, the War Production Board has announced in issuing direction 3 to order L-41.

Such blanket authorizations now will be issued only in cases where the filing of individual project applications would interfere with the war effort or cause extreme hardship to the applicant.

The necessity for blanket construction authorizations has been for the most part eliminated by (1) the recent transfer or jurisdiction over applications involving $25,000 or less to WPB field offices, (2) by simplification of WPB application procedures under direction No. 1 to CMP regulation No. 6, and (3) by the exception of certain types of minor capital additions from the order L-41.

In cases where blanket authorizations may be justified, application will be made as at present on WPB form 617 and filed with the WPB field office for projects less than $25,000, and filed with the War Production Board, Washington, if $25,000 or more. A person seeking blanket authorization will prepare his application in the same way he would prepare it for a single job, in accordance with instructions in WPB form 617.

Blanket authorizations will permit the builder to do miscellaneous routine construction, but no materials may be acquired or used contrary to limitations which will be made a part of the authorization. In the case of equipment items which must be listed on the application, the builder may use only those which are specifically approved.

No job for which tax amortization privileges are requested may be included in a blanket application. A separate application is to be filed for each such job at the time the request for tax amortization is made.

Restrictions Eased on Purchase of Repair Parts

Restrictions on purchase of repair parts for construction machinery and equipment have been eased by an amendment to War Production Board order L-192. Parts for current use now may be purchased by certification instead of through application for WPB authorization, with the exception of purchase orders of over $1000 for parts for shovels, cranes and draglines of less than 2½ cubic yards capacity. Such purchase orders are subject to WPB authorization.

About 85 per cent of all new construction equipment is needed to fill military requirements. This means that used equipment must take care of civilian need. It has been found advisable, therefore, to facilitate the purchase of repair parts to keep the equipment in operation.

Shovels, cranes and draglines are the most critical items covered by order L-192, which controls the production and distribution of specified types of construction equipment.

Certification of purchase orders in all other instances is in substantially the following form: "Authorized under order L-192—Current Use."

MRC Terminates Payments Of Premiums for Tungsten

Premium price payments to tungsten producers will be discontinued on April 30, War Production Board has announced. This action was taken because adequate stockpiles have been built up and current domestic production and imports now are more than sufficient to meet current consumption demands.

Those tungsten producers who qualified as "eligible" were paid $30 per unit of contained tungsten for their ore. The $6 premium was established in November, 1942, to secure needed tungsten from marginal mines.

Under the new program, domestic buying by Metals Reserve Co. will continue at $30 per unit until April 30 and thereafter at $24 per unit until June 30.

Tungsten contracts provide for a termination payment of $3 per unit for the part of the calendar year remaining after cancellation, based on the rate of production for the six months preceding date of cancellation. In accordance with this contract provision, eligible producers are being given a choice of the following three plans of termination: Termination of MRC purchase provision of his contract as of March 31 with termination payments for the remaining nine months of 1944; continued sale to MRC at $30 per unit with termination as of April 30 and termination payments for the remaining eight months of 1944; or further continued sale to MRC from April 30 to June 30 at $24 per unit with termination as of June 30 and termination payments for the remaining six months of the year.

The man behind the Future

Behind our fighting forces is the greatest production effort in the history of the world.

Behind our production effort are the men of science... engineers, designers, researchers, mass-production experts.

Behind these mechanical wizards are the engineering students... the men of tomorrow on whose shoulders rests America's industrial future... your future.

These young men... many already in uniform... are passing up their football and hockey and best girls to cram four-year engineering courses into less than two years.

They are getting behind the war effort. The things they've learned are already at work in America's planes, tanks, guns, and ships.

And behind these students... with endless patience and devotion, giving freely of their minds and hands and time... are the veteran teachers.

Also backing them are America's leading industrial organizations... taking time, though busy on war jobs, to help these youngsters foresee the use and shape of future mechanical equipment.

Hyatt, for instance, regularly provides data of helpful interest for these knowledge-hungry engineers.

Our latest contribution is the Hyatt Engineering Handbook... a quick-reference manual containing a collection of original computations and other fundamental engineering data.

Such is the American way of getting things done, of planning ahead, of imparting knowledge to builders of tomorrow, of cultivating coming men as well as those who have arrived.

We've all got a stake in these young men. The stake is our future... America's future.

Let's give them all we've got.

HYATT BEARINGS
DIVISION OF
GENERAL MOTORS
HARRISON, N. J.

Sorensen's resignation as production chief for Ford chief topic for discussion in motor city currently. Ill health given as cause but other reasons also are advanced. Postwar decentralization of automobile manufacturing activities seen

RESIGNATION of C. E. Sorensen, production chief of the Ford Motor Co. for the past 39 years, has been the chief topic for discussion in automotive circles for the past week.

While ill health was the official reason given for his breaking ties with Ford, several other versions are heard. One is to the effect the Army Air Forces had protested strenuously to Mr. Ford over Mr. Sorensen's "intrusion" into production policies at the Willow Run bomber plant in recent weeks.

There may be some elements of truth in the reports, but certainly it must be agreed that much of the credit for the production accomplishment at Willow Run, and it is no small thing, must go to Sorensen and his staff. His leaving puts another serious breach in the top administrative ranks of the company.

Sorensen joined Ford in 1905 as a pattern maker and foundry engineer, two years after the company was organized. His early activities were largely in the foundry field, which is probably one reason why Ford has always pioneered in the adaptation of new foundry techniques to automotive manufacture. In the mid-twenties, when W. S. Knudsen parted company with Ford, Sorensen took over charge of all production activity. He became almost legendary for his toughness and iron-fisted administrative policies. He is said to have originated the moving assembly line principle of production, the simple method of pulling an automobile chassis through the various assembly stages by means of a tow rope.

Ill Health Reported

A popular commentary on Sorensen in early years ran to the effect that "he was not born, he was quarried." But since 1937, toughness in plant administration has gone into eclipse, so this phase of Sorensen's activities became history. For the past year, his health has not been good, resulting from an attack of pneumonia. Much of his time was spent recuperating in Florida.

Following the death of Edsel B. Ford a year ago, Sorensen was named a vice president and was generally considered to be the top ranking production official of the company. Since that time numerous high Ford officials who had been close to Edsel have left the company. Sorensen was considered to have been in this group which was closely aligned with the son of the founder so perhaps his resignation simply carries forward the pattern set by the departure of others who were teamed with Edsel. He was one of the highest salaried executives in the motor industry, receiving better than $200,000 yearly. He is only 62, and at the time of his resignation said he would be returning to Detroit around May 1 and had no plans for the future.

Sorensen's peculiar talents at organizing production certainly could be put to good use by some other company and he doubtless will receive some lucrative offers. However, there is some doubt that he will entertain them, since in recent years he has devoted much of his time to an elaborate stock farm near Detroit, applying scientific principles to farming and stock raising. He may prefer to spend his full time at this activity,

C. E. SORENSEN

rather than plunging back into the tangles of manufacturing.

It appears likely that when production of automobiles can be resumed—and July, 1945 now is the date upon which sights are being aimed—there will be increasing decentralization of manufacture. Unconfirmed reports are heard of Fisher Body dickering for plant acreage adjacent to the Buick Melrose Park plant in Chicago, now producing Pratt & Whitney aircraft engines. The suggestion is that consideration may be given to the possibility of erecting a body plant here, with Buick building engines and chassis in conjunction with Flint plants. This would give Buick assembly plants in the East, on the West Coast, at Chicago and at Flint. At present, this thinking is largely conjecture, of course, but the trend toward further decentralization is evident.

The enormous Dodge-Chicago engine plant of Chrysler is another unit which might be adapted to automotive manufacture, unless the government decides to maintain the operation as a stand-by facility for airplane engines. As an automotive plant, it might be adapted to handling, say, a large share of Plymouth production, until the war concentrated principally in Detroit. Chrysler divisions always have localized their operations around Detroit, so decentralization may well be looked for in the light of the present trend.

Applying the same reasoning to Studebaker, some spreading out of its operations could be looked for, making use of new plants in Ft. Wayne and Chicago, now busy on aircraft engine parts manufacture. Similarly, Packard conceivably could make some automotive use of the plant it is now operating at Toledo, O.

In the past year, Chevrolet, a newcomer to the light metals industry, produced the record total of 76,000,000 pounds of aluminum aircraft forgings, ranging from a variety of engine parts to 8-foot propeller blades. At the same time, the division's single foundry devoted to production of magnesium castings, turned out 2,000,000 pounds to supply engine requirements.

Undertaking operations in light metals only 18 months ago, Chevrolet has gradually expanded its forging facilities to become the second largest producer in the country. In 1942, production totaled 8,200,000 pounds, indicating a ten-fold expansion in 1943. Three plants contributed the majority of this output. In November, a fourth plant was added. Eighty per cent of the aluminum output and all of the magnesium castings were produced in Michigan plants.

Forgings Output Diversified

Among the types of forgings produced were four types of propeller blades, several different crankcase sections, tail wheel housings, landing gear trunnions, air frame units such as braces, struts, etc., cylinder head air deflectors and pistons. One forge plant produces propeller blades at a monthly rate of more than 30,000 individual blades, while another plant has monthly output numbering some 200,000 individual pieces. Eight different types of magnesium castings are produced.

Army Air Forces have authorized announcement that Chevrolet now is engaged in retooling to produce a new model of Pratt & Whitney engine, the R2800C, considerably more powerful than the R2800 now being built at Tonawanda plants. Approximately seven months will be required to re-equip the various Chevrolet plants participating in the new program, during which time present production will taper off gradually but will not be suspended.

Annual report of Chrysler Corp. for 1943 shows net profit, after taxes, of $23,322,566 on total sales of $886,467,702, or about 2.6 per cent. Provision for federal taxes amounted to $33,750,000. Net profit recovered some from the $15,529,013 reported in 1942 but was far short of the 1941 figure of $40,114,420, although net sales in the latter year were about equal to those of 1943.

Total of $100,000,000, including $30,000,000 in payrolls, has been spent by

the Chrysler-operated Evansville, Ind., ordnance plant since its inception following Pearl Harbor. Summary of the plant's operations, now drastically cut back from original schedules, reveals a total of 2,732,393,000 cartridges of calibers .45 and .30 produced in 1943. Laid end to end, they would encircle the world two and one-half times.

Of the $100,000,000 spent since the plant was started, a total of $6,000,000 went for tools, $26,000,000 for materials, and $30,000,000 in wages and salaries for employes. During the cartridge-making period the cost, per thousand of both types of cartridges, was cut a total of $15.43.

Besides the ammunition produced, 1,500,000 wooden shipping boxes, one foot square, were manufactured, as well as 56,000,000 paper containers, each to hold 50 cartridges. The following materials and tools also were used: Steel weighing 38,000 tons, for bullet jackets and cases; 3,000 tons of copper for the .30-caliber cases; 42,000 tons of lead for both types of bullets; 2,300,000 pounds of powder and 10,000 pounds of TNT for both types; zinc plating weighing 470,000 pounds to cover a surface of 32,000,000 square feet, and 1,500,000 perishable tools.

Edgar A. Turpin, for the past two years manager of the priorities analyst section of the local WPB office, has been named agricultural specialist. He will continue to serve as regional consultant for Farm Machinery and Equipment Manufacturers, and in addition will co-ordinate all WPB activities with the Department of Agriculture, the War Food Administration and the latter's distribution agencies.

Few Automotive Contracts In Cost-Plus Category

Only one-fourth of the war contracts held by the automotive industry fall in the cost-plus-fixed-fee category, instead of the 70 per cent implied in the charge by Senator Ferguson, George Romney, managing director of the Automotive Council for War Production, said recently.

He pointed out that although the trend is decidedly away from this type of contract, such contracts continue to fill a useful purpose where exact determination of costs is impossible, such as in the manufacture of new items, or in the case of products subject to constant change and modification because of battle front experience.

Sharply disagreeing with Senator Ferguson's contention that cost-plus-fixed-fee contracts had encouraged machine tools to stand idle, Mr. Romney pointed out that for more than two years the automotive industry has listed all machine tools for which there was no work, and has made them available to other war contractors. Through the Automotive Council's Machine Tool and Equipment Service, thousands of pieces of available productive equipment changed hands. At the present time, the War Production Board maintains such a listing service and reports 100 per cent co-operation from the large automotive companies.

"It is unfortunate that Senator Ferguson does not check with sources of information at his command for accurate facts before making such statements. Casual and uninformed statements of this type are misleading and serve no useful purpose. The true facts are available to the senator at all times, if he cares to rely upon them," Mr. Romney said.

Versatility of the Jeep Engine Shown in War Use

More "Jeep" engines are now harnessed to the United Nations' war effort than any other type of motor, regardless of size or weight, it was revealed last week. The four-cylinder power plant is now being used in industrial war equipment as well as under the hoods of all quarter-ton scout cars in action with Allied forces throughout the world, according to Ward M. Canaday, president, Willys-Overland Motors.

Although unable, for security reasons, to disclose the number of these engines that have been built into Jeeps since Pearl Harbor, the auto head gave an inkling of the tremendous output by stating that more than 50,000 alone have been turned out since that date for scout car replacements or independent power jobs.

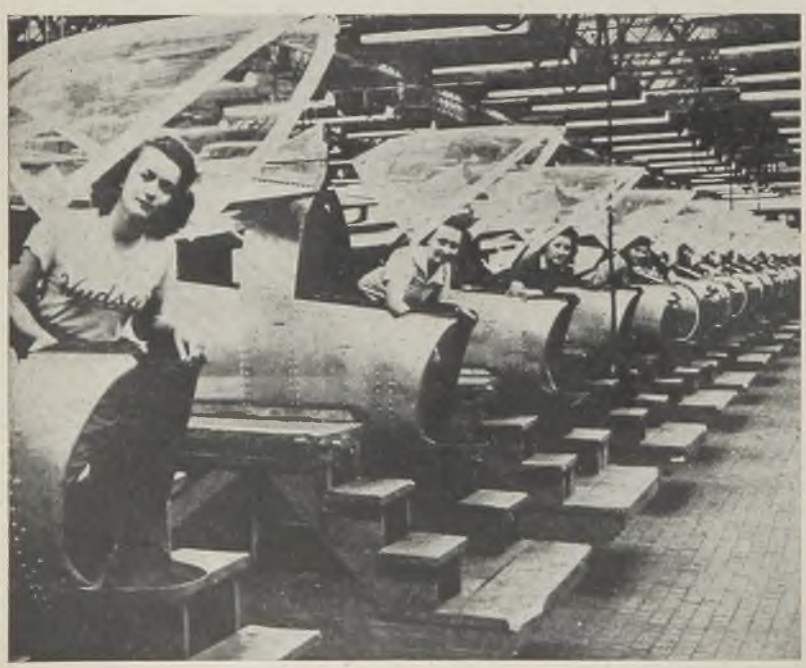
The Willys executive explained that the motor is playing an equally essential role on the production front.

Deliveries of Strategic Materials Under FEA Rise

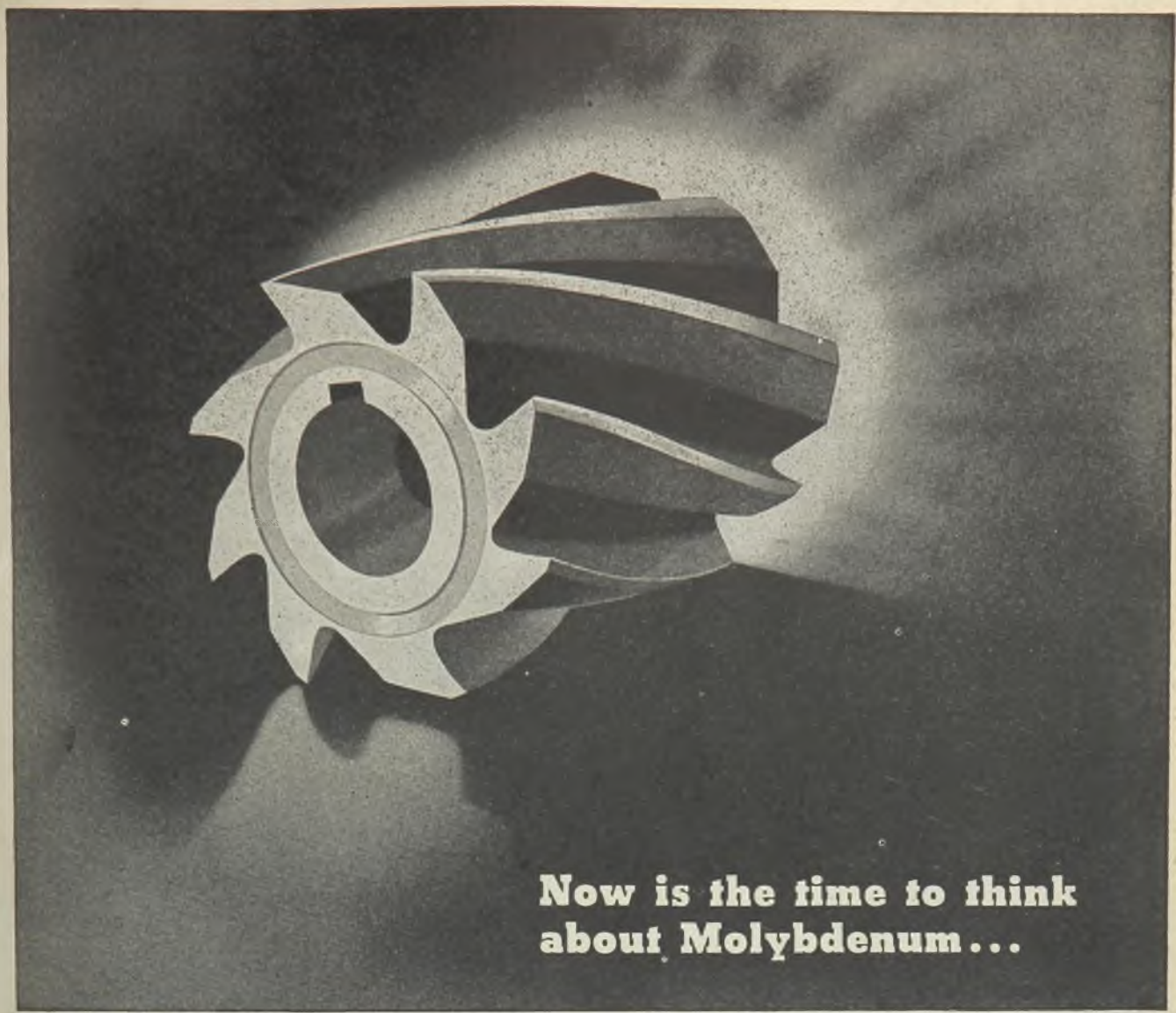
Contract deliveries of strategic commodities bought in foreign countries with government funds under the Foreign Economic Administration's public purchase program totaled $809 million in the year ended Dec. 31, 1943, reports Leo T. Crowley, administrator. Deliveries increased in the second half of the year, amounting to $431 million compared with $378 million in the first half.

Of the 1943 total, deliveries of metals and minerals accounted for $496 million, or over 61 per cent. Deliveries under public purchase contracts rose from $232 million in the first half to $264 million in the second half. These figures do not include preclusive purchases of materials in neutral countries made under FEA direction in order to keep the enemy from obtaining supplies he needs.

Measures have been taken to increase output abroad of a large number of metals and minerals on which our war production program depends. Among them are mica, copper, tin, chrome, nickel, zinc, beryl, tantalite, fluorspar, and manganese.



PACK LETHAL BLOW: Four girls standing beneath the plastic bonnets in the fuselage sections of the Martin B-26 Marauder bombers built in a Hudson plant in Detroit give some idea of the size of the mechanism that loads and fires the hard-hitting tail guns. The secret mechanism will be installed after final inspection of the space the girl workers occupy



It is generally appreciated that the item of perishable tool costs is an important factor in manufacturing accounting. The possibility of savings offered by using molybdenum high speed steels, instead of tungsten types, is therefore worth consideration.

The savings are due first to the lower cost per pound of molybdenum steels, and second to their lower density. The latter results in more tools from an equivalent poundage.

The net savings effected naturally depend on tool performance. It is an established fact that, in a substantial majority of careful comparative tests made in the past, the performance of properly heat-treated molybdenum steels equaled, where it did not better, that of tungsten steels.

A consultation with your supplier should confirm these statements, but it would be a simple matter to check them in your own plant.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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MOLY

"Feeder" plants help Boeing Aircraft solve acute manpower shortage problem. Six branch factories in five cities within easy transportation range of Seattle supplement assemblies of Flying Fortresses

ESTABLISHMENT of branch or "feeder" plants to supplement the output of principal assembly plants has been a technique developed by a number of West Coast airplane builders with notable success. When manpower problems began to be acute last May, Boeing Aircraft Co. in Seattle turned to this system and today is operating six feeder plants in five cities in the state of Washington, employing more than 4000 men and women on production of subassemblies for B-17 Flying Fortresses.

The task of establishing these outside production units was entrusted to Roger Holman, assistant plant facilities manager, and Albert Jacobson, superintendent of a new department of branch plants. The assignment involved many complex problems. A certain number of assembly jobs had to be transferred from plant No. 2 at Seattle to other localities where sources of spare manpower could be tapped. These outside locations had to be within reasonable distance of the main plant as the matter of transportation was vital. It was known how much floor space was required to accommodate each operation, but it was no easy task to find buildings of the proper size and design and to decide which assemblies could be fitted into each of them.

In addition to the problems involving physical makeup of the building, including floor space, ceiling height, column spacing, floor strength and location, there were other factors which had to be met with tact, diplomacy and patience. One of the major hurdles was the matter of obtaining leases for suitable buildings.

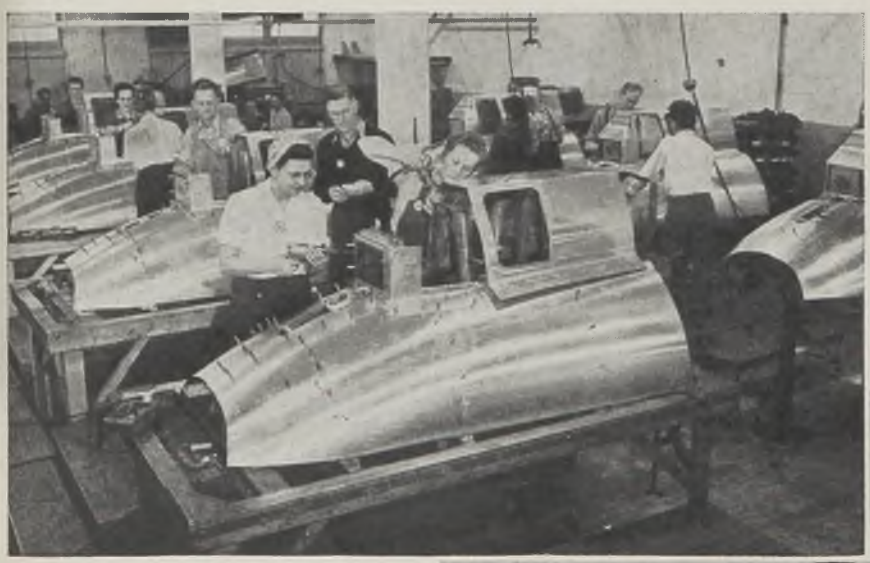
Ran Into Difficulties

Boeing's emissaries first went to Aberdeen, on Grays Harbor, 112 miles from Seattle. Immediately they ran into difficulties when they tried to take over a waterfront warehouse. The owners were willing to talk business. They wanted to sell but refused to consider a lease. Local interests were asked to assist. Two patriotic citizens agreed to buy the structure provided they were given a two-year lease. But Boeing's policy was not to lease for more than one year. Finally the local Chamber of Commerce came to the rescue when members of that body agreed to guarantee the lease for the second year.

The Aberdeen plant began hiring Aug. 15 under the direction of an assistant superintendent from the Seattle plant which also furnished a small group of supervisors. Production lines on the stinger turret, top gun emplacement, side gun panels and other assemblies were transported almost bodily from Seattle. Before workmen had completed alterations, small areas were cleared and production became a reality. A fortnight training period was completed Sept. 1 and 18 days later the first shipment of four stinger turrets went on to Seattle. Today Aderdeen is in efficient operation and is relieving the manpower strain of several plant No. 2 departments in Seattle. Other assemblies coming off the lines at Aberdeen include the tail wheel well, the main door and emergency door frames, and bomb rail supports.

Since Aberdeen started production, branch plants have been established at Tacoma, South Tacoma, Chehalis, Bellingham and Everett. These cities are all within a 100-mile radius of Seattle, Bellingham and Chehalis being the farthest, 94 and 99 miles respectively, Tacoma 31 miles and Everett 26 miles.

The second branch established was at Everett where a two-story plus basement building was leased. It formerly housed a novelty company, an auto parts firm and a longshoremen's hall. This plant swung into production Oct. 13. Before the carpenters had finished alterations, there could be no tooling. Consequently, to avoid lost time, the branch superintendent and his men got under way by making jigs of the wooden cases in which bulkheads had been carried from Seattle. In addition to bulkheads, the chief products of the Everett branch include the radio operator's sec-



Tail or "stinger" turret for the Flying Fortress is built at the Boeing branch plant at Aberdeen. Above is shown a portion of the shop where the upper half of the tail turret is built. At right is shown the largest of the six Boeing branch plants, located in Exposition Hall, Tacoma

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Extra output was being retarded because of frequent tool changes . . . rusting of machined parts . . . and a tendency of the oil toward rancidity. A Sun Cutting Oil Engineer studied the conditions and recommended a change to Sunoco Emulsifying Cutting Oil.

Tool life increased up to 20% — the equivalent of 8 extra hours in every 40-hour week — when they switched to Sunoco. Sunoco also proved to be an effective rust inhibitor, solving their rusting problem . . . and showed no tendency toward rancidity.

Production increased per machine tool unit in this plant . . . and in thousands of other plants where Sunoco has been put on the job. Its high heat-absorbing and rust-preventing characteristics, plus outstanding stability, make possible longer tool life . . . increased production . . . smoother finishes . . . closer tolerances.

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PRODUCTS HELPING INDUSTRY HELP AMERICA

How Aircraft Manufacture Has Expanded

Showing graphically the striking increases in military aircraft production, measured both in units and in total poundage of airframes and spares, the accompanying tabulation is one of the first of its kind to be released by the Aircraft Resources Control Office, Washington.

Particularly to be noted are the increases in units produced, from 19,290 in 1941 to 85,956 in 1943; total poundage of airframes and spares, from 85,700,000 in 1941 to 743,000,000 in 1943; and unit weight per complete airframe, from an average of 3945 pounds in 1941 to 8932 pounds in January, 1944.

Comparing the indicated annual rate in units for 1944—105,500—with the 1941 total of 19,290, and superimposing on this the 126 per cent increase in unit airframe weight, gives the true picture of how airframe manufacture has expanded under war pressure.

Tabulation is as follows:

	Total No. airplanes accepted	Total airframe wt. excluding spares (000,000 lbs.)	Total airframe wt. including spares (000,000 lbs.)	Average wt. per complete airframe, lbs.
1941	19,290	76.1	85.7	3,945
1942	47,873	253.1	292.6	5,287
1943	85,946	645.9	743.0	7,515
Jan.	5,013	30.3	35.9	6,044
Feb.	5,453	35.5	41.4	6,510
Mar.	6,264	41.0	47.3	6,545
Apr.	6,472	45.6	52.7	7,046
May	7,114	50.5	57.3	7,099
June	7,094	53.6	62.1	7,556
July	7,373	56.0	63.7	7,695
Aug.	7,612	59.5	69.1	7,817
Sept.	7,598	61.4	71.2	8,081
Oct.	8,362	66.7	76.1	7,977
Nov	8,789	71.2	80.5	8,101
Dec.	8,802	74.6	85.7	8,475
1944 Jan.	8,789	78.5	90.3 Est.	8,932

tion, complete with all installations, and the camera well.

The third plant to get into operation was South Tacoma where a former winery was leased and altered to meet Boeing's needs. Here trailing edges of the B-17 wing were assembled, with the framework built in jigs and the whole works shifted to dollies moving along a twin-track production line where the skin is riveted on them.

Chehalis furnished a building that had formerly been occupied by a utility company, an automobile agency and a beauty shop. Here production began before construction crews had finished knocking down the interior walls. On Nov. 15 ten workers and several supervisors arrived from the home plant and five days later, Chehalis, the smallest of the six branches, turned out the first set of wing nose sections. Other parts produced here include pilot's and co-pilot's seats and lower turret mounting assemblies.

At Bellingham, Boeing is housed in a modernistic, bank-like building, in the heart of the business section, which was formerly occupied by a department store. From two shops at the Seattle plant, machine assembly jobs were shipped, a section at a time, and set up in carefully prepared areas. Trained crews soon taught local workers and within a short time the branch was operating efficiently. This plant is producing the remarkable number of 225 separate assemblies, among them bomb racks, engine control stands, control columns and many others. Bellingham started operations Oct. 4.

The largest of the branch plants is at Tacoma which was also the last to be established. Here Exposition Hall was leased, formerly the scene of fairs, auto exhibits, dances, hockey matches and other events attracting large crowds. This ultra-modern building with a large floor area was opened for B-17 assembly early this year. Tacoma production includes the control cabin enclosure, dorsal fin, trailing edge wing ribs, top turret windows, elevator hinge and fairing, drag strut and supercharger ring.

At these branch plants a 16-hour day is the rule, divided into two shifts. As far as possible there is no Sunday work in line with Boeing policy. Following the work of trained crews from the Seattle plant, assistant superintendents from headquarters are assigned to the branches on a permanent basis. Inspection is done at each plant.

In these smaller cities, Boeing found ample spare labor to fill the needs of the branch plants. Arrangements were made for the transfer from Seattle to outlying plants of employes living closer to the branches than to Seattle. Previously many workers had driven 50 to 100 miles a day from Everett, Tacoma and other adjacent cities to the Seattle plant. This arrangement has saved a large amount of mileage. The proportion of women workers is reported about the same as at Seattle where women comprise nearly 50 per cent of the total.

The task of hauling primary parts from Seattle to the branches and returning with assemblies is a business in itself. This work is done under contract by a private firm using trucks hauling semitrailers. The job of co-ordinating transportation with the completion of assemblies at the branches and their need at the main plant requires experienced and constant supervision. All in all, Boeing has solved a problem that a year ago was a headache.

Develop New Aircraft "Injection Carburetor"

Development of a new series of aircraft "injection carburetors", which maintain the ice-free characteristics of larger types which now equip most of the nation's combat planes, has been announced by the Stromberg Carburetor division, Bendix Aviation Corp.

Suitable for small airplane engines up to 200-horsepower, the new, smaller "PS" series of injection carburetors is being produced for the Army Air Forces for use in helicopter engines. Incorporating basic design features called for in Army and Navy specifications for smaller aircraft, the carburetors will be ready for delivery to private builders.

The new carburetors are single barrel units and can be adapted for use in any one of three positions—updraft, downdraft, or horizontal. All models are equipped with a vacuum operated, single diaphragm accelerating pump and a combination manual mixture control and idle cut-off. Automatic mixture control and additional power enrichment features are optional in all models.

Army Terminates Contracts For Training Aircraft

Army Air Forces has terminated existing contracts for training planes with three primary contractors because the needs for such aircraft have been met and requested that the companies utilize their workers for increasing production of combat planes.

In terminating the contracts the Army Air Forces will have on hand a quantity of incompleted fabricated parts. These parts will be absorbed as spares in maintenance of present trainer planes.

Primary contractors affected by the order are Consolidated Vultee Corp., Nashville, Tenn., and Downey, Calif., Aeronautical Corp. of America, Middletown, O., and Fairchild Aviation Corp., Hagerstown, Md.

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MEN of INDUSTRY

FRANK J. HIRNER

RICHARD P. FIERST

R. HEATH LARRY

Frank J. Hirner, formerly located in the Chicago branch office of Harnischfeger Corp., Milwaukee, as specialist on welding air-hardening steels for armored fighting equipment, has been named manager of the St. Louis district, with offices at 4030 Chouteau avenue, St. Louis. **J. D. Glatz,** who has served with WPB for the past two years as chief of the crane and hoist section, Tools Division, has been appointed manager of the company's newly-formed Repair Sales division.

—o—

Richard P. Fierst has been elected treasurer, Superior Steel Corp., Pittsburgh. For the past 15 years Mr. Fierst has been connected with the Pittsburgh office, Bureau of Internal Revenue, United States Treasury Department.

—o—

William E. Paris has been appointed operating manager in charge of manufacturing, Willys-Overland Motors Inc., Toledo, O.

—o—

John F. Budke, who has been vice president, counsel and a director of Parkersburg Iron & Steel Co., Parkersburg, W. Va., since 1924, has been elected president of the company, succeeding the late C. F. Niemann, who died Feb. 4. **Charles F. Niemann Jr.,** a director, and former assistant to the president, has been elected executive vice president and treasurer. The families of the two newly-elected officers have been associated in the steel industry since about 1885. **W. Arch Irvin** has been elected to fill the vacancy on the board of directors c used by the elder Mr. Niemann's death.

—o—

E. Q. Smith, previously vice president, Bundy Tubing Co., Detroit, has become president of Agaloy Tubing Co., Elizabeth, N. J., formerly known as Aga Metal Tube Co. **John J. Judge,** formerly associated with Babcock & Wilcox, Barberton, O., is factory superintendent; **W. H. Lohman,** former assistant purchasing agent, Wisconsin Axle division, Timken Detroit Axle Co., at Oshkosh, Wis., is purchasing agent, and **Albert Katz,** formerly development engineer, Bundy Tubing Co., is development engineer for Agaloy Tubing Co. Other additions to the company's staff are: **William Spears,** formerly with Carnegie-Illinois Steel Corp., Pittsburgh, project engineer; **L. M. Clark,** formerly with Zenith Carburetor Co., Detroit, personnel director, and **Lester M. Elliott,** formerly with United States Steel Corp., Pittsburgh, assistant secretary and treasurer.

—o—

R. Heath Larry has been elected secretary of National Tube Co., Pittsburgh, subsidiary of United States Steel Corp., succeeding the late E. W. Criswell. Previously Mr. Larry had been assistant secretary of National Tube Co.

—o—

Charles L. Tolles has been elected president, Jewell Belt Hook Co., Naugatuck, Conn. Other newly-elected officers of the company are: **George E. Bean,** secretary and treasurer; **W. D. Calvert,** cashier, and **D. G. MacVicar,** sales manager. Mr. Tolles, who is also president of Hartford Belting Co., Hartford, Conn., has been elected a director of Jewell Belt Hook Co., and other directors elected for this year are: **George E. Bean, L. A. Dibble, Emil Mannweiler** and **E. M. Beecher.**

—o—

Lloyd C. Smith, previously sales representative in the New York metropolitan area for Nicholson File Co., Providence, R. I., has become associated with Heller Bros. Co., Newark, N. J. in a sales capacity.

—o—

C. P. Monaghan has been named manager of the news and sales training section of Edison General Electric Appliance Co. Inc., Chicago.

—o—

Lewis P. Wilson has joined the Oscar W. Hedstrom Corp., Chicago, as metallurgist. Since 1940 Mr. Wilson has held a similar post with Aluminum Co. of America, Pittsburgh.

—o—

W. A. Armstrong, factory manager of the Bristol, R. I., plant of United States Rubber Co., New York, has announced the following promotions: **W. K. Priestley** has been appointed development engineer; **L. E. Dickinson** is chief process engineer; **W. H. Dibble,** chief chemist; **J. F. S. Abbott,** chief latex engineer; **F. S. Bartlett,** assistant factory manager; **T. C. Jannsen,** production manager in charge of planning and manufacturing; **A. E. Newton,** general foreman of manufacturing departments, and **J. Waters** has been named foreman of latex towers.

—o—

C. D. Proctor has been appointed sales manager, American Type Founders Sales Corp., Elizabeth, N. J. Mr. Proctor served at one time as general promotion manager of Remington Rand Inc., Buffalo.

—o—

B. L. Weaver has been elected vice president, American Wire Fabrics Corp., New York, and will be in charge of the corporation's Mt. Wolf, Pa. plant. For many years Mr. Weaver was associated with Pennsylvania Steel Corp., which was absorbed by Bethlehem Steel Corp. in 1916, and later he engaged in industrial engineering. Since 1941 Mr. Weaver has been chief of the Steel Castings Section, WPB.

—o—

Anton Erhardt has been appointed plant superintendent, National Tool Co., Cleveland. Mr. Erhardt, who invented an improved herringbone gear-shaper cutter which is almost universally used in the metal-cutting tool industry, has been a field representative for National Tool Co. for the past four years, having started with the company's predecessor organization 36 years ago as a lathe operator and worked on every operation in the shop since that time.

—o—

Ralph O. Smith, formerly in charge of mining machinery sales, Vulcan Iron Works, Wilkes-Barre, Pa., has been appointed general sales manager.

—o—

Phil S. Hanna has been appointed assistant to the managing director, Automotive Council for War Production, Detroit. For the past two years Mr. Hanna was business editor of *The Chi-*

PAUL M. SNYDER

Who has been appointed sales manager, Climax Molybdenum Co., New York, as announced in STEEL, March 6, p. 107.

ROBERT A. CAMPBELL

H. P. MUNGER

RICHARD F. V. STANTON

Who has been appointed assistant manager, machinery sales department, Pratt & Whitney, West Hartford, Conn., reported in STEEL, March 6, p. 106.

cago Sun. **Richard Purdy** will continue to assist the managing director, **George Romney,** on general organization work, and in addition will serve as secretary of the contract termination committee. **Harlan V. Hadley** has been named acting manager of the Washington Reporting Service, and **William Norton** has been placed in charge of materials and priorities reporting activities in Washington.

—o—

Robert A. Campbell, former assistant sales manager, Ohio Seamless Tube Co., Shelby, O., has joined Talon Inc., New York, as sales manager of the Steel Tube division, Oil City, Pa.

—o—

Garratt S. Wilkin has been appointed chief of the transportation section, Steel Division, WPB, succeeding **E. Grosvenor Plowman,** newly appointed vice president in charge of traffic, United States Steel Corp., Pittsburgh.

—o—

Charles R. Hook, president, American Rolling Mill Co., Middletown, O., has been elected chairman of the board and president, Rustless Iron & Steel Corp., Baltimore, succeeding **C. E. Tuttle,** who has resigned. **Bruce Borland** has resigned as a director of Rustless.

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Cleve H. Pomeroy has been elected vice president, National Malleable & Steel Castings Co., Cleveland, and will continue as secretary and treasurer.

—o—

William A. Irvin, a director of United States Steel Corp., Pittsburgh, and a former president of that organization, has been elected a director of Willys-Overland Motors Inc., Toledo, O.

—o—

Fred R. Lynn has joined Acro Electric Co., Cleveland, as vice president in charge of manufacturing, and **C. A. Robinson,** formerly assistant vice president, has been named vice president in charge of sales.

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Nelson Bauer has been appointed assistant general sales manager, Pyrene Mfg. Co., Newark, N. J., and he has been succeeded as Newark district manager by **Raymond F. Poole. Frank R. Kachel** has been named assistant district manager in Chicago to succeed Mr. Poole, and **Truman Young,** formerly assistant advertising manager, has been appointed advertising manager of the company. Mr. Young also is advertising manager of C-O-Two Fire Equipment Co., Newark, affiliate of Pyrene Mfg. Co.

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H. P. Munger, formerly superintendent of Republic Steel Corp.'s electrotinning plant at Niles, O., has been appointed plant manager at Olean, N. Y., for two of the plants of Van der Horst Corp. of America, Cleveland.

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Joseph B. Elliott, formerly associated with RCA Mfg. Co. Inc., Camden, N. J., has been appointed general sales manager in charge of both sales and advertising for Schick Inc., Stamford, Conn.

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William D. Bliss, president of Bliss Bros. Tool Co., Milwaukee, and a member of the faculty of Marquette University almost continuously since 1914, has been appointed dean of the university's college of engineering, succeeding **Franz A. Kartak,** who is retiring because of ill health.

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William Isaacs has retired as superintendent of the masonry department, Youngstown Sheet & Tube Co., Youngstown, O., after 40 years with the company.

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J. C. Hammond has been appointed vice president in charge of sales, Franklin Transformer Mfg. Co., Minneapolis, and **R. L. Anderson** has been named chief engineer.

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A. C. Tishacek, works manager, Sivyer Steel Casting Co., Milwaukee, for the past two years, has been appointed vice president in charge of operations.

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Sidney H. Webster has been appointed Pacific Coast sales and engineering representative for the Eclipse-Pioneer division, Bendix Aviation Corp., South Bend, Ind. Mr. Webster will make his

EDWARD A. KRELLER

Who has been appointed manager of the cast to shape department, Jessop Steel Co., Washington, Pa., reported in STEEL, March 6, p. 107.

HARDY B. REISFELD

Who has joined the general machinery export department, Allis-Chalmers Mfg. Co., Milwaukee, reported in STEEL, March 6, p. 108.

N. M. BARNETT

Who has been appointed manager, Chicago branch office, Bailey Meter Co., Cleveland, as announced in STEEL, March 6, p. 107.

ARTHUR J. O'LEARY

Who has been named assistant manager of sales, Lukens Steel Co., Coatesville, Pa., noted in STEEL, March 6, p. 107.

headquarters in the Los Angeles office of the Eclipse-Pioneer division.

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Hugh Willis has been elected vice president of Sperry Gyroscope Co. Inc., Brooklyn, N. Y., and will continue as general sales manager. **Lieut. Commander F. S. Hodgman,** USNR, retired, former assistant chief engineer, has been named manager of the company's Marine division, and **E. E. DaParma,** previously manager of the Brooklyn plant, has been made manager of the Nassau plant at Great Neck, N. Y.

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George D. Sells, formerly associated with American Steel & Wire Co., Duluth, has been appointed superintendent of blast furnaces for Pittsburgh Steel Co., Pittsburgh, and **Charles D. Steele** has been named assistant superintendent of blast furnaces. Mr. Steele has been associated with the company for a number of years as blast furnace foreman.

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John L. Lowe has resigned as foundry engineer for Battelle Memorial Institute, Columbus, O., and the Gray Iron Research Institute Inc. to become assistant to the vice president in charge of operations, United States Pipe & Foundry Co., Burlington, N. J. Before becoming associated with Battelle Memorial Institute in 1940 Mr. Lowe was foundry manager of Vilter Mfg. Co., Milwaukee.

OBITUARIES . . .

William G. Kranz, 71, former vice president in charge of operations, National Malleable & Steel Castings Co., Cleveland, and a director of that company and of Sharon Steel Corp., Sharon, Pa., died March 5 in Cleveland. Mr. Kranz was one of the founders of Sharon Steel Corp. and was a member of the American Iron and Steel Institute.

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Clinton Rhoades Peterkin, 59, who early in this century organized the Wright Aeronautical Syndicate, which is considered the parent of aviation companies, and which was absorbed by Wright Aeronautical Corp., New York, died March 2 in Los Angeles.

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James L. Record, 86, chairman of the board, Minneapolis-Moline Power Implement Co., Minneapolis, died March 2. In 1902 Mr. Record founded and became president of Minneapolis Steel & Machinery Co., and in 1929 that company and two others were merged to form Minneapolis-Moline Power Implement Co.

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Jesse S. Draper, 71, one of the founders of the Hudson Motor Co., Detroit, died March 5 in Toledo, O. Mr. Draper, who had served as a Hudson official for 25 years, was Detroit representative for American Chain & Cable Co., Bridgeport, Conn., at the time of his retirement a few years ago.

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John Marcus Davis, 72, former head of the Delaware, Lackawanna & Western railroad, and prior to that president for four years of Manning, Maxwell & Moore, New York, machinery builders and distributors, died March 2 in New York. Mr. Davis was president of the Lackawanna from July, 1925 until November, 1940 when he resigned and became chairman of the board. He resigned the board chairmanship in December, 1942 and then served as chairman of the executive committee.

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Bernard L. McNulty, 59, for the past 25 years president, Marblehead Lime Co., Chicago, died March 3 in Wilmette, Ill. Mr. McNulty was a trustee of the Illinois Institute of Technology and Armour Research Foundation, Chicago.

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John F. Heine, head of the patent department, Singer Mfg. Co., Elizabeth, N. J., died recently in St. Louis.

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Albert T. Otto, 87, who retired in 1940 as head of the machinery importing and exporting firm of A. T. Otto & Sons, New York, which he had directed since 1904, died March 5 in Scarsdale, N. Y. Mr. Otto was a former member of the board of American Locomotive Co., New York.

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Francis Dayton Canfield III, 49, mechanical engineer who at one time was affiliated with Fulton Iron Works, St. Louis, and later was associated with Research Corp., Bound Brook, N. J. died in Yonkers, N. Y., March 5.

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Maurice E. Pollak, 67, president of Pollak Steel Co., Cincinnati, died March 7. As a young man Mr. Pollak entered the Pollak Steel Co., which had been founded by his father in 1865.

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Joseph E. Galvin, 44, executive vice president of the Galvin Mfg. Corp., Chicago, died March 7 in Oak Park, Ill.

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Niels A. Sorensen, 62, superintendent of the Automotive and Diesel Crankshaft division, Ohio Crankshaft Co., Cleveland, and a nationally known machine tool expert, died March 7 in Cleveland. Prior to joining Ohio Crankshaft Co. in 1937, Mr. Sorensen had been general manager of the Crankshaft division, Hupp Motor Co., Fostoria, O.

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Newton S. Taylor, 55, an executive in the Switchgear and Control division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., died recently in Wilkinsburg, Pa. In 1942 Mr. Taylor received the company's highest employe award, the Order of Merit.

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Wilfred Vaughan, treasurer, Steel Distributors Inc., Philadelphia, died recently in that city.

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Chester B. Gleason, 59, sales representative for United Screw & Bolt Corp., Cleveland division, died March 1 in Cleveland. Prior to joining United Screw & Bolt Corp. in 1932, Mr. Gleason had been assistant to the vice president, Republic Steel Corp., Cleveland.

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John Williams, 78, director of industrial relations, Stamford division, Yale & Towne Mfg. Co., Stamford, Conn., died March 5 in that city. Mr. Williams had served at one time as New York State Commissioner of Labor.

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William Edgar Hyatt, 76, former city sales manager, United States Steel Export Co., New York, a subsidiary of the United States Steel Corp., died March 5, in Plainfield, N. J. Mr. Hyatt had retired in 1932.

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Joseph C. Gehring Jr., vice president and superintendent of Liberty Brazing & Welding Co., Pittsburgh, died recently in that city.

New Dominion Wartime Labor Code Provides Compulsory Bargaining

Code worked out as joint effort of federal and provincial governments, industry and labor aims to stabilize war production. Strikes and lockouts possible only after collective bargaining efforts fail

TORONTO, ONT.

A NATIONAL code in wartime labor relations, affecting about 2,500,000 of the estimated 3,500,000 industrial workers, has been enacted by the Canadian government. The code was presented as a joint effort of the federal and provincial governments and of labor and industry to stabilize war production.

Its regulations, providing for compulsory collective bargaining and outlining conditions of fair labor practices, apply only to war industries and those occupations, transportation, coal mining, etc., which come under the Industrial Disputes Investigation act, which they now supplant.

Spokesmen for the Department of Labor said there is nothing in the national code which prohibits the provinces, through legislation, to bring all nonwar industries which are exclusively under provincial jurisdiction within the application of the code in interest of the uniformity which was sought originally by the Dominion department. Administration of the code, as it would apply to nonwar industries, would have to be by agreement between the Dominion-Provincial governments.

While the code is effective immediately, the composition of the Wartime Labor Relations Board which will administer it has not yet been announced. The board will consist of a chairman, a vice chairman and not more than eight other members. Employer and employe representation on an equitable basis is provided. Strikes or lockouts still are possible under certain conditions, but only after collective bargaining efforts have failed, and a conciliation board report has been before the labor minister for 14 days without completion of an employer-employe agreement. Unfair labor practices applying to employers prohibit attempts to dominate or interfere with trade unions and employes' organizations or to contribute financial support to them. Employers may not refuse to employ or discriminate against employes because they are members of an organization.

Neither side is obliged to accept the finding of a conciliation board, and there compulsion ceases. Full provision is made for the renegotiation of agreements,. and strikes are prohibited in a termination of an agreement.

Terms are given which are designed to eliminate jurisdictional disputes and the raiding of one union by the members of a rival union. Behind them stands a list of penalties, applicable to both sides in a labor dispute, in the event of the regulations being broken.

Penalty clauses are: 1. An employer who causes an illegal lockout—a fine of lockout. 2. An employe who strikes illegally—a fine of not more than $20 for each day on strike. 3. A union or other organization authorizing an illegal strike —fine of not more than $200 for each day of strike. 4. Persons or organizations contravening any sections of the code for which specific penalties are not provided—a fine of not more than $100, against an individual; a fine of not more than $200 against a corporation or organization. 5. Persons offering bribes to those charged with administration of the code or officials who accept a bribe—a fine of not less than $500 and not more than $5000, or imprisonment for not less than six months and not more than five years, or both fine and imprisonment.

Dominion Leading Foreign Source Of United States' Scrap Imports

CANADA made the largest contribution of scrap metals to the United States during 1943, of the 30 countries from which scrap metals have been imported into the United States, it was stated by Benjamin Schwartz, chief, Scrap Metals Section, Foreign Economic Administration, at the annual dinner of the Canadian Secondary Materials Association held in Montreal last week.

"The scrap metal trade of Canada has played an important part in fulfilling the strategic raw material requirements of the United Nations", declared Mr. Schwartz.

"With reference to the United States alone, the contribution of Canada in the form of scrap iron and steel and nonferrous scrap metals for the steel mills and metal melters and refiners of the United States, has been substantial. Although the figures may not at the present time be quoted, it is pertinent to note that Canada is at the top of the list of 30 countries from which scrap metals have been imported into the United States.

Machinery Functions Smoothly

"It is gratifying to state that the machinery established between the two governments for the clearance of exports and imports of scrap, has functioned smoothly and expeditiously.

"It is also interesting that the volume of scrap business has been distributed over a wide base of dealers, and that it was possible to facilitate private trading during the war between scrap dealers in Canada and dealers and consumers in the United States, without the necessity of direct government purchase, thus preserving the ordinary channels of commerce without interruption."

Availability of primary materials on a large and expanded scale appears to be putting a ceiling over the utilization of secondary materials, said Edwin C. Barringer, president, Institute of Scrap Iron and Steel, speaking before the association. A leveling-off rather than expansion will characterize the consumption of most secondary materials, he said.

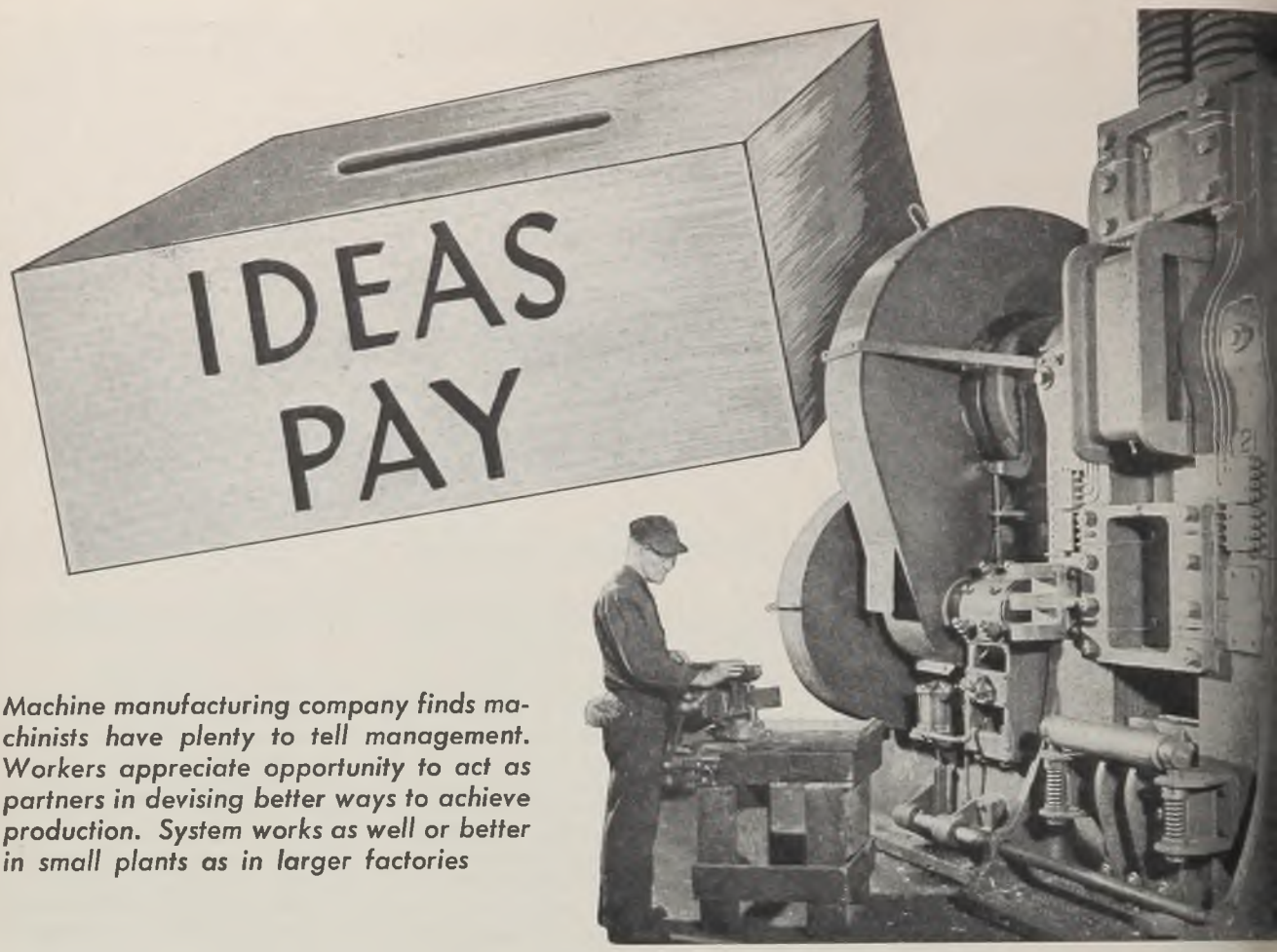
In some classifications, however, Mr. Barringer said a definite shortage is apparent, particularly the preferred base grades, and this is more likely to intensify than diminish for the remainder of the war. Typical is the heavier grade of carbon scrap for the open-hearth furnace, and to a lesser degree, some of the cast iron grades.

Mr. Barringer said that in some directions there are indications that consumers are preparing to reduce their inventories.

"The more comfortable feeling flowing from the increased supply of primary materials has emboldened some consumers to prod the market in an effort to detect soft spots in prices," he said. "This is both inconsistent and unwise. With full knowledge that the government's primary interest in price matters is to restrain inflationary forces and that government prices are ceilings, it is inconsistent for consumers to attempt to exact prices below these ceilings when an occasional surplus appears, whereas it was not possible for dealers to break through these ceilings when there were occasional shortages."

He said that during the immediate postwar adjustment and conversion period the outpouring of secondary materials may be expected to be substantial, but consumption greatly reduced and demand nil.

"After several years of government control some of the aspects of a free market and its fluctuations in price may be terrifying and the first reaction may be agitation for the establishment of a floor under prices and a continuation of controls," he said. "But secondary material dealers thrive best on a moving market and the sooner all industry is weaned from government control, the quicker the return to basic principles."



Machine manufacturing company finds machinists have plenty to tell management. Workers appreciate opportunity to act as partners in devising better ways to achieve production. System works as well or better in small plants as in larger factories

By GEORGE P. THOMAS
President
Thomas Machine Mfg. Co.
Pittsburgh

CAN a plant employing 500 or less workers make effective use of a suggestion system? According to our experience at Thomas Machine, incidentally an experience that began some years before the war, the answer is definitely affirmative. In this regard we feel we have an advantage over big corporations because our individual workers are better able to make their initiative felt and experience its results.

Any machine shop, regardless of size, by its very nature should guarantee a successful suggestion program. This work attracts the finest of American artisans, skilled and semiskilled, trained to handle highly specialized and problem jobs. They are no mere cogs in an industrial machine, but know how to exert skilled brain as well as manual power on their jobs. And their thinking doesn't stop them when they take their hands off machine levers.

Particularly since the war, these men have been taking a management viewpoint toward overall production. They know they are personally matched against enemy machinists, just as our troops are matched against enemy troops. They can out-think the enemy if management gives them a chance and does not proceed on the stultifying premise that all the brains and know-how are in the front office.

Purpose of a suggestion system is simply to give the workers a chance to tell management what they know and to exert their full initiative and ability. They know plenty; and have lots of ability they want to put to use in partnership with management. But they have to know that management takes their contributions seriously and does make use of them. This is basic to any suggestion plan; and it doesn't just happen.

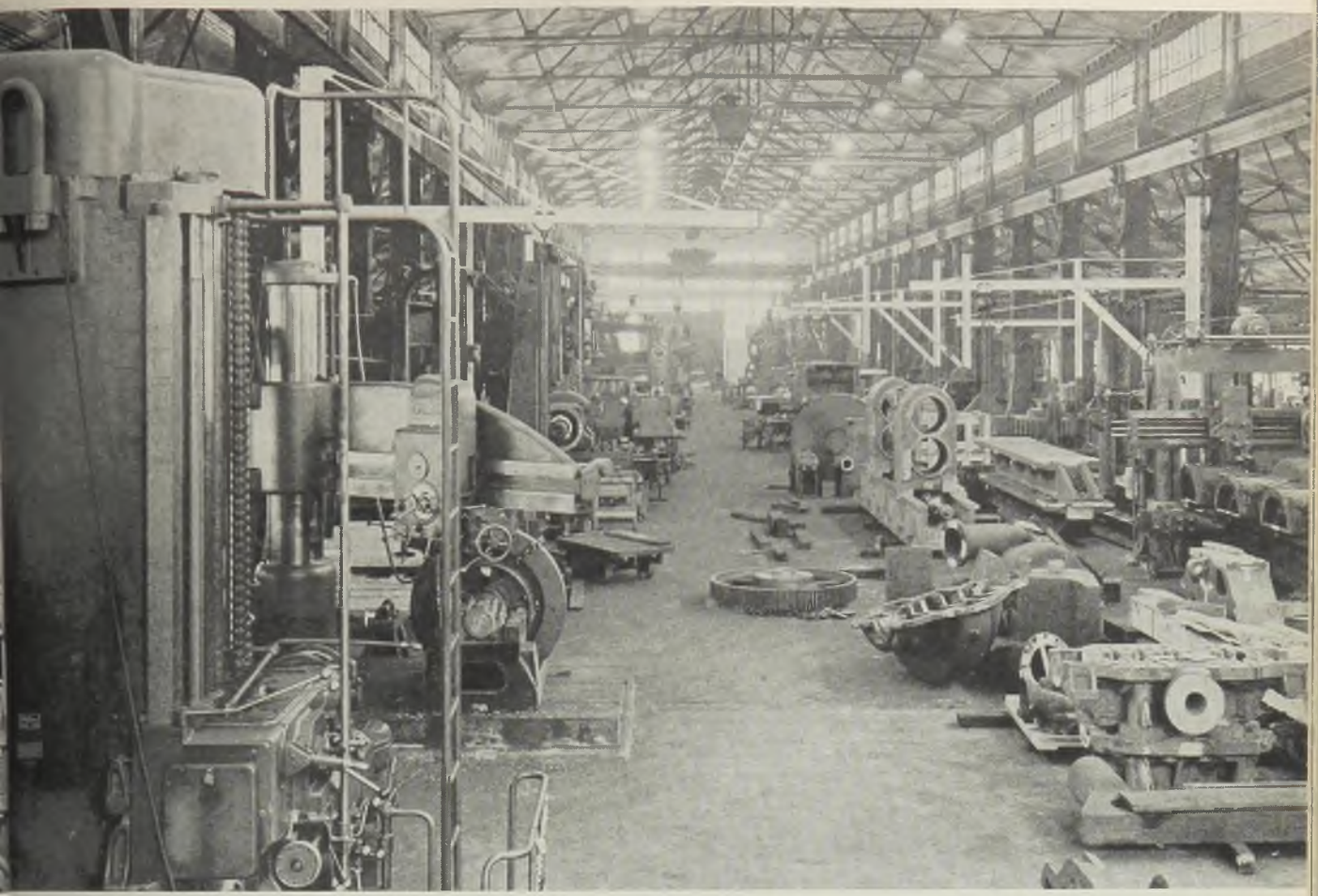
System Extremely Simple

Our system, while extremely simple, is designed to make everyone who makes a suggestion feel his effort has been seriously considered and appreciated, whether accepted or not. Suggestions are collected in boxes in the plant in the usual way. They are then considered, not by the suggestor's immediate superior, but by a committee consisting of the chief engineer, secretary, shop superintendent, general foreman, and myself. This means the suggestion cannot be sidetracked by anyone who might feel the suggestion is a reflection on something he should have done.

Immediate action is taken to accept or reject the suggestion; and a note explaining the grounds for the action is sent to the suggestor over my signature. Awards of from $3 to $50 are made for valuable suggestions. We feel it is better to make numerous smaller awards than fewer larger ones, as it arouses and mainfains more general interest. Often awards are made for good suggestions that cannot be carried out, but because of some factor beyond the knowledge of the worker. In the same way, suggestions which had already been planned by management, are sometimes rewarded if they show conscientious clear thinking.

In other words, we often make awards to show our good faith rather than only for value received. If workers were always being told that their suggestion had already been thought of by management or could not be effected because of lack of materials, etc., they might understandably become discouraged or doubt our sincerity. But when they see awards made for meritorious suggestions even when they cannot be carried out, and see other suggestions put in practice, the inspiration for other men to do likewise spreads through the shop, and the entire morale is lifted.

This type of program should be easier in the small or average size shop because of the more intimate touch that can be maintained. In fact, I have heard men connected with big corporations say that the great bulk of suggestions received



Movable fitter's bench, to take tools to the job and save the machinist going to and from distant work benches, was one suggestion adopted by Thomas Machine Mfg. Co. Above, jib cranes in main aisles were painted white, as result of a worker's suggestion. Purpose was to reduce danger of collision with traveling crane by making jib cranes more easily visible

by them were not worthwhile. They raised the question: Are suggestion programs feasible? I'm sure this could never be a question in any good American machine shop where a plan was given a reasonable trial. Certainly it is not so in ours, where 40 per cent of the suggestions received are sound and logical, and about 30 per cent are put into operation.

What are these suggestions American machinists have to make to management? In our shop we received nothing that would make headlines; it has almost all been down to earth stuff of the kind that has pushed American production so far ahead of the Axis. Most impressive to my mind are the many suggestions to eliminate waste time and motion. The American machinist is extremely alert to this management problem of streamlining production. Here are a few examples of how he talks to management about it in our plant:

"My suggestion is that several small benches about 30 inches square with vises mounted on the top be used as movable fitters' benches that can be moved near machinery being assembled on the fitter's floor. These benches would save a great deal of valuable time that is now being wasted by men going to and from distant work benches."

We should have thought of that one; but it took a machinist to tell management where we were missing out. In our shop the air power situation needed improvement. Quite a few men addressed us on the subject. Here is one proposal:

"I would like to offer a suggestion on a new style of connection for use on air lines. It is hard to describe it in writing but I have one of the connections in my tool box . . ."

This connection was adopted. The workers let us know, too, in a number of suggestions, when insufficient grinders and buffers and the poor state of the wheels was holding up production. One puts it this way:

Complains About Lost Time

"I suggest that something be done about the grinding wheel situation . . . There isn't anything in the shop that causes as much loss of time . . .In my mind, there are two things that must be done: First, install at least four grinders; second, equip all of the grinders with good wheels. Every man in the shop complains about the poor grade of wheels. I know of some machinists that must walk 200 feet each way to grind a tool . . . I have seen as many as four to five men waiting to use a grinder . . . The wheels . . . burn the tools, taking the temper out of them . . ."

Grousing of this kind is valuable to management; because undoubtedly our installation of additional grinders and new wheels speeded up our work.

Here's another who doesn't want to waste time:

"The present setup requires that I or my men walk out to the paint shed across the yard, for paint. This means that the first thing in the morning, after seeing what is to be painted . . . I'm supposed to go from one end of the plant where the brushes are kept in a closet, walk across the shop . . . across the yard . . . choose the right type and color of paint along with the brushes, pour the paint into convenient one-gallon cans . . . Actual painting is begun twenty or thirty minutes after starting time. Upon completion . . . another part needs be painted, but with a different type of paint . . . we have to return the paint we had been using and fill cans with the needed paint. It also means different brushes and that walk across the shop and yard . . . This is repeated

many times in a day's work . . ."

A partial remedy was found for this situation. The quote is included to show what is true of honest workmen as much as management—they don't like to waste time uselessly, even if they are getting paid for it.

Tool handling and distribution brings out this same trait in regard to a situation common in many shops. Here again one man is speaking for quite a few suggestors:

"Delayed deliveries of small hand tools such as twist drills, taps, wrenches and so forth have caused a shortage of these in our shop at present.

"This shortage is further emphasized by 'hoarding' workmen who, because they want these tools quickly when they need them, have adopted a practice of locking them in their tool boxes. This 'private' supply is dragging down the productivity of the entire shop because its immediate effect is increased 'hunting expeditions' by non-hoarding workmen who seek these same tools . . ."

Does that sound familiar? If so, I only wish I could provide a foolproof remedy but am afraid none exists that is not more expensive than its value. Our workers, however, have kept us alert to seeing our checking system for tools operates with considerably improved efficiency.

More tools and facilities were often requested, as:

"I suggest that the company provide a set of wrenches from 1 inch and up, for each crew of fitters so that they don't have to go borrowing or waiting on one. If at all possible, would the company get some good bottom taps, 1 inch, 1¼ inch, 1½ inch, 1¾ inch, they can be used on the headstocks of these lathes."

Yes, the workers often tell us what tools they need, and often they are right. With shifting schedules at high speed management sometimes fails to keep up with these requirements; and it certainly is not good to have skilled men idle for lack of facilities under such conditions. The suggestion system gives the worker a chance to tell us what we have overlooked; and has ranged in the past two years from cranes to babbitt hammers, hook chains, "C" clamps, hydraulic jacks, bench filing machines, block and snap gages and others. Such facilities as grinding wheels in the center of the shop for grinding all rough work such as castings, brackets, and parallel strips; installation of rip saw and band saw in a small separate building handy to the loading track; provision of a hole in the floor to handle gears for shafts, were also proposed.

Once in a while we even get what amounts to a call for help:

"In regard to 60-inch engine head stocks, the one we now have on Pond planer No. 2 is chilled and so hard that double diamond tools will not touch it. The other one we did last month was hard, but this one is bad. We sure will have a lot of trouble with it, lose a lot of time and hold up production. Go down to the planer and see for yourself."

There happened to be no way out in this case, if we intended to meet our schedules. But it certainly is an advantage to know of such situations.

Often the men do make numerous proposals of real technical value, such as one accepted for a clamping arrangement for a large boring mill, and proposed in these terms:

"I have drawn only two sketches to show to what advantage those dogs could be used, which I have spoken of once before. A job can be set up with less time and effort and would be more secure.

"Sketch No. 1. At present we use nine pipe stops and no less than three clamps to hold gear blank. My suggestion is four dogs, two clamps, and two drivers. The X's on sketch No. 1 refer to where machine No. 4 needs a few minor repairs."

Foremen also are privileged to make suggestions under our plan, simply because we find that this is appreciated by them and brings results. Naturally, foremen's suggestions are expected to be of a solid nature.

Machinists are in reality efficiency experts, for those who will listen to them. Machines are their jobs; and with some, you might say, machines are their lives. When they tell us how to get the most out of their machines, it means maximum production.

Workers in our shop have been interested in better working conditions, which management accepts today as meaning better work. One of their main concerns has been lighting, in which we

(*Please turn to Page* 166)

SUGGESTIONS TRIPLED

Impressive results have been achieved by the war workers' suggestion plan for increasing industrial production, according to figures compiled by the War Production Board, the War Manpower Commission, the Maritime Commission and the Army and Navy departments.

In the last six months the volume of usable ideas in factory suggestion boxes has tripled. A great deal of the value of the employe suggestion comes from the fact that war has diverted to factory employment thousands of workers without previous experience in things mechanical, electrical or chemical. Intelligent workers of this type, according to WPB, are not held back in their ideas for improvement by any fixed notions about "impossibility."

They Say:

"Increased individual productivity through utilization of new and more efficient methods and equipment will be the principal factor in determining our future prosperity. Unit costs of postwar products can be kept moderate if individual workers are enabled to produce more and better goods and workers can continue to enjoy the advantages of high incomes. We all want the individual worker to have a high income because he makes up so large a part of the nation's purchasing power."—**R. C. Cosgrove,** vice president and general manager, manufacturing division, Crosley Corp., Cincinnati.

* * *

"I realize that in the general discussion of what is to happen after the war there is far too much Utopia, too little realism. . . Every business unit, large or small, must study its postwar problems from the standpoint of its own individual circumstances. . . Each business must make its own contribution in its own self-interest. Each problem is necessarily different. That is the fundamental concept of free enterprise."—**Alfred P. Sloan Jr.,** chairman, General Motors Corp.

* * *

"For some time to come we in Britain will be working out a form of partnership between the state and large-scale industry. We will be experimenting with different types and degrees of state power over industry, varying all the way from full public ownership and operation to a limited degree of control of prices and practices exercised from the outside."—**Herbert Morrison,** British Home Secretary.

* * *

"By ruthlessly disposing of many types of material and equipment, government contracting authorities can greatly speed the settlement of terminated war contracts. . . Whatever agency now or eventually responsible for property disposal in termination cases must adopt a courageous scrapping program. . . Amounts realized from such sales should be used as a credit against termination claims before final settlement."—**J. Tyson Stokes,** Baldwin Locomotive Works.

George C. Gregson, manager, Hazard Wire Rope and American Cable divisions of the American Chain & Cable Co. Inc., Wilkes-Barre, Pa., accepts the Army-Navy "E" pennant from Rear Admiral Wat T. Cluverius, below, for efficiency and excellence in the production of war materials. Nearly 1000 employes of the company were awarded "E" pins. Maj. Howard P. Klair pinned the emblems on four representative employes at the recent ceremony

Maj. Gen. James L. Collins, commander of the Fifth Service Command, presents the Army-Navy "E" pennant to Franklin G. Smith, president, Osborn Mfg. Co., Cleveland, for outstanding production achievement, above

Below are some of the officials that attended the presentation of the Army-Navy "E" pennant to Willard Storage Battery Co., Cleveland. Left to right, are: B. H. Shafer, works manager; F. J. Lausche, Cleveland mayor; S. W. Rolph, president; C. E. Murray, vice president and general manager; Lieut. Col. T. H. Eickhoff, Army; Lieut. Howes, Navy; Sgt. J. J. Wisniewski; E. M. Simpson, union president; K. E. Roof, personnel manager, and R. E. Gilles, production manager

Cancel Liberty Ship Contract, Place Others

Four shipyards receive orders for 100 new cargo vessels. . . Kaiser Co. awarded contract for 29 Liberty ships

FOUR shipyards were awarded contracts recently for construction of 100 additional cargo vessels of the C1-M-AV1 type, cargo ship of about 5000 tons, and a suspended contract for 119 Liberty ships, under which three were constructed, was canceled.

The new contract for the C1-M-AV1 type increases to 200 the number of that type which are expected for delivery by the first quarter of 1945. Kaiser Co., Vancouver, Wash., will construct 60, Consolidated Steel Corp., Wilmington, Calif., 18, Pennsylvania Shipyards, Beaumont, Tex., 18, and Froemming Bros., Milwaukee, 4.

Cancellation of the suspended contract for the Liberty ships affected the Kaiser Co.'s Vancouver yard but in its place was filed an order for 27 Victory ships.

Platzer Boat Works, Houston, Tex., was awarded a contract to build nine steel tugs and Decatur Iron & Steel Co., Decatur, Ala., will build 10 steel tugs.

SWIFT WRECKING: This large coal and ore bridge at the South Chicago plant of the Interlake Iron Corp. was wrecked in a few seconds by the use of thermit. A thermit furnace was built around four of the eight supports, ignited by electricity, the temperature reached 6000 degrees in ten seconds, melting away the supports and allowing the bridge to topple. The bridge was 300 feet long, 80 feet high, 30 feet wide, and cost $400,000 when built 20 years ago. Acme photo

Paterson-Leitch Co. Marks Its Thirtieth Anniversary

Marking completion of its thirtieth anniversary in business the Paterson-Leitch Co., Cleveland, iron and steel fabricator and warehouse distributor has just brought out a 40-page illustrated catalog and stocklist, in which it details the business history of the company and lists the various services it offers and the steel products it carries.

Formed in January, 1914, the company started as a distributor of reinforcing steel for concrete construction, but gradually has expanded its warehouse service to include the carrying of stocks of hot rolled plates, shapes and bars for immediate delivery. In 1925 the company added a structural steel fabricating department and, in 1928 set up a department for handling a wide range of welding work.

Original equipment of the company consisted of one 5-horsepower electrically-driven bar shear. Equipment now includes a wide assortment of power tools and machinery with a staff of mechanics and engineers in charge of production. The company's original uncovered stock yard has been replaced with a group of modern buildings.

Officers of the company are: President, C. J. Paterson; treasurer, R. I. Leitch; vice president, W. J. Shenk; secretary, R. M. Beutel; assistant treasurer and office manager, William Burkhardt. H. L. Hohman is manager of the warehouse order department and H. C. Titterington is chief engineer of the structural department, while C. F. Greek is manager of the reinforcing bar department, and N. H. Bolz is general superintendent.

BRIEFS . . . .

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

Ingalls Iron Works Co., Pittsburgh, has constructed a door weighing 240 tons for a Navy dirigible hangar. The door, made in six sections of 40 tons each, can open or close within two and one-half minutes.

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United States Rubber Co., New York, announces development of multipore, a filter material containing as many as 6400 perforations per square inch, which is used by chemical plants, steel mills and others for a number of industrial uses.

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Reading-Pratt & Cady division, American Chain & Cable Co. Inc., Bridgeport, Conn., recently released a valve selection chart which is ideal for shop training or for a refresher on valves.

—o—

B. F. Goodrich Co., Akron, O., reports employes turned in 7790 suggestions during 1943 for speeding up war production. A total of $35,185 was paid for 2621 ideas which were used.

—o—

General Electric Co., Schenectady, N. Y., produced in 1943 electric motors and generators totaling 7,200,000 horsepower, four times the output in 1939.

—o—

Manufacturers Screw Products Co., Chicago, has established a surgical, hospitalization, life and weekly indemnity insurance plan for its employes.

—o—

Bureau of Mines, Washington, now has available for free distribution five educational sound films on the manufacturing processes used in the fabrication of aluminum and aluminum alloy products.

—o—

American Can Co., New York, is now mass producing an anti-tank grenade for the Army which weighs less than four pounds.

—o—

American Car & Foundry Co., New York, reports its St. Louis, Mo., foundry

for the second consecutive year won the Stevenson Safety Trophy in group 2.

—o—

Tomkins-Johnson Co., Jackson, Mich., announces that the Industrial Equipment Co., formerly the R. C. Neal Co., has been appointed sales representative for its products in the Buffalo area.

—o—

Aviation Corp., Toledo, O., has established its own publicity bureau to handle information and publicity covering Lycoming and Spencer divisions of Williamsport, Pa., American Propeller and Northern Aircraft Products division, Toledo, O., and Republic Aircraft Products division plants at Detroit.

—o—

Kennametal Inc., Latrobe, Pa., recently opened a branch office at 378 Fifth street, San Francisco, for the distribution and servicing of its products in northern and central California.

—o—

Welding Equipment & Supply Co., Detroit, has prepared a sound slide film program involving two separate films with accompanying recordings in collaboration with the Jam Handy organization. They cover the metallic arc welding of tools and dies.

—o—

General Motors Corp., Detroit, reports its employes received $954,744 in war bonds and stamps for more than 25,000 production suggestions submitted in 1943.

—o—

Bissett Steel Co., Cleveland, points out in a recent release that tool steel tubing has come into much wider use as a result of the pressure to reduce tooling time and speed war production.

—o—

Nicaro Nickel Co., subsidiary of Freeport Sulphur Co., New York, has begun production of nickel in plants at Oriente Province, Cuba, and at Wilmington, Del.

—o—

American Steel & Wire Co., Cleveland, reports that its employes bought $2,666,040 of war bonds in the Fourth War Loan campaign.

—o—

Andrew C. Campbell division, American Chain & Cable Co. Inc., Bridgeport, Conn., covers abrasive milling in a recently issued catalog.

—o—

Pennsylvania Salt Mfg. Co., Philadelphia, moved its New York office on Feb. 1 to 40 West Fortieth street.

—o—

Sundstrand Machine Tool Co., Rockford, Ill., held its foremen's and supervisors' dinner recently in Rockford and discussed present and postwar plans.

—o—

Roos Tool & Mfg. Co., formerly of Bloomfield, N. J., is now located in a new plant at 17-19 Grove street, Montclair, N. J.

—o—

Sylvania Electric Products Inc., Towanda, Pa., plans to build a $100,000 addition to its tungsten products plants in Towanda.

—o—

Warren City Tank & Boiler Co., Warren, O., now uses almost exclusively arc welding in the fabrication of diesel engine crankcases and marine gear cases.

—o—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces that 40 'teen age scientists, 12 of them girls, have been selected from among 15,000 entrants in the third annual nation-wide science talent search to compete in Washington for $11,000 in scholarships.

—o—

A. P. de Sanno & Son Inc., Philadelphia, has available for distribution an illustrated folder containing specific information on radiac abrasive cut-off machines and abrasive cut-off disks.

—o—

Goodyear Tire & Rubber Co., Akron, O., has developed a new type of flooring employing garnets with a fireproof synthetic resin binder to provide sure footing.

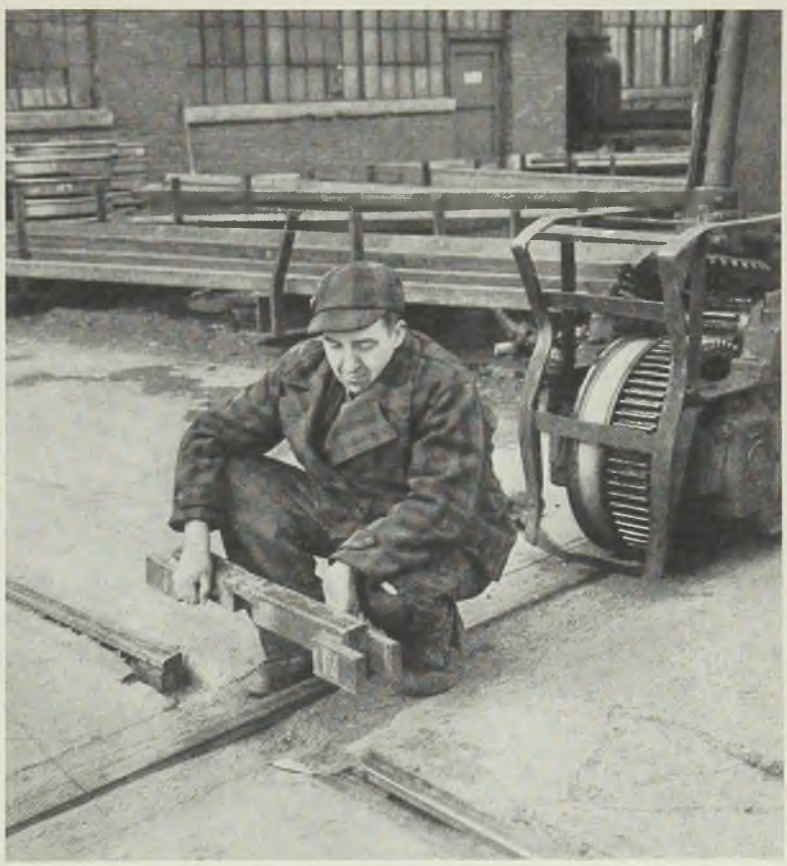
Bethlehem Tells Workers of 1943 Achievements

Company produced 380 vessels and worked on 7726 others. . . Pay 47 per cent of receipts in wages and salaries

PRODUCTION achievements, employment and earnings statistics and figures on how employes supported the war effort through bond purchases, military service and munitions output are included in Bethlehem Steel Co.'s annual report to employes.

Among production highlights, the report points out that the company built 380 fighting and cargo ships during the year, and converted, repaired or serviced 7726 others.

Steel production totaled 13,015,755 tons, and the company produced almost 2,000,000 tons of plates.



PROBLEM'S ANSWER: Portable railroad track inserts, placed in position over the gantry yard crane rail, opened an additional entrance to the Locomotive division shop at General Electric Co.'s Erie Works. Because the driving gear and wheel of the crane are practically the same diameter, a regular crossover was not satisfactory since the driving gear would hit the railroad track each time a crossing was attempted

Production Sustained At Near Record Levels

PACE of industrial activity is generally well sustained. Revision in a number of war materiel production schedules, including redesign of many items, has been largely completed permitting an increased rate of output on the new programs. However, these schedules are subject to constant revision, dictated by military needs, so that no definite production pattern on individual items for 1944 can be accurately forecast. The overall military requirements in 1944 are expected to be only slightly less than last year.

During the latest weekly period gains were recorded in bituminous coal output, engineering construction, electric power consumption and revenue freight carloadings. Declines occurred in petroleum production and business failures, while the national steel rate held unchanged.

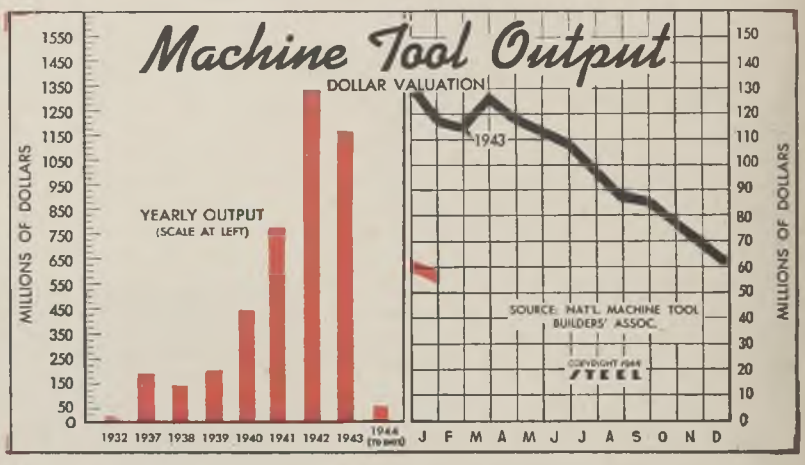
COKE OUTPUT—Combined by-product and beehive coke production during January was 66,424 tons above the previous month and 267,710 more than in like 1943 period. Stocks of by-product coke at producers' plants decreased by 109,887 tons during January and on Feb. 1 were equivalent to 4.7 days' production at the January rate. These stocks of 849,991 tons were also the lowest recorded since July 1, 1943.

SCRAP STATUS—Recording the first increase since June, 1943, stocks of purchased and home scrap rose to 6,448,000 gross tons during December. The increase was due primarily to the observance of the Christmas holiday followed by brief strikes which reduced the December scrap consumption to 4,449,000 gross tons. Monthly peak in scrap stocks last year was 6,918,000 tons during April, while peak consumption month was 4,830,000.

With the continued decline of scrap production by automobile wreckers and the loss of scrap delivered to dealers' yards by peddlers, a prolongation of the downward scrap supply trend is anticipated; and if the present decrease in the collection of production and railroad scrap continues, the position might become acute. At present there is a serious shortage of heavy melting steel and cast scrap grades.

MACHINE TOOLS—The decline in machine tool shipments through the past 13 months reflects the fact that war plants have been adequately equipped with tools and export requirements have decreased. Shipments totaled about $56.3 million during January, or about 6 per cent below the December total and compare with the peak of $131,960,000 recorded in December, 1942.

Net new orders during January of $25,916,000 were slightly above the December volume, reflecting primarily the 46.5 per cent decline in cancellations during the latest period. Order backlogs at the close of January were valued at $181,548,000, a reduction of 13.8 per cent from the Dec. 31, 1943 total. Peak in order backlogs of $1,392,803,000 occurred in March, 1942.



Machine Tool Output
(000 omitted)

	1944	1943	1942	1941
January	$56,349	$117,384	$83,547	$50,700
February	.....	114,593	84,432	54,000
March	.....	125,445	98,358	57,400
April	.....	118,031	103,364	60,300
May	.....	113,710	107,297	69,700
June	.....	108,689	111,090	69,070
July	.....	97,428	113,596	63,019
August	.....	87,405	117,342	70,089
September	.....	85,842	119,883	74,906
October	.....	78,300	130,008	84,178
November	.....	71,811	120,871	81,320
December	.....	60,861	131,960	81,435
Year		Year		
1943	$1,179,318	1941		$812,462
1942	1,321,862	1940		450,000

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	97.5	97.5	100.0	99.5
Electric Power Distributed (million kilowatt hours)	4,465	4,445	4,524	3,947
Bituminous Coal Production (daily av.—1000 tons)	2,155	2,053	2,133	2,113
Petroleum Production (daily av.—1000 bbls.)	4,413	4,423	4,396	3,887
Construction Volume (ENR—unit $1,000,000)	$39.4	$22.2	$35.5	$85.8
Automobile and Truck Output (Ward's—number units)	17,655	17,805	17,745	17,460

*Dates on request.

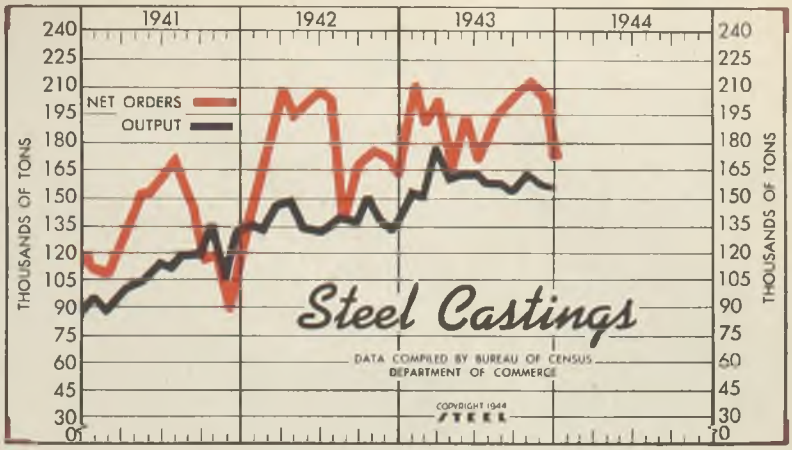
TRADE				
Freight Carloadings (unit—1000 cars)	783†	782	806	783
Business Failures (Dun & Bradstreet, number)	24	36	33	103
Money in Circulation (in millions of dollars)‡	$20,823	$20,696	$20,534	$16,154
Department Store Sales (change from like week a year ago)‡	−9%	−21%	+15%	+33%

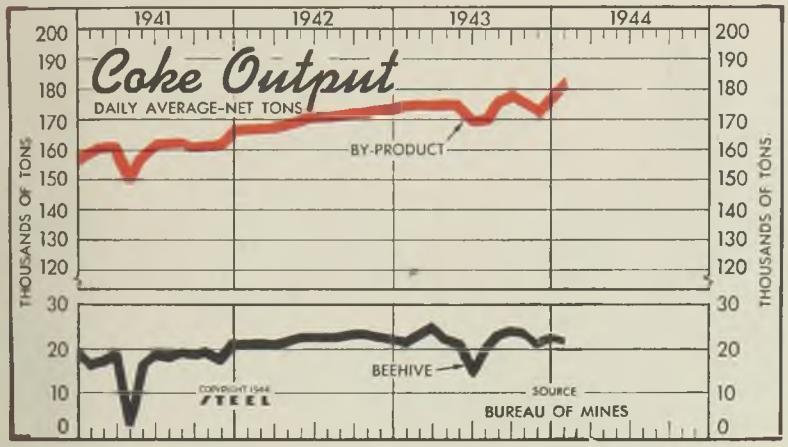
†Preliminary. ‡Federal Reserve Board.

Commercial Steel Castings

(Net tons in thousands)

	Orders		Production	
	1943	1942	1943	1942
Jan.	213.1	150.5	154.7	134.8
Feb.	191.2	179.9	151.5	133.7
Mar.	202.7	211.1	176.5	146.5
Apr.	165.8	191.2	161.4	149.6
May	192.5	199.6	163.8	131.5
June	171.7	208.9	163.9	132.0
July	187.2	202.3	158.7	135.7
Aug.	200.6	141.2	158.8	189.2
Sept.	214.1	177.5	157.8	189.8
Oct.	211.3	179.5	163.9	152.1
Nov.	209.3	173.3	158.8	140.4
Dec.	170.6	172.3	157.8	143.9
Total	2,330.4	2,187.3	1,927.9	1,679.2





Coke Output
Bureau of Mines

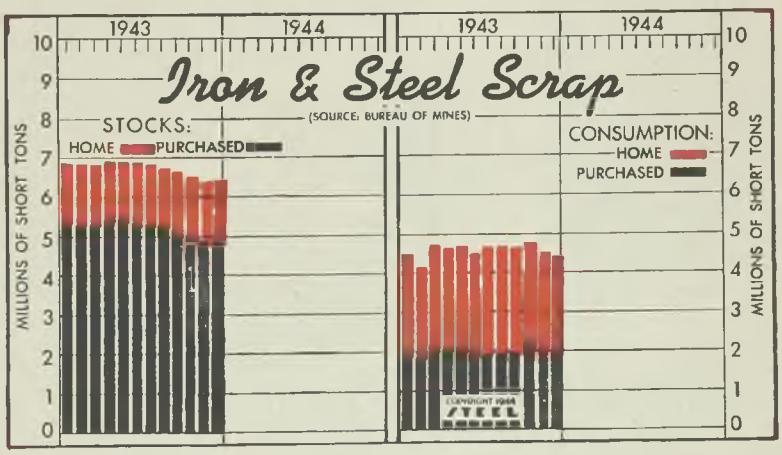
(Daily Average—Net Tons)

	By-Product		Beehive	
	1944	1943	1944	1943
Jan.	182,094	174,044	22,025	21,440
Feb.	.....	175,107	.....	23,991
Mar.	.....	175,051	.....	24,369
Apr.	.....	175,857	.....	22,932
May	.....	174,240	.....	21,270
June	.....	168,735	.....	14,055
July	.....	169,936	.....	20,009
Aug.	.....	176,396	.....	23,102
Sept.	.....	178,090	.....	23,637
Oct.	.....	175,492	.....	23,495
Nov.	.....	171,594	.....	20,421
Dec.	.....	179,042	.....	22,935
Average	.....	174,465	.....	21,795

Iron and Steel Scrap
Bureau of Mines

(Gross Tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan.	6,877	4,100	4,492	4,425
Feb.	6,871	4,073	4,178	4,204
Mar.	6,850	4,101	4,787	4,661
Apr.	6,918	4,324	4,642	4,603
May	6,905	4,602	4,723	4,665
June	6,916	4,859	4,493	4,464
July	6,860	5,087	4,670	4,470
Aug.	6,778	5,279	4,686	4,478
Sept.	6,613	5,545	4,657	4,424
Oct.	6,456	6,260	4,830	4,770
Nov.	6,391	6,742	4,581	4,401
Dec.	6,448	6,930	4,449	4,497
Mo. Av.	6,740	5,159	4,599	4,505



FINANCE

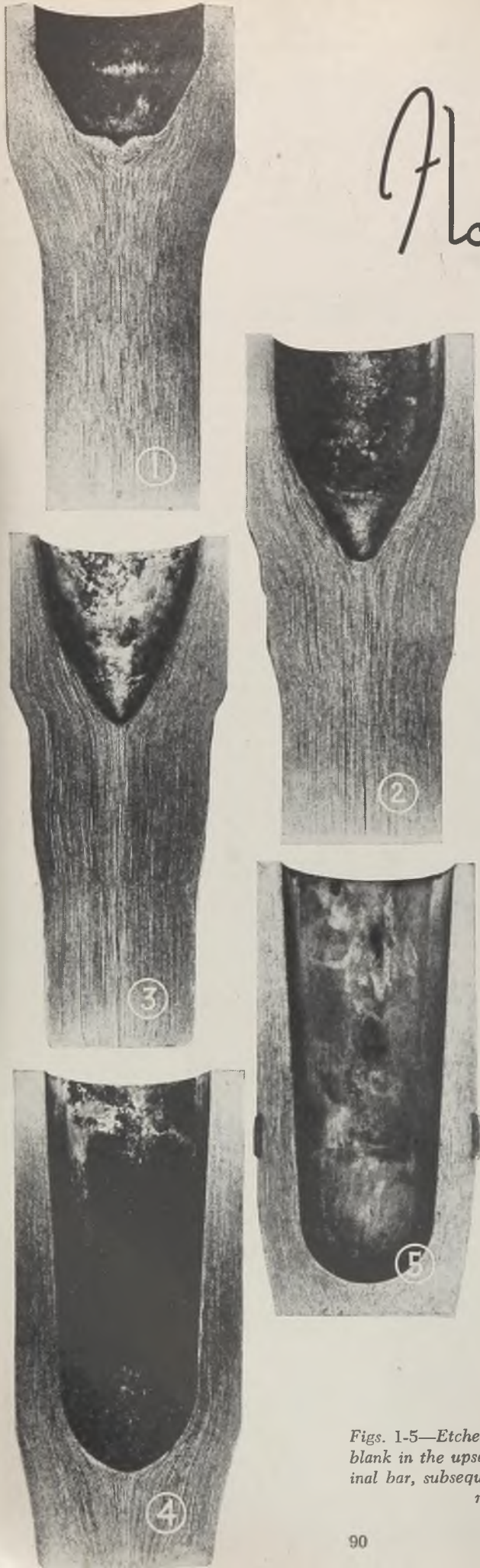
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,178	$8,076	$10,830	$8,501
Federal Gross Debt (billions)	$187.4	$189.6	$178.7	$118.3
Bond Volume, NYSE (millions)	$61.1	$56.2	$94.2	$134.4
Stocks Sales, NYSE (thousands)	4,047	3,973	4,265	9,350
Loans and Investments (millions)†	$53,267	$53,854	$50,827	$41,353
United States Government Obligations Held (millions)†	$38,755	$39,139	$36,575	$28,438

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	248.6	249.5	248.9	247.6
Industrial Raw Materials (Bureau of Labor index)‡	113.7	113.0	112.4	110.6
Manufactured Products (Bureau of Labor index)‡	100.6	100.6	100.4	100.5

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



Flow of Steel IN UPSETTER FORGING

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

WHAT, it may very well be asked at the outset, are the principal objectives sought in a study of the flow of steel during forging operations?

From the standpoint of the finished product, the final orientation of the "grain" has an important bearing on the physical properties, including resistance to fatigue; while during the actual process of manufacture, such a study may throw a revealing light on the causes of die wear and the reasons for defective forgings.

Insofar as the disposition of the grain is concerned, this will obviously be the resultant of the arrangement in the slug prior to the forging operation and such further distortion as may be impressed upon it by subsequent hot work; and in any particular case the procedure should be such as to produce the most favorable conclusion. In a gun forging, for example, the original ingot may be so proportioned as to avoid excessive "drawing down" thus weakening the structure against tangential stress; while in a gear, the original grain may be looped into the teeth to promote resistance to fatigue.

The present study is concerned with the manufacture of forgings in the upsetter. As may be observed from Figs. 1 to 5, which represent the five successive stages in a characteristic sequence, the general tendency is to emphasize the original pattern in the bar, and thus to strengthen the finished shell in the lengthwise direction. Strength in the axial direction is particularly important immediately underneath the rotating band, where the section is weakest and least able to resist the pressure of inertia.

The base of the shell has the appearance of being somewhat scrambled, but this is all to the good, since the base takes the load of high pressure gas as a beam, while the walls are in the situation of a column. As a matter of fact, our prime concern is the absence of basal porosity, rather than strength, since it is here that any traces of secondary pipe in the original bar finally appear. As an added precaution, all high-explosive shell are rendered bore-safe by welding on a thin circular plate, whose grain thus runs crosswise to the grain of the blank.

Development: Up until little more than a decade ago, the progressive piercing of high-explosive shell in the upsetter had not been considered—at least in this country; but in the early thirties, experimentation was begun in Frankford

Figs. 1-5—*Etched cross sections of successive stages in manufacture of forged shell blank in the upsetter. Orientation of the grain is primarily result of rolling of original bar, subsequent forging emphasizing the original pattern. This is a* 105-*millimeter shell from which the collar has been sheared*

Arsenal and pursued with such diligence that the process now takes high rank among the most economical and satisfactory methods employed in the present war.

Instead of confining the action to one or more simple piercing operations characteristic of World War I practice, or to a single pierce, followed by a draw in ring or roller dies, the forging is done with a series of punches and dies in five or six operations, as shown in Fig. 6. By limiting the total amount of forging work, as a result of its division among a number of quick strokes, the time of contact of the cool punch and dies against the hot forging is shortened with great advantage to the life of the tools. Granted adequate rigidity in the machine itself and proper design and care of tools, the process lends itself to the manufacture of sound forgings and low excess stock.

Postwar Conversion: An ancillary advantage, by no means to be discounted, is the readiness with which the upsetter can be diverted to peaceful pursuits. Originally designed for the manufacture of bolts, the upsetter has been applied to a wide diversity of tasks. It is, basically, an extremely heavy horizontal mechanical press, commonly reinforced against longitudinal and transverse strain by round bars of large cross-section. The tool bearing head is driven by a pitman, which derives its energy from a heavy flywheel powered by an electric motor. Located within the flywheel is an air-operated clutch, under control of the operator's foot pedal.

As the main shaft commences to revolve, the movable half of the dies closes in and the bar is held in preparation for the forging stroke. Only one tool is in operation at any given time, the blank being lowered by the operator from one impression to the next as the action proceeds. During the latter part of the single revolution of the main shaft which constitutes the cycle, the dies open and the ram comes to rest in readiness for the next stroke.

Function of the Collar: Formerly shells made in upsetters were forged without the collar at the open end, the impression for which is shown in Fig. 6. But this method virtually has been abandoned and all of the figures exhibiting metal flow, which accompany this discussion, were obtained from blanks forged with a collar.

The function of the collar is to locate the blank and compel forward extrusion thereby avoiding excessive die wear caused by rearward metal flow, and certain difficulties attending the proper location of the blank and the stripping of the piercers.

Succession of Forging Operations: In forging 75-millimeter shell, hot rolled bars of shell steel, 2½ inches in diameter and 19 feet 2 inches long, after removal of a ¼-inch slice from each end for the detection of secondary pipe by macroetching, are sheared into 25½-inch lengths on a Williams & White press. Each of these makes two shell bodies, one end being heated and forged while the other serves as a grip.

In a Surface Combustion furnace, the end being forged is raised to 2200 degrees Fahr., and the bar passed through a roll type descaler. Two passes are made in the first impression in order to complete the initial upset and form the collar. Thereafter the blank is passed from one impression to the next until all five (or six) operations are complete, when it is returned to the furnace and the other end heated in preparation for a repetition of the process, but followed on this occasion by the shearing apart of the twin blanks.

Lubricating oil mixed with graphite is sprayed into the dies, while a water spray is employed to keep the punches in the neighborhood of 800 degrees Fahr. This is hot enough, apparently, to prevent any tendency to crack, yet not hot enough to draw the temper of the punch steel. Collars may be trimmed off after or before the blanks have cooled.

Flow of Metal: In order to study the distribution of metal in the forging process, International Harvester employed the insert method, low carbon 7/16-inch bars being disposed lengthwise at different points. As a clear indication of the

(*Please turn to Page* 132)

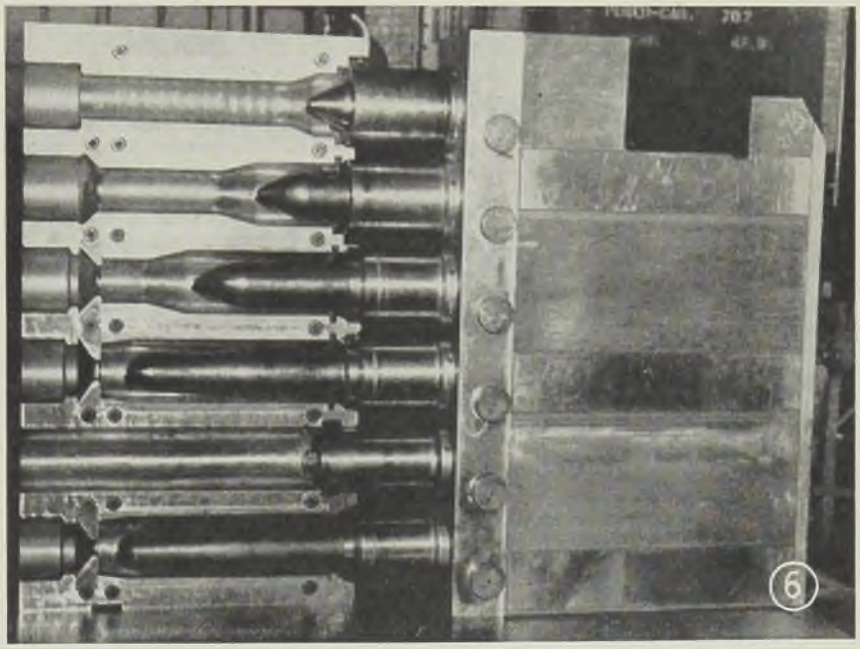


Fig. 6—Tools used in upsetter forging of parts shown in Figs. 1-5. Second stage from bottom shears off collar first formed at mouth of blank to locate forging in successive operations and to control forward extrusion of the metal. All photos from International Harvester Co.

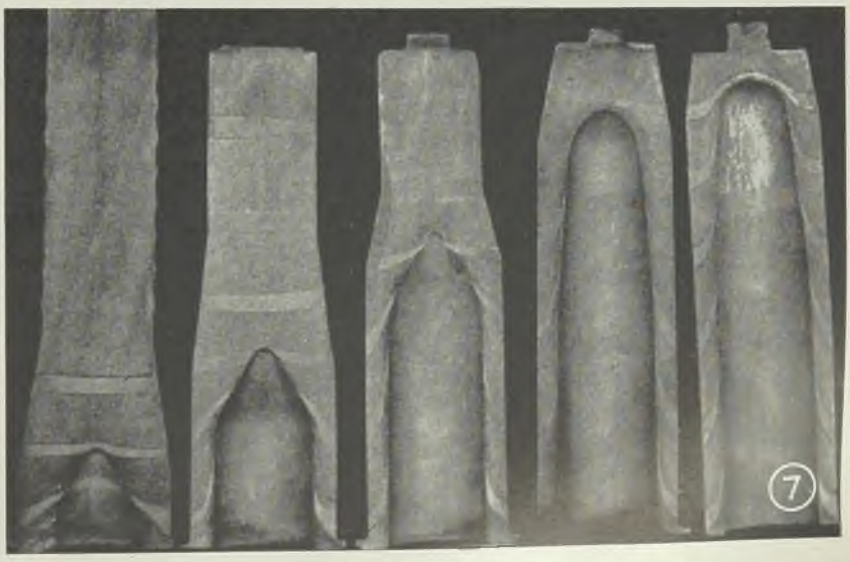
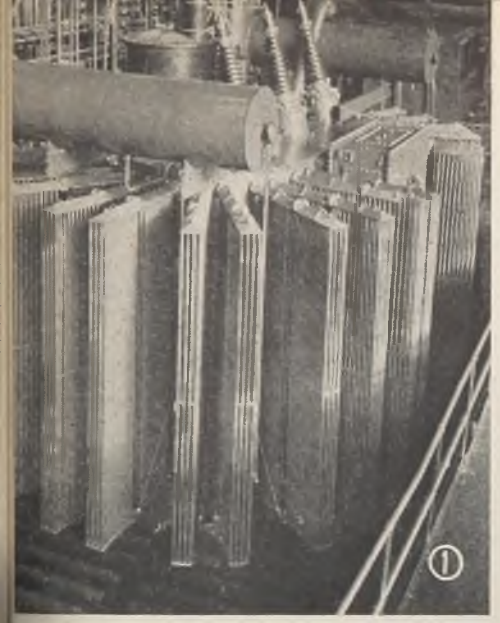


Fig. 7—Nature of longitudinal flow shown by inserts originally equidistant. Note how they are crowded toward base of shell as forging action proceeds from stage to stage, indicating flow of metal relative to the die. Differential flow is also apparent, steel in center of shell having moved forward to fill in the heavy base

Fabricating TRANSFORMER



PERMANENT oil tightness and a mechanical strength capable of supporting from six to eight times its own weight are primary requisites of tanks for large power transformers which make some of the fabricating techniques of interest.

A core and coil assembly for a 10,000-kilovolt-ampere oil-immersed power transformer may vary in weight from 40,000 to 50,000 pounds. The oil it contains may weigh another 28,000 to 60,000 pounds. A 75,000-kilovolt-ampere giant power transformer recently built weighed more than 250 tons when filled with oil.

Tanks are made from low-carbon steel plate to provide good welding quality. The plate must possess a high degree of flatness, be free from laminations and porosity to prevent leakage of the transformer oil, and withstand bending without fracture. Plate thickness for tanks varies from about ¼-inch to 1⅜ inches. Material for lifting lugs may be as thick as 4½ inches.

In fabricating these tanks, many modern techniques are now employed. For instance, all seams, flanges, lifting lugs, jack bosses, braces and other parts attached to the tank are welded. Welding in our tank shop includes alternating-current metallic-arc welding for heavy work and oxyacetylene gas welding for light material and in restricted places. For certain applications, the atomic hydrogen weld is found to be more satisfactory than other types.

Every effort is made to build these large transformer tanks in a single section to permit shipment of the transformer in its own tank and to reduce installation cost to a minimum. However, railroad clearances may require extremely large tanks be made in two sections which can be disassembled for shipment. When the transformer is installed, sections are bolted together with a gasket between flanges or welded together in the field.

In normal times, plates for tanks are obtained from the mills in approximately the sizes required. One of the largest size plates we have used was 169 x 318 inches. Now, as a wartime necessity due to restrictions on steel plates, standard sizes—72 x 240 inches for tanks and 60 x 240 inches for bases and covers—are cut and welded to meet requirements.

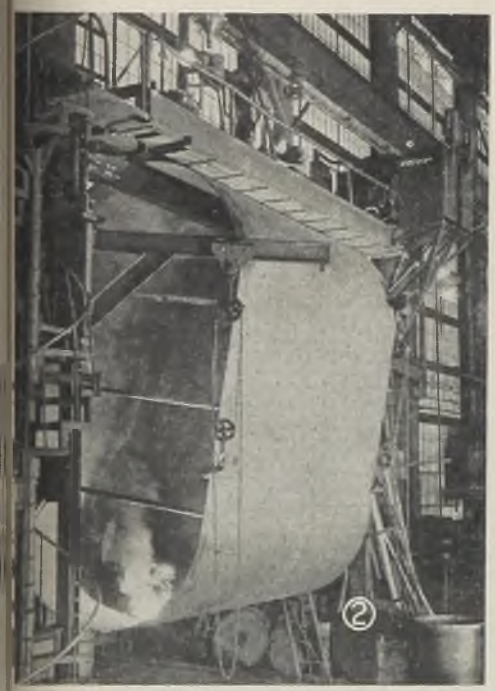
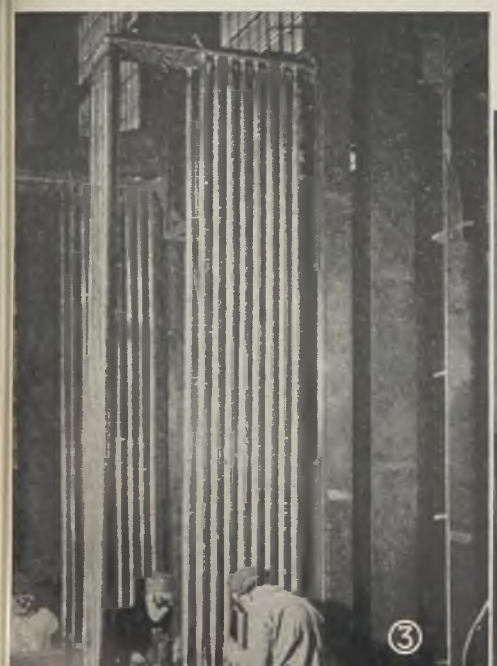


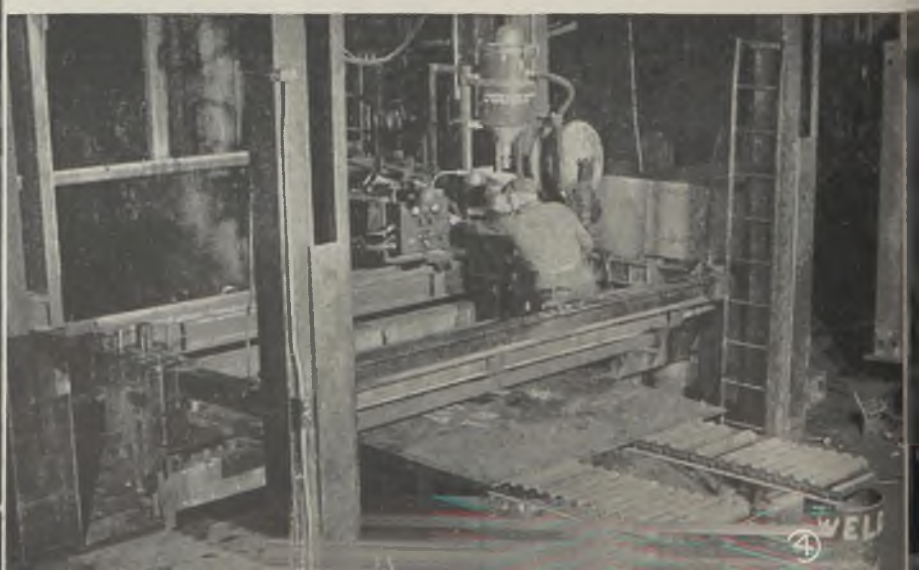
Fig. 1—One of the largest power transformers ever built at General Electric, this 75,000-kva giant weighed 250 tons when filled with oil. Tubular radiators encircling the tank are for cooling the oil.

Fig. 2—Two halves of tank are joined with this specially built seam welder which does outside weld automatically. Inside weld of the two seams is done manually

Fig. 3—Butt-welded steel tubing, swaged at each end, is gas welded to headers to form radiators through which transformer oil will circulate for cooling

Fig. 4—As a war expedient, remnants and pieces from plates of standard size are welded together on this smothered-arc machine into a single plate which sometimes consists of as many as nine segments





By H. W. ALLISON
Power Transformer Mfg. Division
General Electric Co.
Pittsfield, Mass.

TANKS

Plates meeting all requirements have been made from these multiple sheets and give excellent results.

Edges of the plates are prepared for welding by machine gas cutting. The segments are joined together by means of a light hand-welded seam after which the large plate is turned over and a heavy weld is applied by machine. Resulting "bottle tight" welded seams prevent leakage of transformer oil in addition to strengthening the tank structure.

Some transformer tanks are square or rectangular; others are round or elliptical. Regardless of shape, they are made from two pieces which are bent on a hydraulic brake or rolled on a form roll. The two halves are brought together and tack welded. This assembly is then lifted by crane onto the boom of a seam welding machine which does the outside weld automatically with a smothered arc. Rate of travel of the machine is adjusted in accordance with the thickness of the plate being welded. For thicknesses of ½-inch or more, a second pass is made after cleaning out the slag.

The assembly is cross braced to size with pipes and angles, and with the tank upside down, an angle iron band is tack welded to its top. Then the tank is turned over and welded to its base. Lifting lugs are welded on. Openings for junction boxes and fittings are burned out with a gas torch.

The tubes and headers for the transformer are made of rust-resisting copper-bearing steel. The tubes are approximately 2 inches in diameter, swaged at each end to provide additional thickness and strength at the point where they will be welded to the header. Large transformers are equipped with demountable radiators. Each radiator must pass a tightness test in which it is subjected to gas, at a pressure of 80 pounds per square inch.

There are two tests used to assure "bottle tightness" of the tank proper. The first is with air at 3 pounds per square inch pressure during which a soap solution is applied to check the welds. Then, to obtain a durable and long-life paint job, rust, scale and the soapy solution are removed from the outside of the tank by shot-blasting. Finally, the tank must pass a test with transformer oil maintained at a pressure of 5 pounds per square inch for a period of at least 12 hours.

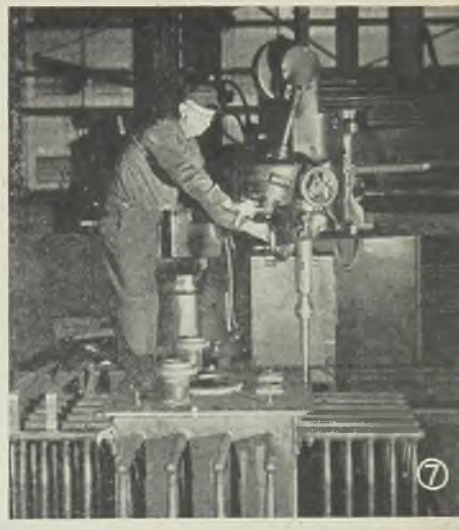
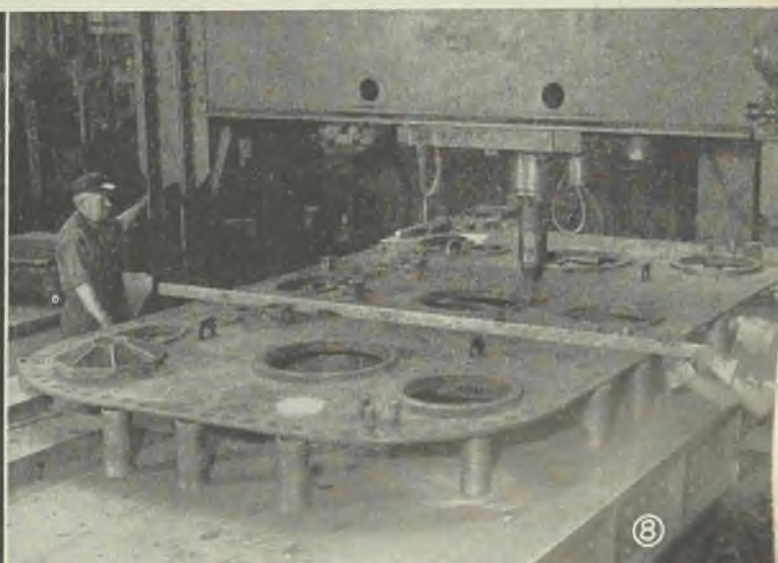


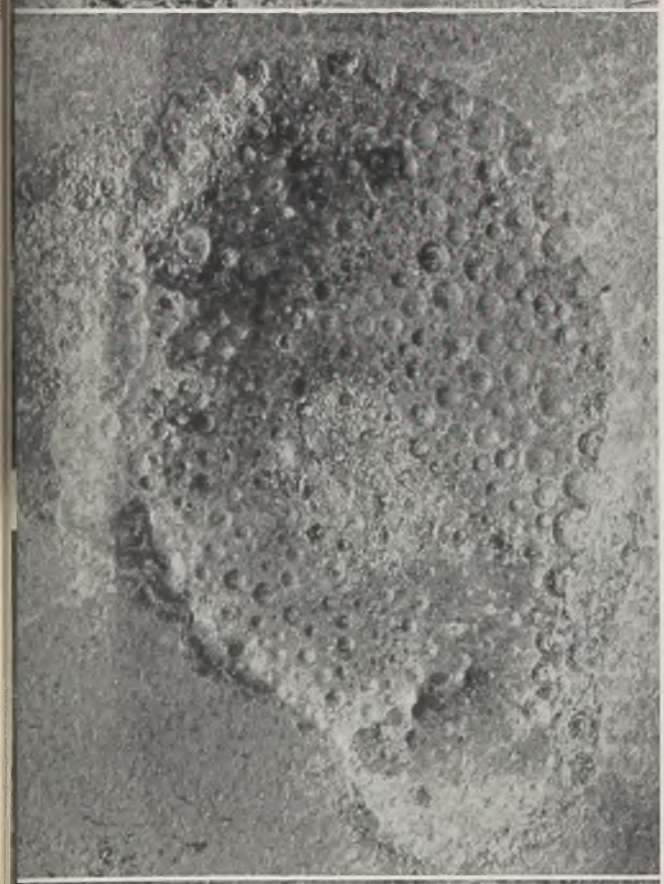
Fig. 5—Plates for round and elliptical tanks are form rolled; those for square or rectangular tanks are bent on a hydraulic brake. Before either forming operation, tube header holes are punched while plate is flat

Fig. 6—Arc welding the lifting lugs to the tank

Fig. 7—Bolt holes in cover and flange of tank are drilled in one operation to assure proper alignment and save time

Fig. 8—Straightening a large tank cover with a 75-ton hydraulic press. Cover will be domed slightly—1/16-inch per foot—to prevent depressions that might hold moisture. Flange and gasket surfaces must be kept flat, however. Note "spider" for checking flatness of flanges over opening at extreme left





The Application, Use

SILVER

INTRICATELY pressed multiple parts, accurately machined components, difficult assemblies, and the mass production of ferrous and nonferrous materials have developed in the war period a great impetus to metal joining by the use of hard solders commonly referred to as silver solders. Most of the alloys in this group have melting points in the range of 1200 to 1600 degrees Fahr. and are generally ternary or quaternary in composition. Other alloys, mainly proprietary products, are included in this group which have melting points below or in the same range.

In the brazing of metal parts with silver solders, it is necessary in most instances, to supply a flux to the joint so that it will react chemically and dissolve the oxides from the joint and the alloy formed in the process of heating and brazing. During the past several years many hundreds of tons of brazing fluxes have been used exclusively in the silver soldering field. Owing to the variety of fluxes on the market, foremen, process engineers, and even research men have had opportunities to study many fluxes from the chemical aspect as well as from the physical properties of joints resulting from the employment of different fluxes.

The fluxes used for silver soldering have the following functions in general:

(1) to dissolve oxides formed from the parts being joined and from the brazing alloy;
(2) to shield or blanket the brazing alloy and the joint from the attack of oxygen;
(3) to assist the flow of the brazing alloy by capillarity;
(4) to provide chemically clean metallic surface, for the melting and spreading of the brazing alloy.

In addition to these functions, there are specific activities of a flux which must be considered in the joining of two metallic parts by low-temperature brazing; namely, the surface tension of the molten salt at the flowing temperature of the brazing alloy, the viscosity of the molten flux, its chemical activity for metallic or refractory oxides, and the reaction equilibrium of the flux-metal interface.

Types of Fluxes

Most fluxes employed for silver brazing can be classified into four categories, each having its own particular advantage in its field of application. Each type of flux should be uniform in composition, consistent in texture, definite in melting point, and should evolve the minimum amount of fumes at the temperature of brazing.

1—Dry powdered flux marketed in 10 to 60 mesh particle size can be employed to advantage in torch brazing as a means of protecting the brazing alloy if metal additions are made in wire or rod form. The heated wire dipped in the powdered flux develops the adherence of the flux to the wire and hence is transferred to the point of brazing. Powdered fluxes are also utilized to a considerable extent in furnace and resistance brazing.

2—The paste flux has, by far, the most universal application,

(Top to Bottom)

Fig. 1—Flux-metal reactions exhibiting undesirable surface cratering of the brazing alloy

Fig. 2—Flux-metal reactions here are similar to those shown in Fig. 1

Fig. 3—In this case, flux-metal reactions are suppressed so that only small gas craters are visible at the flowing edge of the alloy

and Control of . . .

SOLDER FLUXES

By DR. H. L. ANTHONY*

it being used for torch, induction, furnace resistance, and incandescent carbon brazing. Fluxes of this type contain 10 to 30 per cent water and the solid chemicals are ground to a particle size less than 40-mesh.

3—The saturated-solution fluxes closely resemble the paste fluxes. They are sold primarily in paste form, but their manufacturer recommends heating the paste to approximately 160 degrees Fahr. On heating, the flux is converted into a saturated solution applicable by dipping, spraying or brushing.

4—Volatile fluxes are employed in brazing operations where the source of heat is usually generated by means of a brazing torch. Here volatile compounds or mixtures essentially of alkyl borates are introduced into the torch flame, in which the compounds decompose and yield boric oxide as the principal fluxing agent. Additions of acyl fluorides are sometimes made where refractory oxides are encountered.

Chemicals compounded in a powdered, paste or solution flux are approximately identical in composition but differ in the degree of hydration.

Compositions of Solid, Paste and Saturated-Solution Fluxes

Present-day silver brazing fluxes of the powdered, paste, and saturated-solution types contain combinations of several of the following chemicals; boric acid, sodium tetraborate, potassium tetraborate, calcined borax, lithium carbonate, sodium carbonate, potassium carbonate, barium chloride, lithium chloride, cerous chloride, cadmium chloride, zinc chloride, cupric chloride, strontium chloride, potassium chloride, cuprous chloride, sodium phosphate, potassium phosphate, sodium nitrate, alkali boro-silicates, potassium acid fluoride, potassium silico-fluoride, potassium bifluoride, potassium fluoride, sodium fluoride, lithium fluoride, calcium fluoride, potassium fluoborate, and sodium boroformate. Phosphorus alloyed in proprietary silver solders acts as a fluxing agent on the joining of copper and brass parts.

Chemical Composition of Volatile Fluxes

A volatile brazing flux may be defined as an azeotropic mixture of a distillable alkyl borate and a volatile organic solvent which forms a constant boiling mixture with the borate. The applications of volatile fluxes to silver brazing are centered primarily in the field of torch brazing. A fluxing tank containing the volatile flux is introduced to the working tip by means of gas hoses connected to the torch.

The azeotropic fluxing mixture may contain one or more of the following compounds: isopropyl borate, methyl borate, ethyl borate, trimethyl borate, amyl chloride, acyl fluoride, stannic chloride, and an alkyl silicate. Solvents used in developing the volatile flux mixtures may contain: methyl alcohol, ethyl alcohol, acetone, perchlorethylene, and acetonitride. Even with the use of a volatile flux, it is occasionally the practice to use a very small amount of flux paste or flux solution. A combination of these fluxes results in a negligible amount of residue and promotes rapid cleaning of the parts being joined.

Silver solder fluxes of the powdered, paste, and saturated-solution types melt in the temperature range of 800 to 1100 degrees Fahr. and are persistent to 1600 to 1700 degrees Fahr. The molten salt formed, generally the eutectic of a system, is dependent on the borates, alkali fluoborates and chlorides for the rapid oxide dissolution at the melting point of the flux. Most commercial fluxes which are compounded contain salts of lithium, potassium, and sodium; the preference and economic selection is generally the potassium salts because of their chemical activity and lower melting points.

Sodium salts emit a characteristic yellow flame which results in poor visibility for the torch brazing operator. The yellow flux flame can be eliminated by using a flux containing all potassium salts or by the addition of salts of strontium, barium, and lithium. Sodium salts can be compounded exclusively in fluxes without difficulty for furnace, induction, resistance, and incandescent carbon brazing methods.

Cleaning of Metallic Parts Prior to Fluxing and Brazing

Metal parts joined by the use of fluxes and silver solders are generally either machined or pressed to standard dimensional tolerance so that the joining parts will fit properly. In the machining or pressing of these parts, oils, emulsions, greases, and coolants are applied. It is necessary therefore that films of this nature should be removed prior to the application of flux. One of the more efficient methods of removing oily films is that employing solvent degreasing. A solvent for such a purpose is stabilized trichlorethylene, (which prepares the machined or formed surfaces in a satisfactory fashion.)

Another procedure for preparing flux surfaces after completion of machining or pressing is by alkali degreasing, the

*Senior fellow, industrial fellowship of the Scaife Co., Mellon Institute of Industrial Research, Pittsburgh.

Fig. 4—Here, the flux-metal reactions are in equilibrium and no surface cratering is in evidence. Magnification x3, Figs. 1-4

principal solution agents being an alkali and an emulsifying agent. Other methods of surface preparation are wire brushing, filing, grinding, sand blasting, pickling, and electrolytic etching.

The alkali cleaning method for parts to be brazed may leave alkali residues on the surfaces to be fluxed unless special care and precautions are observed in the process. Even after employing the best cleaning methods, if the prepared surfaces for fluxing are left exposed a short time in ordinary air, these surfaces usually become coated with a film. Although such films are only one molecule thick,

Fig. 5—Photomicrograph of a low temperature brazed joint. Steel at left is ASME S-44 (carbon-silicon-molybdenum grade) and at right API J-55 (carbon 0.40, manganese 0.80). Cross section was double etched with 3 per cent Nital, hydrogen peroxide and ammonium hydroxide. Magnification 800 diameters

they may alter the properties of the fluxing surface profoundly. In any method of cleaning, it is difficult to obtain a perfectly clean surface; the most perfect surfaces are probably those obtained by cleaning a single crystal.

In applying a flux to a brazing surface it may be observed at times that the paste or solution flux will contract into small irregular globules and not wet the metallic surface. The contraction of area of the flux film into irregular globules is the result of the surface tension of the applied flux to that particular surface area, or it is the property of the flux to form a contact angle with the metallic surface. The resulting wettability therefore can be defined in terms of the relative adhesions between the flux for the metallic surface and the flux for itself.

To overcome the surface tension and poor wettability of a flux for metallic surfaces, some flux manufacturers add a wetting agent for increasing the wettability of the flux as applied to brazing surfaces. It is most important that the brazing area should be coated with a continuous film of flux, so that the surface will not develop a heaxy oxide film during the heating of the parts on which the brazing alloy will subsequently flow. It is also quite essential that the surfaces should be as clean as possible before the application of the flux.

In a joint assembly where a wire, ring or foil is used as the supply of brazing alloy it is also considered good practice to flux the brazing alloy to prevent oxidation during the heating to its temperature of flowing. It has been mentioned previously that the saturated-solution fluxes can be readily applied by spraying, dipping, and brushing, whereas the paste fluxes, by reason of their consistency, are most favorably applied by brushing on the surface.

pH of Applied Fluxes

Fluxes applied to ferrous metal parts should have a pH in the range of 8 to 10. Keeping the pH on the alkaline side prevents corrosion of the parts if they are allowed to stand any considerable time prior to brazing.

Effect of Clearance on the Application of Fluxes for Silver Solders

For tight-fit joints, actually press fits, the saturated-solution fluxes appear to be the most satisfactory for insuring a flux film between two tightly fitted surfaces. This type of flux is also effective with joints of greater tolerances.

Paste fluxes sometimes contain crystals of secondary crystallization, especially if the fluxes are old or if they have been subjected to freezing temperatures. Fluxes in this condition require warming in order to dissolve the fine dispersion of secondary crystallization. With tight-fitting joints it is exceedingly difficult to enclose properly a paste flux film of a sufficient amount for brazing because of the wiping effect of assembly. Joints having 0.003-inch to 0.010-inch tolerance can occlude sufficient flux for good brazing; however, the amount of occluded flux depends to a large degree on the surface finish of the joining parts. Generally, the rougher the surfaces, the more occluded flux.

Two of the most important properties of a silver soldering flux in the molten state are its surface tension and its solvent capacity for oxides at the temperature where the brazing alloy flows. A molten flux with a high surface tension and an accompanying high viscosity will offer a high resistance and barrier to the flow of the molten brazing alloy at its flow temperature. A high surface tension flux will oppose the natural forces of capillarity exerted by the molten brazing alloy and will not flow the joint except by increasing the brazing temperature.

By increasing the brazing temperature the vapor pressure of the alloy phases will increase and as a consequence will liberate volatile and oxidizable metals, such as cadmium and zinc. On the other hand, if the flux has low surface tension and low viscosity, the brazing alloy will displace the molten flux by capillarity from the joint without flux resistance.

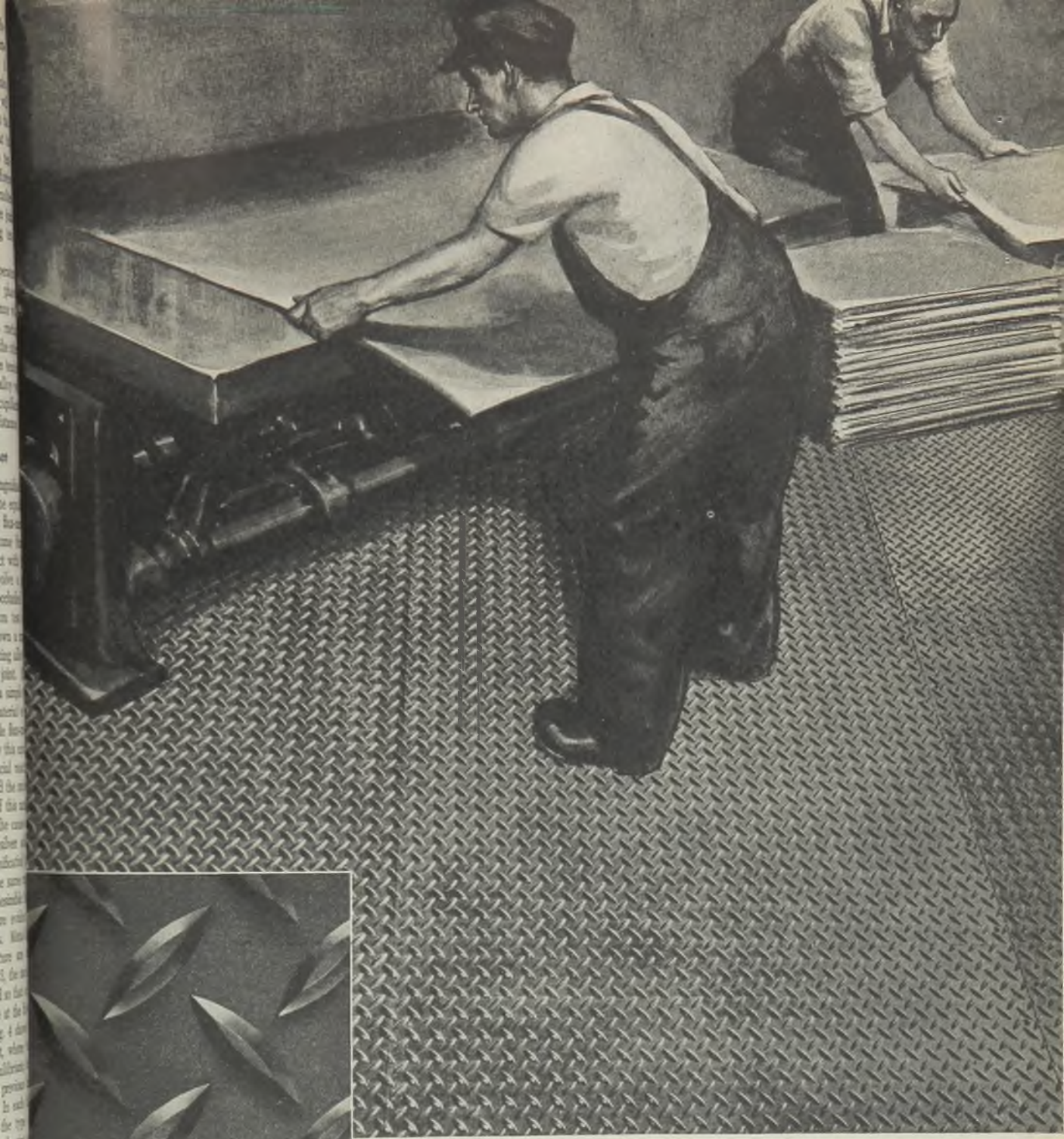
Equilibrium at Interface

A third important and distinguishable property of a molten flux is the equilibrium in effect at the molten flux-metal interface during brazing. Some fluxes by their chemical nature react with the molten brazing alloy and evolve a gas phase which may remain occluded in the brazed joint. A common test for such a reaction is to melt down a small quantity of flux over the brazing alloy to be used for completing the joint. It is preferable to perform such a simple experiment on the grade of material to be subsequently brazed. Visible flux-metal reactions can be observed by this experiment if there is an interfacial reaction between the molten flux and the molten brazing alloy. Reactions of this nature are believed to be one of the causes of "voids" and "islands" in silver solder joints. Fig. 1 at x3 magnification (all subsequent figures are at the same magnification) illustrates an undesirable flux-metal reaction in which are evident a large number of gas craters. Metal-flux reactions of a similar nature are exhibited in Fig. 2. In Fig. 3, the metal-flux reactions are suppressed so that only small gas craters are visible at the flowing edge of the alloy. Fig. 4 shows a flux of recent development, where the flux-metal phases are in equilibrium; the cratering noticeable in the previous figures has been eliminated. In each figure, the only variable is the type of flux employed in melting the brazing alloy to its flow point temperature.

One of the standard government inspection tests for silver solder fluxes is the persistence in the liquid phase at 1600 degrees Fahr. The test is completed by heating a portion of the flux in a silver crucible to 1600 degrees Fahr. for a period of 30 minutes, after which the physical characteristics of the flux shall not be altered appreciably. To complete this test, it is necessary that the flux remain in the liquid state to 1150 degrees Fahr. Some commercial fluxes can be retained in the liquid state to as low as 650 degrees Fahr.

Persistence of molten fluxes on the

(*Please turn to Page* 134)



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METALLIC ARC WELDING ELECTRODES

This is second in a series of articles that will examine the various classes of electrodes and their characteristics. Possibility of getting maximum value from arc welding comes only with a thorough knowledge of the characteristics of each type of rod. Class E6010 rods are discussed here

By HAROLD LAWRENCE

Metallurgist and Welding Engineer

ALMOST three-fourths of all the millions of pounds of metallic arc welding electrodes used fall into the AWS-ASTM E6010 classification. (For a description of the AWS-ASTM classification system see STEEL, March 6, 1944). And as might be surmised from the foregoing statement, E6010 electrodes possess some outstanding properties that make them particularly suitable for a wide variety of welded joints. Although there is no such thing as a universal electrode, class E6010 comes the closest of all available types to filling this role.

Notwithstanding the publicity that has been given the AWS-ASTM classification method, engineers are still unfamiliar with electrodes when only the type numbers are given. Likewise there is the question of interchangeability. Is such and such an electrode like so and so? To clarify this point and to provide a rather complete list of available electrode products Table I lists 23 suppliers of E6010 electrodes. Because of the peculiarity of electrode names, these are given as well. But the main point to remember is that all of these electrodes are supposed to meet the requirements of the E6010 classification.

Of course these are all coated electrodes. They are well adapted to welding in all positions—flat, vertical, horizontal and overhead. Generally this class of electrode is used in the vertical and overhead positions where no other type gives better physical properties or X-ray soundness.

A penetrating arc is a characteristic of E6010 electrodes. This factor insures good root penetration when fillet welds are being made. Or this attribute may be needed in butt welds when deep penetration is required as in a single-V weld. Or for that matter, penetration is most desirable in tack welding where these electrodes are used more than 90 per cent of the time.

Weld metal produced by this group of electrodes solidifies quickly. This property explains the good welds that are found in the vertical and overhead positions where the deposit is flat. In fact the E6010 and E6011 electrodes are classified by one electrode producer as groups that deposit flat fillet welds. That is, these welds possess neither excessive convexity nor excessive concavity, being for all intents and purposes of flat contour along the face of the fillet. The same quick-setting property helps the welder to avoid undercutting which detracts from joint efficiency.

E6010 electrodes form a very desirable type of slag which has a low melting point and a low density. These features combine to permit oscillation, weaving and whipping of the electrode without the danger of slag entrapment. In addition the low volume of slag that is made contributes to ease of manipulation.

While the slag provides some protection for the weld metal, the major share of the essential arc shielding is assumed by the gaseous envelope. Large volumes of hydrogen, carbon monoxide, water vapor and carbon dioxide are evolved as the coating burns. One volume of coating gives off more than 300 volumes of gas. As the gas forms and spreads out from the arc, the harmful gases from the atmosphere, oxygen and nitrogen, are kept away from the weld metal.

It is claimed that the gases generated by the burning coating establish the polarity of this electrode group. At any rate the E6010 type is useful with direct current only. Furthermore good results may be obtained with reverse polarity alone. When reversed polarity is spoken of, the electrode is positive and the work negative. With the circuit arranged for straight polarity the electrode is negative and the work is positive.

The electrodes under discussion are often referred to as cellulosic. No doubt the reference arises from the substantial amount of cellulose found in the coating. Besides the cellulose, the major gas forming constituent, will be found slag-forming materials such as titanium dioxide and magnesium or aluminum silicates. Some ferromanganese is added to function as a deoxidizer or degasifier. These four or five ingredients are stuck together and glued to the core wire with sodium silicate.

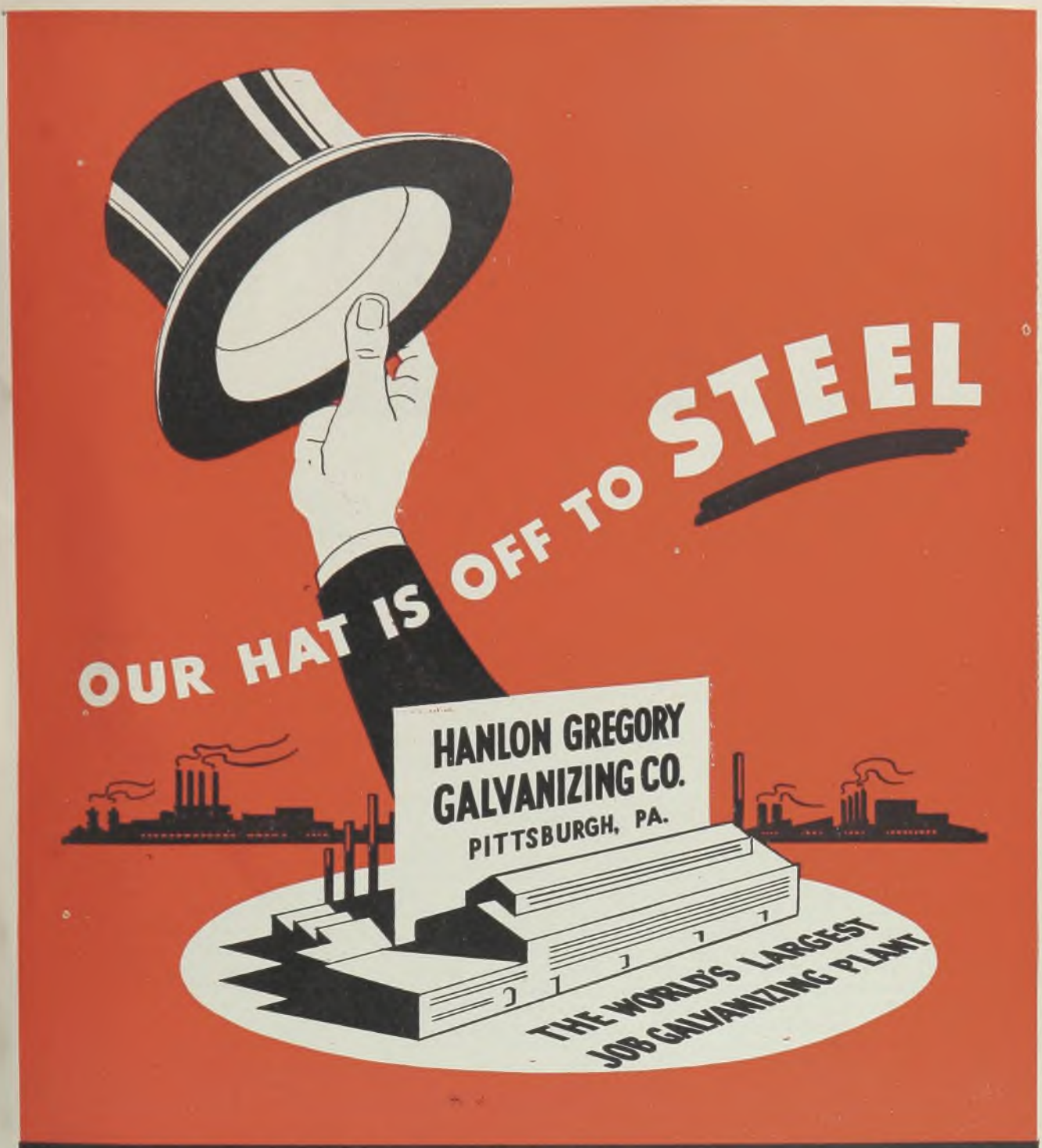
The core wire itself is a rimmed steel containing from 0.10 to 0.15 per cent

(*Please turn to Page* 138)

TABLE I—MANUFACTURERS AND TRADE NAMES OF AWS-ASTM E6010 ELECTRODES

(Primary color—none; Secondary color—none)

Air Reduction Sales Co. 60 E. 42nd Street New York 17	Airco 78E Airco 79E
Allied Weld-Craft Inc. 401 W. South Street Indianapolis, Ind.	Arc-Craft 55 Arc-Craft 55W
American Agile Corp. 5808 Hough Avenue Cleveland 3	Red-White
Anthony Carlin Co. 2717 E. 75th Street Cleveland	P50-x
Champion Rivet Co. East 108th and Harvard Cleveland 5	Blue Devil
Electric Arc Inc. 152-162 Jelliff Avenue Newark, N. J.	Greencote
General Electric Co. Schenectady, N. Y.	W-22 W-22H
Harnishfeger Corp. 4400 W. National Avenue Milwaukee 14	AP
Hobart Brothers Co. Troy, O.	Hobart 55
Hollup Corp. 4700 W. 19th Street Chicago	Sureweld B Sureweld BV
Lincoln Electric Co. 12818 Coit Road Cleveland 1	Fleetweld 5
Marquette Mfg. Co. Inc. 401-419 Johnson St., N. E. Minneapolis	Type 31DR Type 151
McKay Co. York, Pa.	No. 15 No. 15 D
Metal & Thermit Corp. 120 Broadway New York 5	Vertex
Page Steel & Wire Division American Chain & Cable Co. Monessen, Pa.	Hi-Tensile "C"
Reid-Avery Co. Dundalk, Md.	Raco 7
Jos. T. Ryerson & Son Inc. Chicago	No. 215
A. O. Smith Corp. Milwaukee	SW-10
Standard Steel and Wire Co. Bolivar, Pa.	Greyhound Type R
U. S. Steel Supply Co. 1319 Wabansia Avenue Chicago 90	Scully 50
Universal Power Corp. 4300 Euclid Avenue Cleveland 3	Hevikoat RP
Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa.	Flexarc AP
Wilson Welder & Metals Co. 60 E. 42nd Street New York 17	98N 98N V & O



TONS OF STEEL PRODUCED . . .

1917	50,467,880 tons	World War I
1929	63,205,490 tons	Peace Time Peak
1943	89,100,000 tons	World War II
		(an all time record)

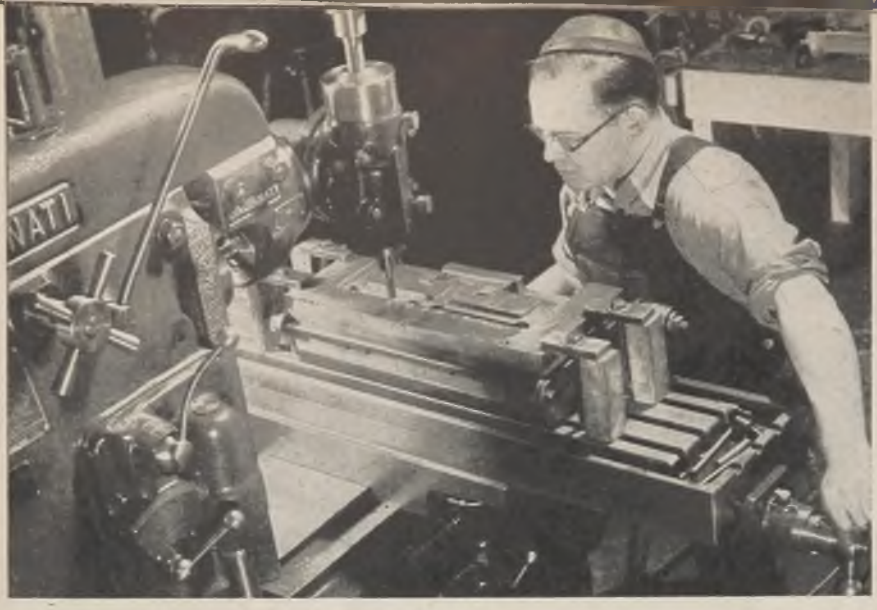


Fig. 1 — Cincinnati high speed universal milling attachment enables end milling to be performed effectively in a heavy duty horizontal milling machine whose regular spindle speeds and operating adjustments are not designed for such small diameter cutters. Photo courtesy Cincinnati Milling Machine Co.

End Milling gets the "Speed-up"

Air turbines and high-frequency electric motors, already well entrenched in woodworking field, are crashing gates of machine tool industry

By GUY HUBBARD
Machine Tool Editor, STEEL

FOR considerably more than a year, machine tool men have sensed that wartime developments in tool engineering foreshadow important changes in machine tool design. Busy though they have been in getting out machines to handle war production, key men of the machine tool industry have been on the alert as never before seeking clues as to the character of these tooling developments and their eventual impact on machine tool engineering.

To no small degree this accounts for recent record attendance—in some cases two or three times that expected—at national meetings of the National Machine Tool Builders' Association in Chicago; of the Machine Tool Forum in Pittsburgh; of the American Society of Tool Engineers in Milwaukee and Indianapolis, and at the production engineering sessions staged by the American Society of Mechanical Engineers.

At this time, when there is sharp criticism of postwar planning in the midst of war, let it be emphasized that none of the improved methods of metalworking are being "kept up anybody's sleeve" at the expense of war production. After their revelation at meetings such as those mentioned, no time has been lost in applying them widely to war work, insofar as they can be applied within the limitations of existing machines. That has been the primary purpose of their public unveiling.

Now that the peak of the demand for machine tools for the war program has been passed, it is perfectly understandable—and I believe quite all right—that there should be active cogitation upon these tooling innovations along lines of how, on the basis of wartime experience, postwar machine tools should be modified, improved and in some cases revolutionized to take full advantage of the new techniques.

It took about 25 years for machine tools in general to catch up fully with the production possibilities of high speed steel. Cemented carbide tooling, which incidentally was one of Germany's "secret weapons" during World War I, has now been with us for almost 20 years. As yet its possibilities have only partially been tapped through design of American machine tools capable of using it to peak efficiency.

It is a safe bet that the tempo of machine tool developments after this war—for instance, those necessary to give full scope to superspeed milling—will be a great deal more rapid than has been the case under any comparable condition of things in the past. The stage is set for them, machinery users will demand them.

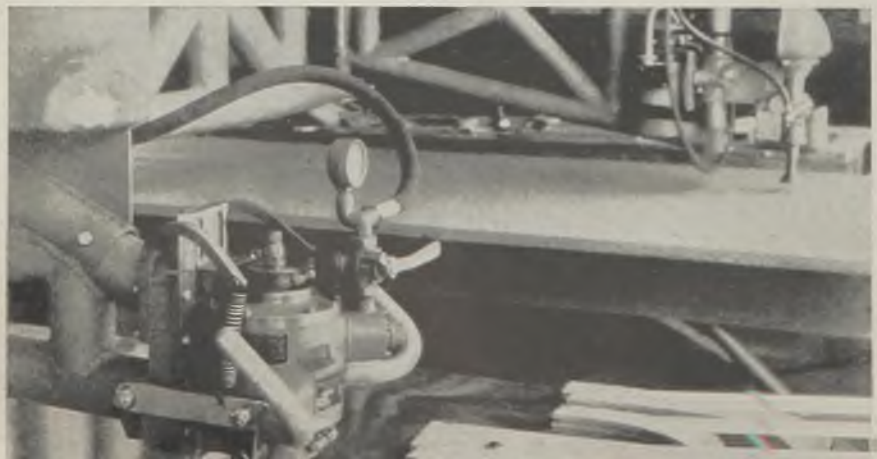
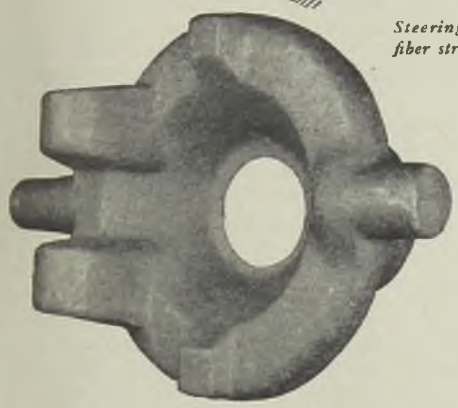


Fig. 2 — Onsrud superspeed air turbine-driven milling head, as adapted by engineers of Beech Aircraft Corp. to perform templet-guided end mill cutting of panels from stacked metal sheets. Three-stage impulse reaction turbine units such as this develop 3-horsepower at 15,000 revolutions per minute. Beechcraft photo

One purpose • • •

the IMPROVEMENT of Metals



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and world competition will force them.

In a previous article entitled "Is Milling Being Revolutionized?" (February 21, 1944 issue of STEEL, Pages 76, 77 and 84), I brought up the subject of high speed end milling and cited a few examples to prove that there is a type of machining whose superspeed possibilities must not be overlooked. I would like to pursue that subject further.

As a background to development work in high speed milling cutters and milling machines for metalworking, I earnestly suggest careful study of the latest cutters and machines used in manufacturing woodworking. A lot can be learned of the shape of things to come, especially in the case of endworking cutters and machines for using them. As a matter of fact, some of the woodworking machinery manufacturers already find themselves in the machine tool business as a result of studies of that kind by production men in the aircraft industry, in which industry superspeed milling seems to have gained its initial impetus.

Look to Woodworking for Ideas

A typical example of how woodworking equipment has been applied to high-speed cutting of metal with end mills, is given by Fig. 2. This machine, representing a meeting of minds between the Beech Aircraft Corp. and the Onsrud Machine Works Inc., makes use of an Onsrud pneumatic motor-driven cutter head mounted on a Beechcraft-built tubular radial arm support. While this particular machine was designed primarily for templet-guided cutting out of metal panels from stacked sheets, similar types of air turbine-driven cutter heads now are being applied to many other kinds of work where efficiency depends on getting small end mills up to speeds not easily attainable through belts or other conventional systems.

These air turbine cutter heads are available in a number of standard models suitable to building into milling machines for a wide variety of purposes. They are governor-controlled and operating at 100 pounds air pressure, they give speeds ranging from 15,000 to more than 50,000 revolutions per minute and develop up to 3 horsepower in the larger sizes such as the three-stage impulse reaction type illustrated.

This type of power unit long has been familiar to users of hand-held power tools, engraving machines and small die sinking machines, but its possibilities in the production machine tool field will stand a lot more exploration, now that ultra-high speed end mills are becoming available in various sizes and shapes —including some very interesting "shear cut" designs. Among the various possibilities is that air-driven attachments for current model milling machines will give these machines high speed milling capabilities far beyond what can be attained through their regular spindle drives.

Speaking of attachments, it must not be overlooked that many of more or less conventional design already are available for doing high speed work

Fig. 3—End milling up to 6000 revolutions per minute on exact radii and to exact angles of arc and to exact depths, is the special function of this rotary head vertical Milwaukee milling machine, here shown at work on two halves of a die casting die. Photo courtesy Kearney & Trecker Corp.

with small mills in machines of heavy duty type. A typical example is that shown in Fig. 1, which is a setup on a horizontal spindle Cincinnati miller featuring the use of a supplementary high speed attachment of two-way adjustable angle type developed by the Cincinnati Milling Machine Co. This is driven from the main spindle through gears which step up the speed.

While this particular setup was not intended to demonstrate any sensational high velocity characteristics of this versatile attachment, it nevertheless is capable of using small end mills much more effectively than they could be used in the slower running main spindle. The interesting point about this tooling is that it enables a complete milling job on a rather complicated part to be completed in one machine at one setup—thus saving a great deal of handling and tooling time, and avoiding tying up a second machine and possibly a second operator. Lately there has been a rising tide of milling attachments similar to this—some driven from the main spindle, some motor-driven through V-belt speeders, and some direct motor-driven. This definitely is a sign of the times in milling.

Fig. 4—High cycle electric motors, similar to this one employed for direct drive of small diameter wheels on a precision internal grinding machine, are destined to be important factors in design of machines for superspeed milling. Photo courtesy Ex-Cell-O Corp.

Another sign of the times indicative of the trend toward end milling as a more general machining method, is the increasing production of vertical spindle milling machines—including heavy duty machines of so-called "gooseneck" type. Among the vertical spindle machines of rather recent vintage is a rotary head machine developed by Kearney & Trecker primarily for tool, jig and die milling, but—with the broadening field of end milling—having much wider possibilities than originally envisioned.

While this is a precision tool of jig borer accuracy, it is sturdy enough for production use in the hands of a reasonably careful operator, even one of limited skill. The unique feature of this machine is that its high speed spindle (250 to 6000 revolutions per minute) is mounted in a "rotary head"—something like an inverted rotary table—in which the spindle can be set off center radially and given automatic or hand circular travel on exact center distances and to exactly controlled arcs of travel, either full 360 degrees or any part thereof, and up to 4 inches in radius. The spindle also has 3 inches of vertical movement either by hand or through eight changes of exactly controlled power feed ranging from 0.0002 to 0.008-inch per revolution. What this machine will do is indicated by the die casting die job, Fig. 3. On work of this kind, cutters as small as 0.014-inch in diameter have been used successfully. While this definitely is not a production setup, no great amount of imagination is needed to envision the production possibilities.

Superspeed Electric Drives

In concluding this article, I want to introduce a subject of which we are destined soon to hear a lot more in connection with high speed milling. I refer to high frequency electric drives. Like air turbines, they already are well known on hand tools and woodworking machines, but outside of a few high speed grinders and some spar millers used in the aircraft industry, they are largely "of the future" as far as standard machine tools are concerned.

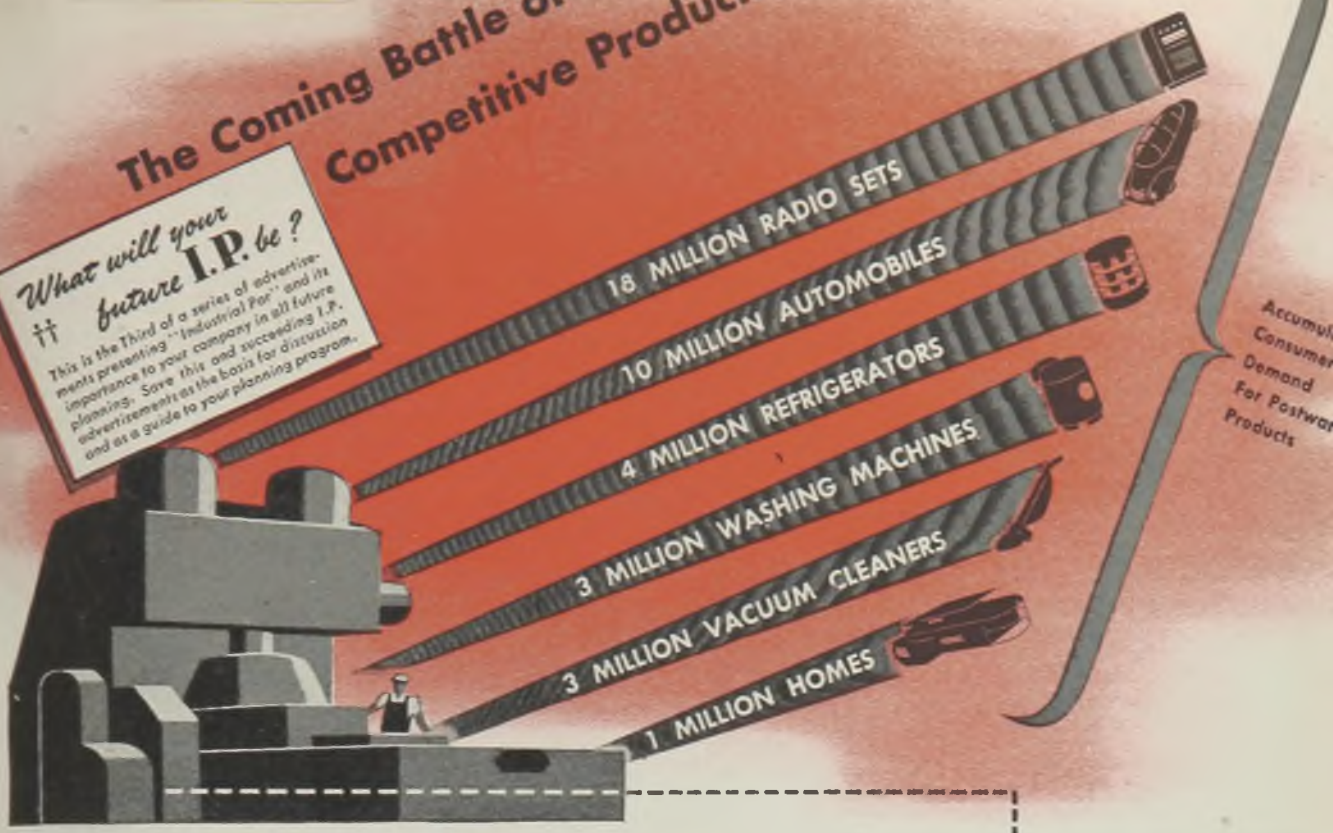
The high frequency installation which I present in Fig. 4 happens to be the wheel head of an Ex-Cell-O internal grinder. Here a wheel of small diameter must be stepped up to extremely high angular speed in order to give it the necessary surface speed for effective cutting. It is easy to envision this water-cooled high cycle head mounted on a milling machine and driving a small end mill at equally effective speed.

I have before me as I write this, a photograph of a 1000-cycle Westinghouse machine tool motor which has rotor speed of 60,000 revolutions per minute. Also, one of a 2000-cycle General Electric machine tool motor, with a tiny grinding wheel mounted on its armature shaft, which runs at the almost incredible speed of 120,000 revolutions per minute. These are not trick designs—they are "the real thing" and they are on the way!

The Coming Battle of Competitive Productio

What will your future **I.P.** *be?*

†† This is the Third of a series of advertisements presenting "Industrial Par" and its importance to your company in all future planning. Save this and succeeding I.P. advertisements as the basis for discussion and as a guide to your planning program.



will your company's I.P. qualify you to meet the Challenge

THERE'S a lot of "wants" waiting to be supplied by peacetime production. Millions of people are just marking time—with billions in money saved and ready to spend — to buy new radios, cars, refrigerators, washing machines, vacuum cleaners, homes and scores of other products as soon as they become available again.

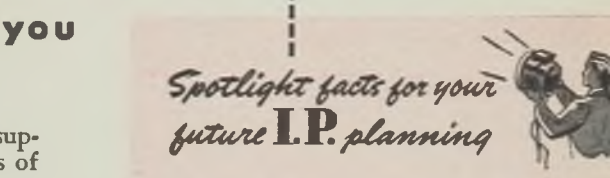
When this flood of pent-up purchasing power breaks, American industry can expect a hard battle of competitive production. The old rule of three in manufacturing consumer goods—quality, quantity, low cost — will be in full sway again.

Manufacturing for peacetime markets will challenge managerial skill as much as manufacturing for war. Building a dominant position in these markets — finding profits — establishing the conditions for employment — will call for broad-visioned plans, able direction and execution.

To improve quality — reduce cost — and increase the output of goods, machine tools — the newest and finest — are indispensable. Machine tools are of key importance in determining your company's standing in terms of *industrial par* — the constantly increasing output per man-hour equal to approximately 50% every 10 years.

Other things being equal — quality of product, price, sales organization — the successes in the coming battle of competitive production will come to those companies best qualified to attain or excel industrial par — its vital significance as summarized in the panel headed "Spotlight Facts for Your Future I. P. Planning."

Your planning for postwar should include as a major project the matter of machine tools — provision for their continuing replacement to assure full productive capacity — to enable you to keep step with a high level of national prosperity — the volume production of more goods for more people at lowest cost and the resulting security of jobs and wages for the greatest number of workers.



Spotlight facts for your future **I.P.** *planning*

* Production methods — developed in wart —increase man-hour output; pent-up buy power — released in peacetime — dema increased production.
* The rate of 2½% increase per year ou per man-hour, established by a 12 year re of industrial production, can be expecte reach at least 4% per year — compoun
* Manufacturers must set a goal of 50% creased output per man-hour every 10 y — to maintain a high level of national p perity and achieve its benefits in terms security of jobs and wages for the grea number of workers and the volume produc of more goods for more people at lowest c
* Machine tools — the most modern, most cient — are recognized as the most effec implements of mass production and increa output at lowest cost — but only conti replacements with the newest and finest chine tools assures full productive capa *Such replacements yearly should be equa 10% of the total machine tool investmen in keeping with increased output.*
* The cost of machine tools is insignifican terms of their productive power . . . f 1927 to 1937, according to census rep American manufacturers had only a tota about 2% invested yearly in machine too ratio to a total volume of 9 billion dol worth of production annually.

†† **Industrial Par** — *the constantly increa output per man-hour equal to approxima 50% every 10 years.*

KEARNEY & TRECKE

CORPORATION

MILWAUKEE 14 WISCONS

MORE BONDS

Milwaukee Machine Too

PREFERRED

Aeronautical Steel Specifications

Presented here is a revised list of aeronautical steel specifications first set up in 1942 under the National Emergency Steel Specifications Program with the object of increasing production through simplification and standardization. Both the original and the revised lists were developed by a special NESS technical advisory committee on aeronautical steels headed by J. B. Johnson, chief, Materials Section, Materiel Command, Army Air Forces, Wright Field, Dayton, O. The Society of Automotive Engineers, American Society for Testing Materials and the American Iron and Steel Institute have participated actively in the NESS program.

The list presented here not only reflects changes in the earlier one, but also combines in a single table the alternative specifications previously included under a tentative classification. The list is intended to assign to the alternate triple-alloy steel specifications a preferred classification in anticipation of their becoming on a tonnage basis the predominant types for aircraft production. The alternative steels are no longer termed "tentative" and in some recent months have accounted for almost 50 per cent of alloy constructional steel production for aircraft use.

While there is less need for conservation of ferroalloys, it is pointed out that conversion from alloy steel production to NE or triple-alloy types is even more necessary than ever because stocks of ferroalloy elements are largely tied up in the form of steel scrap containing nickel, chromium and molybdenum in substantial amounts. This scrap is not suited to production of one and two-alloy steels.

CARBON STEELS

General Trade Designation		Government Specifications: Army-Navy Aeronautical and Federal	Government Specifications: Army and Navy	Government Specifications: Army Air Forces	Government Specifications: Navy Bureau of Aeronautics	SAE Aeronautical Material Specifications (AMS)
BARS, RODS AND FORGINGS						
Screw stock	(1112)		46S17C-Cl. B			5010A
Screw stock	(1120)		46S17C-Cl. A			
1.3 Manganese, Free Cutting	(1117)					5022A
1.5 Manganese, Free Cutting	(1137)					5024A
1.5 Manganese, Free Cutting, Heat Treated	(1137)					5025
	(1015)		46S32 (Int.) Cl. A			5060A
	(1020)	AN-QQ-S-646-1				
	(1022)	AN-QQ-S-646-1				5070
	(1025)	AN-QQ-S-646-1				
	(1035)	AN-S-4				5080
	(1095)	AN-S-5				5132
SHEET AND STRIP						
(Aluminum Coated) Low Carbon						5036
Deep Drawing, Annealed, Cold Rolled	(1010)					5040B
Cold Rolled	(1010)					5042B
Half Hard	(1010)					5044
Cold Rolled	(1020)	AN-S-11				
Cold Rolled	(1025)	AN-S-11				
Annealed	(1070)		47S27a Comp. 2			5120
Annealed	(1095)	AN-QQ-S-666-1				5121
Hard	(1095)					5122
WIRE						
Zinc Coated—Soft		AN-QQ-W-435-3				5033
Zinc Coated—Hard		AN-QQ-W-429-1				
Annealed Uncoated	(1020)					5032
Music Wire—Commercial	(1080)					5110
Music Wire—Best Quality	(1090)	AN-QQ-W-441-3				5112B
Heat Treated	(1070)		47S4g No. 2			5115A
TUBING						
Seamless—Annealed	(1010)					5050A
Welded—Annealed	(1010)					5053
Seamless	(1025)	AN-WW-T-846-1				5075
Welded	(1025)	AN-T-4-1				5077

ALLOY STEELS

BARS, RODS AND FORGINGS						
0.55 Ni, 0.5 Cr, 0.2 Mo:						
	(NE 8615)		46S32 Int.			6270A
	(NE 8617)					6272A
	(NE 8620)	AN-S-13a				6274A
	(NE 8630)	AN-S-14a				6280A
0.55 Ni, 0.5 Cr, 0.25 Mo:						
	(NE 8735)	AN-S-15a				6320A
	(NE 8740)	AN-S-16a				6322A
105,000 T.S.	(NE 8740)					6325A
125,000 T.S.	(NE 8740)	AN-S-16a				6327A
3 Ni, 1 Cr, 0.10 Mo:						
Light Section	(NE 9310)					6260A
Heavy Section	(NE 9310)					6262A
	(NE 9313)					6263A
	(NE 9317)					6264A

(Please turn to Page 107)

Investigate these

ELECTRIC FURNACE STEELS by DISSTON

Aircraft Quality

Standard alloy steel for airplane parts.

Gun Quality

Standard alloy steel for gun barrels, rifle and torpedo parts, and A.P. shot.

These steels are made by modern tool steel practice to Disston's high quality standards. Careful selection of materials, precise control and expert supervision result in an exceptionally sound and clean product.

Reg. U. S. Pat. Off.

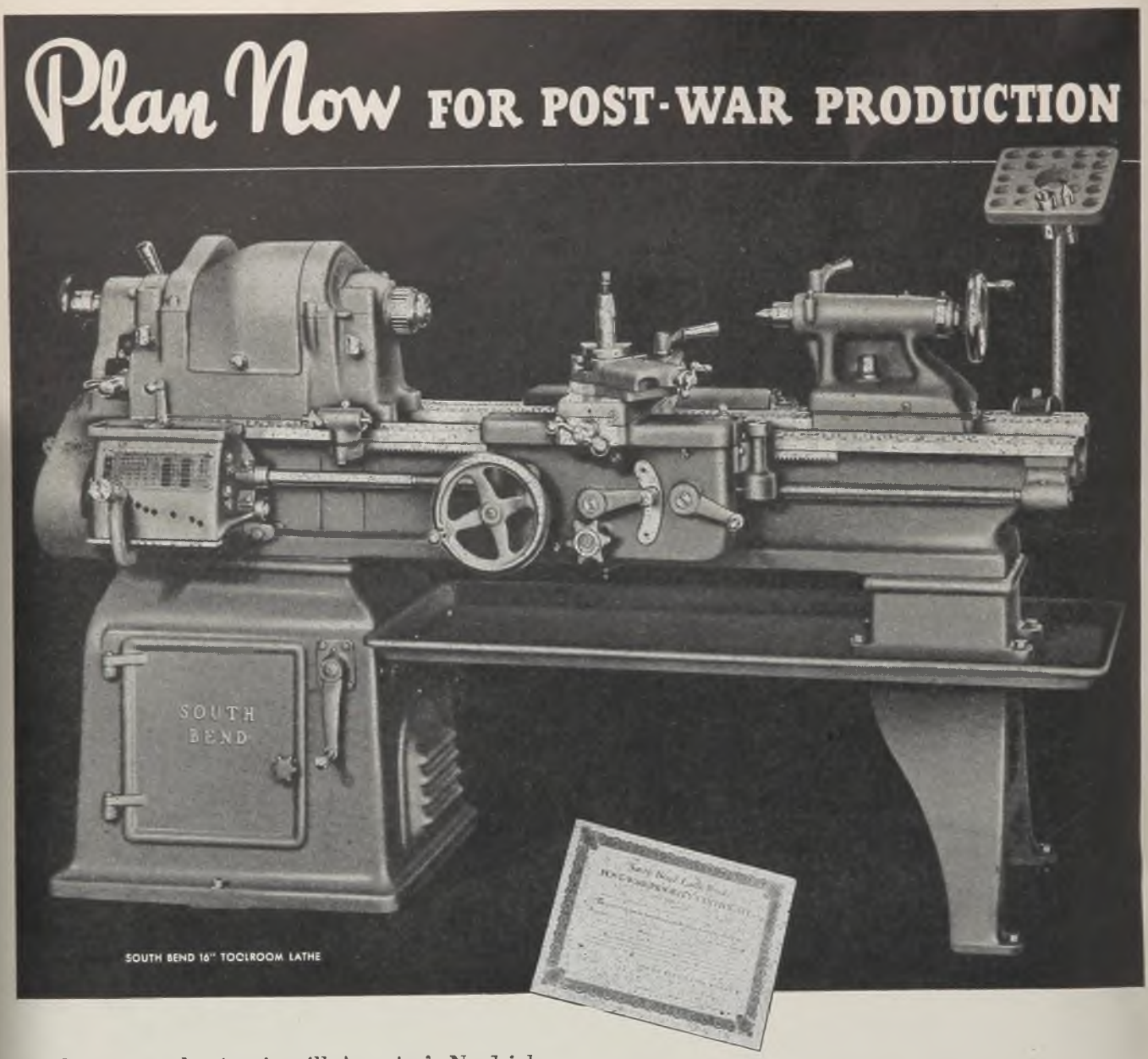
YOUR POSTWAR PLANS

most likely include the use of special steels. Disston metallurgists and engineers can put at your service an unusual background of experience with alloy and carbon steels to help you with your future program. No obligation. Write fully.

HENRY DISSTON & SONS, INC.

326 Tacony, Philadelphia 35, Pa., U. S. A.

Plan Now FOR POST-WAR PRODUCTION



SOUTH BEND 16" TOOLROOM LATHE

While war production is still America's No. 1 job—the time to look ahead to the greatest era of peace-time production is now. Placing orders immediately for post-war machine tools is the first step in reconverting to peace-time production. It means earlier delivery which will permit quicker reconversion—a very important competitive factor.

To manufacturing plants, large and small, where future-planning includes new lathe equipment, South Bend Lathe Works offers a practical post-war priority plan.

You can place your order now for any South Bend Lathe. No deposit or down payment is required. We ask only that your order be placed in good faith. Each order that is received will be acknowledged by a numbered Post-war Priority Certificate.

BUY WAR BONDS NOW . . .
SAVE FOR LATHES

When civilian production is resumed, lathe orders will be filled in the order established by the certificate numbers. Today's prices will apply unless conditions beyond our control necessitate changes. The order may be cancelled at any time. All South Bend Engine Lathes, Toolroom Lathes, and Turret Lathes, embodying improvements developed to meet exacting war production requirements, will be available. No revolutionary changes in design are contemplated.

Don't delay investigating this effective plan that will help strengthen your post-war position. Write now for full details of our Post-war Priority Plan and a copy of Catalog 100-C.

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 37 YEARS — SOUTH BEND 22, INDIANA

ALLOY STEELS

General Trade Designation		Government Specifications: Army-Navy Aeronautical and Federal	Government Specifications: Army and Navy	Government Specifications: Army Air Forces	Government Specifications: Navy Bureau of Aeronautics	SAE Aeronautical Material Specifications (AMS)
1.8 Ni, 0.8 Cr, 0.25 Mo:						
	(4337)	.....	.....	.....	.....	6412A
	(4340)	AN-QQ-S-756a	.....	.....	.....	6415A
1.8 Ni, 0.25 Mo:						
	(4615)	.....	46S32 (Int. Class C)	AC 10240	.....	6290B
	(4617)	.....	.....	.....	.....	6292B
	(4620)	.....	.....	.....	.....	6294B
	(4635)	.....	.....	.....	.....	6310A
	(4640)	.....	.....	.....	EMS 69	6312A
105,000 T.S.	(4640)	.....	.....	.....	.....	6315A
125,000 T.S.	(4640)	.....	.....	.....	.....	6317A
1 Cr, 0.2 Mo:						
	(4130)	AN-QQ-S-684a	.....	.....	.....	6370A
	(4137)	.....	.....	.....	.....	6380A
	(4140)	AN-QQ-S-752a	.....	.....	.....	6382A
1.25 Ni, 0.60 Cr:						
	(3115)	.....	46S32 (Int. Class B)	.....	.....	.....
	(3135)	.....	.....	.....	.....	6330A
	(3140)	AN-QQ-S-690-1	.....	.....	.....	6332
105,000 T.S.	(3140)	.....	.....	.....	.....	6335
125,000 T.S.	(3140)	.....	.....	.....	.....	6337
150,000 T.S.	(3140)	AN-QQ-S-690-1	.....	.....	.....	.....
3.5 Ni, 1.5 Cr:						
Light Section	(3310)	.....	.....	57-107-22AGr.1	EMS 4b-1 and	6250C
Heavy Section	(3310)	.....	.....	57-107-22AGr.1	EMS 5-1	6252C
	(3313)	.....	.....	.....	.....	6253C
	(3316)	.....	.....	57-107-22AGr.2	.....	6254C
1 Cr, 0.15 V:						
	(6135)	.....	46S25	.....	.....	.....
	(6150)	AN-QQ-S-687-2	.....	.....	.....	6448
	(6195)	AN-QQ-S-688-1	.....	.....	.....	.....
0.25 Mo	(4037)	AN-S-9-1	.....	.....	.....	6300
3.5 Ni	(2330)	AN-QQ-S-689-1	.....	.....	.....	.....
5 Ni:						
	(2512)	.....	.....	57-107-18A	EMS 8b-1	6240B
	(2517)	.....	.....	.....	.....	6242B
1.35 Cr:						
	(52100)	.....	.....	AC 10243	EMS 70	.....
	(NE 52100A)	.....	.....	.....	.....	6440A
Nitralloy:						
High Strength	.....	AN-S-19-1 Composition A	.....	.....	.....	6470A
Free Machining	.....	AN-S-19-1 Composition B	.....	.....	.....	.....
SHEET AND STRIP						
0.55 Ni, 0.5 Cr, 0.2 Mo	(NE 8630)	AN-S-12-2	.....	.....	.....	6355A
0.55 Ni, 0.5 Cr, 0.25 Mo:						
	(NE 8735)	AN-S-22-1	.....	.....	.....	6357A
	(NE 8740)	.....	.....	.....	.....	6358
1.8 Ni, 0.8 Cr, 0.25 Mo	(4337)	.....	.....	.....	.....	6359
1 Cr, 0.2 Mo:						
	(4130)	AN-QQ-S-685-4	.....	.....	.....	6350
	(4135)	AN-QQ-S-686-1	.....	.....	.....	6352A
	(4137)	.....	.....	.....	.....	6353
1 Cr, 0.15 V	(6150)	.....	.....	.....	.....	6455A
Low-Alloy High Tensile 75,000 T.S.		AN-QQ-S-676-1	.....	.....	.....	.....
WIRE						
1 Cr, 0.15 V:						
Spring Wire	(6150)	.....	48-7A	.....	EMS 20a-1	6450
Annealed	(6150)	.....	.....	.....	W-42	.....
TUBING, SEAMLESS						
0.55 Ni, 0.5 Cr, 0.2 Mo:						
Annealed	(NE 8630)	AN-T-15-2	.....	.....	.....	.....
Normalized	(NE 8630)	AN-T-15-2	.....	.....	.....	6530A
125,000 T.S.	(NE 8630)	AN-T-15-2	.....	.....	.....	.....
150,000 T.S.	(NE 8630)	AN-T-15-2	.....	.....	.....	.....
180,000 T.S.	(NE 8630)	AN-T-15-2	.....	.....	.....	.....
0.55 Ni, 0.5 Cr, 0.25 Mo:						
Annealed	(NE 8735)	AN-T-22-2	.....	.....	.....	.....
Normalized	(NE 8735)	AN-T-22-2	.....	.....	.....	6535A
125,000 T.S.	(NE 8735)	AN-T-22-2	.....	.....	.....	.....
150,000 T.S.	(NE 8735)	AN-T-22-2	.....	.....	.....	.....
180,000 T.S.	(NE 8735)	AN-T-22-2	.....	.....	.....	.....
1.8 Ni, 0.8 Cr, 0.25 Mo	(4337)	.....	.....	.....	M-491-1	6413
1 Cr, 0.2 Mo:						
Annealed	(4130)	AN-WW-T-850a-1	.....	.....	.....	.....
Normalized	(4130)	AN-WW-T-850a-1	.....	.....	.....	6360A
For Machining	(4130)	.....	.....	.....	.....	6371
125,000 T.S.	(4130)	AN-WW-T-850a-1	.....	.....	.....	6361
150,000 T.S.	(4130)	AN-WW-T-850a-1	.....	.....	.....	6362
180,000 T.S.	(4130)	AN-WW-T-850a-1	.....	.....	.....	6363
Annealed	(4135)	AN-WW-T-852a	.....	.....	.....	.....
Normalized	(4135)	AN-WW-T-852a	.....	.....	.....	6365
125,000 T.S.	(4135)	AN-WW-T-852a	.....	.....	.....	6366
150,000 T.S.	(4135)	AN-WW-T-852a	.....	.....	.....	6367
180,000 T.S.	(4135)	AN-WW-T-852a	.....	.....	.....	6368
200,000 T.S.	(4135)	AN-WW-T-852a	.....	.....	.....	6369
For Machining	(4140)	.....	.....	.....	.....	6381

(Please turn to Page 108)

ALLOY STEELS

General Trade Designation		Government Specifications: Army-Navy Aeronautical and Federal	Government Specifications: Army and Navy	Government Specifications: Army Air Forces	Government Specifications: Navy Bureau of Aeronautics	SAE Aeronautical Material Specifications (AMS)
TUBING, WELDED						
0.55 Ni, 0.5 Cr, 0.2 Mo:						
Normalized	(NE 8630)	AN-T-33-1	.....	.....	.....	6550A
125,000 T.S.	(NE 8630)	AN-T-33-1	.....	.....	.....	.....
150,000 T.S.	(NE 8630)	AN-T-33-1	.....	.....	.....	.....
180,000 T.S.	(NE 8630)	AN-T-33-1	.....	.....	.....	.....
1 Cr, 0.2 Mo	(4130)	AN-T-3	.....	.....	.....	6510

CORROSION RESISTANT STEELS

BARS AND FORGINGS						
18 Cr, 8 Ni	(Type 301)	AN-QQ-S-771-4 Composition G	.....	.....	.....	.....
18 Cr, 8 Ni, 3 Mo	(Type 316)	AN-QQ-S-771-4 Compo. MCR	.....	.....	.....	.....
16 Cr, 2 Ni	(Type 431)	AN-QQ-S-770-2	.....	.....	.....	.....
13 Cr, Free Machining	(Type 416)	QQ-S-763a Class 6	.....	.....	.....	5610A
13 Cr, 1.5 Ni	(Type 414)	.....	.....	AC 10080A	.....	5615A
17 Cr	(Type 440)	QQ-S-763a Class 10	.....	.....	.....	5630A
17 Cr, Free Machining	.....	.....	.....	.....	.....	5632
18 Cr, 8 Ni, Free Machining	(Type 303)	AN-QQ-S-771-4 Compo. FM	.....	.....	.....	5640A
18 Cr, 8 Ni, Swaging	.....	.....	.....	.....	.....	5641
18 Cr, 8 Ni, Heat Resistant	(Type 321 & 347)	QQ-S-763a Class 8	.....	.....	.....	5645B
13 Cr	(Type 420)	.....	57-107-13	.....	.....	.....
Cr, Ni, W, Mo; Valve	.....	.....	.....	.....	EMS 12a	5700
Cr, Ni, Si; Valve	.....	.....	.....	.....	EMS 11a	5705
Cr, Si, Ni; Valve	.....	.....	.....	.....	.....	5710
SHEET AND STRIP						
18 Cr, 8 Ni; Heat Resistant	(Type 321 & 347)	AN-QQ-S-757-3	.....	.....	.....	5510B
18 Cr, 8 Ni, 3 Mo	.....	AN-QQ-S-772a Compo. MCR	.....	.....	.....	.....
18 Cr, 8 Ni	(Type 304)	QQ-S-766a Class 1	.....	.....	.....	.....
18 Cr, 8 Ni; Deep Forming	(Type 302)	.....	.....	.....	.....	5515A
18 Cr, 8 Ni; Cold Rolled, Annealed	(Type 302)	AN-QQ-S-772a Composition G	.....	.....	.....	5516A
18 Cr, 8 Ni; Cold Rolled; 125,000 T.S.	(Type 302)	AN-QQ-S-772a Composition G	.....	.....	.....	5517A
18 Cr, 8 Ni; Cold Rolled; 150,000 T.S.	(Type 302)	AN-QQ-S-772a Composition G	.....	.....	.....	5518A
18 Cr, 8 Ni; Cold Rolled; 175,000 T.S.	(Type 302)	AN-QQ-S-772a Composition G	.....	.....	.....	.....
18 Cr, 8 Ni; Cold Rolled; 185,000 T.S.	(Type 302)	AN-QQ-S-772a Composition G	.....	.....	.....	5519B
WIRE						
18 Cr, 8 Ni; Welding	(Type 347)	.....	46R2c	AC 10286B	.....	5680
18 Cr, 8 Ni; Annealed	(Type 302)	.....	.....	.....	.....	5685A
18 Cr, 8 Ni; Spring	(Type 302)	.....	.....	.....	.....	5688A
18 Cr, 8 Ni 3 Mo Spring	(Type 316)	AN-QQ-W-423-1	.....	.....	.....	.....
TUBING						
18 Cr, 8 Ni; Welded (Hydraulic Systems)	(Type 301)	AN-T-43	.....	.....	.....	.....
18 Cr, 8 Ni; Seamless (Exhaust Systems, etc.)	(Type 347 & 321)	AN-WW-T-858-1	.....	.....	.....	5570C
18 Cr, 8 Ni; Welded (Hydraulic Systems)	(Type 347 & 321)	AN-T-43	.....	.....	.....	.....
18 Cr, 8 Ni; Welded (Exhaust Systems, etc.)	(Type 347 & 321)	AN-WW-T-861-2	.....	.....	.....	5575B
18 Cr, 8 Ni; Flexible (Exhaust Systems, etc.)	(Type 347 & 321)	AN-T-14-1	.....	.....	.....	.....
18 Cr, 8 Ni (Structural)	(Type 302)	AN-WW-T-855-1	.....	.....	.....	.....

Balancing Compound

A material designed for the balancing of electric motor armatures, designated as R-943 balancing compound, is announced by Sterling Varnish Co., 172 Ohio River boulevard, Haysville, Pa. It is supplied in paste or soft putty form and can be applied either by hand or by knife. While it will set in air at room temperature in about 2 hours to a condition such that it will not be affected by subsequent application of insulating varnishes, it does not attain its maximum hardness and mechanical strength unless it is subjected to a temperature of 135 degrees Cent.

Although originally intended for balancing of rotating parts, the company states it is proving to be a highly interesting material for certain types of filling operations such as coil margins and small interstices where good adhesive qualities, low coefficient of expansion and high mechanical strength are required.

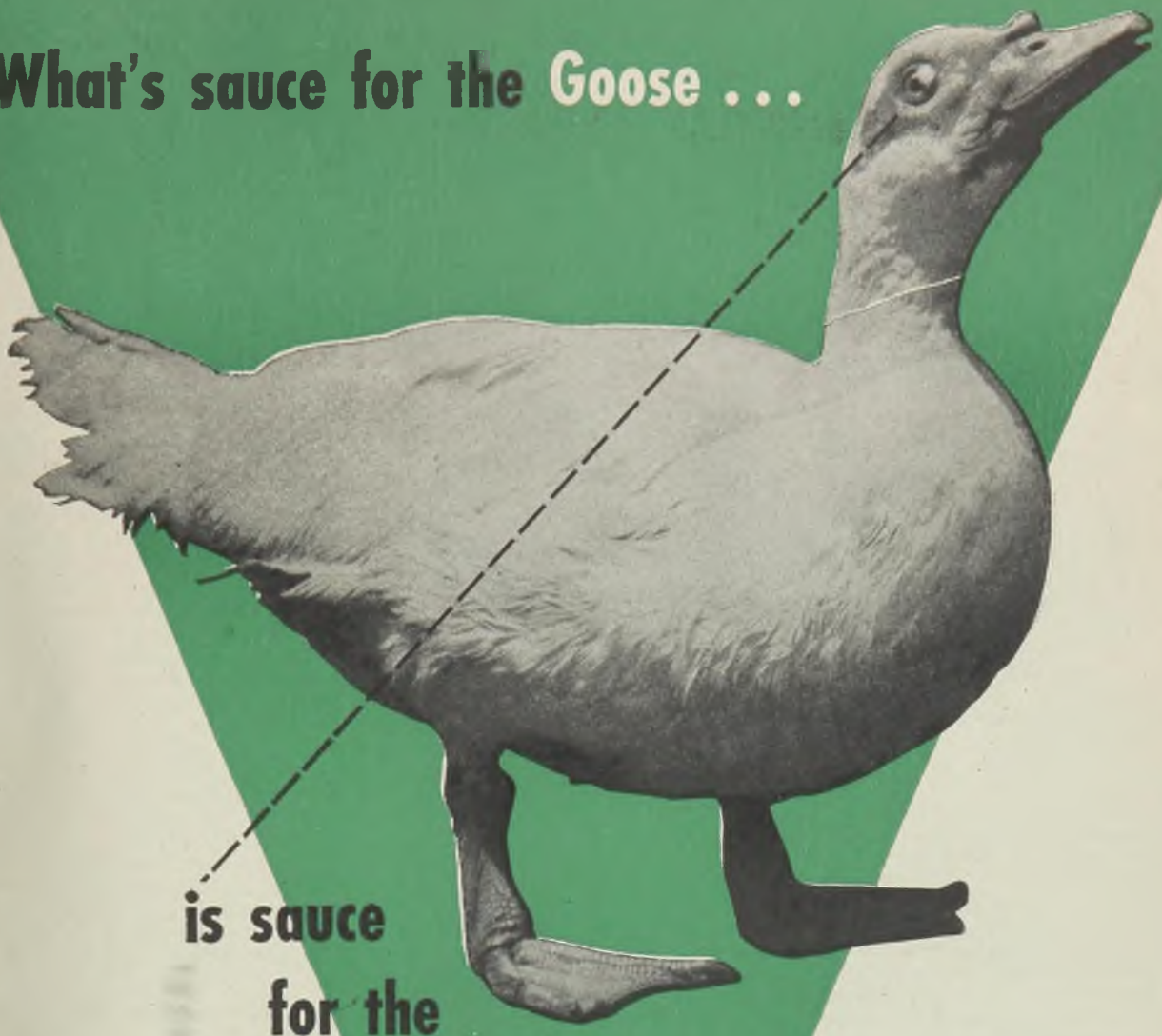
Identification Fluid

Identification marking fluid is now being compounded in 12 different distinct colors to coincide with arbitrary code system in the average stockroom. The fluid is used for marking sheet strips and bar alloys as well as various finished hardened and ground parts for part number marking and other identification. It may be used on all layout work or in inspection departments.

Use of this fluid does not require polishing or finishing of the material to be identified. It is simply brushed on and dries instantly. A remover fluid obliterates part numbers and other identification marks no longer needed. The set is packed in handy combination brush-in-cover containers for shop use. Ink pads and marking pens are also furnished with this identification material.

It is manufactured by and available from Dayton Rogers Mfg. Co., 2835 Twelfth avenue South, Minneapolis 7.

What's sauce for the Goose . . .



is sauce for the Gander

And that applies to welding, too!

For production men agree that Electric Arc Welding—now contributing so essentially to America's wartime production—will play an equally vital part in the manufacturing processes of an approaching peacetime economy. This is just another reason why the **McKay** line of **Stainless, Alloy or Mild Steel Welding Electrodes**—now used nearly 100% for war—is being constantly improved and perfected in one of the nation's leading research institutes. When "Re-Conversion Day" comes, McKAY ELECTRODES will be ready and will embrace the improved metallurgical characteristics required by production-for-peace applications.

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WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

Production HOT

By WALLACE G. IMHOFF
President
Wallace G. Imhoff Co.
Vineland, N. J.

Light articles with large surface area usually are coated by hand

USE of 20 pounds of zinc in the galvanizing pot for each pound of production per hour affords the delivery of approximately 10,000 B.t.u.'s through every square foot of heating area. The number of heat units per square foot per hour bears a definite relation to the heat intensity, and the heat intensity is a vital factor of corrosion of the galvanizing pot; a temperature above 900 degrees Fahr. causes rapid corrosion of the pot. If only 15 pounds of metal per pound of production are allowed the number of heat units per square foot area rises to 12,000 to 15,000 B.t.u.'s, depending upon the heating area to total side area. Assuming this to be the factor of safety in production then there exists the relation of 2000 pounds per hour production with 20 pounds of zinc per pound of production, and between 2600 and 2650 pounds as the maximum overload limit of production. Above this output is the danger of having to transfer more than 15,000 B.t.u.'s through every square foot of heating area, and that means too great a heat intensity which results in rapid corrosion and destruction of the pot. On a safe basis, therefore, 20 pounds of metal per pound of production affords a total metal capacity of 40,000 pounds of zinc in the pot.

The size of the pot is determined as follows: Suppose the article to be coated is 5 feet long, and similar perhaps to an angle or other narrow piece of steel. Assume that each article weighs 20 pounds. The pot holds 40,000 pounds of metal with a 100 per cent safety factor. An allowance of 18 inches is made for scruff, oxide and dirt to accumulate at the ends. That makes the pot length 8 feet. The standard depth of a pot for good combustion application and good operating conditions has been found to be 4 feet. Cut and try methods disclose a width of 3 feet is required. Thus the pot dimension should be 8 feet long, 3 feet wide, and 4 feet deep. Thickness should be 1¼ inches. The pot area is 96 cubic feet. Molten zinc averages about 420 pounds per cubic foot when molten, so that 96 x 420 = 40,320 pounds will be the metal capacity when the pot is entirely full. A galvanizing pot, however, is never filled level with the top.

Technical phases of the relation of production to galvanizing operations and conditions are much more complicated than generally is realized. The most common impression of production is the idea of more pounds or more articles. It is firmly believed by many that all that is necessary is to increase production either in pounds or articles, and that as a direct result costs will be greatly reduced. This is not so.

Suppose, for example, production is a large single heavy article, and that the galvanizing pot is too small in metal capacity although plenty large enough to take the articles. The large heavy articles are at room temperature, and before they can be properly coated they must be brought up to the bath temperature, and then left in the bath for alloying action until all flux bubbles cease to "pop" up through the bath to the surface. When this happens the proper submersion time has been reached and the article should be withdrawn from the molten zinc.

If the pot is too small, and there is not sufficient metal capacity to furnish a large heat reserve, the bath will slowly lose temperature. Two conditions result from this incorrect galvanizing furnace design: (1) The bath can be operated until it is too cold to galvanize, at which time operations must cease and the men sit down and wait until the bath again regains its heat, and (2) excessive heat can be driven into the pot to keep the bath temperature from falling. By the first method time is lost, production falls off, labor costs rise, and galvanizing costs are high; by the second method it is only a question of time until the excessive heating burns a hole in the pot. Both conditions are a result of not having installed the furnace right in the first place.

Takes Heat from Bath

As a contrast to heavy work such as pipe and ship plates which takes excessive heat from the bath all in an extremely short period of time, the opposite condition exists in the metalware field where the articles are bulky, but have little weight. Take a standard 12-quart water pail with a 28-gage steel body and a 30-gage steel bottom. Usually with this type of work there is too much heat. A month's production may be 40 to 60 tons, whereas with heavy work production is 60 tons per 10-hour day. Galvanizing furnace design should take this into account for correct operating conditions and results.

A similar condition is confronted in large and small work. Production may be large pipes and fittings for ships in contrast to small nails and screws. In order to produce a high-quality coating on screws and nails, or like material, small batches must be handled; the treatment requires special labor attention. Handling the product in small batches reduces the pound production put through the bath compared to galvanizing large articles that have a lot of weight, and that can be coated at a fairly good speed because of much easier handling facilities. All of one

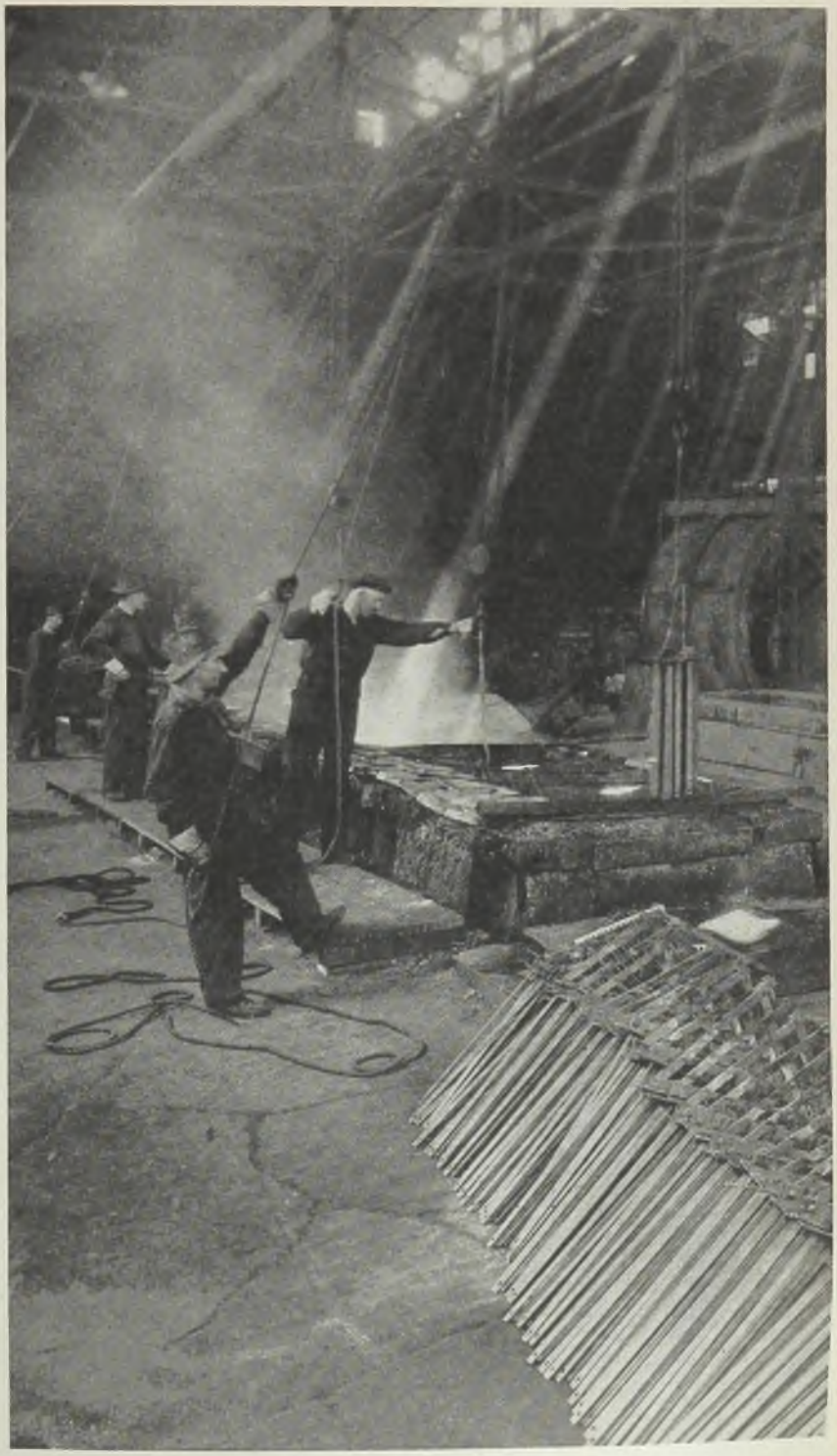
Phases of DIP GALVANIZING

kind of article production, heavy or light, large or small, allows the entire galvanizing unit to be geared up to that kind of work, resulting in maximum production. Mixed articles and a constant changing of sizes and kinds of articles greatly reduce total production. Each kind of article requires its own galvanizing conditions and setup; frequently time is lost in setting up the different handling equipment and adjusting galvanizing conditions to suit the new article to be coated.

Requires Higher Temperature

Table 1 shows that as production increases a higher bath temperature must be carried. If the bath temperature when starting up in the morning is 835 degrees Fahr. then to have correct operating conditions, production must be 19.7 dozen per hour. If the highest quality product is obtained when the production speed is 20.7 dozen per hour then under standard galvanizing operating conditions the bath should have a temperature of 840 degrees Fahr. Low bath temperature involves slower production and longer submersion time. As the temperature rises, production rises and submersion time becomes shorter. Each temperature, and each production, has its own submersion time. If the bath temperature is high and the article is left in the bath longer than its correct submersion time, the zinc deposit increases over that actually required for the best high-quality coating. If the submersion time is excessive, then the zinc attacks the base metal and dross production is greatly increased.

Steel or iron articles enter the galvanizing bath at room temperature, or at drier temperature of 150 to 200 degrees Fahr. Galvanizing bath temperatures vary from 820 to 880 degrees Fahr. with best operating temperatures ranging from 840 to 860 degrees Fahr. Too much production put through the bath for the size of pot and metal capacity necessitates excessive heating of bath to compensate for the heat taken out by the coated stock. This means short submersion time. On the other hand, if bath is too large and is heated excessively then submersion time is too long, dross and



Pole line hardware frequently is handled in batches through coating process

Coating of heavy bulky articles slows down production

zinc per ton of product increases and destruction of equipment is rapid. Table 1 shows that the higher the bath temperature, the heavier the zinc coating will be even when all other factors remain standard; the longer the submersion time the heavier the zinc will be deposited as galvanized coating; and that there is a definite relation between bath temperature, submersion time, and the weight of zinc deposited as coating. Table II shows how correct hot-dip galvanizing conditions are found, and how a standard practice must be set up in every plant, no matter what kind of articles are galvanized, to obtain lowest cost conditions, highest production, and highest quality product. In one plant it took over two years to set up a standard galvanizing practice for all of the articles.

An important relation exists between production and the dross factor. When the submersion time in the bath is too long it tends to create dross, particularly when the base metal is soft iron castings and fittings.

Research reveals that a slowdown in production of castings and fittings may become almost disastrous. As production goes down, dross goes up and vice versa. Therefore, if a bath is operated below its rated capacity, the submersion time is lengthened, and results in excessive dross. As production increases and submersion time is correct, the least amount of zinc is used for coating purposes. High-quality slab zinc added to the bath has a tendency to purify the bath and lower dross production.

TABLE I—WEIGHT OF COATING AT VARIOUS BATH TEMPERATURES

Bath temp., deg. Fahr.	Time of sub-mersion, seconds	Time of with-drawal, seconds	Pro-duction, dozens per hour	Weight of zinc coating, lbs. per gross
800	24.0	11.5	12.5	60.0
805	22.8	11.0	13.5	61.0
810	21.7	10.5	14.5	61.5
815	20.6	10.0	15.6	62.3
820	19.4	9.5	16.6	63.0
825	18.2	9.0	17.7	63.7
830	17.0	8.5	18.7	64.4
835	15.9	7.9	19.7	65.0
840	14.7	7.4	20.7	65.7
845	13.5	6.9	21.0	66.4
850	12.4	6.4	22.8	67.1
855	11.2	5.6	23.6	67.8
860	10.0	5.3	24.8	68.5
865	8.9	4.8	25.9	69.2
870	7.7	4.3	26.9	70.0
875	6.5	3.7	27.9	70.7
880	5.4	3.2	28.9	71.3
885	4.3	2.7	29.9	72.0
890	3.1	2.2	31.0	72.6
895	2.0	1.6	32.0	73.3
900	0.9	1.1	33.0	74.0

Flux Is Carried Over

Fluxing with a muriatic acid dip tends to slow down production and promote corrosion upon drying. If corrosion occurs, the article must be left longer in the bath; in many cases the bath temperature must be carried higher to cause the "zinc to take". This practice leads to lower production, higher dross, more zinc per ton of product, and therefore higher galvanizing costs.

When the liquid flux is used each iron surface has its own flux above it, and carries it over into the galvanizing bath. No time is lost in alloying because the flux keeps the surface clean from corrosion and in perfect condition for galvanizing. Thus the article goes quickly through the bath and comes out perfectly galvanized. This means a low bath temperature, less fuel, less zinc per ton of product, and increased production because of no defective articles.

This age of production requires a wage system that follows production up and down, and pays on the basis of numbers, pounds, or goods produced, rather than as a base wage at a fixed rate per day. The method of remuneration turns everything into numbers, pounds, tons, etc., whatever the production is. The base rate is the 1926 pay rate for production and wages, or an average of a number of years considered to be normal. For example, suppose the normal rate in 1926 was $5.00 a day and 500 articles was the equilibrium production that sitisfied both capital and labor with goodwill and good feeling on both sides. In 1943 the base is immediately turned into production, one article for 1 cent. The emphasis now is not on $5.00 a day, but 500 articles for 500 cents. Suppose that through patriotism and extra effort the same man in March turns out 650 articles in the same time; his wage is $6.50. The method remains the same and as production goes up in articles or pounds, the pay goes up along with it.

TABLE II—SPEED, TEMPERATURE AND ZINC DEPOSITED IN COATING EXTRA-HEAVY REINFORCED CEMENT PAIL WITH AREA OF 688 SQUARE FEET PER 100 PIECES

(Test made with 5-man gang)

Quantity per hr.	84 pieces			96 pieces			108 pieces		
Standard time	5.95 hours			5.21 hours			4.61 hours		
Degrees Fahr.	875	865	855	875	865	855	875	865	855
Lbs. zinc/100	86.00	83.50	81.00	88.50	86.00	83.50	91.00	88.50	86.00
Zinc cost/100 @ $0.0842	7.24	7.03	6.82	7.45	7.24	7.03	7.66	7.45	7.24
Labor cost/100 @ $0.50/hr.	2.98	2.98	2.98	2.61	2.61	2.61	2.31	2.31	2.31
Total cost	10.22	10.01	9.80	10.06	9.85	9.64	9.97	9.76	9.55

Selection of production based on quality of product and galvanizing cost:

First Choice		Second Choice	
Cost	$9.85	Cost	$10.01
Production	96 pieces/hour	Production	84 pieces/hour
Bath temperature	865 deg. Fahr.	Bath temperature	865 deg. Fahr.
Zinc deposited	86.00 lbs./100	Zinc deposited	83.50 lbs./100

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Brazing

. . . . shows its versatility in volume production of many types of joints

A TEXT BOOK defines brazing as a "group of welding processes wherein the filler material is a nonferrous metal or alloy whose melting point is higher than 1000 degrees Fahr. but lower than that of the metals or alloys to be joined."

In recent years, wider recognition has been accorded this method of joining metals by manufacturers of electrical equipment, household utilities, office machines and automotive parts. Its versatility is demonstrated in accompanying photographs showing some methods of brazing nonferrous joints on a production basis at Westinghouse Electric & Mfg. Co.

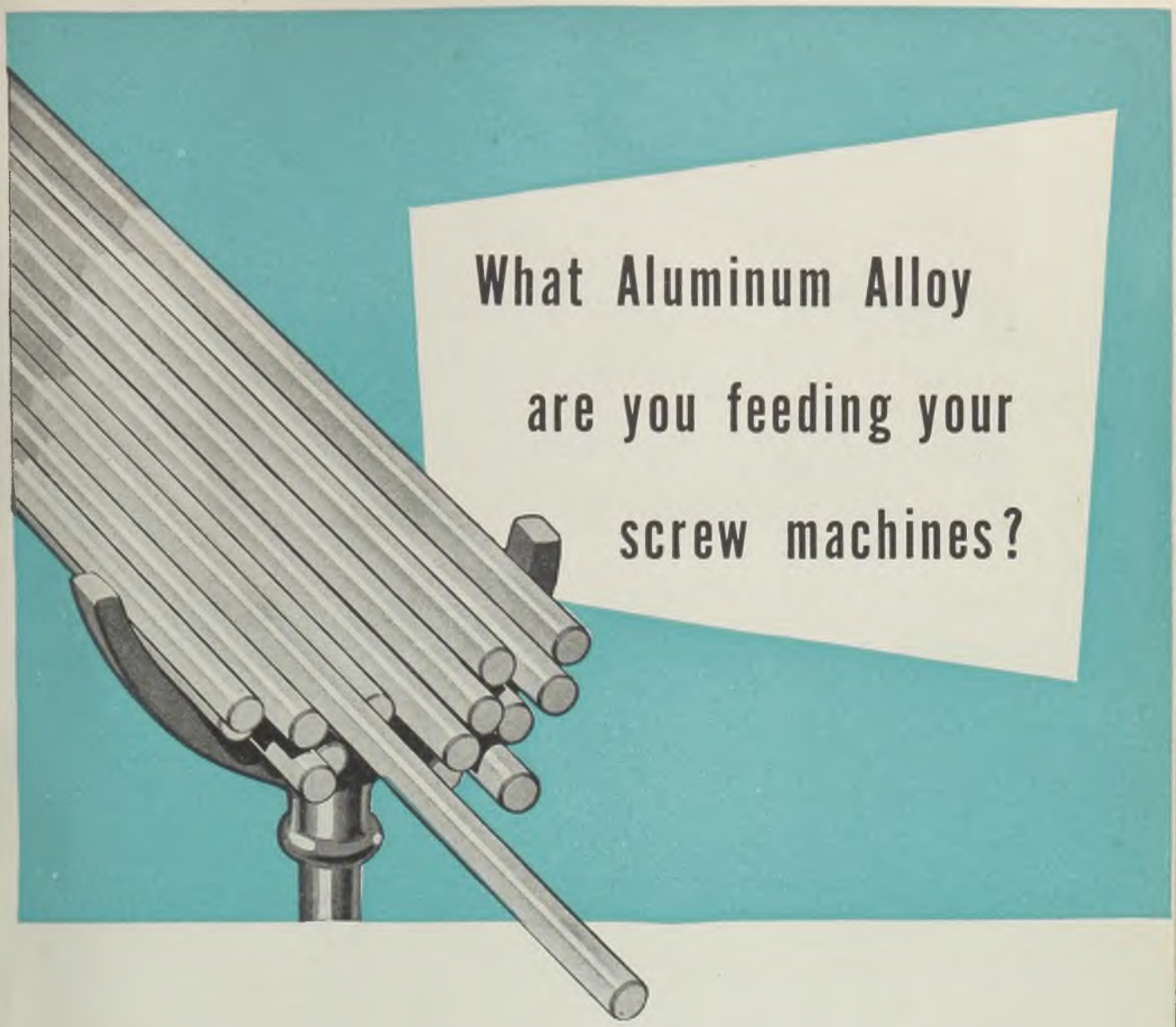
Three of the methods use phos-copper, a low-melting-point filler metal well suited for volume production on certain parent metals. They include gas brazing with an oxyacetylene torch, most flexible method of heating parts to be brazed; incandescent carbon brazing, using a minimum of brazing alloy; and electric furnace brazing, suited to heating a variety of parts. The fourth type, not shown, is accomplished by immersion in either a metal or salt bath heated by gas or electricity.

With the setup shown in circle, a strong, leakproof joint is made in only a few seconds by heating with the gas torch between the diaphragm and copper flange on an assembly for condenser bushings.

Top left, a worker uses the incandescent carbon method to braze terminals to alternating-current welder leads. Heat is generated largely in the carbon electrodes and transferred to the work by conduction. Joints are heated and cooled under pressure, insuring strong joints with a minimum of brazing alloy. No jig is needed, as the portable welding tongs clamp the joint members with enough pressure to insure good contact and prevent movement of members in heating and cooling.

Where the brazing is done in a controlled-temperature furnace, lower right, and a low-melting-temperature brazing alloy such as phos-copper is used, it is possible to finish machine and heat treat parts to a tensile strength of 150,000 pounds per square inch before joining. The phos-copper is replaced. Upon being heated to the melting point in the presence of a reducing protective atmosphere, it is drawn into the joint by capillary action. As a result, the joint is strong and uniform. The protective atmosphere prevents oxidation during heating and cooling, producing clean, bright work of excellent appearance.

Process at lower left is a kind of fifth cousin to the others in that no filler metal is required. Nevertheless, brazing with a spot welder is a bona fide production method. In this application, where it supplements regular spot welding procedures, it affords the advantages of lower heat, faster operation and elimination of special joint preparation.



What Aluminum Alloy are you feeding your screw machines?

Alcoa Alloy 11-S, known as "free-cutting aluminum", was once the standard of many companies for their screw machine products. Then the necessities of war, and the need for maximum output of metal, made it necessary to limit the number of alloys produced. The high strength, but slower machining, 17-S was one of the alloys retained.

Today, production of aluminum has increased to a point where we are again in a position to offer Alloy 11-S. Here is a means, then, if the higher strength of 17-S is not required, of boosting the output of your screw machines: Change over to Alcoa Alloy 11-S.

TYPICAL MECHANICAL PROPERTIES				
Alloy	Yield Strength	Ultimate Strength	Elongation % in 2″	Shearing Strength
17-S	40,000	62,000	22	36,000
11-S	42,000	49,000	14	30,000

Using 11-S or 17-S—all of the usual advantages of aluminum are, of course, retained. You get three times as many pieces per pound, compared to the heavy metals. Resistance to corrosion is inherent in the metal. Aluminum requires no expensive plated coatings, but there are a number of Government-approved finishes for aluminum. For more complete data, write ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

Fig. 1 — Placing openings on all four sides of pallet allows two to four trucks to work on stacks since forks of trucks can engage any side of the pallet, speeding moving and storage operations. All photos by Signal Corps

Materials Handling Innovations

MECHANICAL handling methods used to supply our fighting men are continually undergoing changes in order to expedite the delivery of food, clothing and equipment. In many warehouses of the California Quartermaster Depot, Oakland, Calif., two recent developments are being utilized to speed the movement of vital supplies. They are of interest because they can easily be adapted to plant materials handling operations.

Both of these new improvements were originated and developed by the Commanding Officer of the California Quartermaster Depot, Col. Milton O. Boone. The first of these, known as the "Boone car-plate lifter", is ingeniously simple. It is a device which enables the easy transportation, placing and handling of the extremely heavy and cumbersome steel plates used as ramps between freight cars and loading platforms. Heretofore these heavy plates, which weigh up to 300 pounds, required three or four men to handle them. There was always the danger of crushed fingers or strained backs. Now one girl and a fork truck can, in short order, carry the plates any distance and place them easily in any position with absolutely no physical danger.

Steel loops, with a key handle, are inserted in appropriately shaped holes burned into the plate and turned 90 degrees either way to lock them in place as shown in Figs. 2 and 3. The loops are used in pairs and when installed make perfect apertures for the forks of the hoist-lift truck, which are run through them. When inserted in the loops, the forks of the truck are raised enough to permit ample floor clearance and then the truck carries the plate on the forks to the point desired as in Fig. 3. Thus, the facile, expeditious handling of these formerly heavy and always dangerous ramps is accomplished. Precious time, urgent man hours of labor are saved and, of equal if not greater importance, a safer operation results.

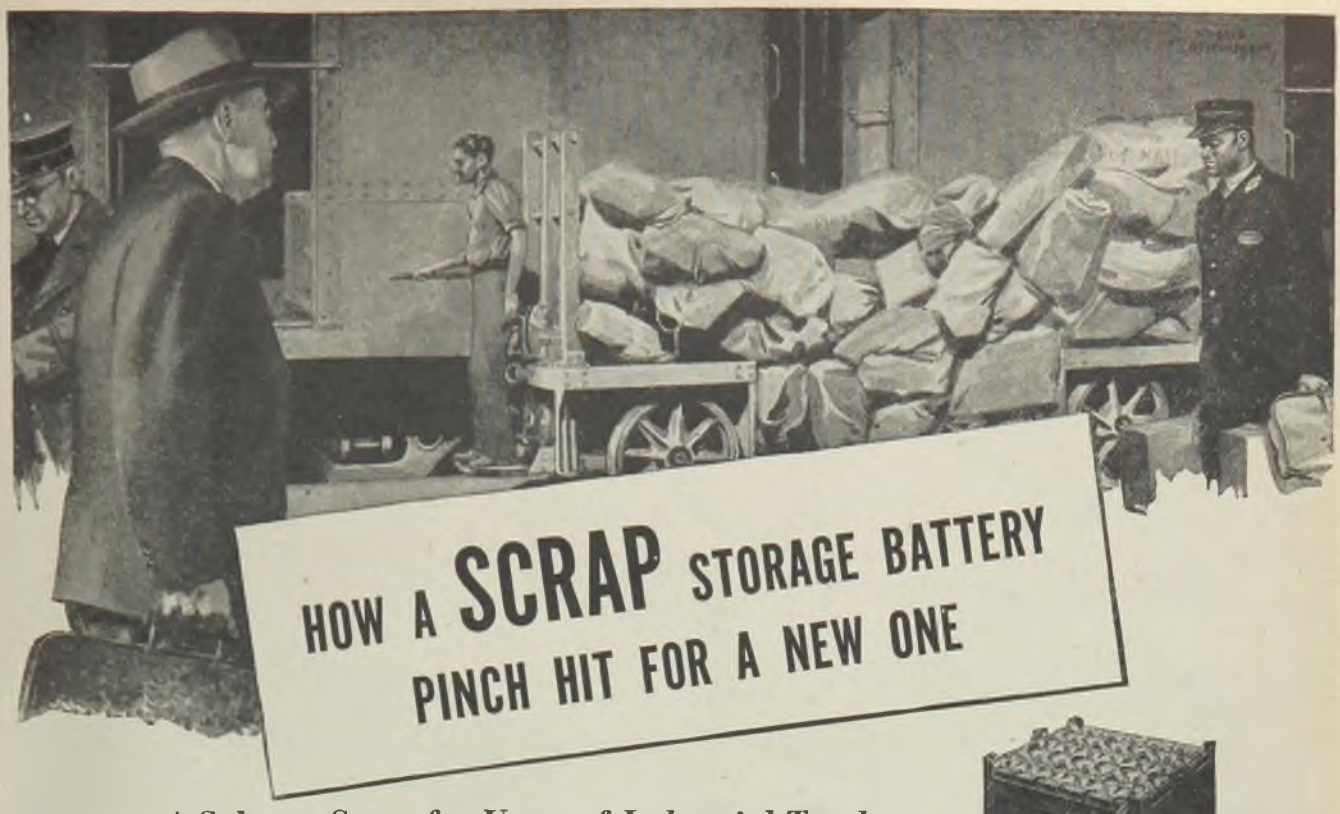
Likewise, since the movement of material is the largest single activity of a supply installation, the second of these developments, known as the "Boone Four-Way" pallet (patent applied for) was designed to eliminate excess movements. The standard pallet has openings at only two ends for the entrance of the two forks of the fork-lift trucks. This means the trucks can approach a tier of goods from but two directions.

The Boone pallet, however, has openings on all four sides, Fig. 1, and permits the entrance of the forks of the

(*Please turn to Page* 143)

Fig. 2 (Left below)—Small rod through end of fitting locks into keyway burned in floor plate, when turned 90 degrees. This permits forks to lift plate as shown

Fig. 3 (Below)—Lifting hooks locked into floor plate simplify problem of moving and placing heavy plates which serve as ramps between loading dock and car floor



HOW A SCRAP STORAGE BATTERY PINCH HIT FOR A NEW ONE

... A Salvage Story for Users of Industrial Trucks

A few years ago, an Edison Alkaline Battery, operating an industrial truck in a New England railroad terminal, was retired from service as "worn out." It had passed the usual "retirement age" and was beginning to show signs of no longer having adequate capacity for the work.

So the electrician in charge issued instructions to have it crated and shipped back to our factory for scrap credit. The battery was crated but in some unaccountable manner was not shipped. Instead, it was sidetracked into a corner of a dead storage room where it remained unnoticed for more than a year.

By lucky coincidence it was discovered again at a time when the terminal happened to be short of industrial-truck batteries. It was uncrated, charged, and put into one of the trucks just to see what it could do. It did so well that it was kept in regular use and was not finally replaced with a new one until more than a year later.

What this incident illustrates, more than anything else, is the fact that even after an alkaline battery reaches the normal end of its useful service life, and no longer delivers its full rated capacity, it is still a dependable power source, not in the habit of failing unexpectedly. Some of the unique characteristics of the Edison Alkaline Battery which account for this great reserve of dependability are cited in the column at the right.

ADVANTAGES OF THE EDISON ALKALINE BATTERY IN INDUSTRIAL TRUCKS AND TRACTORS

★ It is durable mechanically. High strength steel construction is used in the containers, grids, pole pieces, etc. The electrolyte is a preservative of steel.

★ It is foolproof electrically. It may be accidentally short-circuited, over-charged, over-discharged, or even charged in the reverse direction without injury.

★ It can be charged rapidly. It is not subject to finish-rate limitations. It requires no equalizing.

★ It withstands temperature extremes. It is not damaged by freezing. Free air spaces on all sides of all cells provide ventilation for rapid cooling under high temperature conditions.

★ It is simple to maintain. Merely charge adequately, add pure water, keep clean and dry.

★ Its tray assembly and cell connections are extremely simple.

★ Its life is so long that its annual depreciation cost is lower than that of any other type of storage battery.

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The problem of an economical and satisfactory form in which to introduce Boron is met by a special ferro-boron produced by the Molybdenum Corporation.

As to the availability or approved uses of Tungsten, Molybdenum, or Boron, correspondence is invited.

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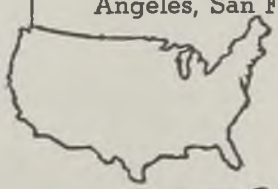

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Hack Saw Machine

A machine to meet the need for a saw to cut off or trim large billets, blocks and forgings, fast and accurately, retaining all the advantages of the hack sawing method has been developed by Armstrong-Blum Mfg. Co., 5700 West Bloomingdale avenue, Chicago 39. The largest capacity hack saw built, it has nominal

capacity of 24 x 24 inches; maximum capacity of 25 x 26 inches; weighs 16,000 pounds; covers a floor space of 56 x 122 inches and has an extreme height of 151 inches.

Low initial cost, low tool cost, small chip loss, low power consumption, low maintenance and simplicity of operation are some of the features of this machine. It employs low pressure feed and unique roll-stroke cutting action. All moving and essential machine parts are fully enclosed and protected against abrasive dust and dirt, as well as rough usage incidental to large work.

This "giant" saw, known as Marvel No. 24, takes a special blade 36 inches long, 4½ inches wide and ⅛-inch thick with 2½ teeth per inch. The blade is of unbreakable composite type, employing high-speed steel teeth and a tough alloy body. The machine illustrated is installed at the Mesta Machine Co., Pittsburgh.

Lathe Tools

Engine lathe tooling is simplified and production greatly facilitated by quick change lathe tools manufactured by Kyle-Johnson Machine Co., 1627 West Pico street, Los Angeles. These tools make possible any necessary change to any kind of operation without the use of wrenches after setup has been determined. Fine height adjustment of all tools is maintained regardless of change of tools from one operation to another, or from lathe to lathe. Instant positioning and accurate repeating is assured.

Tool changes are made in a few seconds—a few turns by hand of the draw screw lock releases the tool to be removed. The other tool is slipped into the special nonbind-taper recess, quickly drawn into full position and rigidly secured.

Drilling is facilitated by using the machine feed. Threading, turning or alternative operations in any combination, may be done at the will of the operator. Side forming is accomplished easily as the tool holder is rigid and excess overhang is eliminated. For boring, the same holder will accommodate boring bars ¼ to 1 inch. Former cut-off troubles are eliminated by fine height adjustments and 50 per cent less overhang.

These quick change lathe tools will take all the feed the lathe itself will stand. Torque load is taken by vertical adjustment screw.

Vernier Gage

Continental Machines Inc., 1301 Washington avenue South, Minneapolis 4, announces the new DoAll vernier gage, which simply and effectively extends the range of combinations of sizes which can be made with any set of gage blocks by enabling combinations to be made in steps of 10 microinches and to the same degree of accuracy as provided by precision gage blocks.

The added versatility of a set of gage blocks used in combination with the gage greatly reduces costs of producing special

gages where the dimensions must be held to "split tenth" accuracy. Gage blocks in combination with the gage can be set up quickly to produce practically all types of snap gages, height gages and depth gages to millionth accuracy at a fraction of the cost of a special gage. In combination with gage blocks a precision sine bar can be set to angles within two seconds of an arc. Toolmakers and inspectors can measure quickly any dimensions to within 10 microinches. No skill is required in setting the gage which is wrung together in the same manner as standard gage blocks.

The gage is simple in construction, consisting of two gage blocks having a precision taper on their mating faces. When the taper faces of two blocks are wrung together with their taper index marks coinciding, the blocks form a gage block whose height is 0.700-inch. One block is graduated into 10 equal parts between the index graduations. By sliding this block to the right, the height of the vernier gage is increased 1/100,000-inch for each graduation, because of the taper. Sliding the block to the left, the height of the vernier gage is decreased 1/100,000-inch for each graduation.

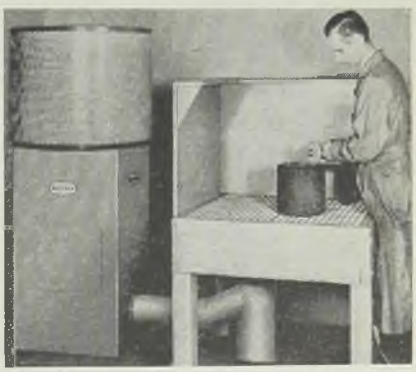
Fluorescent Starter

A new fluorescent starter that utilizes a simple form of thermal switch in series with timing switch has been developed by Westinghouse Electric & Mfg. Co., East Rittsburgh, Pa. When the lamp is in good operating condition the starter functions normally—it merely provides the time to start the lamp. When the lamp fails, the starter makes a few attempts to put it in operation. The resultant heat brings the thermal switch into play which then permanently opens the lamp circuit. The new device eliminates blinking and reduces current flow through lamp auxiliaries—thus saving power. The starter is fully automatic. When the burned-out lamp is replaced, the starter automatically resumes its normal lamp-lighting function. This "No-blink" starter is available for 40 and 100-watt lamps.

Dust Collector

Important features of the new dust collecting unit added to the line of Aget-Detroit Co., 602 First National building, Ann Arbor, Mich., are: Extreme simplicity of installation, savings in heat, reduction in space, valuable interchangeability less time and cost for maintenance. The equipment consists of two separate units—the wood bench with backstops of sheet metal to stop heavy particles, and the self-contained dust collecting unit which has its own motor, fan cyclone separator and filter complete. Installation is by merely connecting the intake of the model 120 Dustkop to the outlet of the bench.

Dust, dirt and lint from flexible shaft



grinding and similar buffing and polishing operations is drawn down through the 1000-pound capacity removable wood grill. Here it encounters a horizontal baffle which spreads the suction of the air and also catches heavier pieces of

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

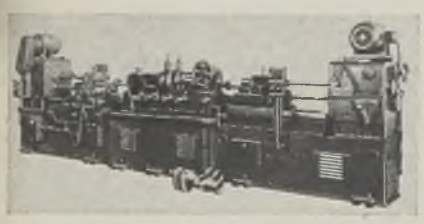
work, as well as any tools which may be dropped through the grill. Heavy dust and dirt drop down through the funnel to the bottom of the stack for removal through a hand-hole clean-out. Lighter dust enters the inlet of the unit through the connecting pipe. A multiple bladed fan, direct-driven by a 1½-horsepower motor, supplies ample suction at the working level and also sufficient pressure to assure high efficiency separation of the dust and air in the cyclone separator. The dust and dirt separated out by the cyclone drops into a glass storage jar, while the cleaned air passes through the drum-type spun glass filter and recirculates throughout the working space for a considerable saving in heating.

Use of separate units permits the use of the Dustkop interchangeably for work other than flexible shaft type. Changing the unit over to handle the dust from a double-end grinder operation, for example, can be accomplished by fastening a double inlet flange to which can be connected flexible metal hose in place of the single type supplied with the unit. Thus, the unit can be used interchangeably as required, taking only a few minutes to make the changeover.

Rating of this model is 1200 cubic feet of air per minute at velocities upward of 4500 feet per minute. The bench is shipped completely assembled except for the sheet metal backguards which are set up easily.

Reaming, Counterboring And Tapping Machine

A special-purpose machine developed for reaming, counterboring, left and righthand tapping aircraft crankshaft sections after assembly is announced by Snyder Tool & Engineering Co., 3400 East Lafayette avenue, Detroit 7. The

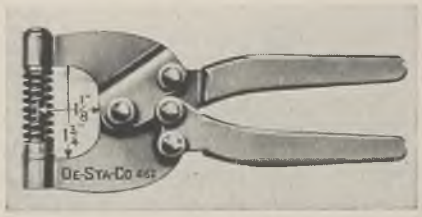


principal distinguishing feature of the machine is its horizontal design which results in the machine being built in three sections—a central section carrying the fixture and two end sections carrying spindles, drives and slides. Each end of the machine is, in effect, an indivdiual machine performing a complete set of operations upon one end of the workpiece. Thus, both ends of the workpiece are processed simultaneously with but one-loading and unloading operation.

The slides for reaming and counterboring have hydraulic feed while tapping is by a lead screw after hydraulic rapid approach. The fixture is manually operated and tools are exchanged between each successive operation. Each tool and operation has its own individual lever setting on the drive unit and the machine automatically selects the correct speed and depth for each tool throughout the automatic work cycle.

Portable Toggle Clamp

Detroit Stamping Co., 359 Midland avenue, Detroit 3, announces a new, small, portable clamp which automatically adjusts itself to varying thicknesses of work. It measures 7¼ inches in overall length and incorporates the pressure-matic feature developed by the



company. Its range of automatic adjustment is from 0 to ⅜-inch and it has a generous throat dimension.

Adaptable to jobs where space limitations prevent the use of larger tools, the instant self-adjusting feature affords exceptional advantages in riveting, welding, reaming, drilling and other operations where manual adjustments of the spindle gap would otherwise require valuable production time. Designated as model 462, the new clamp is built of pressed metal parts, with rust-resisting finish.

Circular Relief Grinder

When equipped with special attachments ,the circular relief grinder, developed by Cleveland Tool Engineering Co., 1263 West Fourth street, Cleveland 13, will accommodate any size of ship or boiler reamer or tap—including all "bent shank" taps. It now is possible to get as many as ten grinds, each of which has true circular relief and is equal to or better than the "factory" grind.

Solution to the problem of centering the tap and holding it in place during the grinding operation is the constant height V-block which is used in conjunction with the offset center. While simple in both principle and operation, this block affords the unique advantage of enabling the most inexperienced operator to center a tap of any diameter in a matter of seconds.

Following the exact outside contour of

the tap or reamer is accomplished automatically. By merely setting the graduated adjustable cam to the correct position, equal relief is given to each cutting edge of the tool. By making each regrind a duplicate of the original or "factory" grind, the number of grinds and the total output of each tool is multiplied many times, thus effecting large savings in replacements alone.

Rods and Indicators For Index Mills

In answer to many requests from users of Index mills, the Index Machine & Tool Co. has designed proper attachments and will install measuring rods, indicators and micrometer heads on the latest model Index mills. With this equipment the user will be able to locate and bore holes in an area 8 x 16 inches. The indicators are graduated in 0.0001-inch and are liberally spaced so that the inexperienced operator will have no difficulty in locating holes exactly where

they are wanted. Equipment is available through Blank & Buxton Machinery Co., 3100 East Michigan avenue, Jackson, Mich.

Spotlight for Arc Welding Operators

To provide glareless illumination of sufficient intensity for an arc welding operator to see his work distinctly through the dark lens of a welding helmet prior to striking the arc, a new spotlight has been designed by the Electric Welding Division, General Electric Co., Schenectady, N. Y.

The spotlight, Cat. 89X391, is especially desirable for production-line welding. It increases production by saving time and reducing operator fatigue since it is not necessary for the operator to lift his helmet before striking the arc. It also reduces spoilage of exacting work because the operator can strike the arc precisely where required.

Mounted on an upright, telescoping metal standard and set firmly in an 18½-inch diameter, 30-pound cast iron base for stability, the spotlight consists of three 300-watt reflector spot lamps surrounded by a circular shade. Rated to give 1000 hours of continuous operation

Reaching the HIGH SPOTS

LOOK at this picture. The Northwest handles frames right to the second floor deck. An emergency solved! No lost time, no trucking, no jamming up of freight elevators, time saved, production speeded up.

An unusual problem! But whether it is unusual or usual Northwest crawler cranes do things no other type of material handling equipment can do. Northwests go anywhere. They make those formerly unused far off corners of the yard available. They handle any type of load and unload or load any type of conveyance. They pile to high storage or low. They handle coal or ashes for the power plant, scrap, borings and turnings for the shop and odd construction jobs for the maintenance department. Your Northwest is *always busy* saving money and speeding up output.

Why not let us tell you more in detail what it can mean on your particular problem? No obligation at all. Ask for the Northwest man.

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- Load and unload a
kind of conveyanc
- Handle any type o
material, loose or solid
- Handle magnet for scrap,
turnings and borings.
- Goes any place to make
out-of-the-way corners
of the yard usable.

Let's get acquainted
INVESTIGATE
THIS Different
CRAWLER
CRANE

NORTHWEST
The Crane that goes Anywhere!

at 120 volts, the lamps are mounted in adjustable porcelain holders, so that the area covered by the light beam can be increased from a single, sharp spot 7 inches in diameter to a clover leaf shaped pattern approximately 17 inches across at its widest point.

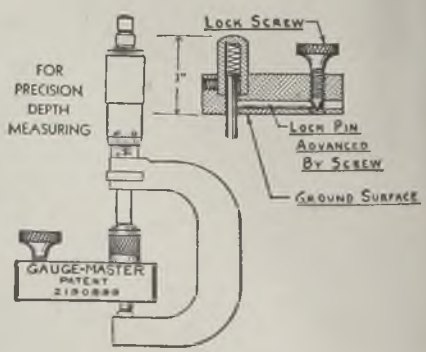
The light can be raised or lowered on its standard and held securely in place by a locking thumb screw to any point from 45 to 76 inches above the base. A universal, friction ball-joint between the

shade and the upright standard permits the light beam to be directed and held at any angle downward between vertical and 30 degrees below horizontal.

Controlled by a foot-operated switch which is depressed by the operator while the arc is struck, the unit is equipped with a 10-foot oilproof, heavily jacketed cable, with plug for connecting the light to the electric circuit. Except for the inside telescoping section of the standard, the entire unit has an attractive black crackle finish and is furnished completely wired and ready for operation.

All-Purpose Gage

A new all-purpose master gage for making depth and inside micrometer measurements with an ordinary micrometer caliper, eliminating need for a depth micrometer in most precision work, has



been perfected by L. H. Harvey Associates, 254 First avenue North, Minneapolis.

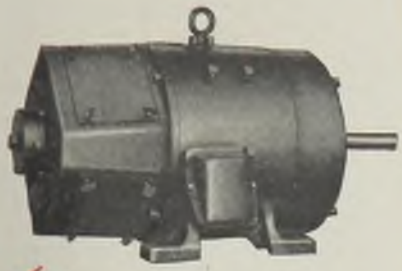
It consists of a hardened steel block ½-inch wide, ½-inch high and 2 inches long, near one end of which is mounted a hollow head containing a coil spring. This spring actuates a measuring pin

CENTURY

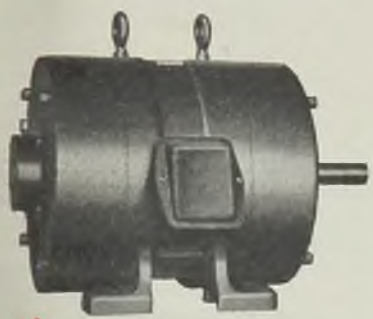
ELECTRIC MOTORS and GENERATORS Meet Navy Combat and Maritime Specifications

Century's Marine Experience Can Help You, Too

Direct current, drip proof motor

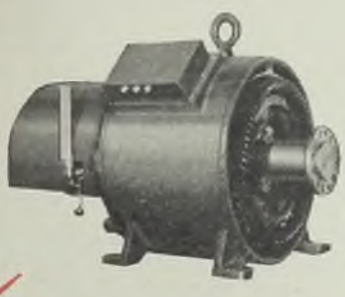


Direct current motor with waterproof protection



3 phase, drip proof motor

3 phase, totally enclosed, fan cooled motor



3 phase, rotating field generator with direct current exciter

The types of Century Motors shown on this page are now in service on many Naval and other marine applications. These motors are ruggedly built to meet the toughest conditions of wartime requirements.

Here are some of the applications of Century Motors in the marine field:

Diesel fuel pumps	Pumps for fresh water stills
Bilge pumps	Air compressors
Transfer pumps	Refrigeration compressors
Brine pumps	Steering gears
Cooling water pumps	Fans and blowers
Fire pumps	Oil burners
Capstans	Workshop machine tools
Hoisting machinery	

Generators and motor generator sets for light, power, and communication

A Century engineer will be glad to assist you with your electric motor application problems. His experience may prove valuable to you—why not call him in today?

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Offices and Stock Points in Principal Cities

Century MOTORS

1/20 to 600 horsepower

358

extending through the ground under-surface of the block and is held in position by a thumb lock screw. In operation, the measuring pin is forced down by the spring until it seats itself, then is locked by the lock screw and the reading is taken with a micrometer caliper, from the top of the head to the tip of the measuring pin.

When the measuring pin is locked flush against the ground surface, release of the lock permits the spring to force the head upward for instantaneous setting to the micrometer. For use with a 2-inch mike the head is set 1 inch above the ground surface. Depths to 1 inch can be measured with the two interchangeable pins supplied with the gage. For a 1-inch mike, the head is set ¾-inch up and depths to ¼-inch can be measured.

Measuring pins are standard 5/32-inch drill rod; longer pins can be made by the user to measure greater depths. Readings can be taken with an ordinary scale if micrometer precision is not required. The gage also can be set to a micrometer reading and used as a go-and-no-go gage.

Lathe Centers

Extension of the carbide insert into the shank of the tool results in longer service life of its new lathe centers and half centers, according to Wendt-Sonis Co., Hannibal, Mo. This extension is approximately equal to the exposed portion of the tip allowing extra regrinds before replacement is needed, should the bearing surface of the tip become damaged.

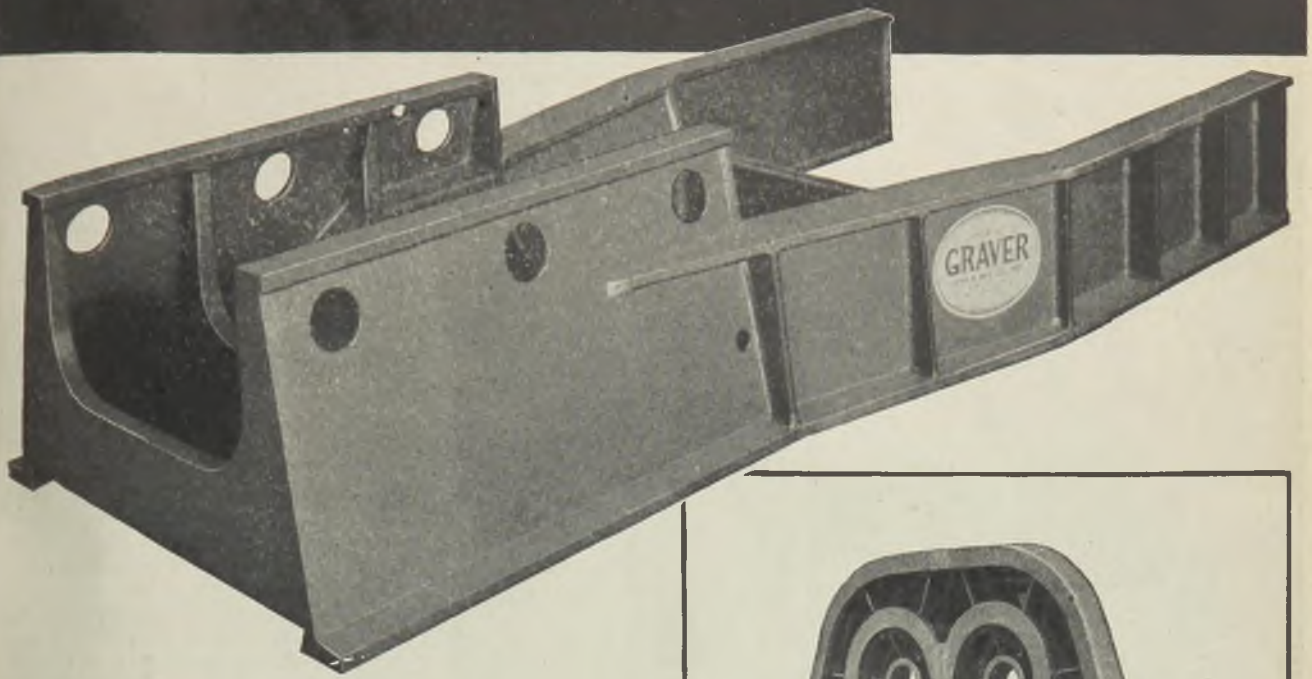
Because of special precision manufacture these lathe centers are guaranteed to a concentricity within 0.0002-inch or less which permits finish grinding and turning to closer tolerances. This accuracy is held for a long time due to the wear resistance of the carbide tip. They are especially advantageous for finish turning and grinding and are stocked in standard tapers.

Milling Machine

A special milling machine has been designed by Sundstrand Machine Tool Co., Rockford, Ill., to form mill the radii and angle on the inside of propeller barrels. The part is of tough steel and requires a heavy cut on practically the entire inside edge and bottom. An angular milling cutter with a radius on the bottom, using high-speed steel blades, is mounted directly to the spindle which is driven by a 10-horsepower motor. Drive to the spindle is through V-belts with pick-off gears provided to furnish spindle speed changes in a ratio of 30 to 1.

The column is of heavy ribbed construction and, in addition to carrying the vertical way surface for vertical travel of the spindle head, it can be fed and traversed to and from the workpiece. The workpiece itself is held in a special fixture mounted on a 22-inch diameter

BETTER DIESELS



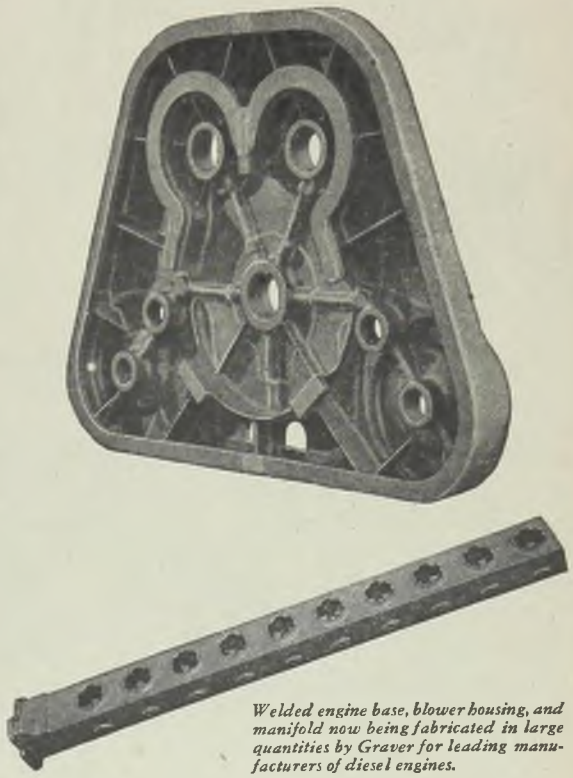
with GRAVER WELDMENTS

Diesels get the tough jobs these days . . . and they're built to handle 'em . . . built to deliver all the power that's needed with plenty in reserve . . . to withstand the shocks and strains of punishing service . . . and come back for more.

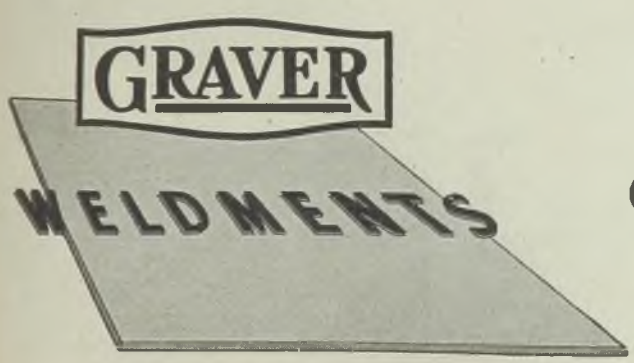
To insure that extra strength and stamina, leading manufacturers of diesels are now depending upon Graver for the fabrication of welded engine bases, blower housings, manifolds, and other important parts.

The services of the Graver Weldry Division are available for the fabrication of welded bases, frames, housings, and other types of heavy welded equipment . . . precision-built to meet the most rigid specifications.

Consult Graver today. We'll gladly submit estimates without obligation.



Welded engine base, blower housing, and manifold now being fabricated in large quantities by Graver for leading manufacturers of diesel engines.



Weldry Division of

GRAVER TANK & MFG. CO., INC.

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rotary table of the solid spindle type with wide suspended bearings for most efficient support and rigidity for heavy melting cuts.

An important feature of this machine is the automatic cycle which provides three independent motions—cross feed to the column, vertical feed to the head

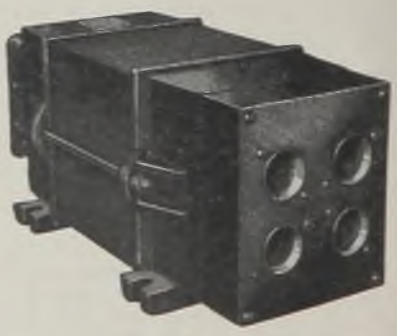
and rotary feed to the table, all timed and interlocked with the starting and stopping of the spindle and coolant flow.

Similar machines can be provided for profile milling operations. The machine has sufficient rigidity to accommodate a 15-horsepower spindle motor.

Hydraulic actuation is provided to each of the moving members of the machine and the rotary table is driven by a fluid motor. Rate of rotation can be varied infinitely from ½ to 10.1 inches per minute.

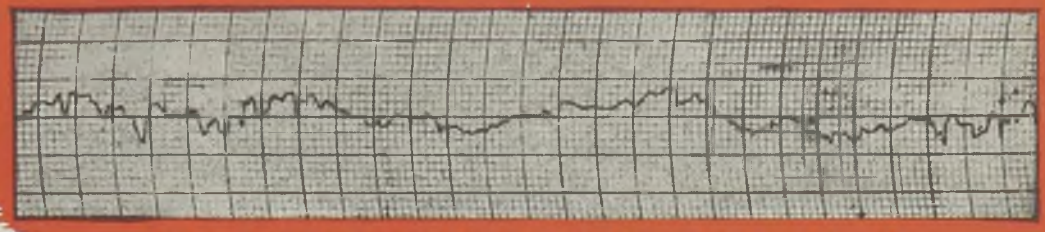
Portable Transformer

Many electrified plants and properties require only power voltage for normal routine operation but under certain emergencies a 110-volt current source is important for inspection lights or use of small portable tools. The transformer developed for this service by Acme Electric & Mfg. Co., Cuba, N. Y., is a 1-kilovolt-ampere air-cooled unit supplied for 440-volt primary and ar-



ranged with dual fused secondaries of 110 volts each. This transformer may be carried and connected to the power line nearest the point where the 110-volt lines are temporarily needed. Fuse receptacles in the secondary are a protection that may be quickly and conveniently replaced on the spot without the delay of inspecting the main switchboard.

Proof of a Better Finish



Each small square represents 1.0 micro inches. Micro inch r.m.s. = 0.9 — 1.8.

Surface Analyzer Tapes Show You Get A Better Finish With Chicago Wheels

These results were obtained at a rate of 10 pieces per hour in an aircraft parts plant. Material, X-13-15, Rockwell 60 to 57, grinds out .006 to .007 stock. Chicago Wheel used, ½ x ½ x ⅛", Grain 180, Grade L Arcite. Spindle Speed 40,000 r.p.m. Lapping and super finishing eliminated on this job.

Can you match that finish? Sounds phenomenal, but you can do the same thing with Chicago Wheels.

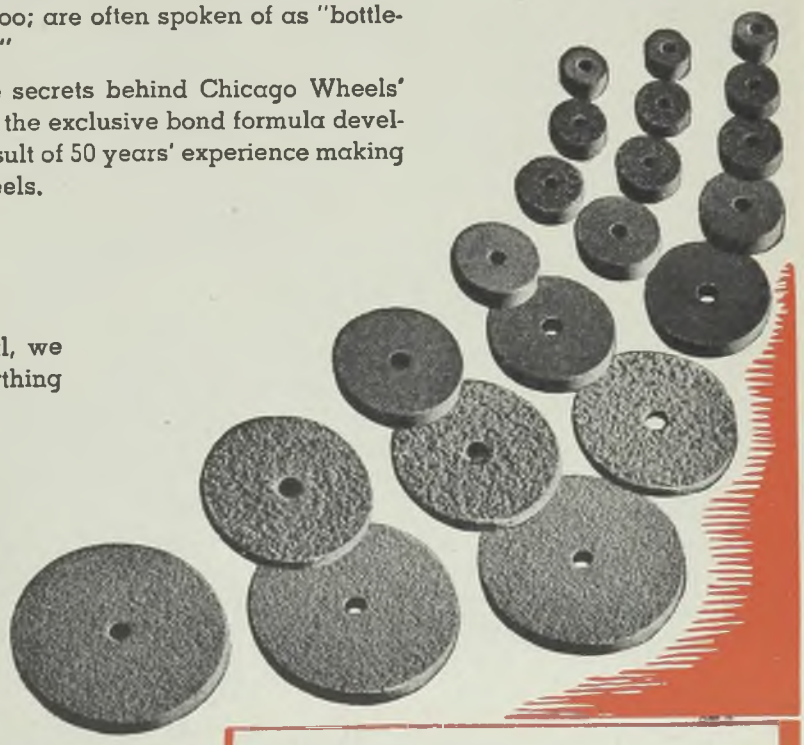
Squint your eye along the surface, test it by "feel" or be scientific and use a surface analyzer to measure your finish in micro inches — you'll find that Chicago Wheels give you better finishes, hold closer tolerances and have longer life. They're mighty fast, too; are often spoken of as "bottle-neck busters."

One of the secrets behind Chicago Wheels' superiority is the exclusive bond formula developed, as a result of 50 years' experience making grinding wheels.

Now Featuring Wheels Up to 3" in Diameter

For the duration, with full WPB approval, we are specializing on the small sizes — anything up to 3" in diameter.

Write for Catalog and we will include Engineering Survey Forms helpful in getting the right solution to your own grinding problems.



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NEW PRODUCTS

Marking Machine — Originally designed for production of hose couplings (15 to 20 per minute), an ingenious machine may be readily adapted to accommodate parts of like nature. Different-size pieces may be easily marked. Acromark Co., Elizabeth 4, N. J. ST10.

—o—

Cutoff Disks, Grinding Wheels—New Radiac synthetic rubber disks and wheels are reported superior in many respects to crude rubber types, based on case histories. Wheels have shown effective performance on wet grinding of ball bearing races and roller bearings and disks on cold-rolled and high-speed steels, roller bearing stock, glass rods and tubing. A. P. de Sanno & Son Inc., Phoenixville, Pa. ST12.

—o—

Riggers' Vise — For splicing and clamping wire rope and cable for forming around the thimble or in forming slings. Patrick-McDermott & Co., Los Angeles. ST13.

—o—

Rotary Table — Designed for use with Portage Machine Co.'s horizontal boring, drilling and milling machine and provides positive positioning at any point with half degree graduations. Table pivots on roller bearings and is cast in Meehanite. ST11.

—o—

Hydraulic Test Bench — Model T-113 includes an intensifier capable of developing pressures up to 30,000 pounds per square inch. Bench is built of steel and equipped with drain pan and filters. Hydraulic Machinery Inc., 12825 Ford Road, Dearborn, Mich. ST14.

—o—

Composition Applicator — For use on any type of polishing or buffing machine, it is designed and constructed so that it can be used for either cylindrical or rectangular bars by merely changing the composition housing for type of bar required. Operation by compressed air makes only one moving part necessary. Hammond Machinery Builders Inc., Kalamazoo, Mich. ST19.

—o—

Electric Portable Sander — Specially designed to cover entire range of abrading from coarse sanding to lapping and finishing, it has a flexible sanding pad which detaches from the machine by simply pulling out a latch. The pad will conform to convex or concave surfaces of moderate curvature. Sterling Tool Products Co., 358 East Ohio street, Chicago. ST20.

—o—

Safety Stop for Planer Tables—Stops runaway planer table after it has run off the bull gear and is therefore out of