ewashing tantalite, vital war-production mineral, at world's largest source in Brazil. Page 62

STEEL

The Magazine of Metalworking and Metalproducing

JANUARY 31, 1944

Volume 114—Number 5

NEWS

TECHNICAL

FEATURES

MARKETS

LIFE-SAVING *Smoke* WAS READY

Photo Courtesy, The Heil Co.

Because We Helped Keep Supplies "IN THE CLEAR"

On Mediterranean beaches, smoke generators like this threw out a dense concealing screen. Lives were saved because they were ready, confusing the enemy and greatly reducing the effectiveness of his fire.

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STEEL
January 31, 1944

Invasion and Politics

Many industrialists share with a large portion of the American public annoyance and impatience over the misleading and often contradictory statements which emanate from Washington as to problems and policies of government administration. If one were to believe half of the stuff which issues from the lips and typewriters of the spokesmen for various government agencies, he would be in a constant state of confusion and bewilderment.

For the sake of our sanity it behooves all of us to consider the factors which are responsible for some of the seemingly crazy behavior of Washington. It will help tremendously to keep in mind the fact that right now two factors dominate almost every move made by federal office holders. One is the approaching invasion of continental Europe. The other is politics in a presidential election year.

These factors do not affect all government officials in the same way. Generally speaking, it is the Army, Navy, Maritime Commission and WPB and other agencies directly tied in with the conduct of the war and with the production of goods for war whose actions are influenced strongly by the invasion factor. Most of the personnel of these agencies is far removed from the influence of politics.

On the other hand, the elected members of Congress, the President, some of his cabinet members and most of the so-called "palace guard" are almost always conscious of the political effect of many of the things they do. They recognize the importance of the invasion factor and are sincere in meeting its implications; nevertheless, they find it difficult to divorce it from political considerations.

The result of these various degrees of responsiveness to the two dominant factors is confusion. For instance, one finds among the higher-ups in Washington contradictory views on the manpower situation, which involves the proposed national service act, on reconversion, renegotiation, method of administering the votes of men and women in the armed services, price controls, subsidies, rationing and disposal of surplus material and equipment. Some observers of long experience say internal bickering among administration officials has never been more bitter than at present.

One solution would be to take the factors in order of timing and importance. Invasion comes first on both counts. If official Washington makes the mistake of giving politics priority over the invasion factor, the public will hold it responsible.

Industry's safe course is to heed the validity of the invasion factor.

TIME TO SIMPLIFY? Observers in Washington are favorably impressed by the assistance the Smaller War Plants Corp. is rendering to small industrial companies. Several government agencies have tackled this job, but SWPC is the first to have started off on the right foot.

Thus far, the success of SWPC seems to lie in its ability to get action for small companies after they have been turned down or ignored by sub-agencies of WPB, OPA, WMC, etc. Also SWPC seems to have gone to extraordinary pains in helping the officials of little companies to understand the working of priorities, limitation orders, price rulings and manpower regulations.

Everybody will applaud SWPC for its good work and hope that it can continue to furnish assistance to small industries as long as the need exists. At the same time, one cannot escape the conclusion that there is something wrong in a general system of government control of business which necessi-

(OVER)

tates an agency to go around correcting the injustices of other agencies.

Perhaps it is time to start simplifying the terrifically complex organization of government controls. —p. 46

* * *

REALISM IN RESEARCH: Guy Hubbard, Machine Tool Editor of STEEL, has a knack of spotting homespun common sense in technical discussions. At the SAE convention in Detroit, while listening to the remarks of J. O. Almen of General Motors research laboratories, he caught the significance of the sentence: "Strength of dynamically loaded, highly stressed bolts and studs is—when all is said and done—determined by the man with the wrench."

This is to say that all other considerations such as design, materials and processing are of little account unless the man who tightens the nut does his work intelligently. "Tension in the bolt, when measured by bolt stretch," said Mr. Almen, "should be 80 per cent of the yield strength either of bolt or abutment, whichever is weaker."

Mr. Hubbard sees promise in the closer relation between the work of the scientist in research and the "man with the wrench." He is right. One of the most wholesome trends in industry is the manner in which the research laboratories are contributing more effectively to the solution of practical problems in manufacturing. We attribute much of this tendency to the leadership of the realists in research, of whom Charles F. Kettering is the dean. —p. 68

* * *

TOUGH DECISIONS AHEAD: Last week the War Production Board recommended to the Defense Plant Corp. that work be suspended on seven steel expansion projects. The units embraced in this proposal are six plants scheduled for operation by Republic Steel Corp. and one for operation by Andrews Steel Co.

These plants are in various stages of completion. One of the Republic units at South Chicago is 98 per cent finished. The government announcement of the proposal to stop work states that the "companies may complete the projects with their own funds if they wish."

Here is a delicate and complicated problem. Shall some of these plants be completed and turned over to private account, displacing older facilities, or shall they be abandoned and scrapped? We must be prepared to face thousands of tough decisions of this kind in the near future. —pp. 35, 38

HANDWRITING ON WALL: In some respects Canada does today what the United States may be doing tomorrow. Our northern neighbor was plunged into all-out war in September, 1939, whereas the States didn't get into it until Dec. 7, 1941. The Dominion has served as a pilot in numerous phases of the American war effort.

Therefore it is interesting to note that Canada is well on her way toward easing the restrictions on critical materials. Supply has overtaken demand and the result is a moderate release of some items for civilian use. This development suggests that the tendency toward easing of restrictions in the United States is logical, although there may be some question as to timing.

The principal factor now is the approaching invasion of continental Europe. If it goes well, easing of restrictions may proceed rapidly. In Canada and in the United States, there should be no wholesale diversion to civilian needs until that event has turned out favorably for the Allied Nations. —pp. 39, 61

* * *

C'EST LA GUERRE! Cancellation of a war contract can cost a lot of money, to say nothing of the waste of good engineering and manufacturing skill. A. H. Allen, conductor of "Mirrors of Motordom," describes the grief which is attending the shift of the facilities of a big plant from streamlined tanks to tracklaying prime movers.

Fifteen months of heart-breaking effort and $36,500,000 went into the tank production effort before the contract was canceled. Only 13 tanks had been turned out, so each actually cost $2,800,000. Sometime in the future, a demagogic politician may run onto these figures and cry to high heaven that the government has been defrauded.

The fact is that war is a wasteful business. The procurement officers who ordered the tanks probably acted wisely on the information available at the time. The war contractors probably tackled the order with efficiency and energy. The fortunes of war dictated that this type of tank was outmoded. Result: Cancellation and waste of time, skill and money.

C'est la guerre! —p. 51

E. L. Shaner

EDITOR-IN-CHIEF

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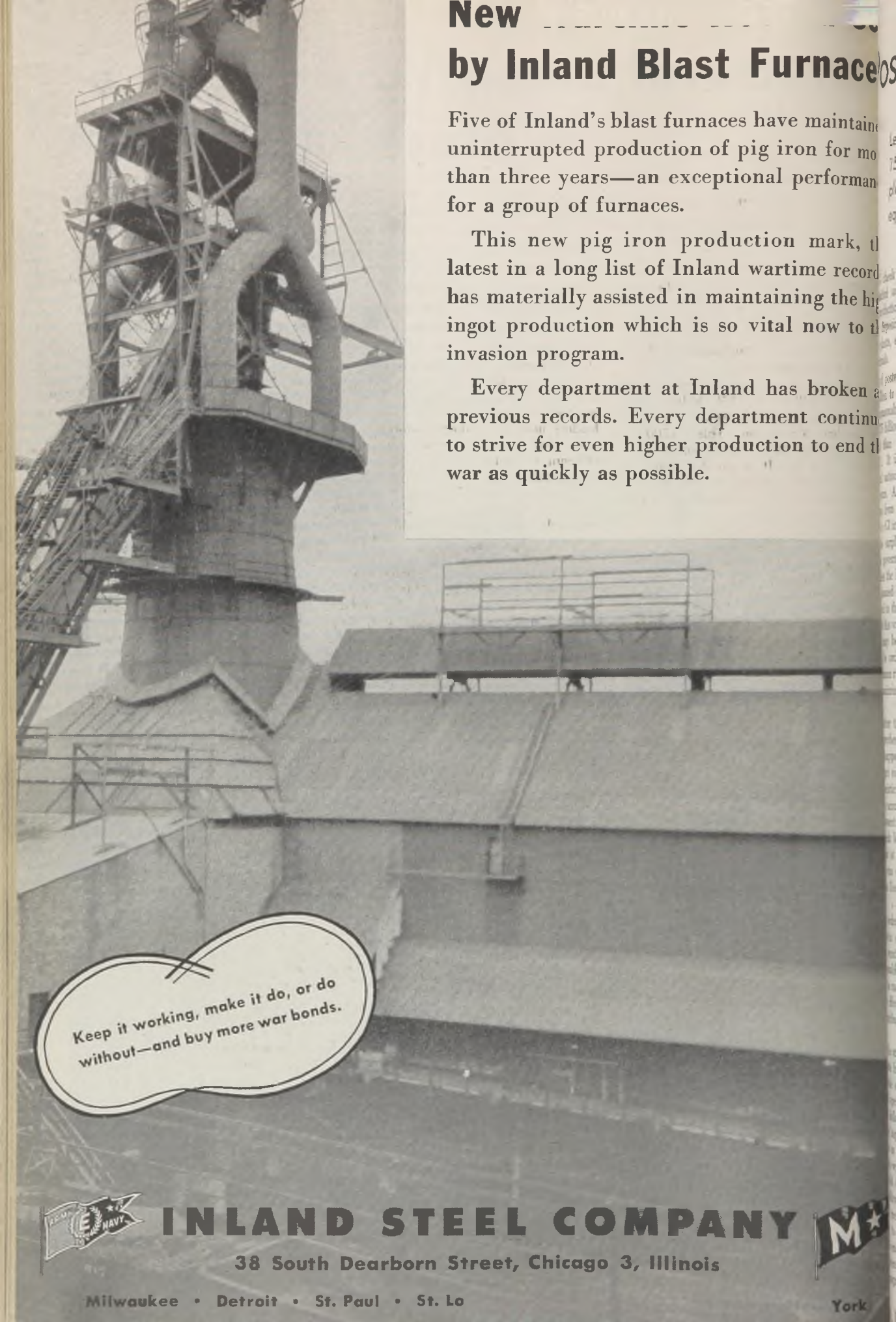

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Postwar Disposal Problem Vast

Leftover materials acquired for war purposes may total $75 billion, nearly 15 times excess after World War I. Liquidation program must be carefully planned and ably administered. Many bills to control disposition of plants, equipment, materiel and raw materials now pending before Congress

By W. J. CAMPBELL
Associate Editor, STEEL

RUNNING cheek by jowl with contract termination and reconversion to peacetime production is the postwar problem of disposing of government-owned war plants, equipment, materiel and raw materials.

Estimates of postwar surpluses range from $25 billion to $150 billion, with the average reasonable figure appearing to be about $75 billion. This is 1500 per cent greater than the surplus after World War I. It is greater than the country's total national income in normal prewar years. And it covers a multitude of items, from huge steel and munitions plants to GI insigne.

Most of the surplus will have little utility to the government after hostilities end. Unless the liquidation program is carefully planned and ably administered, the shock to the postwar economy of disposing of this vast amount of plant and materials may be devastating. The disposal must be orderly, and designed to bring a maximum return to the government with a minimum dislocation to civilian business.

Experience after the first World war justifies the apprehension felt by many as to what will happen when the government starts to get out from under.

The 1918 armistice fell suddenly. The nation still was accumulating raw materials and equipment and producing munitions at a peak level. Much of this material, valued at between $5 and $6 billion, never was shipped and became a surplus when Germany laid down her arms.

No plan for orderly disposition of these goods had been made. The people, tired of war, wanted the surplus sold as quickly as possible. Much of it was dumped on the market in haste and confusion. The effect was to depress markets and contribute to a wave of bankruptcies.

Some of the surplus was sold at public auctions; some from government depots; a considerable amount went to foreign nations and speculators abroad. Several billions of dollars worth had been disposed of by haphazard methods by July, 1921, when an office of Chief Co-ordinator of Sales was established and the remainder sold in a more orderly manner over the following three years.

Overall recovery to the government, according to Roger W. Babson, was about 35 cents on the dollar.

The absence of a well planned liquidation program not only added to the cost of the war but caused immeasurable hardship to many business firms. To avoid a recurrence of this experience on a greatly enlarged scale, businessmen, congressmen and various administration leaders now are groping toward a program that will permit a wiser and more efficient unloading of the vast store of war goods.

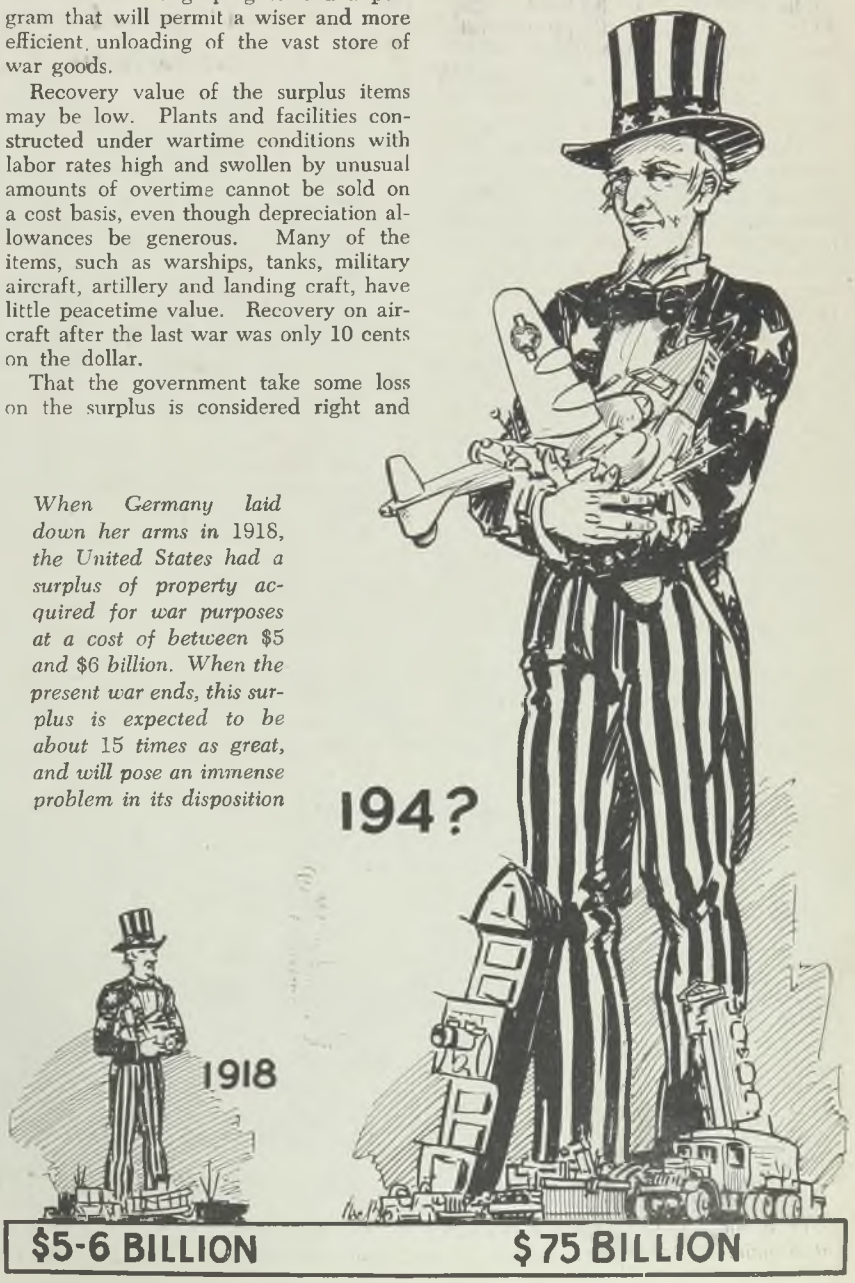
Recovery value of the surplus items may be low. Plants and facilities constructed under wartime conditions with labor rates high and swollen by unusual amounts of overtime cannot be sold on a cost basis, even though depreciation allowances be generous. Many of the items, such as warships, tanks, military aircraft, artillery and landing craft, have little peacetime value. Recovery on aircraft after the last war was only 10 cents on the dollar.

That the government take some loss on the surplus is considered right and proper. Such losses must be considered a part of the cost of the war.

However, the sale of useable items as scrap, or the sale of goods at ridiculously low prices is to be avoided. It is desired that the surplus materials be distributed where they will be most useful, and sold at fair prices. A large order!

Some students of the problem believe

When Germany laid down her arms in 1918, *the United States had a surplus of property acquired for war purposes at a cost of between* $5 *and* $6 *billion. When the present war ends, this surplus is expected to be about* 15 *times as great, and will pose an immense problem in its disposition*



SEN. JAMES E. MURRAY

REP. WRIGHT PATMAN

SEN. JAMES G. SCRUGHAM

it will take as long as 20 years to complete the job. On the other hand, it is recognized that plants and equipment should not be allowed to stand idle and that the quickest possible disposal of them to private management should be made. Benjamin F. Fairless, president, United States Steel Corp., recently expressed industry's thinking on this point:

"The government should dispose of its plants and facilities as promptly as possible after the end of the war. It should not attempt to set itself up in business in competition with private industry. Any such course would be in the direction of state socialism. In disposing of these plants it should be recognized that their cost is not government investment; rather it is the war cost of the same general character as that of a battleship or a destroyer or some other instrument of warfare brought into existence solely for the purpose of defeating the Axis. So instead of attempting to recover the full cost of these plants, the government should be generally willing to take a reduced amount, substantial though the reduction may be, and charge the balance to the general cost of the war.

"A number of these government-owned plants are probably more modern and more efficient than similar facilities owned by private industry. Both, however, may not be required for peacetime and the low-cost units should survive and take the place of outmoded facilities. The government should permit private industry to buy or lease these lower cost plants upon some equitable basis. This is the fairest way of eliminating excess capacity.

"Undoubtedly there will be some government-owned plants whose continu operation after the war cannot be ju fied on economic grounds. In such cas the government should be realistic a either promptly scrap the plant or it under lock and key for possible during some future emergency."

It generally is believed that unl plants for civilian production are ma available as quickly as possible for p vate production and employment af the war ends, employment will be necessarily reduced. However, to du excess consumer goods acquired for purposes is regarded as certain to less possibilities for production and empl ment. It is recognized, on the oth hand, such goods should not be perm nently frozen in government hands.

The surplus disposition problem ready has made its appearance in p liminary form and has drawn the atte tion of business and government to vastly greater problem that must inev ably be confronted after the war or du ing its final phase. At present, the pro lem is mainly one of redistributing ra materials and production equipment such a way as best to promote the effe tive prosecution of the war. Contra terminations and cutbacks, combin with extraordinary production record are making supplies available for the of producers of other items.

Certain mistakes made in the selling

BLACK MARKETS

Black markets in plumbing goods are being nourished by the manner in which the procurement agencies are disposing of surplus goods, W. J. Lang, of the National Association of Master Plumbers, recently told the Patman Small Business Committee. "The Navy sold thousands of brass valves at 15 cents on the dollar. Whereas we plumbers have to sell at ceiling prices and get priority ratings, speculators who bought those Navy valves did so without requiring priorities. At Chicago 65-cent ball-cocks are selling in the black market at $1.70 and a $72 bathtub installation job brings $160. Faucets with a ceiling of $1.50 are bringing $3.25 in the black market."

Hull to hull, these World War I ships stood idle for many years following the 1918 armistice. Many vessels designed for a "Bridge to France" never saw service in the years that followed the last war. NEA photo

...ess equipment in recent months has ...rred demands that preliminary steps ... taken to establish an overall program ... regulate the disposition of the surplus. ...ese demands have been reflected in ... introduction of a dozen or more bills ... Congress since the middle of last sum... Practically all of these touch upon ...ly one phase of the overall problem. ...ne offers a complete program.

Among these measures are:

H.R. 3991, introduced by Rep. Forest ...rness (Rep., Ind.), to prevent dump... of strategic and critical minerals ...er the war and to provide stockpiles ... these minerals for future emergencies.

H.R. 3987, introduced by Rep. Paul ... Shafer (Rep., Mich.), to provide that proceeds from the sale of surplus materials be used for the reduction of the national debt.

H.R. 3873, introduced by Rep. Wright Patman (Dem., Tex.), to amend the Reconstruction Finance Corp. act by adding a new title relating to the sale of surplus property.

S. 1609, introduced by Sen. James E. Murray (Dem., Mont.), to provide for the disposal of government-owned machine tools.

H.R. 3856, introduced by Representative Harness, to dispose of surplus inventories of strategic materials owned by the United States.

H.R. 3826, introduced by Rep. Carl Vinson, (Dem., Ga.), to require the Naval Affairs Committee to approve all disposals and acquisitions by the Navy Department of real property or interests.

S. 1582, introduced by Sen. James G. Scrugham (Dem., Nev.), to establish a Mineral Stockpile Board to conserve mineral supplies after the war.

H.R. 3200, introduced by Representative Patman, to provide certain benefits for members of the armed services upon discharge or release from active duty, and to provide for the use and disposition of surplus war property in the interest of small business.

H.R. 3025, introduced by Rep. Victor Wickersham (Dem., Okla.), to provide for the orderly disposition of surplus army materials to farmers.

H.R. 4009, introduced by Rep. Joe Starnes (Dem., Ala.), to provide for the utilization of surplus machine tools. (This is similar to Senator Murray's S. 1609).

H.R. 3140, introduced by Rep. Carter Manasco (Dem., Ala.), to provide for the disposal of government-owned surpluses, and to create a Surplus Lands and War Plants board.

H.R. 2959, introduced by Rep. Clarence F. Lea (Dem., Calif.), to provide for disposal of surplus aircraft.

Among these and other proposals, the Murray bill (S. 1609), the Patman bill (H. R. 3873) and the Scrugham bill (S. 1582) have been receiving considerable attention.

Would Strive for Unification

The Murray proposal is known as the "Surplus Machine Tool Utilization Act" and would create a Federal Machine Tool Commission of nine members to obtain uniform action through the various departments to classify all surplus tools and create means of disposing of them.

The Patman bill (H. R. 3873) proposes the organization of a new Surplus Property Board to prescribe the methods to be used by government agencies in making inventories of excess property. The board's membership would include the chairman of the Defense Plant Corp. as chairman, the secretaries of War, Navy and Treasury and three businessmen experienced in the sale and distribution of merchandise. The Reconstruction Finance Corp. would act as sales agent.

The Scrugham bill (S. 1582) provides a minerals stockpiling program to protect domestic mining industry and also to create a reserve against future emergencies. Amendments to the bill would include nonferrous scrap metals and possibly ferrous scrap in the stockpiling program as well as the primary minerals.

Many persons, in government and business, believe that the questions of surplus property should be comprehended in a single, integrated piece of legislation covering raw, semiprocessed, secondary and finished materials, tools, machines and plants. If such an overall program is evolved, by the Baruch or some other group, many of the proposals contained in the pending bills well may be incorporated in the general program.

Present, Past and Pending

... DEVELOPS NEW PROJECTILE FORGING METHOD

...ITTSBURGH—Porter Blairsville Co., subsidiary of the H. K. Porter Co. Inc., has ...eveloped a new method of forging heavy projectiles which is claimed to save 13 ...er cent of the amount of steel used compared with previous practice. The new ...rging technique is called the "contoured cavity" method.

... ALUMINUM USE IN EXPERIMENTS PERMITTED

...ASHINGTON—Use of aluminum for postwar experiments now is permitted by WPB. ...eretofore, requests for allocations of metal for experiments in working out models ...r civilian goods have been denied.

... MUSKEGON MANPOWER CONTROLS TIGHTENED

...USKEGON, MICH.—Last week new controls were placed on employment in this ...ea by the War Manpower Commission as a result of the congestion of foundry ...ders for gray iron and steel castings occasioned by the expanding landing craft ...rogram.

... EXPECTS TO DOUBLE NORMAL OUTPUT

...ETROIT—Overall manufacturing schedules of Nash-Kelvinator Corp. after the war ...all for production almost double that of the last prewar year, according to George ...V. Mason, president. Products will include electric refrigerators, electric ranges, ...rozen food cabinets and automobiles.

... DOMESTIC TRANSPORTATION EQUIPMENT OUTPUT REPORTED

...ASHINGTON—Total units of domestic transportation facilities produced and deliv...red during 1943 were as follows: Locomotives, 830; freight cars, 28,790; troop ...leepers and kitchen cars, 661; motor trucks, 2699; truck trailers, 5623; integral buses, ...726; tugboats, 75; towboats, 8; steel barges, 54; wooden barges, 269. Outlook for ...944 is better following disappointing showing last year, Office of Defense Trans...ortation said last week.

... MERCHANT MARINE INCREASED 50 PER CENT IN YEAR

...ASHINGTON—During 1943, record total of 1896 vessels aggregating 19,238,626 ...eadweight tons were completed, United States Maritime Commission reported last ...eek. As of June 30, the American merchant marine totaled about 2000 vessels ...2400 tons or larger) having an aggregate of 20,000,000 deadweight tons, an increase ...f 50 per cent in the fiscal year. Total of 1100 Victory- and C-type ships and fast ...nkers are scheduled for construction this year against 800 Liberty ships.

... WAR LABOR BOARD PENALIZES STRIKERS

...HILADELPHIA—War Labor Board in first case of its kind last week cracked down ...n striking workers who refuse to return to work pending settlement of a dispute. ...rikers at Cramp shipyard are penalized by losing one month's retroactivity on any ...y increase that might be approved in the wage case now pending.

... APPOINTS POSTWAR ECONOMIC COMMITTEE

...ASHINGTON—Speaker of the House Rayburn last week appointed an 18-man ...ouse committee on postwar economic policy and planning, with William M. ...olmer, (Dem., Miss.) chairman.

Termination of Work on Seven Steel Plant Projects Proposed

WPB recommends stoppage on plants estimated to cost $97 million. Says steel from units now is not needed in war program. Republic's electric furnace plant at South Chicago, nearly completed, largest affected

TERMINATION of work on seven more steel plant expansion projects in four states, estimated to cost nearly $97,000,000, last week was recommended to the Defense Plant Corp. by the War Production Board.

The projects, some near completion, are in Republic Steel Corp. plants in South Chicago, Ill., Canton and Massillon, O., East Hartford, Conn., and Andrews Steel Co.'s plant at Wilder, Ky.

Steel originally scheduled to be produced by the projects, all government-financed, is not needed now in the war program, John T. Whiting, director, Steel Division, WPB, said.

Five other steel projects previously recommended by the Steel division for cancellation, to save manpower and prevent unnecessary government expenditures for unneeded steel capacity, were in Carnegie-Illinois Steel Corp. and Geneva Steel Co. plants in the Pittsburgh and Chicago areas and in Utah.

Steel division proposals for termination of the seven projects, all designed specifically to increase the supply of alloy and high quality carbon steel for which requirements in recent months have been declining, have been prepared for transmittal to Jesse H. Jones, chairman, Defense Plant Corp.

Republic Steel Corp.'s electric furnace plant at South Chicago, complete except for certain rolling mill equipment and auxiliaries and having capacity for producing 750,000 tons of steel yearly, is the largest project to be affected by the Steel Division's latest recommendations. This plant, and others on which similar action has been or may be taken, could be operated if completed only by reducing operations of existing plants, Mr. Whiting said.

Alloy Steel Output Declines

Alloy steel production in the United States declined from 1,264,697 tons in March, 1943, to 816,300 tons in December of that year, or approximately 36 per cent.

Republic's electric furnace plant at South Chicago was designed to produce chiefly alloy steel for gun forgings and miscellaneous parts for aircraft. The plant is 98 per cent completed and cost $88,484,860. A second Republic project at South Chicago, also canceled, would provide annealing furnaces for conditioning 9000 tons of alloy steel monthly. This project is more than half completed; it was to have cost $1,044,000.

Other Republic projects proposed for termination include the building of three ingot-warming pits at Massillon, O., facilities for crushing and briquetting 48,000 tons of alloy steel turnings annually at Canton, O., two additional cooling furnaces at Canton, and facilities to increase production of cold drawn aircraft alloy steel bars and other products by 49,200 tons at East Hartford, Conn. The Massillon project has not been started but was to have cost $67,780, the crushing and briquetting facilities at Canton had not been started but were to have cost $43,000, the cooling furnaces at Canton are about half finished and the total cost was to have been $295,000 and the East Hartford project is more than three quarters finished at an estimated total cost to the government of $1,708,000.

Andrews Steel Co.'s new plant at Wilder, Ky., also listed for termination and complete except for some items of equipment, was built chiefly to produce alloy semifinished blooms for gun forgings, at a cost of $5,133,000.

No more federal funds will be supplied after DPC orders cancellation, but the plants will remain in the hands of the operating companies with the money already advanced remaining a debt against the plants. The companies may complete the projects with their own funds if they wish.

With the discontinuance of these seven steel projects it looks as though there would be no further curtailment of the expansion program, according to the best information available.

WPB steel officials, it is understood, have thoroughly gone over the remainder of the program and are not recommending that there be any further cutting down. Of course, this matter still has to be reviewed by the Defense Plant Corp. and it is quite possible that they will insist on some further curtailment insofar as government financed projects are concerned. As far as can be ascertained at this time, no privately financed expansion projects have been or will be curtailed.

NEW COKE PLANT: Spurred by heavy demand for steel and chemicals for war, the new coke plant of the Pittsburgh Steel Co. at Monessen, Pa., is operating at capacity. Above, a woman worker operates device to drench and cool the hot coke with water

War Department To Turn Back $14,214,877,000

An additional appropriation "kick-back" of $14,214,877,000 is expected to be made by the War Department bringing the total such return to the Budget Bureau reserve this year to $27,378,298,000, Representative Snyder (Dem., Pa.), chairman of the House Appropriations Committee said last week.

He said the War Department attributed more than 90 per cent of the new saving, $19,916,000,000 to price reductions, including funds recovered by renegotiation.

Production Resumption To Be Slow

WPB Chairman Nelson tells mayors nation is entering period where there may be idle facilities and some unemployment

CHICAGO

WHILE voicing opposition to immediate relaxing of restrictions on the production of civilian goods, Donald M. Nelson, chairman, War Production Board, speaking to the United States Conference of Mayors at Chicago recently, warned that the country is coming into a period in which there may well be a certain amount of idle manufacturing facilities, idle materials and scattered pockets of temporarily unemployed men and women.

Conscious of the fact that almost certainly great pressure will be brought to bear on Washington for relaxation of civilian goods restrictions, he declared substantial easing of existing curbs would take the nation off "the straight line to victory," and that idle plants might be needed again before the war is finally won.

Further, he said, relaxing of restrictions would interfere with the movement of workers into tight production areas and give the public a false sense of security.

However, WPB is planning to test the use of small lots of idle materials by small concerns in the production of consumer goods under controlled conditions, he said, with a view to strengthening the position of small business and to improve the balance of the war economy (STEEL, page 25, Jan. 24). This plan will be abandoned if any interference with the war program develops, the WPB chief declared.

"If it is found that the civilian economy can be strengthened by these small-scale operations without any injury to war production, we may be able to extend the plan generally," he said, adding that he "would rather be two months late in reconversion than five minutes late in military production."

Under Secretary of War Robert P. Patterson told the mayors that with the end of war the country must evolve something better than mere return to prewar industrial conditions, or it will be afflicted with something worse.

"There is no turning back. We cannot conceive of permitting our production and consumption rates to revert to their old levels," he said, "and they need not do so."

He said the War Department is actively planning for the prompt return of industry to peacetime production with as little dislocation as possible, the department's platform for plant reconversion including final termination of settlements negotiated by procurement agencies, disposal of surpluses and financial aid to contractors, pending final settlement of terminated contracts.

Reversion to prewar industrial conditions, Secretary Patterson said, would result in a 50 per cent reduction in the national income, extensive unemployment and reduced factory capacity, pointing out that at least 50 per cent of all industry now is engaged in war production and about 20 per cent totally converted from peacetime work.

Reconversion, he said, will be simplified because the war will not end in all theaters at the same time. He predicted that a year or more might elapse between the collapse of Germany and the surrender of Japan.

CHARLES E. WILSON

Coming from a conference with President Roosevelt Jan. 22, Charles E. Wilson, executive vice chairman, War Production Board, remarked that he would "be around Washington for a little while."

Following the conference the President wrote to Gerard Swope, General Electric Co. head, requesting that company permit Mr. Wilson to remain in his WPB post "until next summer."

The President told Mr. Swope that "in the immediate future" many questions will arise regarding production for the government. These involve, he said, "changes necessitated by the fact that capacity is being reached in many lines and by the flexibility to take care of demands for new types of arms and munitions and a slowing down in other types."

Date for reconversion to normal production by industry cannot be named, C. E. Wilson tells mechanical refrigerator manufacturers

WASHINGTON

DATE on which reconversion of such war industries as those which formerly produced domestic mechanical refrigerators and similar heavy consumer goods may begin cannot be named now, Charles E. Wilson, executive vice chairman, War Production Board, told members of the domestic mechanical refrigerator industry advisory committee last week.

"Our Army and Navy face what is probably the most perilous undertaking in military history," he emphasized. "Industry must be kept flexible, so that it will be able to meet the requirements for increased war production that may result from impending military operations. Until the outcome of what lies ahead becomes clear—and there is no way of telling when that will be—production of domestic mechanical refrigerators cannot be resumed.

"Materials are available, but labor cannot be assigned to turn these materials into refrigerators. Labor is already in short supply in many areas, and within the next six months another million men will be drafted out of industry."

Addressing the committee members in the same vein, Lemuel L. Boulware, operations vice chairman, WPB, said reconversion of the refrigerator industry is much farther away than has generally been supposed and that all that can be done in the interim is to explore the problems pertaining to an orderly transition from war to civilian production if and when the military situation will permit.

The transition period will be long and difficult, it was brought out in the meeting. It is estimated that the first domestic refrigerators will not come off the assembly lines until six or nine months after production is authorized.

The general problems discussed by the committee included those bearing on the minimum number of models and sizes of refrigerators which might be produced, minimum economic production runs, the expected need for new facilities to replace those now used in war production, bills of material, critical components, such as fractional horsepower motors, automatic controls, and freon refrigerant, and the matter of plant locations with relation to labor supply.

Possible solutions to most of these problems cannot be arrived at until resumption of domestic mechanical refrigerator production is in sight.

Republic's Parley With Union Fails

Steel producer asks issues growing out of wage demands of United Steelworkers be certified to Labor Board

REPUBLIC Steel Corp., Cleveland, last week asked Labor Secretary Perkins to certify the issues growing out of the demands made by the United Steelworkers of America (CIO) on the company to the National War Labor Board.

The union, on Dec. 13, presented the company with 43 demands whose money value could reach a minimum of more than $53,000,000 a year.

In addition to the $53,000,000 annual increase which can be computed, there is also a demand for a guaranteed minimum weekly wage and for severance pay which the company estimates would average $300 per man, which could increase the total by many hundreds of thousands of dollars annually. Largest single demand is one for an increase of 17 cents an hour which alone totals more than $19,000,000 a year.

The demands for one year alone are within $12,000,000 of Republic's net earnings since it was founded in 1930 and represent an approximate 33-1/3 per cent increase in the company's 1943 payroll, the highest payroll in Republic's history, according to the company.

To meet the union's demands would represent an increase of approximately $9 per ton over present government ceiling prices on the steel shipped by Republic in 1943.

In its letter to Secretary Perkins the company stated that "during the period from Dec. 13, 1943, to and including Jan. 19, 1944, representatives of the union and of the company met in ten separate collective bargaining conferences for the purpose of discussing the proposed changes. No agreement has been reached on any of the changes requested either by the union or by the company."

The company offered to continue negotiating with the union.

Since April 1, 1941, there have been two wage increases, totaling 15½ cents an hour. The first, granted on that date, was for 10 cents an hour, and the second, granted on July 16, 1942, and retroactive to Feb. 7, 1942, was for 5½ cents an hour. This increase became the basis for the "Little Steel" formula. The basic wage rate in Republic's steel plants in Ohio, Illinois and New York is now 78 cents an hour. This represents an increase of nearly 25 per cent in less than three years.

As a basis for negotiations the company on Jan. 13 presented the union with ten counterdemands.

These included the elimination of union maintenance and checkoff; overtime to be paid only in excess of 8 hours in any one work day or in excess of 40 hours in any one work week; double service credit for employes for time spent in the Armed Service; penalties for employes who encourage, aid or participate in slowdowns, work stoppages or strikes, and other changes in sections pertaining to hours of work, grievance procedure and rate establishment and adjustment.

ACK ACK DIRECTOR: Tracker unit of the M9 antiaircraft gun director is demonstrated by Oliver E. Buckley, left, president of Bell Telephone Laboratories, and Maj. Gen. L. H. Campbell, chief of Army Ordnance. Standing is Dr. David R. Parkinson, physicist of the Bell staff and originator of the idea. The director tracks the plane target, automatically calculates the lead of the guns to suit conditions, aims and follows the flight electrically with uncanny accuracy. Two variable speed drives, built by Graham Transmissions Inc., Milwaukee, are used

More U. S. Steel Units Ask For Union Conferences

Eight United States Steel Corp. fabricating and other subsidiaries, which received notices on Dec. 4 from United Steelworkers of America (CIO) reopening their labor agreements, have asked that collective bargaining conferences with the union be immediately arranged.

These companies previously suggested that such conferences be withheld pending commencement of negotiations between the union and the five steel producing subsidiaries of United States Steel. Last week these five companies asked the secretary of labor to certify to the National War Labor Board for determination certain issues which could not be concluded in negotiations with the union.

The United States Steel subsidiaries making the present request are: American Bridge Co., Virginia Bridge Co., United States Steel Supply Co., United States Steel Products Co., Universal Atlas Cement Co., Oliver Iron Mining Co., Oil Well Supply Co. and Tubular Alloy Steel Corp.

McNutt Sees Heavy Demand For Labor in Months Ahead

Meeting the manpower demands of the next six months will test the powers of the War Manpower Commission, Paul V. McNutt, war manpower commissioner, said in Cleveland last week.

In the city to discuss various phases of the manpower situation with the local manpower committee, Mr. McNutt indicated July 1 as an important deadline in the nation's prosecution of the war.

He said the production line will continue upward until that time at least and indicated meeting the production demands would not be easy inasmuch as the nation was close to the bottom of the barrel in its manpower resources.

Asked about postwar plans of his agency, Mr. McNutt intimated most of its functions would be taken over at the war's end by agencies which existed prior to the outbreak of hostilities.

J. S. Steel 1943 Net Income Cut By General Increase in Costs

Corporation reports decline of $7,606,247 in earnings compared with preceding year. Last quarter return insufficient for dividend requirements. Postwar reserve fund of $75 million provided

RESERVE fund of $75,000,000 to over future additional costs arising om the war, features the preliminary 943 annual report of the United States teel Corp., issued last week. The fund ill provide for deferred maintenance nd repairs, reconversion and relocation f facilities for peacetime purposes, reemployment and retraining of returned ervice men, losses on raw materials and upplies on hand, and smaller expenses.

The corporation's 1943 net income mounted to $63,642,322, or $4.41 per ommon share, compared with $71,248,-569, or $5.29 per common share, the receding year. Final-quarter net toaled $13,389,673, against $25,646,452 the comparable 1942 quarter.

Decline of $7,606,247 in 1943 net ncome is largely attributable to subtantial increases in payroll costs as vell as heightened expenses in general vhich have been increasing during the ast three years, Chairman Irving S. Olds stated.

Another important factor has been he price limitations in effect since April, 941. Differences in kinds and quanities of products produced and sold unler government allocation also tended to reduce earnings. Because of these limitations the year's income barely covered current dividends, and final-quarter net was insufficient for dividend requirements.

Quarterly dividends of $1.75 per share on preferred, payable Feb. 19 to record of Jan. 28, and $1 a share on common, payable March 10 to record of Feb. 11, were declared.

Provisions for estimated additional costs in the amount of $25,000,000 applicable to 1943, arising out of the war, were made during the year.

Total capital expenditures for additions to and betterment of fixed assets during 1943 were approximately $89,000,000, and unexpended balances for property additions and replacements amounted to about $64,000,000 as of Dec. 31, 1943. Total long term debt outstanding at the end of the year was $136,660,268.

Corporation's 1943 shipments of finished steel products (subject to year-end adjustments) totaled 20,244,830 net tons, a decrease of 1.8 per cent from the 1942 record high of 20,615,137 net tons, the reduction being due in part to changes in nature of production. Final-quarter shipments amounted to 5,175,186 net tons, compared with 5,302,681 tons in the corresponding quarter of 1942 and 5,029,628 tons in the third quarter of 1943.

Production of steel ingots and castings during 1943 by the corporation averaged 97.8 per cent of rated capacity, an all-time tonnage record. Mr. Olds pointed out that the corporation's ingot capacity has been stepped up to about 33,560,000 net tons as of Jan. 1, 1944. This increase is due to a gain of 1,740,000 tons at Homestead and allowance of 867,000 tons for the Geneva plant, less 242,000 tons for the discontinued Pencoyd plant.

Bethlehem Steel Shows $32,124,592 as 1943 Net

Bethlehem Steel Corp.'s 1943 net profits were $32,124,592, or $8.58 a common share, against 1942 net of $25,387,760, or $6.31 per common share. For the fourth quarter the corporation earned $12,707,797, compared with $5,731,289 for the corresponding period of 1942 and $6,573,892 for the third quarter of 1943.

Taxes for 1943 amounted to $167,236,300, against $185,704,093 the preceding year. Postwar refund of excess profits, as allowed by law, is not included in provision for the 1943 taxes. Fourth-quarter income taxes totaled $36,570,000, compared with $67,130,000 for the final period of 1942.

The corporation's average ingot output for 1943 was 100.9 per cent, or 2.9 per cent above the average of 98 per cent achieved for the preceding year. Fourth-quarter average was 104.2 per cent, against 101.6 per cent for the third quarter and 97.9 per cent for the last quarter of 1942.

In December, 1943, Bethlehem Steel Corp. exercised its purchase options to buy facilities which had been erected at certain of its steel plants under Defense Plant Corp. contracts. The year's cash expenditures for additions and improvements to properties owned by the corporation amounted to $48,332,283.

U. S. Steel Corp.'s Earnings, Taxes and Shipments

	4th Quarter 1943	12 Months 1943	12 Months 1942
Net income	$13,389,673	$63,642,322	$71,248,569†
Earnings per share of common stock	$0.81	$4.41	$5.29†
Shipments of finished steel products, net tons	5,175,186	20,244,830	20,615,137
Provision for taxes:			
State, local, and miscellaneous taxes	$10,213,868	$41,539,152	$48,255,157
Estimated federal income taxes	$8,500,000	$88,000,000	$153,070,000†
Total taxes*	$18,713,868	$129,539,152	$201,325,157
Carried to surplus account		$3,609,637	$11,215,884†

† After adjustment for renegotiation of contracts.
* Excluding social security.

Inland Steel Co. Reports Net Profit of $10,810,574

Net profit of Inland Steel Co., Chicago, totaled $10,810,574 in 1943, equal to $6.62 per common share. This is substantially unchanged from the $10,721,372 net income, or $6.57 a share, reported in 1942. Net profit for last year is after $1,000,000 reserve for postwar and other adjustments, and is subject to final audit.

Directors declared a dividend of $1 a share on capital stock, payable March 2 to record Feb. 11.

Company produced 3,597,975 net tons ingots last year, or an increase of 170,464 tons over preceding year. Finished and semifinished steel output in 1943 totaled 2,727,398, a gain of 116,674 tons.

Coke ovens and one blast furnace which company constructed for the Defense Plant Corp. are being successfully operated; another furnace being built for DPC is nearing completion.

Wheeling Steel Corp. Reports $4,479,246 Net

Wheeling Steel Corp.'s preliminary 1943 annual report shows net profit of $4,479,246, or $4.68 per common share, compared with 1942 net of $4,441,964, or $4.61 a share.

The somewhat increased 1943 net was recorded after paying $6,235,000 total taxes, of which federal income and excess profits taxes comprised $3,919,000, and after giving effect to credit for recovery of approximately $600,000 in excess profits paid for prior years in accordance with provisions of the 1942 revenue act. Total taxes for 1942 amounted to $9,253,884, including $6,650,000 of federal income and excess profits taxes.

Sales for 1943 totaled about $121,400,000, compared with $118,988,790 during 1942, but increased costs of labor and raw materials prevented earning of net profits in proportion.

1944 Output Will Increase 25% Over 1943

Aircraft, ships, communication and electronic equipment to make up 60 per cent of total program. December production holds at November level

MUNITIONS production in 1943 was 80 per cent greater than in 1942, and in 1944 will increase about 25 per cent over 1943, according to WPB Chairman Donald M. Nelson.

December production was at about the November level, the WPB index advancing only one point to 662 from a revised figure of 661 for November.

Mr. Nelson said selective upward and downward trends in particular munitions programs will appear during the coming 11 months. For example, small arms ammunition in 1943 was two and one-third times the 1942 output; 1944 production is scheduled to decline. Motor carriages for self-propelled guns also will decline.

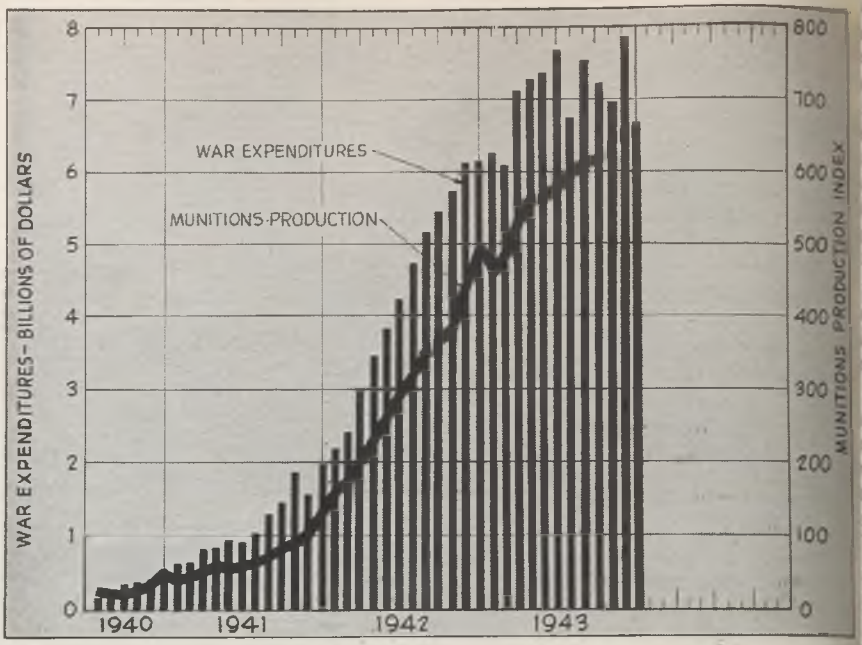
Aircraft, including spares, parts and equipment, will continue in the expanding program and 1944 output is scheduled to be 65 per cent larger than 1943's. Communication and electronic equipment will advance 35 per cent. Shipbuilding will be up 20 per cent. These three programs alone will make up 60 per cent of the total munitions program.

One of the big production jobs immediately ahead is landing craft, scheduled to advance 175 per cent over 1943.

"The year 1944," said Mr. Nelson, "may be expected to present new problems in the expanding programs such as communications and electronics, aircraft and heavy trucks. To keep pace with battle experience, designs will be revised and perfected, assembly lines will have to be geared up, labor will have to be recruited and trained.

"But in contrast to 1942 and 1943, the munitions problems of 1944 will be specialized problems, smaller in scale than during the earlier period of the war when all segments of the munitions program were being pushed and shoved simultaneously. The job ahead will continue to demand maximum effort and ingenuity from labor, management and government, but with the passing of 1943 the nation has definitely solved the major problems in mass production of munitions."

In December, aircraft production advanced 5 per cent; ship work declined 2 per cent; guns and fire-control equipment output was 2 per cent lower; ammunition output dropped 7 per cent; combat and motor vehicles lost 1 per cent; communications and electronic equipment production was 4 per cent higher.



MUNITIONS INDEX

(November 1941 = 100)

	1940	1941	1942	1943
Jan.		41	166	453
Feb.		45	182	476
Mar.		52	213	518
Apr.		60	247	547
May		57	276	548
June		59	309	560
July	23	64	339	587
Aug.	22	72	372	609
Sept.	22	83	387	611
Oct.	27	91	403	644
Nov.	34	100	448	661
Dec.	50	133	497	662

Figures for 1943 have been revised.

Western Miners Get Report On Miscellaneous Minerals

Mercury mining industry is well immersed in problems involved in the transition from all-out record war production to more normal rates, said R. J. Lund, director, Miscellaneous Minerals Division, War Production Board, in a paper presented before the combined meeting of the Western division, American Mining Congress, and the Colorado Mining Association at Denver, Jan. 27-29.

He revealed that mercury requirements were limited to only 54,000 flasks while domestic production increased to almost 54,000 flasks and imports totaled about 50,000 flasks. Government stockpile at

Pig Iron Sets Sixth Consecutive Record in 1943

PIG IRON production in 1943 totaled 61,777,296 net tons, compared with 59,861,047 tons in 1942, according to figures of the American Iron and Steel Institute.

This is the sixth consecutive year in which a new high has been established. Blast furnaces in 1943 operated at an average of 96.4 per cent of capacity for the entire year, compared with 99.2 per cent in 1942, the larger production being due to increased capacity.

These figures include ferromanganese and spiegeleisen, total of these two ferroalloys being 682,400 tons for 1943, compared with 785,103 tons in the previous year.

December pig iron output was 5,139,541 tons, with 73,605 tons of ferromanganese and spiegeleisen, making a total of 5,213,146 tons. This production was at the rate of 95.6 per cent of capacity. Companies represented in this compilation represented 99.8 per cent of total blast furnace production in 1942. Details of production follow:

District	Pig iron	Ferro, spiegel	Total December	Total Year	Per cent capacity
Eastern	971,516	24,456	995,972	11,704,924	91.0
Pittsburgh-Youngstown	2,035,283	19,626	2,054,909	25,351,027	97.6
Cleveland-Detroit	530,164		530,164	6,224,213	101.6
Chicago	1,137,790	10,921	1,148,711	13,206,388	100.9
Southern	343,795	18,602	363,397	4,017,360	90.8
Western	120,993		120,993	1,273,384	81.3
Total	5,139,541	73,605	5,213,146	61,777,296	96.4

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.

end of 1943 approximated two years' mestic requirements at the current rate consumption.

Commenting on the silver situation, . Lund said if imports continue at the esent curtailed rate, it is estimated ere will be a need for some 50 to 75 llion ounces of treasury "free" silver for e in essential civilian and war uses, thout taking into account several po- ntial major new uses on the horizon.

Corundum requirements have more an tripled compared with the prewar riod, he said, but strict allocation has ld consumption down to the available pplies.

Paul Zeigler, Reynolds Metals Co., oke to the meeting on "Role of Light letals in Postwar Economy," while John . Sullivan, Battelle Memorial Institute, oke on "Role of Heavy Metals in Post- ar Economy."

Five minute summaries of the indus- y's problems and needs in lead, zinc, pper, silver, gold, western iron ore, uicksilver, molybdenum, tungsten, vana- ium, manganese, chrome and potash ere made by various speakers. In ad- ition small mine operators' problems, bor matters, mining equipment, taxa- on and stockpiling were discussed at e three-day meeting.

Alloy Steel Output Soars in 1943

Record-breaking total of 13,116,000 tons of ingots and castings reported by American Iron and Steel Institute, gain of 14 per cent over 1942 tonnage

PRODUCTION of alloy steels in the United States during 1943 reached the record-breaking total of 13,116,000 tons of ingots and castings, according to preliminary reports compiled by American Iron and Steel Institute.

The 1943 total was nearly 14 per cent above the previous record of 11,526,000 tons of alloy steel produced in 1942 and is more than four times production in 1939.

During 1943, the peak month for alloy steel production came in March when 1,284,000 tons of alloy steel were produced. Since that month, almost without interruption, alloy steel production declined, reflecting a steady decrease in demand.

In December, production of alloy steels amounted to 799,000 tons which compares with output of 1,185,000 tons in December, 1942. Some part of the decline in the December, 1943, figure was caused by strikes at steel plants.

Of the total tonnage of alloy steel output in 1943, open hearth furnaces produced 70 per cent, or 9,221,000 tons. About 30 per cent, or 3,895,000 tons were produced in electric and crucible furnaces.

That same ratio of open hearth to electric furnace alloy steel production prevailed in 1942. Before the war, however, open hearth furnaces produced as much as 75 per cent of the total alloy steel tonnage.

Scrap Stocks Smaller At End of November

Domestic stocks of steel and iron scrap at consumers', suppliers' and producers' plants at the end of November, 1943, approximated 6,391,000 gross tons, a decrease of 1 per cent from the 6,456,000 tons reported Oct. 31, according to the Bureau of Mines. The decline was caused mainly by a drop of 2 per cent in stocks of purchased scrap at consumers' plants while stocks of home scrap gained approximately 1 per cent.

Total consumption of scrap and pig iron in November was 9,045,000 gross tons, a decrease of almost 5 per cent from the 9,536,000 tons consumed in October, average daily melt being 2 per cent below that of October. This was caused by declines of 4 and 2 per cent in average daily use of home scrap and pig iron while that of purchased scrap increased 1 per cent.

WLB Policy Criticized in House Committee Report

War Labor Board's maintenance of membership policy is an "autocratic challenge to constitutional authority" and has increased, rather than decreased, labor unrest in war industries, it was charged last week in a majority report of the House Select Committee to Investigate the Acts of Executive Agencies.

The report criticized the board's stand on questions of retroactive pay awards, but emphasized principally the maintenance of membership policy which, it said, was an "open invitation to all labor unions not having closed shop agreements to foment labor disputes" and get their cases before the board and win the award.

"In the judgment of this committee that policy greatly increased labor disputes in the war industries and in large measure accounts for the failure of the board to be able to dispose of its cases with reasonable promptitude," said the report.

POSTWAR PREVIEWS

SURPLUS PROPERTY—Leftover materiel, war plants, equipment and raw materials may total $75 billion when war ends. Framing of disposal program poses tremendous problems. Aim is maximum recovery to government and minimum dislocation to private business. See page 35.

RECONVERSION—Bernard M. Baruch to establish overall policies; Donald M. Nelson to execute them. See page 44.

ROADBUILDING—Annual expenditure of $750 million for highways recommended to Congress by President. See page 44.

AUTOMOBILES—Dealers urged to "educate" public to fact that fanciful designs in motor vehicles will be not the "cars of tomorrow" but the cars of the "day after tomorrow." See page 52.

WAR INDUSTRIES—Postwar bonus, in form of incentive pay increase payable after hostilities end, suggested by Donald W. Douglas to tide employes over adjustment period. Much depends on attitude of government in taxation and renegotiation. See page 54.

TANTALITE—Rare metal, mined by primitive methods in Brazil, has fabulous future in field of electronics. See page 63.

APPLIANCES—Two and a half million household washers will be required annually in decade after victory. See page 64.

NEW PRODUCTS—Cleveland machine tool builder buys rights to tapping machine for postwar preparedness. See page 65.

"DREAM CAR" MYTH—Lessons learned from war expected to have great effect on design and construction of future automobiles, but industry will not sacrifice practicability, safety and fundamental standards to fulfill predictions of prophets. See page 68.

TUBULAR PARTS—Increasing familiarity of steel tubing fabricators with materials and improved production techniques augurs for their success in postwar competition. See page 72.

Misinformation

THE amount of misinformation that is sent out from Washington as so-called "inside" news is a phenomenon that continually shocks informed observers. Just as an example, a well-known columnist recently ran a story to the effect that Donald M. Nelson was engaged in a behind-the-scenes race with Bernard M. Baruch to work out plans for the reconversion of American industry "and see who can get it done first." He also added that before Nelson got busy on reconversion, Mr. Baruch had been asked by the White House to study the reconversion problem. Actually, Mr. Nelson has had plans for reconversion for nearly a year. There is no "race" between Nelson and Baruch. Whereas Baruch, under War Mobilization Director James F. Byrnes, is concerned with the establishment of overall reconversion policies, Nelson merely would be the instrument for carrying out these policies.

Roadbuilding Plans

Final report of the National Interregional Highway Committee, prepared with the aid of the Public Roads Administration, recommends the designation and improvement to high standards of a national system of rural and urban highways, totaling approximately 34,000 miles, to interconnect the principal geographic regions of the country. In transmitting the report to Congress President Roosevelt stated that the program called for road building expenditures at a regular annual rate of around $750,000,000. He recommended that Congress enact legislation to implement this program.

War Comes First

Following careful consideration of the recommendations by automobile manufacturers and others that they be permitted now to place orders for machine tools and other equipment they will need in order to reconvert to production of their normal peacetime products, the War Production Board has decided not to relax the provisions of Order E-1-b which permits machine tools to be ordered only for use in war production. The feeling is that no easement of this kind is warranted with the great European invasion job still ahead.

USSR—Big Postwar Market

When Donald M. Nelson returned from his visit to Russia he expressed the opinion that the Soviet Union would be a big market for American goods, particularly industrial equipment, after the war. The same opinion is widely held and is based on the fact that industrialization in the USSR has reached a record-breaking level during the war. Some significant facts are revealed in a recent issue of *Information Bulletin*, publication of the USSR embassy in Washington. Despite the loss of the southern metallurgical industry, the bulletin reveals, pig iron output in the USSR in 1943 was 18 per cent higher than in 1942, while the output of steel rose 17 per cent in 1943. In 1943, the bulletin says, the Soviet Army attained superiority over the Germans in the number of tanks, aircraft, automatic rifles and other weapons.

As will be the case here and in other countries, Russia will be faced with a gigantic job of reconversion after the war and she will need a great deal of equipment to manufacture peacetime goods.

PROFITEERING?

State department is launching another questionnaire to determine whether or not any progress has been made in the effort to protect American manufacturers and exporters against charges of profiteering in the sale of goods to Latin American countries. Americans sell to Latin America at OPA prices but merchants in the receiving countries add huge markups—protecting themselves from criticism by blaming the Americans. All the Latin American countries have price control laws but very few make any serious attempts to enforce them.

The problem is a delicate one inasmuch as Uncle Sam does not feel justified in making any serious attempt to influence the various countries as to how they handle their business. The only government action has been urging by the Co-ordinator of Inter-American Affairs that the various countries enforce their price laws. Some large companies interested in entering the postwar era with friendly relations in Latin America would like to do something about this profiteering but are at a loss how to move.

Minerals from the South

This country's Latin American neighbors are supplying from 25 to 100 per cent of some of the most important minerals required by our war industries, Leo T. Crowley, head of the Foreign Economic Administration, recently revealed to Sen. Kenneth McKellar, acting chairman of the Senate Appropriations Committee.

About 99.9 per cent of the imported quartz crystals come from South America, mainly from Brazil, and approximately 67.5 per cent of tin imports are shipped here from Latin America, with Bolivia as the chief source.

Of the 95 per cent of mica imported to meet the country's needs, Latin America shipped 23 per cent of the total. Eighty-three per cent of all the beryllium used is imported and Latin America, particularly Brazil, supplied 70 per cent of that total.

Physical Fitness

The National Committee on Physical Fitness is about to launch a big publicity campaign. Recently appointed by War Manpower Commissioner Paul V. McNutt, with Dr. William P. Jacobs, president of the Presbyterian College, Clinton, S. C., as chairman, the group has the chore of raising the physical standards of the nation. The new committee was formed to combat a decline in efficiency per average worker, now becoming increasingly evident. The campaign was launched at a press luncheon at the Statler hotel, Washington, Jan. 26. Two booklets were released: "Physical Fitness in Industry," for management and labor, and "Physically Fit for Production," for the individual worker.

Exports Mount

Exports from the United States established an all-time record in 1943 for dollar value. Preliminary estimates are that they came to around $12,500,000,000. This total includes lend-lease shipments, estimated at about 85 per cent of the total, but does not include exports to United States armed forces abroad. Imports for 1943 will total in the neighborhood of $3,400,000,000.

Heaped with Insults

Rep. Fred L. Crawford (Rep., Mich.) expressed the attitude of many congressmen when in a recent hearing of the House Committee on Banking and Currency he made a sharp complaint about the many manufacturers and businessmen who are "afraid" to come to Washington and tell the committees of Congress what they are talking about.

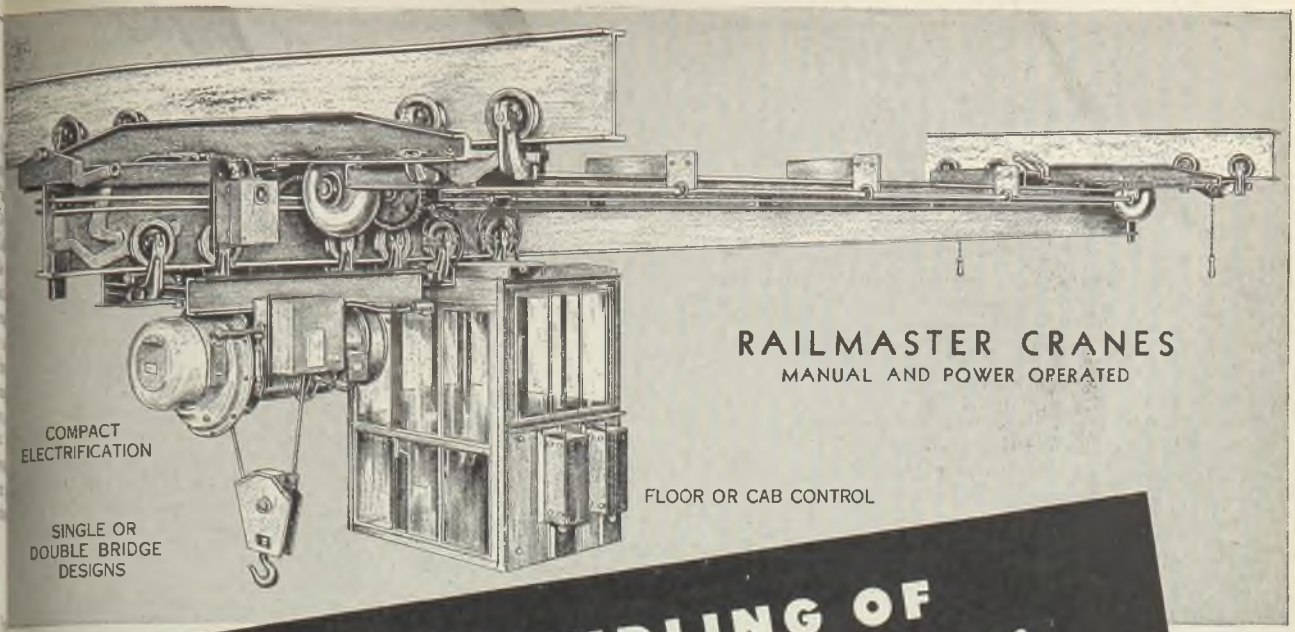
"If private enterprise hasn't the guts to come to Washington and say what it needs, it does not deserve preservation," he exploded.

Rep. Charles L. Gifford (Rep., Mass.) said he could understand that. "Do you recall how these witnesses often are insulted when they appear before this committee?" he asked.

"That should not prevent them from appearing here," retorted Crawford. "Let them be insulted. Members of Congress are insulted too—and they can take it."

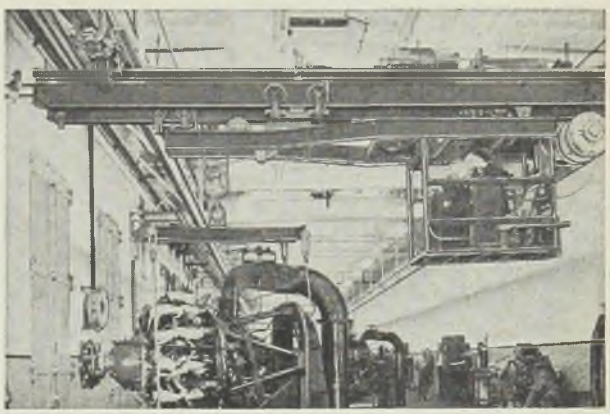
Momentous Ruling Soon

Important chore of ruling on the constitutionality of the Contract Renegotiation act has, on the order of Chief Justice D. Lawrence Groner of the United States Court of Appeals, been assigned to a three-judge statutory court. This court is composed of Chief Justice Groner, Chief Justice Edward C. Eicher of the district court and Associate Justice Jennings Bailey of the district court. Formation of the tribunal resulted from the suit of the Lincoln Electric Co., Cleveland, protesting the demand of the Navy Department that the company return $3,250,000 representing alleged excess profits in 1942.



FLEXIBLE HANDLING OF *Massive Production*

B-28 Bomber Makes Maiden Flight on RailMaster Crane.



Spotting motors with telescoping crane.

MASSIVE loads set up no problem when American MonoRail RailMaster Cranes are on the job. They are not limited to bridging a single span but, with their special interlocking and twin bridge designs, they can cover any area with any type of handling equipment.

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★ SEND FOR BULLETIN C-1. A 56 PAGE BOOK SHOWING SUCCESSFUL APPLICATIONS OF AMERICAN MONORAIL SYSTEMS.

"Little Fellow" Gets Assistance

Smaller War Plants Corp. rises in favor as it performs increasingly impressive job. Helps small industries obtain contracts and solve priority troubles

WASHINGTON

ITS exploratory and organizational period definitely past, the Smaller War Plants Corp. now is doing an increasingly impressive job in furnishing assistance to small industry.

Its staff has acquired a good deal of experience and now reflects much resourcefulness in finding business for small plants and in helping such plants out of priority and other troubles. That this fact is increasingly appreciated by smaller manufacturers is proved by the thousands of calls for assistance that are made each week upon the regional and district offices of the Smaller War Plants Corp.

During one week alone, that ended Jan. 8, field offices of the SWPC were of assistance in the placing of some 350 prime contracts and some 330 subcontracts, involving a total value of $31,000,000.

At the same time SWPC took two prime contracts which it will subcontract to a large number of small manufacturers. One calls for 7,000,000 pairs of shoes, to be made largely from canvas, and the other for 220,000 articles of clothing. SWPC is actively seeking additional prime contracts and expects to be increasingly active in subcontracting. The government procurement agencies no longer look askance at the SWPC but give it full recognition and co-operation—a big victory in itself.

A distinctive type of service which is being rendered to small industry results from the SWPC's close contact with members of the War Production Board and from its knowledge of the priorities system. Here are some cases where the SWPC was able to do something for small plants that were in trouble:

A small plant in Kentucky which normally manufactures compacts and cigarette cases was finishing a Navy contract and was threatened with a shutdown pending receipt of another Navy order. It had on hand a considerable amount of steel originally ordered for compacts and cigarette cases. The company made two unsuccessful attempts to get permission to make up this steel into compacts and cigarette cases and thus keep its plant going and its personnel intact. It then presented its problem to the SWPC which succeeded in obtaining required approval from the War Production Board Appeals Board.

A Pennsylvania manufacturer of automotive springs reported it was in dire straits because of inability to get steel. By showing that this small firm was producing springs required in maintenance of trucks, buses and automobiles the SWPC was able to get a steel allocation for this company.

A manufacturer of neon signs and fluorescent lighting fixtures sought permission to continue the production of these goods, using steel in inventory but was turned down, first by the regional WPB office and then by the WPB Industry Division in Washington. SWPC appealed, on the ground that the material could not be used for anything else and that the frozen inventory was causing excessive hardship, whereupon the request was approved.

A manufacturer of heat disperser plates for use on gas stoves found himself classified with gas toaster manufacturers under the M-126 order. The SWPC won an exception in this case by proving that the heat disperser plates are used in all employment of gas ranges and, by making efficient use of heat, cut down on gas consumption. Now this manufacturer can get steel and manufacture his product in unlimited quantities.

Permitted To Resume Production

A maker of soil shredders had steel on hand but felt that L-257 restricted its use for this purpose. SWPC showed that soil shredders were not included in the list of farm machinery restricted on L-257 and he was permitted to resume manufacture.

Recently the SWPC made up a list of 2260 firms that have open capacity, and it asked the War Production Board to give them consideration in allocating to them material to enable them to make essential civilian products they made in 1941.

Up to date the War Production Board Industry Divisions have reported back to the SWPC as to what action it has taken on a large group of companies on this list. While the report shows that material was allocated most favorably to firms applying, it is noteworthy that the greater percentage of those firms which did not get material, did not ask for material. They did not go to the trouble of filling out the necessery priority forms and the War Production Board, of course, does not allocate materials that are not requested.

Small companies can get service of many types from the 14 SWPC regional and the 103 district offices located all over the country. They can borrow money from the SWPC for the purchase of supplies, materials, machinery and so on. SWPC can often be helpful in dealing with the OPA on price matters, the WMC on manpower matters and with other such government agencies. It is in a position to make expert help available to help them solve their technical and production problems, including such angles as product design. The regional offices have complete libraries of the patents in the hands of the Alien Property Custodian—covering many processes and products which may be manufactured on a royalty-free basis. The SWPC regional and district representatives have proved particularly useful in assisting small manufacturers in filling out various forms, in making up bids and extending advice or imparting information of one kind or another and—in other words, helping them in every way possible.

Current indications are that the Smaller War Plants Corp. will be continued, perhaps under some other name, beyond the war period. Many members of

(*Please turn to Page* 136)

Carriers' Most Urgent Equipment Deficiencies To Be Filled in 1944

AMERICAN railroads entered 1944 with fair assurances their most urgent deficiencies in fixed plant and rolling stock are to be relieved this year. But they will not get deliveries of many needed freight cars and locomotives until the second half. This is because capacity at builders' shops during the first half will be taken up in filling government orders to meet lend-lease and military requirements and also to make up for the accumulation of unfilled orders in 1943.

That means new equipment will not be available on any sizable scale to handle a huge amount of traffic this year. The coal movement has assumed record proportions, troop movements are heavy, and the grain and livestock movements are of abnormal proportions. Director Joseph B. Eastman, Office of Defense Transportation, has warned that the next few months will be the tightest thus far experienced as far as rail transportation is concerned. This is not only because of the size of the traffic load, but also because of the 1943 slippage in freight car and locomotive production, the continued manpower shortage and also because winter weather always

lows down rail operations considerably. Still another factor is that during the months of critical steel shortages the railroads went to unusual lengths in maintenance activities. To save critical materials they repaired and rebuilt cars and locomotives which in normal times would be scrapped. This has been expensive from a dollars and cents standpoint. Nevertheless, it is an ace in the hole of which the railroads can avail themselves at any time rather than order new equipment that might prove a bad investment in the postwar period. Too, in view of the high income and excess-profits taxes on corporate incomes, this expensive repairing and rebuilding is much less costly than would be the case under less burdensome taxes.

The 28,000 freight cars which the railroads were able to obtain in 1943 were built by unusual practices and to abnormal designs. Many were of composite construction—wooden sides and ends on steel frames and steel running gear. Many car bodies were fabricated from non-copper bearing plate mill rejects; because of their irregular dimensions these often had to be welded together so as to form sections large enough to cut out side and end plates. These emergency measures no longer are necessary and the War Production Board, while stipulating that mill overruns, excess primes and rejects should be used where convenient, has ruled that all-steel freight cars again will be produced in 1944.

1100 Locomotives Ordered

The story with respect to locomotives is about the same as that for freight cars. Last year the railroads were clamoring for locomotives. They requested 1200 but actually were able to get 850, of which some 250 were diesels. Capacity being available, also materials, including alloy steels, they have ordered approximately 1100 locomotives for delivery in 1944, of which some 500 will be diesel-powered. These figures include switchers as well as main-line locomotives. The railroads believe that when they get this new equipment they again will be in fair shape to meet peak demand.

It is expected the railroads will wind up 1944 with a big deficiency in passenger cars. There has been no passenger car production since 1941 and it would take considerable time to reconvert passenger car plants. Hence it is unlikely that there could be much passenger car production before the fourth quarter even if the railroads ordered them. Last year ODT asked for the allocation of material for 2000 passenger cars but this request was denied by the WPB because of the aluminum shortage. WPB then was willing to allot material only for 1600 troop sleepers and kitchen cars authorized in 1943. Now the aluminum situation is easier and there seems nothing to prevent launching of a passenger car production program before the end of this year—if such a program is desired.

As a matter of fact, the railroads may prove somewhat reluctant about ordering large numbers of new passenger cars. For one thing, they are not yet certain whether they will be able to get them provided with air-conditioning equipment, now-a-days a railroad "must." For another, they sense a great and growing public impatience with the congestion attendant upon rail travel. They fear a big loss of passenger business when the traveling public again is able to get tires and gas.

Based on what the railroads claimed they needed, they entered 1944 with a rail deficiency of 561,000 tons. For 1944 the railroads have requested 2,500,000 tons of rails. WPB has given assurances they will receive 1,825,000 tons, and this tonnage is to be exceeded by whatever additional production can be gotten out by the mills over and above lend-lease and government requirements. The railroads expect to receive about 2,000,000 tons of rails during 1944. Counting needs that develop during 1944, therefore, a considerable rail demand is expected to flow over into 1945.

The railroads entered 1944 with still other deficiencies. The deficiency in bridges and trestles is estimated at $19,250,000, while that in signal apparatus is estimated at close to $10,000,000. The deficiency in the amount of roadway labor is estimated at $51,000,000.

Change to War Production Proves Stabilizing Influence on Employment

CONVERSION to war production by the metalworking industries has proved to be a stabilizing influence on employment and has limited the redistribution of employment incidental to the war expansion. It has provided continuity of employment in terms of companies and industries, thereby reducing the wartime reshuffling of the labor force, and has tended to diminish the scale of the postwar readjustments that will be necessary when industry is reconverted to its peacetime activities.

These are conclusions of the Bureau of Labor Statistics in a study of the conversion of 35 metalworking industries.

The postwar readjustment problems of some of the industries, however, will be considerable, the bureau points out. Specifically cited is the automobile industry in which only one-sixth of 630,000 wage earners are in plants which have continued to make their prewar product.

In the 35 industries surveyed, plants employing 45.8 per cent of wage earners are principally engaged in the manufacture of combat munitions. Employment in plants where the major product is the same as before the war amounted to 42.4 per cent of the total. The remaining 11.8 per cent was in plants which had shifted from their prewar product to other noncombat products.

A wide range in the degree of conversion was revealed among the industries surveyed. Those whose peacetime products were consumers' durable goods generally show the largest proportion of employment in plants converted to combat munitions. The ability of most of the metalworking industries to change their type of production has resulted in greater relative stability of employment trends.

A number of the industries studied had very slight conversion problems. For example, the steel industry produces basic material. Others, such as bolt and nut manufacturers, make common components. There was no need for conversion by the aircraft, shipbuilding, small arms ammunition and firearms industries. The machine tool and accessories plants were not faced with the need for conversion until recently.

Highest ratios of conversion were found in the industries producing automobiles, clocks and watches, sewing machines, household washing machines, refrigerators, whose normal production was severely curtailed by orders of the War Production Board. Another industry whose conversion was substantial is the locomotive industry which undertook extensive contracts for tank production and thereby greatly expanded its volume of employment. The trend in this industry now is being reversed as the tank program is cut back and the need for locomotives becomes apparent.

Reconverts Plant Facilities To Produce Civilian Stoves

All its war orders filled, the Grand Home Appliance Co., Cleveland, which is the new corporate name of the long-established Cleveland Co-operative Stove Co., is reconverting its facilities in preparation for the production of four-burner gas ranges which it plans to put on the market for civilian use about March 1.

Company officials said that the new gas ranges will be somewhat smaller than ordinary peacetime ranges but do not contain substitute materials such as are embodied in some "victory" models. The War Production Board has approved the company's desire to get back into civilian production after the Army had cut back on its tank requirements and thus left the Grand Home Appliance Co. without any work. The company will be permitted to manufacture approximately the same number of ranges produced in 1941.

The company has had an enormous conversion job since last July because of the vast difference in machinery used to manufacture tank armor and the currently planned civilian stoves.

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

STEEL: Producers and distributors of steel, who have off-grade or rejected steel or idle and excess inventories of steel which they are unable to move under CMP regulations, may apply to WPB for permission to dispose of such material. Applications should contain the name of proposed customer, product to be made, description and location of the material, length of time held, and reason holder has been unable to move it under CMP regulations. Steel producers' applications should be addressed to the appropriate products branch, Steel Division, WPB. Distributors' applications should be addressed to the Warehouse branch, Steel Division, WPB.

ALUMINUM: Paint manufacturers are prohibited from delivering more than 1 gallon of aluminum paint or other aluminum coating, or two pounds of aluminum pigment in any one month to any retail outlet, whether or not the outlet is owned by the manufacturer, unless the outlet can furnish ratings of AA-5 or better.

LEAD: Any person unable to obtain lead from regular sources of supply may make application for delivery of a month's requirements from the Metals Reserve Co. Applications must reach the Tin-Lead Division by the 20th of the month prior to the month in which delivery of the metal is requested. Although reports on form WPB-95 will be made quarterly during 1944, lead will be distributed monthly by MRC as in the past. Lead stocks, receipts and consumption must be reported quarterly on form WPB-95, the first report being due April 20.

All consumers of lead and dealers in pig lead must report on WPB-95, providing they used or sold 40 tons or more of lead during the previous quarter, or had in their possession or under their control 20 tons of lead on the last day of the preceding quarter.

L ORDERS

WATER HEATERS: Water heaters may be sold to consumers for replacement and maintenance purposes without ratings. Sale for other than these purposes is subject to WPB approval. Industrial and commercial users should apply on form WPB-541 and other users on WPB-2631 for preference ratings. Purchase of water heaters by sellers is now controlled by order L-79 which assigns a rating of AA-3 to enable them to purchase and maintain an inventory of such equipment for replacement purposes as well as for new installations. (L-185, -79)

WOOD-BORING BITS: A standardization and simplification schedule for wood-boring bits has been issued, reducing manufacture to 422 kinds and sizes of bits instead of 1285. Schedule VIII of order L-157 limits manufacture to the 18 types and the sizes, styles, grades, etc., of each type set forth in appendix A, attached to the schedule. Eleven types designed for special purposes are exempt from the restrictions. Manufacturers and dealers are prohibited from holding sets of bits in inventory but sets may be made to fill specific orders. Nonconforming bits may be shipped and delivered up to April 22, 1944. (L-157)

MOTOR VEHICLES: Time limitation of April 1, 1944, has been removed on the use of AA-1 ratings to cover the production of replacement parts for medium and heavy motor trucks, truck trailers, passenger carriers, off-the-highway motor vehicles and motorized fire equipment. All orders for replacement parts for the categories of vehicles named, although these orders are not issued with a rating, must be produced as though they bore an AA-1 priority, notwithstanding the provisions of priority regulation No. 1. Passenger automobiles and light truck replacement parts take an automatic AA-2X rating. (L-158)

BATTERIES: Battery manufacturers have been authorized to produce 110 per cent of the number of batteries sold during 1941 or 1943, whichever is higher. Small producers who sold less than 25,000 replacement batteries in 1943 can proceed with unlimited production, providing total for any such producer for 1944 does not exceed 25,000 units.

No producer whose plant is situated in a group 1 labor market area as classified by the War Manpower Commission on Jan. 1, 1944, shall produce replacement batteries in excess of 100 per cent of his sales of batteries produced in that plant during 1941 or 1943, whichever is higher. Any producer having a plant not situated in a group I or group II labor market area may apply to WPB for permission to increase production in excess of the 110 per cent limit at such a plant.

The amendment also eliminates the certificate of compliance previously required from distributors and removes the existing 90-day limitation on distributors' inventories, leaving distributors free to build up such inventories as they deem necessary. It now requires reports by plants rather than the total production of each company as formerly. It also provides that appeals now are to be filed at the field offices of WPB rather than at Washington. (L-180)

INDEX OF ORDER REVISIONS

CONVEYING MACHINERY: Small amounts of carbon steel now may be used in the fabrication of conveying machinery and mechanical power transmission equipment. Pneumatic tube delivery systems have been added to the list of machinery that requires an AA-5 priority to manufacture. (L-193)

TUBULAR GOODS: Manufacture of lightweight tubing, used largely by gas well operators in the eastern area, may be resumed. Before fabrication of this tubing was banned in April, 1943, large quantities of it were used. Specifications for these tubings are set forth in schedule 9 of the order. (L-211)

CONTAINERS: Order L-307, which prohibited the use of new containers of less than 5-gallon capacity for packaging antifreeze mixtures other than ethylene glycol type, has been revoked. Metal containers of 1 gallon and over may be used for ethylene glycol antifreeze. Orders L-103-b and M-81 control glass and metal containers, respectively. (L-307)

M ORDERS

COPPER: Manufacture of new brass or copper tubing, pipe or fittings for installation in gas supply and gas distribution systems is now prohibited. Use of copper to make nose rings for bulls is now permitted. (M-9-c)

A new order, M-9, superseding order M-9-a (Copper and Copper-Base Alloys) and M-9-b (Copper Scrap and Copper-Base Alloy Scrap), has been issued to govern the acceptance of delivery of specified types of copper and copper-base materials (other than controlled materials), and copper-clad and copper-base alloy-clad steel scrap. The new order gives in tabular form the restrictions on acceptance of delivery of copper raw materials. Restrictions on delivery, melting and processing have been eliminated.

No person (other than a scrap dealer or one who is in the business of producing copper raw materials or copper controlled materials) is permitted to keep on hand more than 30 days' accumulation of scrap unless such accumulation aggregates less than 5 tons.

No scrap dealer may accept delivery of any of 31 designated classes of urgently needed copper scrap unless he has sold scrap of such classes during the preceding 60 days in an amount at least equal in weight to his inventory of such scrap on the date of acceptance of delivery. (M-9)

COPPER PRODUCTS: Frozen inventories of copper and copper-base alloy pipe, tubing and fittings in the hands of utilities have been freed for use in underground gas and water supply and distribution installations outside buildings. (M-9-c-4)

ALLOY STEELS: All restrictions have been removed on the formulas by which vanadium, tungsten, molybdenum and nickel alloy steels and chromium-nickel alloy iron and steel were produced. Producers now may use any alloy content they desire in making these melts. This action was taken by revoking supplementary orders M-21-h and M-21-g.

Producers now may melt carbon steel in electric furnaces without filing schedules and obtaining permission from WPB, under provisions of M-21-a, as amended.

Direction 4 to M-21-a, covering all types of alloy steel except stainless and valve steels, was issued to provide that each producer must use alloy scrap in not less than the following amounts for melts in any one calendar month: Scrap (solids and turnings), 60 per cent in electric furnace, and 50 per cent in open hearth. Of these amounts, turnings must constitute 5 per cent in electric furnace and 8 per cent in open hearth while machine shop turnings must constitute 4 per cent in electric furnace or open hearth.

An amendment to M-21-h revokes the requirement that producers of tool steels file melting schedules before making their melts. Certification still must be made that orders are for tool steel. (M-21-a, -g, -h)

CHROME PIGMENTS: Chromium oxide green and zinc chromate have been placed under complete allocation, effective Feb. 1. The other chrome pigments (chrome yellow, chrome green, chrome orange, molybdate chrome orange and hydrated chrome oxide) are grouped, and purchases and use in the first quarter of 1944 are limited to 25 per cent of a user's aggregate purchase of these pigments in 1941. This is exclusive of orders of the grouped pigments for specified government agencies which are exempt from the restrictions of the order.

Users in the printing ink industry are permitted to obtain and use 50 per cent of their 1941 purchases of the grouped chrome pigments, but are allowed no additional supplies for filling government orders. (M-370)

U ORDERS

PUBLIC UTILITIES: Simplified procedures have been established in the basic order governing public utility companies. Principal changes are: Eliminate quantitative restrictions on withdrawals from inventories of material to be used for maintenance, repair and operating supplies; increase the permitted value of overhead construction from $500 to $1500

elieve utilities having inventories of $10,000 r less from controls over purchases and in- entories, although these companies remain sub- ect to other provisions of the order. (U-1)

PRIORITIES REGULATIONS

CERTIFICATIONS: When the standard cer- ification, provided in priorities regulation No. is used in place of a form called for in an- ther WPB order or regulation, any additional nformation required by such other order or egulation must be added to it. The following hanges have been made in the designations f permitted uses of the forms of certifications which it provides: Prohibition against substi- ution of the standard form of certification has een eliminated in the case of certifications alled for in orders L-279 and L-158; list of ertifications which may not be waived under he provisions of priorities regulation No. 7 as been expanded to include those contained in orders L-103-b, L-158, and L-197; per- mission to use the one-time certification has been eliminated in the case of the certifica- tion required in orders L-144 and M-103. (PR No. 7)

PRICE REGULATIONS

COPPER SCRAP: Ceiling prices on the fol- lowing grades of scrap to copper refiners and ingot makers have been reduced to: Brass pipe, 7.50c, f.o.b. shipping point, from 8.00c; old rolled brass scrap, 7.00c from 7.75c; admir- alty condenser tubes, 7.50c from 8.00c; muntz metal condenser tubes, 7.00c from 7.50c; plated rolled brass sheet, pipe and reflectors, 6.50c from 7.50c.

Specific maximum prices have been estab- lished for the first time for the two following grades: No. 2 copper borings, 8.75c; contam- inated gilding metal solids, 8.50c. Previously, these two grades had to be sold as refinery brass at ceiling prices averaging less than 8.00c a pound.

Dealers now may qualify for quantity pre- miums when radiators and zincy bronze solids and borings are included in shipments of 60,000 pounds or more of "red" scrap items. (No. 20)

COKE: Ceiling prices on all by-product and retort gas coke produced in the East have been raised 50 cents a net ton. This territory in- cludes all Atlantic seaboard states, Vermont, and West Virginia and the eastern part of Ohio. (No. 29)

NONFERROUS CASTINGS: On Feb. 1, 1943, maximum prices for copper and copper- base alloy castings were established generally as the seller's most recent prices in the base pricing periods of Oct. 1-15, 1942, or May 11, 1942-Jan. 31, 1943, less 1½ cents per pound. New modified reductions from base period prices have been established, replacing the former flat 1½ cents per pound reductions, as follows: On 85-5-5-5 or 88-10-2 specification castings, 1 cent a pound; on 80-10-10 and yellow brass group castings, 1¼ cents a pound; on the sili- con bronze groups, 1 cent a pound. In the case of 97 per cent copper specification cast- ings, the 1½ cents per pound reduction is com- pletely eliminated. (No. 125)

TIN CANS: Producers of packers' tin cans who sell containers coated with special enamels developed since Oct. 15, 1941, have been authorized to apply to OPA for a maximum price on such cans. (No. 350)

FERROUS FORGINGS: Manufacturers of ferrous forgings may enter into adjustable pric- ing contracts only where: (a) A request for a change in the applicable price is pending; (b) authorization is necessary to promote pro- duction, (c) it will not interfere with the pur- poses of the Emergency Price Control Act of 1942, as amended. Where the manufacturer has filed an application for adjustment under the appropriate section of the regulation, he may deliver at a price which will be adjusted upward in accordance with the action taken by OPA on his application. In all other cases, unless authorized by OPA, the manufacturer must not deliver at a price which is to be in- creased according to action taken by OPA after delivery. (No. 351)

Manufacturers and Packers Effect Savings in Use of Ferrous Metals

Provisions of War Production Board's orders covering steel shipping drums, cans and fluid milk shipping containers account for principal savings in steel. . . Increased demand in 1944 will require 1,900,000 tons of prime plate

LARGE savings in ferrous metals used for the manufacture of containers has been accomplished through the various War Production Board conservation and limitation orders and through its current drive to encourage the re-use of containers. Indicative of the size of the container industry, WPB reports that 5 per cent of the nation's steel was used for making containers in 1943. The demand this year is expected to be even greater.

With war demands for containers enormous, raw materials and labor supply still tight, and with container production facilities strained, the greatest responsibility for conservation and re-use of containers rests on companies whose products require protection during shipment.

The petroleum industry alone is saving 75,000 tons annually through increased re-use of containers, WPB states. Many companies have installed special cleaning and reconditioning equipment to effect these savings. The industry has worked out an elaborate grading system under which new drums are used only for the most essential products and the used drums are graded to get the maximum use out of them down to the final use for packing of asphalt or tar products.

Principal savings in steel have been effected through the issuance and administration of such orders as L-197, covering steel shipping drums; M-81, cans; and M-200, fluid milk shipping containers.

Order L-197 not only prohibits the packing of certain commodities in steel shipping drums, but requires authorization from WPB to deliver and receive them. In granting authorizations, WPB frequently specifies a lighter gage metal drum than requested, thus effecting a considerable saving in metal. Also, by cutting down the number of drums authorized, it forces the use of second-hand drums.

In 1943, about one million new steel drums would have been required to package lard, shortening, and edible oils, but by restricting the packing of these products to used drums about 27,000 tons of steel were saved, WPB estimates.

Order M-81 not only establishes packing quotas for a number of commodities, thus cutting down the total use of cans, but also specifies can materials and can sizes. The latter restriction, particularly, has effected substantial savings in metal by forcing the use of a larger sized can than customarily used for certain products.

It is estimated by WPB that the use of one larger-sized can alone has effected a saving at the rate of over 100,000 tons of steel a year.

It is impossible to arrive at any estimate of the savings effected in steel shipping drums and cans. It is possible, however, to arrive at the approximate savings of metal in fluid milk shipping containers, as order M-200 covers only one type of container. By redesigning and simplifying the required specifications for these containers, it is estimated that on an average about 6 pounds of steel are saved on each can. On the basis of 1,400,000 fluid milk cans produced in the fiscal year ended June 30, 1943, and an estimated output of 1,700,000 for the year ended June 30, 1944, the probable savings of steel will exceed 9000 tons.

Recently WPB announced a list of 169 products which may be packaged in metal containers during 1944, an increase of 22 over last year. To make the 1944 pack possible, an estimated total of 1,900,000 tons of prime plate has been allocated, compared with 1,550,000 used in 1943. The second quarter production of tin plate and black plate will probably exceed the first quarter production quota by 125,000 tons, WPB states. Total tin and black plate production for the first quarter is scheduled at 627,000 tons.

More WPB Steel Division Executives Resign Posts

Further resignations of officials from the staff of the Steel Division, War Production Board, were announced last week.

James A. Rowan, special assistant to John T. Whiting, director of the division, has resigned his post, effective Jan. 29. Before joining WPB Mr. Rowan was news editor, *Iron Age*.

W. F. Vosmer, chief, Carbon Bar and Semifinished Branch of the division, also has resigned his post. He has been with WPB since February, 1942, coming from Republic Steel Corp., Cleveland.

A. A. Archibald of Philadelphia, chief, Shell Steel Section, who has been with WPB since July, 1942, has also resigned, as has M. M. Chapman of Pittsburgh, chief, Sheet Section of the Sheet and Strip Branch of the Steel Division. He has been at WPB since January, 1943.

Lt. Col. D. C. Roth who has been in the Steel Division representing the Army Air Forces on the Steel Division Requirements Committee has been transferred to other duties.

Information supplied by an Industrial Publication

The loss of recoverable alloys in steel scrap has been a major problem confronting the various conservation agencies. Proper segregation of scrap is one effective answer.

Segregation of scrap at the source is comparatively simple. The difficulty comes in preventing mix-ups in subsequent handlings. They can be prevented or remedied by applying two simple tests—spark and spot.

The presence of molybdenum, or nickel, or both, is readily detected by spark testing. Molybdenum causes an easily recognized secondary burst at the end of the spark stream resembling a spearpoint. Nickel produces a spot of intensely white light in the stream near the grinding wheel.

Both elements have a tendency, in the higher contents, to suppress the supplemental bursts characteristic of carbon steels.

Several spot tests for molybdenum have been developed. The simpler ones depend on the red color produced by either potassium ethyl xanthogenate or sodium thiocyanate added to a molybdate obtained from the etched surface of the steel. The dimethyl glyoxime test for nickel also depends on a red coloration. Many of these tests are approximately quantitative.

MIRRORS of MOTORDOM

Widely advertised Detroit Victory Council manpower meeting is fizzle. City continues a critical area lacking supporting data for classification change. Huge cost of contract cutbacks reflected

DETROIT

IF THE recent meeting of the Detroit Victory Council is any indication of the efficacy of such joint labor-management-community groups in helping to solve manpower problems, then they had best be washed up and forgotten.

Advertised as a gathering of 1200 officers, directors and other leaders of the city's civic, labor, business, and industrial organizations, who were to hear clarification of controversial questions on labor supply and demand, it fizzled out to about 300 citizens and their wives who probably more out of curiosity than anything else dropped into the Book-Cadillac ballroom to hear a few canned speeches which clarified nothing except that Mr. Paul McNutt, War Manpower Commission director, is a very handsome man and has a pleasant speaking voice.

The usual apologies were made by several of the speakers for having to cut short their remarks to permit making a radio "deadline" on Mr. McNutt's talk. This is always annoying, for it leaves the distinct impression that the program is not intended at all for those who have taken the trouble to be present, but rather solely for the unseen millions listening breathlessly at their radios.

Originally designed to be by invitation only, the city's "leaders" stayed away in such droves that the meeting was finally thrown open to the public, but even its interest was at best apathetic.

Results of two surveys—one of actual manpower requirements of 7000 employers and the other of available worker supply—were supposed to have been presented, but as E. L. Cushman, state director of the WMC explained, replies to questionnaires from employers were so few as to be utterly inconclusive, while the house-to-house survey of available worker personnel made by the Office of Civilian Defense was little better as far as presenting any concrete data was concerned.

So, in the absence of any supporting data on the advisability of making a change, Detroit is still a critical labor area in which no new war contracts can be placed or present contracts renewed. Mr. McNutt in his prepared address said war production would increase slightly in 1944 in the Detroit district, and decried all talk of resumption of civilian production and of the possible effects of cutbacks in armament schedules. One received the impression that manpower requirements generally throughout the country are now being fairly well met and that concern over deficiencies is dwindling.

Further than that, the impression was unmistakable that community enterprises such as the Detroit Victory Council, while admirable in purpose, evoke a minimum of response from those toward whom their efforts are directed, whether business, labor or community. Perhaps this apathy reflects the feeling manpower problems had best be left to the individual employer and the federalization of employment practices disbanded in favor of restoring the efficiency and autonomy of agencies skilled in this work and with a more intimate appreciation of the problems involved.

Tanks—$2,800,000 Each

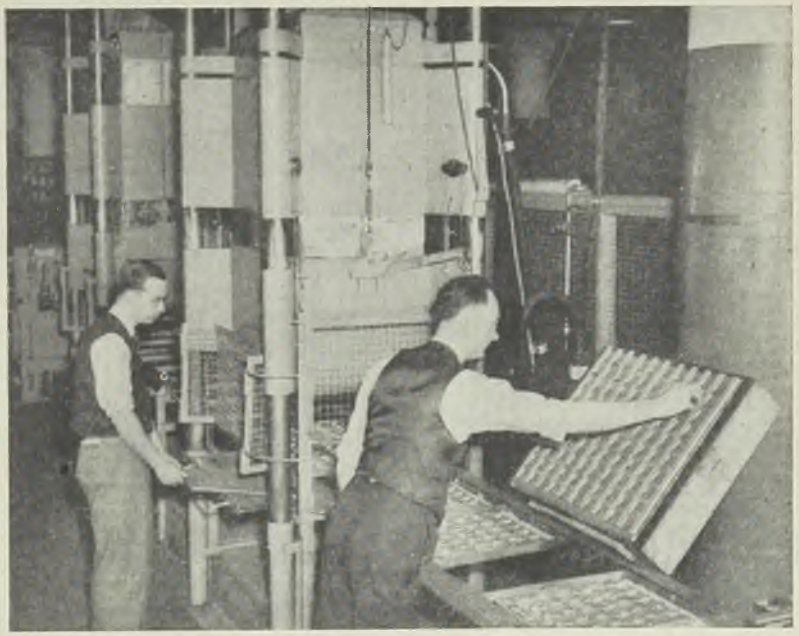
All admonitions about minimizing the importance of cutbacks of war production to the contrary, here is the pattern of one single cutback at International Harvester Co. which shows the magnitude and extent of sudden schedules changes, together with their enormous costs:

Thirteen tanks built at an estimated cost of $36,500,000—or $2,800,000 each! Fifteen months of preliminary work in preparing an old railroad factory for production of a streamlined tank, with 5400 engineering changes digested before the appearance of the first production models.

It took Harvester from December, 1941, to March, 1943, to iron out all the "bugs" and to fill up the production lines with 250 hulls—this before a single completed tank was produced. After seven pilot models and six production models had been finished, the contract was canceled and a new contract placed for an 18-ton tracklaying prime mover.

Realizing to its fullest the effect of changing strategy on war production, Harvester engineering crews went to work. In the 1320x440-foot plant, every single one of the 1154 machines used on tank work had to be moved. Eventually 706 were converted to the prime mover job, while the rest either were shipped to other companies or placed in a vacant corner of the plant. Last of the tank equipment, six vertical boring mills worth $25,000 each, were shipped to an Army warehouse a few weeks ago.

A bare 10 per cent of the jigs and fixtures were suitable for the new contract; the rest had to be discarded as scrap. A battery of end-over cradle machines for welding the front, rear and top of the tank had to be ripped out and scrapped, the pits below them filled and concreted. Carloads of material in in-



INSPECTION LINE: Described several months ago in Mirrors of Motordom, this is the first picture to be released showing the continuous, automatic X-ray inspection line at the Ternstedt Manufacturing division of Fisher Body in Detroit. Aluminum castings are placed in trays which move along the conveyor line under the X-ray unit where a lead-lined hood drops over the tray while the exposure is being made. Equipment is estimated to have capacity to handle a tray of one to 20 parts every 30 seconds. Parts, principally aircraft fuselage elements, up to 5 inches in thickness can be inspected

ventory were shipped to other arsenals or scrapped. The 250 completed hulls, worth around $16,000 each, were cut up into scrap for remelting.

Meanwhile new equipment was arriving. New foundations had to be installed for a battery of drill presses. A month was required to install a network of individually operated cranes and hoists. Two weeks were required to install a special draw furnace with a 10-foot underground supporting structure. In all about three months were needed for the plant transformation, during which time about 35 per cent of the best mechanics left the job, in spite of the Army's offer of temporary employment at nearby government arsenals.

Before an accurate claim could be made for payment of work done on the tank contract, special forms were fanned out to 431 first-tier subcontractors and to some 1500 other suppliers. Even now, termination proceedings are not completed. As of Dec. 31, a total of 363 had been settled in full; 11 were in the hands of Army Ordnance officers awaiting approval; 55 were being processed by Harvester; four of the largest claims were not even filed, being held up awaiting claims from subcontractors.

New Contract Scaled Back

Today the plant is running smoothly on the prime mover job. But already this new contract has been scaled back 50 per cent!

Another and more recent cutback, or rather cancellation, in the automotive field, has been the suspension of steel shell case manufacture at Buick. Employing a unique process of hot and cold upsetting (STEEL, May 3, 1943, p. 92) a high-manganese low-carbon steel, Buick had produced close to 2,500,000 of the 75-millimeter cases and at the termination of the contract was producing close to 300,000 monthly. The contract had not been completed, but was chopped off peremptorily, along with numerous other steel shell and cartridge case jobs.

Approximately 1000 men have been freed by cancellation of the Buick contract. Some will be absorbed in other departments; others will find work elsewhere. This Flint division of General Motors has seen a greater percentage expansion in its normal peacetime employment than any other GM unit, going from around 16,000 in 1941 to something like 45,000 now.

Reports are heard Buick shortly will reopen its gray iron foundry to supply cylinder heads and blocks for Hercules Motor, as a part of its general program to reinforce supply sources for engines required by the accelerated military and civilian truck schedules. Buick has a large iron foundry, with six 27-ton per hour cupolas, which has been idle since suspension of automotive production. Most of the supervisory force under W. G. Mixer, superintendent, has transferred to the new aluminum aircraft engine cylinder head foundry built two years ago on the Buick property.

Certain details of Chrysler Corp. operations, presented to the Truman committee in Washington several weeks ago by K. T. Keller, president, and not published widely since, are worthy of enumerating here. Summarized, they are:

Number of plants doing war work	20
Chrysler-owned floor space, sq. ft.	17,000,000
Space rented from private owners, sq. ft.	1,500,000
Government owned space, sq. ft.	11,500,000
Chrysler-owned property, acres	3,300
Government-owned property, acres	1,100
Number of employes	106,600
Number of employes, end of 1941	71,600
Number of war contracts negotiated	195
Number of war contracts completed	103
Number of peacetime machine tools owned	20,665
Number of these converted to war work	17,909
Number of these still idle	2,347
Number of machine tools owned by DPC	19,277
Number of these now in former automobile plant space	8,980
Number of these in tank arsenal	1,857
Number of these at Dodge Chicago engine plant	8,438
Floor space required to store government-owned machine tools, minimum sq. ft.	2,750,000
Cost of moving such equipment into storage	$3,000,000

Auto Dealers Told Fanciful Designs Not Likely Soon

Several thousand automobile dealers jammed the city's hotels last week for their annual convention. Highlights were formal addresses by Congressman Charles Halleck, Henry Ford II, R. H. Grant of General Motors, A. vanDerZee of Chrysler and Paul Hoffman of Studebaker.

In one of his first public appearances since assuming the vice presidency of Ford Motor Co., the 26-year old son of the late Edsel Ford urged dealers to help educate the public to the realization that the fanciful automotive designs now being shown by industrial designers are not the "cars of tomorrow" but rather the cars of the "day after tomorrow."

Said Representative Halleck, of Indiana: "The average car owner is sold on his car, but he does wish some genius would do something more about what he regards as simple problems. For instance, he wants to feel his car will take him safely anywhere, at any time, in any weather and at any speed. He wonders why more advances have not been made in keeping windshields clean in snow, ice and rain, in preventing skidding, in modernizing ventilation, and in providing a national highway system so modern that he can go fast and see something at the same time. Particularly he does not like long stretches of bare concrete through barren country."

Buick has lost only 300 of its 3000 dealers since the start of war, already is being besieged with requests for new dealerships. Its dealers in 1943 made more money than in any year since 1929 as a result of sharply reduced overhead, full prices on new cars plus storage charges, exceptionally large volume of repair and maintenance business. Eighty per cent of Buick new car buyers are reported to return to their original dealers for service work to keep their autos in running condition.

They Say:

"Elimination of mass unemployment is peacetime's first requirement and government aid and co-operation with business are essential to achieve that goal."—**Beardsley Ruml**, chairman, Federal Reserve Bank of New York.

* * *

"The first postwar auto will closely resemble the 1942 models. It's got to be that way because automobile manufacturers are tied down to a lot of expensive tools. Moreover, they've got to move fast with a new car, and you can't do it if you have to retool completely. But if they mistake the period of brisk demand right after the war as something permanent instead of temporary, in my opinion the whole industry will be sunk."—**William B. Stout**, designer and engineer, Detroit.

* * *

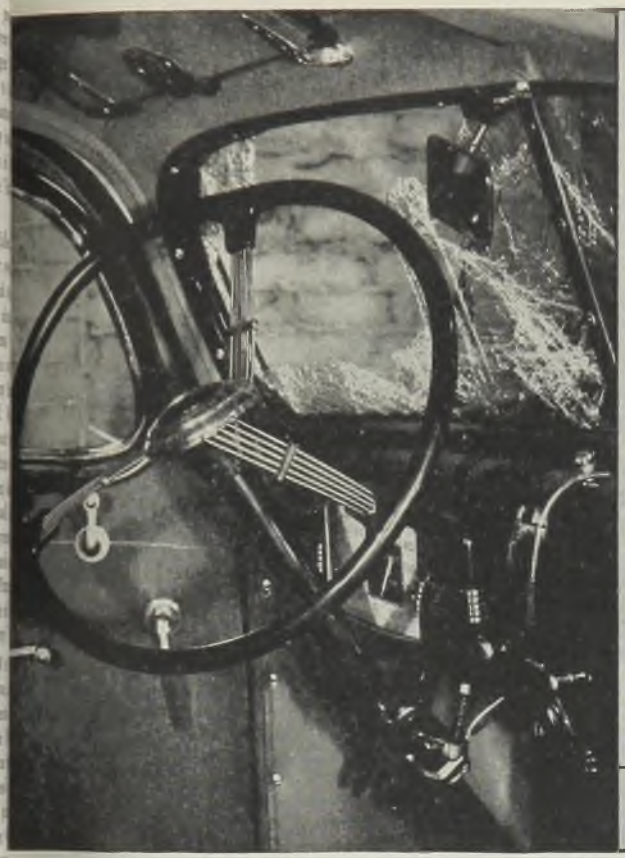
"Set machinery in motion for a postwar preparedness program as insurance against another war. . . Such a plan would not be very expensive and would not depend upon universal military service although that offers many advantages or upon large-scale production of military goods."—**Charles E. Wilson**, executive vice chairman, War Production Board.

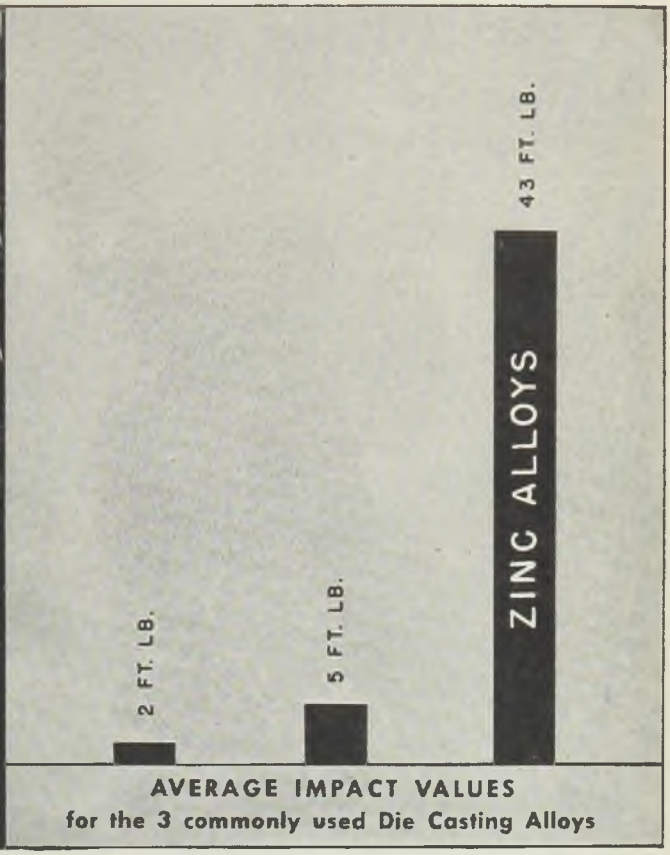
* * *

"You have no doubt heard rumors of tremendous cutbacks. I want to begin by saying clearly and emphatically that there is no tremendous program of war contract cancellations planned by any of the procurement agencies at all. Present plans call for maintaining in the first six months of 1944 approximately the production level reached in the last quarter of 1943. And that is as far as anyone can see in a war."—**Paul V. McNutt**, chairman, War Manpower Commission.

IMPACT!

—JUST ONE OF THE MECHANICAL PROPERTIES IN WHICH ZINC ALLOY DIE CASTINGS EXCEL





AVERAGE IMPACT VALUES
for the 3 commonly used Die Casting Alloys

The automobile shown above hit a street car—head on. As might be expected, it is in a rather sorry condition. The zinc alloy die cast steering wheel hub withstood the impact, however, even though the wheel was badly distorted. Impact strength is just one of the properties of zinc die casting alloys which is not equaled by either of the other commonly used die casting metals.

Zinc alloy die castings are also superior in tensile and compressive strength, as well as in ductility and hardness. These properties, combined with highest production speed, have made zinc alloy die castings the most widely used under normal conditions.

Every die casting company is equipped to make zinc alloy die castings. Ask them about the many advantages of zinc alloy die castings over other materials and other production methods—or write to The New Jersey Zinc Company, 160 Front Street, New York 7, New York.

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WING TIPS

Postwar bonus, in form of incentive wage increase payable after hostilities end, suggested by Donald W. Douglas to tide employes over adjustment period. Much depends on action to be taken by the government

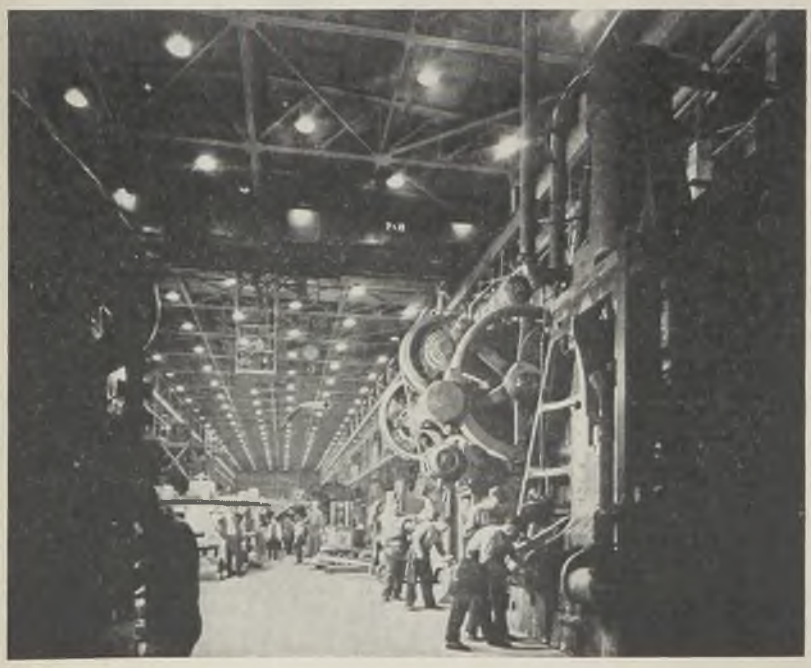
IN A man-to-man discussion with an employe recently, Donald W. Douglas, president, Douglas Aircraft Co., frankly discussed some vital problems of interest to the aircraft manufacturing industry. Questioned as to his reported solution to the postwar problem—to "Shut up the damn shop!"—Mr. Douglas said there was no truth whatever to this alleged statement which was part of an interview on many subjects. He had been asked by a reporter what would be done if the government, over night and without warning, canceled all contracts. Mr. Douglas then said he was confident nothing like that would happen, but that if it did, there is naturally only one thing to do. If there is no work for a plant, you have to close it up until something is found to keep it in operation. Continuing, Mr. Douglas told his inquiring employe:

"That's not a plan, it is a condition. Planning is something else again, and we are not neglecting that, either. My own idea is that when the time comes, contracts should be tapered off and employes released gradually to give them an opportunity to find their way back into normal business and industrial life. To provide assistance during this period of readjustment, we have suggested to the government a plan for a postwar bonus. This would be in the form of an incentive pay increase in wages, based on increased production and length of service. It would be cumulative and payable only after the war, or on final termination of employment. This plan is now under consideration by the government.

"I personally hope to remain in this industry after the war, and I would like to keep with us every employe who wants to remain, and for whom we can possibly find work. We have been giving a great deal of thought to postwar planning, but that is a problem in which industry alone cannot play the deciding role. The government, with its vast powers and controls, necessarily must play a part in any postwar program for the nation. But we are ready and anxious to do our share.

"For example, there is the question of contract termination. Wherever cancellations are necessary, this should be done in such a way that there can be an orderly and equitable readjustment. Another problem is the disposition of surplus transport planes which are still serviceable. In connection with the Douglas transports, of which we have built many thousands, my personal suggestion would be for the government to lease to the airlines, immediately after the war, such C-47s (two-engine cargo planes) as would not be required for postwar policing or reconstruction. At the same time, it could turn back to us a number of "Skymasters" (C-54 four-engine cargo planes) for conversion to passenger planes. Then, when the conversion job is finished, the government could sell the C-54s to the airlines, and take back the leased C-47s for possible disposal to some worthy ally, China, for example, will be in drastic need of transport airplanes, and if she were given help in starting airlines, could become a tremendous market.

"Another serious problem will be that of government-owned plants, but that is a responsibility of the government, and the future of the plants is up to the government to determine. These plants are valuable properties which can, with wise planning, be put to good use. Perhaps it may be difficult in some cases to find single industries which can fill such large structures, but they could be divided to house several new projects which would require the techniques, production equipment and trained personnel available. Our company has a group of experts studying these things. Wherever the government permits us to do so, we will try to provide information and assistance to local communities which may want to keep their plants in operation."



HAMMERS IN ACTION: Forging operations have started at Chrysler Corp.'s new Dodge Chicago plant where 18-cylinder airplane engines for superfortress bombers are to be manufactured. The plant, largest of its kind in the world, will build the Wright 2200-horsepower radial engine, which has forged steel crankcases

Buick Heavy Producer Of Aircraft Engines

Shipments of Pratt & Whitney twin-row radial engines by the Buick Motor division, General Motors, to the Army Air Forces since the first engine was turned out in January, 1942, have aggregated 33,027 engines or approximately 40,000,000 horsepower, of which 8401 engines were shipped in 1942, equivalent to slightly over 10,000,000 horsepower, and 24,626 in 1943, totaling over 29,500,000 horsepower. Actual production exceeded these figures, the excess being represented in engines awaiting official acceptance and shipment to the Army.

Largest of the company's more than 30 war production projects, the Pratt & Whitney program has accounted for a substantial part of the employment increase since 1941.

Peak employment on all projects totaled 45,000, compared with a 17,000 top in 1941, the last year of automobile production, representing an expansion of 165 per cent.

Willow Run Plant Ahead of Schedule for Fourth Month

About ten days or so ago Ford Motor Co. officials, with the sanction of the War Department, broadcast the news the Willow Run bomber plant had passed its fourth consecutive month of better-than-scheduled production, with output now in the third thousand group. Monthly production is approaching 450, it was said, and five times as many B-24 Lib-

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erators were delivered from the plant during the last quarter of 1943 as during the first quarter.

The announcement confirms the estimate presented in these pages some weeks ago to the effect Willow Run was supplying over one-third of all the heavy bombers built throughout the country. From present indications, a production tempo of one airplane each working hour, once ridiculed as fantastic, is virtually at hand.

When Willow Run was in its early stages, numerous aircraft industry executives sharply criticized what they called "overtooling and overmechanizing" of the plant, pointing to the excessive costs involved and the likely inability to absorb engineering changes. Automotive experts on the Ford staff clung to the belief this was the only way to develop mass output, and in this they were correct, for the Air Forces are now getting B-24s in mass quantities. If that is what is wanted, then the tooling cost and the mechanization of Willow Run are amply justified.

Release of the Ford announcement caused some speculation as to the purpose behind it. Usually such news is timed to counteract or minimize some other allegation or statement calculated to have a disparaging effect on Ford in the public eye. As yet, however, no such irritant has appeared.

Another effect of the remarkable tooling and materials handling job accomplished at Willow Run has been to put the plant in top rank as far as output per employe or per square foot of floor space is concerned. Willow Run production in terms of pounds of airplane produced per employe is far ahead of the national average, and probably exceeds that of any aircraft plant in the country.

Expressed in terms of total output for 1943, however, top honors are accorded Consolidated Vultee Aircraft Corp., which delivered more airplanes by number and by weight last year than any other producer. The Aircraft Production Board of WPB discloses Consolidated Vultee deliveries totaled better than 126,000,000 pounds, including spares, comparing with 115,000,000 pounds delivered by the second highest producer and 73,000,000 pounds by the third largest. Convair delivered over 12 per cent by number and over 16 per cent by weight of all aircraft built in the United States in 1943.

Republic Aviation Sets Record in P-47 Production

A new aircraft production record was established in December by the Republic Aviation Corp. in its output of P-47 Thunderbolt fighter planes, according to figures now available at the War Production Board.

Spot Welder Attachment Speeds Manufacture of Hose Strap

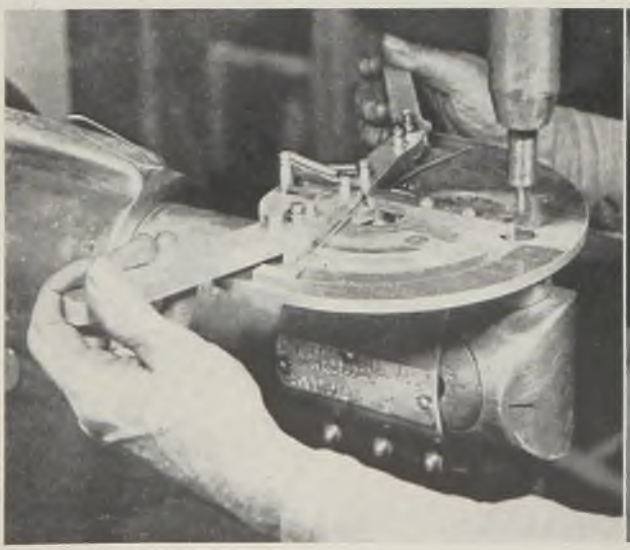
Man-hours spent in the manufacture of a small hose strap used in Boeing Flying Fortresses have been reduced by the use of a simple spot welder attachment which was designed and produced by the Boeing tool design department. The device has resulted in two workers producing as many straps in one hour as six persons did previously in a full day.

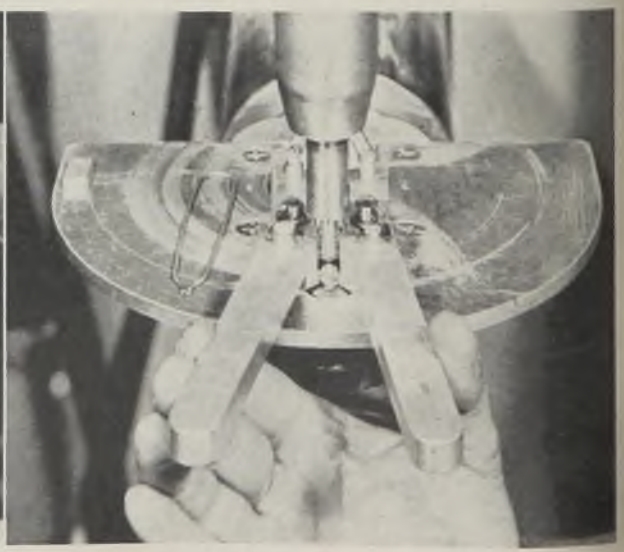
The strap, or tube lock, used to secure hose and tubes installed in B-17 bombers is bent from a piece of stainless steel wire into an oval shape about 3 inches long and then the free ends are welded together. Previously the wire was cut in one shop, formed in a second, and flash welded in a third. Cutting left the ends too irregular for flash welding and so the ends had to be ground until they met each other squarely. Despite the extra process of grinding, rejections on inspection were running about 5 per cent because of faulty welds.

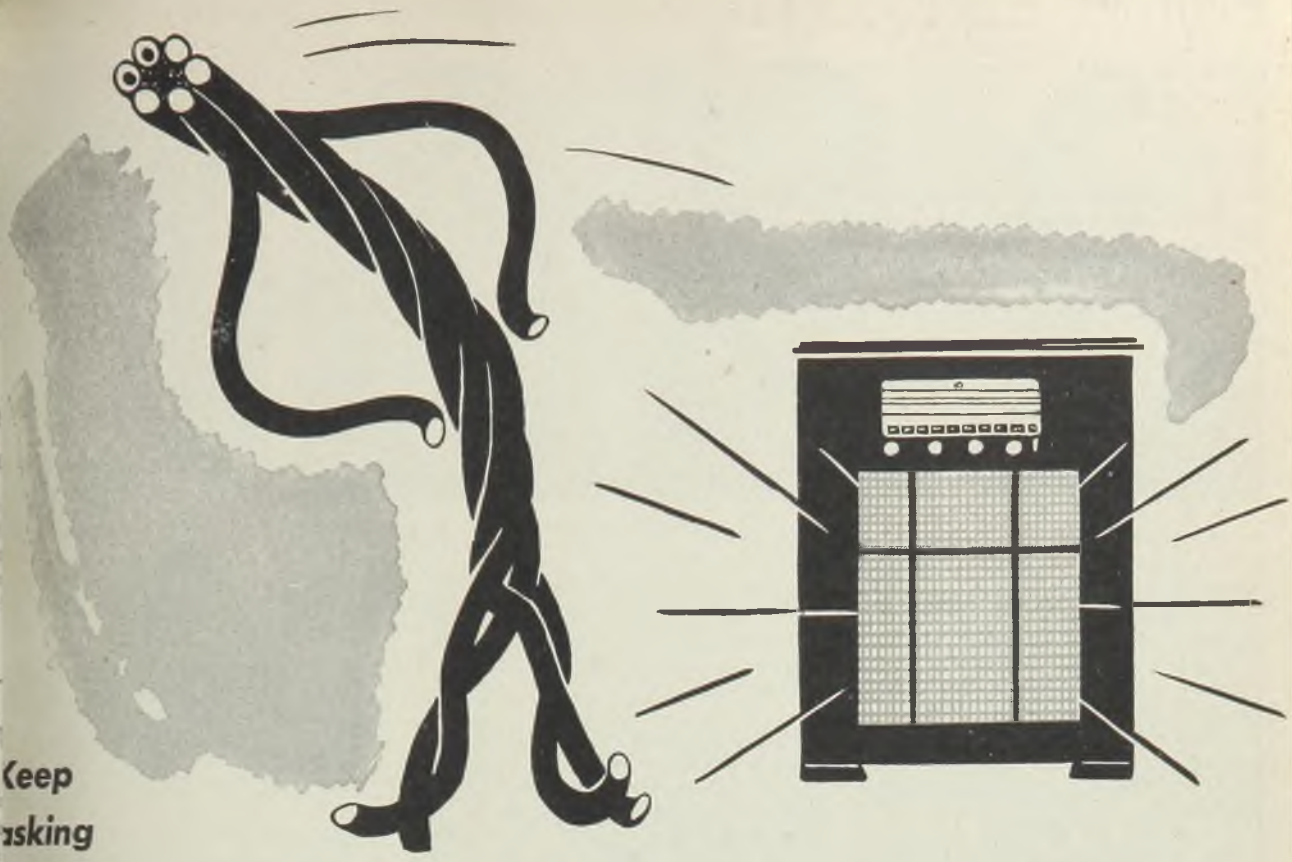
The problem of reducing production time and eliminating rejections was turned over to the tool design department. It was decided spot welding would be more satisfactory than flash welding. The problem was how to form and spot weld the straps with a minimum of effort and time. The answer finally evolved itself into the attachment now in use. It is a circular fixture which is attached to the spot welder arm. The fixture holds a die around which the wire is bent into the form of the strap by two levers. When the wire is bent, by one quick movement of the operator, the ends are joined in position for welding. A foot lever then operates the welder.

Wire still is cut to length before it is inserted in the shaper, as the designers concluded the production did not warrant an automatic cutting device on the attachment. Neither would it warrant automatic bending of the wire, so the device is operated by hand.

Left below, stainless steel wire stock is located in the fixture. Rear end of the forming block acts as a front locator. Operator then pulls on the forming arms of the fixture, causing the wire to bend to the contour of the form block. Right, the forming arms have a slight tip which causes the wire ends of cross directly over the welding tip, and the weld is then made.







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W. C. STOLK

B. M. STALEY

PAUL W. POLK

Col. W. F. Rockwell, president, Pittsburgh Equitable Meter Co., Pittsburgh, has been elected a director of the First National Bank at Pittsburgh. Colonel Rockwell, who is chairman of the board, Standard Steel Spring Co., Pittsburgh, and Timken-Detroit Axle Co., Detroit, is resigning as director of production of the United States Maritime Commission, Washington.

—o—

Jean A. Hollander has been named director of consumer information, Can Manufacturers Institute Inc. Mrs. Hollander, who has been with the institute since its inception in 1939, will continue to make her headquarters in the Washington office.

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Fred C. Smith, former assistant sales manager, has been appointed general sales manager of McKay Co., Pittsburgh and York, Pa.

—o—

D. I. Packard has been appointed Chicago district manager, Baldwin Locomotive Works, Philadelphia, succeeding **Charles Riddell,** who continues his association with the company's Chicago office as special representative.

—o—

Joseph T. Wilson, manager, World Trade division, International Business Machines Corp., New York, has been elected president of the Inter-American Safety Council Inc., an organization to promote public and industrial safety in the Latin-American countries.

—o—

W. E. Mackley has been appointed manager of the manufacturers sales department of the New York office, American Steel & Wire Co., Cleveland. **F. E. Ward** has been named to succeed Mr. Mackley as manager of sales at Buffalo, and **F. L. Nonnenmacher** has been made assistant manager of the manufacturers sales department in New York, replacing Mr. Ward.

—o—

George H. Meilinger has been appointed manager of the household refrigeration department, Westinghouse Electric & Mfg. Co., Mansfield, O. Mr. Meilinger adds this responsibility for direction of postwar development, manufacture and sales of home refrigeration equipment to his present work of supervising contract negotiations on certain types of war work.

—o—

W. C. Stolk has been named vice president in charge of sales, American Can Co., New York, **R. L. Sullivan** has been made vice president in charge of the Atlantic division, and **W. J. Wardell,** comptroller, has been made vice president and comptroller. Mr. Stolk succeeds **C. H. Black,** who recently was elected executive vice president.

—o—

A. C. Hamilton has been appointed Michigan representative of National Smelting Co., Cleveland.

—o—

Charles L. Foley has been appointed engineering sales representative for Kropp Forge Co., Chicago, in New York and adjacent territories.

—o—

Edward F. Wiegand, formerly with the purchasing department, Landers, Frary & Clark Mfg. Co., New Britain, Conn., has been appointed purchasing agent, Chandler-Evans Co., South Meriden, Conn.

—o—

Virgil C. Dollman has been named sales representative for Indiana for Wheeling Steel Corp., Wheeling, West Va., and **William G. Owens** has resumed his duties with the sales department in Wheeling after a year's service with the War Production Board.

—o—

Harold D. Conklin has been appointed manager of the Hotpoint Range and Water Heater Sales division, Edison General Electric Appliance Co. Inc., Chicago, and **F. B. Williams** has been named regional sales manager of the southern region.

—o—

Edward C. Smith has been elected president of Bay City Steel Castings Co., Bay City, Mich., succeeding **Edward M. Mills,** who has relinquished ownership of the company because of ill health. Other newly-elected officers are: **William L. Mueller,** vice president, and **C. C. Keegan,** secretary-treasurer. Mr. Keegan also assumes the duties of general manager.

—o—

B. M. Staley, previously general manager of the Rotary Pump division, National Transit Pump & Machinery Co., Oil City, Pa., has been appointed factory manager of Kaydon Engineering Corp., Muskegon, Mich.

—o—

Paul W. Polk, vice president in charge of field distribution and engineering, Sheffield Corp., Dayton, O., has been granted leave of absence to accept a commission as lieutenant (j.g.) in the United States Navy. **Oscar A. Ahlers,** assistant to the president, has been named acting head of the distribution division.

—o—

James Terry has been appointed district manager of the Cincinnati sales office and warehouse, Columbia Tool Steel Co., Chicago Heights, Ill., succeeding the late W. G. Sonderman. In this new post Mr. Terry fills a position which his father, F. A. Terry, held for 26 years prior to his retirement in 1939.

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George R. Rich, chief design engineer, Tennessee Valley Authority, has been appointed a member of the Sectional Committee on Shaft Couplings, American Standards Association.

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B. J. Brugge has been appointed welding engineer in the Detroit office of Lincoln Electric Co., Cleveland, and **R. H. Davies** has been named a representative in Washington.

—o—

J. Henry Schroder, vice president, Sunbeam Electric Mfg. Co., Evansville, Ind., has been named general manager, taking over responsibilities relinquished by **W. A. Carson,** president and treasurer. **Walter V. Stippler** has been named vice president in charge of production.

—o—

Thomas Mac Lachlan has been named general manager in charge of the enlarged New York sales and export office, H. K. Porter Co. Inc., Pittsburgh. Previously he was New York manager for Vulcan Iron Works, Wilkes Barre, Pa. **R. G. Newell,** who managed the New

York office of Quimby Pump Co. before its acquisition by Porter, is directing activities of Porter's Quimby Pump division in New England and the New York district, from the new office, and **Earl M. Bardo** also is located there representing Porter chemical process equipment in the same territory.

—o—

Edwin S. Pearce, president, Railway Service & Supply Corp., has been elected president of the Indianapolis Chamber of Commerce, and **C. Harvey Bradley,** president, W. J. Holliday & Co., was elected vice president. New directors of the Indianapolis Chamber of Commerce include: **R. Norman Baxter,** Baxter Steel Equipment Co., and **E. B. Newill,** general manager, Allison division, General Motors Corp.

—o—

Fred L. Haven has been assigned special duties on the manager's staff at the Worcester, Mass., North Works of American Steel & Wire Co., Cleveland, and **Nelson W. Dempsey** has been assigned special duties, general superintendent's staff, South Works. **Thomas Tyrrell** has been appointed foreman, rolling, No. 3 rod mill, at the company's hot mill in Joliet, Ill.

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Philip S. Hill has been appointed assistant manager, Eastern division, Willamette Hyster Co., Peoria, Ill., and **Frank McMillan** succeeds Mr. Hill as manager of the company's Washington office.

—o—

Clarence S. Tay, formerly manager of the discontinued Chicago factory branch, Crosley Corp., Cincinnati, has been transferred to the company's main office, where he is serving as automotive product manager.

—o—

Milton Kutz has been appointed acting assistant general manager, Electrochemicals department, E. I. du Pont de Nemours & Co., Wilmington, Del. The appointment marks the return of Mr. Kutz to the post which ill-health forced him to relinquish 18 months ago.

PAUL S. KILLIAN

Who has been elected purchasing agent, Bethlehem Steel Co., Bethlehem, Pa., as announced in STEEL, Jan. 24, p. 48.

JOHN A. HAGAN

H. N. ARBUTHNOT

—o—

John A. Hagan has been appointed general manager of the new production planning department, Carnegie-Illinois Steel Corp., Pittsburgh. **James M. Morehouse** is assistant general manager, and **Herbert F. Byrne** has been named assistant to the general manager. The new department is under the direction of **D. F. Austin,** vice president of the corporation. **John M. Hodge** has been appointed company development engineer, steel heat treating.

—o—

H. N. Arbuthnot has been named regional manager in Detroit for Allegheny Ludlum Steel Corp., Brackenridge, Pa. Mr. Arbuthnot formerly had been assistant sales manager. In his new capacity he will consolidate direction of the corporation's manufacturing unit in the Detroit area, the Forging and Casting division, and its Detroit sales branch.

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George W. Parker has been elected president, Mueller Ltd., Sarnia, Ont., subsidiary of Mueller Co., Decatur, Ill.; **R. McIntyre,** works manager, has been elected vice president, and **Hugh L. Baker,** secretary and director.

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H. C. F. Mockridge, member of the law firm of Osler, Hoskin & Harcourt, Toronto, has been elected a director of International Nickel Co. of Canada Ltd., Toronto, filling the vacancy on the board caused by the recent death of Britton Osler.

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L. W. Schellhammer, formerly associated with Jones & Laughlin Steel Corp., Pittsburgh, has become affiliated with the Cincinnati sales office of Inland Steel Co., Chicago.

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Roland Whitehurst, former assistant sales manager, Electric Storage Battery Co., Philadelphia, has been named sales manager.

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Lloyd Ashby, formerly supervisor of foreman training and assistant educational supervisor at the Richmond, Ind., plant of Perfect Circle Co., Hagerstown, Ind., has been named personnel manager at Richmond.

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Roy E. Ward, Los Angeles district manager of Austin Co., Cleveland, since 1925, and **Frank W. Maynard,** the company's district manager at Oakland, Calif. since 1937, have been named vice presidents.

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Frank C. O'Brien has been appointed general manager, Burlington Steel Co., Ltd., Hamilton, Ont., and **Norman A. Eager,** assistant sales manager since 1940, has been appointed sales manager.

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James P. Baldwin has been appointed general manager of Corbin Screw Corp., division of American Hardware Corp., New Britain, Conn. Formerly Mr. Baldwin had been works manager of the division.

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James A. Dwyer has been appointed general manager of sales and branches, Crane Co., Chicago.

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A. Olson has been appointed Pittsburgh district manager for Colonial Broach Co., Detroit, and J. R. Armstrong has been named district manager in Indianapolis.

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Gordon Groth has been appointed assistant to the president, Pennsylvania Rubber Co., Jeannette, Pa.

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Howard S. Welch, former vice president and general manager, Bendix Aviation Export Corp., New York, has been appointed export sales manager, Sperry Gyroscope Co., Brooklyn, N. Y.

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Gwilym A. Price, vice president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected a director of Pittsburgh Steel Co., Pittsburgh. **J. A. Zoelker,** formerly sales manager, has been elected sales vice president. **J. Herbert Carson,** who has been treasurer and comptroller of the Pittsburgh

Coke & Iron Co., has been elected comptroller of Pittsburgh Steel Co., while **J. N. White** has been elected assistant comptroller of Pittsburgh Steel, having been auditor of the company since 1937.

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A. M. Wickwire has been named vice president, Automatic Products Corp., Wilmington, Del., and also has been appointed president and a director of Mercury Clutch Corp., Canton, O., a subsidiary of Automatic Products Corp.

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S. M. Jenks, general superintendent, Carnegie-Illinois Steel Corp., Chicago, has been elected a director of the Indiana State Chamber of Commerce.

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Paul C. Van Zandt, consulting engineer and former vice president of operations and engineering, Universal Atlas Cement Co., Chicago, United States Steel Corp. subsidiary, has retired.

LEE BERGSTROM

Who has been made manager, Los Angeles district sales office, Joseph T. Ryerson & Son Inc., Chicago, noted in STEEL, Jan. 24, p. 48.

CARL L. ZAK

Who has been made manager of tubular sales, Pittsburgh Steel Co., Pittsburgh, as announced in STEEL, Jan. 24, p. 48.

OBITUARIES . . .

Alfred Fritzsche, 74, vice president in charge of sales, Automatic Sprinkler Corp. of America, Youngstown, O., died Jan. 18 in New York. Mr. Fritzsche had been vice president and general sales manager of General Fire Extinguisher Co., Providence, R. I., before joining Automatic Sprinkler Corp. in 1937. He was a director of many companies, including General Industries Co., Elyria, O., Beaver Pipe Tools Inc., Warren, O., and the Missouri & Pacific railroad.

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Alfred V. Sims, 79, president of Sims Pump Valve Co., New York, died Jan. 21 in Hamden, Conn. Mr. Sims invented the Sims valve used on naval ships.

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John F. Guider, a former vice president of Cadillac Motor Car Co., Detroit, and at one time works manager of the old Pierce Arrow Motor Car Co., died Jan. 14 in Kenmore, N. Y.

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Fred J. Macwilliams, 49, general manager and one of the founders, Abart Gear & Machine Co., Chicago, died Jan. 23 in that city, after an extended illness.

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Mason P. Rumney, 60, vice president, Detroit Steel Products Co., Detroit, died Jan. 20 in Rochester, Minn. Mr. Rumney began his career with the company 35 years ago as a salesman. In 1927 he was elected president of the Detroit Railroad & Harbor Terminals Co., and at the time of his death he was mayor of the city of Grosse Pointe, Mich.

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Ernest E. Wilson, 45, for the past two years director of the General Motors Proving Ground, Milford, Mich., and associated with GM since 1928, died in Detroit, Jan. 22.

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Allen N. Bradford, 47, general manager of the Russell, Burdsall & Ward Bolt & Nut Co.'s plant at Rock Falls, Ill., died recently in Sterling, Ill., following a few days' illness.

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Charles Frankl, 77, who retired in 1925 from the presidency of Elizabeth Street Foundry Co., Chicago, died there Jan. 20.

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James E. Kelly, 64, owner, Chicago Brass Works, died Jan. 19 in that city following a heart attack.

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Maxwell R. Berry, president and treasurer of Electric Products Co., Cleveland, died Jan. 24 in Jacksonville, Fla. after a brief illness. Mr. Berry organized the Electric Products Co., manufacturer of motor generators and switchboards, 32 years ago.

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John J. Huddleston, 64, general manager, Algoma Coal & Coke Co., Algoma, W. Va., died Jan. 24.

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Harry B. Cutter, co-owner of Brighton Foundry Co., Cincinnati, died recently in Westwood, O. Mr. Cutter and his son, Harry Jr., founded the foundry in 1931.

ALLEN N. BRADFORD

Harvey Hanes, chief technician of the experimental department, Remington-Rand Inc., Tonawanda, N. Y., died in that city, Jan. 21.

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John Storm, 43, New York district sales manager for Carborundum Co., Niagara Falls, N. Y., died Jan. 23 in Englewood, N. J.

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John J. Marthaler, president of Marthaler Machine & Engineering Co., St. Paul, died recently in that city.

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Edward F. Tannewitz, 53, retired vice president, Detroit Gasket & Mfg. Co., Detroit, died Jan. 21 in that city.

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Edward J. Frost, 74, who retired in 1929 from the presidency of Frost Gear & Forge Co., Jackson, Mich., died in Jackson, Jan. 21.

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Lyle B. Yeaton, who had been secretary-manager of the Wholesale Metal Dealers Club, Los Angeles, for 19 years, and recently had been associated with Earle M. Jorgensen Co., Los Angeles, died Jan. 7.

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Paul Niegsch, associated with Pemco Corp., Baltimore, for more than 31 years, died Dec. 14 in Baltimore. Mr. Niegsch had spent nine years in England for the company, and immediately prior to his retirement three years ago he had served in the West Coast office.

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Gustav F. Sexauer, 78, founder, president and general manager, Badger Corrugating Co., La Crosse, Wis., died recently in that city.

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Jacob C. Karr, 70, who operated J. C. Karr & Co., Cleveland, died there Jan. 23 after a brief illness.

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Roger T. McCune, 46, assistant plant superintendent, Weatherhead Co., Cleveland, died in that city Jan. 23.

More Steel Restrictions Eased

Improvement in war materials situation reflected in revised orders. Canadian cargo ship deliveries since start of war total 232. Big increase in exports shown

TORONTO, CANADA

FURTHER lifting of restrictions on non-war use of steel is revealed in a new order by the Steel Controller, No. S. C. 33A, which is substituted for order No. S. C. 33.

Under the new order consumers buying in Canada any steel in the forms shown in part 1 of the schedule A are to show on the face of the purchase order the following: Purpose of use fully described in words; and PSC percentage pattern if more than one use; stock on hand of each item ordered; total quantities outstanding undelivered on all previous purchase orders, and how long the quantities will last that are being ordered.

Consumers ordering in Canada any steel in the form shown in part 2 of schedule A need only show on the face of the order the following: Purpose of use fully described in words; and PCS percentage pattern if more than one use.

Any steel products not listed are not now subject to steel control regulations.

SCHEDULE "A"

Classes of Steel: (Whether Carbon Steel, Alloy Steel or Wrought Iron)

Part 1

Bars, cold finished
Bars, concrete reinforcing
Bars, hot rolled (also including hoops, bands and all other bar mill sections)
Billets, sheet bars and tin plate bars
Black plate (also including blued plate, Canada plate, etc.)
Plates
Rails
Sheets, galvanized
Sheets, hot rolled or cold reduced
Structural shapes and piling
Terne plate
Tie plates and splice bars
Tin plate
Tool steel

Part 2

Axles and wheels for running on rails (also including steel tires and rims)
Bale ties
Blooms, ingots and slabs
Castings, steel
Forgings, frame and open hammer (also including die blocks)
Grinding balls
Nails, staples and wire spikes
Pipe and tubes
Strip, hot rolled or cold reduced
Wire (coated or uncoated, not further fabricated than coiled or cut and straightened)
Wire rods

A new procedure when purchasing the above types of steel is that buyers are now required to send their original purchase order with two extra copies instead of just one as in S.C. 33 direct to the steel controlier. All purchase orders approved by the controller will be so marked and forwarded by him direct to the producer, and an approved copy will be returned to the applicant; purchase orders not approved by the controller will be so marked and returned to the applicant.

As a result of the improvement in the situation in war materials and reduction in many lines of war production, restrictions have been removed on the use of three classifications of metals and of one type of scrap rubber, C. D. Howe, Minister of Munitions and Supply, announced.

The minister announced the release of metals to the trade will not result in any perceptible increase in consumer goods. While a manufacturer may get aluminum tie wire for electrical conductors, for example, a dozen odd things which he requires to make an article may still be in critical supply. Manufacturers of articles from these materials do not enjoy any labor priorities whatever, he stated.

Mr. Howe offered definite suggestions only in the lifting of restrictions on steel pipe, cast iron pipe, wire and wire rods. It would permit, he said, manufacturers to produce more water pipe, drainage pipe, bailing wire, stovepipe wire and box strapping wire, which is fine if you need a water pipe or some wire to hold the sewing machine together, but no good if you need a new lawnmower.

Lift Restrictions on Magnesium

Lifting of restrictions on magnesium, Mr. Howe stated, presents a challenge to metallurgists and to manufacturers for the simple reason that they have never had magnesium before. The amended order follows by about a month removal of restrictions on the sale and use of scrap aluminum and secondary aluminum ingots derived from scrap.

The new order by G. C. Bateman, metals controller, cancels restrictions on the sale and use of aluminum rivets, cast aluminum, welding rod, aluminum welding wire, metallizing wire, aluminum wire for anodizing and aluminum tie wire for electrical conductors. It also provides that, except for such quantities as may be reserved for the controller, any person may acquire or use aluminum powder or paste as a pigment in making paint.

M. W. Mackenzie, Deputy Chairman of Wartime Prices and Trade Board, stated that continuation of standardization regulations would result in speedier alleviation of the short supply situation in end products brought about when the metal situation was more critical.

Cargo ships delivered by Canadian shipbuilders since the start of the war to Dec. 31 last amounted to 232, Department of Munitions and Supplies announced. Of these, 219 were in the 10,000-ton class—152 were made in western shipyards and 67 in eastern yards. Thirteen 4700-ton ships were delivered from eastern yards. Details of naval shipbuilding were not disclosed, but Munitions Minister Howe said recently that more than 500 naval vessels, ranging from patrol boats to a destroyer, have been turned out by Canadian shipyards since the outbreak of war.

Victor Spencer, president, Pioneer Gold Mines, has purchased the Vancouver plant of Hamilton Bridge Western Ltd. from Hamilton Bridge Ltd., Hamilton. The name of the company will be changed and it will continue to fabricate steel parts for West Coast Shipbuilders Ltd.

During 1943 Canadian export trade reached the highest total in history according to Trade Minister MacKinnon. Dealing with Canada's external trade Mr. MacKinnon stated: "The total of domestic and foreign exports during the year attained the unprecedented figure of slightly more than $3,000,000,000. The value of 1943 exports was more than three times greater than the value of 1939 exports, set at more than $935,900,000.

"Well over 70 per cent of these exports were materials used directly in the carrying on of this total war. While the great bulk of exports went to the United Kingdom and the United States, exports to the Middle East and to the Far East, both of them war zones, were enormous. Moreover exports of munitions to Russia were of unprecedented value.

"The growth of export trade during the war period has far exceeded the substantial rise in imports entered for consumption, so that in 1943 our favourable balance of commodity trade will exceed $1,350,000,000."

The minister intimated that 1944 export figures would be even greater than those of last year.

The following figures show Canadian iron and steel exports for the past five years:

Canadian Iron and Steel Exports

	1939	1940	1941	1942	1943
		(Millions of Dollars)			
Pigs, ingots, blooms, billets	5.2	12.9	21.8	20.5	21.9
Motor vehicles, and parts (includes trucks, Bren gun carriers, Universal carriers, tanks, etc.	25.9	65.6	153.7	328.3	472.
Guns		2.7	13.	73.7	143.9
Nonferrous metals	182.9	194.7	244.	308.9	332.7
Nonmetallic minerals	29.3	33.8	45.2	56.6	62.2
Explosives	.6	2.8	20.2	24.3	17.2
Other chemicals and products	23.7	28.4	38.5	53.	69.2
Ships	.5	.1	2.	106.8	82.9
Aircraft and parts	.4	6.	20.2	27.	44.7
Canadian Army and Navy Stores	.0	2.5	40.3	55.1	48.7
Cartridge and shells	.8	12.5	41.9	300.4	353.8

Comb Brazil's Hills

About 52 per cent of United Nation's supply of critical ore found in northeastern section of country. Primitive mining methods followed by natives but some American machinery is being utilized

DEEP in the interior of northeastern Brazil a hide-and-seek battle with nature to find and mine tantalite is being waged. Tantalite, a rare pitch-black mineral, ranks as one of the most important resources in the Allied war chest. The reason: Tantalum, derived from tantalite, gives added power and increased range to United States and United Nations war weapons.

Tantalite's exact military uses are military secrets, but an idea of the heavy wartime demand for the mineral can be gleaned from its high priority. Of all the strategic materials shipped by air to the United States from Brazil and other nations, tantalite alone holds top rating: A-1-A.

But producing 52 per cent of the world's highest-grade tantalite in Brazil is far from easy. Biggest problem of all is locating the black substance in the mountainous area stretching in a wide arc of 3600 square miles through the states of Paraiba and Rio Grande de Norte.

Tantalite ore usually is found clustered with other minerals in towering, odd-shaped rock formations called pegmatite dikes. Or it may be found in alluvial deposits beneath the level valley land. But the problem comes in determining which of the thousands of dikes and deposits in the region contain sufficient tantalite to warrant a costly mining effort.

Frequently, a likely-looking lode will yield a few pounds of high-grade ore, then peter out. An obscure mine, on the other hand, might suddenly turn into a rich source with a plentiful supply. And even tantalite ore itself is hard to distinguish from other minerals with similar characteristics.

Tantalite buyer balances the mineral on his scales. Price of this rare mineral, needed for war use, runs more than $6000 *a ton*

This battle of man versus nature is being fought on a battleground that closely resembles North America's semi-arid Southwest: rainless, thin-grassed back country of granite-faced mountains and occasional spiny cactus plants. Nature is slowly losing the battle; tantalite production in 1943 zoomed 140 per cent over that of 1942, and this year's output is expected to double that of last year.

The most amazing thing about tantalite is the small, though priceless, amount of product resulting from an incredible amount of work. An estimated 3000 tons of rock must be mined to get one ton of tantalite, and it takes one man 130 days to crush, wash and prepare a ton of the ore for shipment. This becomes even more remarkable when it is realized that tantalite mining, despite the recent use of American mechanical equipment, is still basically a hand-picking and hand-washing operation.

400 Mines in Operation

Sweating with pick and shovel in the tropical sun, about 8000 Brazilian laborers are moving broken rock and working subsurface deposits. These men form the tantalite army which moves into areas surveyed and checked by its officers, the Brazilian and American government engineers. Altogether some 400 mines are being operated, all by private prospectors and companies that sell the tantalite to exporters who, in turn, sell the bagged, graded mineral to the United States government.

The American government's role in tantalite production is one of buying, financing, and supplying technical assistance. By an agreement with the Brazilian government, the United States Purchasing Commission, now a part of the Foreign Economic Administration, buys all of Brazil's tantalite output, loans money to private producers to stimulate development and swift exploitation of mines.

For its part, the Brazilian government has assigned technicians to work with American engineers in speeding up tantalite production. In 1940, before the current rush for the mineral began, Brazil's National Department of Mineral Production built a chemical laboratory at Campina Grande, to analyze and grade the ore. This proved invaluable in locating high-grade tantalite deposits.

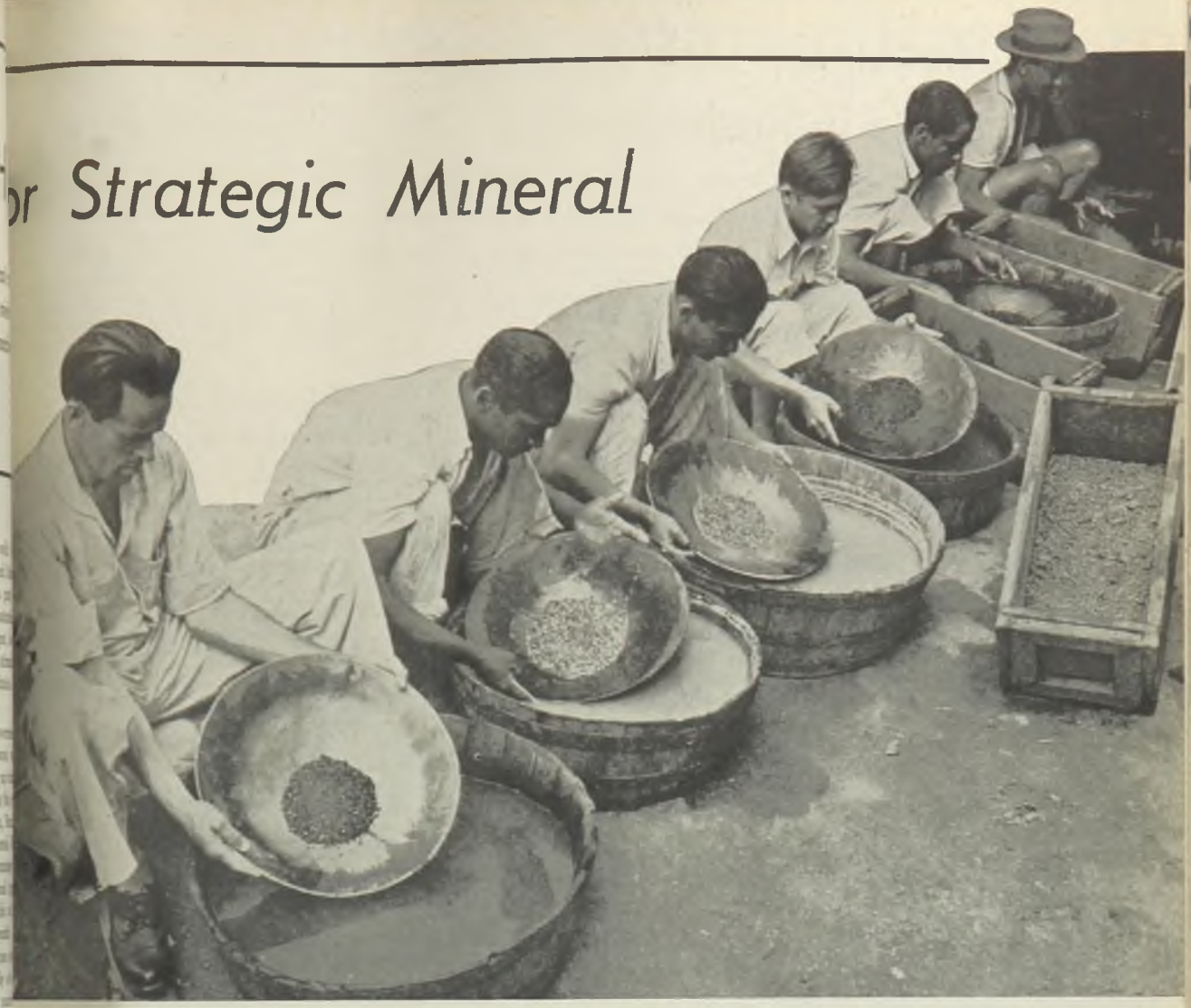
Brazilian-American co-operation today is augmenting the Allied supply of one of the world's most prized materials and, at the same time, is denying it to the Germans and Japanese. Axis agents two years ago were busy in the area buying up all the coal-like mineral they could lay their hands on. Fortunately, Brazil's tantalite production was very low during the two years of feverish Axis activity.

Thus, while some tantalite fell into enemy hands, the amount was almost negligible; and after Pearl Harbor Brazil's door was slammed shut to further Axis purchases.

Tantalite mining is expensive. While labor is cheap (most unskilled workers earn around 30 cents a day), the average producer finds it hard to make ends meet, owing to the small quantity of tantalite which he is likely to mine after an extremely laborious effort. As a consequence, producers turn increasingly to simpler and far more profitable operations in scheelite mining, and the United States Purchasing Commission is hard-pressed to check the trend.

Many Brazilians feel that the tantalite business is a war bubble that will burst, and they don't want to be caught short. But the USPC men have effectively counteracted this belief by easing the mine owners' financial burden through loans

...r Strategic Mineral



Workmen rewashing tantalite at the headquarters of the world's largest producers of the mineral in northern Brazil. Modern mining methods are gradually replacing former primitive methods

and higher prices, and by pointing out the fabulous peacetime future which tantalite appears to have in the field of electronics.

The USPC's tantalite program did not get into full swing until last February, after a preliminary geological survey in the summer of 1942 had shown the wisdom of a large-scale mining effort in this area. Brazil's ore, running better than 45 per cent pure tantalite, was found to exceed by far the quality and more than equal the quantity of the ore mined in Australia and South Africa, the other two major sources of tantalite. Some prospectors in the area have been pecking away at tantalite mining since 1927, and the industry took form in 1937; but it took the war and the pressing military need for the mineral to set the area booming.

Communication to the tantalite mines, sprawling over vast distances, has been a huge problem. The old sandy roads twisting over mountains and across valleys were inadequate to handle truck traffic and they had to be improved. The USPC alone added about 65 miles of new country-type roadway, and is building more.

Mechanization of tantalite mining has been slow. Machines are new to the Brazilian miners who have traditionally worked with the most primitive tools. But, as compressors and jack-hammers and other equipment gradually come in from the United States, the Brazilians are gaining valuable experience which will stand them in good stead after the war.

Mechanization Proceeds Slowly

United States government agencies are bringing down about $250,000 worth of mining equipment, including a large crusher and rolls. These mechanical tools and other mining equipment now coming into the country are being leased to the Brazilian producers at low cost.

Today, Brazilian mining men generally are still using old-fashioned hand washing to recover tantalite. They set up wooden sluice boxes near subsurface deposits, dig holes to care for water, which is usually carried in gasoline cans from streams sometimes miles away. The rock and dirt are broken, screened and then washed in the water box. Tantalite, being heavy, sinks to the bottom of the box while the dirt drains off. The precious overflow water is then collected and used again.

The Brazilian miners live near their work. Most of them have thrown up thatched-roofed lean-tos next to the excavations, sleeping ten or more men in hammocks strung diagonally across the inside.

Once or twice a week the miners gather together their tantalite ore, pack it on burro-back, and set off for the nearest town, where dealers weigh the mineral, judge its quality. These dealers, in turn, ship the ore by truck to Campina Grande where it is graded, washed, sun-dried and bagged. The last step in the tantalite cycle in Brazil takes place at Natal's great Parnamirim air field, where the tantalite is loaded aboard American military transports and rushed to the United States where it is used in the war industries in the form of tantalum.

Heavy Machinery Dealers Expect Some Easing in Restrictions

View expressed at twenty-fifth convention of Associated Equipment Distributors that likely releasing of greater amount of metals and materials into commercial channels this year is happy augury for their industry

DISTRIBUTORS of heavy construction machinery, who during the first two years of war have been forced to operate largely as service organizations, look forward in 1944 to revised WPB regulations which will help their business.

This was the view expressed by E. P. Phillips, president, Associated Equipment Distributors, addressing the organization's twenty-fifth convention at the Edgewater Beach hotel, Chicago.

During the war, the industry has operated flexibly and has kept the vast army of bulldozers, tractors and steam shovels, and such equipment in the country and on the battlefronts well maintained and distributed.

"Easing of government regulations and the releasing of a greater amount of metals and materials, such as aluminum, into commercial channels in 1944 is a happy augury for our business and for public works of a nonmilitary nature," said Mr. Phillips, who is president, Phillips Machinery Co., Richmond, Va. "During the year we may expect WPB to allow more and more such materials for civilian use."

The industry must participate in the disposition of surplus equipment to prevent low prices and dumping, asserted F. Salditt, vice president and general manager, Harnischfeger Corp., Milwaukee. "Organized manufacturers can do better because they know the salient features of their product and the marketing conditions," he said.

Those attending the convention agreed that unused surplus equipment at the war's end should be channeled back to the manufacturers and used equipment should be channeled through equipment dealers.

Henry Hale, director of the construction machinery division, WPB, Washington, stated that as of Sept. 30, 1943, dealers had a backlog of $690,000,000, and that heavy demand for such machinery for military construction will continue throughout the emergency.

G. W. Van Keppel, president, G. W. Van Keppel Co., Kansas City, Mo., was elected president, and H. O. Penn, president, H. O. Penn Machinery Co. Inc., New York, was named executive vice president.

New vice presidents include Frank B. McBath, president, Columbia Equipment Co., Portland, Oreg.; A. E. Hahnan, vice president, Tractor & Machinery Co., Atlanta, Ga.; and R. S. Patten, general manager, Patten Tractor & Equipment Co., Chicago. W. W. Bucher, president, R. E. Brooks Co., New York, is treasurer, and C. F. Winchester, National Press building, Washington 4, is executive secretary.

Washer-Ironer Manufacturers' Convention Told Big Postwar Market Is in the Making

AMERICAN homes will require household washers at the rate of 2,500,000 yearly through the decade "beginning with the year V-1," members of the American Washer and Ironer Manufacturers' Association were told at their twenty-ninth annual meeting, Jan. 19 in Chicago.

Demand for ironers was estimated at 300,000 in the first year and 400,000 in the second, climbing to a ratio of one ironer to every five washers within a few years after resumption of production for civilian needs.

World-wide use of American-made household washers with the coming of peace was foreseen by John M. Wicht, director, home laundering equipment division, General Electric Co., Bridgeport, Conn., beginning his third term as the association president.

President Wicht will name an industry committee to study world export potentialities. He urged raising a special fund for promoting industry interests.

Bernard J. Hank, president, Conlon Corp., Chicago, who presented the estimates of washer-ironer postwar potentials, submitted the forecast as chairman of a subcommittee which has spent almost a year surveying the industry's expansion possibilities. Highest washer production before Pearl Harbor was 1,959,887 units, in 1941. The Hank committee estimated postwar residential construction at the rate of 900,000 units yearly in the first ten years, compared to 300,000 annually in the ten years preceding World War II.

Plans for the information and guidance of washer-ironer manufacturers in the reconversion and postwar periods have been evolved and will be continued by a committee under Roy A. Bradt, vice president, Maytag Co., Newton, Iowa, named early in 1943.

Judson S. Sayre, president, Bendix Home Appliances Inc., South Bend, Ind., chairman of the industry advisory board appointed by WPB, gave the details of negotiations for resumption of washer-ironer manufacturing when the progress of the war permits and Mr. Bradt, under whose supervision the industry's recommended plan for reconversion was prepared, described its latest stages to the group.

Additional War Plants Granted Production Awards

The Army and Navy recently announced the granting of awards for excellence to the following war plants:

Baldwin Locomotive Works, The Whitcomb Locomotive Co., Rochelle, Ill.

The Brill Corp., The J. G. Brill Co., Philadelphia.

Ensign-Bickford Co., Avon plant, Avon, Conn.

Ensign-Bickford Co., Simsbury plant, Simsbury, Conn.

General Time Instruments Corp., Westclox division, La Salle, Ill.

Hercules Powder Co., Missouri ordnance works, Louisiana, Miss., and Volunteer ordnance works, Chattanooga, Tenn.

The Mill-Rose Co., Cleveland.

Noblitt-Sparks Industries Inc., Central avenue plant, Columbus, Ind., also the heater, radio and reel plants, Columbus, Ind.

Utica Cutlery Co., Utica, N. Y.

American Bridge Co., Ambridge, Pa.

H. M. Harper Co., Chicago, received third award.

Amertorp Corp., St. Louis.

Crown Iron Works Co., Minneapolis.

Grapho Products Inc., Indianapolis.

Pfaudler Co., Rochester, N. Y.

Bell Sound Systems Inc., Columbus, O.

H. D. Conkey & Co., Mendota, Ill.

W. S. Darley & Co., Chicago.

Outboard, Marine & Mfg. Co., Galesburg, Ill.

Gale Products Co., Galesburg, Ill.

Owens-Illinois Can Co., Baltimore.

DeVilbiss Co., Toledo, O.

H. K. Porter Co. Inc., Pittsburgh.

Charles H. Besly & Co., Chicago.

L. F. Grammes & Sons Inc., Allentown, Pa.

Hanlon-Waters Inc., Tulsa, Okla.

Heyden Chemical Corp., Danville, Pa.

Kermath Mfg. Co., Detroit.

McCabe Powers Auto Body Co., Sutter Creek, Calif.

Adolf Meller Co., Providence, R. I.

Mixing Equipment Co. Inc., Rochester, N. Y.

Raybestos Manhattan Inc., Manheim, Pa.

Shell Chemical Co., Wilmington, Calif.

Shell Union Oil Corp., Martinez, Calif.

Square D Co., Suffern, N. Y.

R. D. Suman & Co. Inc., Richmond, Ind.

United Metal Box Co. Inc., Brooklyn, N. Y.

Willard Storage Battery Co., Cleveland.

Winter Bros. Stamping Co., Detroit.

Youngstown Sheet & Tube Co., Chicago district works, East Chicago, Ind.

Federal Cartridge Corp., Anoka, Minn.

Moore Drop Forging Co., plants at Springfield and Chicopee, Mass.

John J. Nesbitt Inc., Philadelphia.

New England Lime Co., Canaan, Conn.

Saginaw Stamping & Tool Co., Saginaw, Mich.

Stackpole Carbon Co., St. Marys, Pa.

United States Rubber Co., Woonsocket, R. I.

Wells-Gardner & Co., Chicago.

Babcock & Wilcox Co., New York, awarded third star.

National Forge & Ordnance Co., Buffalo, awarded fourth star.

Dodge Steel Co., Philadelphia.

Burgess-Norton Mfg. Co., Geneva, Ill., awarded second star.

Warner & Swasey Buys Rights to Tapping Machine

Cleveland machine tool builder says acquisition of Bakewell machine is in preparedness for postwar markets

TO PREPARE for postwar markets, the Warney & Swasey Co., Cleveland, announces purchase of manufacturing rights for the Bakewell tapping machine from the Bakewell Mfg. Co., Los Angeles.

To be known as the Warner & Swasey precision threading and tapping machine, its production is being transferred to the company's Cleveland plants and its sale will be handled by the same branch offices as handle Warner & Swasey turret lathes.

The precision threading and tapping machine is designed to tap or cut threads at speeds required by mass production and is capable of holding such threads to what is known as a "Class 5" tolerance.

The machine provides greater precision for tapping operations in a variety of materials.

Perfect threads can be cut in plastics, aluminum and its alloys, magnesium, bronze, nickel, and stainless steels, it is claimed. The precision threading and tapping machine will cut either internal or external threads with equal ease, and right- or left-hand threads as desired. A large number of these machines have been produced and currently are being used by industry to meet Army, Navy, and Air Force requirements.

SAFETY AWARD: Recognition of an outstanding safety record was given to the Cleveland district of the Republic Steel Corp. when J. L. Hyland, Cleveland district manager, left, accepted the corporation's safety award from J. A. Voss, director, industrial relations, Republic Steel Corp.

BRIEFS . . .

Surface Combustion Co., Toledo, O., announces a new combustion-type high-altitude aircraft heater, built to withstand tremendous air pressures and to stay in operation at extremely high altitudes.

—o—

Consolidated Management Consultants, industrial engineers, New York, offer a booklet, "Wage Incentives in Wartime", as guide to increase production without extra manpower.

—o—

B. F. Goodrich Co. will soon establish manufacturing operations in DuBois, Pa. New unit will manufacture products in which rubber and textiles are employed.

—o—

International Detrola Corp., New York, is the new name given to the merged companies, Detrola Corp. and International Machine Tool Corp.

—o—

Krembs & Co., Chicago, has published a chart to facilitate the finding of the best flux to use in connection with many metal-joining jobs.

—o—

New Departure division, General Motors Corp., Bristol, Conn., reports output of ball bearings during November and December totaled more than in the whole four years of World War I.

—o—

Heppenstall Co., Pittsburgh, has been authorized to add a fourth star to its All-Navy "E" flag for continued exceptional achievement.

—o—

Pullman Co., Chicago, paid more than $70,000 in cash awards to employes during 1943 for suggestions, totaling 32,143 ideas, of which 6301 were adopted.

—o—

Behr-Manning Corp., Troy, N. Y., division of Norton Co., has published a revised addition for general use of its booklet on coated abrasives.

—o—

Fitzgibbons Boiler Co. Inc., Oswego, N. Y., will soon manufacture boilers for railroad locomotives.

—o—

United States Rubber Co., New York, is expanding production facilities at four of its major tire plants located in Chicopee Falls, Mass., Eau Claire, Wis., Detroit and Los Angeles, to meet increased military and civilian requirements.

—o—

Meehanite Metal Corp., New Rochelle, N. Y., has made arrangements with African Malleable Foundries Ltd., Benoni, Transvaal, South Africa, to manufacture Meehanite castings.

—o—

Manufacturers Brass Foundry Co., Chicago, in a booklet presents photographs of every step in producing brass and aluminum castings.

—o—

A. M. Byers Co., Pittsburgh, reports gross sales increased 18 per cent to $24,157,136 in 1943 but net profit dropped from $1,195,422 in 1942 to $1,147,113 in 1943 due to higher production costs and increased taxation.

—o—

N. A. Woodworth Co., Ferndale, Calif., recently purchased the Suprex Co.

—o—

General Electric Co., Schenectady, N. Y., announces that stockholders totaled 229,058 on Dec. 28, 1943, compared with 221,501 the year preceding.

—o—

Vendo Co., Kansas City, Mo., has established a contest among its various production departments by the use of bombers on a map to spur output.

—o—

Barker & Williamson, Upper Darby, Pa., has issued a new catalog which presents information on variable air condensers.

—o—

American Foundry Equipment Co., Mishawaka, Ind., has revised bulletin No. 9 describing its metal washing machine.

—o—

Briggs & Stratton Corp., Milwaukee, reports profits for 1942 were reduced from $1,783,898 to $1,070,726 as a result of renegotiations proceedings.

—o—

United States Steel Corp., New York, and its subsidiary companies will purchase government securities amounting to $75,000,000 during the Fourth War Loan Drive.

THE BUSINESS TREND

Output Ceiling Near as Slight Gains Are Shown

FOLLOWING a week in which production gages registered slight increases, the December output report of War Production Board Chairman Nelson makes clear that industry is maintaining a pace sufficient to bring us victory. However, advance of only a point in December's overall index gives evidence that peak levels are close at hand.

Revenue freight carloadings, which recently have declined, this week recovered substantially. Petroleum and bituminous coal both recorded higher output for the week, and bank clearings showed an increase. Construction volume was low in comparison with the preceding week's high total, but new construction financing so far this year is about 47 times that of the comparable period of 1943.

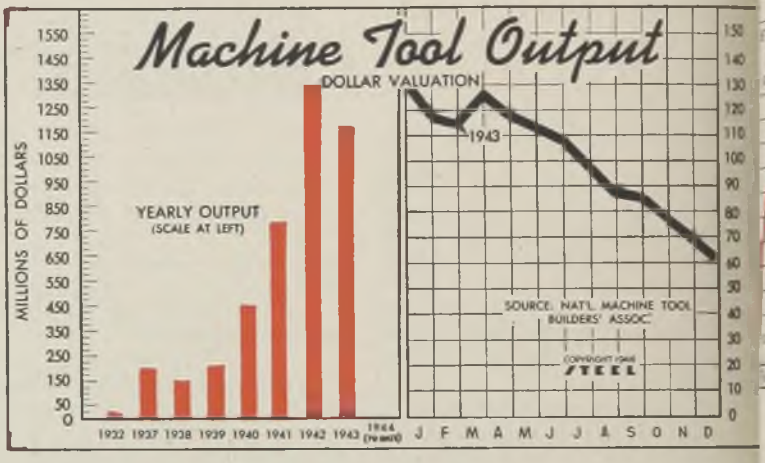
AUTOMOTIVE OUTPUT—Reduction in military truck schedules, to permit a substantial increase in 1944 production of civilian trucks and avert a possible transport crisis, is a possibility for the early future. Some observers believe the present military vehicle schedules will be scaled down to bring them within the realm of actual attainment and allow enlarged output of civilian units.

Present overall program calls for production of 122,979 civilian trucks this year. Scaling down of the military schedules might permit turning out 275,000 or more civilian vehicles. Continuing shortage of bearings, axles, and tires will perhaps hamper output later in the year, though new facilities are being rushed to completion.

PRODUCTION PROSPECTS—Executives interviewed in a recent survey anticipate little change in the 1944 production rate as compared with last year, assuming continuation of the war. Continued cost increases and narrowing of profit margins are foreseen. Average of commodity prices is expected to be somewhat higher; price controls will greatly lessen the extent of price increases.

"REAL" WEEKLY EARNINGS—In 25 manufacturin industries the latest figures available show "real" weekl earnings advancing to reach a new peak level. For t 12 months since November of 1942 these earnings hav risen 8.5 per cent. In the period from January, 194 base date of the Little Steel formula, to November, 194 dollar weekly income increased 55.5 per cent and livin costs only 20.3 per cent.

MACHINE TOOLS—Downward trend of machine to output continues, with December shipments over 15 pe cent below those of November. Total company orde received in December amounted to $33,746,000, abo 10.5 per cent less than the November total, $37,705,00 December cancellations were 16 per cent higher tha for November. Unfilled orders backlog at end of Decen ber totaled $211,751,000, or 14 per cent less than N vember's month-end backlog of $246,509,000.



Machine Tool Output

(000 omitted)

	1943	1942	194
January	$117,384	$83,547	$50,7
February	114,593	84,432	54,0
March	125,445	98,358	57,4
April	118,031	103,364	60,3
May	113,710	107,297	60,8
June	108,689	111,090	69,0
July	97,428	113,596	63,0
August	87,405	117,342	70,0
September	85,842	119,883	74,9
October	78,300	130,008	84,1
November	71,811	120,871	81,3
December	60,680	131,960	81,4

Year		Year	
1943	$1,179,318	1941	$812,4
1942	1,321,862	1940	450,0

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	99.0	99.0	93.0	99.0
Electric Power Distributed (million kilowatt hours)	4,531	4,539	4,295	3,974
Bituminous Coal Production (daily av.—1000 tons)	2,133	2,062	2,029	1,929
Petroleum Production (daily av.—1000 bbls.)	4,391	4,375	4,363	3,961
Construction Volume (ENR—unit $1,000,000)	$25.5	$98.7	$34.7	$67.9
Automobile and Truck Output (Ward's—number units)	18,000	17,770	15,570	18,420

*Dates on request.

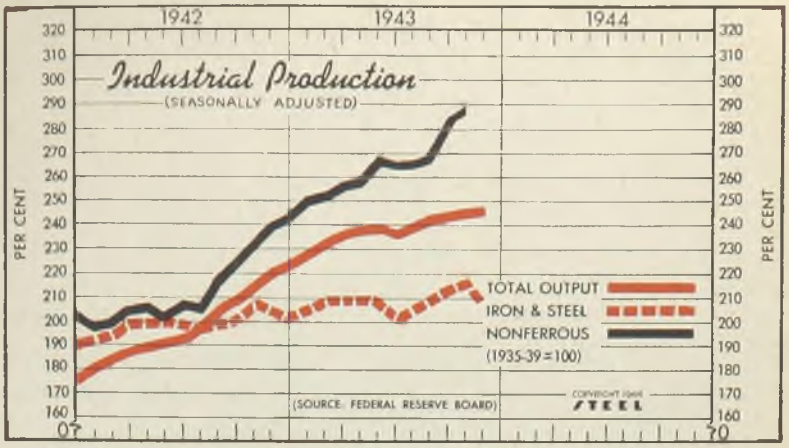
TRADE				
Freight Carloadings (unit—1000 cars)	811†	780	641	704
Business Failures (Dun & Bradstreet, number)	23	39	21	114
Money in Circulation (in millions of dollars)‡	$20,408	$20,404	$20,382	$15,354
Department Store Sales (change from like week a year ago)‡	−3%	−6%	−1%	+6%

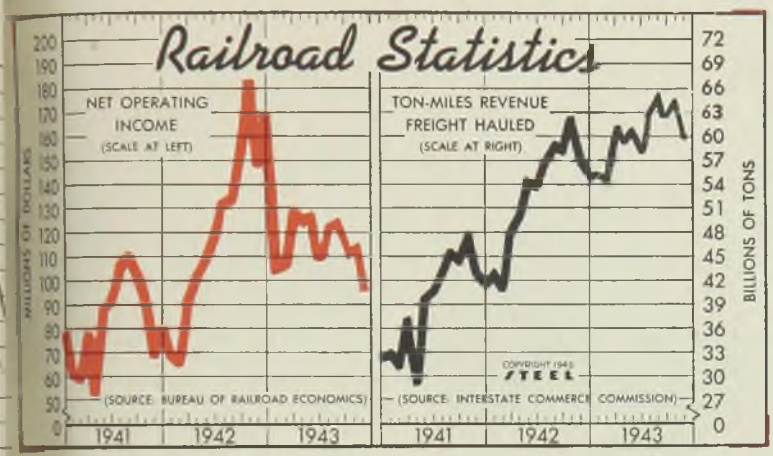
†Preliminary. ‡Federal Reserve Board.

Federal Reserve Board's Production Indices

(1935-1939 = 100)

	Total Production		Iron, Steel		Nonferrous	
	1943	1942	1943	1942	1943	1942
Jan.	227	181	204	192	250	197
Feb.	232	183	208	194	252	199
Mar.	235	186	210	200	256	204
Apr.	237	189	209	199	257	205
May	238	191	208	200	266	200
June	236	193	201	198	264	206
July	239	197	203	196	264	205
Aug.	242	204	209	197	267	216
Sept.	243	208	213	199	284	223
Oct.	247	215	214	207	289	230
Nov.	247	220	209	204	...	239
Dec.	...	223	...	200	...	242
Avg.	...	199	...	199	...	214



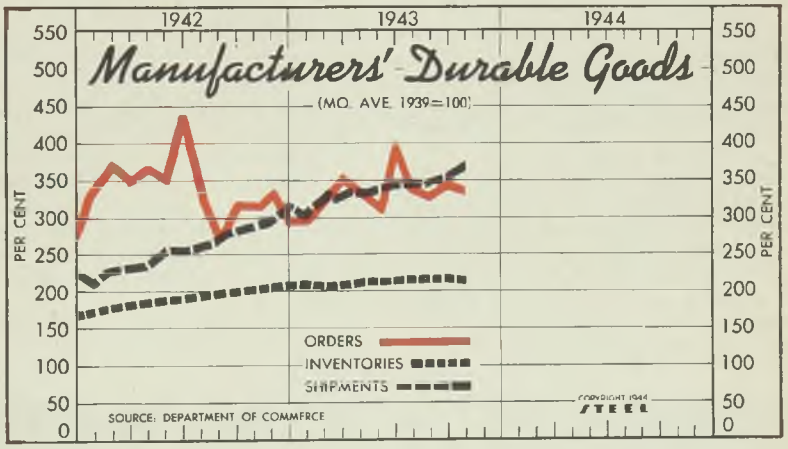


Statistics of Class I Railroads

	Net Operating Income			Ton-Miles Revenue Freight		
	1943	1942	1941	1943	1942	1941
	(millions)			(billions)		
Jan.	$105.3	$66.8	$62.0	55.1	43.9	32.9
Feb.	106.1	64.4	58.5	54.4	40.8	31.1
Mar.	129.6	90.6	80.6	61.2	48.3	37.2
Apr.	127.1	101.6	52.6	59.1	50.0	29.0
May	128.2	109.7	88.6	62.1	54.2	39.7
June	109.7	118.7	93.3	58.0	53.9	40.7
July	120.6	133.6	106.3	63.7	57.0	42.8
Aug.	124.6	135.9	111.3	65.1	58.6	45.5
Sept.	110.2	154.6	104.4	62.5	58.2	44.3
Oct.	113.1	184.7	94.1	65.0	62.2	47.7
Nov.	96.4	148.9	68.9	59.6	57.0	42.6
Dec.	.....	170.9	79.3	....	55.0	41.3
Avg.	.....	$122.9	$83.3	....	53.2	39.6

Manufacturers Durable Goods

	Orders		Shipments		Inventories	
	1943	1942	1943	1942	1943	1942
Jan.	293.5	333.9	298	214	211.3	179.2
Feb.	326.6	373.4	337	232	209.6	180.8
Mar.	349.2	344.4	330	235	210.7	183.4
Apr.	329.8	362.1	338	239	213.5	186.6
May	313.0	348.4	338	254	213.5	190.2
June	392.7	439.5	343	256	211.8	193.2
July	338.7	321.8	346	264	211.4	195.8
Aug.	325.0	269.4	348	270	213.3	198.0
Sept.	341.1	314.5	356	283	214.7	200.9
Oct.	339.5	312.1	371	289	214.0	204.1
Nov.	....	334.7	....	300	....	207.7
Dec.	....	291.1	....	320	....	210.1
Ave.	....	337.1	....	263	....	194.2



FINANCE	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,260	$8,963	$10,523	$7,772
Federal Gross Debt (billions)	$170.9	$170.6	$169.8	$113.8
Bond Volume, NYSE (millions)	$80.4	$97.2	$35.0	$69.7
Stocks Sales, NYSE (thousands)	4,336	4,698	3,167	4,013
Loans and Investments (millions)†	$49,539	$49,527	$50,509	$41,239
United States Government Obligations Held (millions)†	$36,044	$36,033	$36,722	$28,142

†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)†	247.4	247.3	246.3	243.6
Industrial Raw Materials (Bureau of Labor index)‡	112.3	112.1	112.1	107.6
Manufactured Products (Bureau of Labor index)‡	100.4	100.4	100.4	100.3

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

Hints as to Automotive Future Gleaned from SAE Meeting

Lessons learned in hard school of war will have profound effect on design and production of machines which will travel on land, in the water and through the air, even though transition from the old to the new will take much longer than the public is being led to believe

Success of the American automotive industry in mobilizing itself for action against the Axis powers has been due fully as much to intensified research and planning within the industry as it has to material resources and plant facilities. That—to my mind—is one of the major points brought out by the mass of evidence presented during the recent annual meeting of the Society of Automotive Engineers in Detroit. American ingenuity of course has played a very large part in these wartime achievements. However, it has been scientifically guided ingenuity—not the old fashioned rule-of-thumb variety which prevailed to a considerable extent in the earlier days of the industry.

The war with the Axis unquestionably is serving the automotive industry as a tough but highly effective training school for tough battles which lie ahead in the economic war-to-come. In that economic war, the industry undoubtedly will have to face continued high costs of labor and materials; continued scarcities of some materials; and some really stiff overseas competition. While the time will come when vehicles of radically new overall design will become realities, that will be a matter of years rather than months after the ending of the European and oriental wars.

From things which came out during the SAE meeting, there can be little question but what the automobile industry immediately after the war will have a lot in common with that mythical country pictured by Lewis Carroll, wherein, "everyone has to keep running just as fast as he can in order to remain in the same place where he was". In other words, there will be such a tremendous backlog of critical business in the replacement of worn out vehicles, that for a considerable time the industry will have to run just as fast as it can in order to stay just about where it was in 1941.

While this state of affairs would seem to rule out the early advent of mass production of any of the "dream cars" conceived by imaginative air brush artists, it certainly does not rule out utilization to full degree of war-born materials and war-born engineering and production techniques in the manufacture of conservative postwar cars, which at best are much more apt to cost the user "over $1000" than "under $500"—the latter figure being one to which altogether too many people are looking forward at the present time.

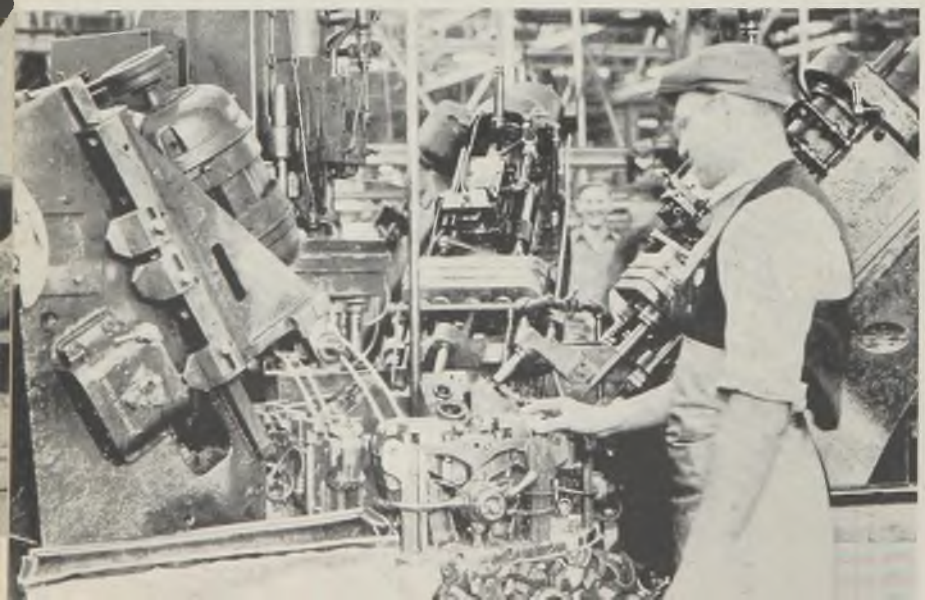
Puncturing of the myth of the postwar "dream car", as carried out by Edgard C. De Smet, executive engineer, Willys-Overland, Inc., Toledo, O., was based on clear thinking of a man whose close association with such radical developments as the famous Jeep certainly precludes his being branded as a conservative with a closed mind.

As he analyzed the situation, the American public loves to inspect vehicles of advanced design—but buys the conservative models. Great as the temptation may be to build dream cars, manufacturers will have to face realities of the practical, economical utilizations of familiar materials including steel, aluminum and glass. Aside from all this, careful consideration proves that short, wide "teardrop" designs—as widely publicized pictorially—actually are too wide for the highways and for garage doorways. While rear-mounting of engines may have some advantages, the average driver has psychological aversion for high speed driving of a hoodless car with nothing between himself and eternity except a bumper and a windshield.

"The American public," said Mr. De Smet, "will not pay excessive premiums for intangible features and questionable improvements. Neither will we be willing to sacrifice practicability, safety and fundamental habits and standards for the sake of fulfilling predictions of prophets.

In his comparison of steel with aluminum, Mr. De Smet dealt primarily with fabrication of automobile bodies. "As a basic material," he said, "we find that the cost of any suitable aluminum alloy is much higher than body steel. Present sheet prices call for an average of 30 cents per pound for aluminum, against 3 cents per pound for steel—or about ten-to-one. Considering an approximate saving in weight of one pound for each pound of aluminum used, when comparing parts of equal strength, we still have an unfavorable cost ratio of five-to-one for a given fabricated assembly.

"Undoubtedly the price of aluminum will be lower after the war—due to tre-



When civilian motor vehicles again go into production, general adoption of various wartime improvements in tools and in machining methods will be mandatory in order to help counteract increased costs in other directions. This will bring about much retooling and will force sweeping redesign of many types of machine tools. Photo courtesy Chrysler Corp.

By GUY HUBBARD
Machine Tool Editor, STEEL

mendous expansion of production facilities. It must be remembered, however, that production of steel also has increased considerably, so that no matter what happens, steel as a raw material always will be far cheaper than aluminum. Even if we should adopt secondary aluminum for the majority of our body parts and are able thus to realize total reduction of 50 per cent in present cost of aluminum—and if we discount the possibility of any reduction in the price of steel—the final cost ratio for a given assembly still will be two-and-one half to one in favor of steel."

In presenting the case for aluminum, L. W. Kempf, aluminum research laboratories, Aluminum Co. of America, Cleveland, seemed to be thinking in terms of heavy sections, rather than body panels. "Even at 20 cents per pound for primary aluminum," he pointed out, "the automobile industry has found it economical to use aluminum pistons in large volume.

Effect of Price Fluctuations

"In the past, when price of secondary metal dropped to 7 or 8 cents per pound, considerable use was made of aluminum in such parts as cylinder heads and intake manifolds. This relatively limited expansion in the use of aluminum, which reached a maximum of something on the order of 35 pounds of aluminum per car on a small portion of the cars manufactured, quickly demonstrated that there was not enough secondary aluminum available to support this expanded use. The price of secondary metal rose rapidly and within a short time was but little lower than of primary. Soon the trend toward aluminum reversed.

"Therefore, it can be assumed that with conditions in the metal industry relatively the same between the various metals as was true in the pre-war era, aluminum may be utilized—at least to the extent of about 35 pounds per car—at a price around 8 cents per pound.

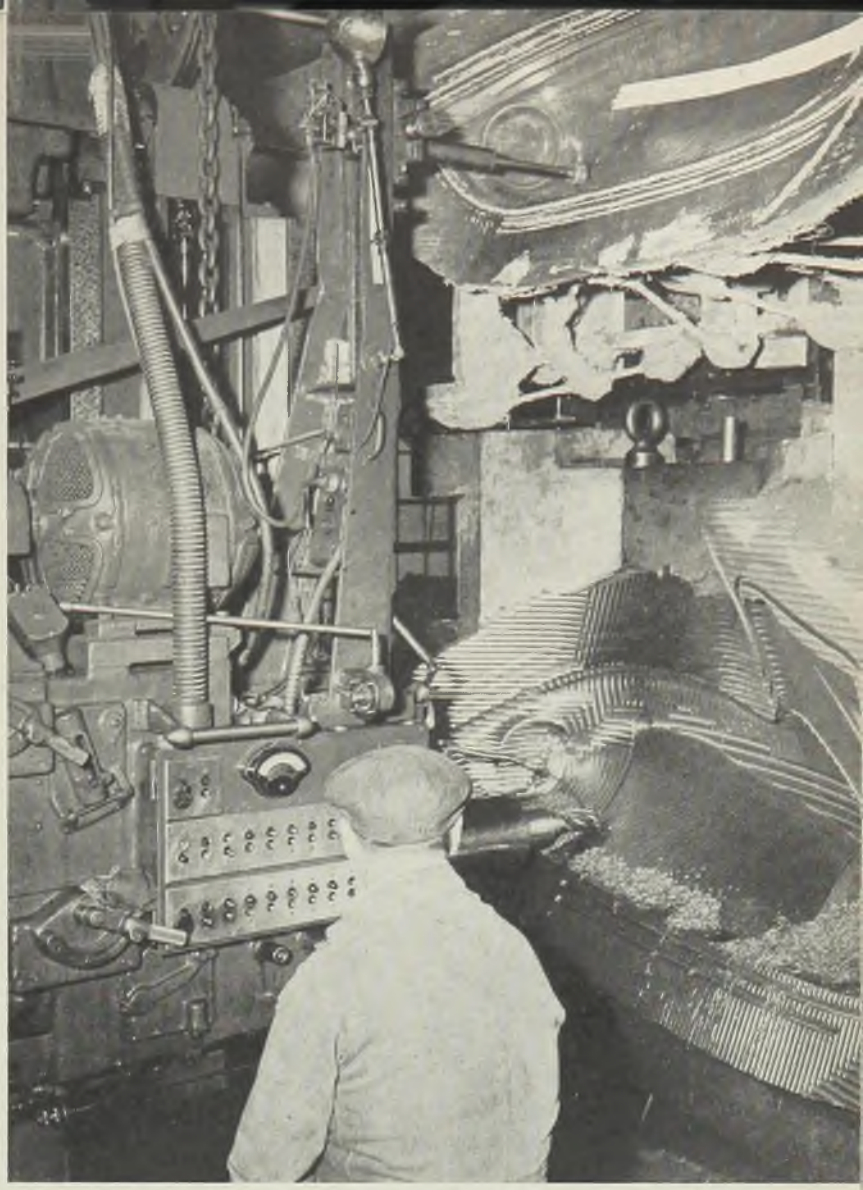
"Judging from past history, secondary metal will play an important role in any large scale use of aluminum alloys in automobile construction. In the past, the price of secondary for long periods has ranged between one-third and one-half that of primary. Therefore, it may be assumed that secondary aluminum will be available after the war at a price of the order of magnitude of 5 cents per pound. This is equivalent to 1¾ cents per pound for iron. Thus the metal cost for automobile castings will reach the same general level as for iron castings."

In their paper entitled, "Porous Chromium for Engine Cylinders", H. Van der Horst and Russell Pyles, Van der Horst Corp. of America, forecast direct plating on bores of aluminum cylinder blocks. Methods, they stated, have been developed for accomplishing this and to date show considerable promise of success. As yet, however, experience in service types of engines has not been attained.

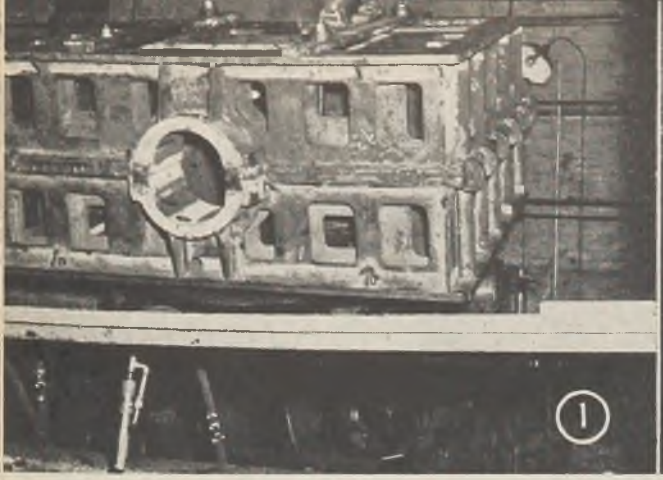
As this writer listened to the evidence in favor of steel and in favor of aluminum, it appeared to him that under existing conditions each material has its well defined uses and limitations. However, developments in deep drawing and joining, and in machining methods, are liable at any time to upset the balance one way or the other. For example, super-speed milling of aluminum—now becoming prevalent in the aircraft industry—certainly will move over into the automobile plants as a cost-cutting light alloy machining process. Its extension to machining of ferrous metals then can be expected to follow. There also is strong evidence that postwar counterparts of the present "national emergency" steels are destined to take active part in this coming rivalry of metals.

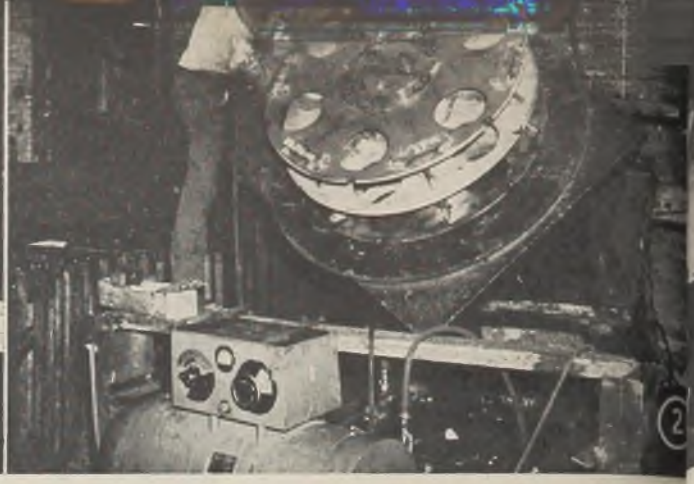
That postwar engineering thinking more than ever before will be dominated by definitely specified end results, was emphasized by a number of speakers. J. O. Almen, research laboratories, General Motors Corp., Detroit, summed up this literal thinking when he said: "Strength of dynamically loaded, highly stressed bolts and studs is—when all is said and done—determined by *the man with the wrench*. All other considerations such as design materials and processing, are relatively of minor importance. Therefore nut tightness should be checked by the only reliable method, which is to measure the actual stretch of the bolt. Tension in the bolt, when measured by bolt stretch, should be 80 per cent of the yield strength either of bolt or abutment—whichever is weaker.

It seems to me that when the scientist and the "man with the wrench" are able to work together like this, America has wiped out the "town and gown" variety of class distinction in industry to an extent that assures great things for us after the war as well as victory in the war.



While the war has encouraged developments in die design, deep-drawing technique and in the use of new materials, all signs point to continued use of sheet steel in the bodies of mass-produced postwar automobiles. Hence, design must be at least held within the broad bounds of this economical and practical material. OEM photo taken by Palmer in tool shop of Frederick Palmer & Sons Inc., Detroit





FABRICATING MARINE PARTS

By J. R. MITCHELL
Welding Superintendent
Farrel-Birmingham Co.
Ansonia, Conn.
And
A. A. YOUNG
Welding Engineer
Alfred B. King & Co.
New Haven, Conn.

ARC WELDING is responsible for many of the production records in manufacturing marine drives for ships. Improved electrodes and arc welding equipment play a most important part in the manufacture of gear blanks, gear cases, covers and other parts used in the propulsion units for all types of ships.

The experience of Farrel-Birmingham engineers in designing gear drives of all types for both industrial and marine service extends over a period of many years. Steel castings are incorporated in many designs where they can be used most effectively in conjunction with rolled steel plates. Other designs consist entirely of rolled plate.

In fabricating parts for ship propulsion units close control of operations is a necessity. Considerable pre-planning has to be done to determine where to make allowances for shrinkage and to establish setting-up and welding procedures. Quite frequently the work is planned to make several subassemblies, welding these units, then combining them into the complete assembly. In others the complete job is set up and welded in one assembly. Often, special welding jigs and fixtures are built to expedite the work and to insure that the finished product conforms to dimensions.

Templates are made to be used on oxyacetylene shape cutting machines. These provide for shrinkage allowances and complete instructions are given to the operator with each template as to the size tip to use, the speed of travel for cutting and whether single or multiple torches should be used. All plates coming off the cutting machines are checked to be sure they conform to dimensions. Close control at this stage helps to prevent such conditions as bad fit-ups and excessive welding in subsequent operations.

In the setting-up operations, a work sheet is furnished which clearly defines each operation to the workman. With these instructions he knows exactly where allowances have been made for shrinkage or whether a part has to be set out of alignment a certain amount in order to have it come into alignment during welding.

A card is furnished with every welding job giving complete instructions on how each operation is to be performed. The welder starting a job looks up the number of the operation on the job card and finds instructions as to the size and type of weld to make, where to start and where to finish, and the size and type electrode to be used. A sample of a typical job card is shown in Fig. 8.

On building the first job of any given type the pre-planned procedures are carefully followed and checked. At times it is necessary to change a procedure or sequence in order to overcome some unforeseen condition that may arise in the course of manufacture. Wherever practicable, all work is mounted on positioners so that welding can be done downhand. This expedites the work and produces welds of a smooth, neat appearance.

In some welding work precautions have to be taken against distortion. Fig. 1 shows one method of doing this which has proved economical and effective. Two lower sections of an all-rolled steel drive case are clamped together with specially made C-clamps tack welded into place to hold the top and bottom plates. Fig. 1 shows this clamping arrangement at the right. Similar clamps are positioned at the left. One section of the drive acts as a strongback or brace for the other, thus avoiding the necessity of using a special strongback or welding fixture to hold the parts in alignment.

The gear drives, formerly made of

Fig. 1—Arc welded marine gear drive, one of many kinds of marine parts constructed for all types of vessels at Farrel-Birmingham Co. Small "C" clamps (right) show method of holding two heavy units together to prevent distortion

Fig. 2—Gear blank subassembly being arc welded on positioner to obtain most efficient welding speed

Fig. 3—Welding gear blank to gear rim. Baffles shown around outside of rim are for confining gas flame heat to rim and prevent spotty hardness if heat was directed on rim alone

Fig. 4 — Complete gear blank assembly being cleaned of all weld scale

cast steel, are now constructed of 0.15 to 0.25 per cent low carbon steel with plate thicknesses ranging from 1 to 1⅝ inches. Multiple pass procedure is used in welding deep-groove joints and single pass on straight fillet joints. When using the multiple pass procedure, slag is removed before depositing successive beads. Shielded arc electrodes for mild steel in 3/16-inch and ¼-inch sizes are used throughout. Current ranges from approximately 150 to 300 amperes for the larger sized rods.

Gear blank subassemblies, such as the one being fabricated in Fig. 2, were also formerly cast before turning to arc welding.

The webs, which are multiple-pass welded to the rim and hub, are of ½-inch to 1-inch mild steel plate. The first pieces, consisting of the hub and three webs separated by ribs, are shown in Fig. 2 being welded downhand on a positioner.

Electrodes for welding the complete subassembly are mild steel rods in sizes up to ¼-inch diameter with the welding machine set at recommended amperage for highest speed work.

The hub and web assembly is then flat positioned inside the rim of the gear and arc welded to the rim as shown in Fig. 3. In this operation the rims are preheated up to 300 degrees Fahr. with a gas ring, the heat being confined to the rim by means of sheet steel baffles shown in Fig. 3. The baffles permit a uniform heating of the rim, thus preventing a spotty hardness that would result if the flame were applied directly on the rim. The rims vary in diameter from 4 to 10 feet, are 20 to 36 inches across the face and have a thickness of from 2½ to 4½ inches.

In Fig. 4 the all-welded rim is being thoroughly cleaned of weld spatter. Sand blasting and air-operated chippers and grinders are used for this purpose.

The extensive use of welding in gear case fabrication is indicated by the large number of welded joints shown in the close-up view of one portion of the unit, Fig. 5. Arc welded pipe outlets, some of which are shown in Fig. 5, range in size from ½ to 4 inches in diameter. The all-welded gear case sections are finish machined on a horizontal planer as shown in Fig. 6.

Another type of marine part that is constructed in record time by means of arc welding is the oil pan assembly shown in Fig. 7. Such parts are made of preformed sheet metal, ¼ to ⅜-inch in thickness. Supporting members, arc welded inside the pan for rigidity, are of ¼-inch by 2-inch rolled steel angle sections, 3 to 12 braces being used depending upon the size of the pan required.

Angle clips being fused to the outside edges of the box, Fig. 7, are for holding the pan rigid for planing.

The three main pieces of sheet metal are fillet welded inside and out to assure strong, leak-proof construction. Mild steel electrodes, ¼-inch in diameter are used, single pass, with current set at approximately 325 amperes.

Increased production of these vital marine parts has been effected by extensive use of materials handling equipment, including welding positioners, and by employing the largest diameter electrodes as recommended in present day welding techniques. Thorough training of operators helped in boosting production.

ORDER NO.	ITEM NO.	PIECE	PIECE
T-802	1A01	LOWER GEAR CASES	(THIS IS SAMPLE ONLY)
MACH. NO.	NO. PCS.	DEPT 89 PRODUCTION ORDER	DWG. NO. D2-8095
	2		CARD NO. OF TRANSFERRED BY

OPER. NO.	WORK STATION	DESCRIPTION OF OPERATION	PREP. UNITS	STD. UNITS EACH
40	FW	Set one case on top of the other with top plates face to face, clamp with 24 C clamps. Weld 18-1/4" x 1" x 2" straps to across joint 1/4" weld. 3/16" FW9.		DW
41	89-93	Mount on manipulator with case #1 on top (two man operation).	5	85
42	"	Weld all welds to top plate and brg. seats complete, flush and 1/4" fillets to case #1 1/4" FW9.	10	1440
43	" (8)	Weld all vertical welds in case #1 includes welds of ribs to side and end plates, 1/4" FW9. These welds can be positioned to weld downhand.		1025

Fig. 5—Close-up of weld of gear case for ship propulsion unit

Fig. 6—Planing operations on welded gear case

Fig. 7—Arc welding hold-down clips on weld fabricated oil pan. Welded cylindrical covers are shown in background

Fig. 8—Sample job card used on all welding procedures in conjunction with work sheet to define each operation

Improved Tubi

THE FABRICATION of parts from tubing is not difficult when proper equipment and experienced men are available, but without these it can be extremely laborious.

Manufacturers who have had to produce assemblies which contain fabricated tubular parts have learned a great deal concerning the type of service offered by concerns that are generally known as tube bending companies. There are a number of these scattered through the metalworking areas, operating independently as job shops; and there are also a number of tube manufacturers which have large fabricating departments as adjuncts to their tube mills.

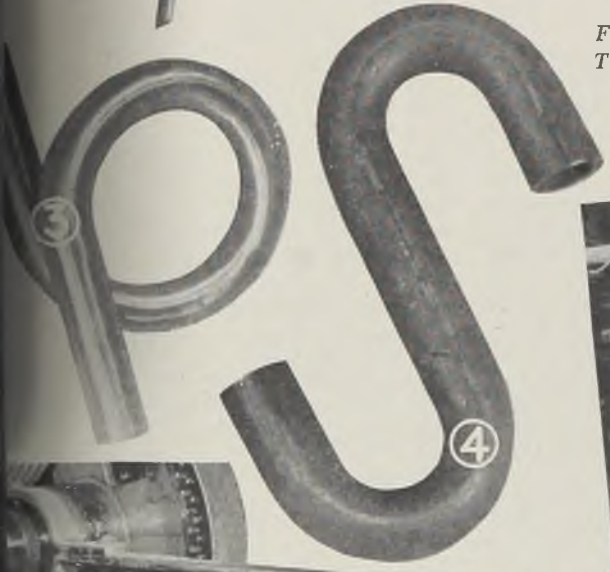
Tube bending is a very simple or a very complex operation depending upon a number of variables. The simpler bends are easily made with conventional tube bending equipment, either hand or power operated. The more difficult ones require more complicated machinery and a thorough knowledge of all factors affecting the operation. The ac-

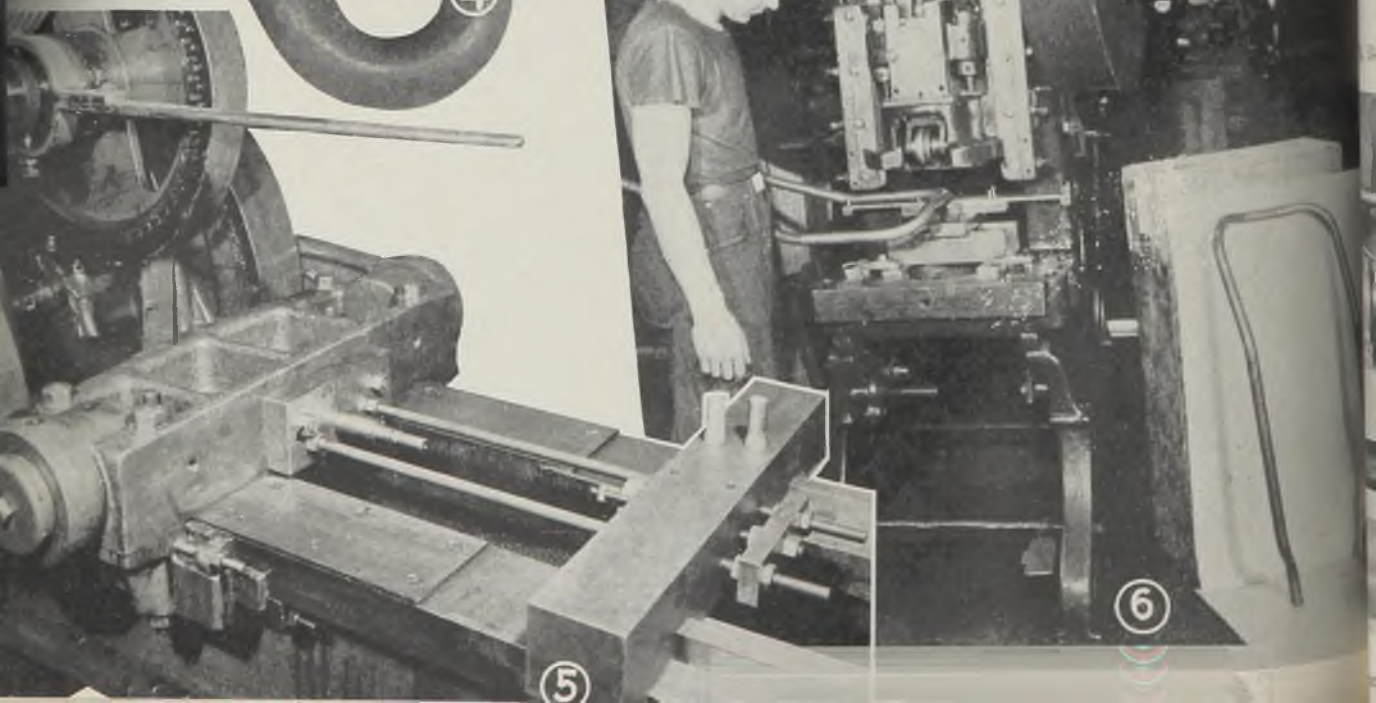
Fig. 1—The table brace has one end bent in spiral form and the other end flattened and slotted. The soldering iron casing is a two-stage reduction which requires four operations

Fig. 2—Bends in small tubing for high pressure steam line

Fig. 3—A typical 360 degree bend

Fig. 4—Two return bends made in a single piece of ¾-inch pipe. This procedure provides extra stock length for gripping in the bending die





Fabrication

companying illustrations clearly show that numerous operations other than bending are commonly required on tubular parts and that in many cases no bending at all is involved in the fabrication.

The design of tubular parts can be greatly improved in many instances, with consequent improvement in production, through proper regard to such factors as the size and grade of tube, the location of bends, and methods of making connections.

The Duer Tube Bending Co., Chicago, is representative of what might be called the tube fabricating industry. The plant is equipped with hydraulic tube benders for making "mandrel bends" and several types of presses, including one deep drawing press, for making "press bends." For cutting to length there are friction saws and roll cutters. A bulldozer serves on jobs needing a long stroke and much power, and a swaging machine does special sizing, tapering and end closing work. A double end burring machine dresses both ends of cut lengths, and a special beading machine makes either single or multiple beads as required.

A completely equipped machine shop prepares special dies and jigs for all of these machines. There is also a welding shop with equipment for gas welding, arc welding and brazing all kinds of tube assemblies. All these facilities are devoted entirely to fabrication of special parts from tubing received in mill lengths.

Fig. 1 shows two common uses of tubing. One of these is a table brace made of ⅝ x 0.065-inch welded steel tubing. After cutting to length and trimming the cut ends, a closure cap is inserted in one end. About 13/16-inch is left straight. Bending starts on a 1-inch radius and finishes on a 3-inch radius, tooling and procedure having been developed to make this spiral bend in a single operation. The opposite end is flattened and slotted by two press operations.

The second part in Fig. 1 is a soldering iron casing, fabricated from ⅞ x

Fig. 5—The bulldozer is useful for operations requiring a long stroke and much pressure, such as reducing a portion of these tube lengths

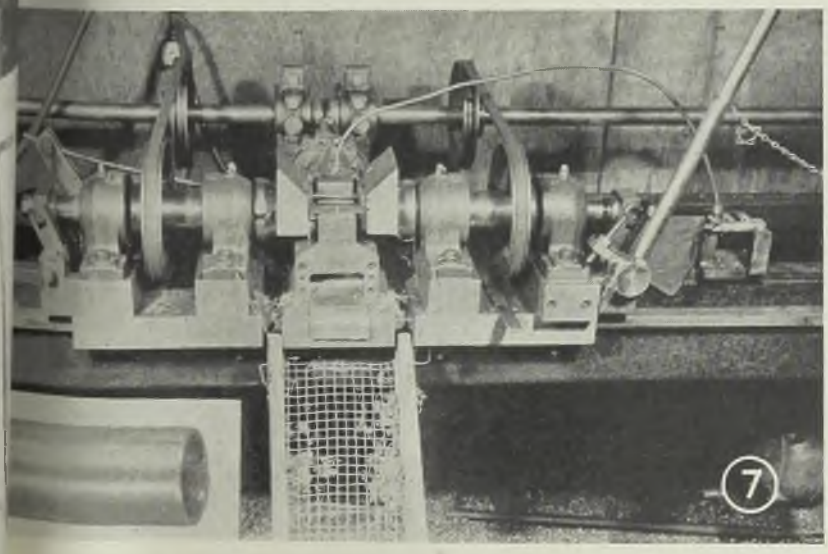
Fig. 6—A deep draw press is used for several special types of bends. The part illustrated contains a number of compound bends

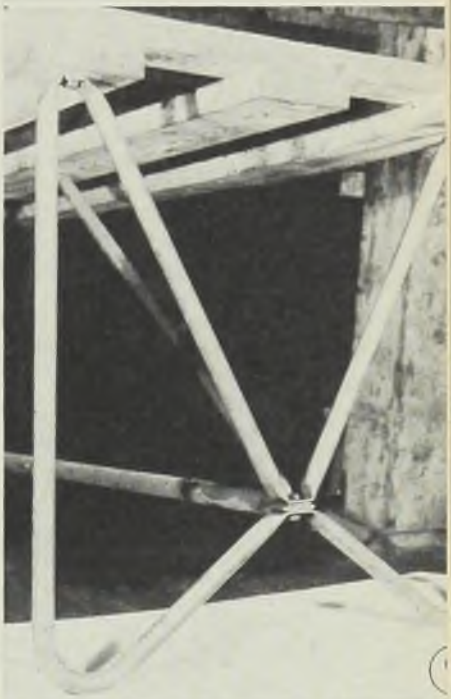
Fig. 7—This machine removes the burr from both ends in one operation and automatically trims the piece accurately to length

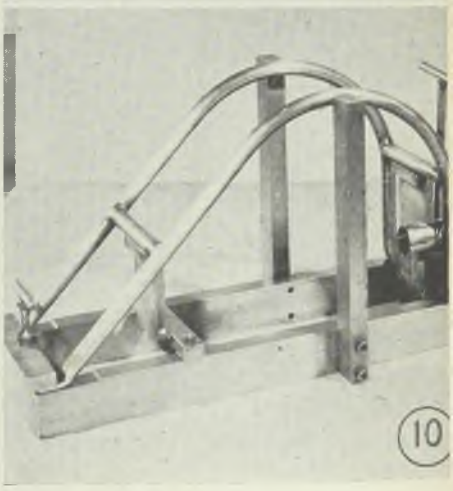
Fig. 8—Original design of end section of mess table frame

Fig. 9—Here the end section is redesigned to dispense with the horizontal bracing member

Fig. 10—Assembly jig used in the manufacture of tubular steel guards







0.049-inch tube. About 3¼ inches remain at ⅞-inch diameter, 2⅜ inches are reduced to ⅝-inch diameter and 4¼ inches are reduced to ½-inch diameter, the job requiring four press operations.

In Fig. 2 are two 90-degree bends made for a high pressure steam coil. The material is ¾ x 0.065-inch welded steel tube, annealed, pickled and pressure tested, mandrel bent on a ⅝-inch inside radius. One piece has ½-inch tangents and the other has 2-inch tangents. Production of these two parts was simplified by bending long lengths as shown in Fig. 11, allowing ⅛-inch for saw cuts. After bending, cutting and trimming, these parts were bored at each end with a special reamer to 0.628—0.630 inch inside diameter.

The order of operations here is worth noting. If the tube had been cut to short lengths before bending, the shorter pieces would have needed to be cut oversize because the ½-inch tangent is insufficient for satisfactory gripping in the bender, and a considerable waste in labor and material would have been involved in cropping the excess length.

Fig. 3 is a 360-degree bend on 1¼-inch inside radius, made in one operation. Tube is ¾ x 0.035-inch. It is good economy to tool up to make bends of this type in a single pass when a reasonably large quantity is involved.

A somewhat unusual job was the production of return bends without tangents, using ¾-inch standard pipe and bending on ¾-inch inside radius, mandrel bends being specified. Fig. 4 shows how two bends were made on one length of pipe, the straight portions being subsequently cropped.

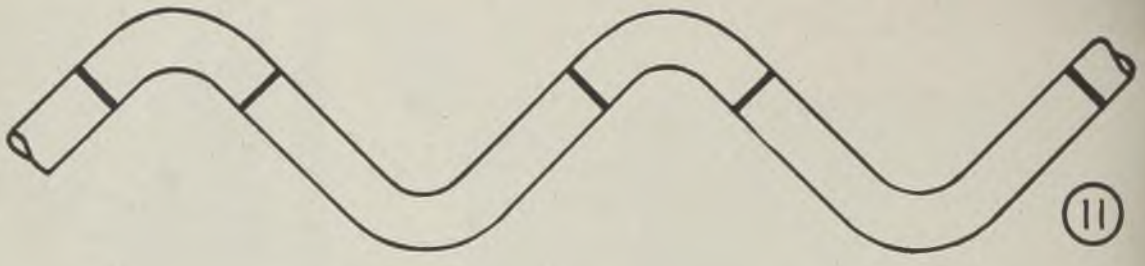
Ordinarily the customer of the independent tube fabricating shop furnishes the tube material. Fig. 5, however, shows a little job that was done with material from the scrap pile. A small quantity of short lengths of stainless steel tube with one end expanded was required but it was impossible to get delivery on the tubing. This production problem was solved by utilizing some cropped ends of stainless steel tubing of larger size which happened to be on hand as scrap from a previous job. Instead of expanding, the bulldozer was tooled to reduce the larger tube to the needed diameter; and that after all, is probably the more desirable way to produce the part from this material.

Fig. 8 shows a job involving larger pieces of tubing. As first designed the end section of the tubular framework for these mess tables contained a horizontal member welded to the two legs of the vertical U as in Fig. 8. It was pointed out to the customer that this horizontal piece could be dispensed with and all welding eliminated by simply making the end section as in Fig. 9. The saving of material and labor is typical of what can be accomplished by inviting the experienced tube fabricator to participate in the development of design.

One example is shown in the fabricated assembly, Fig. 10. This is a guard made of ⅝ x 0.065-inch welded steel tube. The sequence of operations is: Bend side tubes; flatten ends; punch bolt holes and trim; bend flats; mill out side edges of flats (right and left); cut and burr large tube (1¼ x 0.035-inch); punch slot 3/32-inch wide by ¾-inch long both sides; pierce 3/16-inch holes; cut, burr and notch cross tubes; set in jig and weld. The simple but highly efficient jig shown here is of a type that can be adapted for assembly of many tube structures.

Tubular construction is steadily growing in favor, yet there are some who hesitate to adopt it because they do not know how. Familiarity with both the machines and the material enables the experienced fabricator to turn out much higher production on even the simplest operations than is usually obtained with less experienced help. When the fabrication of a part involves several bends or several different operations, the availability of a wide range of machines and tools, plus the knowledge of production short cuts, have a more important effect on fabrication cost.

Fig. 11—Cutting layout for bends in Fig. 2



Machinery's Handbook In Its Twelfth Edition

Machinery's Handbook, by Erik Oberg and F. D. Jones; fabrikoid, 1815 pages 4½ x 7 inches; published by Industrial Press, 148 Lafayette street, New York, for $6.

The twelfth edition of this manual, which first was published in 1914, contains many additions and revisions from the prior issue in the effort to keep it abreast of changing conditions. These changes are many and affect almost every chapter. A few are as follows: Planetary gear designing charts with formulas for finding ratio and direction of driven gear rotation; class 5 screw thread fit for threaded steel studs, as approved for federal services by the government; standard grinding wheel markings adopted by the Grinding Wheel Manufacturers' standard gage for sheet steel, now used in place of the original U. S. standard gage; thickness tolerances adopted by sheet steel manufacturers for hot and cold-rolled sheets; American standard pipe threads, 1942 revision; revisions in SAE steels, including both old and revised composition numbers.

Band Brake Replaces Worn Locking Device

When the locking device originally built into the rotary table of a large drilling, boring, and milling machine at General Electric Co.'s Schenectady Works became worn and would no longer hold, a pneumatic brake with remote control was devised by a machinist. The brake consists of a leather-lined metal band placed around the base of the revolving table. One end is bolted to the frame beneath the table while the movable end is attached to the same frame through a lever. An air cylinder with its plunger pressing against this lever furnishes the necessary movement to actuate the brake.

Air lines are run to a three-way air valve at the control station, enabling the operator to make all necessary adjustments for revolving and locking the table and starting the drill from one point. Reversing the flow of air retracts the plunger and releases the brake.

Stop-Off Paint Available

A stop-off paint for selective carburization on steel parts in liquid carburizing baths has been developed by the Parker Chemical Co., Detroit and is now being marketed under the trade name No-Kase.

This new compound, the company states, provides positive protection from carburization on such difficult sections as threaded edges.

Applied as a paint, material is easily confined to the area where protection is desired and within an hour is sufficiently dry for immersion in the carburizing bath.

The heat of the bath burns out the vehicle of this product and leaves the pigment as a continuous metallic coating. Any of the coating remaining after carburizing and quenching is easily removed by wire brushing. Patent applications have been filed covering the compound.

Telechron Electric Timekeeper, Warren Telechron Co., Ashland, Mass.

The inside story of a clock

In the manufacture of this pre-war Timekeeper, many individual parts are made from brass. For example, the rotor units are produced from Free Cutting Brass Rod in an interesting high speed automatic operation which, using a five-turret lathe, counterbores, spots, drills, reams, forms and cuts off an endless stream of finished caps.

Revere Brass is used widely in the manufacture of watch and clock parts and in a wide variety of chronological and recording instruments such as fire alarm systems, telegraph mechanisms, ship chronometers, watchman call boxes, and the like.

In this particular manufacturing field, Revere offers a variety of tested materials such as Sheet, Strip and Roll Brass. Also Free Cutting Brass Rod in all standard sizes and shapes. Brass Sheet Stock is offered in various widths, gauges, lengths and tempers, in an infinite variety of combinations depending upon the alloy and characteristics required. Special finishes are available for many alloys and products.

• • •

While primarily engaged in supplying Sheet, Strip, Rod, Bar, Tube and other mill products, Revere is also prepared to furnish a considerable number of fabricated semi-finished materials and parts not only in copper and copper base alloys, but also in magnesium and aluminum. Its intricate die-pressed aluminum forgings, especially as utilized by the aviation industry, are a case in point. If you have unusual technical problems involving the use of any Revere products, we shall gladly give you the benefit of our knowledge. Address Executive Offices. No obligation, of course.

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ALUMINUM FORGING PRACTICE

THE Aluminum Committee of the SAE War Engineering Board was established as a clearing house to study the four phases of forging aluminum: Die design, metallurgical problems, inspection of raw materials, standardization of test pieces. In the judgment of the subcommittees, the Aluminum Committee and the SAE War Engineering Board, the following recommendations represent best practice:

Aluminum Die Design — The precautions to be taken in the design of dies for aluminum alloy forgings are to reduce or eliminate blisters on forgings; to increase die life. Blisters on aluminum alloy forgings may result from over heating in the solution heat-treat process, improper atmosphere in the heat-treating furnace, defects in bar stock, improperly designed dies, or by improper forging technique.

It has been found that troubles encountered in the earlier part of last year with blisters on aluminum alloy forgings has to a large extent been cleared up. Due to improved manufacturing technique, extruded material is no more subject to blistering than is rolled stock.

In an earlier report it was stated that blisters could result from frictional heat generated by the improper working of the material. These can usually be eliminated by adding fullers to the dies, using lighter blows, by the proper use of the correct die lubricant and by insisting that the die faces be given the proper finish.

In the design of dies for aluminum alloy hammer forgings, fundamentals to be adhered to include: Putting the finishing impression as near the center of the die as possible; cutting the impression so that the metal flow of the forging would be at right angle to the grain flow of the die block material; equally proportioning the amount of work done in the various impressions, so that the wear would be distributed properly and leaving ample edge distance.

Of the many factors directly affecting die life, the following seem to be the most important: The use of the proper kind of steel; the hardness of the die; preheating the die before use; properly soaking the forging billet; the manner of finishing the working surfaces of the die; the thicknesses of the flash; design.

Dies for hammer forgings are usually purchased in the heat-treated condition. The hardness will vary with the type of work being done. There seems to be a direct relationship between the depth of impression and the hardness of the die. On forgings having wide, thin webs, the best results may be expected with a shore hardness of 55 to 60. Average forging die should be from 48 to 51 shore. Large dies, especially those with deep impressions, were found to work most satisfactorily at shore hardnesses from 43 to 48. Press dies are usually finished at 55 to 60. However, some particular jobs can be heat treated to 65 with good results. In some cases, die life may be increased by stress relief after periods of use.

Dies can be seriously injured and their life shortened by improper handling in the shop. All dies should be preheated slowly and uniformly to a temperature of 250 to 400 degrees Fahr. before making forgings. *Use of cold dies is probably one of the greatest causes of die breakage.* The first 50 to 100 blows should be taken lightly.

The aluminum forging stock must be heated uniformly throughout the cross section for longest die life. Working cold material in dies causes excessive wear and early failure and will also result in erratic physical properties in the forging.

Finish on dies is an important factor in die life. All dies must show a surface smoothness characteristic of the best forging die practice. This bears no reference either to profilometer readings or other surface measuring devices or to any characteristic of flatness or contour. *No angularly irregular surfaces must be present.*

Polishing marks must follow the direction of metal flow. Irregularly oriented marks, whorls on the die surfaces, and the like, must be avoided.

The thickness of the flash must be such as not to restrict the flow of metal. Thin flashings are more readily and economically trimmed. Flashings of about 0.040-inch give best die life.

Most common types of die failures are cracks which may result from explosion of the lubricant in the corners and angles of the impression, or may be the result of a continued over-stress of the steel at these locations during the forging operation.

The human element, of course, is not to be ignored. Willful misuse and mishandling of dies, such as misaligning them in the machine, striking them too hard, subjecting them to extremes temperature, improperly applying lubricant—all have a direct and heavy bearing on die life.

On the basis of replies to questionnaires sent to a number of manufacturers, the following recommendations are made regarding lubricants for aluminum forging:

—Use high viscosity oil combined with low viscosity oil in such proportions that it has highest friction reducing properties the highest film strength (with the least amount of oil and graphite deposited on the die surface) and nonexplosive.

—The high viscosity oil may be of a mineral, animal or vegetable base. The viscosity or body of the oil may vary in consistency for the particular part being forged. The low viscosity oil may be any solvent that will have a thinning action on the heavier oil, allowing it to spread more easily over the die surface.

—A typical mixture is 50 per cent lard oil plus 50 per cent distillate. Sometimes a small amount of graphite is added. Many other lubricants are used such as pale mineral oil, lard oil, peanut oil, castor oil, graphited oil and many others including mixtures of the above.

—The high viscosity oil is the actual lubricant and graphite in small proportions is frequently added to help reduce friction.

—The low viscosity oil thins the combination to enable it to spread the lubricant, volatilizing and allowing a thin film to remain on the die surface without flowing into deep pockets.

The lubricant may be applied by spray, swab or air blast. If graphite is used in a spray, it must be sufficiently agitated to prevent the nozzle from plugging.

Metallurgical Problems — The use of extruded aluminum alloy bars for forging stock. In the general forging and forging stock suppliers meeting, held in Washington, Sept. 14, 1942, under the chairmanship of A. H. Bunker of WPB, the use of extruded aluminum alloy bars for forging stock was seriously questioned. Subsequently, at a meeting of the WPB Forging Stock Committee all of the forging stock representatives present agreed, that with proper control satisfactory forging stock can be manufactured by either the rolling or extrusion processes. *Since then, objections to the use of extruded stock have continued to occur so that its use has not been as extensive as it could have been otherwise.*

Inasmuch as the recent serious shortage of aluminum alloy forging stock required the fullest possible use of extruded stock, the Metallurgical Problems Subcommittee did undertake a study of the problem. The subcommittee unanimously agreed on the following conclusion:

—All evidence with which the members of the subcommittee were cognizant indicates that today forgings made from

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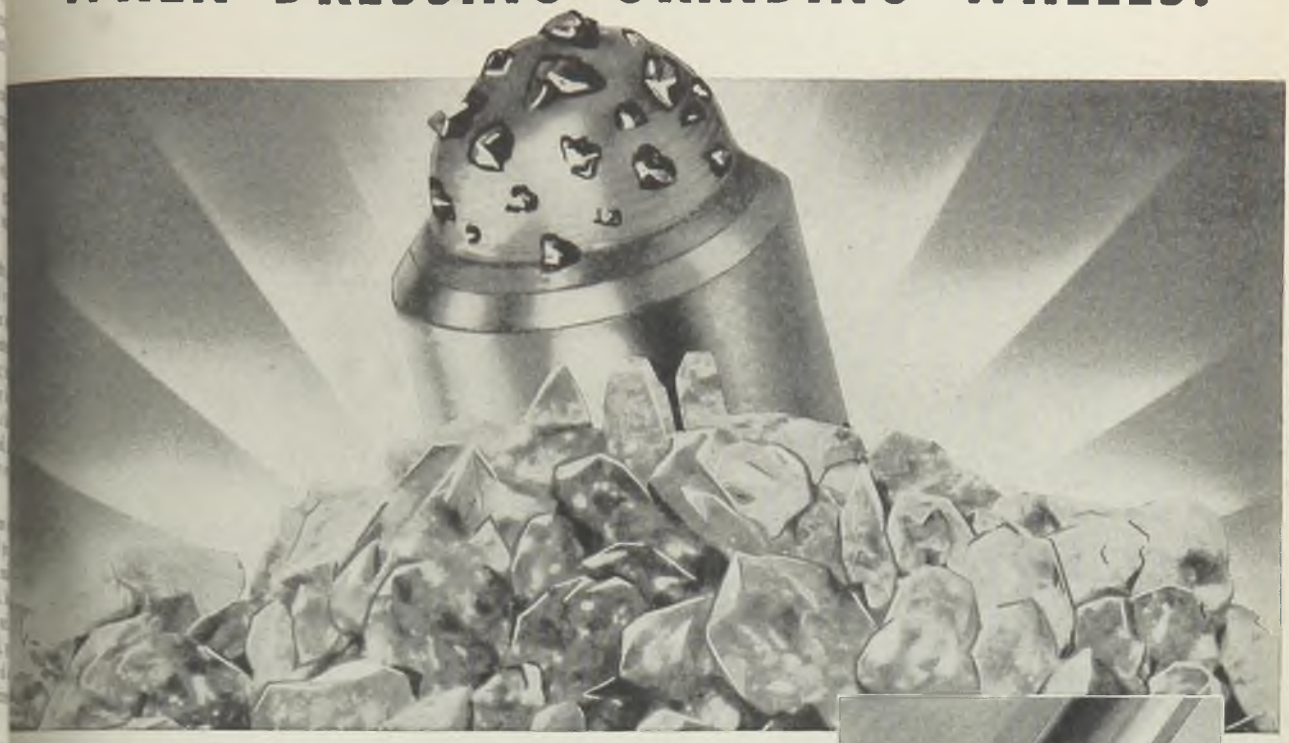

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currently manufactured extruded stock are no more subject to blistering than forgings made from rolled stock.

—No definite proof could be found to substantiate the criticism that excessive cracking occurs in the coarse grain region or at the interface between coarse and normal sized grains during forging operations on currently manufactured extruded stock.

—No definite proof could be found that excessive cracking occurs in the coarse grain regions on forgings made from currently manufactured extruded stock during the solution heat treatment and quenching operations. If, at any time in the future, such evidence should be presented, the subject will be further investigated.

—On the basis of all available evidence, the presence of a band of coarse grains on the surface of heat-treated extruded stock or on the surface of finished heat-treated forgings is not objectionable, provided the grains do not show separation. Should evidence to the contrary be presented, the subject will be further investigated.

All objections to the use of extruded forging stock were based on the following three criticisms: Excessive blistering of forgings during solution heat treatment; excessive cracking of the stock in the coarse grain region or at the interface between coarse and normal sized grains during forging operations; excessive cracking of the forgings in the coarse grain region during the solution heat treatment and quenching operations.

A number of samples were exhibited, but none of the samples had a direct bearing on the questions at issue. Either the samples were illustrative of old material, which was probably produced prior to the general meeting of Forgers and Forging Stock Producers, September, 1942, or the defects involved could not be attributed to the extrusion processes.

In view of a lack of positive evidence that cracking problems do exist, the subcommittee was inclined to believe that all three criticisms were based on experiences prior to the general meeting September, 1942, and on samples presented at that meeting. The subcommittee's discussions also led to the belief that many of the defective samples exhibited at the September meeting were the results of inexperience on the part of the forgers as well as of defective stock. The disappearance of the difficulties with extruded stock since September, was generally attributed to an improvement in the stock itself and to an improvement in the forging and heat treating techniques employed.

Effects Of Chemical Composition: It was desired to make recommendations, if possible, for composition control to insure minimum specification values for tensile and hardness properties in finished 14S-T forgings made from extruded forging stock.

The subcommittee concluded that entirely satisfactory physical properties can be obtained in properly heat treated and artificially aged forgings made from extruded 14S stock by employing a nominal silicon content of 0.90 per cent in 14S of nominal composition with impurities controlled according to Federal Specification QQ-A-367b and analyzing 0.90 per cent silicon, 4.40 copper, 0.50 manganese, 0.40 magnesium.

The Aluminum Co. of America, Bohn Aluminum & Brass Corp., Extruded Metals Defense Corp., and Reynolds Metals Co. have agreed to control the chemical composition of their 14S forging stock, both rolled and extruded, in accordance with the above recommendations.

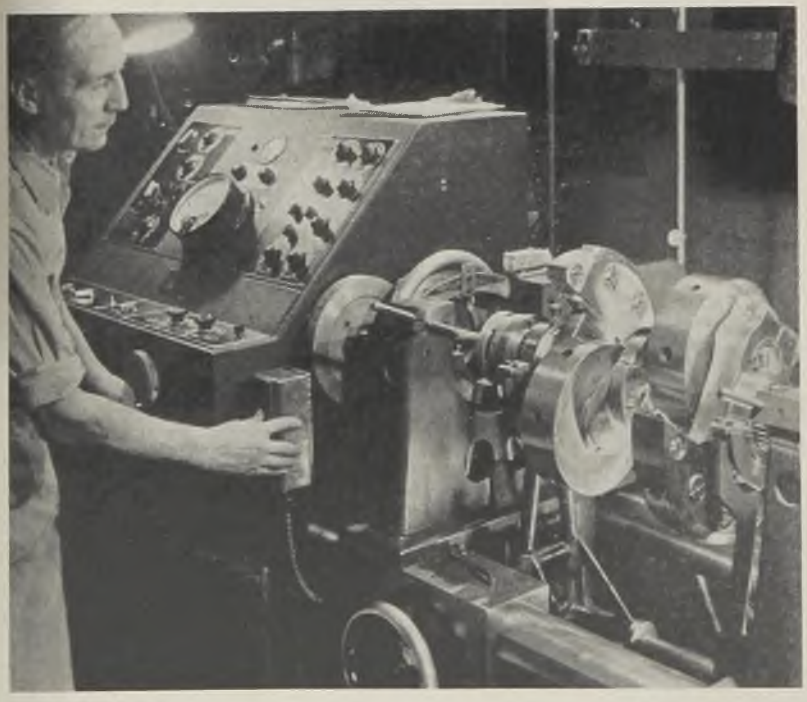
When 14S, as well as a number of other aluminum alloys, is fabricated by the extrusion and rolling processes, two different grain structures are obtained. The characteristic grain structure of extruded 14S forging stock is only partially modified by thermal treatment so that abnormally high mechanical properties result in extruded stock after the solution and artificial aging heat treatments. Normal forging operations cause more recrystallization to occur during the solution heat treatment; and for this reason, lower tensile and yield strengths, as well as greater elongations, are secured in the finished, heat treated and artificially aged forgings than are secured in the as-extruded material similarly heat treated and artificially aged.

Final yield and tensile values in the finished 14S-T forgings progressively decrease with increasing amounts of forging until the amount of recrystallization is such that the mechanical properties approach those obtained on as-rolled, heat treated and artificially aged stock. With comparable chemical compositions and comparable conditions of heat treatment and artificial aging, tensile and yield strengths of finished 14S-T forgings made from extruded stock are approximately equal to, or greater than, similar forgings made from rolled stock, depending on the amount of forging.

Experimental data from several sources showed that very satisfactory physical properties can be consistently secured in material forged from normal 14S extruded stock by maintaining a sufficient silicon content. In cases where 14S-T forgings failed to meet required tensile strength, the silicon contents were relatively low. The subcommittee, therefore, concluded that an increase in the current nominal silicon contents of 14S is desirable and agreed to recommend a nominal figure of 0.90 per cent.

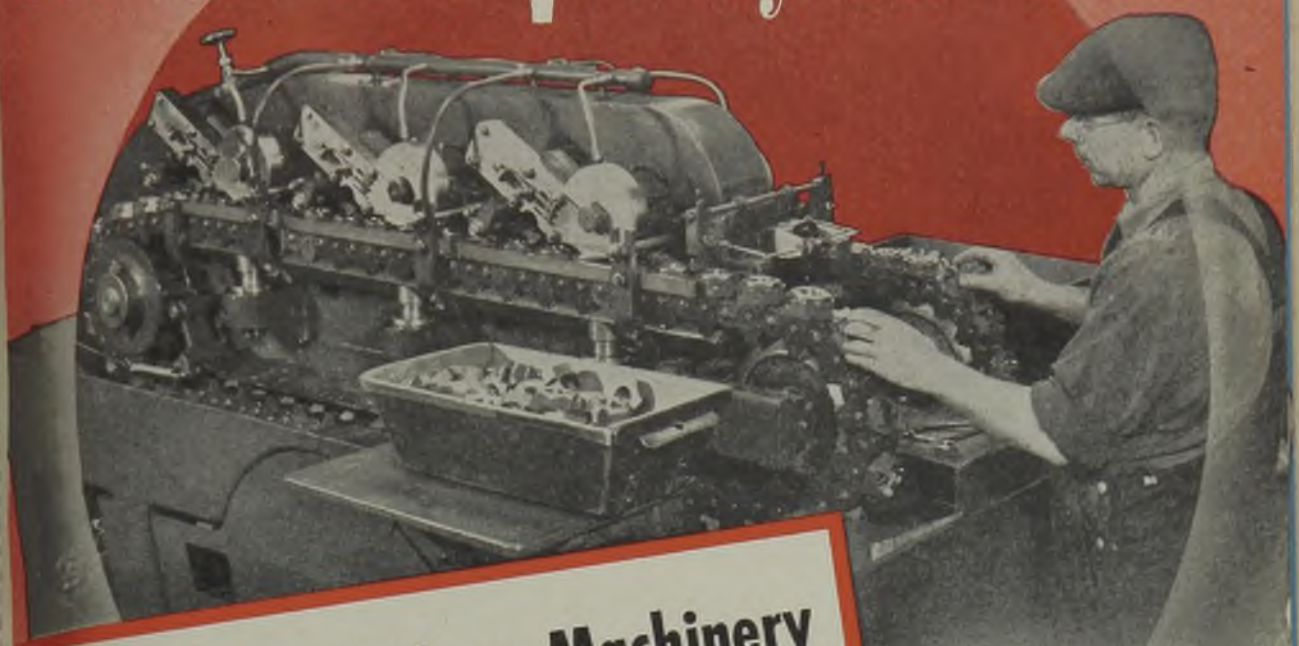
Inspection of Raw Materials: Most manufacturers of aluminum alloy forgings have their own method of checking and inspecting raw material to assure good results in subsequent operations. A procedure for inspection that has proved satisfactory in practice and is recommended by this subcommittee is outlined here.

Since any method of inspection is limited by the facilities of the user, and must be adapted to his particular prob-



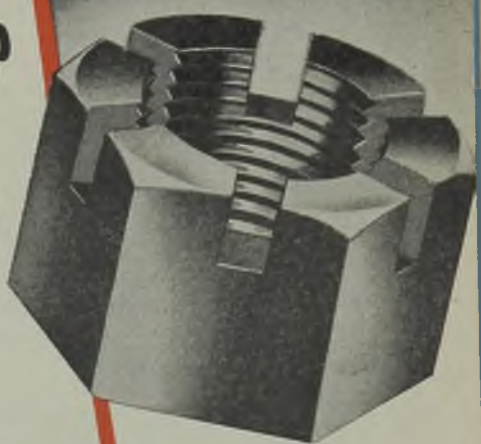
DYNETRIC BALANCING MACHINE: A high degree of dynamic balance is assured on Cyclone engine crankshafts at the Wright Aircraft Corp., through the use of the Gisholt Dynetric balancing machine. Unbalance is transmitted through an electrical network and electronic amplifier to recording instruments. Developed by Westinghouse, this electric equipment determines the exact amount of even the slightest degree of unbalance of a rotating crankshaft. Too, it shows the precise point at which the correction should be made

Partners for Victory...and After...



The Most Modern Machinery ...and Veteran Craftsmanship

This specially designed Automatic Slotter—one of only two of its kind in the world—is just three months old. Joe Rudo, its operator, has been with the Detroit Nut Company for over 20 years. The partnership between the veteran worker and the modern precision machine is of two-fold importance. Today, it is helping to speed victory. Tomorrow, the swifter availability of Detroit Nut Company's products will help cut the timetable of the changeover to the fuller, richer life that American mechanical ingenuity has already blue-printed for a world at peace again.



The machine pictured above slots up to 1,000 hexagon nuts (from 1-7/16" to 2-3/8" across flats) every hour . . . three times the production speed of older methods.

MANUFACTURERS—MILLED FROM BAR HEXAGON SEMI-FINISHED NUTS OF STEEL, BRASS, BRONZE AND SPECIAL MATERIALS

DETROIT NUT COMPANY

HUBBARD AVE. & M. C. R. R.
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REPRESENTED IN ALL PRINCIPAL CITIES

lems, the suggested procedure must of necessity be general in nature. The following outline is presented with these conditions in mind and for convenience is divided into four steps: Chemistry, physical properties after heat treatment, surface defects and internal defects.

Chemistry: For checking the chemistry of a shipment of bar stock, one test may be taken from every 10,000 pounds or less of each alloy and size in every carload. Samples are taken from bars selected at random, and the analysis may be made by any approved method.

Physical Properties After Heat Treatment: To determine if the raw material responds to heat treatment, one sample may be taken from every 10,000 pounds or less for each size and alloy in every carload. These test pieces are taken at the same time and by the same method as the chemistry samples. The test pieces are then forged or drawn to test bar size by methods to be recommended by the SAE-WEB Aluminum Committee on Test Bars.

Surface Defects: Bar stock as received is inspected for surface defects, such as rolling seams, laps, abrasions, etc., either before or after cutting into forging slugs, whichever is more convenient. Most surface defects, with the exception of rolling seams, are easily detected by visual inspection, and can be repaired by grinding or filing. Rolling seams present a more difficult problem, since their outward appearance is no indication of their depth. When the material is cut by shearing, however, the seams frequently open up, and examination of the sheared ends reveals the depth. If the forging slugs are cut by methods other than shearing it may be necessary to etch after repairing to determine if the seams have been completely removed.

Small forgings that are blocked and finished in the same die without a clean-up between operations are more subject to damage from surface defects than larger forgings that are cleaned up between blocking and finishing. Inspection of a few forgings from the hammer or press when starting a new job will quickly establish just how much repairing is necessary to produce clean forgings. After a little experience the inspector can tell immediately upon examination if removal of a surface defect is necessary.

Internal Defects: These are usually more prevalent in large diameter stock and may be cracks or ingot defects. Porosity, pipe and inclusions are less common but may ocasionally be encountered. While defects of this nature are not usually apparent on the sheared or sawed face of the bar, they can be revealed by facing a thin disk of the bar stock by milling or machining, then polishing and etching in any suitable etchant, such as 10 per cent caustic soda, followed by a rinse and nitric acid bath to remove stains. If any question still exists as to soundness, a few slugs preheated to the usual forging temperature and drawn out on flat dies will decide the question.

Rejections: Since defects do not occur in every bar of a shipment, and a single bar is rarely defective throughout, it is common practice to reject only the defective portion of the material. The individual needs of the user will determine what percentage of defective material is cause for rejection of the entire amount.

"Personal Hardware"

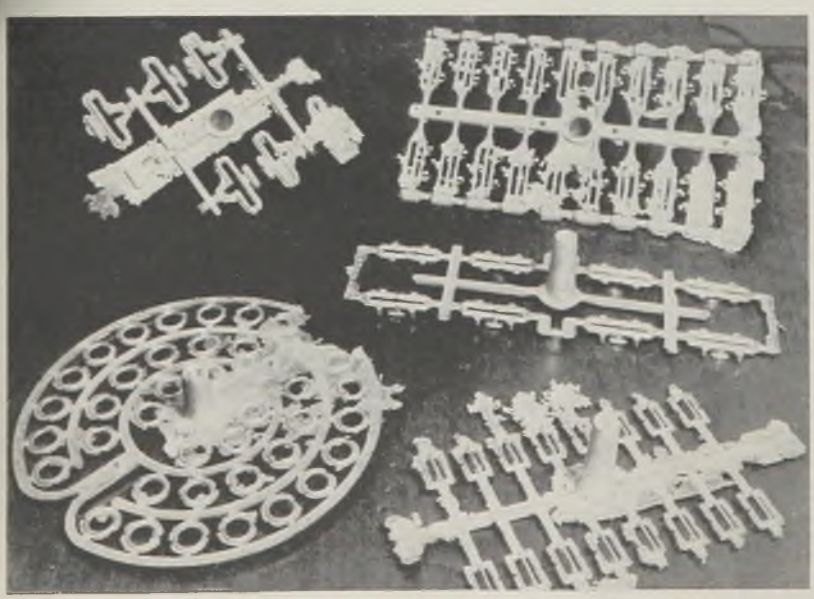
. . . . produced rapidly by die casting

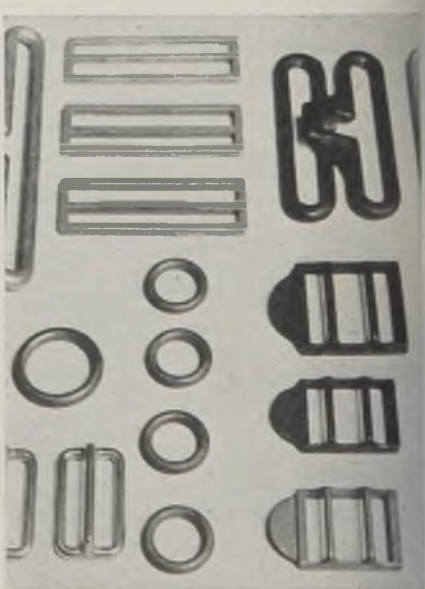
TYPICAL of the way small parts are being produced by die casting in zinc alloy, many of them in million lots, are the "personal hardware" items for the armed forces. Those shown in these illustrations are largely belt clasps and slides, while the rings are for tent applications. The die castings are produced with great rapidity and most of them in shapes which cannot be duplicated otherwise at so low a cost. The die castings are all in one piece, formed by the die in a single operation, and can be given any of numerous finishes.

Fig. 1, left, shows six gates of parts as they come from the die. As will be seen, from 8 to 38 castings are produced in one shot of the machine. (Two castings have been broken from the gate in upper left corner.) Fig. 2 shows typical items ready for use.

The flash is removed rapidly by trim dies in a punch press. Though some subsequent tumbling may be needed to give the required smoothness of surface where the flash is sheared, this is a rapid and inexpensive process, in which thousands of castings are handled at one time. Products shown are made by Rupert Die Casting Corp., Kansas City, Mo.

The method of gating is clearly shown. Some of the gates include overflow wells. These are employed, when needed, to insure sound castings of excellent surface smoothness. The zinc alloy used has a tensile strength in excess of 45,000 pounds per square inch and is unusually high in ductility and in impact resistance, especially for a cast material.





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K3H

Rockwell 91.8 A—Harder than KM but not as strong. K3H, the most crater resistant grade, is recommended for finishing or moderate cuts on carbon and alloy steels .30% carbon and above, and also for general use on soft steels containing less than .30% carbon. Used widely for milling of steels.

K4H

Rockwell 92.3 A—More resistant to edge wear than K3H but not as crater resitant. For precision boring and light finishing cuts on all steels. Very good for tools requiring large nose radius or where tool must dwell without cutting. Used widely for milling and extremely rough cutting of non-ferrous and non-metallic materials.

K2S

Rockwell 91.5 A—A strong grade better able to withstand abrasion and sand inclusions than KM, but not as crater resistant. For roughing steel castings and for very rough cuts on cast iron.

K6

Rockwell 92.1 A—A straight Tungsten Carbide grade, more abrasion resistant than K4H, but with less impact resistance. For general use on cast iron, non-ferrous and non-metallics.

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AN ENGINEERING APPROACH TO THE SELECTION, EVALUATION AND SPECIFICATION OF

METALLIC MATERIALS

In the tenth installment of his report for the War Metallurgy Committee, Doctor Gillett discusses testing of parts under simulated service conditions and machinability as a processing requirement in selecting materials. In previous installments, Doctor Gillett discussed many phases of his subject, including other test methods. He pointed out also that chemical composition alone is not a sufficient criterion in evaluating materials

By H. W. GILLETT

General Principles of Special, Simulated Service, Testing

SIMULATED service tests of the particular part being studied are much cheaper to operate and give more direct and reliable results than do service tests outside the laboratory in which control of variables is less precise, obtaining correct records is more difficult, and in which trouble with some part not being studied, is likely to delay and to obscure the results. When trying to test an engine bearing to destruction in an actual engine, it is common to find that failure of some other part, pistons for example, occurs often enough to make that approach very time-consuming.

Dissecting the machine down to the part to be studied, rigging up to duplicate service loading on the service conditions of that part and running it under close observation, greatly simplifies the testing task. Sometimes a scale model will do as well if account is taken of metallurgical size effects.

In such cases as wear testing or corrosion testing, a simulated service test method must be checked for consistency of results in different tests on specimens of the same uniform material. Until it has been redesigned and adjusted to give consistent results on one material, it is of no use in differentiating among materials. The next step is to use it on a series of three or more materials whose relative behavior in that type of service is known or is obvious. The equipment and method of operation must be such that these are put in their proper order. In that case, the equipment will probably be useful in appraising new materials. At least, it should exclude from further consideration those materials that are definitely unfitted to withstand the conditions of service that have been listed and incorporated in the simulated service tester. Since the engineer is not always wise enough to have spotted all the important conditions of service, it remains to corroborate the test indications by actual service.

Gears offer a fine example of the value of the simulated service method of approach. The early engineering approach to the metallurgy of gear steels assumed that the primary cause of failure was impact, and great stress was laid on core toughness in the carburized piece.

Almen and Boegehold[105] have recounted how, by taking the rear axle alone, and putting it through its paces in the laboratory, it was successfully shown that repeated stress rather than impact was responsible, yet that steels did not necessarily behave in gears as their behavior in polished fatigue or even in notched fatigue tests would imply. They finally came to the conclusion that it was the stresses, largely governed by the rigidity of the assembly, i.e., the tooth contact, that counted most, and that when the assembly was engineered with these factors in view, any one of many steel compositions could be used. Distortion in heat treatment was considered the only important metallurgical factor involved. Incidentally, this was before the days of modern hardenability testing, and the indication now is that steels of equal and complete hardenability should equally resist distortion during heat treatment.

Some of the comments in the discussion of this paper may well be quoted for their application to present day problems of steel substitution. "There is no evidence that one alloy steel is better than another for rear axle gear application"; "the notched bar impact test has very little engineering value"; "mechanical conditions have a dominant effect on gear life. That there is very little difference in the alloys from which gears are made can be deduced without tests from the fact that many alloys and many heat treatments are in everyday use in production, all presumably giving satisfactory service." "It is probable that in the majority of machine elements the alloy used is relatively unimportant as compared to mechanical conditions producing stress concentrations, cheaper steels can be used for many parts now made from the more expensive alloys". In this problem "the fatigue program properly carried out leads to a solution whereas the impact problem would be meaningless, or worse, in that it could give misleading results".

Almen has recently[108] reiterated the finding that "industry has paid premium prices for alloy steels because of their fancied advantages when used as gears and in other parts. Fatigue tests on actual machine parts correlated with service records have shown that there is no detectable difference between the high priced alloy steels and many of the low priced alloy steels when used in many machine elements." He goes on to say that any real differences in fatigue characteristics are "so small in comparison with the mechanical fatigue hazards introduced by the design and fabrication of the machine part as to be negligible".

The famous "four-square" running-to-destruction test for full-scale rear axles employed in the Chrysler laboratory has led to conclusions about rigidity, etc., corroborating Almen's findings, and emphasizing the importance of tooth contact and the tooth finish.

Analogous work of Widrig and of Wood and Saunders has been mentioned in another connection (References 31 and 32).

A case where traditional laboratory tests for mechanical properties, and foundry tests for behavior in casting indicated a "candidate substitute" to deserve election but where the indications were incorrect, is cited by Young and Haniuk[106]. The question was whether the nickel content of aluminum alloy AMS 4220 for cast cylinder heads could be substituted by iron. As they put it, the laboratory and foundry tests said, "yes", but the engine said, "no", for every head cracked on experimental running. This does not mean that a test might not be devised that would differentiate without the test of actual service, it means that some property was involved not measured by the conventional tests that were employed. However, it was doubtless simpler, as well as more convincing, to make the engine test than to cast about for some other test that would measure the pertinent property. You are not sure, in a case like this, whether you have selected the

ight test conditions to correlate with ervice, without a final service test.

CHAPTER VII
Ability to be Processed

Processing by Present Methods

The design engineer is directly concerned with the properties of the finished part, and his specifications must be so written that the desired properties are, and the necessary quality is, secured. It is equally necessary that the material be so chosen that processing from the raw material to the finished part is feasible, and quantity production secured.

Foremost among the processing requirements comes machinability. The prosaic limitations set by the rate at which the machine shop can turn out parts hold the designer down to moderate strength levels when he might otherwise use much stronger materials and cut his strength/weight ratios. Machinability must be considered when the designer picks a material, even though, with modern tool materials, modern machine shop methods, and the adaptation of grinding to rapid production, the old limits have been vastly extended upward. Even in so important a material as armor plate for tanks, it is good sense to keep the hardness down to where it can just be reasonably well machined, and get a lot of good tanks rather than to push the hardness up to where the armor might be a trace better, but the production of tanks would be small, because of the machine shop bottleneck.

That machinability holds the strength of many parts down to a mediocre level, on the basis of static strength, is not altogether unfortunate, since, in notched fatigue, as Fig. 22, brings out, the high static strength is illusory. Extreme care is necessary to avoid stress-raisers in steels of difficult machinability that are to be employed under repeated stress.

Machinability is one function of the structure of steel and the structure is, in the ordinary steels that can be considered as alternates, determined by the heat treatment, not the composition.

Machinability

What was unmachinable yesterday is machinable today, due to improvements in tool materials, machine tools and machine shop technique, and the range of grindable materials has likewise been greatly increased by improvements in the technique of grinding. Cost saving and increased production are such determining factors that ease of machining is a most important attribute in a metallic material of construction.

It is not difficult to accept that general statement, but defining "ease of machining" is difficult, because it means different things to different people. One may appraise it on the basis of energy required to remove a given weight of chips, another on the basis of tool wear, and another on the basis of the smoothness of finish. Whatever the basis, different materials or different structures produced in steel by heat treatment are not necessarily in the same order for different machining operations, such as turning, milling, broaching, etc.[108]

Truly precise and quantitative evaluation of fine-haired differences in machinability may be very time consuming and costly. Proving the value of a particular composition or heat treatment for a new high speed tool steel or the evaluation of a new cemented carbide tool may demand making tons of chips under the most carefully controlled conditions. Fortunately, useful information on the machinability of materials to be cut, is not as difficult or costly.

Testing for ability of a tool to retain cutting power involves using a standard material to be cut, whose resistance to cutting is the same in all tests. The design engineer is not much concerned with such tests, but the ability of a material to be cut does enter into his choice of material so he is concerned with the type of testing in which the tool is the constant factor.

However, since a tool becomes progressively dulled during a test, it is necessary to cancel out that factor by periodically evaluating the condition of the tool through its performance, at that stage of dulling, on some standard reference material.

For comparison of very easily machined materials cold drawn SAE 1112 Bessemer screw stock is usually taken as the base line reference material, and its machinability rated at 100 per cent. Annealed SAE 1340 with a rating of about 50 per cent in comparison with 1112 might serve as another base. Annealed 1 per cent carbon unalloyed tool steel is taken as 100 per cent for some comparisons.

When nonferrous alloys are compared, free cutting brass, 62 copper, 34½ zinc, 3½ lead, is often taken as the base line.

After selecting as a base line, some standard material, of which a goodly quantity of high uniformity is available, and which represents fairly closely the expected behavior of the materials to be tested and classified, a suitable tool material, also available in good quantity and uniformity, is chosen, and precautions taken for grinding the test tools to exactly the same contour, and one suitable for the job. Then, by alternately cutting the material to be tested and the base line material, comparisons can be made on whatever basis may best fit the problem.

Tool Wear May Be Criterion

This basis may be the energy required to remove a given amount of material, as by mounting what amounts to a single tooth milling cutter on a pendulum, analogous to notched bar impact testing, swinging the pendulum so that it cuts a definite sized chip from the test piece, and noting the height of swing after the cut is made. Or elaborate means for measuring the energy expended in a regular cutting operation may be installed.

Tool wear or breakdown may be used as the criterion, the speed and feed may be adjusted till the tool fails to cut within a certain number of minutes and the data plotted on a log-log scale to give a line whose slope measures machinability. This scheme is often used to evaluate machinability under roughing cuts. For machinability under finishing cuts, a follower-tool, set say 0.001-inch back of the active tool, may be used and the time noted at which the follower just makes contact, indicating 0.001-inch wear on the active tool. The type of finish produced is, of course, also noted.

For fine-haired differentiation of suitability for machining under existing shop methods, the testing should approach, as closely as possible, the actual shop conditions to be met, though it often occurs that when other conditions have

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THE shovel above is handling soda for the Central of Georgia R. R. Working in conditions like this calls for nice control and handling.

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brought about a shift to a material not at first considered satisfactorily machinable by the machine shop, forced experimentation on tool materials, tool shapes, speeds and feeds, etc., gives the shop an acquaintanceship with the material that ultimately allows its machining in fully as satisfactory a fashion as was the case with the earlier material.

Some makers of screw machine stock set up a screw machine and produce a quantity of some standard object from each heat, when sales depend on fine-haired differences.

A fair approximation to the general overall machinability of a material can be had by the use of a power hack saw and a drill press to compare behavior with that of a reference material. Details of these simple tests are described by Nead, Sims, and Harder.[109]

Without attempting to deal with fine-haired differences, it may be noted that, by nearly any criterion, commercial magnesium alloys, leaded bearing bronzes, leaded brasses, graphite-containing materials such as malleable iron, gray cast iron, graphitic steel, and high-sulphur steels such as commercial screw stock, all of which give short, crumbly chips, are very readily machinable, while tough and gummy materials like pure copper, pure aluminum, nickel, and monel metal rate as difficultly machinable, as do steels of high hardness, and austenitic steels of great propensity toward work hardening.

As is clearly brought out by Ernst[110], the separation of a chip is brought about by plastic flow, followed by cleavage of the chip from the work (rupture) and perhaps by cleavage within the chip. Easy plastic flow and easy cleavage, together, mean easy machining. Easy plastic flow is naturally found in weak materials, easy cleavage in brittle ones, so both requirements are contrary to the engineering needs for strength and toughness. A compromise has to be made. Stepping stones for progressive cleavage (i.e. inclusions) need to be provided that aid rupture at final breakdown, but that depreciate the static load-carrying ability within the elastic range, and the fatigue resistance, as little as possible. Moreover, these inclusions should not be unduly abrasive to the cutting tool.

Adjustment of chemical composition so as to produce ready work-hardening to the point of embrittlement upon the severe deformation the chip undergoes, but not a marked embrittlement under the slight deformations permissible in service, may be used as aids to machinability.

Soft, or at least relatively nonabrasive materials that can be uniformly disseminated as constituents or inclusions, best fill the requirements, with graphite in cast iron and lead in brass, as outstanding examples. Manganese sulphide in steels, i.e., an increased sulphur content, is a great standby.

Iron carbide (or complex carbide in alloy steels) is a brittle constituent whose distribution can be controlled by heat treatment, and which, from the point of view of machining, is interspersed within the tough matrix, much as inclusions are. Its hardness and abrasive action make it oppose machinability while its introduction of brittle stepping stones favors it. Heat treatment is therefore a potent factor in machinability, and can be applied to steels pretty much irrespective of alloy content, but not irrespective of a given heat and the method by which the heat is "finished".[111] Obviously, large chunks of aluminum oxide are so abrasive to tools that care must be taken to avoid them when using aluminum to control grain size.

Toward Better Chip Cleavage

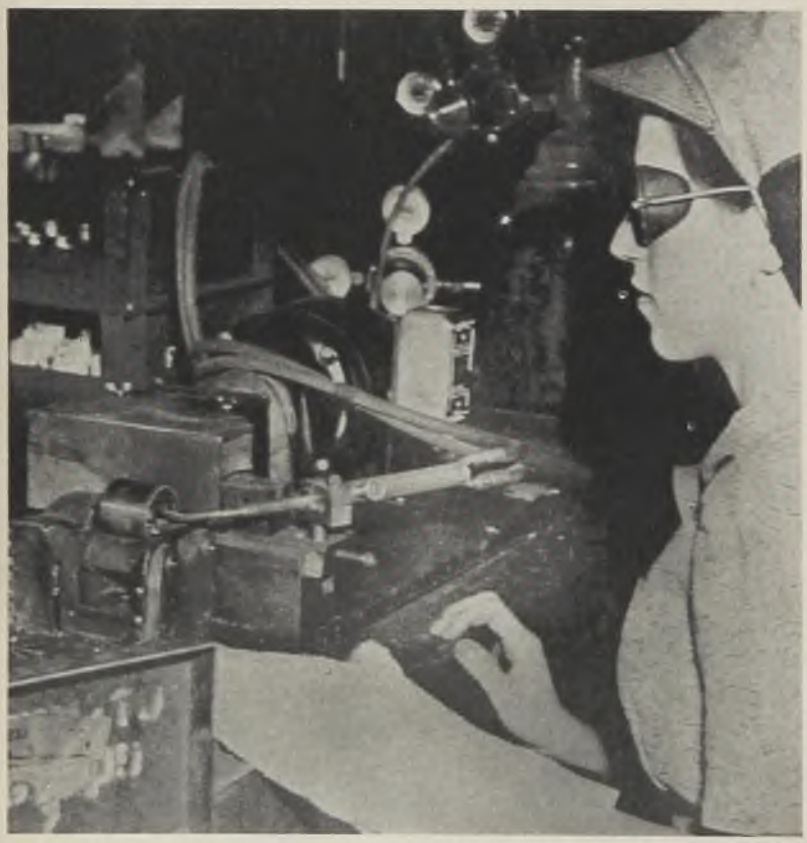
In low carbon steels it is feasible to raise the phosphorus content and thus secure embrittlement of the chips without embrittling the steel. Nitrogen has a somewhat similar action. Cold-drawing hardens a metal and converts a gummy one to one less gummy, and also puts it part way along the road to the cracking that accompanies "over-cold working" so that the chip tends to break up better.

Thus cold drawn bessemer screw stock, high in phosphorus, sulphur and nitrogen, utilizes several different mechanisms for securing machinability. Addition of a small amount of lead gives further improvement, and lead, in amounts usually under 0.25 per cent, can be used to increase machinability of a wide range of carbon and alloy steels with little or no harm to mechanical properties.

Other nonabrasive insoluble materials such as silver or bismuth have a similar effect.

Selenium may be used along with sulphur in steel, and is a well-recognized addition to stainless steels. Selenium or tellurium are likewise used in copper-base alloys. Bismuth and lead are used in aluminum-base alloys.

In steel, the grain size and the distribution of carbide affect the speed with which machining can be done and the finish



FLAME TREATMENT SPEEDED: Previously the operation of surface treating small laminated aircraft instrument motor cores was done by hand with an oxidizing flame. This required the movement of a small, high-temperature gas flame across and around the core. The flame had to be kept steady in order to destroy small burrs and properly treat the surface, thus making it a difficult as well as a slow process.

An automatic fixture developed by A. J. Green, a general foreman at one of General Electric's plants, has speeded up this process. The fixture uses a welder's torch mounted on a sliding block driven by a crank wheel. The core is placed on the rolls which rotate it at a speed that permits the cross-wise travel of the torch to carry the flame back and forth along the slots and surface of the bore. The core makes two or three complete revolutions and is removed

produced, so that heat-treatment and grain-coarsening propensities can be adjusted for the desired type of machining and final heat treatment of the rough machined or the finished part then given to secure the desired mechanical properties. Discussion of this phase of the subject necessarily leads into metallurgy and the use of metallurgical terminology beyond the point of interest of most design engineers. The specific question of the machinability of the NE steels has been examined by Boston[112] who concludes that it "compares favorably" with that of the steels replaced.

Formability

The facility with which metals may be formed by plastic deformation, hot or cold, depends on the yield strength at that temperature, i.e., on the elastic resistance, and on the ductility or malleability after the yield strength is passed. It would, therefore, appear that most of the information necessary for evaluation would be given by a tensile test at the forming temperature.

Actually, a tensile test is inadequate for evaluation, because the deformation produced in forming is seldom by pure tension. Forming is more of a kneading than a pulling. There is more restraint upon deformation than when only free surfaces in tension are concerned, and cracking, especially edge cracking, occurs more readily.

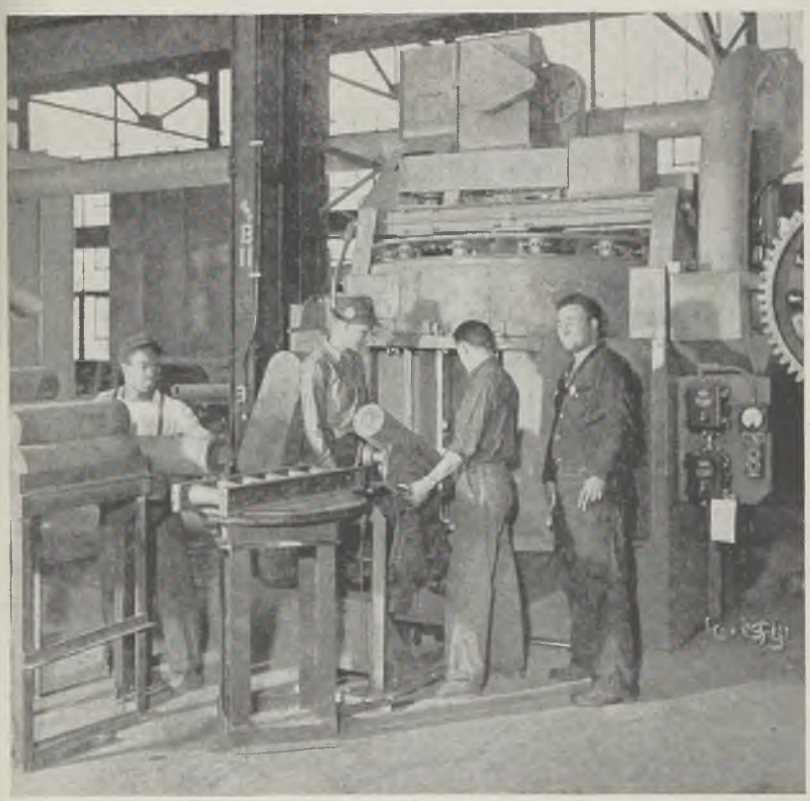
The ruling conditions under which deformation occurs in forming need to be reproduced in any test for evaluation of formability.

The general behavior in hot working is usually quite well indicated, provided the time, temperature, and atmosphere of heating have been made the same as in practice, by flattening cylinders into pancakes under a power hammer and observing the edge cracking.

In hot fabrication of heavy plate, Eberle[113] appraised propensity toward hot cracking in 1½-inch plate for hot forming by heating a specimen with a 1¼-inch diameter hole in it and forcing a 3-inch diameter ball through the hole, which produced deformation akin to that necessary in the objects being produced, and noting the behavior as to cracking.

The design engineer is more often concerned with the behavior of his materials in cold forming than in hot forming. The simplest forming operation is by bending in one direction only, and to appraise ability for such deformation, a bend test is naturally chosen, and its severity is adjusted in accordance with the bends to be made. If it is only necessary to bend 30 degrees, the material need not be able to be bent flat upon itself. The requirements are usually phrased in terms of the angle of bend that can be endured, without cracking in the outer fibers, on bending around a pin or other form whose radius bears a definite relation to the thickness of the material to be bent. Just as sharp edges and burrs would be removed so as to decrease local stress concentration and resultant cracking in actual fabrication, so the edges of the test specimen should be smoothed. The test can be refined by measurement of elongation over different portions of the convex surfaces after bending, giving information analogous to that of the ductility measurements of the tension test, and magnetic powder methods could be used to make tiny cracks more evident. Rough and ready bend test equipment can be used to give about as much information as is given by a tensile test at less cost.

Special equipment for "guided bend" tests, facilitates testing. Farmer and Hale[114] describe a bend test for wire. The "wrap" test for wire, in which the wire itself serves as the pin over which it is bent and is thus automatically adjusted to the wire size, is familiar to all users of wire.



SHELL HOPPER: As each 155-millimeter rough shell forging reaches the end of the roller conveyor line into this ordnance plant's cleaning department, its progress is halted by man at left until operators of the cleaning machine, a Wheelabrator cabinet built by American Foundry Equipment Co., are ready for it. Then turntable in foreground is swiveled to line up with conveyor, forging is shoved on its short track and table and shell are swung back into alignment with the hopper, a manually operated up-ender built on principles known since the dawn of mechanics but nevertheless an efficient device for speeding this work. It gives the final fillip to the forging, placing it on the loading support of the sand blast machine

Tests—Simple Vs. Complex

The ability of materials in thin sheet to take bends, and the radius over which they must be formed to stand bending without cracking, are evaluated by Gohn[115] who mounts V-shaped wedges with varying radii over a nonradiused V-block in a punch press and stamps the specimen into a right-angled bend, noting cracking or "orange-peeling." When only simple bending is required, accurate evaluation of difference in behavior of materials is not difficult.

As the thickness of the material tested decreases or the deformation required becomes more complex, something better than rough and ready bend tests is needed for differentiation among materials.

Ability of material, work hardened by bending, to take further deformation, if it passes a 180 degree single bend test, may be roughly evaluated by repeated bending. Epstein, Nead and Halley[116] bent ⅛-inch thick sheets over a ⅛-inch diameter pin 90 degrees in one direction, then 180 degrees in the reverse direction, and back and forth till the specimen broke.

When actual deep drawing is concerned that requires the metal to stretch, to flow under lateral compression and simultaneously to withstand radial tensile strength, the combination of forces is too complex for a tensile or a bend test to tell the story. Barber[117] therefore uses as a test, in the regular press, a sample form block carrying an assortment of different shapes, both easy and difficult to form.

Deep drawing operations for forming of complex shapes and twisted surfaces,

(*Please turn to Page* 102)

General Motors Photo from OWI

When we beat our tanks into winches...

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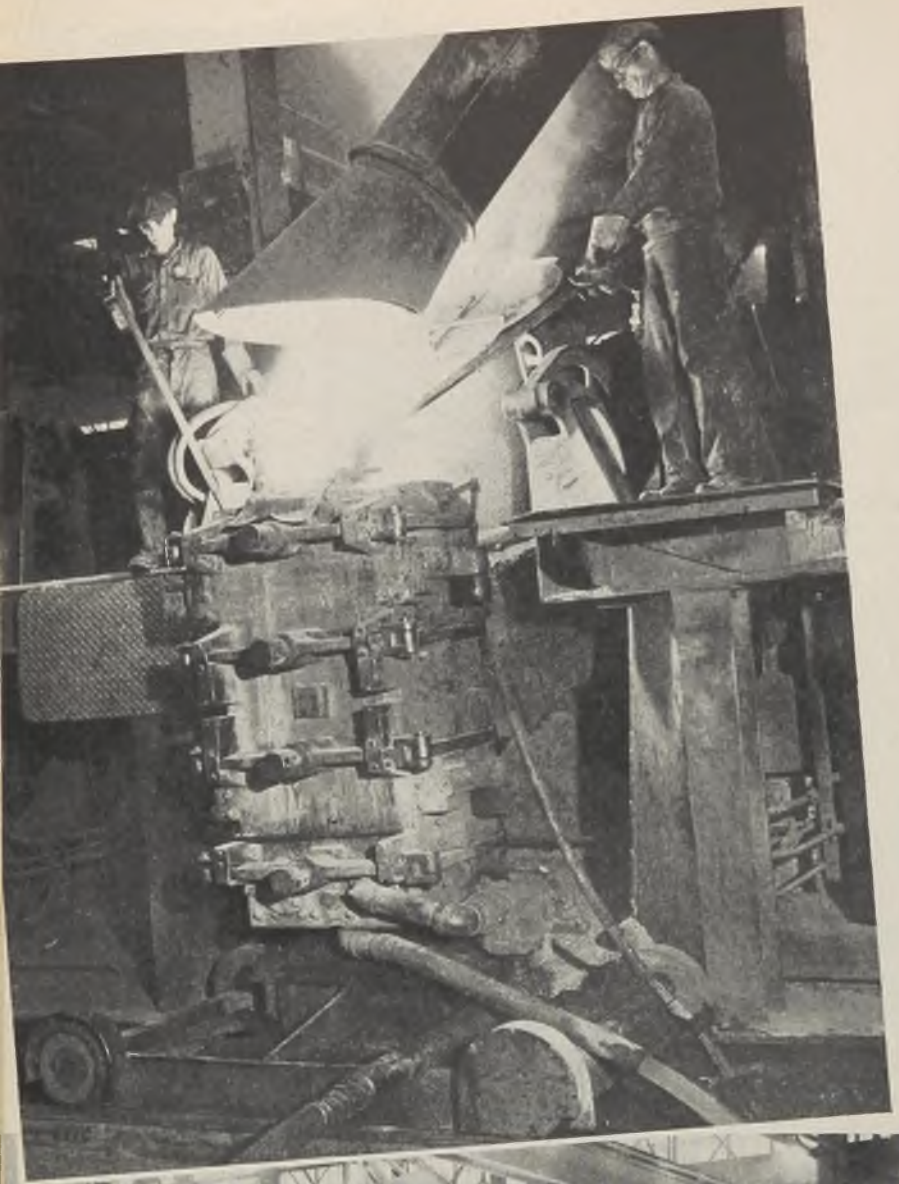
FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

CONE-DRIVE DIVISION MICHIGAN TOOL COMPANY
7171 E. McNichols Rd., Detroit 12, U.S.A.

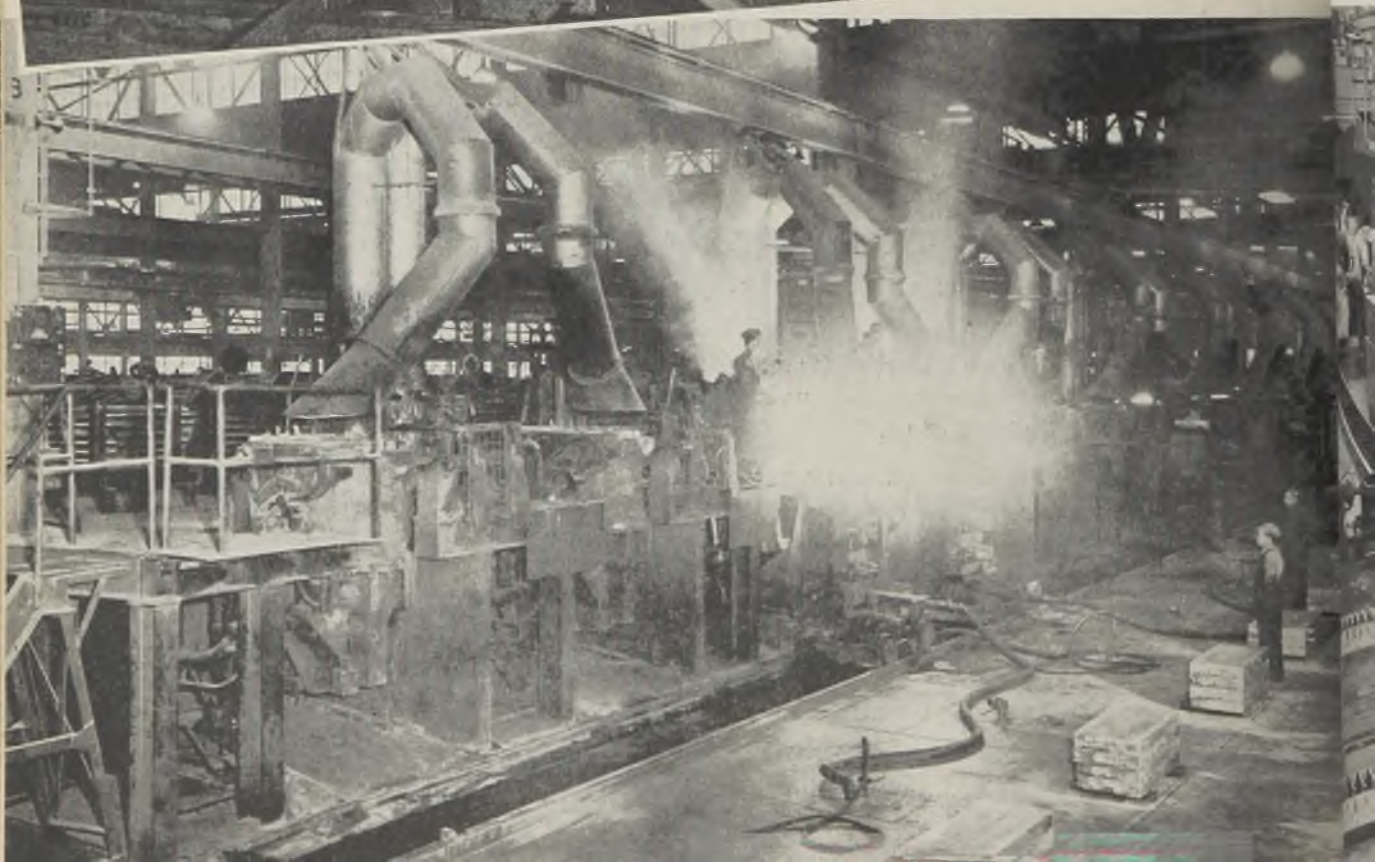


MANY INNOVATIONS have been incorporated in the new brass mill recently constructed by the Bridgeport Brass Co. at Indianapolis for the Ordnance Department which greatly increase both speed and capacity over that obtained with usual practice. The entire project, which includes a large cartridge case manufacturing unit, was conceived, constructed and placed in operation in less than a year.

The furnace building, 300 x 525 feet, is divided into five bays which are served by 13 overhead traveling cranes. The

Fig. 1 (*Left*)—*Pouring side of a battery of electric induction and melting furnaces in the Bridgeport Ordnance plant at Indianapolis. These furnaces each melt close to* 1700 *pounds of cold charge an hour*

Fig. 2 (*Below*)—*Brass is poured into* 2-*part water-cooled hinged molds, which facilitate removal of slabs or billets*



New Brass Mill

. . . . features innovations resulting in greatly increased speed and capacity

charging floor is 10 feet high and 40 feet wide. Copper, zinc and other raw materials are brought into the building on a railroad siding along the east side of the building and are handled by high-lift trucks. The charges are weighed, made up in tote boxes and moved by crane to the charging floor where they are top charged into the melting furnaces.

These furnaces are arranged in a straight line. A track on which truck-equipped molds operate extends the entire length of the furnace bank on the pouring side. The molds are water-cooled and hinged into two parts for easy removal of the slabs or billets. The furnaces swing on trunnions and are tilted by hydraulic rams. All fumes are removed by suction through a hood and vented outside the building.

The melting furnaces are of the tilting, electric induction type with an independent steel core which is required since brass, of course, is nonmagnetic. The core is held in an upright position and the primary coil comprising several turns is wound around the section nearest the bottom of the furnace. This primary coil is covered by a refractory material which in reality constitutes an extension of the furnace bottom.

Serves As Secondary Coil

A U-shaped hole running down and back up the other side through the refractory and filled with the material being melted serves as the secondary coil. This hole is so directed that it comes down from the one side of the furnace bottom, passes around the core opening and reenters furnace at other side of bottom.

The molten metal comprising the secondary coil circulates up through the furnace and down again, thus melting the cold charge at the rapid rate of close to 1700 pounds per hour.

The rolling mill equipment includes a 2-high, universal reversing type, hot breaking-down mill; two slab millers; a 2-stand, 4-high, tandem, intermediate mill; a 4-high, single-stand finishing mill; extrusion press; cake heating and annealing furnaces; and, pickling, slitting, shearing and handling equipment. All this is arranged so that the flow of material is progressive and integrated from unit to unit.

The sheet mill starts with a hot reversing breakdown mill and is served with two cake heating furnaces. These are of the walking beam type, about 9 x 30 feet. The walking beam is unique in that one set of rails simply lifts the work off the other set and holds it up while the shuttle rails move back to the starting position. It then places the work back on the shuttle rails which move it forward. Each furnace is heated by 40 gas burners, 20 to a side, half over-firing the work and half firing below the walking beam system. The conveyor system is located on a series of refractory piers, the spaces between being employed as a combustion and heating chamber. Each furnace handles 1 or 2 rows of cakes.

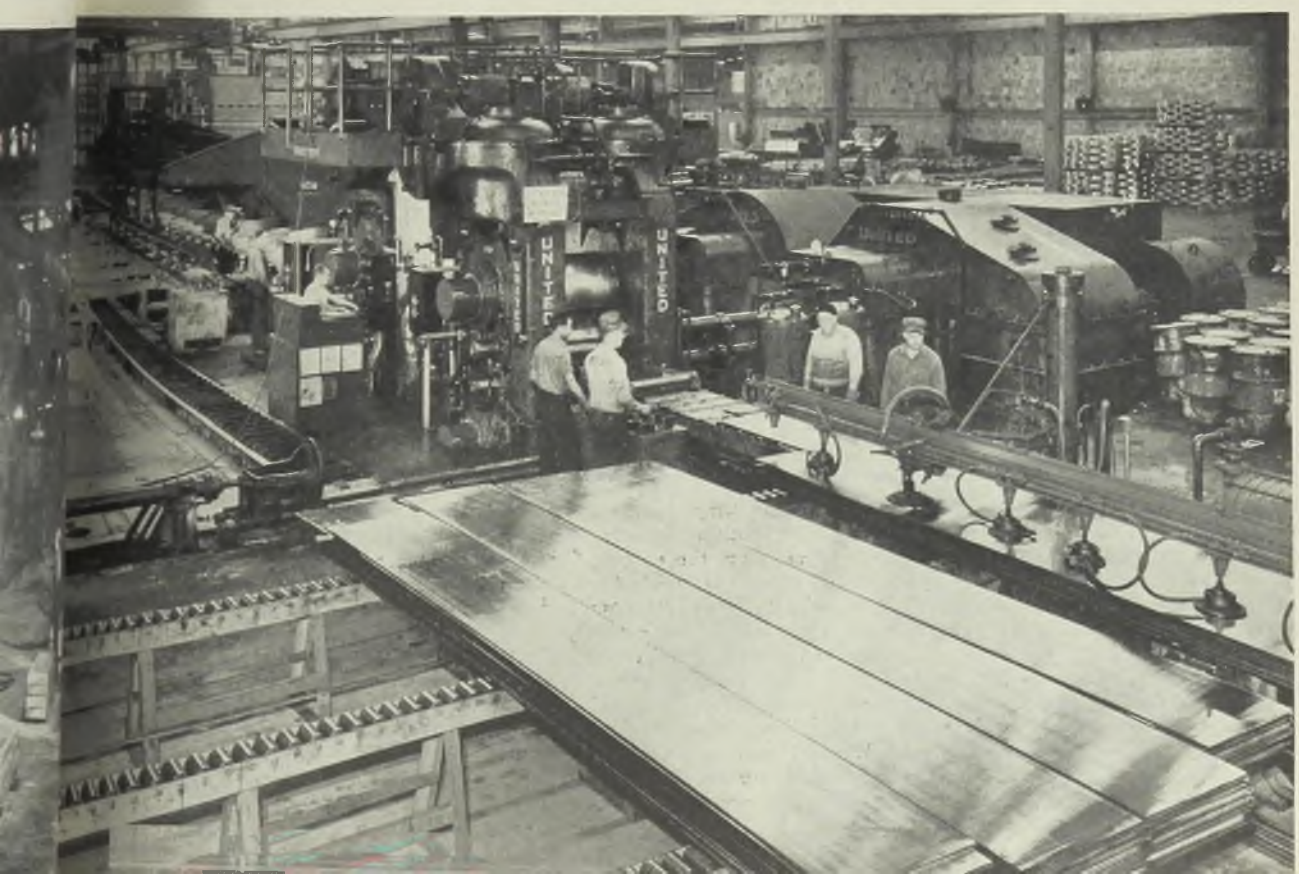


Fig. 3—This 2-stand, 4-high intermediate tandem mill rolls semifinished brass from breakdown mill down to thickness of about ⅛-inch

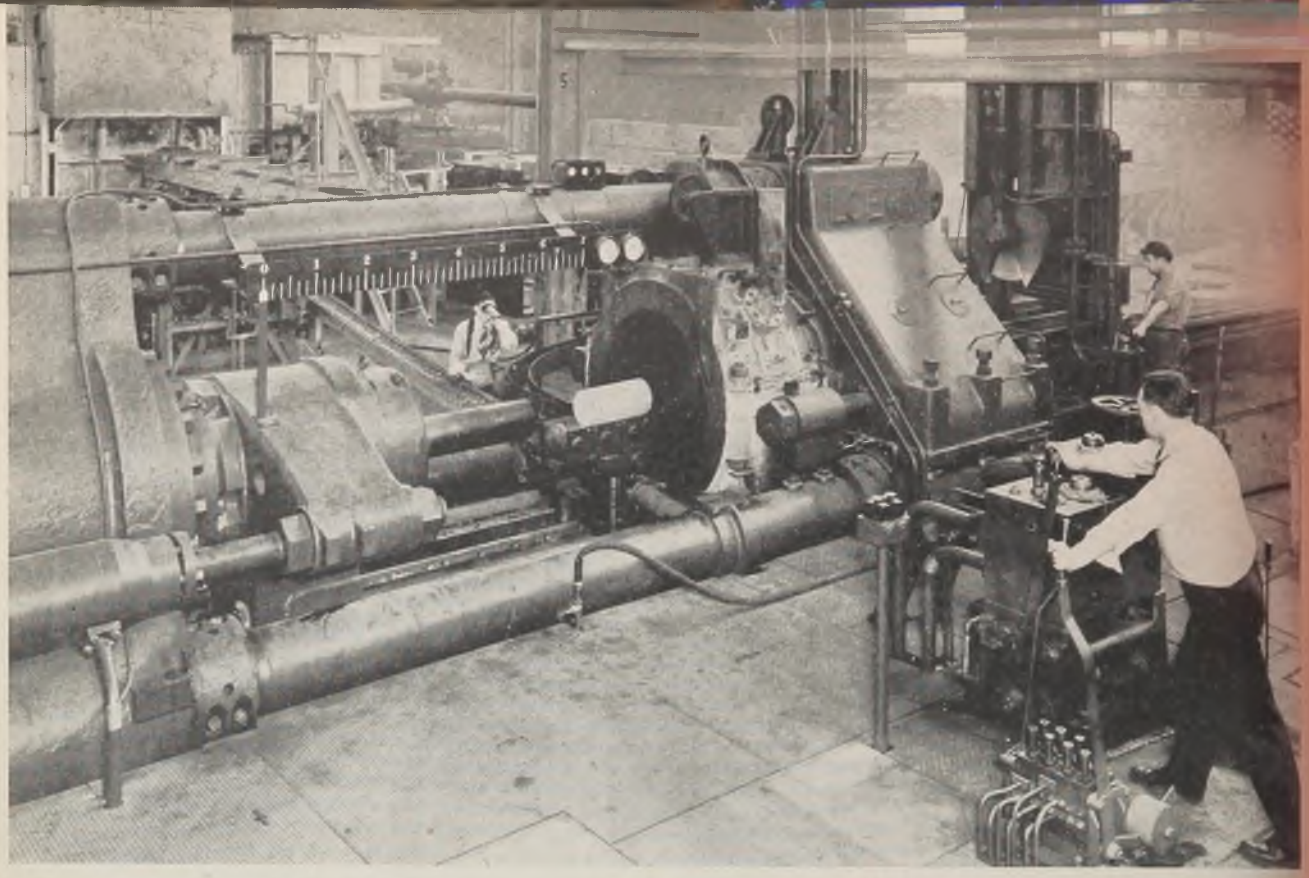


Fig. 4—The extrusion press shown here turns out flat bars ½-inch thick and 5⅛ inches wide, and from 18 to 50 feet long for further reduction on the tandem mill. The press handles billets 10 inches diameter and about 22 inches long

One charger serves both furnaces, moving back and forth from one to the other on a track. It consists of an electric hoist and a set of tongs which picks up a cake and deposits it on the walking beams in the loading zone. The heating chamber of each furnace is divided into three zones, the burners for each being manifolded together. Each furnace is equipped with pyrometric control.

A hot cake is kicked out of the furnace by push-button control onto a roller table which moves it into the rolls. The mill has an automatic screwdown and an automatic control over the spacing of the edging rolls. These are controlled from the pulpit with Selsyn indicators to show the exact roll settings.

Flexibility in rolling procedure is obtained by placing a storage table on the other side of the breakdown mill for temporarily storing the slabs from the mill. The slabs are conveyed from the roller table on to a cross chain conveyor which drags them through a tank of water and slides them over on to the storage roller table. All the slabs are cooled by water spray positioned directly over the roller table. Some of the slabs are run through directly from the breakdown mill to the straightening rolls and slab millers and those on the storage table are transferred by crane to another storage table just in front of the millers. They are charged from this onto the roller table by a frame carrying a series of vacuum cups and moved by rack and pinion.

The millers mill off first one surface of the slabs and then the other, the work being turned by a flopover between the two. Milling is done on the bottom side of the slab so that the chips will fall away and not be rolled into the metal surface.

At this point some of the slabs are angle sheared and go directly to the blanking and cupping presses while others are cut to length from the tandem cold mill. This is a 2-stand, 4-high mill and rolls material down to about ⅛-inch for 0.30-caliber strip. Everything from ¼-inch and lighter is coiled. For further reduction of such material as gilding metal for bullet jackets there is a single-stand rolling mill.

Material Flow Continuous

Sheet and strip brass flow without interruption to blanking, cupping and cartridge case draw presses. These presses are served with a full complement of annealing and stress-relieving furnaces, picklers, tapering, trimming, piercing, heading machines, etc. Ample space is provided for inspection and shipping.

An extrusion press is employed for production of semifinished material for cold-rolling. Brass from the melting furnaces is poured in special molds in the form of billets, 10 inches diameter and 66 inches long, which are cut into three pieces for the extruder. These are reheated in a rotary-hearth furnace, 30 feet diameter and 10 feet high. The hearth sets on rollers riding on two circular tracks and is water-sealed. Heat is supplied by 23 burners firing through the outside wall above the work. Inside the furnace is a 10-foot diameter well with 10 more gas burners also to overfire the work. Automatic temperature control with recording pyrometers is part of the equipment. The loader and unloader is a frame with air actuated tongs. This is mounted on a counterweighted motor-driven car that can be inserted and withdrawn through the single door. This unit sets on two tracks. The extruded material is in the form of flat bars from 18 to 50 feet long, and these are cut into various lengths which are sent to the tandem mill for cold rolling.

This brass mill rolls enough raw material to supply many cartridge case factories. In addition, it has three lines producing 37, 90 and 105 millimeter cases. Most of the raw material shipped out of this plant is in the form of brass blanks and cups; blanks for cases from 20 millimeter to 105 millimeter, and cups for small arms ammunition. For these there is a long line of presses.

Two special furnaces are provided for coil annealing, Each is about 75 feet in overall length, and is equipped with rollers in hearth in two sections to accommodate two rows of work. Loading and unloading equipment includes two motor-operated transfer cars rolling on tracks, one in the front and one in the rear of the furnaces. There is a roller conveyor along one side of the furnaces, running from front to rear, and two on the opposite side. Trays, placed on these conveyors or tables, are loaded with coils by crane and then rolled onto the transfer car, which moves them in front of the furnace being charged. By means of a pusher on the car, the loaded trays are pushed into the furnace, advancing the

(*Please turn to Page* 114)

JANUARY...A TIME TO LOOK *Both Ways*

JANUARY, named for the Roman god Janus, is traditionally a time to sum up the accomplishments of the past year and to look forward to the year ahead.

This year particularly, wise management in the Iron and Steel Industry is making use of the experience gained in the past few years to plan *now* for the reconversion to peacetime operation.

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How Much Pressure for Metal Cleaning Machines?

By H. M. SADWITH
Vice President
Industrial Washing Machine Corp.
New Brunswick, N. J.

APPLICATION of various pressures to cleaning operations started with the origin of metal cleaning machines. Not so long ago the only production cleaning machines were dishwashers. Then one of these machines was put to work cleaning ball bearings, and for many years metal cleaning machines were only overgrown dishwashers. Since dishwashers only require a 10 or 15-pound spraying pressure, it was thought that higher pressures were not needed.

When the machines were adopted by the baking industry for cleaning baking pans and utensils, it became apparent that the results were not good until a pressure of 25 pounds per square inch was used, because the material to be removed was baked on the pan surface and actual force was necessary to dislodge it.

A pressure of 25 pounds per square inch was also used successfully in industrial metal cleaning machines for removing oils and greases. But buffing, drawing and lapping compounds were not completely removed, and it was thought that these soils could only be removed by hand cleaning.

In 1940 a large manufacturer of airplane engines wanted a machine for cleaning disassembled engines after their "green" run which is the first performance run of an airplane engine in a test cell after it has been completely assembled. A soil of carbon smut on the pistons and inside the cylinders, in addition to grease and oil, had to be removed before the component parts of the engine could be handled for inspection when the engine was taken down after its green run.

Cleaners in aqueous solution could not be used because of an oxidation factor and kerosene was selected as a cleaning medium. Since this was only a solvent, very high pressures had to be utilized to do the job.

After much testing, 95 pounds per square inch was found to be the highest practical pressure at which to operate. The cleaning results were satisfactory and, subsequently, 15 machines of this character were eventually built for similar jobs. During our tests, we were surprised to find that buffing compound, drawing compound, and lapping compound as well as many other hitherto unremovable soils now were successfully cleansed from parts "in process." Kerosene or Varsol was still the cleaning medium.

There are many phenomena which present themselves at these high pressures. One is that the friction of the pump impeller heats the solution higher than its "flash point"; therefore, coils had to be put in the tank through which cold water was run in order to keep the temperature down. A second is that the solution tends to vaporize at these high pressures. We feel this cuts down the washing efficiency.

When the various chemical companies put on the market detergents which not only cleaned at high temperatures but also left a slight rust inhibitor on the metal, we found that the pressures on all but the green-run cleaning machines could be reduced. The method of forcefully blasting the soil off the work by force alone was replaced by one of combining chemical, heat and spraying action.

Once it was allowable to use a heated solution in the machine, the cleaning improved because the heat helped me the wax binder of the buffing and po ishing compounds and pressures aroun 35 to 55 pounds per square inch wer sufficient for most cleaning problem

While it is true that for very specia applications, cleaning pressures of 2 pounds per square inch and unde (combined with chemicals) are in us we believe in designing the machin with sufficient pressure so that any on of several well known chemicals ca be employed successfully. Consequentl the user of the machine is not limite to any one particular cleaning solutio

A very important consideration mus be given to the size of the spray noz zle orifice. The larger the orifice, th larger the spray drop. As is well known the force of impact is proportional t the mass times the square of the veloc ity. Therefore, while pressure (whic becomes velocity) is of utmost import ance, the mass of the drop also play an essential part.

Another point to bear in mind is th fact that the force of pressure varie inversely with the square of the dis tance from the work.

No set rule can be given for deter mining the most efficient pressure an orifice size, as these are affected b such factors as:

—Soil to be removed
—Shape of part
—Temperature used
—Detergent used
—Hardness of local water supply
—Distance from spray to work

The part to be cleaned should be washed in a position affording maximum drainage. However, some parts will cup or trap water in any position;

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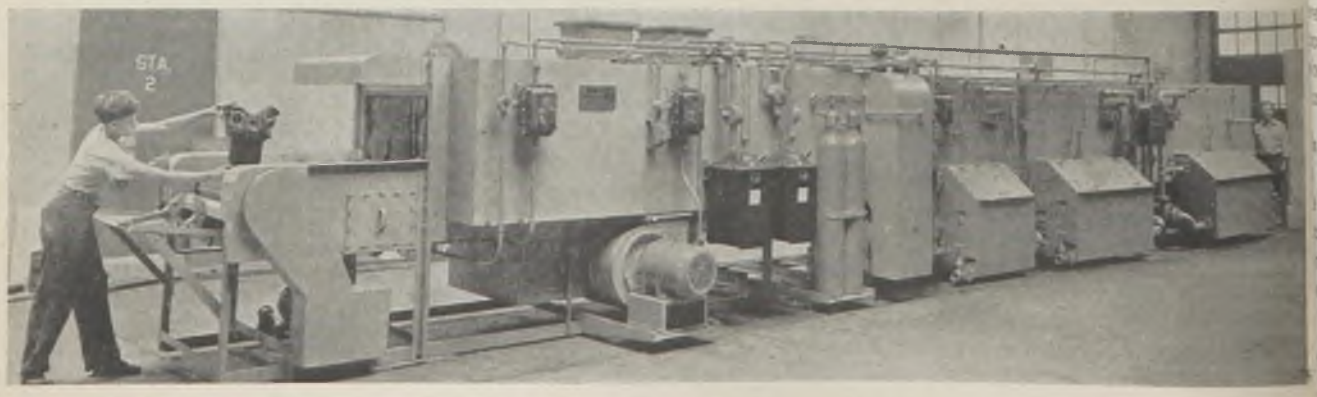
Typical industrial cleaning machine with continuous chain belt conveyor for carrying work through unit. This machine is designed for aircraft engine parts. One feature is a built-in automatic carbon-dioxide fire extinguishing system



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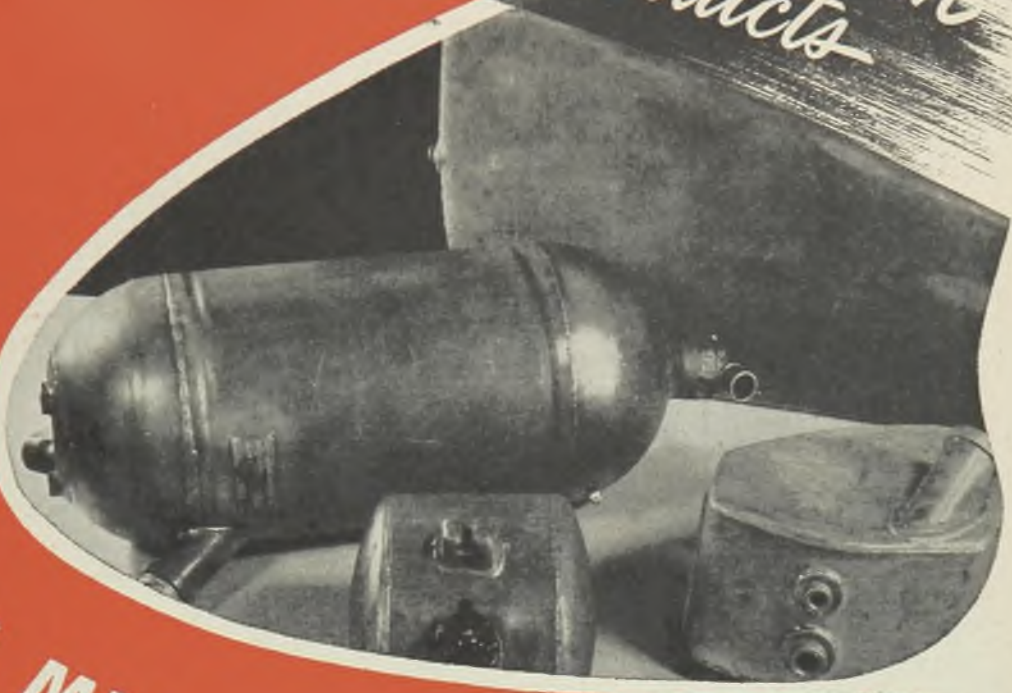

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