

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 117, NO. 8 AUG. 20, 1945

NEWS

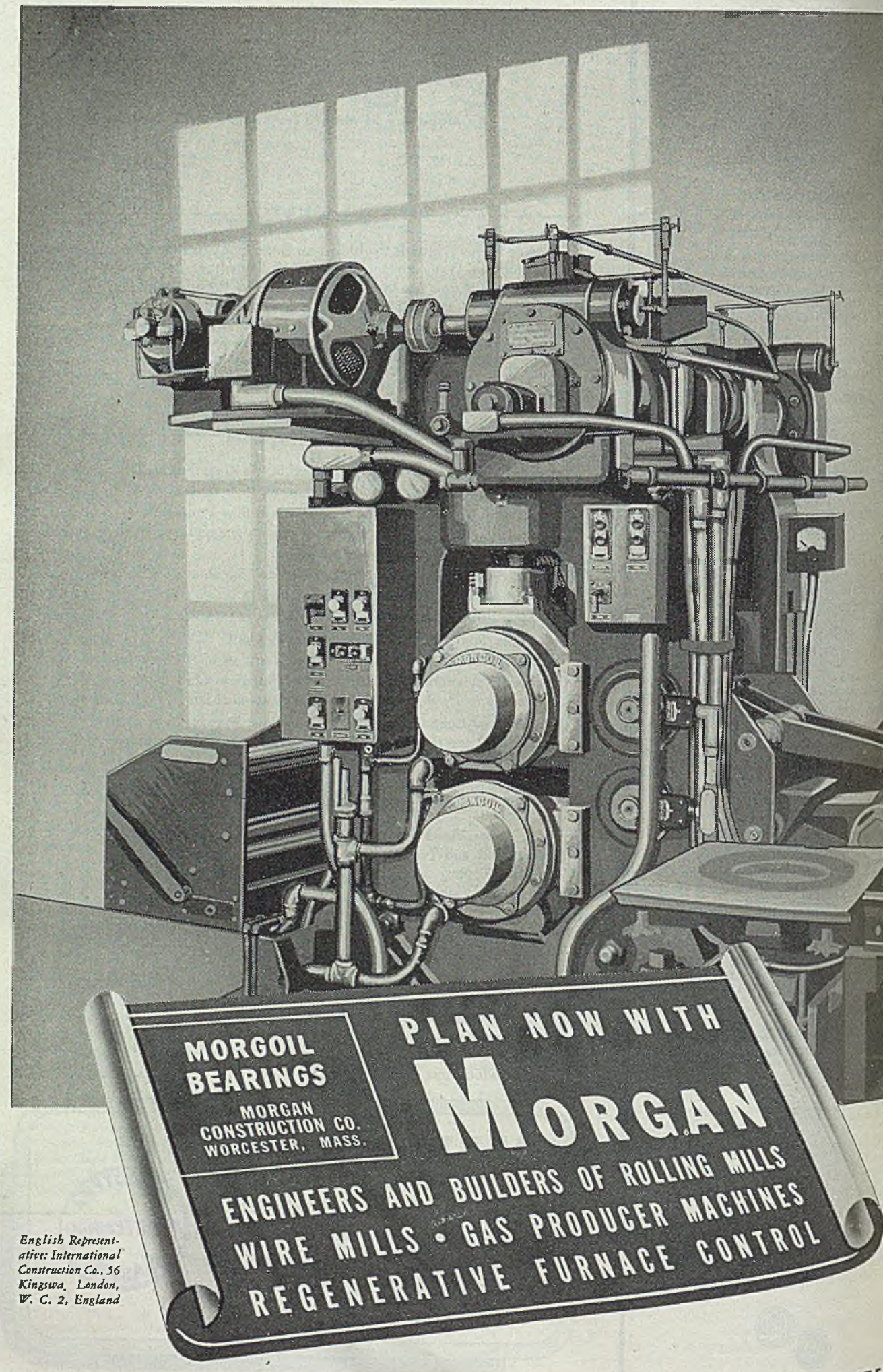
TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

Steel Handling Innovations Increase Capacity
Symposium on Special Shapes for Welding
Steels Preferred for Ball and Roller Bearings
Rapid Colorimetric Analysis of Alloy Content
Air-Powered Tools Widely Used at Eaton Mfg. Co.



English Representative: International Construction Co., 56 Kingswa, London, W. C. 2, England

STEEL
August 20, 1945

Dawn's Early Light

Within a period of 99 days two of the most ruthless aggressor nations of all time have surrendered unconditionally to the United Nations. With respectful and admiring recognition of the incalculable contributions to this victory by Russia, Great Britain, China and others, it is clear to everybody that it was the great power of the United States more than any other factor which brought the enemies to their knees.

"We tell ourselves," as President Truman reminded us Aug. 9, "that we have emerged from this war the most powerful nation in the world . . . . and that war has shown that we have tremendous resources, skillful workers and managers, able generals and brave people . . . ."

"All these things," he said "we knew before. The new thing—the thing we have learned now and should never forget—is this: That a society of self-governing men is more powerful, more enduring, more creative than any other kind of society, however disciplined, however centralized. We know now that the basic proposition of the worth and dignity of man . . . . is the strongest, the most creative force now present in this world."

Now that peace has been won at terrific price, it behooves us to preserve and guard this great national asset—this society of self-governing men—so that it may be of the greatest possible service in the gigantic task of reconstruction and in the development of a world of lasting peace. We say "preserve" and "guard" because there are individuals in our country who sincerely believe we would profit by shaping our way of life more to the pattern of Russia or to that of the untried new regime in England.

We have nothing to gain by exchanging our way of doing things—proved so spectacularly effective in the late war—for the methods and forms employed by less fortunate nations. Rather than to risk weakening our form of government by trying the desperate expedients resorted to by Russia and England, we should be refining, strengthening and improving our society of self-governing men so that it will be even more effective in serving the people.

The first faint flush of the dawn of peace finds our nation in an enviable position. If we will nourish the good that is in our way of life, the full light of day will reveal to all the world that ours is the system best adapted to the responsibilities and opportunities of the new era ahead.

$80 BILLION A YEAR: More than a month ago—before anybody could know when the war would end—the Committee for Economic Development decided that its report on the volume of goods American manufacturers expect to produce in 1947 would be released on Aug. 20. Call it good luck or foresight, the fact remains that this careful study of the expectations of manufacturers in 290 industrial groups could not have been given a more timely debut.

Encouraging is the report's estimate that manufactures in 1947 will total $80,518,000,000, compared with $56,843,000,000 in 1939, both figures representing prices at the 1939 level. Allowing for increased efficiencies and other factors, about 13,469,000 employees will be required to turn out this estimated $80 billion of goods. On the basis of the 1939 ratio of employment in manufactures to total employment, the number of civilians employed in 1947 may be about 53,448,000.

The report is based upon the assumption that the war would continue into 1946 and that 1947 would

(OVER)

be the first full year of peace. Victory is months ahead of schedule; therefore part of the expectations of CED may materialize before the end of 1946.

The big job of government is to clear the way of obstacles so that this $80 billion goal can be reached or exceeded. —p. 109

° ° °

GREEN LIGHT IS ON: Washington's shift from war to peace differs sharply from that which followed the end of World War I. Somebody has said that on Armistice Day in 1918, the dollar-a-year men left Washington on the 11 p.m. train. This remark, while facetious, was not too far from the truth.

This time certain controls will be continued, chiefly those which deal with inflation and the distribution of scarce materials. The overall policy seems to be to give industry every possible encouragement to get going on civilian work at the earliest possible moment.

Of the 600 or more WPB controls in effect before V-E Day, only about 40 remain. Manpower controls are off. Gasoline and some foods have been removed from the ration list. OPA is continuing most price controls and WLB and SSU of the Treasury Department are still regulating wages and salaries.

The present attitude of government to give private enterprise a relatively free hand to adjust itself should help ease the shock of transition appreciably. —p. 97

° ° °

SPEED MAY SURPRISE: WPB is releasing materials for production in the fourth quarter of 700,000 mechanical refrigerators, 500,000 mechanical washers, 75,000 sewing machines and from 75,000 to 100,000 electric ranges. Also it is becoming evident that substantial tonnages of steel will be available at an early date for automobiles, railroad cars and locomotives and for construction.

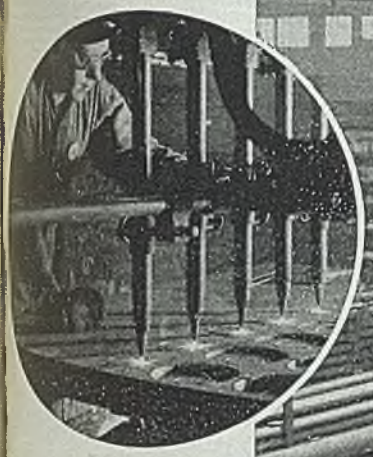
It is possible that some important materials will be available in ample volume before the manufacturing plants can be made ready to use them. The crux of the reconversion problem now is to equip and tool production lines so that the resumption of peacetime manufacturing can absorb idle workers as rapidly as possible.

This will be a tough problem at best. Much ingenuity will be required to overcome deficiencies in scarce supplies and items of equipment. However, the attractiveness of pent-up demand will be a powerful incentive. The speed of reconversion may surprise us. —pp. 98, 99

NOW FOR A QUICK SHIFT: Army and Navy officials have formulated a $1 billion program for postwar aircraft development (p. 120) to avoid a sudden breaking up of engineering and production skills in the aviation industries . . . American Iron & Steel Institute believes new records for exports of steel from the United States may be expected. Of 16,600,000 tons of pig iron and rolled steel figuring in international trade in 1936 (p. 124), only 1,400,000 tons or 8 per cent was shipped from the United States. American exporters have a good chance to share heavily in the markets once supplied from Europe . . . . A federal judge has dismissed the government's suit against Cold Metal Process Co. (p. 125) in which it was charged that the company had fraudulently obtained patents on steel rolling equipment . . . . The Wagner-Ellender bill, S. 1342, designed to promote and assist postwar housing (p. 106), has a good chance of favorable action when Congress reconvenes. We think it could be improved by amending it to provide for merging FHA, FHLS, FPHA and perhaps other agencies into a single housing body . . . . With the war over, the quotas for automobile production have been removed (p. 113) but manufacturers will need 60 to 90 days to reorient plants to the higher level of output . . . . U. S. Steel's plans to expand Columbia Steel's facilities at Pittsburg, Calif. may cause Henry Kaiser to restudy his program for building sheet mills at Fontana. Involved is the question (p. 119) of how much production the West Coast market can support . . . . In line with the adage "in time of peace prepare for war", American Bridge Co. has developed a welded steel container resembling an Army Quonset hut (p. 125) in which big guns or other war equipment, subjected to an inert gas atmosphere, can be stored for decades with full protection against the corroding effects of normal atmospheres . . . . Transportation equipment fares exceedingly well in CED's report on estimated manufacturing volume in 1947. CED foresees a volume of $7.1 billion for automobiles and automobile equipment and $1.5 billion for other transportation equipment. Each of these figures exceeds the corresponding volume for 1939 by about 75 per cent (p. 109), whereas the average increase for all durable goods is 50.3 per cent. The estimated volume for iron and steel and their products is 37.3 per cent in excess of production in 1939.

E. L. Shaner

EDITOR-IN-CHIEF



4 Things to Know About Steel

1. Where to Get the Steel You Need—The thousands of kinds, shapes and sizes of steel in eleven Ryerson Steel-Service plants are still the largest, most complete stocks available anywhere. This means that, despite shortages in some sizes, you can be more certain of getting the steel you need from Ryerson.

2. Technical Service—For more than 100 years Ryerson has supplied steel from stock. During that period Ryerson technical men have gained much practical experience on problems of steel selection and fabrication. Experience that makes Ryerson technical service of real value. It is yours for the asking.

3. Fast, Accurate Preparation—Ryerson saves you time and expense—prepares steel to your exact specifications with modern, precision equipment. Facilities include high-speed hack saws and shears, batteries of flame cutters, punches—everything needed to cut steel to the size and shape you need in the shortest possible time.

4. Prompt Delivery—Whether you need a single piece of steel or many tons you'll get prompt action from the nearest Ryerson plant. Phone, wire, or write for any steel requirement. And if you do not have a copy of our latest Stock List and Steel Data Book, we'll be pleased to send one.

PRODUCTS IN RYERSON STOCK INCLUDE:

Sheets and Plates—all kinds including plain, galvanized, corrugated for roofing, siding, stainless, etc.

Steel Bars, Mild Steel, Alloy and Stainless—Rounds, Squares, Flats, etc.—Hot Rolled and Cold Finished—Shafting, etc.

Structural Steel including Beams, Angles, Channels, Tees, Zees.

Mechanical Tubing—Seamless Steel.

Boiler Tubes and Fittings.

Inland 4-way floor plate and stair treads for safety, rigidity and long life.

Hi-Bond Concrete Reinforcing Bars, Wire Mesh and allied building materials.

Allegheny Stainless Sheets, Plates, Strip, Bars, Tubing, etc.

Alloy Steels, Tool Steels.

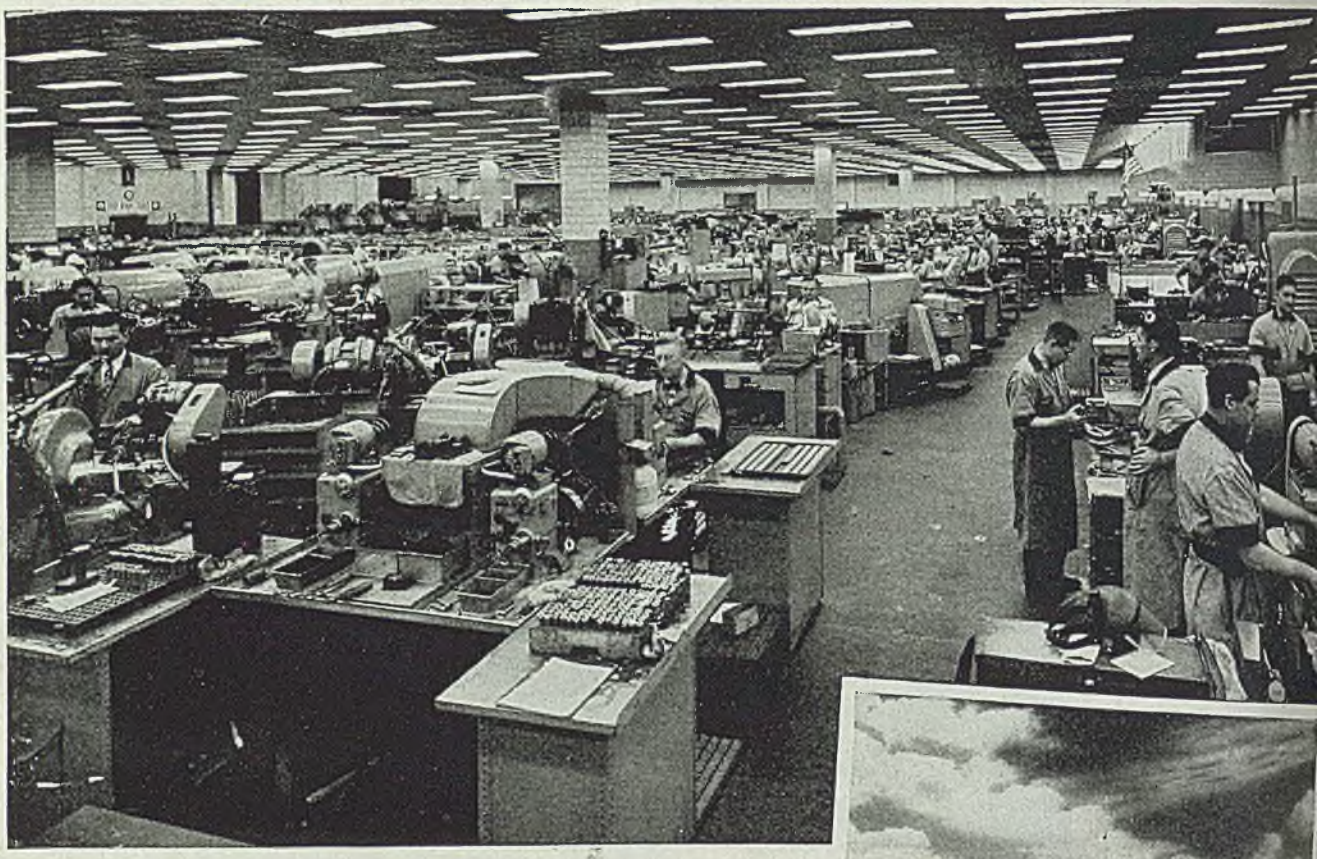
Welding Rod, Babbitt, Solder.

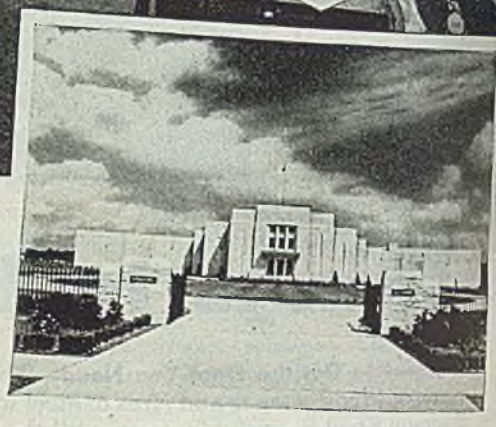
Bolts, Nuts, Washers, Rivets, etc.

Metal Working Machinery and Tools.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON STEEL





PRECISION

THE GOVERNING PRINCIPLE

WORLD'S largest and oldest exclusive manufacturer of precision governing equipment for prime movers, the 75-year-old Woodward Governor Company of Rockford, Ill., has gained worldwide fame for its development and constant improvement of hydraulic turbine governors. They were also the first company to produce satisfactory governors for Diesel engines and variable-pitch airplane propellers.

Like so many metal working plants throughout the nation where *precision is the governing principle,* Woodward has for many years used *Texaco Cutting and Soluble Oils* to assure the faster machining, better finish and longer tool life essential for mass production of precision parts.

Texaco cutting fluids cool and lubricate the tools, carry away heat and prevent chip welding — thus prolonging tool life, assuring greater output.

The services of a Texaco Engineer specializing in cutting coolants are available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

RECONVERSION RUSTPROOFI

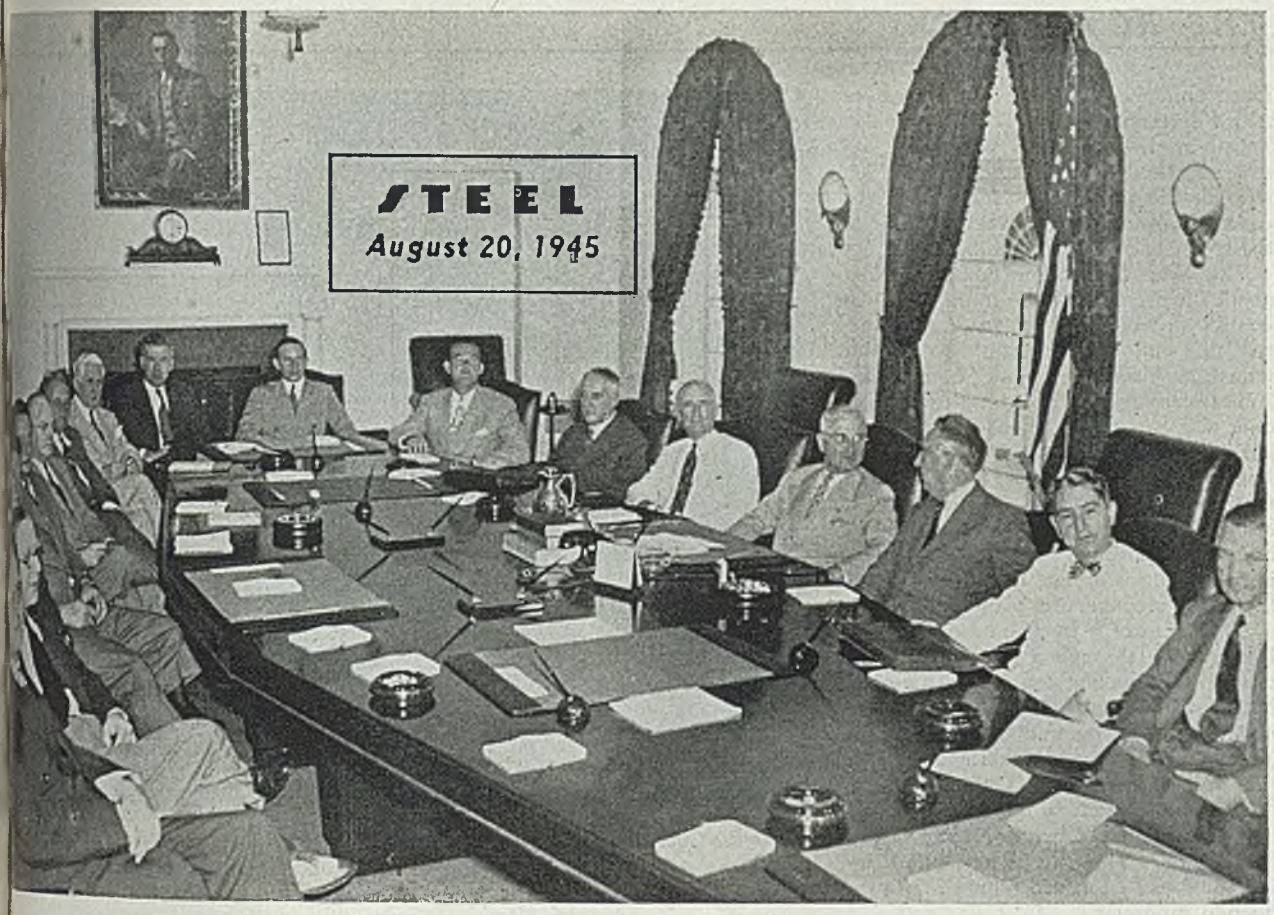
5 Points to Remember

1. Upon termination of war cont Government-owned produc equipment must be rustpro promptly, in accordance with *cial instructions.*
2. Ordnance Specification P.S. contains *official instructions* fo complete processing of such e ment.
3. These instructions require that rustproofing materials me Government specifications be
4. *Texaco rustproofing products* Ordnance specifications for ap tion on Government-owned e ment.
5. For full information, see your T representative or write to us.

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT—



Gathered to hear the momentous news of Japan's surrender are the members of President Truman's cabinet and heads of various government agencies, called by the Chief Executive to consider the surrender and the reconversion of America to peace. Left to right: Clinton P. Anderson, secretary of agriculture; L. B. Schwellenbach, secretary of labor; John B. Blanford, housing administrator; J. A. Krug, War Production Board chairman; John W. Snyder, director, Office of War Mobilization and Reconversion; William Davis, director of economic stabilization; Leo T. Crowley, foreign economic advisor; Henry A. Wallace, secretary of commerce; Abe Fortas, under secretary of interior; Robert Hannegan, postmaster general; Henry L. Stimson, secretary of war; James F. Byrnes, secretary of state; President Truman; Fred M. Vinson, secretary of treasury; Tom Clark, attorney general; James V. Forrestal, secretary of navy. NEA photo

ndustry Faces Difficult Problems on Road Back to Peacetime Economy

Sudden collapse of Japan catches country short on reconversion preparations but business and government agencies move quickly to end munitions output, resume production of civilian goods. Unemployment seen soaring

UNWINDING of the war economy nd reorientation to the ends of peace e presenting the United States with roblems hardly less difficult than those f industrial mobilization for war.

Collapse of Japan, months before it was expected by the planners, has caught America short in reconversion preparations.

The problems of shifting from war to large scale peacetime production, of redeploying returning veterans and displaced war workers, of contract termination, of clearing plants of government-owned machinery and inventories, of disposal of war surpluses and of rebuilding normal foreign and domestic trade, will require a rapid shifting of gears—so rapid that some loud clashing will be inevitable.

Return to peacetime production is not going to be smooth. Unemployment will mount rapidly. Dislocations will be numerous. Recession in many lines of business will be sharp.

But although both the government agencies and business were on the short side of peace planning, they were not altogether unprepared. Before the din of the celebration of victory had died away, the leading government agencies and many industrial spokesmen came forward with plans for the difficult transition ahead.

Military procurement officials moved quickly to cancel about $32 billion worth of war contracts, the bulk of all orders outstanding. In many cases district ordnance offices sent wires to prime contractors within two hours after the Pres-

ident announced Japan's acceptance of Allied surrender terms.

Only a few contracts were kept active and these were mostly for research and development. In some districts, cancellations amounted to 98 per cent of the total contracts outstanding.

The War Production Board revoked about 90 per cent of the more than 400 control orders in effect after VE-Day, retaining only those necessary to prevent industrial dislocation and bottlenecks. Indications are that about 40 control orders will be kept in effect for the present. In announcing the WPB reconversion plan, Chairman J. A. Krug stressed that even the controls being retained are only temporary and will be revoked as soon as possible. In addition to lifting the control orders, the high spots of the WPB reconversion plan are:

1. Release of a huge industrial building program through a plan to relax industrial construction controls. This plan, designed to absorb the manpower and materials freed by military cutbacks, is already in effect and additional relaxation will be considered within 30 days.

2. Remove ceilings on production of automobiles and other consumer's durable goods. These important industries may now move forward with all-out production programs.

3. Orders controlling materials that are still in short supply (tin, crude rubber, textiles, lumber, etc.,) will be retained until shortages ease or until there is no longer any danger of a scramble.

4. Inventory controls will be retained until the danger of hoarding, pre-emptive buying and stockpiling by the few at the expense of the many are over.

5. Preferential protection of small business ($50,000 or less per quarter) including the rating system will remain in effect for the time being until the effects of cutbacks can be appraised and it is safe to remove them.

6. WPB will retain its powers for breaking bottlenecks or giving protection where needed to military or highly essential civilian or export needs. These powers will be used only where necessary and business should not rely on priorities for conducting its normal activities.

WPB Retains Leadership

WPB, which with its predecessors guided the march into all-out production for war, now appears destined to play the leading role in guiding the country back to peacetime economy. This is in line with President Truman's recent letter to Chairman Krug asking WPB to help work out an orderly transition from war to civilian production "under the guidance of John W. Snyder, head of the Office of War Mobilization and Reconversion."

The President asked the WPB officials and staff to stay on the job like "good soldiers" until the need for their skills and experience had passed.

During the transition period, WPB will continue to work with the Office of Price Administration, War Manpower Commission and other agencies whose activities are essential to the shift to the peacetime economy.

That unemployment will rise sharply and rapidly is freely admitted by the WMC. Paul V. McNutt, chairman of the commission, predicts unemployment may rise to more than 5,000,000 within the next 90 days and will reach 6,200,000 by the middle of December.

This unemployment figure does not include the emergency war workers—the housewives, the aged, the young and part-time workers—who will withdraw from the labor force. The number of these emergency workers is expected to be reduced by 1,800,000 by the end of the year.

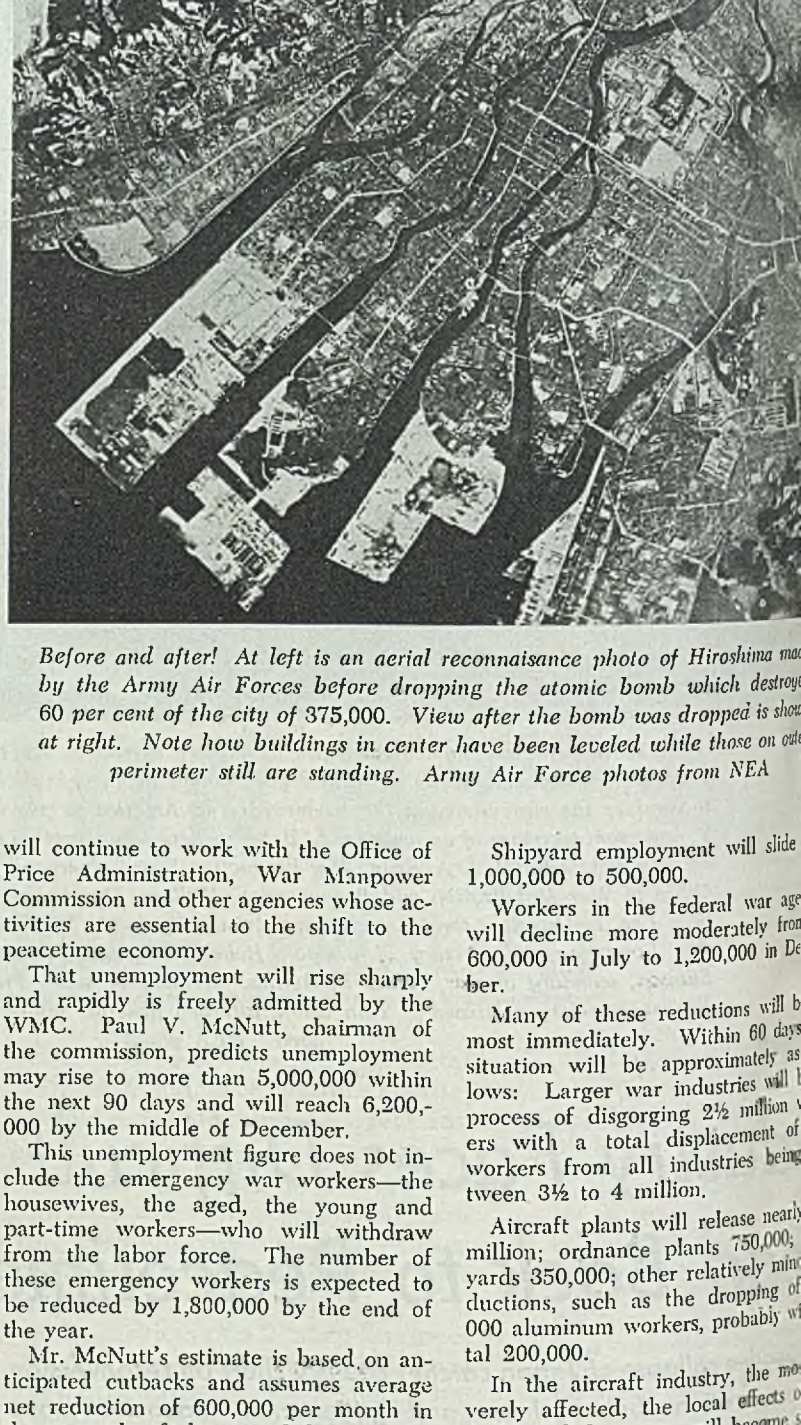
Mr. McNutt's estimate is based on anticipated cutbacks and assumes average net reduction of 600,000 per month in the strength of the armed forces. Future unemployment will be directly related to the rate of demobilization during coming months.

A WMC survey of the industrial employment outlook indicates that:

Employment in the metal-chemical-rubber products industries (the so-called munitions industries) will be cut in half from 7,900,000 in July to 4,100,000 in December.

Ordnance employment will be reduced from 1,100,000 in July to 100,000 in December.

Aircraft employment will drop from 1,300,000 to 200,000.



Before and after! At left is an aerial reconnaisance photo of Hiroshima ma by the Army Air Forces before dropping the atomic bomb which destroy 60 per cent of the city of 375,000. View after the bomb was dropped is sho at right. Note how buildings in center have been leveled while those on out perimeter still are standing. Army Air Force photos from NEA

Shipyard employment will slide 1,000,000 to 500,000.

Workers in the federal war age will decline more moderately fro 600,000 in July to 1,200,000 in De ber.

Many of these reductions will b most immediately. Within 60 days situation will be approximately as lows: Larger war industries will process of disgorging 2½ million ers with a total displacement of workers from all industries being tween 3½ to 4 million.

Aircraft plants will release nearly million; ordnance plants 750,000; yards 350,000; other relatively min ductions, such as the dropping of 000 aluminum workers, probably w tal 200,000.

In the aircraft industry, the mo verely affected, the local effects quick and deep cuts will become s by mid-October. Many of the new built plants will be closed compl Heaviest cuts will be in Los Ange Detroit with more than 120,000 a workers to be released in each Buffalo will probably lose 45,000, cago and Seattle, 30,000 each, and timore, Hartford, Conn., Wichita, and San Diego, Calif., more than 2 apiece. In a number of aircraft ters, nearly all such workers will b leased: In Kansas City, 35,000; At Ga., 26,000; Cincinnati, 27,000; D 18,000; Oklahoma City 17,000; a Ft. Worth, Tex., Omaha, Nebr.,

O., Tulsa, Okla., and Flint, Mich., than 10,000 each.

ere displacement in some types of nce plants will be held to 750,000 Oct. 15, by the absorption of labor achinery, railroad equipment and prewar types of work, the local im- of ordnance cuts will be enormous all arms, and isolated explosives ading plants. In about 50 of the type plants practically all of the 00 workers will be disemployed. officials are fearful that loading explosives plants, purposely built in te sections, may become "cancers employment and unrest unless a dispersal of workers is carried

me shipbuilding communities will al early signs of distress due to the p cancellations in Navy procurement. wever, the timing of cutbacks and the ation of the plants affected are ex- d to avert situations as severe as anticipated in the ammunition areas. However, it is now ex- d 350,000 ship workers will be ed within the next 60 days.

hile automotive plants will share ly in aircraft and ordnance con- cancellations, many workers re- ed will continue in the manufacture civilian trucks and passenger cars. wever, the industry faces two major blems. Government-owned material tools must be cleared out of the nts and a considerable period will be quired for repipelining parts and com- ponents for large volume production.

While many labor demands are vis- ble, according to the WMC, extending ross the board from steel and coal to construction, household appliances and equipment and other industries, the ex- ent to which workers will shift de- pends in large measure on the outlook for materials.

Re-employment in the production of major household appliances, such as refrigerators, washing machines, ranges and vacuum cleaners, which employed about 100,000 before the war, has been held back by shortages in sheet steel, and fractional horsepower motors. These and other component bottlenecks are now expected to unsnarl and these industries should undergo a significant expansion in the next two months.

Several basic civilian industries are regarded as of extreme importance because of their deferred labor demands. The railroads for example need 25,000 more workers; steel mill employment is 50,000 less than it was two years ago; coal mines have unmet demands for male workers; construction is short of workers. These industries are likely to absorb large numbers of men until their working forces are built up to normal on the basis of a 40-hour week.

Early action on the part of the OPA on reconversion pricing is anticipated. Immediately following the Jap surrender, OPA removed from price control a number of consumer goods which do not enter significantly into the cost of living. Controls of the more basic goods will be continued for an indefinite period, although modifications to encourage early large scale resumption of civilian manufacturing are expected.

The task of settling canceled war contracts was more than doubled by the Japanese surrender. It brought roughly 30 billions of canceled contracts to add to a backlog of 14 billions pending be-

(*Please turn to Page* 204)

Present, Past and Pending

■ BRITISH ECONOMIC POLICY STATED AS PARLIAMENT OPENS

LONDON—Government declaration of policy at the opening of Parliament last week did not include nationalization of the iron and steel industry, but specified public ownership of the Bank of England and nationalization of the coal mining industry. It also implied that controls would be maintained or extended in various directions. More details of the Labor party's plans are expected to be developed in Parliament debate.

■ CENTRAL IRON & STEEL REOPENING DISTRICT OFFICES

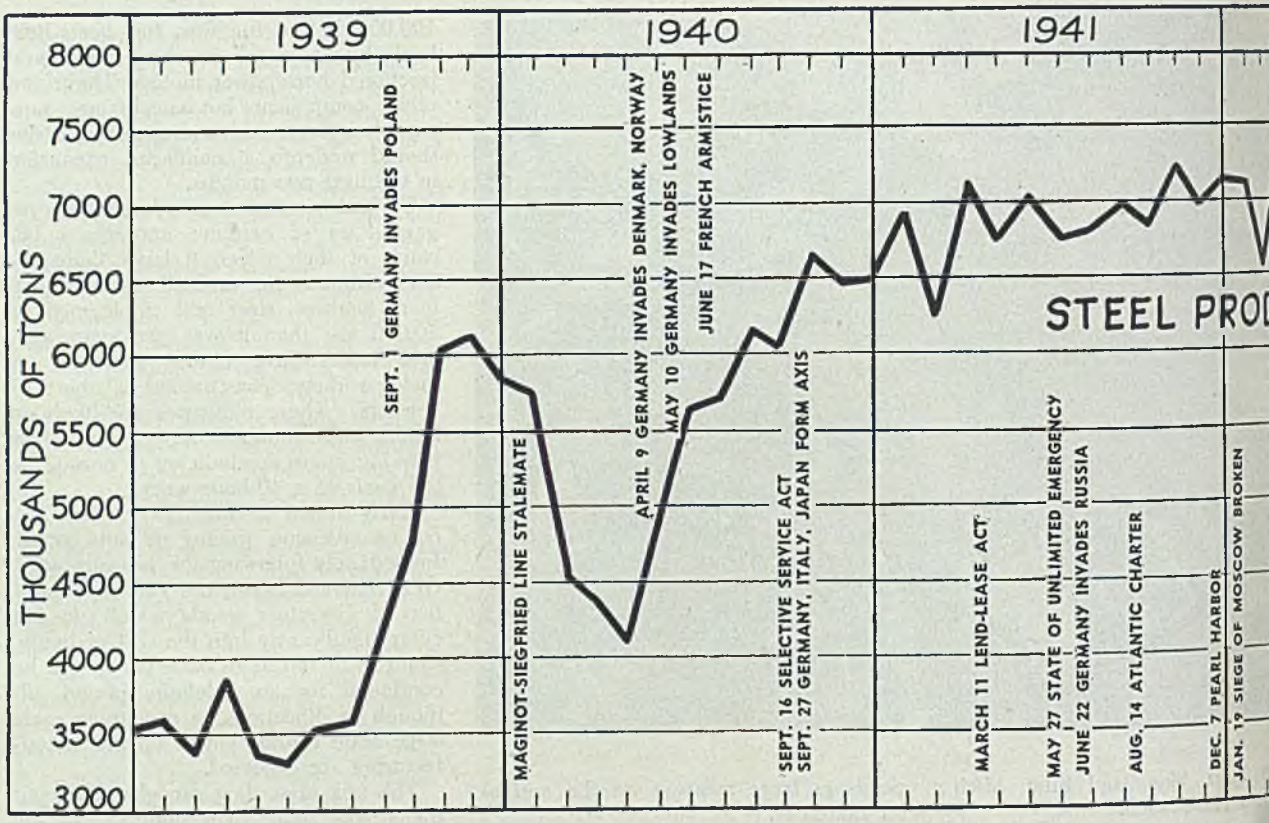
HARRISBURG—Central Iron & Steel Co. is opening district offices again. At the beginning of the war all such offices were closed by the company but it now has opened an office in New York at 25 Broadway, and one in Richmond, Va., in the Mutual Bank Bldg. Offices will be opened at other points along the eastern seaboard shortly.

■ STEEL PLANTS EMPLOYING 23,000 RETURNED VETERANS

NEW YORK—Twenty-three thousand veterans of World War II are now at work in steel plants, more than half of whom are back on payrolls of the company they worked for when they went to war, according to the American Iron & Steel Institute. The number of returned service men employed by the steel industry is just over 10 per cent of the total of 225,000 steelworkers who joined the armed forces since late in 1940.

■ HALL LAMP TO EXTEND ITS PRODUCTS INTO NEW FIELDS

DETROIT—The C. M. Hall Lamp Co., pioneer manufacturer of automotive lighting equipment, last week announced plans for extending its operations into diversified applications. Since 1909 the company has largely supplied lamps for independent motor cars, trucks, buses and motorcycles. Now it plans to also build lighting equipment for aircraft, marine, railroad, utility and general industrial and commercial requirements.



CHRONOLOGY OF WAR'S IMPACT

—1939—

September:
1—Germany invades Poland. Steel operations 64 per cent. Steel industry employing 500,000. Steel capacity 81,828,958 tons.
8—President declares limited national emergency.
30—Federal Reserve Board Production Index 111.

October:
14—Ingot rate up to 89.5 per cent.
31—Steel exports up sharply.

November:
4—Congress fixes cash and carry policy on shipments of munitions to belligerents.
24—War Resources Board dissolved.
27—Steel rate up to 94 per cent.

December:
2—President asks airplane and bomb manufacturers not to sell to nations bombing civilians.
6—Inter-Departmental Committee for co-ordination of foreign and domestic military purchases appointed.

—1940—

January:
1—Steel capacity 81,619,496 tons.
23—Anglo-French purchasing board formed to handle military purchases in U. S.
31—Federal Reserve Board Production Index 122.

February:
2—Machine tool builders asked to give priority to orders from American airplane engine companies.
24—Steel rate down to 67 per cent because domestic demand is slow.

March:
12—Russian-Finnish peace treaty signed.
30—Domestic steel buying slow. Ingot rate down to 61 per cent.

April:
9—Germany invades Denmark and Norway.
30—Steel employment off 60,000 to 503,000.

May:
10—Germany invades Belgium and Netherlands.
16—President sets defense goal of 50,000 warplanes.
25—Office of Emergency Management established.
29—Advisory Commission to Council of National Defense appointed. Dunkirk.
31—Steel operations climbing; up to 78.5 per cent.

June:
1—Anglo-French steel purchasing commission arrives in U. S.
9—Defense Council establishes Iron and Steel group.
10—Italy declares war on France and Britain.
17—Army and Navy Munitions Board form a priorities committee. Steel rate up to 86 per cent.
22—France signs Armistice with Germany.
27—National Defense Research Committee formed.
28—Metals Reserve Co. and Rubber Reserve Co. formed by RFC. Act to expedite national defense authorizes advance payment up to 30 per cent on defense contracts, negotiation of contracts and priority for Army and Navy contracts.

July:
2—Congress authorizes embargo on exports of munitions and critical materials. Office of Export Control established.
19—Two-ocean Navy, land force of 1,200,000 and 18,000 more warplanes authorized.
24—Training-within-Industry advisory committee formed.
31—Steel rate tops 90 per cent.

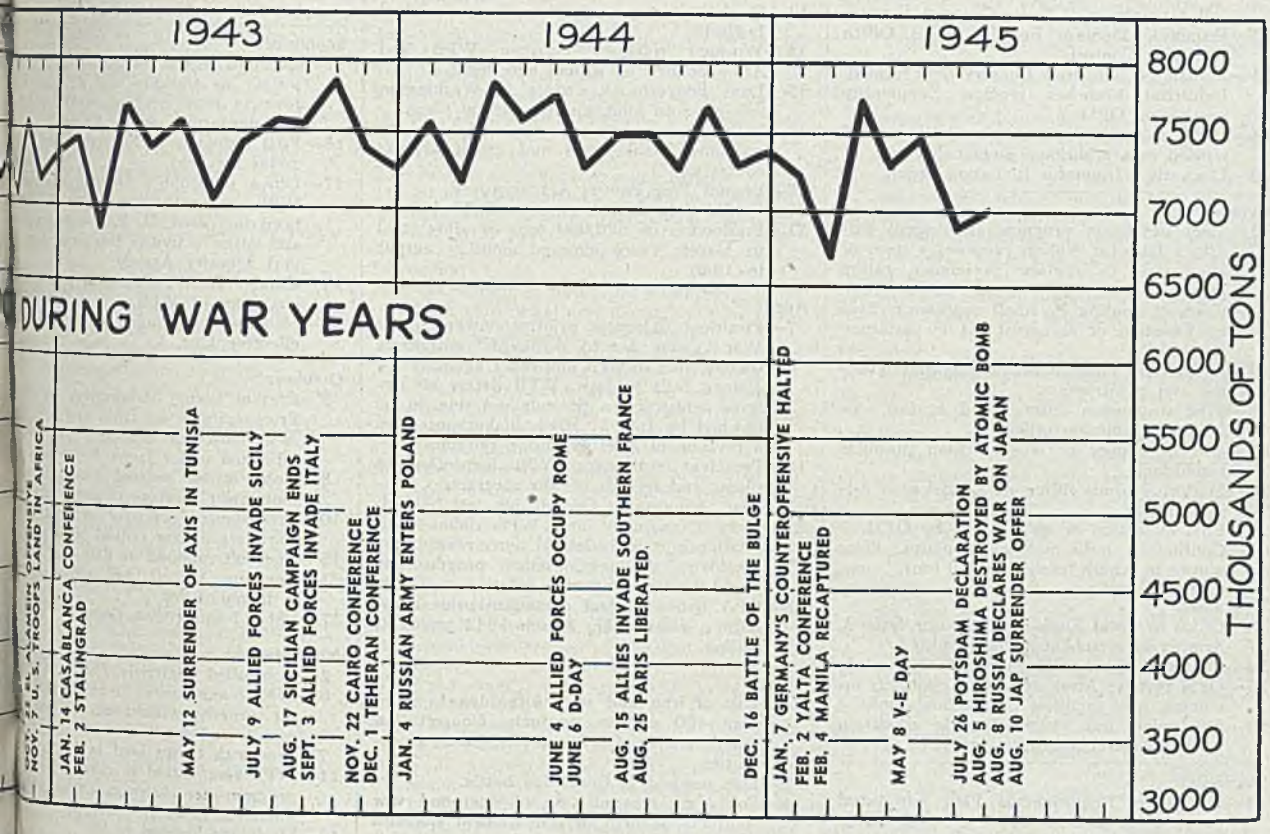
August:
17—Permanent joint board on defense of and Canada formed.
22—Steel Institute sets up Committee on ernment Specifications. Defense Corp. formed.
31—Labor Policy for defense cont adopted. Includes maintenance of 4 week and compliance with federal legislation. Steel exports show tend crease in 15 months.

September:
6—Advisory Commission adopts policy o ing defense contracts.
16—Selective Service Act passed with p for commandeering plants not co-op on defense orders.
26—Embargo placed on export of scrap to Britain and Western Hemisphere.
27—Japan joins Axis.

October:
8—Second Revenue Act of 1940 au special amortization of defense and other changes in income tax encourage defense plant construct production.
10—Property Requisitioning Act authori ernment requisitioning of military equipment, munitions and material
16—Scrap and high octane gas placed o control list.
21—Priorities Board formed with Kno chairman.
31—Monthly record output of 6,644,542 steel reported.

November:
5—Roosevelt re-elected for third term.
8—Britain places orders for 26,000 planes in U. S.
25—Shipbuilding Labor Stabilization Co appointed.

December:
10—Export licensing extended to most



DUSTRY, SEPT., 1939—AUG., 1945

machine tools. Embargo placed on ex-
rts of iron and steel except to Britain and
estern Hemisphere.
y and Navy Munitions Board made re-
nsible for priorities on critical items.
ard yearly output of steel set at 66,-
,686 tons in 1940.

—1941—

l capacity now 83,506,700 tons.
ice of Production Management estab-
hed, absorbing production, purchasing
d priorities functions of Advisory Com-
ission.
British Supply Council in America an-
nced.
PM appoints 4-man committee to handle
el priorities.
achine tool manufacturers asked to re-
ire priority certificates before shipping to
stomers.

ense Contract Service replaces Office of
all Business Activities.
aximum prices established for secondhand
achine tools in first ceiling price order.
Public Debt Act of 1941 raises limit to
65 billion.
Production Planning Board formed.
First Gano Dunn report indicates steel ca-
acity adequate.
Priorities Division imposes first mandatory
priorities on aluminum and machine tools.

-Truman Committee to investigate defense
program created by Senate.
-Production, Purchases and Priorities Divi-
sions and Bureau of Research and Statistics
defined.
—Lend-Lease Act approved.
—Labor Division established.
—National Defense Mediation Board estab-
lished. Priorities Administrative Order No.
1 extends critical list and priority review by Army and Navy Munitions Board.
20—Mandatory priorities applied to certain alloy steels.
22—First formal priority order M-1 is issued on aluminum.
24—Ceiling prices are fixed for scrap and secondary aluminum.

April:
6—German invades Yugoslavia and Greece.
11—Office of Price Administration and Civilian Supply set up.
11—First shipbuilding stabilization agreement approved for Pacific Coast.
17—Ceiling prices established on steel at March 31, 1941 level.
28—Coal strike cuts steel rate.

May:
1—OPM priorities Division inaugurates system of inventory control over 16 metals, including iron and steel.
2—President urges 24-hour day and 7-day week in production of machine tools.
6—Plant Site Board established.
8—Steel Institute technical committee issues pamphlet "Possible Substitutes for Nickel Steels."
14—OPM moves to provide additional steel-making facilities on Pacific Coast.
22—Second Gano Dunn report predicts possible deficit in steel supply. President asks for study of possibility of increasing steel capacity by 10 million tons.
27—President proclaims state of unlimited national emergency.
28—Ickes named petroleum co-ordinator.
29—General steel preference delivery order issued.
31—Priority power extended to nonmilitary orders.

June:
3—OPM discusses with steel industry leaders tentative plans for steel capacity expansion.
9—President orders Army to take over North American Aviation plant to prevent work stoppage.
10—Steel men report on capacity expansion plans to OPM.
22—Germany invades Russia.
24—OPM establishes commodity sections and industry advisory committees.
28—Office of Scientific Research and Development replaces National Defense Research Committee.
30—Steel production at new high, 99 per cent.

July:
7—American troops occupy Iceland. OPM compliance section organized.
20—Leon Henderson proposes 50 per cent cut in production of autos, refrigerators and washing machines.
21—National aluminum salvage drive launched.
30—Economic Defense Board established under Vice President Wallace. Office of Inter-American Affairs established. President asks Congress for legislation to prevent inflation.
31—Steel plate output rises to 483,000 tons in month.

August:
1—Pig iron placed under complete allocation.
9—Order M-21 to conserve supply and direct production of steel effected, basic regulation controlling steel throughout war. Maintenance and repair rating plan begun.
14—Roosevelt-Churchill conference—Atlantic Charter.
21—Federal Reserve Board regulates consumer credit and installment purchases. Auto production ordered cut 26½ per cent by Nov. 30 and 50 per cent by July 31, 1942.
28—Office of Price Administration replaces Office of Price Administration & Civilian Supply. Supply Priorities & Allocations Board established over OPM council.
29—OPM reorganized with six major divisions: Production, Purchases, Priorities, Labor, Materials, Civilian Supply.

September:
4—Division of Contract Distribution under

Odlum replaces Defense Contract Service.
15—Economic Defense Board absorbs Office of Export Control.
23—Bureau of Industrial Conservation formed. Industrial branches replace Commodity Sections in OPM.
24—OPM submits program for building 10 million tons additional steel capacity.
30—Domestic refrigerator limitation order.

October:
2—Steel expansion program authorized. Priorities Director Nelson proposes system of allocations to replace preference rating plan.
4—Contract pooling by small contractors held no violation of anti-trust act by Attorney General.
9—Restrictions effected on nonessential building and construction.
16—First suspension order issued against violator of aluminum order.
21—Use of copper in most civilian products forbidden.
28—Stettinius heads office of Lend-Lease Administration.
29—First allocation of scrap made by OPM.
31—Continuous mills producing plates. Plate output in month totals 600,000 tons.

November:
5—Office of Solid Fuels Co-ordinator formed.
17—Arming of merchant ships permitted.
24—Coal strikes cut steel output.
25—OPM reviews Army and Navy contracts involving new facilities or machine tools.
29—Steel plate put under complete allocation in first general allocation order.

December:
3—Production Requirements Plan introduced on optional basis to secure detailed scheduling of requirements by quarters.
7—Japs attack at Pearl Harbor. Arbitration Board directs eight large steel companies to accept closed shop in captive coal mine dispute.
8—War declared on Japs. Steel Institute Shell Steel Committee named.
10—168-hour week on military items adopted.
11—War with Germany and Italy.
18—First War Powers Act. Office of Defense Transportation created. Industrial branches in purchases and supply divisions made responsible to Director-General through Philip Reed.
20—Selective Service age limits increased 18 through 64.
28—General imports order puts 13 strategic materials under import control.
31—Steel output for year sets new record at 82,836,946 tons.

—1942—

January:
1—Steel capacity now 87,890,500 tons.
5—Tire rationing begins.
6—President sets 1942 production goals at 60,000 planes, 45,000 tanks, 20 000 anti-aircraft guns and 8,000,000 tons of shipping.
12—War Labor Board replaces Defense Mediation Board.
15—Truman committee report criticizes lag in war production.
16—WPB established replacing SPAB.
21—Production of autos and light trucks stopped.
24—OPM abolished by President. New Steel Institute pamphlet on alternate steels to conserve nickel-chromium alloys issued.
26—Combined Raw Materials Board established. WPB regulation 1 delegates priorities authority to Division of Industry Operations.
30—Emergency Price Control Act approved.

February:
7—War Shipping Administration established.
9—Premium payments authorized on over-quota production of copper, lead and zinc.
23—Production of domestic refrigerators halted.
28—Steel mill stocks of scrap drop to low point.

March:
1—War Production Drive launched.
2—Sale of autos placed under OPA control.
12—Steel shell case committee set up by Steel Institute.
16—Working relations between WPB and Army defined by formal agreement.
25—Lord Beaverbrook arrives in Washington to confer on joint war production plans.
26—War procurement agencies authorized to guarantee bank loans and credit to war contractors.
27—Second War Powers Act approved.
28—Public debt limit raised to $125 billion.
31—Production of 820,000 tons of alloy steel in March, twice average monthly output in 1940.

April:
7—President delegates priority powers under War Powers Act to WPB, and authorizes redelegation to OPA and other agencies.
9—Bataan falls to Japs. WPB defers all defense construction projects not due to be finished by July 1, 1943; makes necessary a revision of steel expansion program.
10—President authorizes WPB inspection of plants and records of war contracts.
18—War Manpower Commission established.
22—Navy Department and WPB define their relationships in bi-lateral agreement.
27—President outlines 7-point program to "hold-the-line" against inflation.
28—OPA issues general maximum price regulations, establishing March 1942 prices as ceiling.

May:
5—Use of iron and steel forbidden in more than 400 civilian products. Conservation order M-126. ODT receives broader authority.
7—Japs stopped in Coral Sea battle.
14—Policy on renegotiation of open-end war contracts defined for procurement agencies by WPB.
15—Gasoline rationing effected in East. Stove production ordered concentrated.
20—About 10 per cent of steel expansion projects suspended because they could not be completed in time set by WPB.

June:
2—Production Requirements Plan announced effective in third quarter. Import control extended to essential civilian products.
5—Japs defeated at Midway. Food Requirements Committee established.
8—First estimate of shell steel requirements.
9—Combined Production & Resources Board formed.
11—Smaller War Plants Corp. established.
12—Scrap rubber drive.
13—Office of War Information established.
22—War Manpower Commission issues directive to WPB to furnish information on relative importance of war products and their labor requirements.
30—Steel plate production tops 1 million tons per month for first time in history. Steel employment up to 659,000, high point of war.

July:
8—WPB realigned. Materials and Production Divisions abolished.
16—War Labor Board announces wage stabilization policy in "Little Steel" case. War Manpower Commission announces policy to prevent pirating of war workers.
23—National Salvage campaign for scrap, fats and tin cans begins.
30—Steel industry committee submits Steel Quota Plan for approval to WPB, seeking to simplify and improve control of steel distribution.

August:
6—President vetoes Rubber Supply Bill, appoints Baruch committee.
7—Guadalcanal landing begins U. S. offensive in South Pacific.
12—American Steel Mission leaves for Great Britain to co-ordinate operations of two nations.
17—Development of National Emergency Steels announced.
25—Crude rubber allocated.
27—War Materials Inc. set up as agent of Metals Reserve Co. on scrap and salvage.
31—Alloy steel production tops 1 million tons monthly, 4 times prewar level.

September:
7—Germans attack at Stalingrad. Leg sought to stabilize cost of living. restricts movement of workers in and nonferrous metals industries.
15—First estimates of Navy shell steel ments received.
17—Office of Rubber Director establis WPB under William Jeffers. WMC tions increased. U. S. Employment and other activities taken over fro eral Security Agency.
18—Charles E. Wilson named producti chairman of WPB.
25—Nationwide rationing of gasoline effective Dec. 1.

October:
3—Cost of Living Stabilization Act a Price ceilings on foods and rents ized. Office of Economic Stabiliza tablished under James F. Byrnes.
8—Gold mines ordered closed bec manpower shortage in metal minin
10—Procurement agencies ordered t contracts in less critical labor are
15—Fuel oil rationed in East and Mid
21—Revenue Act of 1942 authorizes in income taxes.
27—Labor Requirements Committee est

November:
2—Controlled Materials Plan announ
6—WMC announces "manning tabl for orderly withdrawals of war into armed services.
7—American troops land in North A
11—WPB reorganized in relation to C program vice chairman. Divisional ments Committees established.
13—Draft age lowered to 18.
30—Steel mill scrap stocks now up cent over low point in preceding

December:
2—Petroleum Administration for Wa lished.
4—New production scheduling prog nounced by WPB.
5—Selective Service transferred to W
9—Aircraft Production Board establish ore shipments exceed 92 million 1942 shipping season; new record
17—Leon Henderson resigns as Price istrator, effective Jan. 18, 1943.
22—Government overtime pay law a on temporary basis.
29—Inventory control of consumer g dered for wholesalers and retaile
31—Manpower shortage developing industry. Steel production tops 86 tons in 1942. Machine tool output shipments $1,329 million.

—1943—

January:
1—Steelmaking capacity 89,599,960 t
2—Production goals for 1943 doubl of 1942, including 100,000 pla
6—War budget exceeds $100 billion.
7—OPA bans pleasure driving.
14—Casablanca Conference.
30—Mineral Resources Co-ordinating mittee in WPB organized.

February:
2—Russia victor at Stalingrad.
9—Minimum work week of 48 hours by President.
16—Wilson named executive vice of WPB with broad powers.
20—Rubber Development Corp. es Bedrock civilian needs program by Office of Civilian Supply.
26—First general scheduling order critical components.

March:
2—Wilson freezes hiring of new per
5—Drive launched for more open-he steel production. Lend-Lease s ments to Russia up to Feb. 1, ported at 580 000 tons.
10—Truman War Production In Committee files second report. Resources Planning Board post

presented to Congress.
-Senate establishes committee on postwar economic policy and planning.
-Smaller War Plants Division of WPB transferred to Smaller War Plants Corp.
-WPB reorganized for third time.
-Rationing of ments and protein foods initiated.
-Alloy steel output in month totals 1,-253,709 tons, new record.

-Rationing of canned fruits and vegetables begins.
-President issues "hold the line" order to freeze prices and wages.
-War Food Administration established. Solid Fuels Administration established.
-WPB priorities to rubber program blamed for high-octane gasoline shortage.
-Lake ore shipping season starts month late due to bad weather.
-Work stoppages curtail steel production.

-Government takes over coal mines in strike. Functions of Office of Civilian Requirements clarified. WMC orders 48-hour work week in steel industry effective Nov. 1.
-Wartime overtime pay act approved.
-Axis surrenders in Tunisia.
-Army announces savings of nearly $2 billion through renegotiation of contracts by Price Adjustment Boards.
-Office of War Mobilization established by Byrnes.

-Steel production held down by sporadic strikes in coal mines.
-Bernard M. Baruch becomes adviser to James in Office of War Mobilization.
-Pay-as-you-go tax bill approved.
-Development of steel cartridge case hailed as one of the miracles of the war.
-War Labor Disputes Act passed over Presidential veto.
-Scrap production drive launched to overcome estimated 26 per cent deficiency.
-Chief of Planning and Statistics in WPB resigned.
-Steel cutting down steel labor forces. Employment in mills 28,000 below year ago.

-Steel expansion program behind schedule because of low priorities. Government reports about 75 per cent completed, with steel capacity indicated at 91 million tons.
-Plan to distribute domestically some 1,000,000 tons of steel purchased on Lend-Lease for Russia but not shipped.
-Machine tool production. In June $108,-000,000. Production resumed on 10 essential household articles.
-War conditions production index stands at 111 compared with 79 at beginning of war.
-Office of Economic Warfare established.
-Mussolini ousted.
-Nine war contracts being canceled.

-Lightweight, flexible pipelines of steel play big role in Sicilian campaign.
-Moscow conference.
-Steel Institute announces 165,000 steel industry employees in armed forces.
-WMC issues job classifications in draft to protect war production.

-Allies invade Italy. Badoglio government signs armistice.
-Financial reports indicate continued rise in steelmaking costs and lower output per worker.
-Demand for alloy steel slackening.
-Baruch manpower report urges deferment of essential workers and pooling of labor in critical areas.
-Foreign Economic Administration established.

-Expanded alloy steel capacity presents problem.
13—Italy declares war on Germany.
18—Steel Institute issues manual on packaging steel for overseas shipment.
19—Moscow conference.
20—War Contracts Adjustment Board formed to handle renegotiation problems. Bad weather cuts down ore movement on Great Lakes.
25—Bowles named OPA administrator.
31—Steel production for month is 7,819,061 tons, new record, with steel ingot rate at 101.3 per cent.

November:
5—Truman committee urges attention to problems of contract termination, surplus property disposal and reconversion.
6—Baruch named director of unit for war and postwar adjustment policies in OWM.
18—Senate Committee report on reconversion.
21—Steel allotments for domestic transportation increased. U. S. landing on Tarawa.
22—Cairo conference.
30—Steelworkers' earnings at new high on both hourly and weekly basis. Nelson presents reconversion policy.

December:
1—Teheran conference.
8—West Coast manpower program.
10—Selective Service Act amended.
21—Pig iron allocation removed by WPB.
24—Eisenhower named Allied commander in Europe.
27—Army takes over railroads to prevent threatened strike.
28—Striking steelworkers return to jobs after brief walkout as WLB modifies ruling.
31—Four aluminum pot lines close in first major cutback in aluminum production. Steel production for 1943 totals 88 872,598 tons, fourth consecutive year of record output.

—1944—

January:
1—Steel capacity now rated at 93,648,490 tons.
4—Russian Army enters Poland.
8—Byrnes authorizes uniform termination article for fixed-price war contracts.
9—Program of 65,000 landing craft announced.
10—President's message to Congress asks for realistic tax law, continued renegotiation, economic stabilization, National Service Act.
12—WPB reaffirms policy of restricting non-military construction.
17—WPB Director Nelson says there can be no general resumption of civilian production while major offensives are ahead.
22—Anzio.

February:
12—Nelson says small business must be given first opportunity to reconvert.
15—Baruch-Hancock report on War and Post-war Adjustment Policy.
19—Surplus Property Administration established.
25—New revenue bill passed over Presidential veto; revises and continues renegotiation, and provides for War Contract Price Adjustment Board.

March:
3—Third Truman Committee report urges further preparation for resumption of civilian production.
7—Nelson outlines WPB policies on cutbacks and resumption of civilian production.
14—Selective Service order cancels deferments of men 18 to 26 except certified key men.
21—Decide not to ration coal in 1944.

April:
1—Steel output in first quarter of year record-breaking.
17—Reconversion of auto industry discussed at meeting of Automobile Industry Advisory Committee.
20—National Service Act urged by War and Navy secretaries, or legislation to draft workers for war industry. March plate shipments total 1,204,000 tons, highest of war period.
29—Surplus War Property administrator announces basic policies for disposition of property under war contract terminations.

May:
5—Steel industry's profits in 1943 show 5.1 per cent earned on investment—lower than in many peacetime years.
6—Steel industry employment off 40,000 in six months, largely due to draft.
9—Resumption or expansion of civilian production prohibited in Group I and II labor areas, subject to exceptions for Group II areas.
10—Forrestal named Secretary of Navy.
13—Lend-Lease Act extended through June, 1945.
17—WPB holds emergency conferences on critical manpower shortage in foundries.
22—Brewster fighter plane contract canceled effective July 1.
25—Production Executive Committee Staff formed to study and recommend action on cutbacks and reconversion.
31—Steel industry payrolls during May set new record with wage earners averaging over $56 per week.

June:
1—U. S. Army revealed as having used 27 per cent of total steel output in 1943 and 24 per cent in 1942.
4—Allies occupy Rome.
6—D-Day. Preferential treatment for smaller war plants authorized in any relaxation of quotas on civilian production.
14—Americans land on Saipan.
15—Steel industry preparing for re-employment of returned war veterans. First German robot bomb reported by London.
17—Tank and truck program enlarged.
18—Nelson announces plan to issue four reconversion orders.
22—GI Bill of Rights approved.
23—Alloy steel demand declining.

July:
1—Contract Settlement Act approved. Steel capacity at midyear placed at 94,050,750 tons; blast furnace capacity at 68,446,000 tons. Wartime expansion program virtually completed.
11—Release dates set on reconversion orders.
15—Aluminum order relaxed.
18—Tojo and Jap cabinet resign.
22—Limited production of postwar experimental models authorized.
26—General Somervell orders 54-hour week for civilian workers of Army Service Forces.
27—American break-through in Normandy.
29—Unrated orders permitted on machine tools for civilian production.

August:
1—New manpower controls in unessential industries in tight labor areas announced.
3—Increased output of heavy truck and bus tires sought.
11—Cutback in aircraft production and shift to larger planes announced.
15—Allies land in Southern France. Priorities Reg. 25, spot authorization plan, authorizes resumption of civilian production where labor, materials and facilities are available.
19—Navy takes over five strike-bound plants on West Coast.
21—Dumbarton Oaks conference.
23—Rumania signs armistice with Russia.
24—Nelson leaves on presidential mission to China. J. A. Krug named acting chairman of WPB as C. E. Wilson resigns as executive vice chairman.
25—Paris liberated. WPB requires Area Production Urgency Committee approval for increase or resumption of production except by small companies.
31—Net earnings of steel companies in first six months 1944 down 50 per cent from first half of 1937.

September:
1—Rubber Bureau replaces Office of Rubber Director.
6—Army releases demobilization plan. WPB announces policy of virtually unrestricted

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Carbuilders Look for Moderate Increase in Freight Car Orders

Brisk spurt in passenger car construction also forecast. Preliminary estimates of freight car awards placed at 50,000 for 1945 and around 65,000 for 1946. Expect easing in steel and other raw material supplies. Immediate trend uncertain

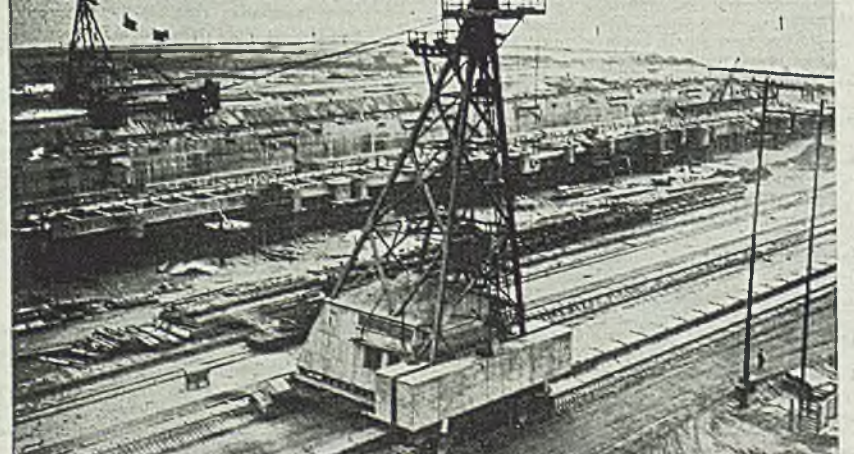
ALTHOUGH not inaugurated necessarily by any immediate spurt, domestic freight car buying should undergo a moderate increase during the next 12 months or so. With awards up to the middle of August amounting to approximately 25,000 cars, some trade interests look for the total for this year to involve around 50,000 cars, with the remaining four months of 1945 averaging better than 5000 cars per month. Next year, according to present tentative estimates, domestic freight car purchases should involve around 65,000 cars.

These two yearly figures would compare with 53,221 in 1944, a decrease for this year, and increase for next year. Both this year and next, on the basis of present estimates, would run substantially heavier than in 1943 and 1942, but fall far short of 1941, when around 120,000 cars were placed in an effort to meet mounting war requirements. Next year should compare fairly closely with the best prewar years and be much better than the average for the 10 years before the war, which included the deep depression years, in which purchases in at least two were almost negligible.

The immediate months following the end of the war are particularly difficult to forecast, some trade leaders declare. Steel supply should loosen up rather rapidly; and the same should be true with other required materials. However, the business confusion immediately following the collapse of Japan may result in the carriers moving cautiously until the situation clarifies.

Some sellers of car steel, although a minority, doubt if the average for the remaining four months of this year would run even as high as above indicated. Still others, likewise a minority, believe that purchases may average much heavier, reflecting particularly purchases late in the year. As a matter of fact, the disposition generally is to look for more activity late in the year than over the next two months. Not infrequently year-end buying has been substantial, due to the fact that programs for the ensuing year are not lined up much before that time.

Passenger car construction, held under sharp war-time restraint until a short while ago, is expected to take a brisk spurt, not only with a view to augmenting existing equipment, but



FOR SALE: This $187,000 cableway system which helped build the Navy's drydocks at Terminal Island, Calif., where kamikazed battlewagons were repaired, is being offered for sale to the highest bidder by the government

placing outmoded equipment wi
of modern design, providing ne
forts and convenience and unsu
to date in general attractiveness.
has to be done if the railroads
compete successfully for postwar
Various orders for streamlined c
now under contract or up fo
consideration. The New York
inquiry for 95 up to 265 sleepe
baggage cars, up for bidding l
month, is possibly the largest s
out at present.

There has been much wear a
on equipment during the recen
gency years, but the railroads se
stantial drop in traffic now that
has come to an end, and for tha
may not be disposed to buy too
for a while. There should be i
ment in domestic freight car bu
compared with the past couple
or so, but no great splurge, it
phasized, simply because of the
wear on equipment, or becaus
rials and manpower will be in m
ter supply. Too, the railroa
learned much during the past em
in making the most of what the
and that should also be a facto
future trend of buying.

Carbuilders Not Overly Optim

Nor are carbuilders overly o
over the postwar export outlook
tainly there is less optimism t
eral months ago when France,
stance, was talking about 74,0
for rehabilitation and fairly su
lists were being discussed in oth
ters. The French list subsequen
cut, at least insofar as the earl
was concerned, to 36,500 cars, a
this appears out of the picture.

For one thing, France wan
equipment the end of this yea
least most of it, so as to be
much as possible by lend-lease f
Plans for this equipment dragg
delivery of much of it by the
this year appeared out of the
Further, it developed, so it is
that considerable equipment wh
many had siphoned from the
countries was available, and s
too badly in need of repair, s
could be utilized again in Fra
the other European countries fro
it was originally taken.

So far as reported, only 1500
cars are now on order for Franc
were placed some time ago,
going to the Ralston Steel Car
lumbus, O., and 700 to the
Car & Foundry Co. Despite li
backs in the Army program, it
probable that orders will be pla
for many hospital cars.

Further, there is the need fo
ment in these countries, and
buildings and repair facilities
ciently restored, these countries

(*Please turn to Page* 20

Conservation of High-Grade Ore Reserves Urged

Mining engineer, in memorandum to War Production Board, suggests moves to assure ore supply in emergency

VOICING alarm at the rapid rate at which irreplaceable reserves of high-grade open-pit iron ore are being exhausted, W. R. Van Slyke, Eveleth, Minn., a mining engineer of long residence and experience on the Mesabi iron range in Minnesota, in a memorandum to the War Production Board advances a number of suggestions for the conservation of high-grade open-pit iron ore reserves.

To assure the United States a permanent and strong strategic position in world affairs, Mr. Van Slyke in the memorandum states he believes the federal government must make certain that a large and readily accessible supply of high-grade iron ore for emergency use will be available at all times.

He suggests two steps for this purpose. The first is to acquire absolute control of a 300 to 400-million-ton reserve of high-grade open-pit ore in the Mesabi range and put and keep from a third to half of this reserve in condition for instantaneous production.

Suggests Raising Ore Prices

The second step is to raise present ore prices at the mines at least $1 per ton to make economically possible large scale mining of underground ore and beneficiating of low grade ores, including taconite, as offsets against curtailed open-pit operation. This can be done, he says, either by a flat increase in the Lake Erie price of ore or by combining reduction in tax burden on ore and reduction in upper lake rail freights with an increase in prices of Lake Erie ore.

During World War I, says Mr. Van Slyke, the Mesabi was in its prime and easily able to meet needs for rapidly expanded production. In World War II, the Mesabi was well past middle age but production from open pits had been tremendously increased and on the return of peace, reserves of readily minable high-grade open-pit ore are materially depleted.

According to E. W. Davis, director of the Mines Experiment Station of the University of Minnesota, Mesabi reserves of open-pit ore and concentrate amounted to approximately 615 million tons on Jan. 1, 1944. Shipments of about 60 million tons in 1944 reduced this to about 555 million tons and 1945 production will leave reserves of about 500 million tons.

Close of the German and Japanese phases of the war, followed by postwar reconstruction, will require sustained production of iron ore and it will take only a few years at present or near-present rates to reduce open-pit reserves to a point that it will be impossible again to increase output sufficiently to meet another crisis.

If the above suggestions were taken however, Mr. Van Slyke says, the United States would be prepared for any emergency and under a peacetime economy an iron ore famine need never be feared. Domestic production from the remaining open-pit mines, accompanied by resuscitation of underground mining and development of technique for utilizing the great reserve of low-grade ores and import of foreign ores could be made to provide indefinitely for peacetime needs.

At present, underground reserves of merchantable Mesabi ore are estimated at 300 to 400 million tons and supplies of low-grade ores, chiefly taconite, are seemingly inexhaustible. Underground mining is negligible on the Mesabi because under present price ceilings these operations result in loss. Utilization of taconite also must await increased iron ore values to justify investment in beneficiating plants.

Mr. Van Slyke believes that while the government should act to increase iron ore value at the mines it should also consider advisability of placing floors under such values as further encouragement to mining higher cost and lower grade ores, as a further deterrent to exhaustion of higher grade and more cheaply minable ore.

The more strongly underground mining becomes established in the Lake Superior district and the larger the capital investment in concentrating plants the more steady will be the value of iron ore, even without OPA ceilings and floors, at levels substantially above those now existing, due to withdrawal of this strategic ore from competition. At the same time underground mining and beneficiating would create fields for postwar employment.

Mr. Van Slyke suggests that questions to be worked out in acquiring the strategic reserve would include how the properties are to be acquired, how ownership and leaseholds are to be recompensed, how much should be paid for the reserves, how tax interests of state, county and local divisions are to be adjusted and by whom and on what basis the reserves are to be operated when a crisis impends.

TRANSITION TOPICS

THE ROAD BACK—Transition to peacetime economy beset with problems comparable to those of mobilizing for war. Munitions contracts totaling $32 billion canceled. Unemployment expected to rise to 6.2 million by December. See page 97.

RAILROADS—Domestic freight car buying to increase moderately in next year. Purchases in 1946 estimated at 65,000 units. See page 104.

HOUSING—Wagner-Ellender bill would grant additional federal aid for dwelling construction. Goal is 1,250,000 units a year. See page 106.

POSTWAR MARKETS—Survey by Committee for Economic Development shows manufacturers expect large volume of business in first full postwar year. Manufactures may top $80 billion. Employment may about balance demand for jobs. See page 109.

WEST COAST—United States Steel Corp.'s position believed strengthened by plans for expanding at Columbia Steel. See page 119.

AIRCRAFT—Billion dollar development and procurement program of Army and Navy to help cushion impact of war contract cancellations for planemakers. See page 120.

GEAR "ROLLING"—Twenty-five years in development, ingenious fixtures finally evolved for gear "rolling" are lifting horizon for this simple, fast and accurate testing method. See page 126.

LABORATORY PROGRESS—Results from war-period grain-size studies encourage intensified investigation. See page 128.

STAINLESS CLADDING—Opportunities for use of stainless clad metal expected to increase in proportion to growing importance of process and product. See page 145.

Wagner-Ellender Bill Designed To Encourage Postwar Building

Home construction at rate of 1,250,000 units annually predicted if additional federal assistance is approved. Program would involve expenditure of about $6 billion annually, larger than in any previous year

ENACTMENT of S. 1342, the Wagner-Ellender National Housing Policy bill, will be good news for business in the immediate postwar period, spokesmen for the National Housing Agency declare. With the additional assistance that would be given by the government under this bill, they believe, housing construction should be in the neighborhood of 1,250,000 units per year. At an average investment of $5000, this would come to an annual house building program of some $6 billion a year.

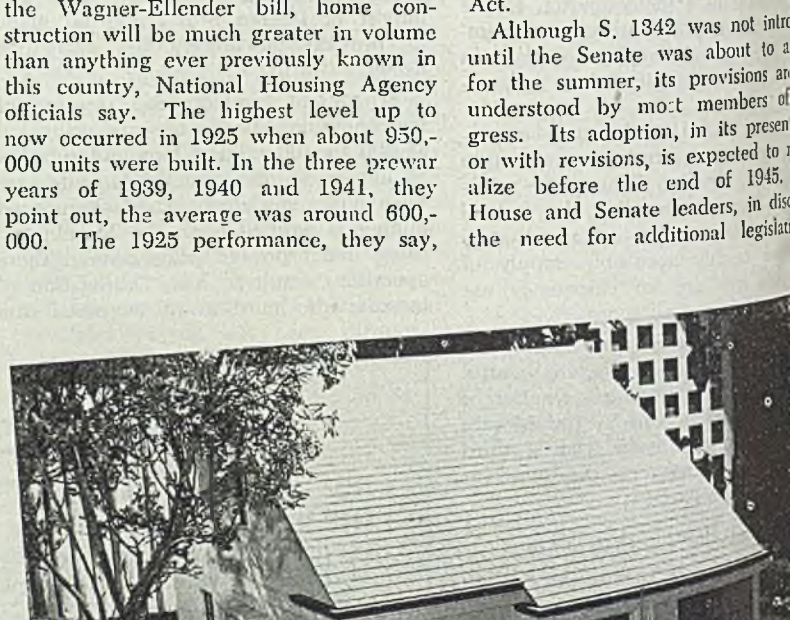
Such a program, they figure, would provide 1.5 million jobs directly on building sites, good for an average of 40 weeks a year. It would provide indirectly for some 2.5 million jobs, averaging 47 weeks a year, in manufacturing plants, on railroads and truck lines, and in distribution capacities.

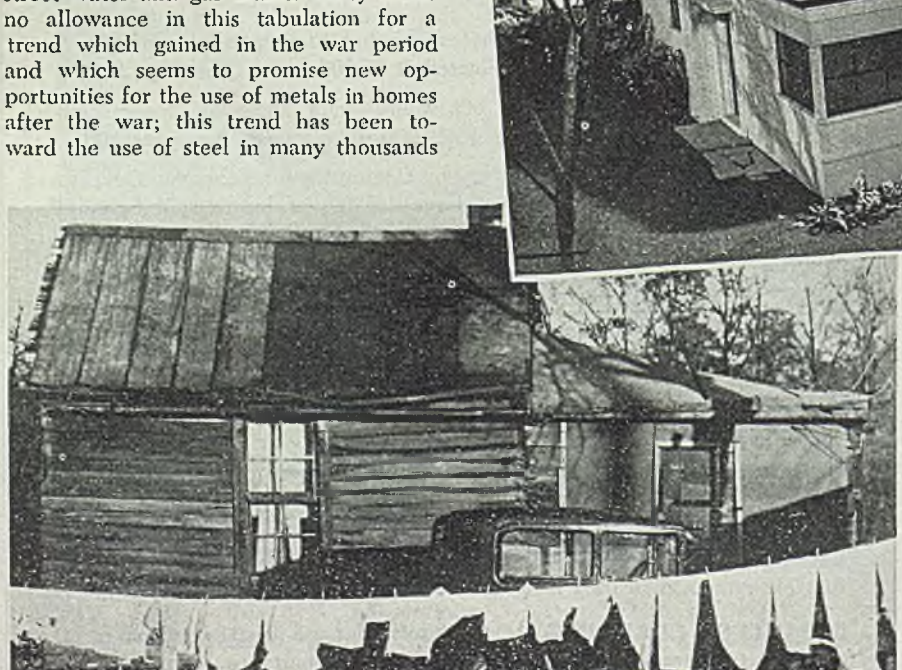
Recently, National Housing Agency statisticians compiled some figures to show the extent to which various materials were used in home construction before the war. About 5 tons of metals, they found, were used in the average prewar home. This included building hardware, bathtubs and other plumbing, gutters and downspouts, furnaces and radiators, refrigerators, washing machines, and pipe connections with street water and gas mains. They made no allowance in this tabulation for a trend which gained in the war period and which seems to promise new opportunities for the use of metals in homes after the war; this trend has been toward the use of steel in many thousands of prefabricated buildings and also toward the use of prefabricated housing parts — as the steel porches, closets and staircases in the homes at Clairton, Pa., occupied by employees at the Irwin Works of Carnegie-Illinois Steel Corp.

If the home building does come to approximately 1,250,000 units per year, as contemplated by the proponents of the Wagner-Ellender bill, home construction will be much greater in volume than anything ever previously known in this country, National Housing Agency officials say. The highest level up to now occurred in 1925 when about 950,000 units were built. In the three prewar years of 1939, 1940 and 1941, they point out, the average was around 600,000. The 1925 performance, they say, represented a spurt rather than a tained activity, whereas the Wa Ellender bill provisions are aim creating stability in home building struction.

The $6 billion annual home bu program envisioned above for the war period, these spokesmen poin makes no provisions for other con tion or for home repairs and ma ance. They point out that other g ment agencies have calculated that construction, including factory bui airport buildings, office buildings, buildings, bridges, etc., may well to $9 or $10 billion a year. Ho pairs and maintenance, they es should involve expenditure of som billion annually. The machine giving government financial assista home repair work already exists i I of the Federal Housing Adminis Act.

Although S. 1342 was not intro until the Senate was about to a for the summer, its provisions are understood by most members of gress. Its adoption, in its presen or with revisions, is expected to r alize before the end of 1945. House and Senate leaders, in disc the need for additional legislat





Home building on an unp cedented scale is expected to s within a few months and in a tion to providing better housing more people will provide post jobs and postwar markets for terials. Slum dwellings such shown at left will go in the ea a modernization program assi by federal funds. Shown abov a typical modern home for dustrial workers earning from to $50 a week. Without lot, it cost about $4700. NEA photo

It is reported that . . . . . .

The National Interregional Highway Committee and the American Trucking Association have agreed on the continuance of the schedules of truck sizes and weights accepted by the states for the war emergency. *Engineering News Record.*

get ready with CONE for tomorrow

An electronic tube has been developed capable of amplifying grid currents as minute as .00000000000001 ampere. *Ohmite News.*

get ready with CONE for tomorrow

Two industrial plants have installed steam-heated sidewalks to make snow shoveling unnecessary. *Erco Mfg. Co., Bethlehem, Pa., Merrill Rubber Co., Buffalo, N. Y.*

get ready with CONE for tomorrow

A compound called "2-4-D" is being tested on golf greens. It appears to be successful in selectively killing weeds without damaging the grass. *Science Digest.*

get ready with CONE for tomorrow

More than 200 industries, including the manufacturers of chewing gum, glass, synthetic rubber, drugs, textiles, paper and printing are finding that controlled heat and humidity (air conditioning) are essential to their work. *Wall Street Journal.*

get ready with CONE for tomorrow

A new laboratory exclusively for the study of jet propulsion fuels and lubricants has just been put into operation. *Wood River, Illinois.*

get ready with CONE for tomorrow

An electronic device rides with a test pilot and sends back eighty instrument readings per second covering stresses, temperature and speed. *Consolidated-Vultee.*

get ready with CONE for tomorrow

A new variation of the magnetic sound recorder uses a paper tape covered with powdered iron. It is claimed to be cheaper and more efficient than wire. *Radio & Television Retailing.*

This country's production of electrical instruments has increased 4,000 per cent since the beginning of the war. *Electrical Manufacturer's Public Information Center.*

get ready with CONE for tomorrow

A new semi-precious stone derived from deposits in this country is called "Hemetine." *Gabriel Williams Co., N. Y.*

get ready with CONE for tomorrow

A new pencil is said to make 12 carbon copies without cutting the paper. *Reliance Pencil Co., Mt. Vernon, N. Y.*

get ready with CONE for tomorrow

One of the suggested improvements in locomotive power is the use of mercury vapor in place of steam. *Business Week.*

Lace can now be made on a foundation of polyvinyl alcohol sheeting which is easily dissolved after the weaving is done. *E. I. duPont deNemours.*

get ready with CONE for tomorrow

An automatic headlight dimmer uses an "electric eye" to dim the lights on one car when the lights of another approach it. *Arrow Safety Device Co., Mt. Holly, N. J.*

get ready with CONE for tomorrow

Tetra Cresyl Silicate has been found far superior to water for the transference of heat. By its use a temperature of 800 degrees could be piped around the house from a central plant and could be used to heat stoves, irons, water tanks, or small appliances. Connected in summer to a refrigerating plant, it could also cool the house. *Science Digest.*

get ready with CONE for tomorrow

One of the largest American drug manufacturers has set up a "pilot farm" to experiment with the growing of drug plants that were formerly imported. *S. B. Penick & Co., N. Y.*

help business and encourage employment in the reconversion and postwar periods, promised a high priority for housing legislation after Congress reconvenes.

The heavy spade work in mapping out the national housing program already has been done, by the Housing Subcommittee on Postwar Economic Policy and Planning; it was out of the study by this subcommittee that the Wagner-Ellender bill grew. During the hearings of this subcommittee it became apparent that partisan politics would play little part in the creation of a national housing policy.

Sen. Robert A. Taft (Rep., O.), chairman of the Housing Subcommittee, already has gone on record with a statement that it should be a simple matter to agree on satisfactory revisions in S. 1342 in conference with its sponsors, Senators Robert F. Wagner (Dem., N.Y.) and Allen J. Ellender (Dem., Miss.).

House Companion Bill Expected

No companion bill yet has been introduced in the House but that omission should be remedied as soon as the House again is in session. The study in the House has been concentrated in the House Committee on Economic Policy and Planning, and this committee headed by Rep. William M. Colmer (Dem., Miss.), recently went on record as approving the general program recommended by the Taft subcommittee, and largely incorporated in the Wagner-Ellender bill. It is possible the House bill may be introduced by Rep. Jerry Voorhis (Dem., Calif.) with the blessing of Rep. Jesse P. Wolcott (Rep., Mich.); both are members of the House postwar economic committee.

To encourage a large volume of housing construction after the war, the Wagner-Ellender bill would continue three prewar building aid programs: 1—The Federal Housing Administration program under which the government insures mortgages on privately financed homes; 2—the Federal Home Loan system which smooths out problems of home construction by loaning money to savings and loan associations; and 3—the Federal Public Housing Authority program for providing federal financial assistance to local housing authorities, in the form of loans or subsidies, for building low-rental housing in connection with slum clearance projects.

The Wagner-Ellender bill also would set up some additional government aids.

It would create a program of federal research covering building materials and home construction methods; the purpose is to lower the cost of low-cost housing of satisfactory construction. The National Housing Administrator is directed to make an inventory of all research presently under way in the United States, either privately or publicly sponsored; he would render aid when necessary to intensify desirable research studies, and he would organize additional studies to fill existing gaps in the national setup. The objective is a continuing research campaign on all economic and market factors involved in efficient direction of the national housing program.

The Wagner-Ellender bill would create an important new mortgage insurance system to encourage life insurance companies and other monied institutions to invest on a larger scale in construction of houses for rent; under this policy they would own housing developments outright and operate them instead of acting merely as mortgageholders. The government would guarantee these institutions a minimum yield of 2¾ per cent annually, with depreciation at 2 per cent a year. But there are incentive features to encourage efficient operation and management. For instance, the rentals in a new building would be set so as to return 3¼ per cent on the investment. When, through efficient management, the yield became greater, the profit would be greater and the mortgage could be written off faster. Of earnings between 3¼ and 4 per cent, for example, half the amount over 3¼ per cent would be added to the operator's profits and the other half would go toward faster retirement of the investment. Under the incentive provisions, investments might be retired in 35 years instead of the standard term of 50 years.

As indicated by the investment retirement terms, 35 to 50 years, it is assumed in the bill that the houses—or apartments—will be of substantial construction. This plan is intended to be self-supporting; it really is an extension of the FHA system of insuring mortgages on privately financed individual houses.

Slum Clearance Provisions

The bill incorporates a plan for federal financial assistance for cities faced with the problem of redeveloping blighted and slum areas. The federal government would lend funds for a long term at interest not above the federal going rate—which now is approximately 2½ per cent. The cities would buy the land by condemnation procedure and would clear it and sell or lease it for new housing construction at prices in line with the new value of the land. In addition to the original loan the National Housing Administrator could make annual contributions to a city, with matching contributions by the city.

The scheme is one that the cities will greet with favor, according to qualified witnesses who appeared during the hearings of the Taft subcommittee; under it a city would be able to recoup itself in three ways for any losses between buying and clearing a site, on the one hand, and selling or leasing it on the other. It would benefit from the spread between the low rate of interest charged by the government (or by private l when the latter are willing to f the money at a competitive rate) a commercial rates of interest that it charge on amounts due under sa lease agreements. It would benefit the federal contributions which be made annually if the National ing Admistrator considered them necessary to encourage slum cle and redevelopment. And the city be able to collect somewhat high rates after redevelopment.

Would Foster Low-Cost Constru

The Wagner-Ellender bill wou crease funds for disposal unde Federal Public Housing Authority for encouraging construction of rental homes, but it would lim extension of this type of assistan persons in very low income group

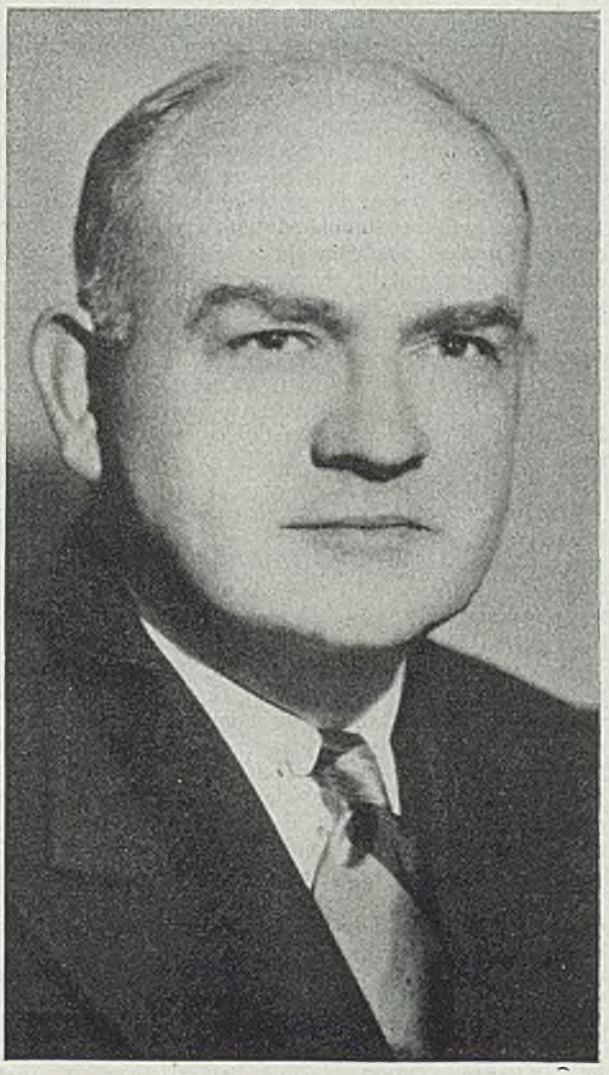
The bill would provide help fo house construction under two plans would provide for direct loans b Department of Agriculture at 3 pe interest for terms as long as 40 for financing construction, rehabil and repairs of farm houses. The plan would extend the Federal Housing Authority loan plan so assist tenant farmers and other income farmers in renting or pu ing homes.

The Wagner-Ellender bill, incide ly, would continue the National H Agency as the government's one embracing housing agency. This tinues the wartime setup creat executive order of the Presiden mediately after Pearl Harbor.

The Taft subcommittee repor commends a plan which the W Ellender bill does not now includ whose incorporation in the bill no will be insisted on by Senator This plan has to do with lower-housing built for sale. Under the mortgage insurance plan the builde obtain a conditional mortgage ins commitment; this enables him ahead with his business with assu that the FHA will insure the mo on a new house after it has been pleted and an acceptable buyer for it. The recommendation in the report would enable the FHA to firm commitments on multiple h developments—say, in a case a builder wanted to construct 300 at the rate of 100 a year. The subcommittee felt that such an ar ment not only would encourage con tion of lower-priced housing on a scale but would enable builders to more effectively and thus achieve mies in land costs, in the purch materials, in hiring labor, in ut equipment and in other ways. builders consulted on this plan th that firm commitments beforehand reference to mortgage insurance enable them to reduce their bu costs by as much as 15 to 20 pe

Value of Manufactures In First Year of Peace May Top $80 Billion

Survey of manufacturers and trade associations shows expectations of rise in output of 42 per cent over 1939. Total employment may be around 53.5 million, approximately enough to balance need for jobs



T. G. MacGOWAN

ERICAN manufacturers plan to ce about 42 per cent more goods first full year after the war than made in 1939. Should their exions prove to be correct, early postanufactures in this country will be $80,518 million, compared with 69 million in 1939, both figures at the 1939 price level.

e figures were obtained from 1406 manufacturers and from 158 associations with more than 20,000 ers by the Committee for Economic opment in a study covering more 18 months. The survey was super- by T. G. MacGowan, manager of et research for the Firestone Tire bber Co., Akron, who is chairman CED marketing committee. Mr. Gowan was assisted by more than 50 of the nation's leading market specialists.

When the survey was started, it was assumed arbitrarily that the war against Japan would end sometime in 1946 and that 1947 would be the first full peacetime year. The sudden collapse of the Nipponese, earlier than was anticipated when the survey was started, will make 1946 the first full postwar year. Most of the conditions considered by the manufacturers in making their estimates for 1947 now should apply with equal force to 1946. However, it appears that government agencies and perhaps manufacturers have been caught short in their reconversion preparations and the shift to civilian goods production may take a little longer following the end of the war than had the conflict run its anticipated course.

While making it plain that the study is not intended as a prediction of total national employment in the first full postwar year, Mr. MacGowan said that in 1939 we needed 10,078,000 workers to produce the $57 billion worth of goods manufactured in that year. Allowing for increased efficiency and other factors, we shall require approximately 13,469,000 workers to produce the $80 billion worth of manufactures in the first full postwar year. If 1939 ratios of manufacturing employment hold good after the war, the total number of employed civilians may be about 53,448,000, he added.

The CED marketing committee divides the postwar years into three more or less distinct periods:

Period One—The transitional interval in which industry reconverts its productive facilities to peacetime uses, and in

TABLE I

How Industry Estimates Markets in 1947 in the 20 Chief Manufacturing Groups

Industry	Value of Manufactures 1939 Price Level (Millions of Dollars) 1939	Estimated 1947	Per Cent Increase Est. 1947 over 1939
Non-Durable Goods			
Food and kindred products	$10,618.0	$14,185.6	33.6%
Tobacco products	1,322.2	2,240.0	69.4
Textile and fiber products	3,930.7	4,997.9	27.2
Apparel and other fabric products	3,325.0	4,136.3	24.4
Paper and allied products	2,019.6	2,579.3	27.7
Printing, publishing and allied industries	2,578.5	3,359.8	30.3
Chemicals and allied products	3,733.7	5,907.3	58.2
Petroleum and coal products	2,954.0	4,023.5	36.2
Rubber products	902.3	1,329.2	47.3
Leather and leather products	1,389.5	1,699.3	22.3
Total Non-Durable	$32,773.3	$44,458.2	35.7%
Durable Goods			
Lumber and timber basic products	$1,122.1	$1,412.8	25.9%
Furniture and finished lumber products	1,267.7	1,872.5	47.7
Stone, clay and glass products	1,440.2	2,062.6	43.2
Iron and steel and their products, except machinery	6,591.5	9,052.4	37.3
Nonferrous metals and their products	2,572.9	3,710.1	44.2
Electrical machinery	1,727.4	2,698.3	56.2
Machinery, except electrical	3,254.2	4,961.1	52.5
Automobiles and automobile equipment	4,047.9	7,117.6	75.8
Transportation equipment, except automobiles	882.9	1,539.1	74.3
Total Durable	$22,906.7	$34,426.5	50.3%
Miscellaneous Industrial	$ 1,163.0	$ 1,630.3	40.2%
Grand Total (all manufacturing industry)	$56,843.0	$80,515.0	41.6%

which a large part of the job of unwinding the war economy will be accomplished.

Period Two—The catching-up-with-accumulated-demand stage. During the beginning of this period an abnormally large number of persons will be in the armed services. During the whole of this stage sales will be stimulated both by demand for goods unobtainable or scarce during the war and by the presence of very large savings.

Period Three—The stage in which we attempt to shift successfully to a self-sustaining basis. Jobs will depend upon current demand and current income. The full effects of the increase in the labor force and the wartime increase in productivity will now be felt.

The first period is one in which good planning and speedy and orderly execution of plans by both government and business can bear sound fruits in minimizing transitional unemployment. The third period is the one which economists believe is basically fraught with danger to our economy and its institutions. However, the second period is of more immediate moment because its dangers and problems are nearer at hand. It is important not only for its own sake but because it is essential that during this period we prepare to cope with the problems of the period to follow.

The CED survey covers the second period, or catching-up-with accumulated-demand stage. This, the committee decided, would be the first full year after hostilities end.

Here are the figures showing the actual value of United States manufactures in 1939 and the estimates of employers and trade associations as to the value of production in the first full postwar year (1947 in the committee's questionnaires):

TABLE II

Value of Manufactures at the 1939 Price Level (Millions of Dollars)

Industry	1939	1947	% Increase
Nondurable	$32,773.3	$44,458.2	35.7
Durable	22,906.7	34,426.5	50.3
Miscellaneous	1,163.0	1,630.3	40.2
Total	$56,843.0	$80,515.0	41.6

Broken down into the 20 chief manufacturing groups into which the 1939 census of manufactures was divided, actual 1939 production and estimated output in the first full postwar year are shown in Table I. Percentages of increase range from a high of 75.8 in "automobiles and automobile equipment" to a low of 22.3 for "leather and leather products." Machinery ranks high on the list with an estimated increase of more than 52 per cent; iron and steel holds a middle position with an estimated increase of 37.3 per cent.

Estimates for subclassifications in the iron and steel, nonferrous metals, electrical machinery, machinery, and automobiles and automobile equipment are shown in Table III.

After showing what industry believes

TABLE III

How Industry Estimates Markets in 1947 in Manufacturing Subclassifications in Chief Metalworking Industries

		Value of Manufactures at the 1939 Price Level (Millions of dollars)	Per Inc Est
	Iron and Steel and Their Products, Except Machinery	1939	Estimated 1947
1411	Blast furnace products	$ 550.8	$716.9
1412	Steel works and rolling mills	2,720.0	3,680.5
1421	Gray-iron and semisteel castings	209.7	291.8
1422	Malleable iron castings	53.5	74.2
1423	Steel castings	135.5	219.9
1424	Cast iron pipe and fittings	65.1	91.2
1430	Tin cans and other tinware not elsewhere classified	372.6	521.4
1441	Wire drawn from purchased rods	176.5	223.1
1442	Nails, spikes, etc., not made in wire mills or in plants operated in connection with rolling mills	12.9	14.4
1449	Wirework not elsewhere classified	158.3	208.0
1451	Cutlery (except aluminum, silver and plated cutlery) and edge tools	59.9	78.3
1452	Tools (except edge tools, machine tools, files and saws)	75.3	97.9
1454	Saws	18.5	26.3
1459	Hardware not elsewhere classified	154.5	213.9
1461	Enameled iron sanitary ware and other plumbers' supplies (not including pipe and vitreous and semivitreous china sanitary ware)	125.6	181.7
1462	Oil burners, domestic and industrial	18.5	32.7
1463	Power boilers and associated products	141.0	180.5
1464	Steam and hot-water heating apparatus (including hot-water furnaces)	45.4	61.0
1465	Stoves, ranges, water heaters and hot-air furnaces (except electric)	223.4	317.5
1466	Steam fittings, regardless of material	112.0	151.2
1469	Heating and cooking apparatus, except electric, not elsewhere classified	20.3	38.6
1472	Automobile stampings	47.8	62.8
1473	Stamped and pressed metal products (except automobile stampings)	178.4	281.6
1481	Fabricated structural steel and ornamental metal work made in plants not operated in connection with rolling mills	284.7	366.3
1482	Doors, window sash, frames, molding, and trim (made of metal)	48.2	84.1
1491	Bolts, nuts, washers and rivets—made in plants not operated in connection with rolling mills	84.1	114.7
1492	Forgings, iron and steel—made in plants not operated in connection with rolling mills	104.9	164.8
1495	Screw-machine products and wood screws	82.8	134.0
1497	Firearms	17.7	23.1
1499	Cold-rolled steel sheets and strip and cold-finished steel bars made in plants not operated in connection with hot-rolling mills	70.4	104.9
	All other	222.8	298.0
	Total iron and steel and their products except machinery	$6,591.5	$9,052.4

		Value of Manufactures at the 1939 Price Level (Millions of dollars)	
	Electrical Machinery	1939	Estimated 1947
1611	Wiring devices and supplies	$ 94.3	$137.5
1612	Carbon products for the electrical industry, and manufactures of carbon or artificial graphite	18.4	27.8
1613	Electrical measuring instruments	41.8	56.3
1619	Generating, distribution, and industrial apparatus, and apparatus for incorporation in manufactured products, not elsewhere classified	470.5	787.3
1620	Electrical appliances	145.7	244.4
1630	Insulated wire and cable	120.4	168.0
1640	Automotive electrical equipment	109.8	145.3
1650	Electric lamps	84.8	123.2
1661	Radios, radio tubes, and phonographs	275.9	499.9
1662	Communication equipment	191.3	275.7
1691	Batteries, storage and primary (dry and wet)	117.6	151.5
1692	X-ray and therapeutic apparatus and electronic tubes	17.9	26.7
1699	Electrical products not elsewhere classified	39.0	54.7
	Total electrical machinery	$1,727.4	$2,698.5

		Value of Manufactures at the 1939 Price Level (Millions of dollars)	
	Machinery, Except Electrical	1939	Estimated 1947
1711	Steam engines, turbines and waterwheels	$ 24.8	$ 36.3
1712	Internal-combustion engines	110.4	167.6
1721	Tractors	254.0	436.6
1729	Agricultural machinery (except tractors)	167.9	300.2
1731	Construction and similar machinery (except mining and oil-field machinery and tools)	140.1	211.4
1732	Oil-field machinery and tools	89.0	115.9

Machinery, Except Electrical	Value of Manufactures at the 1939 Price Level (Millions of dollars) 1939	Estimated 1947	Per Cent Increase Est. 1947 over 1939
Mining machinery and equipment	33.6	39.3	17.0
Machine tools	218.0	278.5	27.8
Machine-tool and other metalworking machinery accessories, metal-cutting and shaping tools, and machinists' precision tools	125.6	190.1	51.4
Metalworking machinery and equipment, not elsewhere classified	99.0	132.7	34.0
Food-products machinery	90.8	147.7	62.7
Textile machinery	93.3	145.8	56.3
Paper-mill, pulp-mill, and paper-products machinery	32.4	44.3	36.7
Printing-trades machinery and equipment	55.6	109.5	96.9
Special industry machinery, not elsewhere classified	55.8	87.1	56.1
Measuring and dispensing pumps	44.3	53.4	20.5
Pumping equipment and air compressors	134.9	195.6	45.0
Elevators, escalators and conveyors	64.1	105.7	64.9
Cars and trucks, industrial	17.3	35.3	104.0
Blowers: Exhaust and ventilating fans	28.6	44.2	54.5
Measuring instruments, mechanical (except electrical measuring instruments, watches and clocks)	39.7	50.7	27.7
Mechanical power-transmission equipment	170.3	256.3	50.5
Machine shop products not elsewhere classified	360.3	477.0	32.4
Industrial machinery not elsewhere classified	140.6	219.3	56.0
Office and store machines not elsewhere classified	150.2	202.5	34.8
Vending, amusement and other coin-operated machines	23.1	48.7	110.8
Scales and balances	14.4	18.4	27.8
Laundry equipment, domestic	61.6	111.1	80.4
Commercial laundry, dry-cleaning and pressing machinery	21.8	35.0	60.6
Refrigerators, domestic (Mechanical and absorption), refrigeration machinery and equipment and complete air conditioning units	278.6	438.5	57.4
All other	114.1	226.4	98.4
Total machinery, except electrical	$3,254.2	$4,961.1	52.5

Automobiles and Automobile Equipment	Value of Manufactures at the 1939 Price Level (Millions of dollars) 1939	Estimated 1947	Per Cent Increase Est 1947 over 1939
Motor vehicles, motor-vehicle bodies, parts and accessories	$4,039.9	$7,107.5	75.9
Automobile trailers (for attachment to passenger cars)	7.9	10.1	67.7
Total automobiles and automobile equipment	$4,047.8	$7,117.6	75.8
Transportation Equipment, Except Automobiles			
Locomotives (including frames) and parts: Railroad, mining and industrial	$ 47.4	$109.0	129.9
Cars and car equipment—railroad, street and rapid-transit	168.4	360.8	114.3
Aircraft and parts, including aircraft engines	279.5	552.4	97.6
Shipbuilding and ship repairing	327.4	403.8	23.3
Boatbuilding and boat repairing	10.9	25.8	136.7
All other	49.3	87.3	77.1
Total transportation equipment, except automobiles	$882.9	$1,539.1	74.3

tal value of production may be in
st full postwar year, the committee
estimates that combined services
4469,000 workers will be required
duce this volume of manufactured
ucts. This total compares with 10,-
000 persons who actually were en-
ed in producing the 1939 volume of
nufactures or an increase of 33.7 per
in the first full postwar year over
. Improved machinery, better meth-
and continuing increase in produc-
y per man-hour will make it possi-
for production to rise in greater pro-
tion than the number of employees,
MacGowan said reports to CED in-
ate.

"The estimated 1947 increase of about
per cent in the value of manufactures
ill not be reflected in a comparable
crease in employment unless the
mount produced per worker is the same,"
the committee points out.

The increase in productivity per man-hour, the study shows, had been increasing about 3 per cent per year up to the outbreak of the war. During the war the rate of increase in productivity is believed to have slowed down and the committee estimates the total increase from 1939 to 1947 will be about 6 per cent.

On this basis, annual output per manufacturing employee in 1939 amounted to $5640 and in 1947 should amount to $5978. If this assumption is correct, and the estimates of 1947 value of manufactures total $80,515 million, manufacturing in 1947 would employ 13,469,000, an increase of 33.7 per cent in employment compared with the 42 per cent increase in value of manufactures.

In attempting to project an estimate of total employment from its figures on manufacturing industries, the committee assumes that in the first full postwar year manufacturing employment will account for 25.2 per cent of the total employment.

On this basis, the committee hazards as its best (but admittedly rough) guess that the level of total civilian employment in the first full postwar year will be about 53.5 million. Due to many variable and unknown factors, however, the actual level of civilian employment might vary between 51 and 57 million, the committee cautions.

Should the 53.5 million job level materialize, the committee believes we would have substantially full employment during the first postwar years.

The committee found that estimates of the number of civilian jobs needed in the first full postwar year ranged from 50.2 million to 58.5 million. Estimates of jobs that will be available range from 51 million to 57 million. The committee's own best guess of civilian jobs needed is 54 million, compared with an estimate of 53.5 million jobs available.

The committee's study suggests strongly that the war will be followed by a period of high-level production, sales and employment.

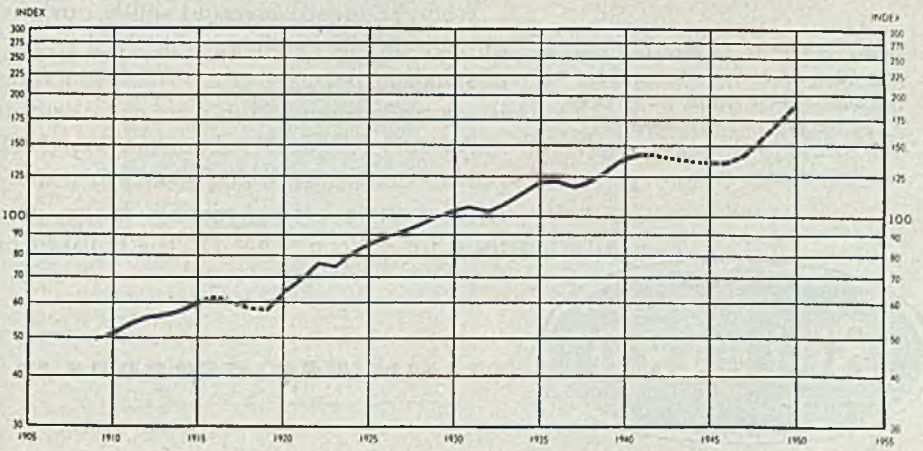
"But this favorable result will not occur automatically. It is not assured," the committee emphasizes.

"The obtaining of the desired high

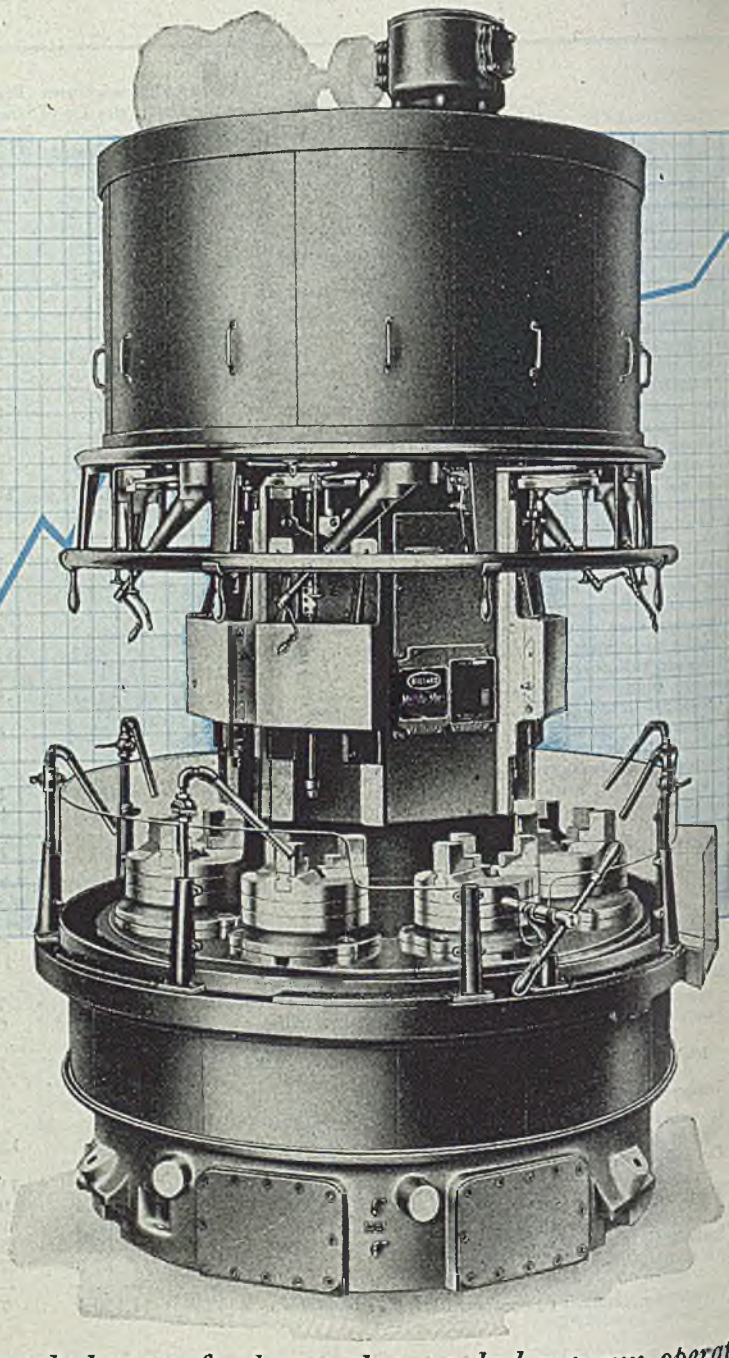
(*Please turn to Page 206*)

OUTPUT PER MAN-HOUR IN MANUFACTURING

1929 = 100



EXTRA PUSH
In The Right Places For Severe Production Schedules



Bullard Type D MULT-AU-MATICS are available — with 6 or 8 spindles in 4 sizes for work up to 23" diameter.

Built to stand strains of high-speed, heavy-feed, tough-metal, long-run operat

Long life and maintained accuracy in multiple spindle mass production of all classes of castings, forgings and cut-off bar stock are assured by the extreme massiveness and rigidity built into the Bullard Type D MULT-AU-MATIC.

From the rugged base and sturdy carrier that guards alignment accuracy, up through the rigid column to the feed works that assure complete coordination of spindles, tool-carrying heads and indexing . . . this unified heavy construction is accurately controlled to meet every demand for efficient operation.

For complete details about the way the Bullard Type D MULT-AU-MATIC produces one finished piece (or two) within a few seconds of the time of the longest single boring, turning, facing, grooving or drilling operation, write today for Bulletin MAM-D. The Bullard Company, Bridgeport 2, Connecticut

From Government Machine Tool Surplus Lists select the better machines to replace obsolete models you've been using on non-critical operations. Ask Bullard for information on these models by machine number.

BULLARD

CREATES ***NEW METHODS*** TO MAKE MACHINES DO M

by A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Cancellations following V-J Day create open capacity in automotive plants. Industry not yet prepared to take up slack through increased passenger car production. Output now geared to quotas approximating 5 per cent of capacity

DETROIT

A FLOOD of contract cancellations following immediately on the heels of V-J Day has not found the automotive industry ready at once to take up the slack in productive capacity and employment which has been released. Passenger car production was being geared to quotas established by WPB, amounting to only 5 per cent of the industry's capacity of 1941, and it is not a simple matter to reschedule operations overnight. All quotas have been officially lifted without delay, but it may take 60 to 90 days for resident plants to a higher level of output.

The same problems must be faced as those enumerated last fall when first consideration was given to pre-reconversion essentials—clearing plants of government material in inventory and in process, removal of government-owned equipment, cancellation and settlement of subcontracts, etc. Meanwhile there has been no concrete plan advanced for accomplishing these steps, all that had been done was to develop a system of "combined operations" so that a meager output of automobiles could be sandwiched into continuing war production.

Ford in Best Position

Of all companies, Ford seems to be in best position for a quick acceleration of passenger car schedules. The first Ford to come from a branch assembly plant rolled off the lines last Monday at the Edgewater, N. J., division where before the war 400 cars a day were assembled. Production at the Rouge is stepping up gradually, currently being around 70 per day. Nearly all important war contracts were terminated even before V-J Day. Unwinding of steel allocations should see the Ford mill ready to roll sheet and strip tonnage which can be rushed to the pressed steel building for fabrication into body components.

Tests on the Ford 5-cylinder in-line engine (firing order 1-2-3-4-5), have been fairly well concluded and it is characterized as the smoothest running engine ever developed at the Rouge. It will probably be the power unit in the light-weight economy model Ford now taking shape, although final decision has not been reached. No equipment program for this project has been released, pending the results of attempts to acquire a long list of government-owned equipment in Ford plants. This equipment has been reviewed in minute detail and selections made of what can be used and what cannot, but the only information yet to be pried out of the owners is large gobs of silence.

Hudson passenger car assemblies were scheduled to start last week, although no formal announcement was made by the company. A few "teaser" ads have been released showing small sections of the front and rear end of the 1946 model, but not enough to give any clear indication of the overall appearance. The Hudson quota of 8000 for this year is now meaningless and should be bettered by a wide margin, providing the obstacles recited can be hurdled.

Chrysler divisions are probably in the least favorable position of any in the industry for early resumption of car production. Corporation officials have purposely soft pedaled all talk of reconversion and what progress has been made has been kept as secret as the company's atomic bomb project. First parts releases from Briggs for Plymouth bodies call for shipments Sept. 17, suggesting Oct. 15 as the earliest possible date of new car assemblies.

Automotive production will be resumed in Los Angeles by General Motors late this month, with assembly of Chevrolet trucks at the South Gate plant there which is being enlarged from 718,000 to 1,068,000 square feet. All contracts for structural steel, conveyors, ovens, spray booths and air conditioning systems have been let and 175 employees recalled to work. Employment will be up to 550 by September and to 1500 by Nov. 15. The South Gate plant, which assembled Buick, Olds and Pontiac cars before the war, will start its lines with assembly of both large and small Chevrolet trucks and chassis for school buses; by December it will be assembling B-O-P models once more.

General Motors has purchased property in the San Fernando Valley north of Van Nuys for eventual construction of another southern California assembly plant, reportedly to employ 5000. This may be planned for Chevrolet assemblies, since a former plant at Oakland has been leased to the Army and will not be available for some time.

As of July 1, cutbacks of 26 per cent in dollar billing of Packard war engines and a reduction of 16 per cent in engines shipped have contributed to a drop in profits of $1,087,287 for the first half of the year, and approximate halving of earnings for the same period last year. Lower volume this year was paralleled by increased overhead incident to prereconversion work and production of replacement parts. The former costs ran to $828,334, while the limited production of replacement parts resulted in a loss of $554,298 on this phase alone. Backlogs for aircraft and marine engines stood at $490,000,000 on July 1, schedules running into late 1946. Presumably this will be cut to the bone any day now.

Chromic Acid Sought

Likelihood of a continued shortage of chromic acid for plating solutions, even after war contract terminations, has spurred automotive plating experts to intensive research on means to obtain such acid. As explained here several weeks ago, chromic acid is the principal source for pure chromium metal, required in appreciable quantities for the jet engine program which, being experimental in nature, likely will be continued even after the war's end. Furthermore, the production of chromic acid is said to be a particularly unpleasant process as far as labor is concerned, and suppliers are finding difficulty in obtaining sufficient help to keep output anywhere near normal. The acid is derived from chrome ore, but an involved series of processing and refining operations is required, beyond the capacity of any average plating department. Hence it appears no ready supply of chromic acid is going to be available in the months to come, whatever the turn of events.

General Motors Research technicians, tackling the problem in co-operation with a Baltimore chemical company, have come up with a method for reclaiming chromic acid from spent anodizing solutions used extensively in the aircraft industries for the surface protection of aluminum alloys. The normal anodizing solution contains about 15 ounces of

FRED HOELZEL

Who has been appointed product and sales engineer, Hupp Motor Car Corp., Cleveland and Detroit. He formerly was connected with the Cadillac Motor Car Co.

chromic acid per gallon, plus a certain amount of sulphuric acid. As the solution is used the aluminum content gradually builds up and when it reaches something over 1 ounce per gallon (9-10 grams per liter) it is drained off and usually dumped down the sewer. While this may sound wasteful it is actually less expensive to replace the anodizing tanks with new solutions than to attempt reclaiming spent solution. However, the chromic acid content of the used solution still is close to the original level and by evaporating, adding an excess of sulphuric acid and centrifuging is possible to separate crystals of chromic acid to the amount of about 8 ounces per gallon.

Chrome plating baths usually carry about 35 ounces of chromic acid per gallon, plus about one-hundredth this weight of sulphuric acid, so the amount which can be reclaimed from anodizing solutions can go a long way toward supplying the requirements of plating baths.

Result is that General Motors has been on the prowl for anodizing solutions from aircraft manufacturers and has purchased stocks from as far off as San Francisco in an effort to bolster its position on chromic acid. It is claimed a carload of acid would take care of the corporation's requirements for months to come, but it is just impossible to buy even this limited quantity.

Job platers might well give this idea some serious consideration, since there are believed to be large stocks of anodizing solutions available from the aircraft industry, and in the weeks ahead even more should become freed. Care should be taken that solutions are of the type with a chromic acid base, since some are of an oxalic acid type from which, of course, no chromic acid could be extracted.

The suggestion advanced here several weeks ago that chrome salts might be leached from chrome ore, of which a plentiful supply exists, is said by plating experts to be of doubtful value, since too many impurities, principally iron and sulphur, might come through in the process of leaching, seriously interfering with proper functioning of plating baths.

Perhaps somewhat anticlimactic in wake of the V-J day uproar, McCord Corp. finally has been permitted to reveal details of a new infantrymen's combat vest or body protector, patterned after the flak suits produced for aircraft crewmen. The latter weigh about 24 pounds and the protective elements are of thin-gage Hadfield's manganese steel. The infantryme style, however, is of aluminum alloy 75S made up in 20 separate pieces fitted in a nylon vest which can be folded up easy carrying. It weighs only 12 poun and while it will not resist penetration a direct bullet hit, it does provide pr tection against flying shrapnel to vi body organs, somewhat resembli "chest" protectors worn by baseb catchers and umpires.

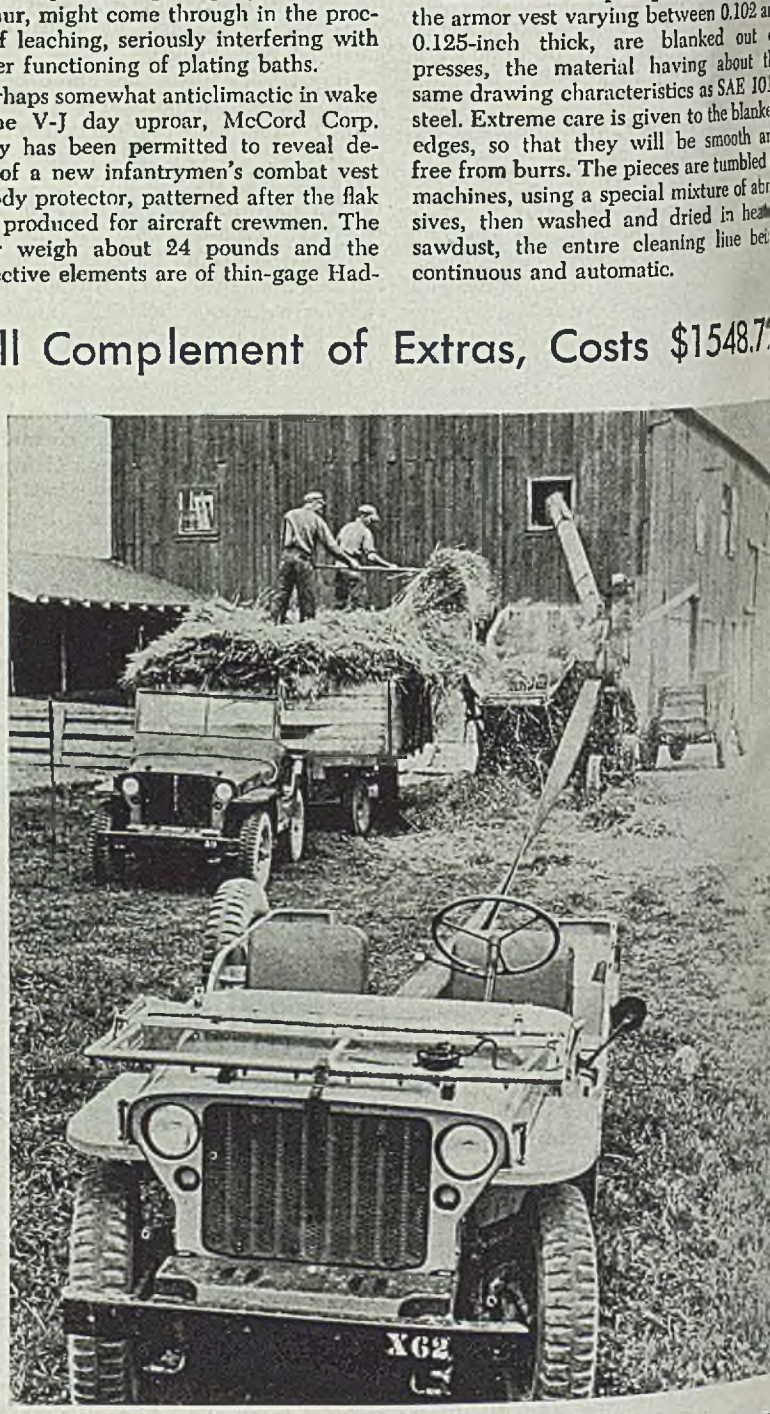
The relatively new aluminum alloy said to have considerably greater streng than the 24ST type, for example, sho ing Vickers hardness of 176-179, agai 135-140 for the softer material with te sile strength of 75,000 psi, yield point 6 000 psi, elongation in 2 inches 10 p cent and shear strength 40,000 psi.

The various shaped pieces making the armor vest varying between 0.102 a 0.125-inch thick, are blanked out presses, the material having about t same drawing characteristics as SAE 10 steel. Extreme care is given to the blank edges, so that they will be smooth a free from burrs. The pieces are tumbled machines, using a special mixture of abr sives, then washed and dried in hea sawdust, the entire cleaning line bei continuous and automatic.

Peacetime Jeep, with Full Complement of Extras, Costs $1548.7

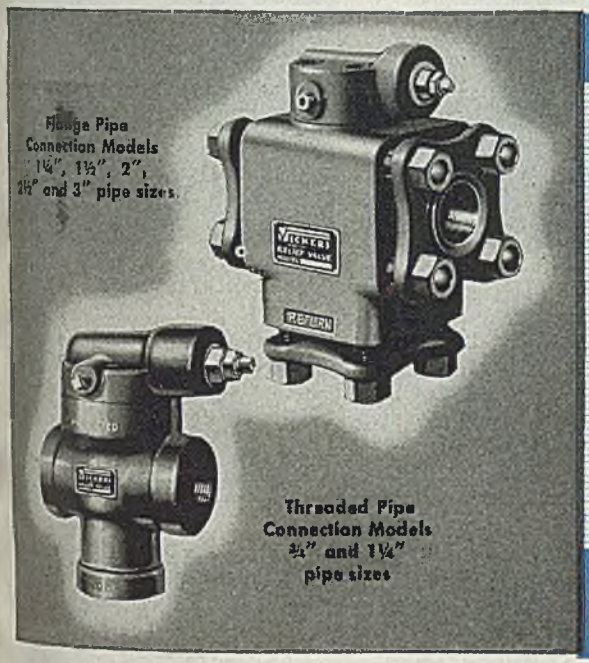
Anyone caring to place an order for a jeep to use on his farm may first be interested in knowing what it will cost. While ceiling price of the basic jeep unit has been announced as $1090, there is a long list of extras involved before it can be considered fully equipped for the farm service it is advertised to perform. The invoice would look as follows:

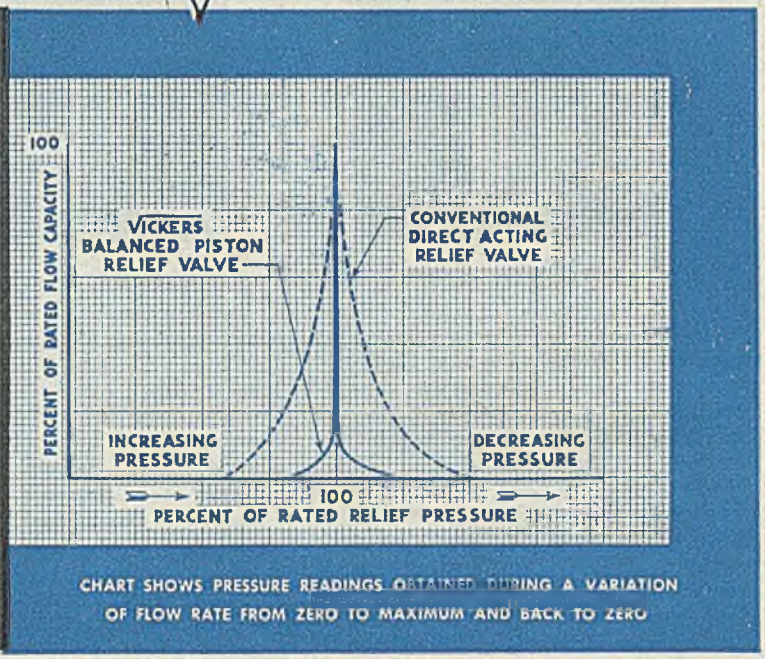
Base price of unit	$1090.00
Federal excise tax	46.53
Transportation by rail, factory to dealer (average)	25.00
Preparing and conditioning by dealer	20.00
Front body top	51.05
Rear body top	28.44
Draw bar	6.91
Governor	27.21
Heater	17.41
Pintle hook	4.01
Power takeoff attachment for rear	90.67
Power takeoff attachment for front	24.44
Power takeoff shield for front	1.93
Pulley and pulley drive—rear	56.28
Radiator brush guard	4.11
Additional front bucket seat (equipped with only one)	10.51
Rear passenger seat for two	12.96
Spare tire and tube	13.76
All above equipment items subject to federal excise tax added to selling price, at 5%	17.50
Delivered on the farm	$1548.72



MORE ACCURATE

HYDRAULIC PRESSURE CONTROL





VICKERS

Balanced Piston Type

RELIEF VALVES

As indicated by the chart above, Vickers Balanced Piston Type Relief Valves have a negligible pressure variation throughout their capacity range. In these valves a hydraulically loaded and balanced piston takes the place of the customary spring-loaded direct-acting relief mechanism. This means more sensitive operation as well as greater accuracy throughout the wide pressure range.

This accuracy of control prevents pressure override when sudden changes in pressure occur in the hydraulic system. Compact design, longer operating life, installation directly in the pressure line, quiet operation, and simple adjustment are other advantages of these Vickers Balanced Piston Relief Valves. See Bulletin 38-3 for complete information.

Vickers Application Engineers will gladly discuss with you how Vickers Hydromotive Controls can be used to your advantage.

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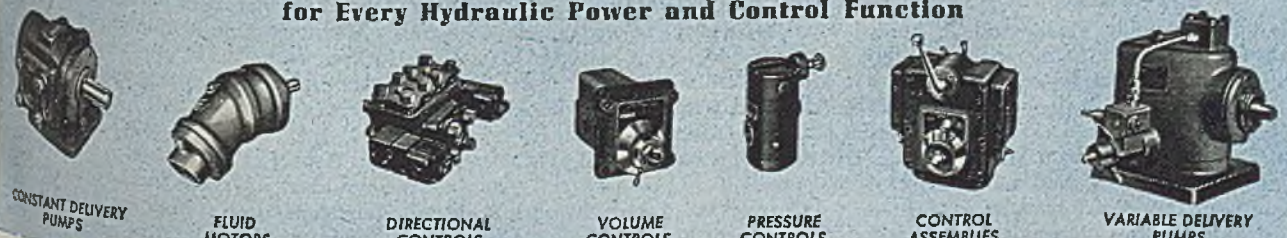
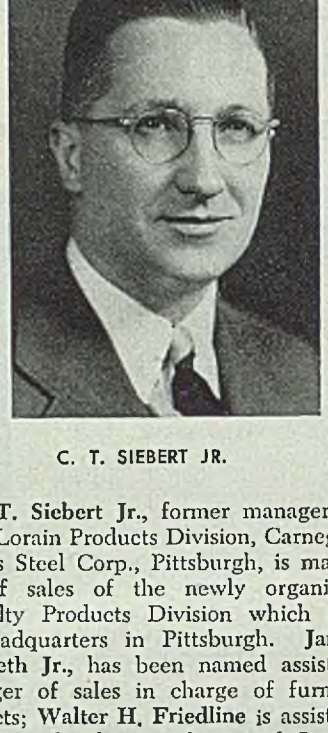
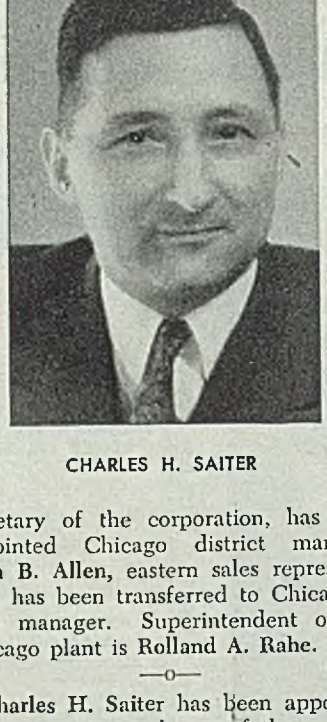


MEN of INDUSTRY



C. T. SIEBERT JR.



CHARLES H. SAITER

LEON P. DISINGER

C. T. Siebert Jr., former manager of sales, Lorain Products Division, Carnegie-Illinois Steel Corp., Pittsburgh, is manager of sales of the newly organized Specialty Products Division which has its headquarters in Pittsburgh. **James MacBeth Jr.**, has been named assistant manager of sales in charge of furnace products; **Walter H. Friedline** is assistant manager of sales in charge of Lorain products; and **A. M. Harper**, who has been manager of the Specialty Division for the past 12 years, will remain with that division until Sept. 1, when he plans to retire.

—o—

A. G. Bussmann and **L. D. Granger** have been elected vice presidents, Wickwire Spencer Metallurgical Corp., Newark, N. J. Mr. Bussmann is also vice president in charge of sales, Wickwire Spencer Steel Co. and has been associated with the company since 1930. Mr. Granger, steel metallurgist and engineer, previously had been assistant to the executive vice president, Wickwire Spencer Metallurgical Corp. He also is vice president, American Wire Fabrics Corp., another Wickwire Spencer subsidiary. Mr. Bussmann will continue to be located at the executive offices of the parent company in New York, and Mr. Granger will be located at the metallurgical corporation's plant and offices, Newark.

—o—

Frank G. Corregan has been named purchasing agent, Pittsburgh Limestone Corp., Pittsburgh, succeeding the late **Robert Carter. J. N. Suliot** has been appointed superintendent of the company's Moler dolomite quarry, Millville, W. Va., replacing Mr. Corregan.

—o—

C. H. Reynolds, vice president, Sheffield Corp., Dayton, O., is now in Europe on a mission for the War Department.

—o—

Ralph H. Cleveland, Waterbury plant manager, and **Henderson M. Bell**, Cleveland plant manager, Chromium Corp. of America, New York, have been elected vice presidents. **Donald H. Bissell**, secretary of the corporation, has been appointed Chicago district manager. **John B. Allen**, eastern sales representative, has been transferred to Chicago as sales manager. Superintendent of the Chicago plant is **Rolland A. Rahe.**

—o—

Charles H. Saiter has been appointed sales manager in charge of the recently organized Heavy Machine Division, Cleveland Crane & Engineering Co., Wickliffe, O. He has been with the company 23 years.

—o—

Dr. Otto Zmeskal has been named director of research, Bridgeville Division, Universal-Cyclops Steel Corp., Bridgeville, Pa.

—o—

Arden L. Knight has returned from three and a half years' service with the United States Navy and has been named eastern New England sales manager, Braeburn Alloy Steel Corp., Braeburn, Pa.

—o—

Forrest H. Ramage has been named assistant manager of sales, Pipe Division, Republic Steel Corp., Cleveland. He recently served as assistant manager of the Commercial Research Division.

—o—

R. C. Page and **W. A. Redpath** have been promoted to assistant managers of sales, Chicago plant, Joseph T. Ryerson & Son Inc., Chicago. Mr. Redpath has served as Chicago city sales representative since 1927, and Mr. Page has been general sales representative in Iowa since 1932.

—o—

Ellis Hunter, recently appointed president-elect, British Iron & Steel Federation, is deputy-chairman and managing director, Dorman Long & Co. Ltd., Middlesbrough, England. He became connected with Dorman Long & Co. in January, 1938, and has been associated with the British steel industry since 1922.

—o—

Charles W. Yerger has been elected chairman of the board, Lea Mfg. Co., Waterbury, Conn. Mr. Yerger formerly was associated with Hanson-Van Winkle-Munning Co., Matawan, N. J., as executive vice president.

—o—

Leon P. Disinger, vice president, Buckeye Brass & Mfg. Co., Cleveland, has been named vice president and director of sales. Mr. Disinger has served the company as production manager, secretary-treasurer and was elected vice president in 1931.

—o—

C. S. Goddard, after 27 years' service with Goddard & Goddard Co., Detroit, has resigned as general sales manager. He is moving to the West Coast where he will continue with the company. **Stanley H. Grattan** succeeds Mr. Goddard as general sales manager.

—o—

Irving B. Babcock, president, Aviation Corp., New York, has been elected president, Crosley Corp., Cincinnati. **Raymond C. Cosgrove**, vice president and general manager, Manufacturing Division and **James D. Shouse**, vice president in charge of the Broadcasting Division, will continue in those positions and also remain as directors. In the Manufacturing Division **Lewis M. Clement** was elected vice president in charge of research and engineering; **Frank A. Schotters**, vice president in charge of production. Other officers elected include: **Lewis M. Crossley**, vice president, **Raymond S. Pruitt**, Chicago, secretary and general counsel, **Walter Mogensen**, Detroit, treasurer, and **Edwin J. Ellig**, assistant secretary-treasurer.

—o—

R. A. Williams has been named executive vice president and a director of the American Car & Foundry Export Co., New York. He is also vice president in charge of sales, American Car & Foundry Co.

—o—

Hobart C. Ramsey, executive vice president, Worthington Pump & Machinery Corp., Harrison, N. J., has been named president, Ransome Ma-

STE

JAMES D. SLOAN

J. S. MURRAY

S. B. TAYLOR

Library Co., Dunellen, N. J., a subsidiary of the Worthington company. J. G. Ten Eyck has been named vice president and general manager; **Kenneth W.** Chapman has been appointed works manager. Newly elected directors are J. Ten Eyck and **Carl F. Oechsle**, vice president in charge of sales.

—o—

James D. Sloan has been appointed purchasing agent of raw materials, Youngstown Sheet & Tube Co., Youngstown, and **Jared F. Cone** has been named purchasing agent of machinery, construction and maintenance repair and operating supplies. **Charles T. Moke**, purchasing agent for the company for the past 35 years, has retired.

—o—

Joseph J. Glass, formerly Buffalo plant manager and sales representative, American Brake Shoe Co., New York, has been appointed sales manager, Small Steel Castings Inc., Buffalo. Officers of the new corporation include: **Joseph Cheney**, president; **Joseph Spriesch**, vice president and treasurer; and **Mrs. Marion Cheney**, secretary.

—o—

James de Kiep, formerly manager, a-c motor engineering department, Westinghouse Electric Corp., Pittsburgh, recently was named chief engineer in charge of electrical and mechanical design and development, Electric Machinery Mfg. Co., Minneapolis.

—o—

N. A. Pedersen, Elkhart, Ind., has been elected president, C. B. Hunt & Son Inc., Salem, O. N. C. Hunt, formerly president, will become treasurer of the corporation. S. C. Chessman has been named vice president and general manager.

—o—

R. Carl Wolf, president, Atlanta Gas Light Co., Atlanta, Ga., has been elected managing director, American Gas Association, New York, effective Oct. 1. He will succeed **Alexander Forward**, managing director since 1923, who is retiring.

—o—

Raymond E. Olson recently was made general sales manager to head all sales activities of the Taylor Instrument Companies, Rochester, N. Y. **Frank S. Ward** has been named industrial sales manager; **Ralph E. Clarridge** assumes the duties of sales engineering manager; and **W. Maben Griffith** has taken on the additional duties of commercial sales manager.

—o—

J. S. Murray, formerly chief electrical engineer, Follansbee Steel Corp., Pittsburgh, has been appointed Pittsburgh district manager, Alliance Machine Co., Alliance, O. Mr. Murray is first vice president, Association of Iron & Steel Engineers.

—o—

Ralph V. Bradley has returned to the Caterpillar Tractor Co., Peoria, Ill., after serving three years with the Pan American Airways in Brazil. **Maj. Thomas R. Clark**, who resigned in July, 1942 to enter the Army Corps of Engineers, has been released from the Army and has rejoined the Caterpillar company. He will serve as district representative with headquarters at Omaha, Nebr. **W. J. Bornholdt** has been appointed an assistant purchasing agent.

—o—

Rodman B. Doremus has been promoted from vice president to executive vice president and **Francis J. Tytus** has been named vice president and chief engineer, F. H. McGraw & Co., New York. **Louis B. Palmer** was erected treasurer.

—o—

A. S. Haagman has become affiliated with Simon Holland & Son Inc., Brooklyn, N. Y., as engineer in charge of sales. He previously had been associated with Foster-Wheeler Corp., New York.

—o—

John E. Ohlson, formerly with Wyeth Inc., Philadelphia, has been appointed senior chemical engineer, Pennsylvania Salt Mfg. Co., Philadelphia.

—o—

Franklin A. Reed recently was appointed sales manager, Niagara Machine & Tool Works, Buffalo, succeeding **George R. Kinney**, resigned.

S. B. Taylor has been elected president, Parker Appliance Co., Cleveland, succeeding **H. I. Markham**, who, until his recent elevation to chairman, served as president, following the late **Arthur L. Parker**, founder and chief executive of the company. Mr. Taylor also was elected a director. Other officers of the company include: **C. H. Wagner Jr.**, secretary; **F. A. Rolla**, treasurer; **J. J. Helminak**, assistant treasurer, **J. E. Schlacter**, assistant secretary and **O. W. Berndt**, comptroller.

—o—

Robert V. Lackner has been named field engineer for Allis-Chalmers Mfg. Co., Milwaukee, in the Pittsburgh district. He has been associated with Carnegie-Illinois Steel Corp. at its Duquesne works for the past nine years.

—o—

J. C. Baker has been appointed by Rheem Research Products Inc., Baltimore, to be its representative in the eastern Ohio-western Pennsylvania-West Virginia territory.

—o—

E. H. Eckert has been advanced from assistant traffic manager, Waukesha Motor Co., Waukesha, Wis., to traffic manager.

—o—

Paul W. Pheneger has been appointed general superintendent, Michigan Seamless Tube Co., South Lyon, Mich. Mr. Pheneger previously was employed by Spang Chalfant Division, National Supply Co., Pittsburgh.

—o—

R. F. Nelson has been appointed vice president and assistant to the president, R. G. LeTourneau Inc., Peoria, Ill. Mr. Nelson will go to England this fall to establish a factory there.

—o—

H. R. Cornish has resigned as comptroller, treasurer and director, Sal-Way Steel Treating Co., Detroit, to become comptroller, Lonergan Mfg. Co., Albion, Mich.

—o—

Dr. J. T. Rettaliata, manager of research and gas turbine development,

ROBERT C. COWAN

District manager of sales in Philadelphia, Columbia Steel & Shafting Co., Pittsburgh, as noted in STEEL, Aug. 13, p. 94.

DR. L. M. CURRIE

Who is vice president in charge of research, National Carbon Co. Inc., Cleveland, as noted in STEEL, Aug. 13, p. 96.

R. W. BURT

Who has been named manager, Tubing D sion, Joseph T. Ryerson & Son Inc., Chicago, noted in STEEL, Aug. 6, p. 102.

Allis-Chalmers Mfg. Co., Milwaukee, has been named chairman of the mechanical engineering department, Illinois Institute of Technology, Chicago, effective Nov. 1.

—o—

T. J. McDonnell has been appointed sales manager of the Minneapolis plant, Butler Mfg. Co., Kansas City, Mo.

—o—

E. R. Haan recently was named director of advertising, Doall Co., Des Plaines, Ill.

—o—

George R. Sommers recently was appointed Pacific Coast sales manager, Lighting Division, Sylvania Electric Products Inc., Ipswich, Mass. He will make his headquarters in San Francisco.

—o—

John R. Cameron, Detroit, has been named representative in the state of Michigan for the Whiting Stoker Sales Co., Chicago.

R. S. Rheay has been named division sales manager, southeastern United States territory, Osgood Co. and General Excavator Co., Marion, O.

—o—

E. S. Goebel has been named acting director of field sales, Communications and Electronics Division, Galvin Mfg. Corp., Chicago. **Norman Wunderlich** resigned as sales manager July 1.

—o—

F. A. Wright has been named assistant general sales manager, Cutler-Hammer Inc., Milwaukee. Mr. Wright has been associated with the company since 1927.

—o—

Rollin D. Hager has been named general superintendent, Industrial Products Division, B. F. Goodrich Co., Akron, and succeeds **G. L. Matthias**, who has retired because of illness. **H. L. Dixon** has been appointed production manager of the division succeeding Mr. Hager and E. L. Slingluff has been named manager of claim manufacturing. **J. M. Failey** been named New York assistant dist manager, Industrial Products Sales vision; **R. G. Cox** is manager, lathe molded and extruded goods sales; Geo **J. Fischer**, is manager, hose departme and **Edgar T. Gregory**, operating m ager.

—o—

Col. Joseph P. Woodlock has b elected executive vice president, Roc ter Ropes Inc., Jamaica, N. Y., and take over his duties as soon as he released as associate director, Office Surplus Property, Reconstruction Fina Corp.

—o—

Harold Wright, chief metallurgist, man Long & Co. Ltd., Middlesbro England, has been awarded the Be mer gold medal by the Iron & Steel stitute.

OBITUARIES . . .

John F. Geoghegan, 68, New York, contracting manager for the American Bridge Co., Pittsburgh, died Aug. 6 at New Rochelle, N. Y. Mr. Geoghegan had been with the company at New York for 40 years.

—o—

John B. Berryman, 83, chairman, Crane Co., Chicago, died Aug. 11 in that city. He had been associated with the company 53 years and was elected chairman in 1935.

—o—

Philip S. Graver, 67, vice president, Graver Tank & Mfg. Co. Inc., East Chicago, Ind., died Aug. 12 in that city. He had been associated with the company 50 years.

—o—

Allen P. Doron, 68, Cleveland, president and co-founder, Factory Stores, which originated the steel mill canteen, died in Chicago, Aug. 10.

—o—

J. Fred Gilmore, 69, formerly with Republic Steel Corp., Cleveland, died recently in Los Angeles. In recent years Mr. Gilmore represented several steel companies on the Pacific Coast.

—o—

Samuel W. Laird, 52, an engineer with the Bethlehem Steel Co., Bethlehem, Pa., died Aug. 10. Mr. Laird had been with the steel company since his graduation from Lehigh University in 1914 except for the period during the first world war when he served with the Army.

—o—

Edward J. McCue, 71, for 37 years foreman engineer, Walter Scott & Co., Plainfield, N. J., died Aug. 7.

—o—

James G. Davey, 51, formerly associated with the Empire Steel Corp., Mansfield, O., Canton Tin Plate C Canton, O., and Republic Steel C Cleveland, died at Temple, Tex., Aug Mr. Davey during the past few was superintendent of the sheet an mills at Monterrey, Mexico.

—o—

F. Archer Thompson, 62, in charg the Detroit office, Bullard Co., Br port, Conn., died recently in Detro

—o—

Horace Burrough III, 49, assi general manager of sales, Merrimac vision, Monsanto Chemical Co., St. L died Aug. 8 at his home in Swamp Mass.

—o—

Warren Crampton, 69, who was ager of sales at Baltimore, for the L Steel Co., and its subsidiaries, C ville, Pa., for more than 39 years signing that position in 1939 becau ill-health, died Aug. 9.

U. S. Steel's Position Believed Strengthened by Expansion Plans

Some western industrialists say corporation's position will be strengthened by building up Coast plants rather than by acquiring Geneva plant. Steel's decision may force Kaiser to change plans for construction of Fontana rolling mill

SOME West Coast industrialists believe that United States Steel Corp.'s decision to expand its present Pacific Coast facilities rather than to buy the Geneva plant may force Henry Kaiser to change his plans.

These observers also believe that in the long run U. S. Steel will be in a considerably sounder position by building up the plants it already owns on the Coast, instead of taking over Geneva which they believe could easily become a "white elephant."

Mr. Kaiser's major planning readjustment revolves around his intention to build a sheet rolling mill at the Fontana plant. That project was one of the keystones of his announcement of a few months ago in which he proposed to set up an integrated, independent steel industry in the West.

Although the West Coast consumes a third of all the tin plate used in the United States, it appears unlikely that the area could support two facilities of this kind, because shipments of tin plate from the eastern mills cannot be ruled out.

"Big Steel" Gets Head Start

U. S. Steel's intention to build a $25 million mill in connection with its Consolidated Steel Co. plant at Pittsburg, Calif., on San Francisco Bay, therefore, gives "Big Steel" a long jump on Mr. Kaiser.

Commenting on the proposal, William A. Ross, president of Columbia, said:

"The authorization of the installation at Columbia's plant at Pittsburg, Calif., of modern cold reduction facilities of an annual capacity of more than 325,000 tons of sheets and tin plate is a continuation of the modernization program which was inaugurated shortly after Columbia became a part of U. S. Steel in 1930. Until interrupted by the war, Columbia had expended large sums for such modernization. This program from its inception has embraced the installation of modern cold reduction facilities to enable Columbia to supply its customers with cold-reduced sheets and tin plate of the highest quality.

"Erection of these finishing facilities near the market will assure customers of prompt delivery and efficient service. As Mr. Fairless, president of U. S. Steel, has pointed out in a separate statement, sheets and tin plate produced at this new mill will be comparable in quality to the products of any steel mill in the country."

"The basic policy of Columbia Steel Co.," Mr. Ross continued, "has been to serve its customers in the Far West to the best of its ability. Before the war Columbia maintained the only integrated steel operation west of the Rocky mountains, with a blast furnace and by-product coke ovens at Provo, Utah, using iron ore, coal and limestone from our mines and quarries in Utah, and with steelmaking and finishing facilities at Pittsburg and Torrance, Calif. Columbia now has an ingot capacity of 597,600 tons a year, which is approximately half that of the new government-owned steel mill at Geneva, Utah.

"We are happy to announce the authorization of these new facilities at Pittsburg, Calif., as a further confirmation of our policy of keeping pace from time to time with western steel needs. Columbia Steel Co. recognizes the industrial importance of the Far West and its market for steel, and contemplates taking the necessary action at appropriate times in the future to meet the postwar steel needs of these markets."

Kenneth T. Norris, president, Norris Stamping & Mfg. Co., Los Angeles, and chairman, Steel Committee of the Western States Council, said last week that the committee is entirely neutral as to bidding on the Geneva and Fontana steel plants.

Mr. Norris referred to the withdrawal of United States Steel Corp. as an active bidder for Geneva and expressed satisfaction with the corporation's announced plans to increase coast production at Torrance and Pittsburg, Calif.

He said that the committee's sole objective was the obtaining of lower priced steels for consumption in the West and declared that this end could best be attained by the operation of both Fontana and Geneva by private interests.

Western Manufacturers Anticipate No Serious Reconversion Problems

FOR the rank and file of West Coast manufacturers, the end of the war will not bring serious reconversion problems.

The reason is that war goods supplied by a majority of companies are of a type made before the war and which will continue to be made in peacetime, with only small modification.

Reconversion for oil industry, one of the most active of the Coast war suppliers, for instance will be relatively simple. Paint makers, as another illustration, who diverted most of their output to war uses will simply go back to supplying the big pentup civilian demand. Machinery fabricators generally face the same outlook. The examples could be extended through nearly all phases of enterprise.

With only one or two exceptions, West Coast industry faces no such problems as, say, Detroit where the automobile makers stopped making their normal product almost entirely and turned to new things such as planes and guns, tanks, ammunition, etc.

Perhaps the wartime industry most vitally affected by the war's end will be shipbuilding. Even in it, however, the transition will be cushioned.

New shipbuilding contracts in most yards already have been completed, or nearly so. A large part of the facilities have been shifted to repair work which is likely to continue for a considerable time. Most of the Navy vessels will need extensive overhaul. Cargo and passenger ships also must be repaired, renovated and many will be converted to peacetime use. In addition a big demand has piled up for coastwise vessels, fishing trawlers, and other small boats.

The aircraft industry, of course, will slide down from its production eminence, but the decline is likely to be gradual. Plans are well along for converting some of the military models into postwar passenger and cargo planes, and the government is likely to spend large amounts in the next few years on new experimental models which are just coming into being. The plane industry will not undergo a complete reconversion turnover. It will be making the same general product, but in smaller volume and in different style.

Labor dislocations for a time probably will be widespread. However, cutbacks during the past year already have defined pretty well the course of these adjustments. "The transition period during which labor will shift from war to peacetime pursuits may turn out to be shorter than expected.

The western railroads which have been carrying the brunt of war traffic since V-E Day will not see their activity ended overnight. Instead there is likely to be a long period of continued high activity during which men and materials are returned from abroad.

WING TIPS

Billion dollar postwar aircraft development program planned by Army and Navy. Will help cushion vast cutbacks on orders which exceeded $16 billion annually for military planes. Further study of jet-propelled types scheduled

AN IMMEDIATE postwar development and procurement program intended to avoid a sudden breakup of the aviation industry's engineering and production skills has been formulated by the Army and Navy.

The plan, understood to involve the expenditure of more than $1 billion for production models and experimental work in the next 12 months, was prepared in the War Production Board after officials had discussed with aviation executives the dangers that might result from widespread contract cancellations at the end of the war. The program is said to have been approved by John W. Snyder, director of War Mobilization and Reconversion.

Army and Navy officials, while admitting they have drawn up plans, have not disclosed details as to the type of planes to be developed or the companies involved. It was intimated, however, that experimentation will be primarily with jet-propelled planes and that some revision of the program might be necessitated by the development of the atomic bomb.

Military aircraft sales lately have exceeded $16 billion annually, compared with a prewar level of $200 million. Without war contracts, the industry would be left with a $400 million backlog for civilian transports, it is estimated.

A billion dollar expenditure for military plane development would cushion the primary aircraft companies to a considerable extent now that orders for warplanes are cut, some industry officials believe. A very large portion of the vast cutbacks in warplane contracts will be absorbed by companies not building aircraft during peacetime.

Major aircraft builders believe that retirement from the aircraft field of those companies not regularly building aircraft, the retirement of women workers and others employed in aircraft plants only as a wartime measure, and the substantial orders for peacetime planes for private operators and airlines and for engines, parts and planes for foreign governments will enable the old-line companies to maintain employment at a fair level.

Guy W. Vaughan, president of Curtiss-Wright Corp., which employed 150,000 workers at its various plants, said the corporation has orders for C-46 two-engine transports for a number of airlines and orders for propellers and engines from foreign governments and airline operators which he believes will keep busy a substantial portion of the Curtiss-Wright employees.

Glenn W. Martin, president of the company bearing his name in Baltimo has been quoted as saying that volunt retirement of women, experts and wo ers from other fields for the duration a other employees working for patriotic r sons might amount to as much as 80 cent of the Martin wartime force.

Within ten years after the war, he p dicts, the Martin company will be e ploying as many people as during war for production of long-range fly boats, feeder planes, and craft for armed forces.

Republic Aviation Corp., Farmingd N. Y., already has built a small ampl ious plane upon which it is pinning hopes for peacetime markets. Al Marchev, president, believes his c pany will sell almost as many of th to private owners as it has sold Thund bolts to the government. The only ference will be that the private pl will sell for around $3000, less than o tenth the price received for the Thund bolt.

COMFORT IN THE AIR: Illustrating the ample space in the Hawaii Mars, Martin transport, is this modern living room arranged in one of the cargo hatches on the lower deck. With the exception of wall and ceiling finishes, this picture might well be one of the lounges on Mars transports which will operate for transoceanic service after the war

Improved Type of Hose Developed for Airplanes

Engines of American airplanes will lubricated and cooled more efficiently result of the development of a new s thetic rubber hose which offers increa resistance to heat and pressure, acc ing to United States Rubber Co., N York, which perfected the new hose.

It is designed to withstand temp tures up to 250 F for use in oil and up to 300 F for installation in ing systems. Resistance to pressure inch hose is double that of hose form used, with strength increased propor ately in other sizes, the company cla

New Cargo Plane Flight Tested Ahead of Schedul

Thirty days ahead of schedule, the North American Aviation-built Packet "Flying Boxcar" successfully pleted its maiden flight recently.

Scheduled for flight in Septembe first production model of the Fairc designed cargo plane flew eight m after North American Aviation was a ed a fixed price contract to build the craft for the Army Air Forces.

Preliminary work was started last uary, when the first engineering dat received from the designer, the Fai Engine & Airplane Corp., Hagers Md.

Pushing toward early production plane which was needed on aerial s lines to Allied forces advancing acro Pacific to Japan, North American tion's engineers immediately worke a manufacturing breakdown of the to speed up quantity production.

Close on the tail of the first produ plane are the second and third p both of which were scheduled to be

STE

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THOUSANDS of electric industrial trucks are now getting more work done at lower cost because of the advanced research of Philco engineers in developing tougher, more powerful storage batteries. Philco has long led in providing batteries of maximum capacity, with the rugged long-life construction especially engineered for today's heavier work schedules.

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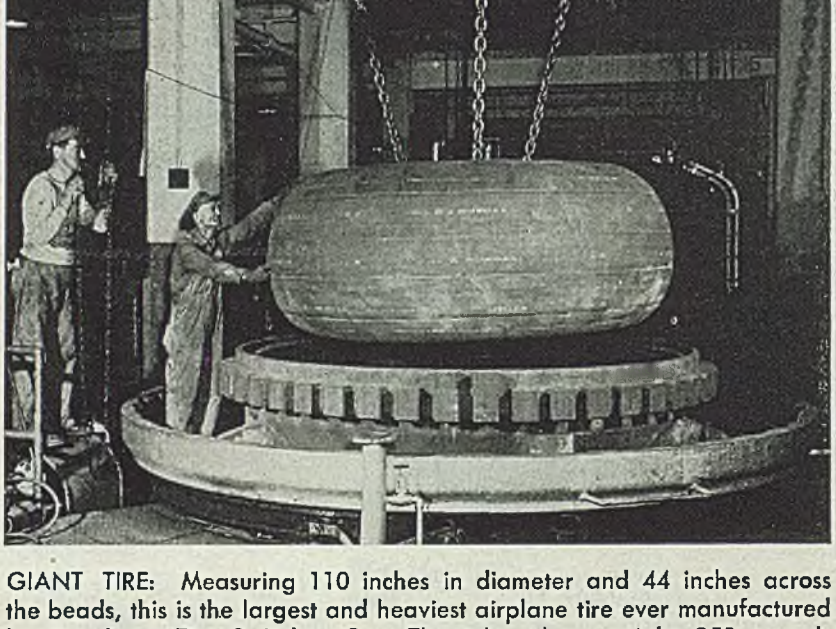


GIANT TIRE: Measuring 110 inches in diameter and 44 inches across the beads, this is the largest and heaviest airplane tire ever manufactured by Goodyear Tire & Ruber Co. The tube alone weighs 250 pounds and the completed tire with rim weighs 2600 pounds

pleted by the end of August.

The C-82 is the fourth type airplane produced in the government-owned Texas plant operated by the North American Aviation. Besides AT-6 Texan trainers and P-51 Mustang fighters now in production, the plant also has built B-24 Liberator bombers. This production has called for four complete tooling programs since the plant began operations in March, 1941.

When Liberator production ceased last December, North American Aviation was asked to bid on the new type cargo plane and won the fixed price contract by submitting the lowest offer in the first competitive bidding held by the Army Air Forces since 1940.

Designed to take off and land on short fields with heavy loads, the C-82 is capable of operation close behind the front lines, and is especially adaptable to conditions that were encountered by forces siezing bases close to Japan.

High Speeds of Jet-Propelled Fighter Planes Will Require Specially Designed Armament

LIFE and death combat nine miles above the earth's surface by jet-propelled planes whose terrific speed will hurtle them toward each other at more than 1000 miles per hour was portrayed by R. A. Averitt, of General Electric Co.'s Aviation Division, to engineers attending a meeting of the Institute of Aeronautical Sciences at Los Angeles, Aug. 16.

Split-second timing would be necessary. According to Mr. Averitt, the aerial battle would be conducted at such a lightning-like pace the fighters would be in and out of range in two seconds or less. He said that gun turrets and gunsights will be mounted flush, or within the skin line of the jet plane, and even gun barrels will not be allowed to protrude.

These were some of the developments outlined in a paper by Mr. Averitt titled "Armament for Jet Propelled Bombardment Airplanes" which was presented for him by P. M. Klauber, one of his associates in the G. E. Aviation Division. Mr. Averitt and Mr. Klauber have both been indentified with General Electric's armament systems developed for such planes as the B-29, A-26 and P-61.

The necessity for minimizing drag in every detail of the jet-propelled plane will outrule protruding turrets or sights, Mr. Averitt stated. Any significant protrusion may have such detrimental effect to the total jet plane performance as to render the plane useless for its purpose.

The jet-propelled bomber that emerges with Mr. Averitt's design analysis will include the following armament features:

1. Multiple-gun, remotely controlled nose and tail turrets.

2. Periscope sighting stations, either double-ended and mounted vertically in the airplane, or single-ended, mounted horizontally and capable of sighting in a forward or aft hemisphere.

3. Computers with hair-trigger brains that will make the most of limited effective firing range.

Emphasizing the need for close coordination of future armament development with airplane design, Mr. Averitt declared that jet propulsion opens a completely new approach to the design of bombardment airplanes. He predicted that further development in guns, sights, radar, computers, and accessories will produce designs far advanced beyond present equipment.

Some idea of the extent of the progress coming in aircraft armament is indicated in the fact that Mr. Averitt termed the direct vision type sighting stations now used on the B-29 as "out of the question" for jet-propelled bombers. The periscope sights they will use instead will boast such additional refinements as fixed eyepiece and optical range finders.

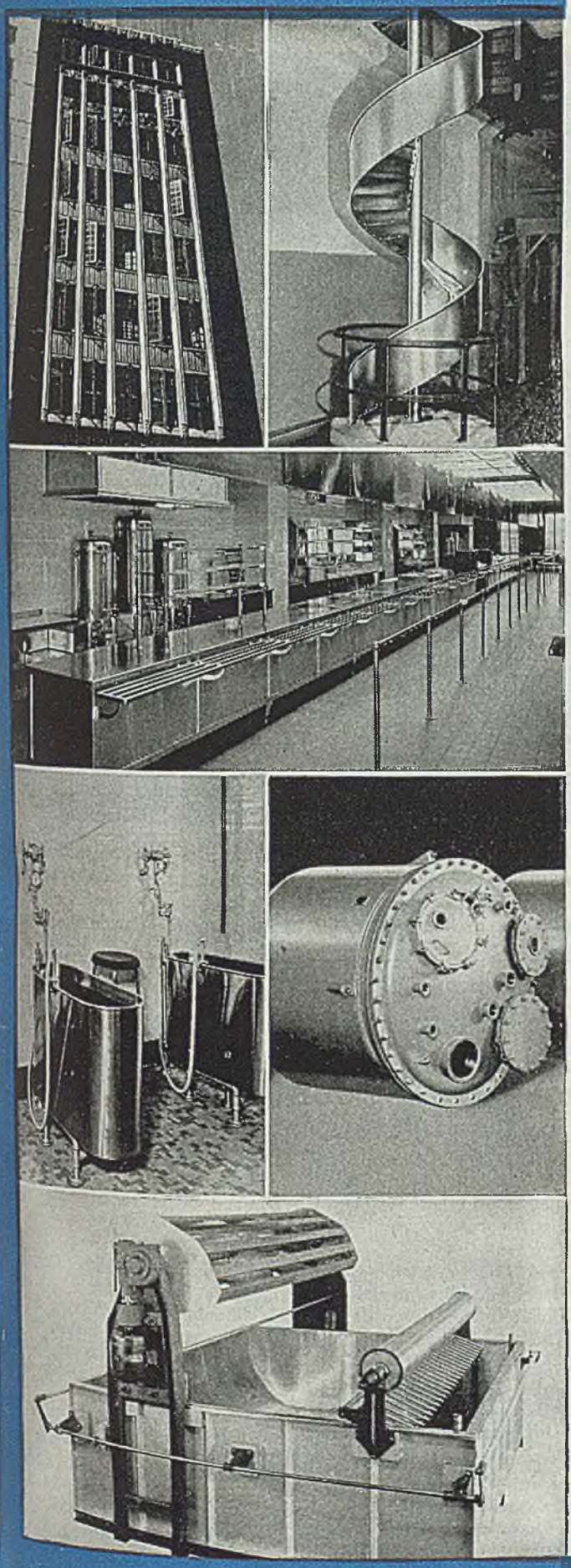
Swiftness of combat maneuvers between jet-propelled fighter and bomber as described by Mr. Averitt was breathtaking. On one arbitrarily selected flight path a jet fighter with a nose turret capable of a 60-degree cone of fire symmetrically disposed about its centerline would have only slightly more than three seconds of firing in an attack on a jet-propelled bomber. But by executing a 10g turn, the fighter would be in position five and one-half seconds later to fire on the bomber at a range of approximately 2000 yards.

Westinghouse Demonstrates Jet Propulsion Engines

Military jet propulsion engines ranging from a midget the size of a heavy artillery shell to a keg-sized version producing as much power as the largest piston aircraft engine yet built were demonstrated on the test stands recently to a group of eastern aircraft manufacturers and their engineers at the Westinghouse Electric Corp.'s Aviation Gas Turbine Division, South Philadelphia, Pa.

Under the authority of the Navy, for which Westinghouse developed the first wholly American design of jet propulsion engine, the plane builders had a private engineering preview of the machines that may power postwar airliners and cargo carriers.

G. H. Woodward, manager of the Aviation Gas Turbine Division, told the aviation executives that "as soon as military demand permits, a part of the company's manufacturing facilities will be turned to the production of commercial versions of the present jet engines. These postwar designs, however, will have propellers driven by compact, light-weight gas turbines somewhat similar to those that now produce jet thrust for high-performance military aircraft. Engineering work on these designs, based on the present military engines, is already well under way.



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New Record for U. S. Exports of Steel Expected

Postwar steel shipments expected to improve U.S. rank over that of prewar period, institute says

MUCH speculation as to probable postwar volume of world trade for iron and steel products has been generated by the end of the European war, it was pointed out last week by the American Iron & Steel Institute.

There are many reasons, the institute said, to believe that in the immediate years of reconstruction export of steel from the United States will far exceed that of prewar years.

Although during World War II the United States became the leading exporter of iron and steel, in the years before the war this country was outranked by several European nations.

In 1936, a representative prewar year, the United States supplied only 8 per cent of the international trade in steel products, despite the fact that then, as now, it operated virtually half of the world's steel capacity.

World trade in steel products that year totaled nearly 16,600,000 tons of pig iron and rolled steel, of which less than 1,400,000 tons were shipped from this country.

That total put this country in fifth place among nations, ranking behind Germany with nearly 4 million tons; Belgium-Luxemburg, 3,300,000 tons; the United Kingdom, 2,300,000 tons; and France, 1,700,000 tons.

The nations of Europe were by far the biggest importers of iron and steel and at the same time the largest exporters.

Almost half (8,200,000 tons) of the iron and steel going into world trade in that year went into European countries, including the United Kingdom and Soviet Russia. Nearly 85 per cent of all the steel exported from one country to another came from Europe.

During 1936, nearly 7,800,000 tons of pig iron and rolled steel products were shipped between European countries.

Cincinnati A.S.M.E. Plans Two-Day Technical Meeting

A two-day technical meeting will be held by the Cincinnati section of the American Society of Mechanical Engineers, Oct 2 and 3, at Netherland Plaza Hotel, Cincinnati. This meeting is to replace the section's fall meeting which was cancelled because of restrictions on travel.

ULTRAFINE WORLD: Checking a thread gage smaller than a thumb nail is relatively simple when this comparator at Westinghouse Electric Corp. is used. By a system of mirrors, the gage, above, has been enlarged 100 times to facilitate study of its contours for absolute accuracy

BRIEFS . . . .

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

Austin Co., Cleveland, has contract to build a $1 million plant in Danville, Ill., for General Electric Co., for the manufacture of small transformers for fluorescent lighting equipment.

—o—

R. D. Wood Co., Philadelphia, will move its Philadelphia offices to the Public Ledger Bldg., Independence Square, Philadelphia 5, as of Sept. 1.

—o—

Paragon Spring Co., Chicago, has been organized by Harry G. Faust and Christie W. Hohe, both formerly with Chicago Coil Spring Co.

—o—

Osgood Co. and General Excavator Co., Marion, O., have appointed six new distributors as follows: Southeast Florida, Allied Equipment Co.; northern Florida, Don Graze, Jacksonville; Houston, Tex., area, Texas Railway Equipment Co.; Sullivan, Ulster and Orange, N. Y., co ties, VandeWater Co., Walden Schenectady, N. Y., while Ohio will handled by Gibson-Stewart Co., Cl land.

—o—

Westinghouse Electric Corp.'s L Division, Bloomfield, N. J., has me its illuminating engineering departm with the commercial engineering dep ment, with D. W. Atwater heading newly-consolidated departments.

—o—

F. H. McGraw Co., New York, received contracts aggregating $2,5 000 from the General Aniline & Corp., New York, for construction a power house at Binghamton, N. Y., a wash house at Rensselaer, N. Y.

—o—

Federal Products Corp., Provide R. I., has announced E. L. Stacey, so

ern Texas representative for Federal Products, has moved his office to 2148 Dryden Road, Houston 5, Tex.

—o—

American Can Co.'s Hudson plant, Jersey City, N. J., has halted output of machine gun belt links on orders from the Army Ordnance Department, after completion of nearly 500 million units.

—o—

C. B. Hunt & Son Co., Salem, O., has been reorganized and incorporated under the name of C. B. Hunt & Son Inc.

—o—

Lester B. Knight & Associates, Chicago, have announced a new consulting and engineering service, specializing in foundry problems.

—o—

Crosley Corp., Cincinnati, has appointed Gustavo Madrazo, president of the Independent Electric Co., Havana, Cuba, to be distributor in Cuba of all Crosley peacetime products.

—o—

Carpenter Steel Co., Reading, Pa., has opened a warehouse and office at 790 Greenwich Street, New York.

—o—

F. L. Jacobs Co., Detroit, has acquired a plant at Dowagiac, Mich., for the manufacture of washing machines.

—o—

Small Steel Castings Inc., Buffalo, specializing in small castings requiring special skills, has been formed by Joseph Cheney and Joseph Spriesch, both of the Spriesch Tool & Mfg. Co. Inc., Buffalo.

—o—

Roger Wilson Associates, Washington, have opened offices at 1603 K Street Northwest, as consultants to industry, specializing in representing industrial clients before government agencies.

AWARDS . . .

The Army-Navy "E" award for excellence in manufacture of war materials has been given the following:

Albert Lea Foundry Co., Queens Stove Works Inc., Albert Lea, Minn.

American Jewels Corp., Attleboro, Mass.

Anaconda Wire and Cable Co., Anderson mill, Anderson, Ind.

Anderson Aircraft Inc., New York.

Apollo Mfg. Co., Newark, N. J.

Associated Springs Corp., Wallace Barnes Co. Division, Bristol, Conn.; and Raymond Mfg. Co. Division, Corry, Pa.

Automatic Machine Products Co., Birmingham.

Barr Mfg. Corp., Weedsport, N. Y.

W. A. Barrows Porcelain Enameling Co., Cincinnati.

Bendix Aviation Corp., Marshall Eclipse Division, Green Island, Troy, N. Y.

Benwood Linze Co. & Benwood Linze Electric Mfg. Co., St. Louis.

Buchanan Steel Products Corp., Buchanan, Mich.

Char-Lynn Co., Minneapolis.

Connors Steel Co., Birmingham.

Cornelius Co., Minneapolis.

Cuyahoga Spring Co., Cleveland.

E. I. du Pont de Nemours & Co., Industrial Division, Doyle Works, Leominster, Mass.

Enamel Products Co., Cleveland.

Fanger Research & Mfg. Co., San Francisco.

John E. Fast & Co., Chicago.

Flexitallic Gasket Co., Camden, N. J.

Fuller Johnson Corp., Caille Motor Co., Detroit.

Lenk Mfg. Co., Newton, Mass.

Link-Belt Speeder Corp., Link-Belt Co., Cedar Rapids, Iowa.

A. Mamaux & Son, Pittsburgh.

Milwaukee Gear Co., Milwaukee.

Mullins Mfg. Corp., Salem plant, Salem, O.

North American Philips Co. Inc., plants at Dobbs Ferry and Mt. Vernon, N. Y.

Northrop Aircraft Inc., Hawthorne, Calif.

Permanente Metals Corp., Carbothermic plant, Permanente, Calif.

Radio Receptor Co. Inc., New York.

Rahain Machine & Tool Co., Gardner, Mass.

Republic Steel Corp., Niles Steel Products Division, Niles, O.

Rupert Diecasting Co., Kansas City, Mo.

Schlueter Mfg. Co., St. Louis.

Southern Aircraft Corp., Garland, Tex.

Spence Engineering Co., Walden, N. Y.

Swan Engineering & Machine Co., Davenport, Iowa.

Vulcan Steel Products Co., Brooklyn, N. Y.

J. K. Welding Co. Inc., Brooklyn, N. Y.

Wico Electric Co., West Springfield, Mass.

Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia.

Youngstown Sheet & Tube Co., Chicago District plants, Chicago.

Cleveland Paint Firm To Build Research Laboratory

Arco Co., Cleveland, has started construction of a $1 million research laboratory for development of paints, lacquers, varnishes and new industrial coatings. The laboratory, scheduled for completion early in 1946, will be of structural steel and brick construction, and is to be located adjacent to the company's general offices at 7301 Bessemer Avenue.

The upper floor of the new laboratory will be given over entirely to product development work, and the ground floor to an evaluation and testing laboratory, resin research and a pilot plant for experimental production of new resins. Accelerated testing of new and experimental finishes will be provided for in controlled temperature rooms.

Bridge Company Develops Gun Storage Units

Hermetically sealed steel containers would preserve artillery equipment for any future emergencies

METHODS of storing America's big guns and other heavy artillery equipment in hermetically sealed containers are being developed by United States Steel Corp.'s American Bridge Co. plant, Ambridge, Pa.

The company, in its extensive research and experiments on this project in co-operation with the Pittsburgh Ordnance District, has developed a welded steel container closely resembling the Army Quonset hut.

The equipment, after being stored in such a unit, will be subjected to an inert gas atmosphere. Thus, by replacing the normal atmosphere with its corroding factors of oxygen and moisture it is expected that deterioration of the contents will be prevented over a long period of time. Equipment so preserved will be ready for use in event of another Pearl Harbor. A burner's torch could quickly open the containers.

Under the plan now being worked out, reconditioned artillery pieces will be delivered to the Ambridge plant for "packaging" and ultimately shipped to designated storage locations. The containers are designed for storage almost anywhere under extreme temperatures ranging from 60 degrees below to 170 degrees above zero.

Steckel Patent Upheld as Court Dismisses Federal Government's Case in Its Entirety

SUIT filed by the federal government against the Cold Metal Process Co., Youngstown, and A. P. Steckel, director of the company, last week was "dismissed in its entirety" by Federal Judge Shackelford Miller Jr., of Louisville.

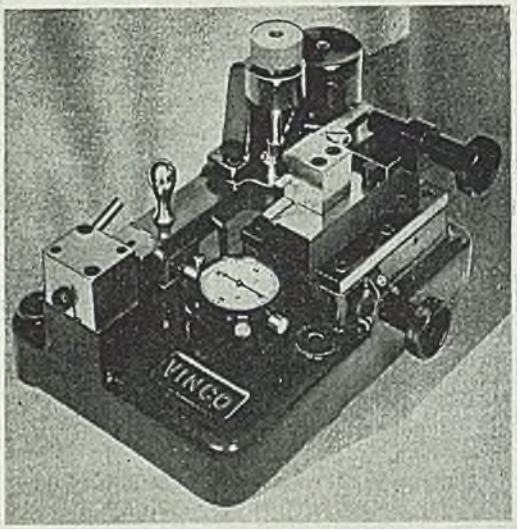
Judge Miller ruled that there was no fraud practiced against the U. S. Patent Office in obtaining the patents.

The government sought to cancel patents on which the company and Steckel are said to have collected royalties of approximately $800,000 a year since 1930 from various steel manufacturers. The case involved more than $3 million in future royalties and more than $500,000 now impounded by the court.

The government charged that Mr. Steckel and the company fraudulently obtained two patents on steel rolling equipment. The first hearing was scheduled for Sept. 24, 1944, while the trial was set for Nov. 28.

Judge Miller was designated by the U. S. Circuit Court of Appeals at Cincinnati to try the case. He spent four weeks in Cleveland last December and January hearing evidence and the last three weeks examining records. The testimony covered more than 3300 pages and Judge Miller's opinion comprises 30 pages.

Steckel is one of the large stockholders of the company, a director and one of the inventors of the cold rolling process.



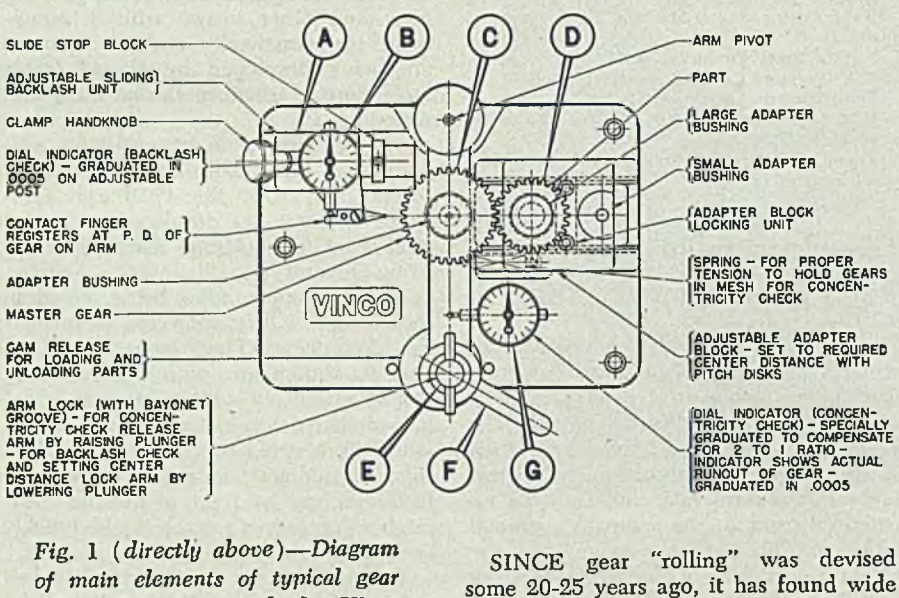


Fig. 1 (directly above)—Diagram of main elements of typical gear rolling fixture as made by Vinco Corp., Detroit

Across top of page—

Fig. 2—Spur gear rolling fixture with elements in position for checking backlash. To check second gear in cluster, another master is placed on movable arm and position of part gear reversed so large gear then engages the master

Fig. 3—This fixture can check a production part rack using a master pinion or a part pinion can be checked by a master rack

Fig. 4—Helical gears are checked in this modified design

Fig. 5—Internal spur gears are handled in this fixture. Note that portion of master gear extends above part gear for checking backlash on this setup

Fig. 6—Backlash and runout of worms and worm wheels are checked easily on this gear rolling fixture. An angular cut spur gear can be used as master in checking worms since only point contact is required to make the test

Gear

SINCE gear "rolling" was devised some 20-25 years ago, it has found wide acceptance as a production method of checking gears in gear manufacture. It is a simple, fast and quite accurate method of testing that requires no great skill on the part of the operator. The equipment is small, compact and inexpensive, thus lending itself to making 100 per cent checks right at the machine where the gear is made.

Some gear makers are using gear rolling fixtures to check before heat treatment and final grind, thus catching rejects early before expensive finishing work has been done on the parts.

Gear rolling fixtures are now available for checking spur, helical, spiral and worm gears as well as racks, internal spur and helical gears in sizes from 3/16 to 20 in. OD. This increased range has been accompanied by wider usage, some plants employing several hundred gear rolling fixtures.

In this method, the gear under test is fully meshed with a master gear and the change in center-to-center distances read on a dial gage as the gears are revolved or "rolled" against each other. The method derives its name from this rolling of the gear under test against the master.

The gear rolling fixture employed in this operation provides a fixed bearing point for the master. The gear under test is mounted on a bearing point ca ried on an arm pivoted at one end. dial gage is connected to the arm to sho movement.

Typical of recent developments in ge rolling fixtures are those made by Vin Corp., Detroit. The plan diagram, Fi 1, shows the essential elements and the relation. The other illustrations reve modified designs for checking vario types of gears. C. B. Smith, chi engineer at Vinco, explains typical ope ation as follows:

Eccentricity Check: Referring to Fi 1, the precision master gear C and th gear to be checked D are mounted adapter bushings to fit the fixture bea ings. If the fixture is designed for single high-production part, the blo carrying the adapter bushing for gear will be fixed, a part of the baseplate, the gear rolling fixture is the adjustab type used for low production parts for spot checks of various size hig production parts, this block will be in t form of a slide that can be adjusted a locked throughout a wide range of cen distances, according to the particul gears being checked.

The adapter bushing for the mas gear is carried on the arm which pivoted at the top and is free to mo at the other end when the arm lock E is released. The two gears are he fully in mesh under proper tension by spring. As the gears are turned or roll by hand, any eccentricity is revealed movement of the hand of the dial indi tor G which amplifies any movement the arm.

Tooth Form: While not intended

By
G. W. BIRDSALL
Associate Editor, STEEL

"Rolling"

. . . a simple, fast method of checking in gear production becomes increasingly useful with the development of ingenious fixtures

check tooth form, this can be done by rotating the gears slowly and watching for any regular movement of the runout gage as successive teeth are engaged. Incorrect tooth form manifests itself by repeated small movements of the gage needle corresponding to individual teeth.

On the "Dual Purpose" adjustable type fixture the correct center distance is set by the use of two pitch disks which are placed on the adapter where the part gear and master gear are mounted. By this method it is possible to set the correct center distance to 0.0001-in. or less. The pitch disks are removed and the part gear and master gear are then placed on the adapters.

Checks Backlash: These same fixtures carry another indicator gage and mount designed to check backlash. The correct center distance between the master and gear being tested is maintained by inserting plunger E into a fixed bushing in the base. The backlash unit A then is moved forward on its slide until it contacts a stop block set to bring the indicator finger to a position where it contacts the master gear at approximately the pitch diameter.

With the gear under test locked against rotation, the master is rotated by hand and the backlash is read directly from indicator B. To check both maximum and minimum backlash of a gear, it is only necessary to clamp the gear at two positions, namely at the points where the indicator C showed highest and lowest readings. No sample part is necessary in setting up the backlash check.

Both runout and backlash are checked from the same master gear and fixture.

No Errors From "Centers": One of the features of such gear rolling fixtures is that the gear to be tested is loaded directly on the adapters or on its own bearing surface rather than being placed on an arbor and mounted between centers. By avoiding the use of "centers", there is no chance for incorporating additional errors that might thus accrue from the mounting. By locating the part on the same bearing surfaces used in final assembly, no error can occur from that cause.

Dual purpose fixtures require no setup time, thus are adapted to rapid production work. Since all elements of the rolling fixtures are fixed, all checking conditions remain constant. When using the adjustable type fixture, original setup is a simple, fast mechanical operation.

With all readings taken directly from the calibrated indicator dials, no calculations are involved in use of such a fixture. Yet accurate quantitative comparisons are readily available from the instruments.

The small size of such fixtures is also an advantage. Occupying a space on the bench as small as 6¾ x 9 in. they can readily be used right at the machine where the gear is made.

Speed, too, of this method is high because it is possible to check maximum and minumum eccentricity as well as backlash in less than a minute.

Wide Range Handled: A different master gear can be used for each different size or type of work gear, or the same master can be employed in checking a considerable range of gears if desired. For using a common master, the master gear must have the same pressure angle and same diameter pitch as gears to be checked. The master gear must completely span the face width of the gear being checked, because it is necessary to check the whole face or flank of the gear teeth.

Spur Gears: Fig. 2 shows a spur gear rolling fixture with the elements in position for checking backlash. Runout is checked by disengaging the bayonet locking plunger and allowing the part gear and master to meet at zero backlash. Arrangement of elements and their operation is same as in the diagram Fig. 1.

To check the second gear of this cluster, Fig. 2, another master is mounted in place and the part gear position reversed so that the other gear then engages the master. Fixtures of this type are designed and built where large production of a gear cluster is involved.

Racks and Pinions: A production part rack can be checked by a master pinion or a part pinion can be checked by a master rack in the gear rolling fixture, Fig. 3. While details of manipulation of this fixture are somewhat different than the plain fixtures, Fig. 1 and 2, the principle of operation is the same. Too, method of mounting and locating the parts must be adapted to their shape and the checking requirements.

Helical Gears: These same comments also apply to other modifications of gear

(*Please turn to Page* 164)

A New Method of EVALUATING GRAIN SIZE

Logarithmic relationship between dimensions of grain and grain size number aids calculation in new system for determining spatial grain size of equiaxed polycrystalline metals. Distribution of sizes shown to be all important

By WILLIAM A. JOHNSON
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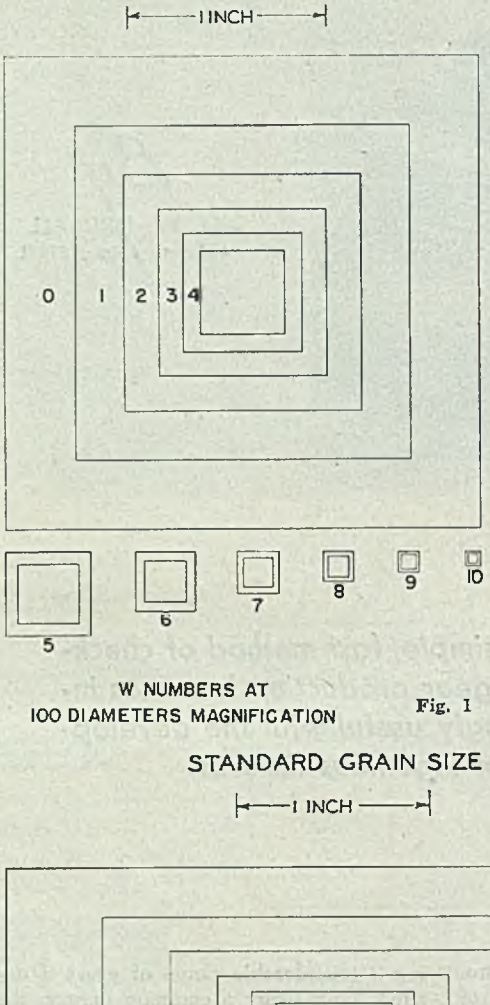


Fig. 1

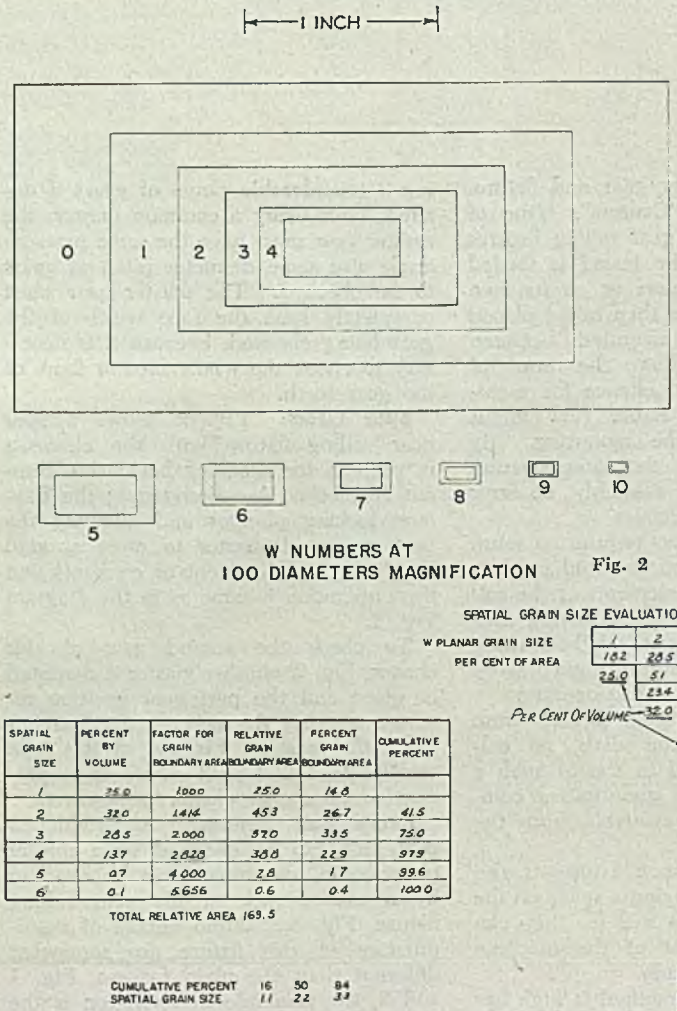


Fig. 2

SPATIAL GRAIN SIZE EVALUATION

W PLANAR GRAIN SIZE	1	2	3	4	5	6	SMALLER
PER CENT OF AREA	18.2	28.5	20.5	17.7	5.3	1.0	
	25.0	5.1	1.3	0.3	0.1	0.0	
		23.4	17.2	17.4	5.2	1.8	
PER CENT OF VOLUME		32.0	6.5	1.6	0.4	0.1	
			20.7	15.8	4.8	1.7	
			28.5	5.6	1.5	0.5	
				10.0	3.3	1.2	
				13.7	2.6	0.9	
					0.5	0.3	
					0.7	0.2	
						0.1	
						0.1	

SPATIAL GRAIN SIZE	PER CENT BY VOLUME	FACTOR FOR GRAIN BOUNDARY AREA	RELATIVE GRAIN BOUNDARY AREA	PERCENT GRAIN BOUNDARY AREA	CUMULATIVE PERCENT
1	25.0	1.000	25.0	14.8	
2	32.0	1.414	45.3	26.7	41.5
3	28.5	2.000	57.0	33.5	75.0
4	13.7	2.828	38.8	22.9	97.9
5	0.7	4.000	2.8	1.7	99.6
6	0.1	5.656	0.6	0.4	100.0

TOTAL RELATIVE AREA 169.5

CUMULATIVE PERCENT 16 50 84
SPATIAL GRAIN SIZE 1.1 2.2 3.3

MAGNIFICATION CORRECTION FOR 100X = 0

MEAN SPATIAL GRAIN SIZE
2.2 ± 1.1

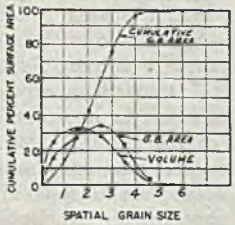


Fig. 3

PROPERTIES of metals are kno to be affected greatly by the size their component grains. Thus, anne ing of brass is specified and controll entirely by grain size measurements, a such measurements occupy an import place in the specifications of many grad of steel.

With one minor exception, grain s is universally evaluated simply fr observations on plane polished surfac whereas properties undoubtedly are termined by the size of the grains space. Thus, observations on a pl which cuts the several grains in a fi at any position from a corner to largest cross-section, always yield a ra of grain sizes even in the rare case constant spatial size. Under the m favorable circumstances, not more th one-half the planar grains will lie in range covered by one ASTM numb with appreciable numbers of all sma grains.

This situation is not recognized by present standard methods of evaluat grain size. They merely use the m diameter, or area, or number of gra in a plane field and any abnormality distribution of sizes is obscured. grain size is an important variable,

tably distribution of sizes in space too can be significant.

An important contribution to this problem could be made even if we knew only the distribution over a plane section when the grains all have the same volume. Fortunately, however, it is possible to go further than that and actually determine the distribution of sizes in space from observations on the plane. The measurements and requisite calculation are little more time-consuming than current methods and permit an accurate and complete evaluation of the grain structure. It is clear that such observations are necessary before the effects of grain size distribution can be assessed.

The mathematical analysis necessary to establish the relation between spatial and planar grain size is too involved for presentation in this article. It is intended to present only the formal steps necessary to evaluate spatial grain size with such additional information as is required to make the whole intelligible.

Grain Size Nomenclature: Several years ago Scheil[1] published data on the spatial and planar grain sizes of a sample of recrystallized Armco iron that may be considered quite typical of equiaxed polycrystalline metals. In working out the mathematical relationship between the two distributions, it turns out that the spatial distribution is related to the planar by an awkward integral equation, and that it is the distribution of sizes, and not merely the average size, that is important. The mathematical difficulty is easily surmounted, but a determination of the distribution of planar sizes cannot be circumvented. Because, to determine a distribution of sizes, it is necessary to measure individual grains, a new grain size standard must be defined.

Because of its wide acceptance in all ferrous metallurgy, it is desirable that any new definition be as similar as possible to that of the American Society for Testing Materials. A further advantage of this system is the logarithmic relationship between the dimensions of the grain and the grain size number which facilitates the numerical calculations. The ASTM, or Timken, grain size system is defined[2] by the equation which

TABLE I

APPLICATION OF GRAIN COUNT TO DETERMINE RELATIVE PERCENTAGE OF AREA OCCUPIED BY EACH SIZE

W Size No.	No. of Grains	Factor	Relative Area	Per Cent of Total Area
1	9.9	x32 =	316.8	18.2
2	28.3	x16 =	452.8	28.5
3	56.6	x 8 =	452.8	28.5
4	70.7	x 4 =	282.8	17.7
5	42.4	x 2 =	84.8	5.3
6 and higher	28.3	x 1 =	28.3	1.8

Total Area = 1618.3

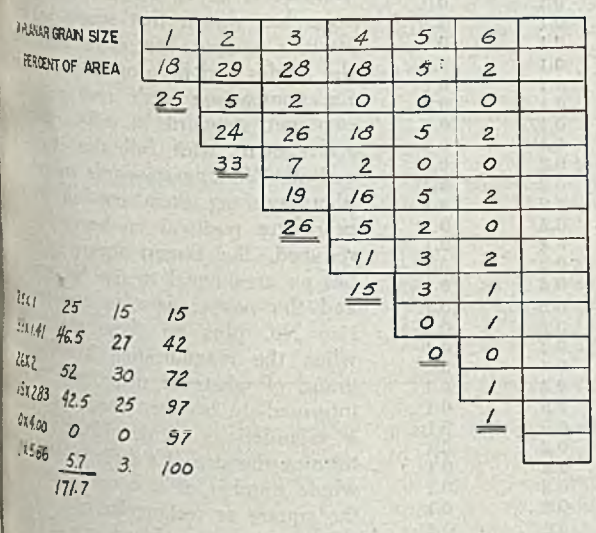
TABLE II

AVERAGES—PERCENTAGE OF AREA OCCUPIED BY EACH GRAIN SIZE ESTIMATED FOR FOUR SEPARATE AREAS

W Size No.	Estimated % A	B	C	D	Avge. %
1	20	20	20	10	17.5
2	25	30	30	25	27.5
3	30	20	40	30	30
4	15	20	10	25	17.5
5	5	10	0	5	5
6 and smaller	5	0	0	5	2.5

Last column of figures represents distribution of sizes of grains by percentages of area of a plane passed through the specimen.

SPATIAL GRAIN SIZE EVALUATION



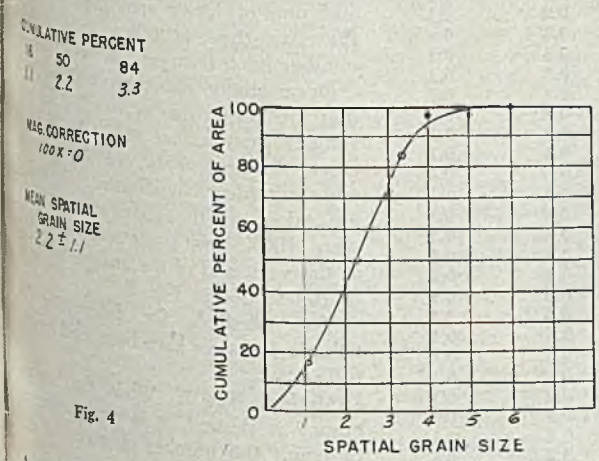
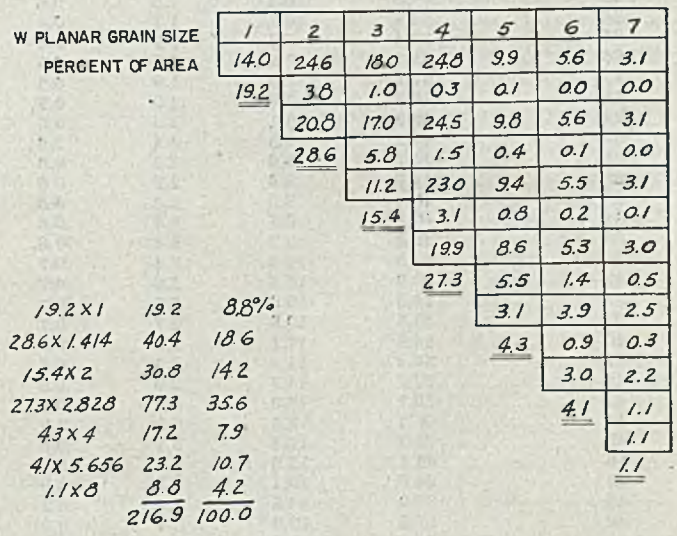


Fig. 4

SPATIAL GRAIN SIZE EVALUATION



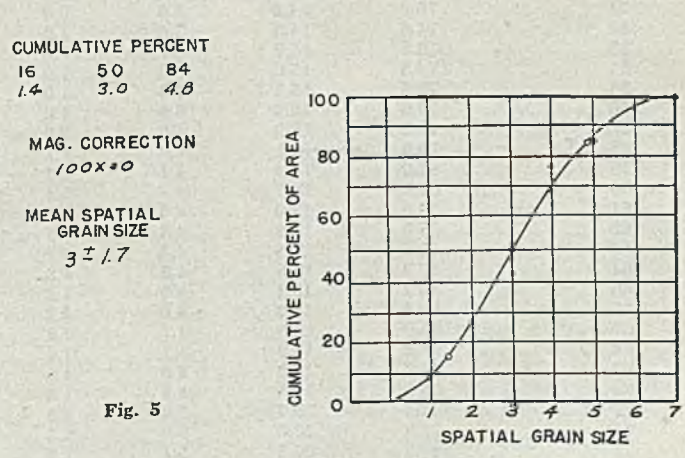


Fig. 5

is set forth in the next five lines:

Number of planar grains at $100X = 2^{N-1}$ per sq in.

where N is the grain size number.

This also may be written:

Mean planar grain area at $100X = 2^{1-N}$ sq in.

Thus, a sample of ASTM size No. 1 will have an average planar grain area of 1 sq in., but will exhibit a range of grain areas from 2 or more square inches to zero. In spite of this situation, charts sometimes are shown[2] with a hexagonal network of identical areas for comparison with specimens. This tends to mislead many observers into believing that the ASTM number refers to a single constant size, while in reality it refers to the average of a group of different size planar grains. The ASTM definition, to be suitable for our problem, could be modified by restricting it to apply to a single grain. Using the letter W as the grain size number of a specific grain, such a definition would be:

Planar grain area at $100X = 2^{1-W}$ sq in., and it is convenient to make the further definition that the spatial grain whose greatest cross-sectional area is of No. W is of spatial size No. W. Un this circumstance, a specimen ha a uniform spatial size of No. W will h a range of planar sizes from No. W and will have an ASTM mean size about No. W plus 1. To avoid confu when spatial grain size data are c pared with ASTM data, it is more venient to have the spatial grain system defined so that the mean g size number is the same, or very ne so, in both systems for most specim On this basis, the planar grain size W, of each individual grain visible a plane surface is defined by the tion:

Planar grain area at $100X = 2^{1-W}$ sq

Determination of Experimental D

According to the definition of W g size numbers as adopted and alre described, a single grain having an of 2 sq in. at 100X is size No. 1, an area of ⅛ sq in. of size No. The majority of grains, however, not have integral grain size numb i.e., a grain of 3 sq in. is size No. 0 Actually, it is not necessary to determ the exact size of every planar grain the field of view, but it suffices group them in ranges of one grain unit. Thus, all grains of size No. to 2½ (1.41 to 0.71 sq in.) are recor as size No. 2.

Sizes of individual grains may be termined most easily by comparison a set of standard areas representing sizes Nos. ½, ½, 1½, 2½, etc. Exp ence has shown that square and angular shapes are more useful the circles and hexagons sometimes for comparison with real grains, two such standards of wide applicab are shown twice full size in Figs and 2. Working standards are made photographing them one-half size preparing positives on heavy film. reduced, the largest square in Fig has an area equal to size No. minus and the next square an area equa size No. plus ½; these values a when the magnification is 100X. grain, of whatever shape, with an intermediate between these two squ is recorded as of size No. 0. To termine the size of a grain to the ne whole number, it is compared to e the square or rectangular grid, and adjacent sizes are found, one of gr and one of lesser area than the g the size then is taken as the w number lying between the adjacent a

Occasionally structures will be f that are too coarse or too fine for venient examination at 100X. In t cases, measurements can be made any suitable magnification. The are taken as though the magnifica were 100X, and a correction is app at the very end of the analysis accor to the values in Fig. 8.

Two methods for determining tribution of sizes have been used suc fully.

Method No. 1: When the best curacy is desired, it is most satisfac to count the number of grains of

TABLE III

SUBTRACTION TABLE FOR SPATIAL GRAIN SIZE CALCULATIONS

% Surface Occupied by Planar Size W	% Volume Occupied by Spatial Size W	% Surface Occupied by Planar Size W1	W2	W3	W4	W5 and higher
1	1.4	0.3	0.1	0	0	0
2	2.8	0.6	0.1	0	0	0
3	4.1	0.8	0.2	0.1	0	0
4	5.5	1.1	0.3	0.1	0	0
5	6.9	1.4	0.4	0.1	0	0
6	8.2	1.7	0.4	0.1	0	0
7	9.6	2.0	0.5	0.1	0	0
8	11.0	2.2	0.6	0.2	0	0
9	12.3	2.5	0.6	0.2	0	0
10	13.8	2.8	0.7	0.2	0.1	0
11	15.2	3.1	0.8	0.2	0.1	0
12	16.4	3.3	0.8	0.2	0.1	0
13	17.8	3.6	0.9	0.2	0.1	0
14	19.3	3.9	1.0	0.3	0.1	0
15	20.6	4.2	1.1	0.3	0.1	0
16	22.0	4.5	1.1	0.3	0.1	0
17	23.3	4.7	1.2	0.3	0.1	0
18	24.7	5.0	1.3	0.3	0.1	0
19	26.1	5.3	1.3	0.4	0.1	0
20	27.5	5.6	1.4	0.4	0.1	0
21	28.8	5.8	1.5	0.4	0.1	0
22	30.1	6.1	1.5	0.4	0.1	0
23	31.5	6.4	1.6	0.4	0.1	0
24	32.9	6.7	1.7	0.4	0.1	0
25	34.4	7.0	1.7	0.5	0.1	0.1
26	35.7	7.2	1.8	0.5	0.1	0.1
27	37.1	7.5	1.9	0.5	0.1	0.1
28	38.5	7.8	2.0	0.5	0.1	0.1
29	39.8	8.1	2.0	0.5	0.1	0.1
30	41.2	8.3	2.1	0.6	0.1	0.1
31	42.7	8.6	2.2	0.6	0.2	0.1
32	44.0	8.9	2.2	0.6	0.2	0.1
33	45.4	9.2	2.3	0.6	0.2	0.1
34	46.8	9.5	2.4	0.6	0.2	0.1
35	48.0	9.7	2.4	0.6	0.2	0.1
36	49.5	10.0	2.5	0.7	0.2	0.1
37	50.9	10.3	2.6	0.7	0.2	0.1
38	52.3	10.6	2.7	0.7	0.2	0.1
39	53.5	10.8	2.7	0.7	0.2	0.1
40	54.9	11.1	2.8	0.7	0.2	0.1
41	56.4	11.4	2.9	0.8	0.2	0.1
42	57.7	11.7	2.9	0.8	0.2	0.1
43	59.1	12.0	3.0	0.8	0.2	0.1
44	60.4	12.2	3.1	0.8	0.2	0.1
45	61.7	12.5	3.1	0.8	0.2	0.1
46	63.1	12.8	3.2	0.8	0.2	0.1
47	64.6	13.1	3.3	0.9	0.2	0.1
48	65.9	13.3	3.4	0.9	0.2	0.1
49	67.2	13.6	3.4	0.9	0.2	0.1
50	68.6	13.9	3.5	0.9	0.2	0.1
51	70.0	14.2	3.6	0.9	0.2	0.1
52	71.5	14.5	3.6	1.0	0.3	0.1
53	72.8	14.7	3.7	1.0	0.3	0.1
54	74.2	15.0	3.8	1.0	0.3	0.1
55	75.5	15.3	3.8	1.0	0.3	0.1
56	76.9	15.6	3.9	1.0	0.3	0.1
57	78.2	15.8	4.0	1.0	0.3	0.1
58	79.6	16.1	4.0	1.1	0.3	0.1
59	81.0	16.4	4.1	1.1	0.3	0.1
60	82.4	16.7	4.2	1.1	0.3	0.1
61	83.8	17.0	4.3	1.1	0.3	0.1
62	85.0	17.2	4.3	1.1	0.3	0.1
63	86.5	17.5	4.4	1.2	0.3	0.1
64	87.9	17.8	4.5	1.2	0.3	0.1
65	89.2	18.1	4.5	1.2	0.3	0.1
66	90.5	18.3	4.6	1.2	0.3	0.1
67	91.9	18.6	4.7	1.2	0.3	0.1
68	93.2	18.9	4.7	1.2	0.3	0.1
69	94.7	19.2	4.8	1.3	0.3	0.1
70	96.1	19.5	4.9	1.3	0.3	0.1
71	94.4	19.7	5.0	1.3	0.3	0.1
72	98.8	20.0	5.0	1.3	0.4	0.1
73	100.2	20.3	5.1	1.3	0.4	0.1

W PLANAR GRAIN SIZE	1	2	3	4	5	6	7
PERCENT OF AREA	6.4	18.4	31.8	17.4	15.1	7.6	3.3
	8.8	1.8	0.4	0.2	0.0	.0	0.0
		16.6	31.4	17.2	15.1	7.6	3.3
		22.8	4.7	1.1	0.3	0.1	0.0
			26.7	16.1	14.8	7.5	3.3
			36.7	7.3	1.9	0.5	0.3
				8.8	12.9	7.0	3.0
				12.1	2.3	0.7	0.3
					10.6	6.3	2.7
					14.1	3.0	0.5
						3.3	2.2
						4.5	1.2
							1.0
							1.0

8.8X1	8.8	3.7	3.7
12.7X1.414	32.2	13.5	17.2
26.7X2	73.4	30.8	48.0
22.2X2.828	34.2	14.3	62.3
4.1X4	56.4	23.6	85.9
4.5X5.656	25.4	10.7	96.6
10X8	8.0	3.4	100.0
	238.4		

CUMULATIVE PER CENT

1	50	84
1.7	3.3	4.8

MAG. CORRECTION

100X = 0

MEAN SPATIAL GRAIN SIZE

3.3 ± 1.6

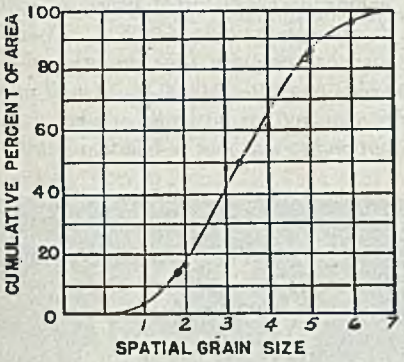


Fig. 6

W PLANAR GRAIN SIZE	1	2	3	4	5	6	7
PERCENT OF AREA	10.2	21.5	24.9	21.1	12.5	6.6	3.2
	14.0	2.8	0.7	0.2	0.1	0.0	0.0
		18.7	24.2	20.9	12.4	6.6	3.2
		25.7	5.2	1.4	0.3	0.1	0.0
			19.0	19.5	12.1	6.5	3.2
			26.1	5.3	1.3	0.4	0.1
				14.2	10.8	6.1	3.1
				19.5	4.0	1.0	0.3
					6.8	5.1	2.8
					9.3	1.9	0.6
						3.2	2.2
						4.4	1.2
							1.0
							1.0

14X1	14.0	6.1	6.1
25.7X1.414	36.3	15.8	21.9
26.1X2	52.2	22.8	44.7
19.5X2.828	56.2	24.7	69.4
9.3X4	37.2	16.2	85.6
4.4X5.656	24.9	10.9	96.5
10X8	8.0	3.5	100.0
	228.8	100.0	

CUMULATIVE PERCENT

16	50	84
1.7	3.2	4.9

MAG. CORRECTION

100X=0

MEAN SPATIAL GRAIN SIZE

3.2 ± 1.6

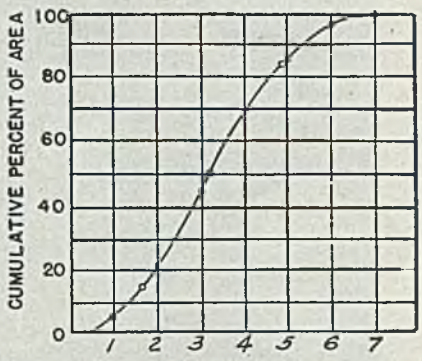
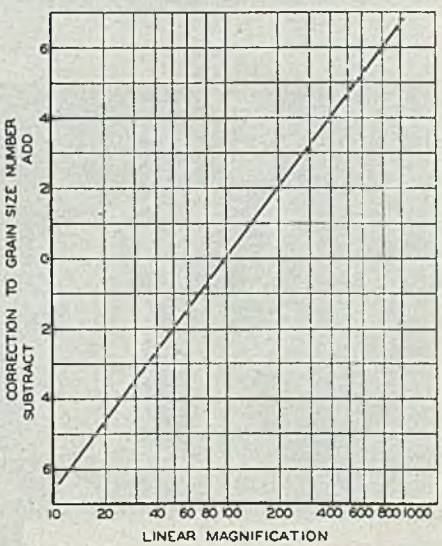


Fig. 7

TABLE IV
IRREGULARITY RESULTING FROM TOO FEW DATA
EXAMPLE OF TWO MEASUREMENTS ON SINGLE SPECIMEN

Size	1	2	3	4	5	6	7 and smaller
No. Grains, A	2.2	7.7	11.3	31	25	28	31
No. Grains, B	1.0	5.8	20.0	22	38	38	35
Per Cent Area, A	14.0	24.6	18.0	24.8	9.9	5.6	3.1
Per Cent Area, B	6.4	18.4	31.8	17.4	15.1	7.6	3.3
Average	10.2	21.5	24.9	21.1	12.5	6.6	3.2



CORRECTION TO BE APPLIED WHEN STANDARD GRAIN SIZE CHARTS ARE USED AT MAGNIFICATIONS OTHER THAN 100 X

Fig. 8

tegral size and convert these figures to percentages of area. Counting is facilitated by photographing the specimen on paper negatives and marking the size of each grain on these prints. Eastman Royal Bromide, E5, double-weight paper (formerly called PMC 9 Extra Contrast) has been found very satisfactory and requires only a short exposure. When a large number of specimens are to be measured, the making of such negatives requires relatively little additional time and they furnish a valuable permanent record of the appearance of the specimens. Any size area may be measured, but to insure a random sample, an arbitrary region should be marked out which does not follow the grain boundaries. The size of all grains wholly or partly within this region is measured. The number of grains of each size then is corrected, giving grains entirely within the region a weight of unity, and grains partly within the region a weight equal to the fraction of the grain estimated visually to lie within the region. Enough areas are examined in this fashion to yield a total of about 200 grains. The results of such a count, where calculations are for the purpose of determining the relative percentage of the area occupied by each size, might be as shown in Table I. In working by this method, any set of multiplying numbers may be used, if successive ones decrease by a factor of 2 as grain size number increases one unit.

Method No. 2: Percentage of the area of field occupied by each grain size is estimated visually. This estimate is repeated for several fields and the data are averaged. Any size field may be examined, but it should be the same size for each estimate and the total area examined should include from 100 to 200 grains. If four areas were examined, the estimates might be as shown in Table II. In this table the last row of figures is the distribution of sizes of grains by percentages of the area of a plane passed through the specimen.

Calculation of the Spatial Grain Size: It is not difficult to understand the principle on which is based the calculation

(*Please turn to Page* 168)

JIG GRINDERS...

Tackle production proble

By FREDERICK C. VICTORY
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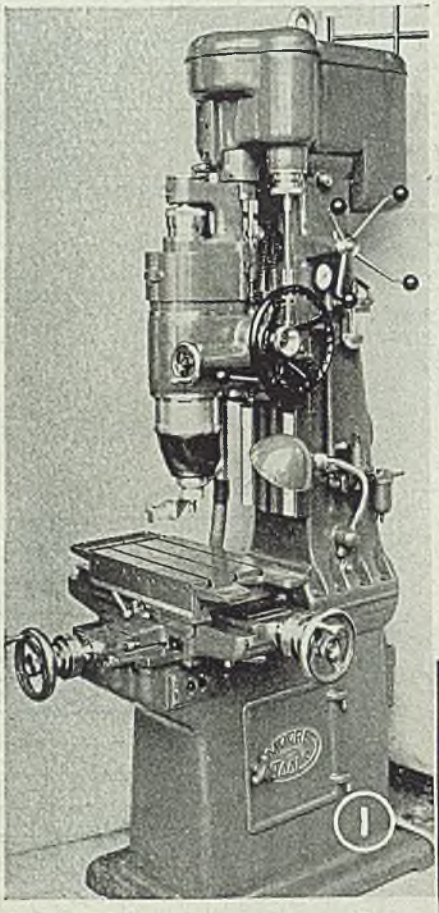
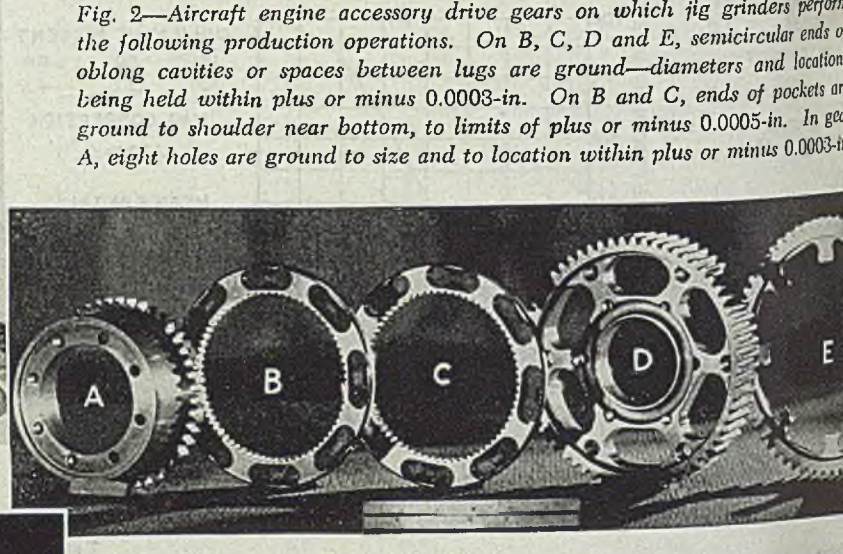


Fig. 1—General view of jig grinder, minus its fixtures for gear job, showin location of hole locating, sizing and operational controls

Fig. 2—Aircraft engine accessory drive gears on which jig grinders perfor the following production operations. On B, C, D and E, semicircular ends o oblong cavities or spaces between lugs are ground—diameters and location being held within plus or minus 0.0003-in. On B and C, ends of pockets ar ground to shoulder near bottom, to limits of plus or minus 0.0005-in. In ge A, eight holes are ground to size and to location within plus or minus 0.0003-i



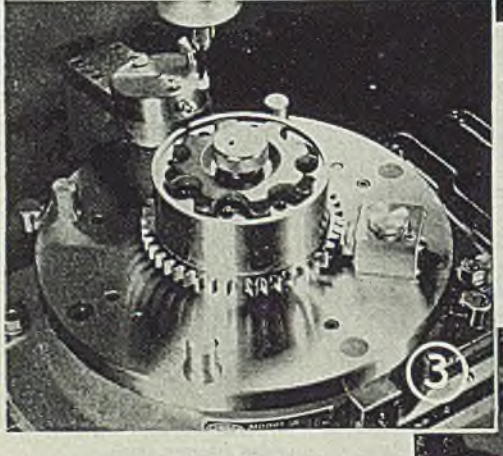
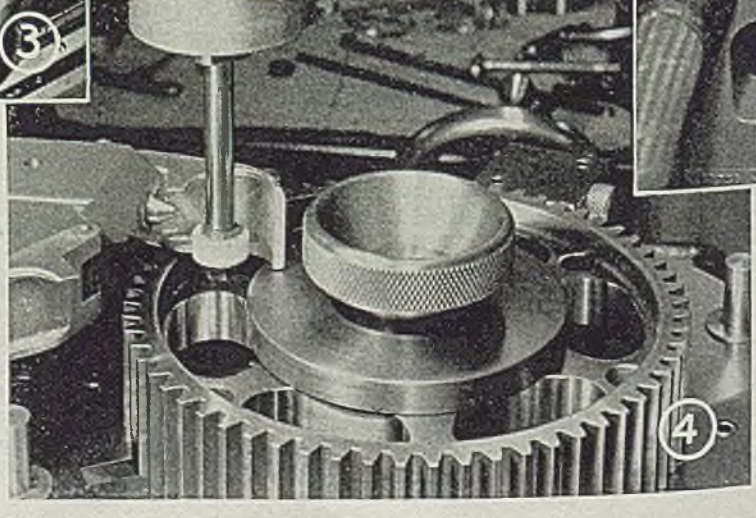


Fig. 3—Cup-shaped gear (A in Fig. 2) mounted in fixture on jig grinder. Wheel makes two passes in each of eight straight, round holes—0.001-in. being left for final pass. Indexing turret at rear holds two diamonds. One dresses wheel for roughing, the other for finishing

Fig. 4—Setup for "spoked" gear (D in Fig. 2). Revolving and traversing at operating rate, wheel is dressed by preset diamond, then continues on to grind curved face of spoke to correct radius and location. Hole in top of arm locates diamond-setting block, not shown



BY DESIGNING and building a practical, precision machine with a planetary grinding head—called the jig grinder because of its close relation to the jig borer—Moore Special Tool Co. Inc. has put the final positioning and sizing of holes in hardened work on a true "machine shop practice" basis. In other words, such work no longer involves trick or makeshift setups.

That the scope of the applications of this machine, shown in Fig. 1, is by no means limited to the tool and die for which it originally was designed was emphasized recently when 14 of these jig grinders were installed in the production lines of a well known automotive plant. The grinding problems involved in this plant were in connection with manufacture of the gears shown in Fig. 2, these gears being for vitally needed aircraft engines.

Only two modifications were required to adapt this precision "toolroom machine" to this production job: (1) A special gear ratio in the power feed to permit plunge grinding, a method which is described further on; and (2) a simple stationary precision indexing fixture for each gear, incorporating automatic hole sizing through wheel dressing.

Most of the features required to adapt the standard jig grinder to this mass-production job are incorporated in the work-holding fixtures, which are shown in Figs. 3, 4, 5, 6 and 7. The main considerations in the design of these were high accuracy and convenience of setup and operation. The basic design features of the fixtures consist of a rotating hardened plate, jig ground and bushed, which is the indexing control, and a spring plunger which snaps into the bushings, thus positively determining angular location.

Exact gear-locating in the machine is of great importance, because of the close tie-up between the grinding and all previous operations. In addition to centralizing by means of a close-fitting plug, or pocket, as illustrated, each gear must be oriented to its correct angular relationship. For this purpose, a plug held in by spring pressure is employed. The "business end" of the plug corresponds to a rack tooth or to two rack teeth, and locates on the pitch diameter of the gear. In some cases, this locator fits between two of the gear teeth, in others it straddles a single tooth. One tooth of each gear is marked. This is the reference point for setting up every operation in the

(*Please turn to Page 176*)

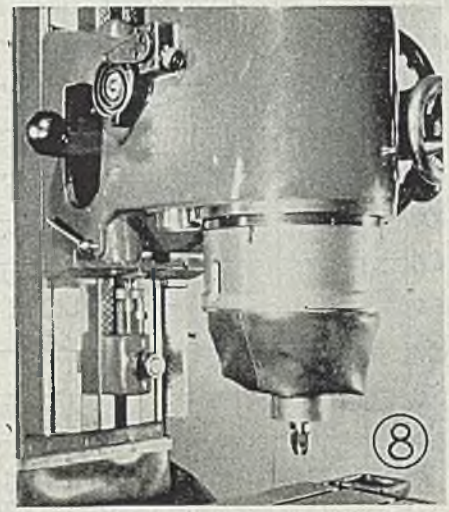
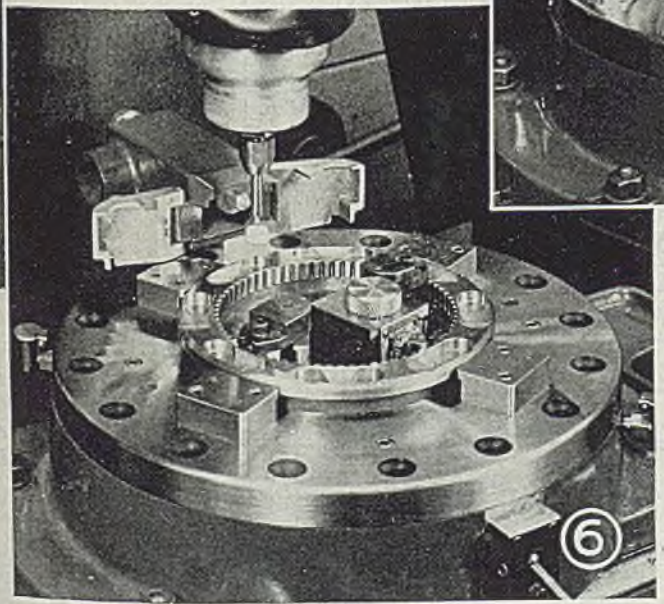


Fig. 8—Depth setting provisions for jig grinder head. Micrometer stop assures accurate repeat settings of main spindle housing. Positive adjustable stop on pinion shaft determines grinding depth. Angular limiting screw, left center, provides small increments of adjustment. If pinion shaft is given more than one full turn in raising, scroll lifts screw clear, allowing full travel

Fig. 5—Sides of internal lugs of gear E (Fig. 2) are ground to exact radius and location. Hollow arm holding diamond serves as vacuum nozzle for removal of abrasive dust and metallic particles. Resulting airflow cools wheel and work. Guard doors around diamond are closed when operating

Fig. 6—Fixture for holding internal gears B and C (Fig. 2) has four locating blocks with flanges ground to fit external diameter. Note single rack tooth plug providing angular location by meshing between gear teeth. Ends of pockets are ground at this setup



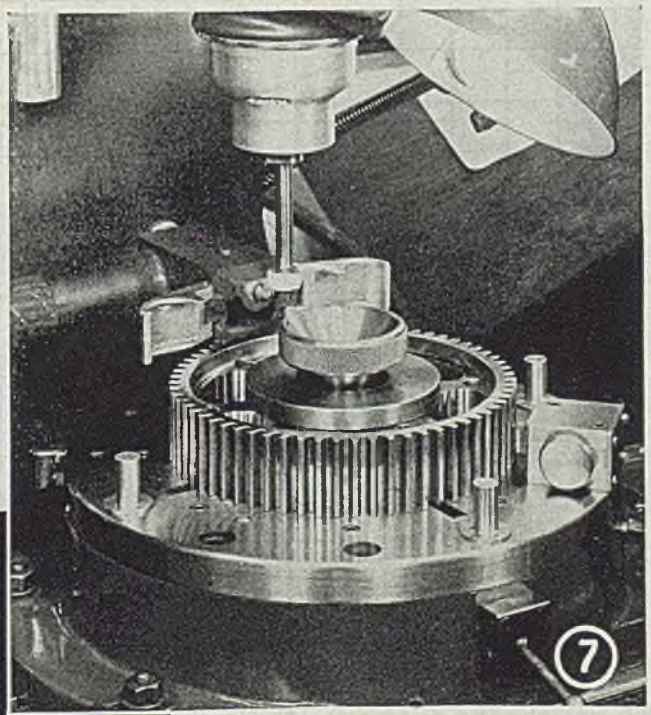


Fig. 7—Setup for gear D (Fig. 2), showing external use of rack tooth locating plug. Handle at right front of fixture releases spring-backed locking plunger when indexing the table. Slots in table permit insertion of lifter bar in case work sticks on locators

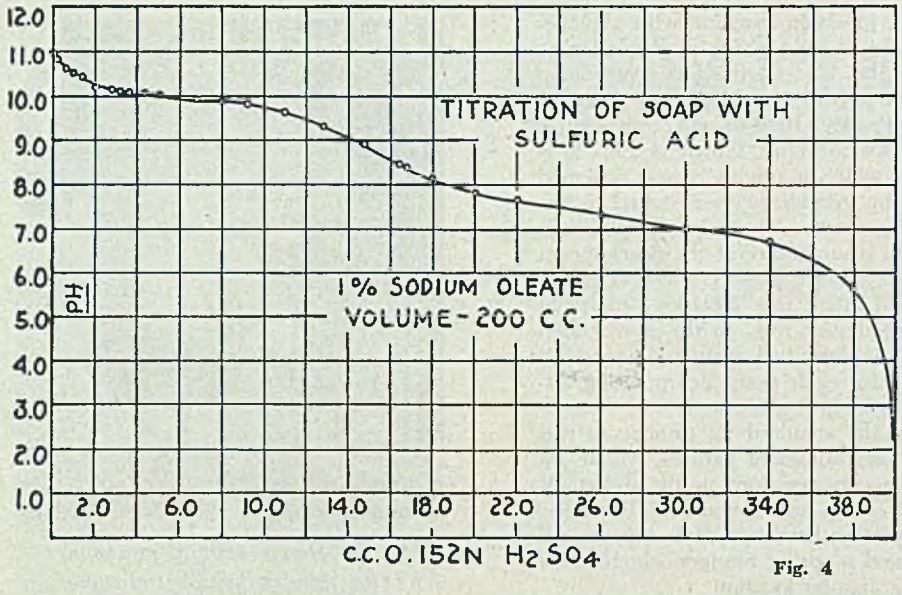


Fig. 4

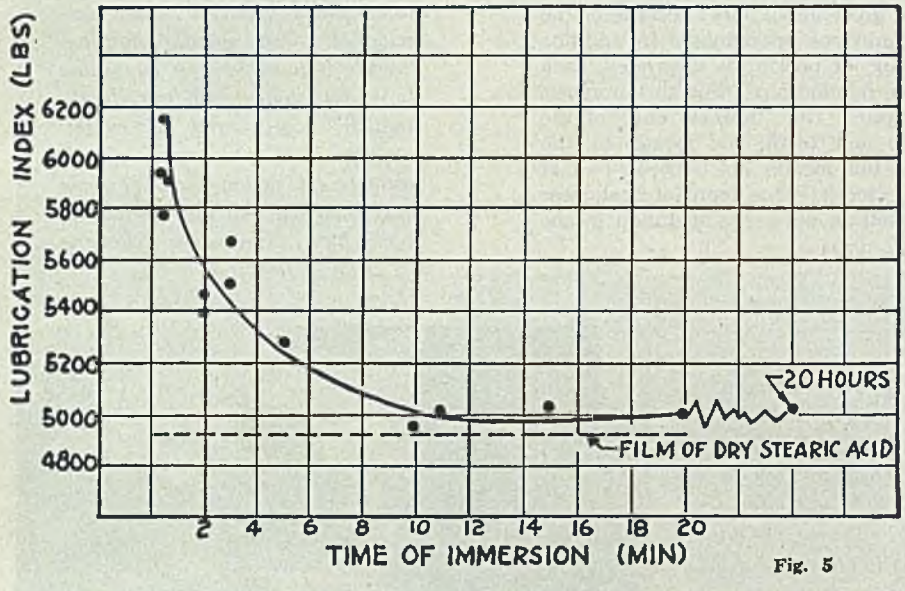


Fig. 5

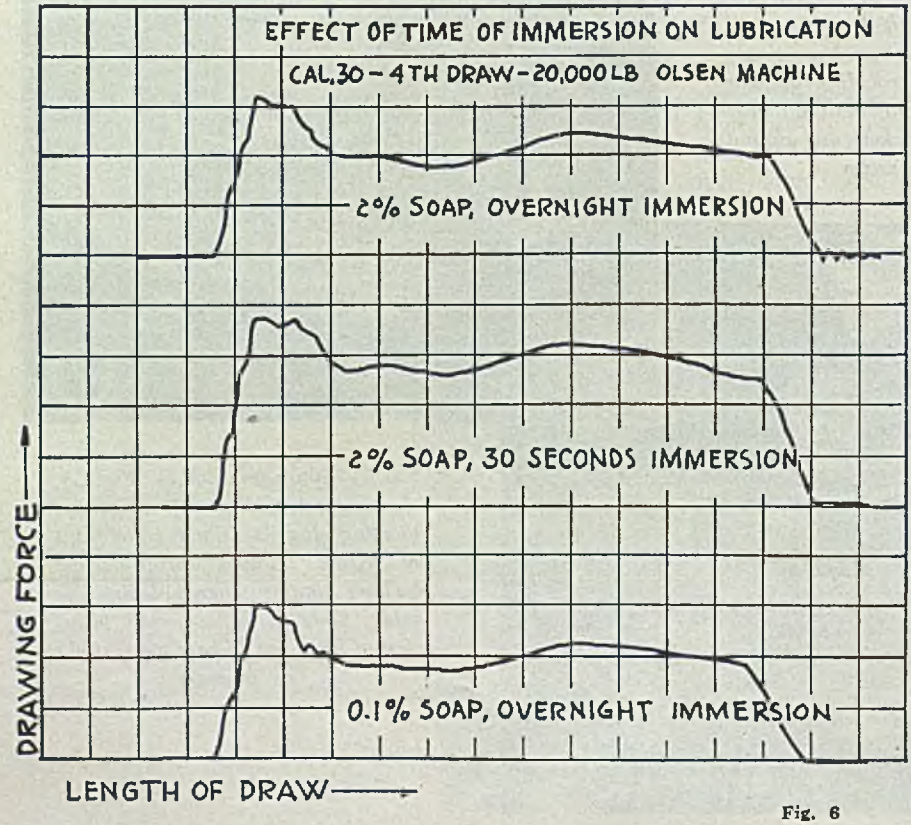
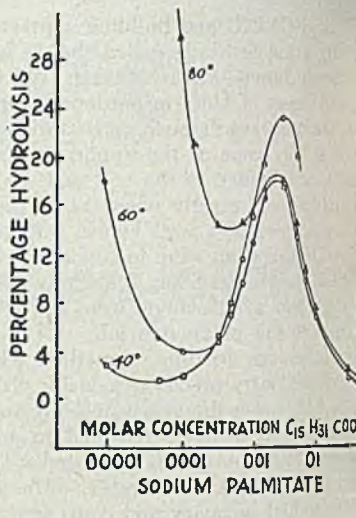
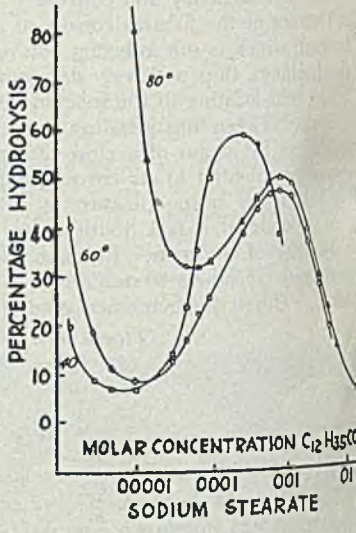


Fig. 6





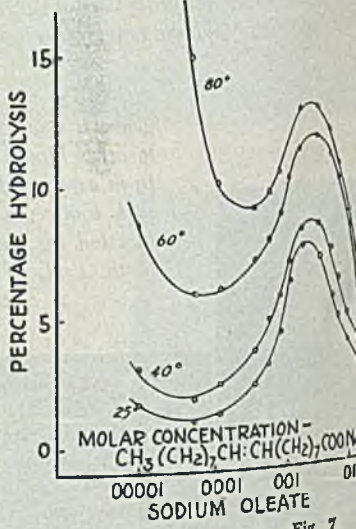


Fig. 7

Fig. 4—Lubrication has bee found to be dependent upon th pH of the soap dispersion; ph greater than 12 causes the sam pull-back as water, while pH of 7. effects reduction of 25 per cent i pull-back

STE

LUBRICATION... in the Drawing of Metals

Lubrication by soap dispersions in water and commercial emulsion lubricants are discussed by Mr. Spring in second and concluding part of his article on drawing of brass. E. G. Budd test is described

By SAMUEL SPRING
Chemist
Frankford Arsenal
Philadelphia

DISPERSIONS of soap and water have been widely used as lubricants for drawing brass, usually with considerable success. As a consequence, an investigation was made of the action of soap in this connection. In some preliminary work, it was found that a break occurred in the neutralization curve for sodium oleate (Fig. 4). This indicated the formation of an acid salt of the soap and the role of this constituent was consequently investigated. Williams[4] has pointed out that the lubricating action of soap dispersions is due to the fatty acids or acid soaps derived from hydrolysis, since lubrication was found to be dependent upon the pH of the soap dispersion.

Soap dispersions having a pH greater than 12 caused the same back-pull in a wire drawing machine as water whereas those having a pH of 7.3 caused a reduction of the back pull of 25 per cent. The hydrolysis of soap to form acid soaps has been discussed in detail by Lewkowitsch[1] and Powney and Jordan[6] have concluded from their studies that acid soaps are formed as a result of soap hydrolysis. Acid soaps are considered by these authors to be adsorption complexes formed by interaction of neutral soap and free fatty acid.

In order to confirm the above mechanism, soap solutions were made with varying alkali and fatty acid concentrations and their performance as drawing lubricants determined. Data obtained in the low speed drawing test are given in Table IV. It may be observed that the soap made up in 0.1 per cent sodium hydroxide increased drawing forces by about 55 per cent in comparison with unmodified soap. Forces were above the capacity of the machine when dispersions of soap were made in 0.2 per cent sodium hydroxide solution.

In addition, some data were obtained by means of a test utilizing an Olsen ductility tester, according to a procedure developed by P. S. Parkinson, Chief Chemist of the E. G. Budd Mfg. Co., Philadelphia. In this ductility test, metal strip is forced through a 1 in. steel ring, by means of a 0.87 in. steel ball so as to form a cup. Ductility, interpreted here as lubricant performance, is determined by the height of the cup formed prior to fracture. In these experiments, a cup was preformed to a hei ht of 0.28 in. in thoroughly annealed brass strip 0.042 in. thick. The lubricant was then applied and the cupping continued until fracture started. The data on the effect of addition of alkali or free fatty acid to soap dispersions on the height of the cup, prior to fracture, are given in Table VII.

In order to dispel the popular opinion that the heavy gel and slippery-to-the-touch characteristics of soap dispersions are important for good drawing lubrication, these characteristics were removed from normal gelled 2 per cent Soap A, by the addition of alcohol. The slight increase in draw forces was considered due to greater solubility of the acid soap and when additional acid soap was added the forces were less than those for the gelled soap (Table IV). In addition, very dilute soap of 0.1 per cent concentration having no gel and little slipperiness, was equal in effectiveness to the gelled soap. The soap containing alkali gave the heaviest gel and was most slippery to the touch but was ineffective as a lubricant.

Since lubrication by soap dispersions is a result of hydrolysis, it was considered that increased dilution should cause increased hydrolysis within certain concentration ranges as indicated by the data of Powney and Jordan (Fig. 7).

Accordingly, drawing test data were obtained for concentrations of 2, 0.5 and 0.1 per cent beef tallow soda soap (Table V). It may be observed that moderately increased dilution caused a slight improvement in some cases but the results were no worse in any case. These data have been confirmed by extensive tests under production conditions. Ductility test data also confirm this effect (Table VII). Sodium oleate showed a greater improvement with dilution which is in agreement with the hydrolysis data of Powney and Jordan (Fig. 7).

The action of the fatty acids derived from hydrolysis of the soap and present as acid soap is that of the polar lubricants discussed in STEEL earlier this year. It is quite possible that the acid soap is adsorbed as such, since oleic acid or concentrated sodium oleate solutions, alone, were not as effective as very dilute sodium oleate solution (Table VI).

Effect of Carbon Dioxide: It was observed that the pH of soap dispersions decreased during use which suggested the possibility that carbon dioxide, present in the air, could displace fatty acids from soap solutions. Examination of the literature disclosed very little information on this point although one reference[7] mentions that free fatty acids were formed during the drying of soap at elevated temperatures, which is ascribed

Fig. 5—Effect of immersion of brass case pieces in 2 per cent soap dispersion (gelled) at room temperature on lubrication. Performance as indicated by the low speed drawing test

Fig. 6—Effect of time of immersion in soap dispersions on lubrication

Fig. 7 (directly above)—These curves from Powney and Jordan[6] show that sodium oleate displays relatively greater improvement with dilution

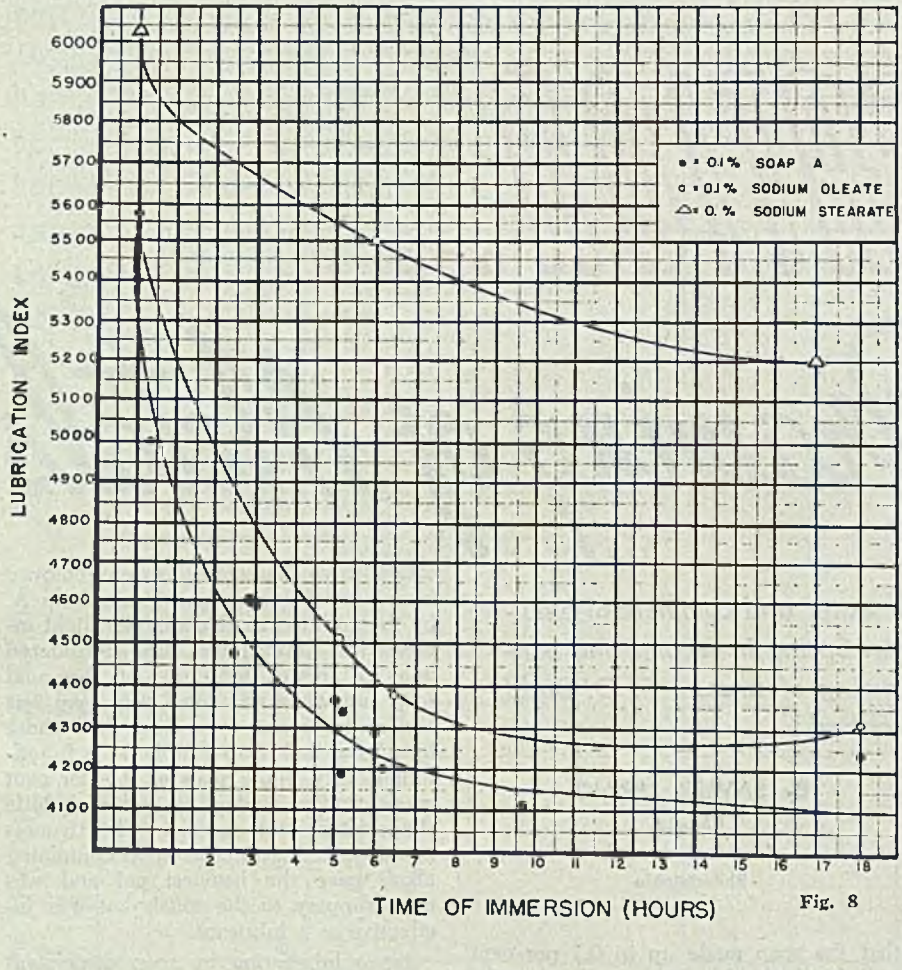


Fig. 8

Fig. 8—Effect of immersion of brass case pieces in 0.1 per cent dispersion of three soaps at room temperature on lubrication performance as indicated by the low speed drawing test

TABLE IV
EFFECT OF SOAP ALKALINITY AND LACK OF IMPORTANCE OF HEAVY GEL STRUCTURE

Lubricant	No. of Pieces Drawn	1st Maximum Force (lb)	2nd Maximum Force (lb)
1. 2% Soap (gel)	10	2430	1800
2. 2% Soap plus 20% ethyl alcohol (no gel)	10	2470	1730
3. Same as 2 plus 0.4% acid soap	10	2330	1560
4. 2% Soap plus 0.1% sodium hydroxide (heavy gel)	8	4110	2300
5. 0.1% Soap (no gel)°	10	2300	1890
6. 2% Soap (gel)°	10	2380	2000

°Different tools from 1 to 4.

TABLE V
EFFECT OF DILUTION OF SOAPS ON LUBRICATION PERFORMANCE

Lubricant	No. of Pieces Drawn	1st Max. Force (lb)	1st Min. Force (lb)	2nd Max. Force (lb)	Lubrication Index
1. 2% Soap A	20	2490	1640	1960	6090
2. 0.5% Soap A	20	2490	1620	1940	6050
3. 2% Soap A	15	2430	1670	1960	6060
4. 0.1% Soap A	15	2360	1560	1890	5810
5. 2% sodium oleate	10	2660	1720	2050	6430
6. 0.1% sodium oleate	10	2300	1450	1830	5580

TABLE VI
EFFECT OF 24 HOUR IMMERSION OF BRASS PIECES IN SOAP DISPERSIONS OF VARIOUS CONCENTRATIONS

Lubricant	No. of Pieces	1st Max. Force (lb)	1st Min. Force (lb)	2nd Max. Force (lb)	Lubrication Index (lb)
1. 2% Soap A	15	2080	1270	1630	4980
2. 0.5% Soap A	15	1830	1120	1510	4460
3. 0.1% Soap A	15	1830	1050	1390	4270
4. 0.05% Soap A	10	1770	1080	1400	4250

to the action of atmospheric carb dioxide. In addition, Bulkley and Rit had found, in determining the surf tension of soap solutions, that an parently solid film was formed at surface, which they found to be due the action of carbon dioxide in the atm phere.

In these experiments, it was fo that when carbon dioxide gas was b bled through a soap dispersion, the ph cal characteristics changed from a ge a nonviscous, milky dispersion, the decreased and at a pH of 6.8 some per cent of the soap fatty acids were tractable with ethyl ether. This placement of fatty acids by carbon diox probably explains the tradition that sto soap dispersions are better lubrica than freshly prepared soap dispersions

Effect of Prolonged Immersion of Br in Soap Dispersion: The action of fa acids present in soap dispersions is v probably one of adsorption. It has b established by several investigators that fatty acids in oil require a cer length of time for adsorption and or tation when present in low concentrati The effect of increased time of contac brass with soap dispersion was theref studied to determine whether gre thicknesses of lubricating film yield improved performance could be tained. Brass case pieces were kept contact with soap dispersions for vary lengths of time and were drawn at speed.

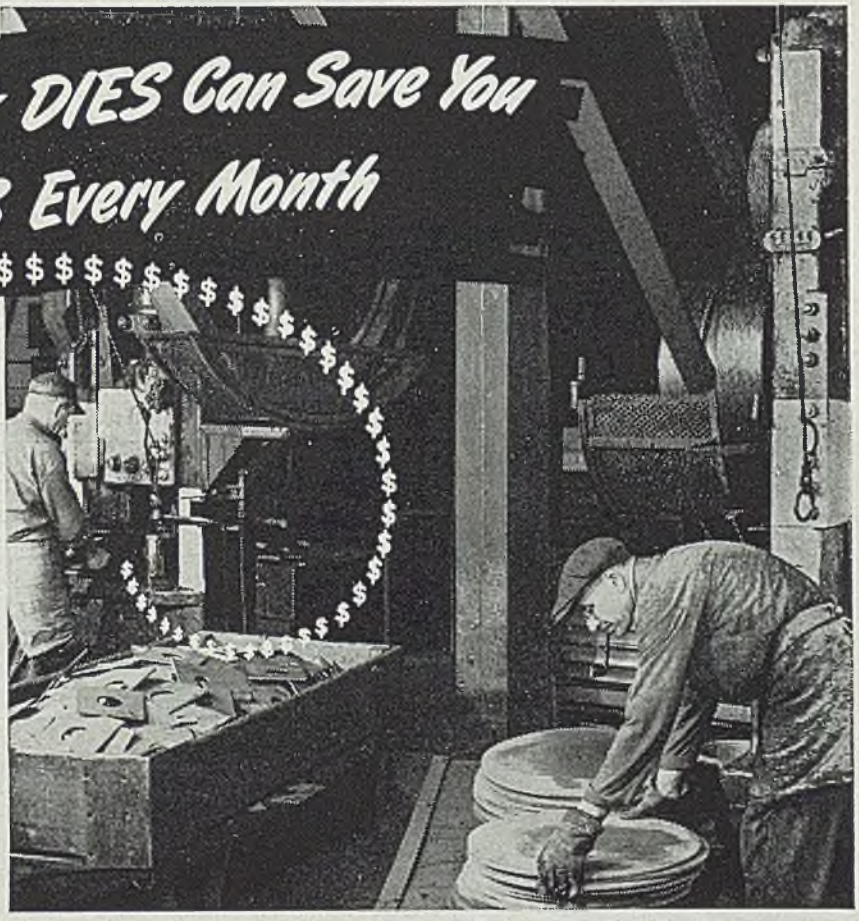
It may be observed from examina of the data in Fig. 5 that increase of time of immersion in 2 per cent soap persion caused a continual improvem in lubrication which became progressi smaller until the maximum improvem namely, a 17 per cent reduction in d forces was obtained in 20 min.

Storage of pieces in contact with s of varying concentrations for 20 hr g the interesting result that consider greater improvement was obtained the very dilute soap dispersions than the 2 per cent soap dispersion (Table and Fig. 6). The curve for lubrication time of immersion was then determ for 0.1 per cent soap (Fig. 8) and it found that continual improvement sulted from increased immersion time to about 6 hr.[11] At this point there w reduction in lubrication index of al 30 per cent.

When it is considered that a large of the lubrication index represents force required for actual deformatio the metal, it is possible to assume the energy loss due to friction is siderably greater than 30 per cent normal soap lubrication, which is ra good lubrication for this application

A marked improvement due to longed immersion in dilute soap

How Your TOOLS & DIES Can Save You EXTRA DOLLARS Every Month



Tooling costs go down when you put this 3-step *job analysis* plan to work. Watch production costs drop as machines and presses stay on the job more hours every month. Use these three steps to stop the loss from tools that wear too rapidly or fail prematurely.

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Proper heat treatment is the second step to better tools that cut costs. To get the heat treating results you want, use the "Matched Tool Steel Manual". It contains the most complete heat treating information available in printed form. And as a special help to your heat treaters, we have prepared a handy slide chart that condenses the basic heat treating information and puts it in easy-to-use form. Drop us a line and let us know how many Carpenter heat treating slide charts you will need.

3. Check Costs By Output Per Grind

In the competitive days ahead, costs will have to be cut. But, costs skyrocket and output slumps when tools fail prematurely in service or need too frequent regrinding. So keep a record of the results from each tool set-up and use it as a guide to get more output, lower costs. And if you want shop help with new tool steel problems, call your nearby Carpenter representative. He can work with you to reduce costs all along the line.

THE CARPENTER STEEL COMPANY
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Carpenter MATCHED TOOL STEELS

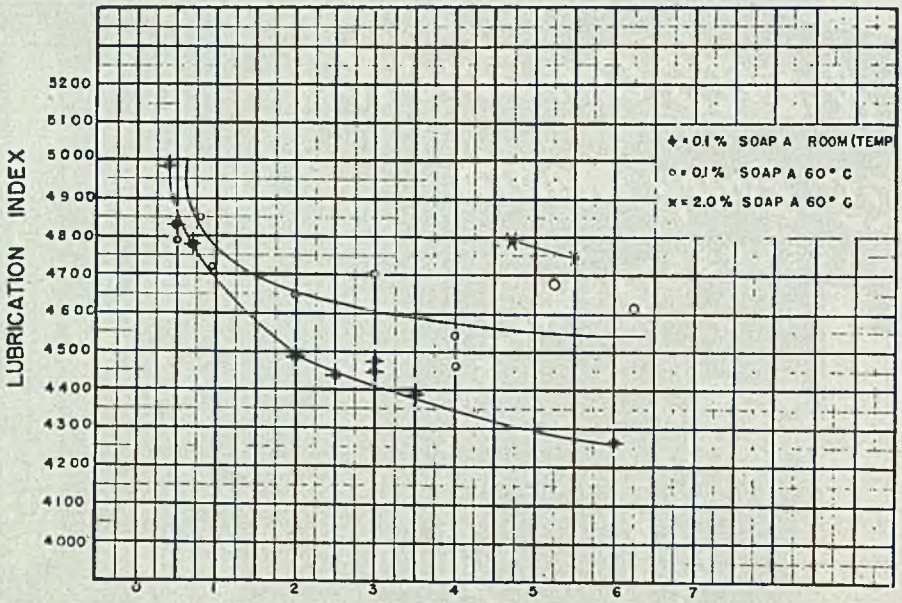


Fig. 9

TABLE VII
RESULTS OF THE PARKINSON TEST WITH AN OLSEN DUCTILITY TESTER

	Lubricant	No. of Tests	d_c (in.)°	h (in.)†
1.	No applied lubricant	4	.490	.28
2.	Mineral oil	3	.500	.26
3.	2% Soap A	14	.529	.31
4.	2% Soap A plus 0.2% sodium hydroxide	2	.503	.30
5.	2% Soap A plus 0.1% sodium hydroxide	2	.521	.30
6.	2% Soap A plus 0.4% stearic acid	2	.541	.31
7.	2% Soap A plus 0.8% stearic acid	2	.546	.32
8.	Dried stearic acid from 5% solution in petroleum ether	6	.581	.43
9.	0.1% Soap A	2	.542	.37
10.	0.1% Soap A—3 hours immersion	2	.591	.53
11.	0.1% Soap A—6 hours immersion	2	.581	.57

°Height of the cup at fracture.
†Distance from the base of the cup to the point of fracture.

TABLE VIII
COMPARISON OF DRIED SOAP AND LUBRICATING DEPOSIT FORMED BY IMMERSION IN DILUTE SOAP DISPERSION

	Lubricant	1st Max. Force (lb)	1st Min. Force (lb)	2nd Max. Force (lb)	Lubrication° Index (lb)
1.	Dried soap from 8 oz./gal dispersion	2900	1090	1570	5500
2.	Dried soap from 12 oz./gal dispersion	3040	1220	1730	5990
3.	24 hours immersion in 0.1% soap	2430	910	1270	4610
4.	Dried soap from 8 oz./gal dispersion	3450	1080	1490	5990†
5.	24 hours immersion in 0.1% soap	2530	980	1400	4930

°Each figure in the table represents the average of 10 pieces drawn.
†Expts. 1-3 and 4-5 were performed with two different sets of tools.

TABLE IX
EFFECT OF INCREASED FREE FATTY ACID CONTENT ON DRAWING LUBRICATION

	Lubricant	No. of Pieces	1st Max. Force (lb)	1st Min. Force (lb)	2nd Max. Force (lb)	Lubrication Index (lb)
1.	2% Soap	30	2810	1400	1670	5880
2.	Emulsion A°	20	2730	1350	1650	5730
3.	Emulsion B†	30	2600	1240	1540	5380

°Emulsion A—2.8% Tallow, 0.9% Soap, 0.6% Stearic Acid, Rem. Water.
†Emulsion B—2.8% Tallow, 0.9% Soap, 1.2% Stearic Acid, Rem. Water.

persion was also noted in the ductility test (Table VII).

After several hours, immersion in the 0.1 per cent soap dispersion, the pieces were covered with a layer of a bluish white material, with a matte finish, part of which could be scraped from the pieces. The longer the immersion time, the thicker and bluer this deposit became.† This deposit formed in 0.1 per cent soap and in 0.1 per cent sodium oleate (U.S.P.) but did not form in 0.1 per cent sodium stearate (U.S.P.). In the latter case, there was not much improvement in lubrication with time of immersion in contrast to the first two soaps (Fig. 8). It appears that the factor determining these results is the adsorption

†The deposit obtained after 24 hr was scraped from the pieces and its melting point determined. This was similar to that of copper stearate and palmitate and zinc stearate.

Fig. 9—Influence of increased tem perature on the prolonged immer sion soap effect

of an adherent thick film deposit s that an approach to fluid lubrica conditions is obtained. Because of mode of formation, which results in cure anchorage of the film, better res are obtained by the use of this met than by means of dried soap films. (ble VIII).

The better results obtained on imm sion in 0.1 per cent soap in compar with 2.0 per cent soap are probably to retardation of the migration of soap to the metal surface, by the gel structure of the more concentra soap. This is borne out by the impr ment in lubrication obtained when immersion was made in 2 per cent dispersion maintained at 60°C (Fig. In this case the gel structure was moved, in contrast to the same conc tration of soap at room temperature

Since the mobility of the molecules acid soap should be greater at hig temperatures, immersion in 0.1 per c soap maintained at 60°C was tried may be observed from Fig. 9 that the mersion at 60°C gave worse results that at room temperature. This might due to disorientation of the molecu or the prevention of orientation by cessive agitation of the molecules. In immersion at 60°C the deposit that formed was considerably bluer than formed under similar conditions at r temperature, indicating more co soap formation. This may have some fect on these results.

Emulsion Lubricants: In testing large number of proprietary brass dr ing lubricants it was found that pra cally no differences in drawing fo were obtained even though wide va tions in soap and fatty matter con existed. With those proprietary lu cants in which there was a reductio drawing forces, it was found that compounds had high free fatty contents. Therefore, several emuls were formulated and the data obta with these in the low speed drawing are given in Table IX.

In may be observed that the e sions that were higher in free fatty content gave better results than others. However, a practical limit to amount of free fatty acid that may used is reached by the corrosive eff of the emulsion. The emulsion that the highest free fatty acid content ca brass to become green after 24 h storage at room temperature.

This does not mean that lubricant this sort may not be used. Howeve used, the work should be washed be too great a time has elapsed. If drawing process is followed immedia by annealing and pickling operations, the green discoloration is of little portance. However, under the latter cumstance the excess of drawing

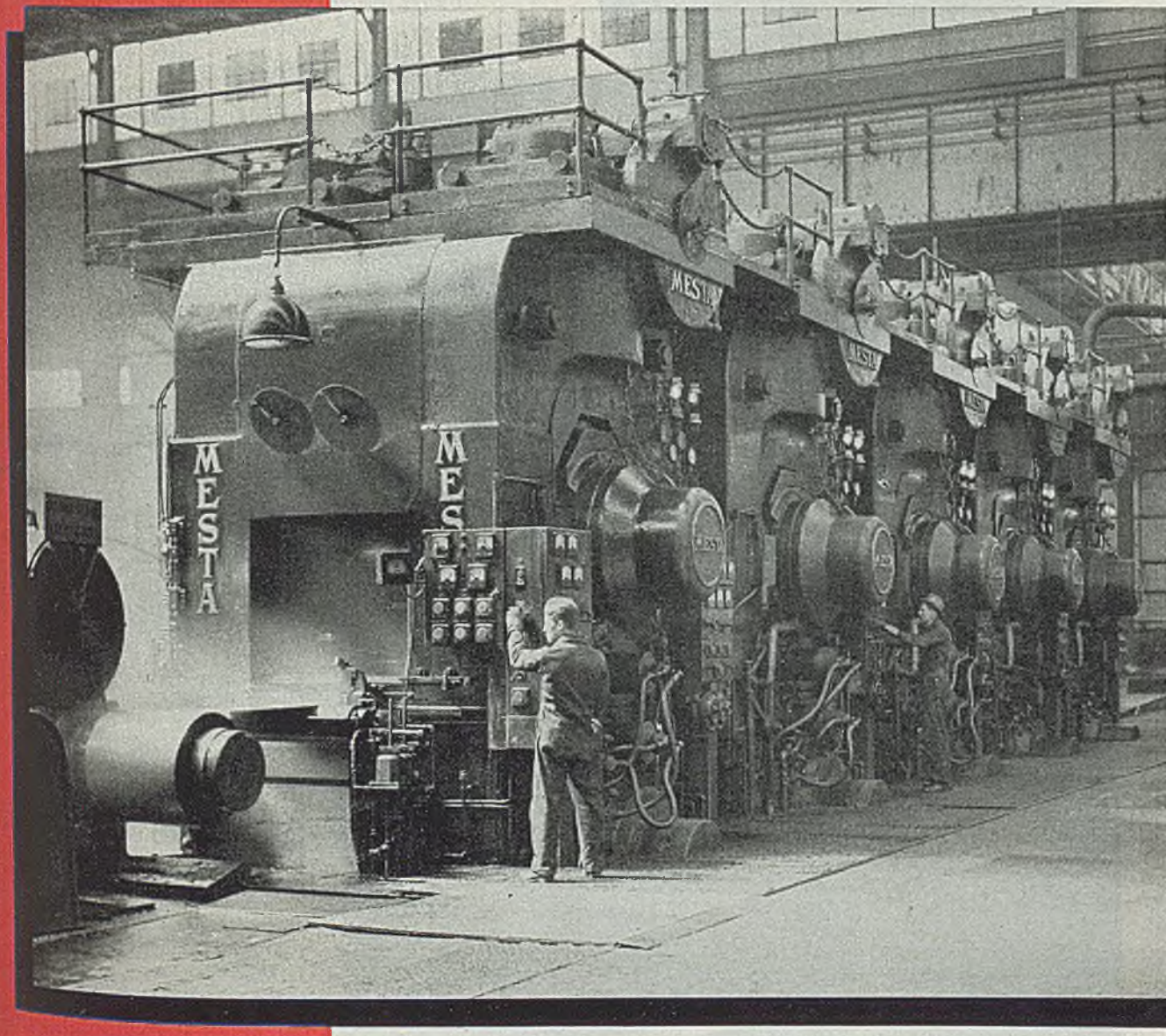
(*Please turn to Page 185*)

OF ALL FIVE STAND FOUR-HIGH TANDEM COLD TIN MILLS IN OPERATION IN THE UNITED STATES, 93% ARE MESTA BUILT.

MESTA

HIGHER SPEED

FOUR HIGH TANDEM COLD MILLS



ARMY E NAVY

BUY MORE WAR BONDS

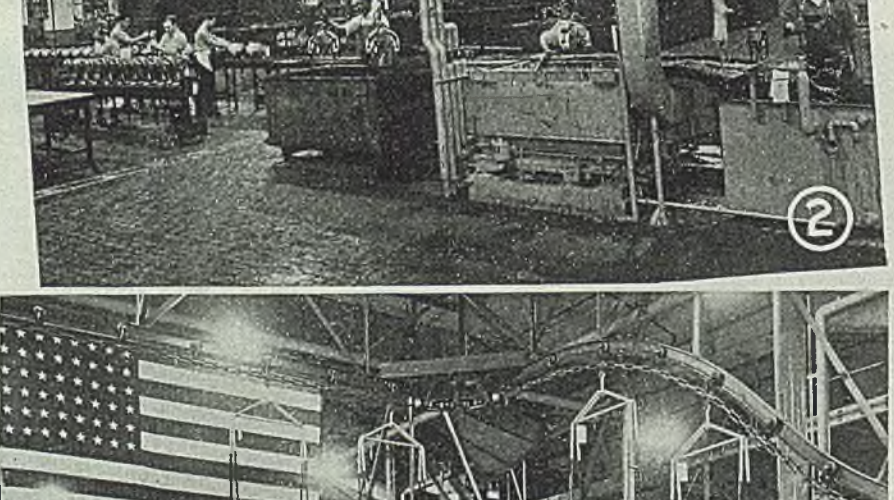
First in the industry with the Four-High Tandem Cold Tin Mill, Mesta has constantly maintained its position of leadership, and is building mills with delivery speeds which yesterday were considered impossible. These mills feature new types of drives and control systems which maintain synchronization during acceleration, deceleration and at normal operating speeds.

MESTA MACHINE COMPANY PITTSBURGH, PA.

Scheduling SPARE PARTS

Dodge Chicago plant, manufacturing Wright aircraft engines in quantity, has developed special procurement system to co-ordinate handling of extra parts with regular production

By A. H. ALLEN
Associate Editor, STEEL



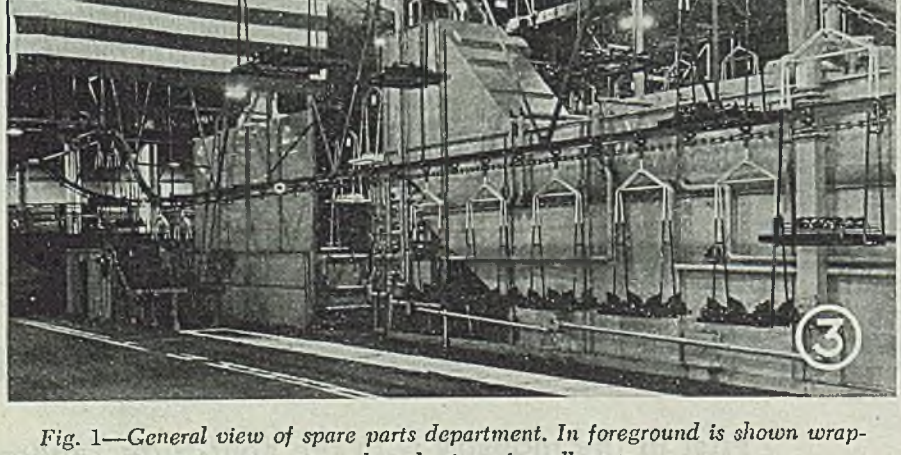


Fig. 1—General view of spare parts department. In foreground is shown wrapping and packaging of small parts

Fig. 2—Section of spare parts department for cold dipping of Class A parts

Fig. 3—Conveyors carrying racks of parts here traverse hooded dipping tanks

ALL spare parts activities, as well as the shipment of engines, at Chrysler's Dodge Chicago plant are centered in the spare parts division under jurisdiction of the production manager. It comprises four departments, each of which handles a separate phase of the work.

Spare parts, engine order and record department, as the name implies, handles all contacts with the Army Air Forces, having to do with spare parts procurement, shipping instructions, and the spares incident to the contract. This department also issues engine sales orders, spare parts schedules, and spare parts shipping releases; records shipments, and makes all necessary correc tions to schedules and contract as ne cessitated by engineering releases.

Spare parts packing department estab lishes packaging processes and prepare all parts for shipment. Spare parts as sembly department handles all require spare parts assemblies. Engine and spar parts shipping department handles th shipment of engines and spare parts.

From the beginning of the contrac for production of the 18-cylinder Wrigh 3350 engine all plans for tooling the sho and for the purchase of raw materi and finished parts have taken into con sideration spare parts requirements a well as production requirements, an adequate space was set aside for th spare parts program.

Billing of Material

First step was to compile a comple bill of material, covering the engine be built, which was presented to the A Service Command, which in turn a ranged for a meeting of the Joint Ai craft Committee on Spare Parts Procur ment. This committee, which include representatives from the Air Servi Command, the Bureau of Aeronautic the Royal Air Force, and the manufa turers, which included the Dodge Ch cago plant, met at the Wright Aerona tical Corp. plant at Paterson, N. to determine service codes, and spa parts procurement factors.

Wright Aeronautical provided an e gine which had been completely dis sembled and each part was analyzed detail and a procurement percentage tablished for each part. As a result this meeting, an official procureme guide was formulated. Instructions w issued to tool up on the basis of the percentage factors, plus 50 per cent provide for second-year spare requi ments.

Next step was to transmit this formation to the planning department that proper quantities of raw materi and purchased finished parts could provided, and to the master mechan and shop so that peak tooling and p

New

50,000 KVA INTERRUPTING CAPACITY

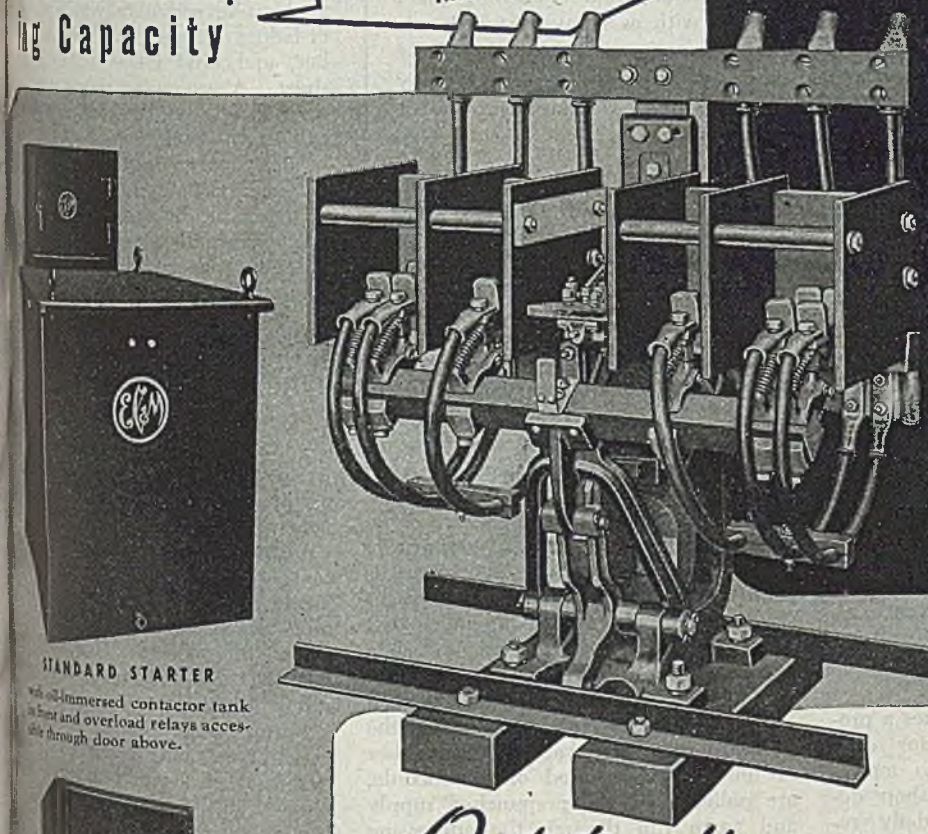
MOTOR STARTERS BY EC&M

Also Available in 25,000 KVA and Moderate Interrupting Capacity

HEAVY DUTY MAGNETIC CONTACTOR - - 1500 H.P. Max. 2300 Volt Contactor - - 50,000 KVA Interrupting Capacity

THESE heavy-duty starters, for full voltage starting of **2300 volt** and **4600 volt motors,** are of magnetic contactor design —suitable for both severe, repetitive starting and inching applications.

Where equipment with high interrupting capacity is required, 25,000 and 50,000 KVA starters are recommended. Also available are moderate interrupting capacity starters for 2300 volts. Reversing starters have two moderate capacity contactors, mechanically and electrically interlocked and mounted in one tank.



STANDARD STARTER with oil-immersed contactor tank in front and overload relays accessible through door above.

COMBINATION STARTER having self-contained disconnect switches—contactor-tank at rear.

Outstanding FEATURES OF DESIGN!

1. Heavy-duty, magnetic contactors specifically designed for high voltage service.
2. Contacts are large and provide over 2″ opening at the off position.
3. Self-contained potential transformer supplies 220 volts for push-button operation.
4. Adjustable type overload relays, magnetically reset from push-button—or hand-set if desired.
5. Convenient terminals and large conduit connection box make installation easier, faster.

Send for new Bulletin 1062-C for *full voltage starting* of 2300 and 4600 volt motors. It also describes Type VIII Enclosed Starters for Class 1, Group D Hazardous Locations.

★ ★ ★ ★ ★ ★

THE ELECTRIC CONTROLLER & MFG. CO.

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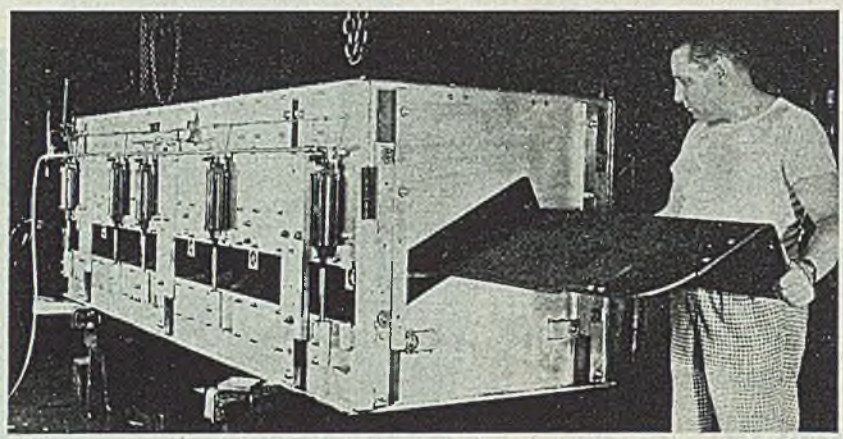


AIR POWER OPERATES STRAIGHTENER: Nine 9-in. stroke air motors exert 2000 lb pressure in operating this straightening and quenching plant for armor plate. It will handle heavy material with as many as two bends after it has been heat treated. Straightening formerly was accomplished by "smithing" (hand hammering, etc.), a long and expensive process. Very little scrap is made, reject rate being one in 4 months. Overall improvement over old method is 80 per cent

duction capacities could be established. This was done by means of a spare parts requirement form, giving full information regarding the total usage of each part, and the number of spares required for one engine and for the total contract. It is kept up to date through revisions whenever engineering changes affect spare parts requirements. At the present time, this form is used not only in the planning department and the various spare parts departments, but at the request of the Air Service Command, copies are sent to Patterson Field as well as to specialized depots, as advance information.

Production Requirement Records

The planning department issues a production requirement record for each part. The card, distributed to master mechanics as well as to all shop departments, shows the peak daily requirements for each part including production requirements, spare parts requirements, replacements and estimated scrap. It thus becomes the responsibility of each division manager to set up each production line on this basis.

In an effort to attain scheduled requirements, a spare parts packing schedule is issued approximately 30 days ahead of delivery dates. This schedule is an authorization for the bond room or finished stores to release the required parts to the packing department.

For the purposes of proper corrosion control, all parts are divided into four main classes. Class A parts, which represent over 70 per cent of the total, are metallic parts around which the conveyor system is designed. Class B parts are magnesium, aluminum and painted units. Class C parts are those such as gaskets requiring no corrosion protection, and Class D are assemblies. An operation sheet has been issued giving detailed instruction regarding the packing of each part, and includes a routing code. For example: Code "A.I.D." indicates a Class A part, individually wrapped, in double grade A paper. Unit pack quantity and box size are also included.

The spare parts and engine order and record department, maintains a file of shipping tickets in quadruplicate for each unit pack of each part number. These tickets are run through an addressing machine, where the center portion is printed, showing the unit pack quantity, part number, item number, part name, assembly used in, packing code and box size. These cards are prepunched for the item number. As soon as the packing schedule is issued, the proper number of tickets for the number of unit packs included on a schedule, are pulled from the prepunched supply and again run through the addressing machine to record the ticket number, due date, model and schedule number. These tickets, together with a copy of the proper schedule, are delivered to the spare parts receiving area.

As parts are received from the bond room, a quantity of tickets equivalent to the number of pieces of each part received is pulled from the numerical file, at which point one copy is detached and recorded against the schedule, thus enabling issuance of a shortage report each morning, showing parts still due against a particular schedule. The remaining three tickets accompany the parts to the packing area. Class A parts, as shown by routing code, are placed on a conveyor and go through a washing machine and are dipped in a rust inhibitor. This provides a thin protective film to reduce danger of finger print acidity at inspection. The parts then are inspected by both plant and A. A. F. inspectors and approved parts are placed on an overhead co where they go through a tank con rust ban to neutralize acidity, greaser, a hot dip and finally, packing benches. Class B parts the conveyor and are cold dipped C parts go directly to the benches and Class D parts to the bly area.

Parts are packaged in unit pack tities, at which time one copy shipping ticket is used as a lab copy is placed inside the cart further identification and the fourt accompanies the parts on a belt co to the boxing area, and is detac the packages are placed in the box for shipment. At this point, sheet is used as basis for issuan packing sheet.

Each day's shipments are recor a shipping summary which sho of-lading number, packing shee ber, and total pieces on each sheet. A summary shows total shipped for the day, month to da cumulative total.

The packing department sends of each packing sheet with the shipping tickets to the spare par gine order and record department, they are checked against the s summary. Tickets are sorted b number as punched and daily shi are recorded on the part numbe ping record.

Shipping, Schedule Summar

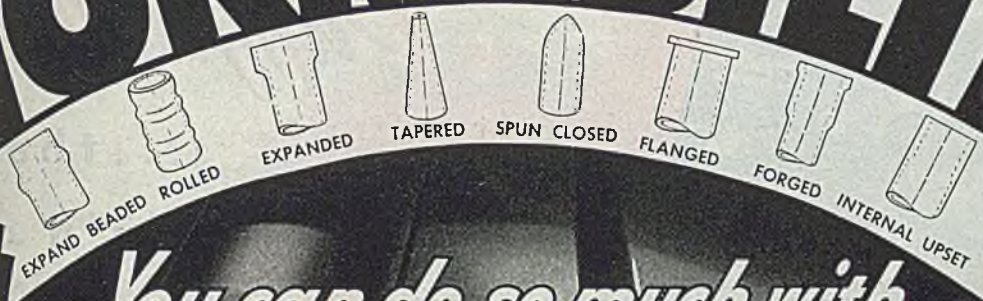
As a final record of each mon tivities and future 6 months' sch a shipping and schedule summary called "brown book" is issued tenth of each month. This is for to the Air Service Command in former acceptance reports. It sent to specialized depots for th vance information. This report detailed information as to the status of each part.

Special orders are treated inc ently of regularly scheduled spa means of sales orders and specia ping tickets printed in red. S portion of the sales order has blanked out on all except shippi partment, traffic department, a copies to prevent shipping info being circulated to uninterested

One problem is the handling neering changes as they affec parts. In the case of the relea new part, which supersedes an and performs the same functio same procurement percentage as in the official guide is used for perseded part. If a new part n viously used is released, a proc percentage is established and fo to the Air Service Command f firmation.

Any changes affecting the tot on the contract are covered b parts change reports, which indic number of parts to be added number of parts to be removed, summary shows the net incre decrease in dollar value of th parts contract.

WORKABILITY



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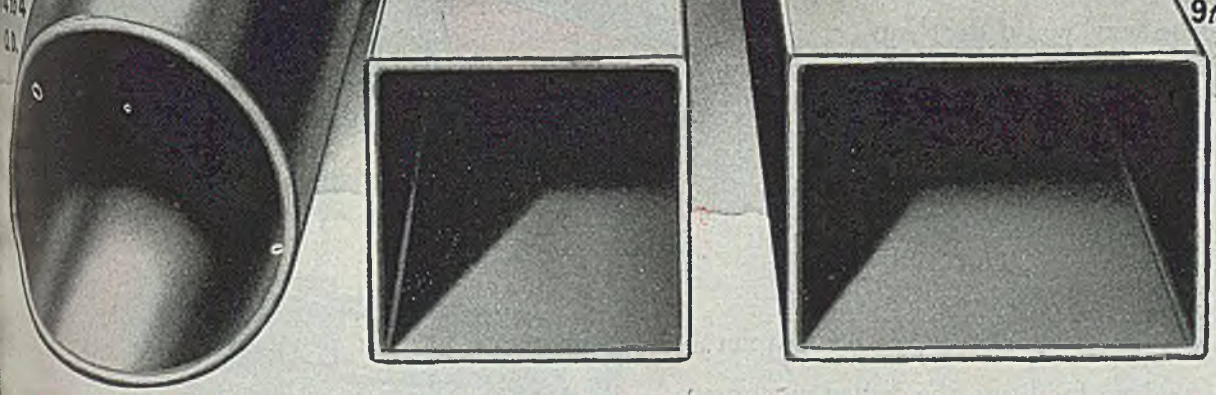

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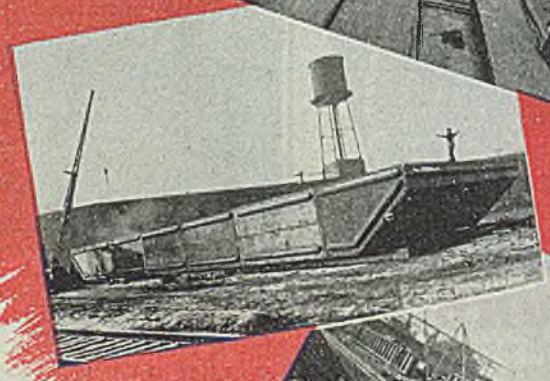

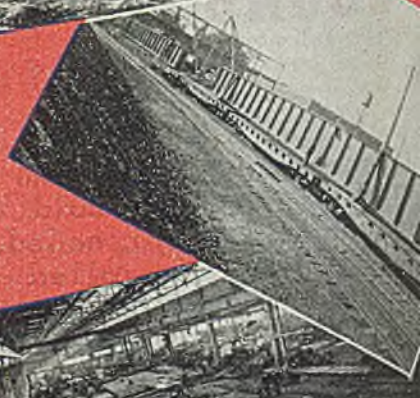

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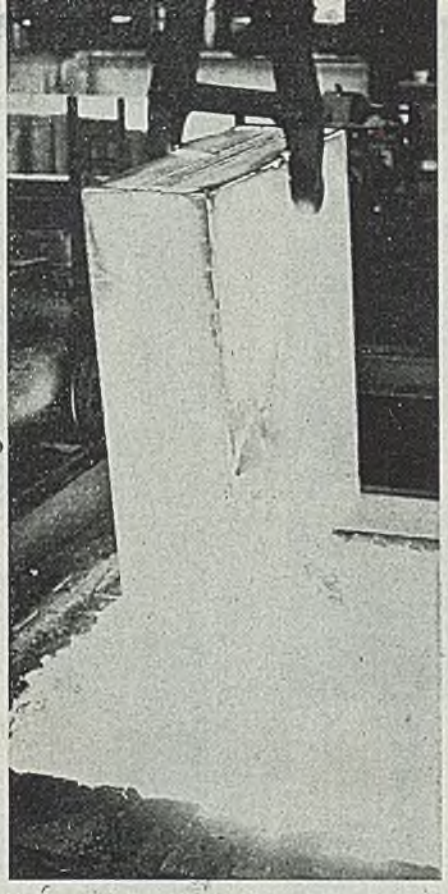
Improved Techniques Produce Superior

STAINLESS CLAD STEEL

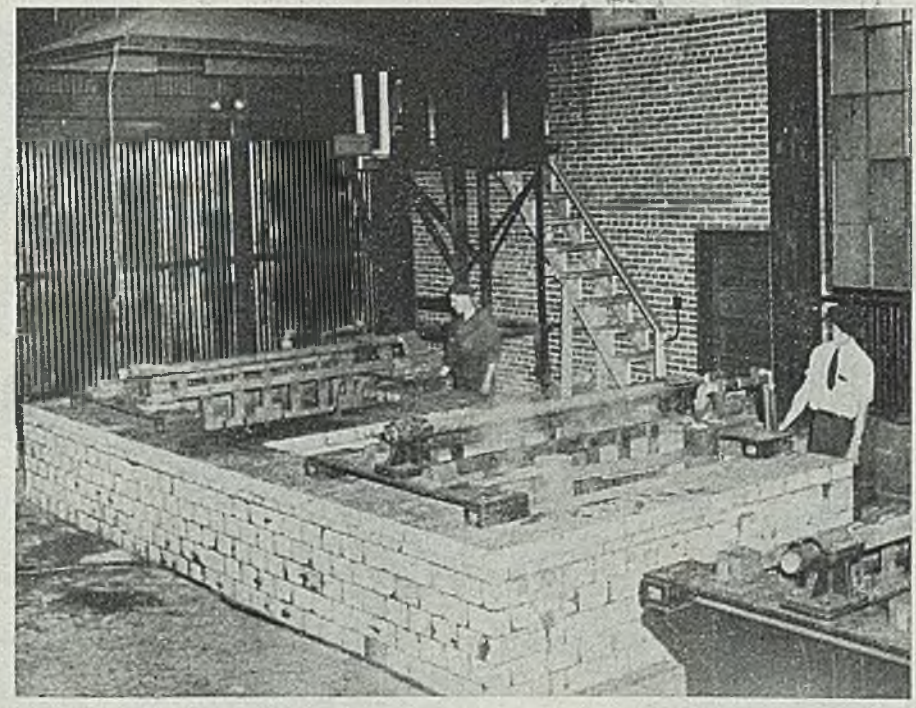
Postwar opportunities for use of stainless clad metal may increase in proportion to growing importance of cladding. Applications range from heavy stainless clad for chemical equipment to sheets as thin as 0.025-in. gage



By L. W. TOWNSEND
Manager
Composite Steel Division
Jessop Steel Co.
Washington, Pa.

CLAD METAL has been pushed into a position of prominence in the metal-working field as a result of the war. A definitely established product in only a few spots before the war, composite metal has blossomed as a full-blown material for a wide range of applications. Biggest impetus has been the shortage of many strategic alloying materials. As a result, we saw the development of stainless clad steel for dozens of corrosion-resistant applications where full stainless would take an unnecessary excess of nickel and chromium.

These clad metals, some of which were little more than laboratory curiosities before the war, have become

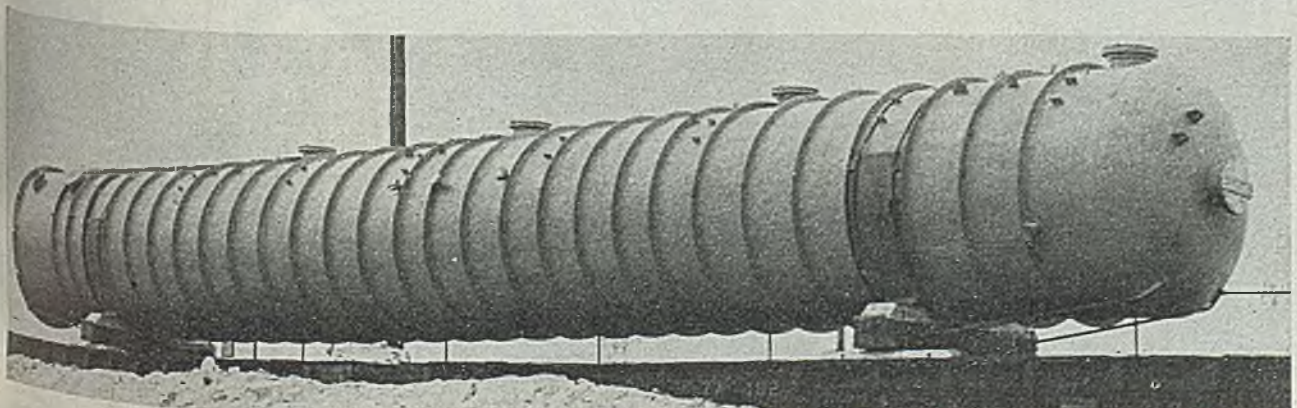


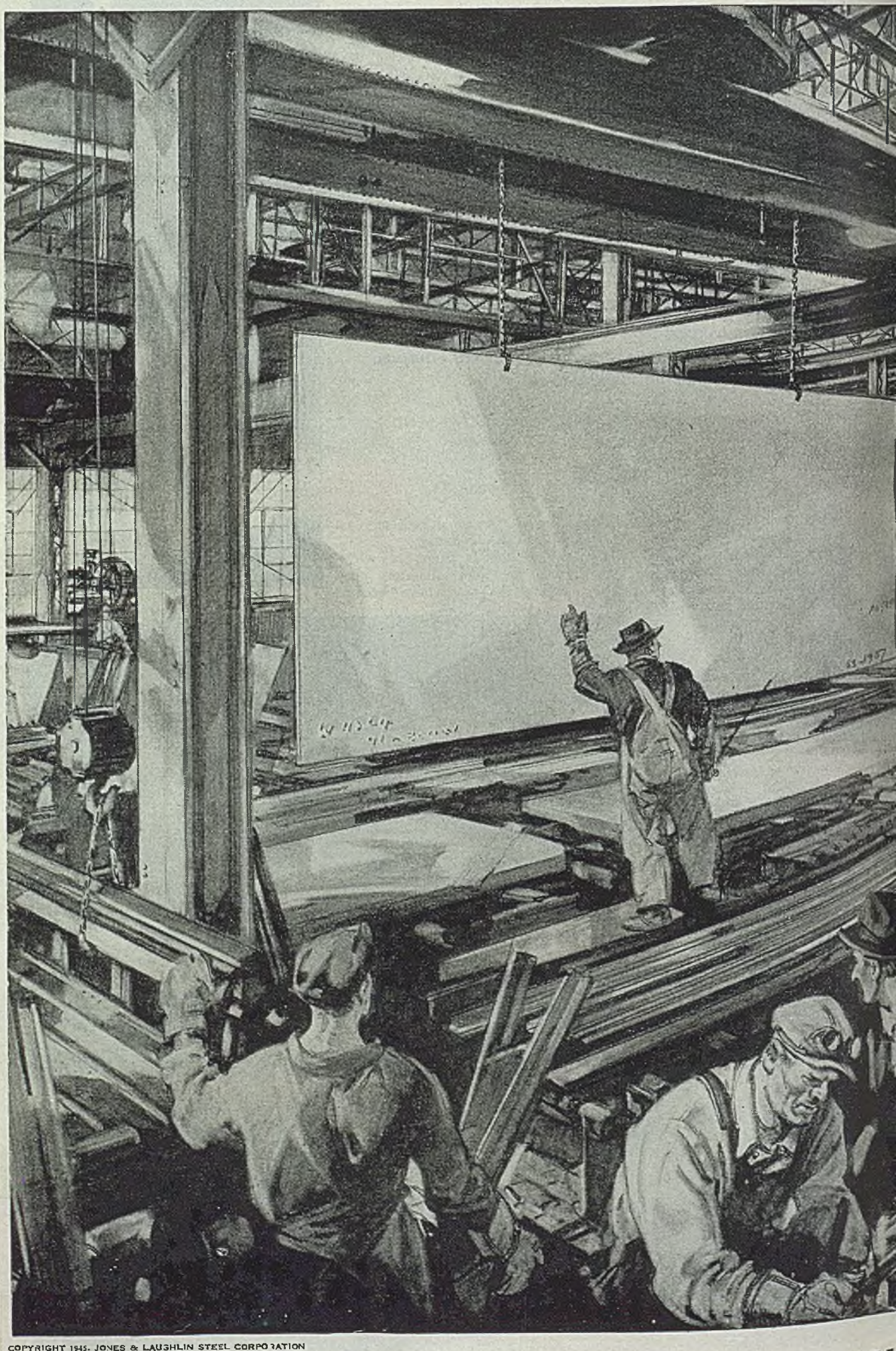
Top to bottom—

Fig. 1—*Out of the soaking pit, ready for rolling, comes this "sandwich" made of low alloy steel backing plates and a "filling" of two sheets of stainless steel, separated by thin sheet of inert material*

Fig. 2—*Stainless sheets are given deposit of electrolytic iron in this plating bath. Under Armstrong process, this coating prevents formation of iron oxide on sheets and makes bonding between stainless and backing plates easier*

Fig. 3—*Fabricated from stainless clad plate for Celanese Corp. of America by American Locomotive Co., this 80-ft tower has a stainless interior of uniform thickness throughout, although thickness of backing metal varies*





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PUTS STEEL TO WORK FOR WAR AND PEACE

Steel is our mightiest, most serviceable metal and is commonly thought of in terms of tons. But steel is also, a nail, a bolt, a rod, a sheet, a strand of wire—an infinite number of shapes and sizes, for serving us in countless ways in war and peace.

At warehouses that specialize in supplying steel for all manner of war and industrial production and construction projects, you see steel in all its variety; see it as a great family of steels, differing one from another, yet related in their basic origin.

Making steels available for regular and specific needs in varying quantity; cutting to special size and shape by flame or machine; arc-welding and riveting into assemblies and units—these are some of the services performed by the steel warehouse.

J&L's seven strategically situated, closely knit warehouses have, by their quick-on-the-trigger response to critical needs, also helped industry break many a bottleneck of war production; by their fabricating ability have helped solve many vital problems of supply for the armed forces. This service of supply that went to war without delay of conversion, is ready to respond readily and accurately to the demands peace will bring for steel in all its shapes and forms.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

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Richard Fox, Memphis

Fred Siegrist, New Orleans

Walter Bagnall, New York

Conrad J. Schreiner, Pittsburgh

FROM AN ORIGINAL DRAWING AND SKETCHES MADE AT J&L WAREHOUSES BY ORISON MACPHERSON

WAREHOUSES IN WAR

Elevator plates for U. S. S. Franklin, wounded hero of the Pacific that limped home to Brooklyn Navy Yard, were furnished by J&L New York warehouse, flame-cut from a heavy mill plate. (Illustration shows warehouse crew lifting a steel plate from J&L rolling mills that measures 96 in. x 360 in., is 1 inch thick, weighs 5 tons.)

First U. S. locomotive to cross Rhine contained units fabricated in J&L Chicago warehouse and assembled by Allied forces. Same class of steel railroad equipment units, fabricated earlier by same warehouse, had served General Montgomery's immortal 8th army in pursuit of "Desert Fox" Rommel across North Africa.

Steel to help stop Von Runstedt with armor-piercing shells, flown across Atlantic, was supplied in 24 hours by J&L Chicago warehouse to nearby shell plant in form of J&L special hot-rolled bars shipped from stock.

Steel bases for army mortars are being made by the hundreds in J&L warehouses and shipped to fighting forces in Pacific area. This base, developed exclusively by J&L, is in 3 portable parts that "nest."

New Orleans warehouse built L C T's and L C M's for U. S. Navy, as well as deck houses for L S M's and fabricated all the steel for large wharf for a floating dry dock.

"Trainers" for helmsmen, dryland equipment, seated on circular steel bases of Jal-Tread checker floor plate, were supplied to Merchant Marine Service exclusively by a J&L Steel warehouse.

Gear cases for warships were fabricated for U. S. Navy by J&L Chicago warehouse.

Steel rings for cargo nets and nets for boarding enemy vessels were turned out by the thousands in a J&L warehouse by the simple process of flame-cutting them from steel plates, like doughnuts.

Steel rushed to high octane plant by Chicago warehouse in 18 hours, cut to size, marked for identification, enabled quick resumption after accidental shut-down.

2 Men in 26 hours helped Pacific war by sticking to emergency job in J&L Detroit warehouse of changing flame hardening equipment and using it to harden steel sprockets for a manufacturer of LVT 3's desperately needed in Pacific area.

140 end products from N. Y. Warehouse have been furnished to the Army, Navy and Maritime Service since war began. Each of these 140 was a separate and distinct article of steel carried in stock or fabricated by the warehouse. All were furnished in quantity, some of them by the millions. They ranged from building steel for docks, hangars and bases to wire rope slings; channel buoys, ship lights and Jal-Tread checker plates. Similar large lists of items for war were supplied, often under rush orders, by six other J&L warehouses in Chicago, Cincinnati, Detroit, Memphis, New Orleans, Pittsburgh.

standard production items. Developmental work adapting them to civilian goods long has been under way, particularly in the stainless-clad steel group. This product has an especial appeal in civilian goods items, because it gives most of the advantages of stainless at a considerably lower cost. In addition, processes used in its production have grown from experimental stages to fully evolved operations on which costs and performance are definitely known.

In the past there have been many applications where solid stainless steel was recommended because it was the only available material with the required strength and corrosion resistance. The only alternative was chromium plated steel, which in itself created problems of fabrication and had relatively low abrasion resistance. The development of stainless-clad steel has provided an in-between material which can be used where solid stainless is not economically feasible, and where plating is impractical because of size or shape of the object, or where abrasion would destroy the plated coating.

An excellent indicator of the importance of this product and a measure of the need for it is the large number of different processes which have been independently developed for its production. Some of these have proven uneconomical, but there are several processes now being used commercially to provide a composite of stainless steel and low alloy backing steel.

Spot Welding Method: Stainless clad material now is produced by rolling both the stainless steel and backing steel components to their final gage thickness and then attaching the stainless to the backing by spotwelding. This method is particularly applicable to the heavier gages, and the union of the two metals is accomplished either by the use of intermittent welds or by the use of overlapping welds. The latter method, using overlapping welds, is recognized under the ASTM code specifications as a continuously and integrally bonded material.

Fusion-Welding Method: Another and important method in the production of stainless clad steel is to apply the stainless to its low-alloy backing by a modification of fusion welding before rolling. After the application of the stainless portion in a special intermelting setup through the use of an electric arc, the material is rolled to the gage in which it will be used.

There are several processes, differing only slightly, which are designed to achieve a forge or interdiffusion union between the two components during a hot working operation. In these operations, the stainless steel components being prepared for hot working are in pairs and have between them some inert material known as a separator. In all cases the stainless clad sections are rolled in pairs with one stainless surface facing the other. Assemblies, or ingots, are rolled to double the gage required and then separated through the center plane where the separator had previously been placed.

Alternative Assemblies: Procedure for assembling the stainless components

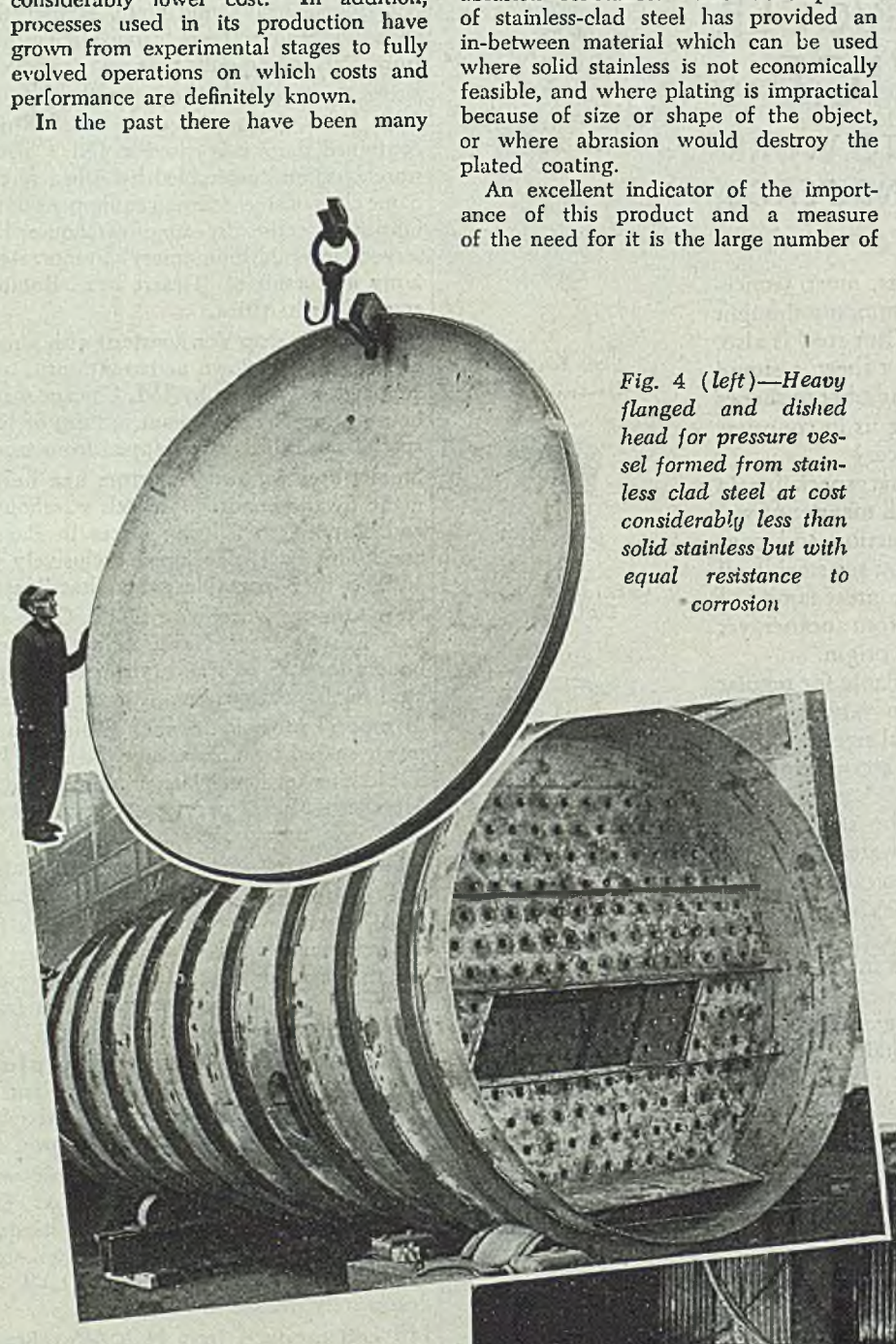


Fig. 4 (left)—Heavy flanged and dished head for pressure vessel formed from stainless clad steel at cost considerably less than solid stainless but with equal resistance to corrosion

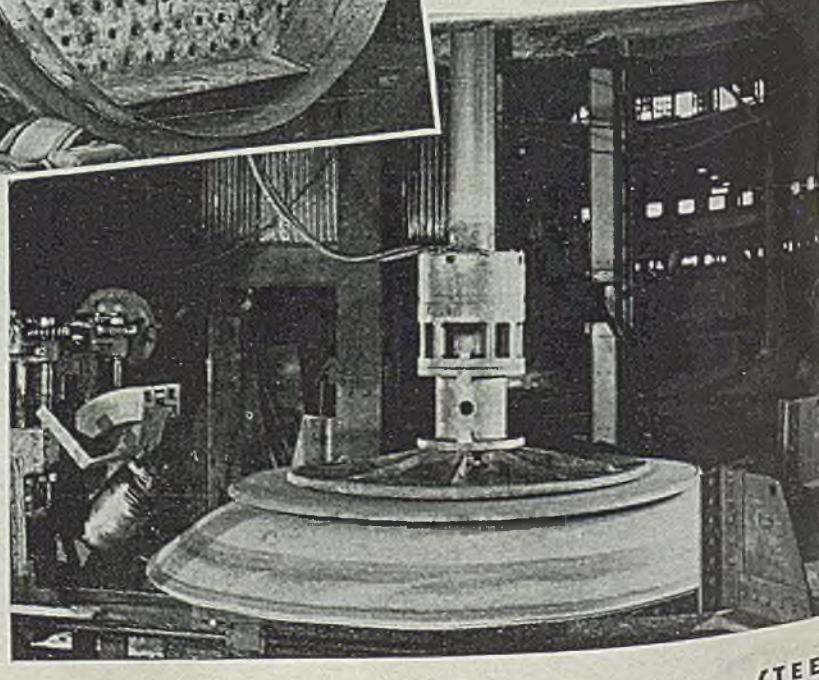
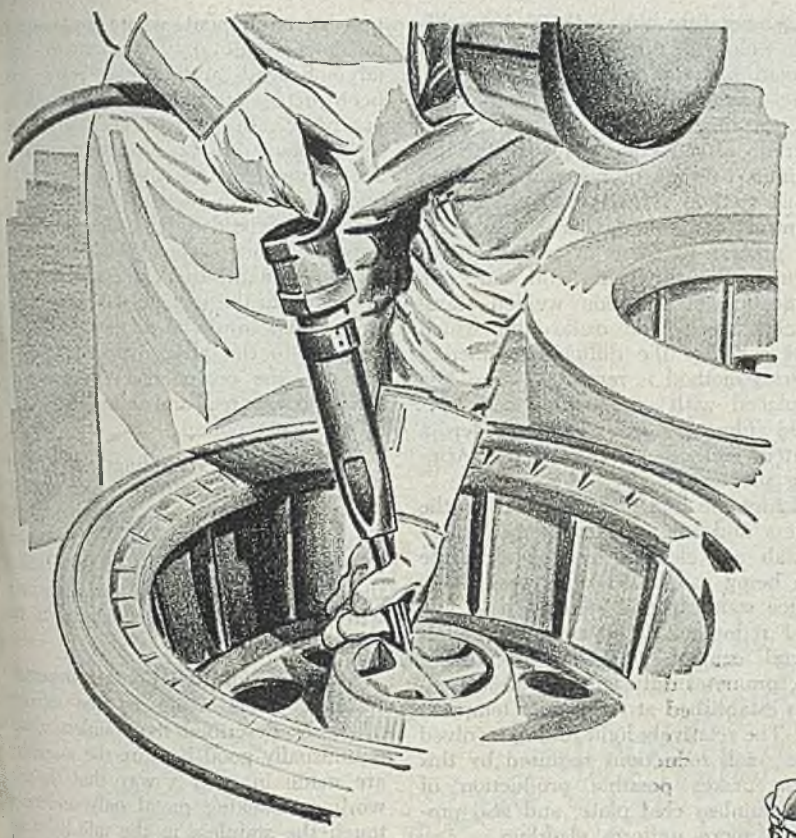
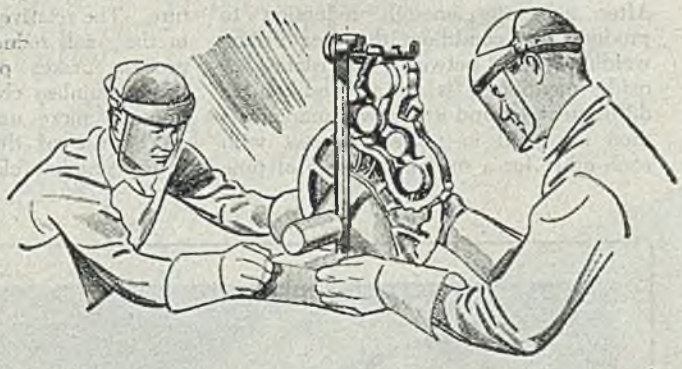


Fig. 5 (above)—Interior view of tower shown in Fig. 3, indicating its complex internal construction

Fig. 6 (right)—Spinning dished head from 140-in. circle of 1⅝-in. stainless clad plate. Finished head will have OD of 122⅝ in.



Production men who know magnesium know it is easy to work



Through good shop practice they speed production of new lightweight products

Go to the men in the shops . . . the production men who work with magnesium . . . if you want the real down-to-earth story of its unusual machinability and exceptional ease in working.

They will tell you how magnesium—the lightest of all structural metals—saves time and labor and tools. They will describe its easy sawing, with band and circular saws and also hand and power hack saws, permitting larger cuts per tooth than other structural metals.

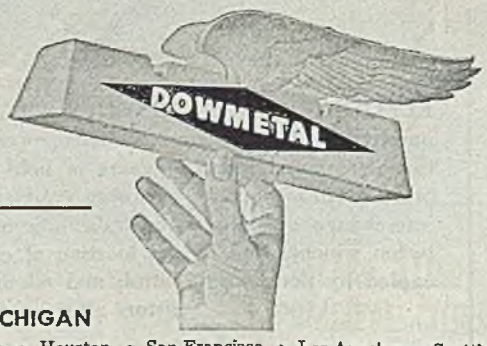
And these production men will tell you, too, that magnesium is worked faster and easier than most metals by hand tools—such as chipping tools, drills, burrs, chisels, planes, portable milling cutters.

Shop techniques have, in fact, been developed for all common fabrication methods to speed the output of new products of lightweight magnesium.

Dow men thoroughly familiar with these operations are on call to consult with you at all times.

MAGNESIUM

THE METAL OF MOTION



MAGNESIUM DIVISION, THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

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and the backing metal differs widely in these operations. In some cases, the backing metal is a slab on which a sheet of stainless is laid, followed by a separator, another sheet of stainless, and another backing slab. This "sandwich" is then welded around the edges so it will hold together during the rolling operation described above. In other cases, the assembly is made by setting the stainless inserts and the separator in an ingot mold and casting the backing metal around them. In a combination of these two methods, sandwiches are made by using thin backing slabs, and the whole assembly then is inserted in an ingot mold and backing metal poured around it.

During hot rolling, the chief difficulty is in the oxide film which forms on the surface of the stainless steel components. It is necessary to achieve a high ratio of reduction in the higher rolling temperatures (2250 to 1850° F) in order to spread the thin oxide coat beyond its elastic limit and tear it into small island critically dispersed in the plane between the two components. After achieving enough reduction to produce this condition, the area in the welding plane between the islands of oxide mentioned is in a condition to diffusion-weld, and if the two components then are held in perfect contact with each other for a sufficient length of time at a temperature above 1850° F, a diffusion weld will take place and a stainless clad material will result. Because of the practical limits on thickness of ingots of this type and because of the high ratio of reduction required, the upper limits in gage of material produced by this method is comparatively low.

Control of Iron Oxide: In a related process to those described above, differing slightly but still in the classification of diffusion welded stainless clad steels, the oxide film which causes some of the difficulties inherent with this method is removed. The film is replaced with an electrolytically deposited film of iron oxide under a patented method known as the Armstrong process.

Because the iron plated surface of the stainless and one surface of the backing slab are cleaned free of all oxide when being assembled, it is possible to produce stainless clad steel with as low as 3:1 reduction. The complete metal-to-metal contact, with no intervening oxide, promotes diffusion as soon as contact is established at the proper temperature. The relatively light rolling involved in the small reductions required by this process makes possible production of heavy stainless clad plate, and also produces a more uniform cladding.

The use of this method to produce heavy stainless clad is of importance in process equipment where large equipment is required. For example very large flanged and dished heads have been made of stainless clad steels in one piece. In order to meet the forming requirements on these sections, considerable gage thickness sometimes has to be added. If this were all stainless, the extra cost would be considerable. Since only the inner surface needs to be corrosion resistant, the extra thickness can be added to the surface slab of low alloy steel. This results in double savings, because with the greater thickness of the backing, the percentage of stainless required is lowered, and thus a lower overall price per pound.

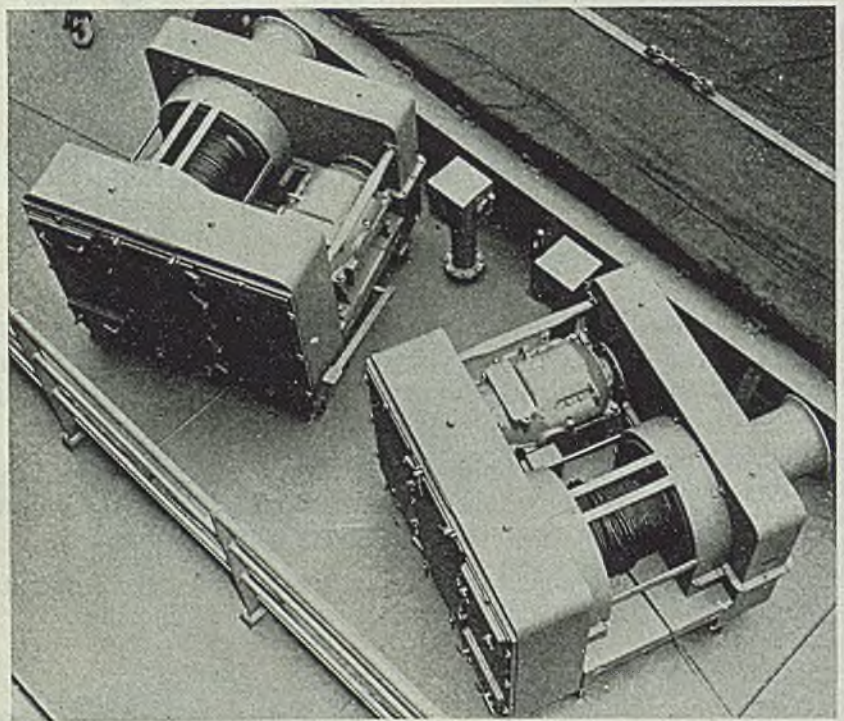
Percentage of cladding can now be controlled so that 10 per cent cladding can be produced down to 3/16-in. thickness, and 5 per cent down to 3/8-in. thickness. The thickness of the cladding then may be designed in accordance with the corrosion encountered in the application involved.

Avoidance of Roll Contact Important: In clad steels made by the diffusion processes described the stainless surface is unusually good because the assemblies are made in such a way that the rolls work on backing metal only and never touch the stainless in the middle of the sandwich. Also, because the stainless is in the heart of the assembly as it is rolled, the temperature of the stainless tends to remain at perfect rolling levels throughout the operation. Because of this condition, it is possible to roll stainless clad steels in much larger sizes than is possible on solid stainless steel. Some 50 per cent clad ¼-in. stainless plate, for example, has been produced in sizes up to 181 x 150 in.

Equipment used to fabricate clad stainless does not require the same amount of power which is necessary to form solid stainless sections. Using proper technique, stainless clad in the heavier gages can be gas cut successfully. Welding is simplified because it is possible to bevel the edges in such a way as to prevent a pickup of stainless steel when welding from the backside. This is accomplished with a minimum of bevel on the stainless side and consequently a minimum of expensive stainless welding rod is required.

Stainless clad material in the heavier gages has developed at a more rapid rate than in the sheet gages, but problems involved in sheet production are rapidly being overcome, and tremendous postwar activity can be expected in this field. Production of stainless clad sheets down to 0.025-in. gage not only is feasible, but is an accomplished fact. Stainless clad sheet lends itself readily to strip mill practice, and this development will lead to wide use of the product in the automotive industry, and for cold-pressed applications such as wall trim, hardware and the like, for various architectural purposes.

With the knowledge and experience gained during the war and prior thereto, stainless clad steel is believed certain to become increasingly important.



ELECTRIC CARGO WINCHES: USMC unit type winches shown are powered by Westinghouse 50-horsepower motor, with motor and winch drum in conventional location, gears in hold side enclosure, electric control and brake drum in opposite enclosure. Advantages of standardized design include interchange of parts; decentralization of control; elimination of wiring between winches and former location of control; release of space formerly occupied by deckhouse control; and elimination of wiring between panel and resistors after installation on ship

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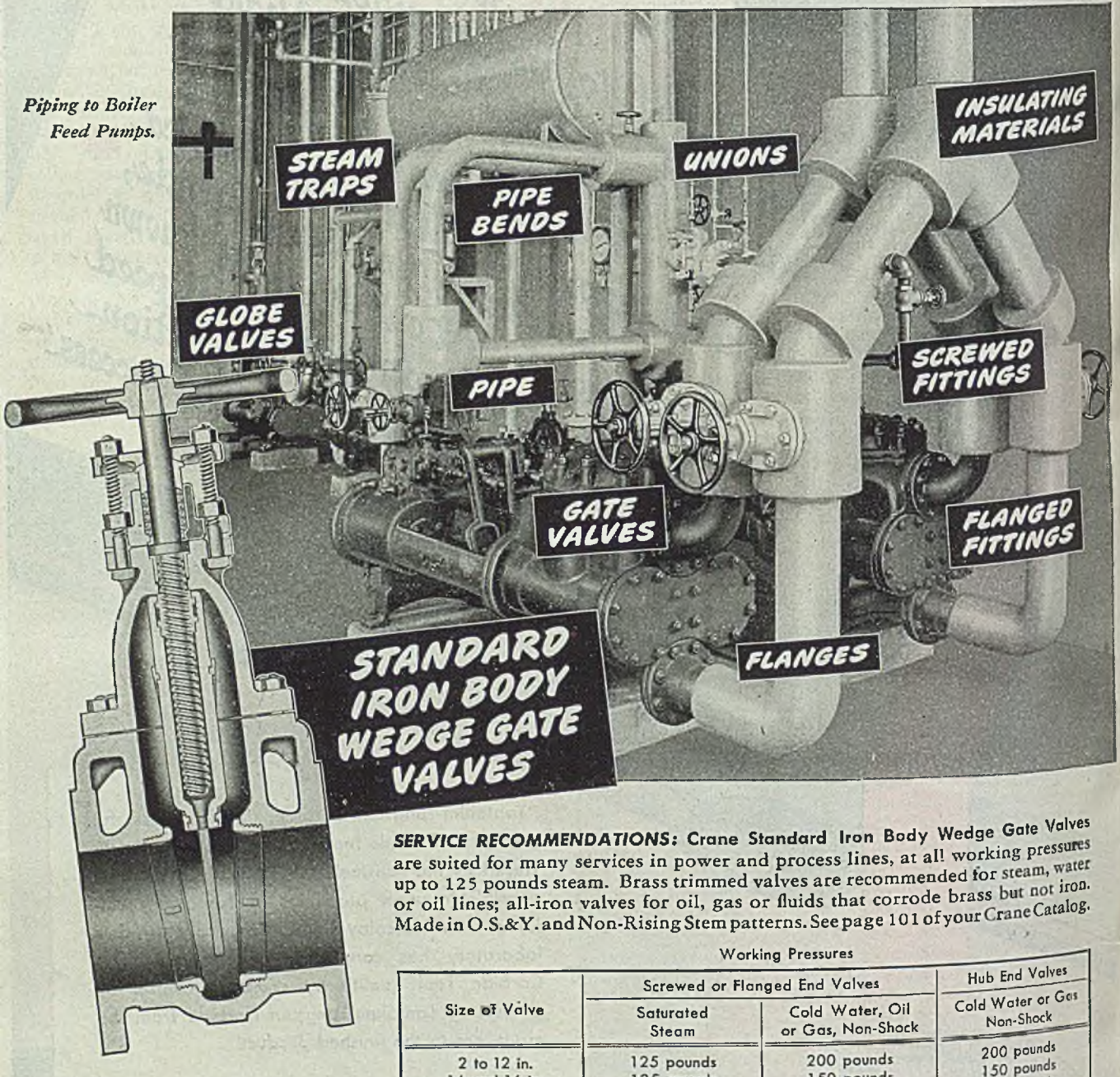

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Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

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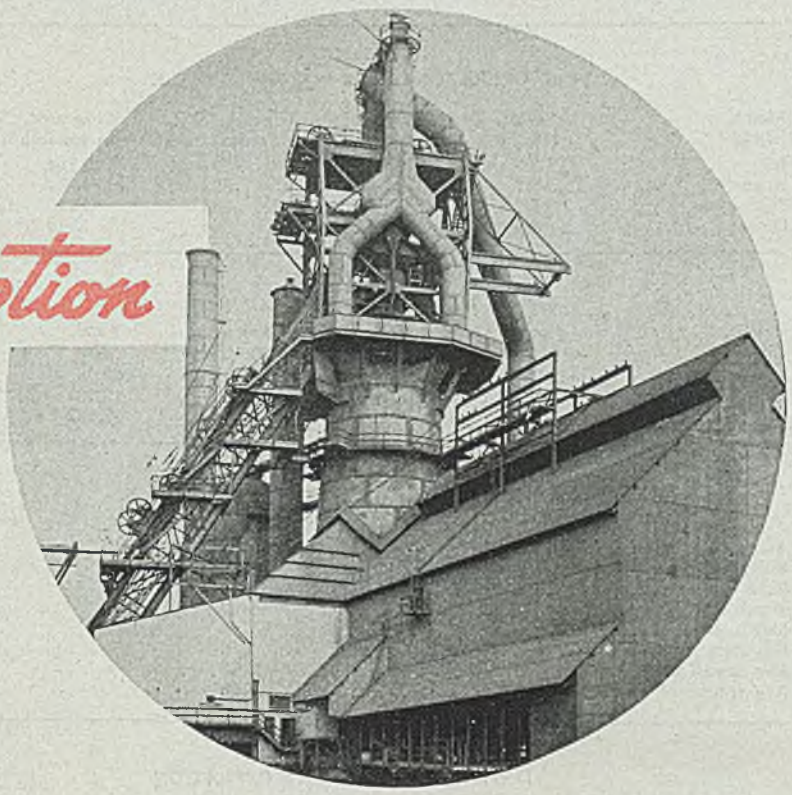
STEEL

Gas Flow AND Coke Consumption

in the Blast Furnace

Minimum coke consumption and maximum blast furnace production frequently are determined by an orderly gas flow controlled by physical make-up of stock. Observations on the use of dry blast with moisture content of 1 to 2 grains per cubic foot during summer and winter are presented



One of the modern stacks operated by the Inland Steel Co.

DURING the last two decades Kinney, Furnas, Joseph[2] and Johnson[3] published fundamental papers about gas flow and stock distribution in the blast furnace, pointing out the paramount importance of good gas-solid contact and gas flow.

Proper gas flow and good gas-solid contact do not necessarily go together. They are two different things. There evidently will be excellent gas flow if the charge is made up of large lumps of ore, large stone and large coke; but contact between ore and gas will be poor. On the other hand if all material is fine, the gas-solid contact theoretically will be excellent, but the furnace stock will be packed, the gas flow will not be proper, the furnace will kick and results also will be poor.

It is generally accepted that coke in the blast furnace serves three purposes: (1) to produce heat, (2) to act as reducing agent, and (3) to provide voids for the orderly gas flow up through the stock column.

Since there are three functions of coke in the blast furnace the minimum fuel consumption for smelting iron must be the minimum coke consumption required for the one of the three functions which requires the most coke.

An attempt will be made to show that there are conditions where the amount of coke required to assure proper gas flow is larger than either the thermal or chemical requirements; and if this is the case any attempt to improve the furnace performance by a better heat or chemical economy is doomed from the start.

Undersized Coke: Study of the effects of undersize coke in the blast furnace affords a better understanding of the mechanical functions of the coke in the furnace.

Any coke screening system is successful only when the small coke is prevented from taking up space between the large pieces and thus packing the furnace. The problem when charging small coke, therefore, is to make sure that the different sizes have no chance of mixing in the furnace. Theoretically there will be the same amount of voids in the layers of small and large coke by charging the different sizes independently. In practice the fine pieces pack tighter and there is some loss of voids.

On No. 3 blast furnace it is possible to use 33-1/3 per cent coke as small as 5/8-in. with a reduction in the cubic feet of wind blown per minute of only 15 per cent by making sure that different sizes of coke never are dumped together from the large bell.

Table I shows data for four months' operation on No. 3 blast furnace of the Inland Steel Co. where no burden change was made except for the amount of "nut" coke (on 5/8 x 5/8-in. and through 1 x 1¼-in.) charged.

Tonnage naturally is higher when more wind is blown and taken by the furnace without acting up. At the same time the coke consumption and top heat are somewhat higher. This is nothing new and the traditional explanation is: The increased amount of wind causes poorer gas-solid contact, the efficiency of the furnace drops, and consequently there is higher coke consumption and top heat. It is believed that this is not the whole story.

The wind must be cut immediately, when putting even a small percentage of nut coke on the furnace burden otherwise severe kicking spells may result with serious loss of production. The same is true when coke of weak structure is used. For instance, on a recent occasion a strong coke with a stability index of 47.9 per cent and a size of 2.15 in. was replaced by a larger coke of 2.36 in. average size and 43.6 per cent stability. The expectation is that more wind can be blown with the larger coke. Actually, of two furnaces tested, one took 1890 cfm less wind and the other furnace 2043 cfm less wind over a two-week period. The weaker coke evidently crumbled to such an extent inside of the furnace that it tightened up the stock column. This shows that coke which is large in size at one given point in the coke handling system does not necessarily retain that size and guarantee good gas flow.

This undoubtedly means that for our standard burdens when blowing "full wind", there are just enough voids available for an orderly gas flow up through the furnace. If more wind is desired more voids have to be provided in order to loosen the stock column. This can be done by increased coke consumption and consequently higher top heat, the latter accounting for the extra energy fed into the furnace. Raising the tonnage proportionately with increased wind, provided full wind is already blown, requires more voids. Increased tonnage at

By KURT NEUSTAETTER
Blast Furnace Engineer
Inland Steel Co.
Indiana Harbor, Ind.

[1]All references appear at end of paper.

This paper was presented before the meeting of the Blast Furnace and Coke Association of the Chicago District, Chicago, May 22. It was awarded first prize in the blast furnace section of the fourth annual technical papers contest sponsored by the Association.

August 20, 1945

TABLE I

OPERATING DATA FOR NO. 3 STACK

Month, 1942	Nut coke,%	Wind blown, cfm	Avg daily output, tons	Coke used, lbs/ton iron	Top heat, °F
July	20.5	45,640	821	1514	256
August	15.7	47,006	822	1531	274
September	12.7	47,527	834	1546	292
October	5.8	47,494	844	1549	331

TABLE II

DATA ON COKE PRACTICE

Period, 1941-42	Nut coke, %	Screened ore used, %	Avg daily output, tons	Wind, cfm	Coke used lbs/ton iron
12/1-12/11	22.2	None	738	42,683	1539
12/12-12/20	6.7-11.1	16 for 14 da	799	45,397	1508
12/30-1/13	22.2	16	773	43,482	1530

TABLE III

DATA ON MONTHLY FURNACE OPERATION

	Best month	Poorest month
Avg daily production, nt	1309	1092
Scrap used per day, nt	113	67
Coke consumption, lbs/ton iron	1497	1460
Wind blown, cfm	67,494	59,529
Slag volume, lbs/ton iron	746	912
No. kicks over 10 in. per day	1.9	24.4
Avg inwall temp., °F	1148	1228
Avg spread of inwall temp., /F	218	281

TABLE IV

DATA ON NO. 1 STACK'S OPERATION

Period 1943-44	Turnings	Wind blown, cfm	Avg No. kicks over 10"/day	Flue dust, lbs/ton iron	Coke used, lbs/ton iron	Avg daily prod., tons
12/14-12/27	on	53,585	10.4	64	1468	969
12/28-1/10	off	53,942	3.2	38	1643	888
1/11-1/24	on	54,685	11.5	75	1501	975

TABLE V

TEST RUNS ON DIFFERENT GRADES OF COKE

	Coke I	Coke II	Coke III
Avg coke size, in	2.08	2.19	2.18
Tumbler stability, %	45.3	48.6	47.5
Avg daily production, nt	1197	1254	1260
Coke consumption, lbs/ton iron	1653	1644	1675
Wind, cfm	71,800	71,788	71,902
Burden carried, lbs/charge	36,387	37,509	37,110
Flue dust, lbs/ton iron	53	76	79
Changes of filling mark/day	0.19	0.70	0.78
No. of test days	37	23	23

TABLE VI

COMPARISON OF THREE OPERATIONS

Humidity control	No. 1 None	No. 2 Regular operation	No. 3 Forced operation
Moisture in blast, grains/cu ft	6.91	1.00	1.00
Avg iron output/day/nt	985	985	989
Coke consumption, lbs/ton iron	1560	1529	1479
Blast temperature, °F	1020	1000	906
Wind blown, cfm	57,889	57,921	55,584
Burden, lbs/charge	24,648	25,413	26,717
No. of kicks over 10-in/day	4.7	5.1	18.0
Dustcatcher flue dust, lbs/ton iron	64	75	105

constant wind, if achieved by more efficient operation, is accompanied by a lower coke rate.

In order to provide the required voids, additional coke is required, with higher coke rate resulting. This is more coke than is required for thermal or chemical reactions. However, the same effect of increasing voids by increasing coke consumptions can also be attained by charging screened ore. When screening out the ore fines more wind often can be blown and thus raise the tonnage, but in this case the coke consumption does not go up; in fact it goes down. Nickel[4] found a 7.8 per cent higher iron production and a 9.7 per cent reduction in coke consumption when using 45 per cent screened ore and blowing practically the same wind. Inland has had similar results. In this case intimate gas-solid contact is secondary in importance to improved gas flow. When using oversize ore, the furnace is handicapped because the large sized pieces are harder to reduce. In spite of this, the additional voids of the oversize ore more than offset this handicap.

Table II shows that the adverse effect of undersize coke can be offset by oversize ore. Decreasing nut coke permit the blowing of more wind, and afford an increase in tonnage. When the origi amount of nut coke was brought b and screened ore was added the tonna stayed above the original tonnage and t wind did not have to be cut back to original volume.

Inefficient Operation: After 5 yea uninterrupted campaign No. 5 furna at the Inland Steel Co. had its month poorest operation. The furnace refused take the wind previously blown and h frequent and violent kicking spells. T operation was unusual, in that it was companied by the lowest coke consum tion the furnace had ever had a by a new pattern of inwall tempera ture recordings. The latter did have the steady pattern of good oper tion nor the spread pattern of bl operation, as described by Johnson[5] Tofft[5], but the recordings were zigza ging all over the chart.

Table III shows pertinent data for t best and poorest months of No. 5 furna operation. The lower tonnage is not su prising when considering the lower win less scrap and higher slag volume. Th factors however make the low-coke co sumption still more astounding. All co ventional means such as checking t blast, and changing the order height of filling were tried in order bring the furnace back to normal without avail.

The pattern of the inwall points a the way the furnace finally was brough back to better operation show what w wrong.

After efforts were made to impro furnace operation for several week the borings and turnings were taken the burden. It was not expected th would help the furnace since it w known that during record operation most twice as much scrap had be charged. Nevertheless when the scr was deleted the kicking stopped; the f nace took more wind and produc satisfactorily. Unfortunately a w after this change the wind had to be back again for a reason not inherent furnace conditions.

Claims could be made that this pro the detrimental effect of scrap on f nace performance, but facts make clear that the adverse influence of scrap was at least partly indirect. It known that scrap has some tendency make furnaces kick. This, besides reasons discussed here, might be to the formation of networks wh hinder an orderly descent of the st particularly when bushy turnings used.

However, this can be held in reason bounds if we have sufficient voids, then increases in production and creases in coke consumption can achieved. A good example of this is performance of No. 1 stack during time of No. 5's poor performance heretofore described. The data follo Table IV.

What happened on No. 5 fur was that for some unknown reason

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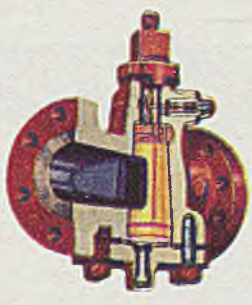
years ago, at Bibi Eibat, Russia, an oil ...ell gushed forth this unbelievable pro...tion in one month. Fortunes of liquid ...gold spewed upward, *out of control.* The ...famous Dos Bocas well, south of Tampico, ...Mexico, also wildly flowed at a rate esti...ed well above 100,000 barrels daily ...until it emptied an entire pool of oil and ...a barrel of oil was saved. Oil flowed ...the Gulf of Mexico and the well ...caught fire. Back in March, 1910, ...famous Lakeview Gusher, north of ...Calif., roared in from a depth of ...feet, producing 60,000 barrels daily ...it was *out of control* and failed to ...become a commercial producer. The celebrated Potrero del Llano No. 4, brought in in 1910, was reported to have produced more than 115,000,000 barrels during its life. For 10 years this Mexican well averaged 10,000,000 barrels per year—but millions of barrels were lost when the well ran wild—completely *out of control.* On Feb. 15, 1916, the Cerro Azul No. 4, near Tampico, came in with a flow of 152,000 barrels. On Feb. 19, it flowed 261,000 barrels. To Dec. 31, 1921, it produced 57,000,000 barrels; then was lost—*completely out of control!*

LACK OF CONTROL can wreak havoc in any industry, in any plant, in any pipe line, just as it devastates production of an oil well. The "nerve center"—actually the heart of control—is in the *valves* on your lines. Any degree less than 100% safe control means danger—danger to production, at least, if not to life and property. Nordstrom Valves are engineered for 100% *safe control,* regardless of the service. That's why valve orders carrying the most severe specifications are invariably directed to Nordstrom.



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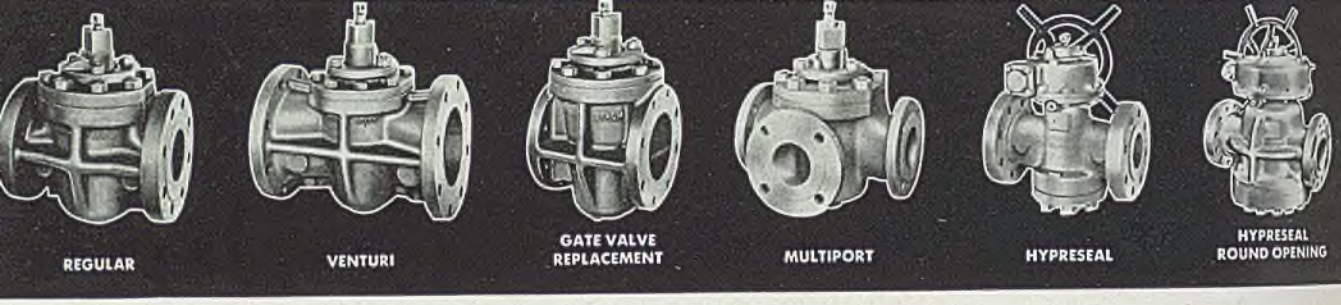

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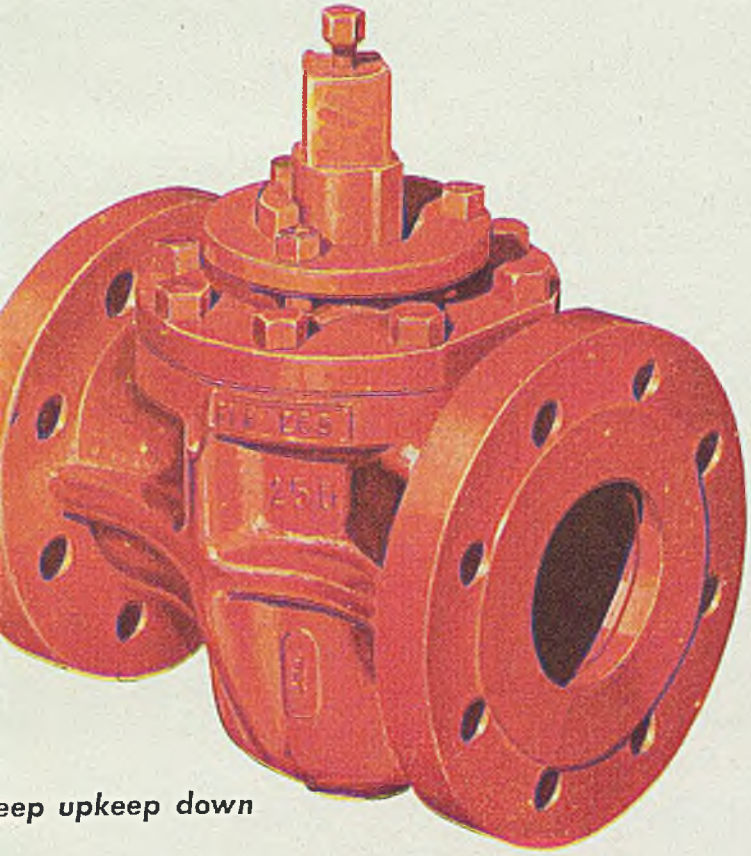

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Nordstrom Valves are made in a variety of patterns, each suitable for a particular field of use. Nordstrom engineers have carefully proportioned the designs to produce maximum efficiency of operation.

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HYPRESEAL PATTERN. In the higher pressures the Hypreseal design is provided, embodying a full-floating, inverted plug. The tapered form of port opening is standard. But for some uses, such as oil pipe lines and oil field control heads, a full round bore through the valve is required. Round opening design can be supplied.

Nordstrom Valves meet the standard specifications as principally prescribed in A.S.A. and A.P.I. Standards. Complete details are given in the Nordstrom Valve Catalog.

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unprecedented efficiency was achieved. The heat balance was at its best, but when the coke consumption was reduced to such a low rate, there were not enough voids left for orderly gas flow. Similarity of the inwall temperature and spread to those of the best months shows that the filling of the furnace and the makeup of the stock were essentially correct. But their jittery pattern showed that the channels of gas flow were not open and the gas had to seek its way here and there through the too dense stock. When the scrap was taken off, the coke consumption increased and enough voids for unobstructed gas flow became available.

On the other hand on No. 1 furnace where there were enough voids available on account of much higher coke consumption, good results were obtained in spite of the effect of the scrap which caused some kicking, and consequently large flue dust production.

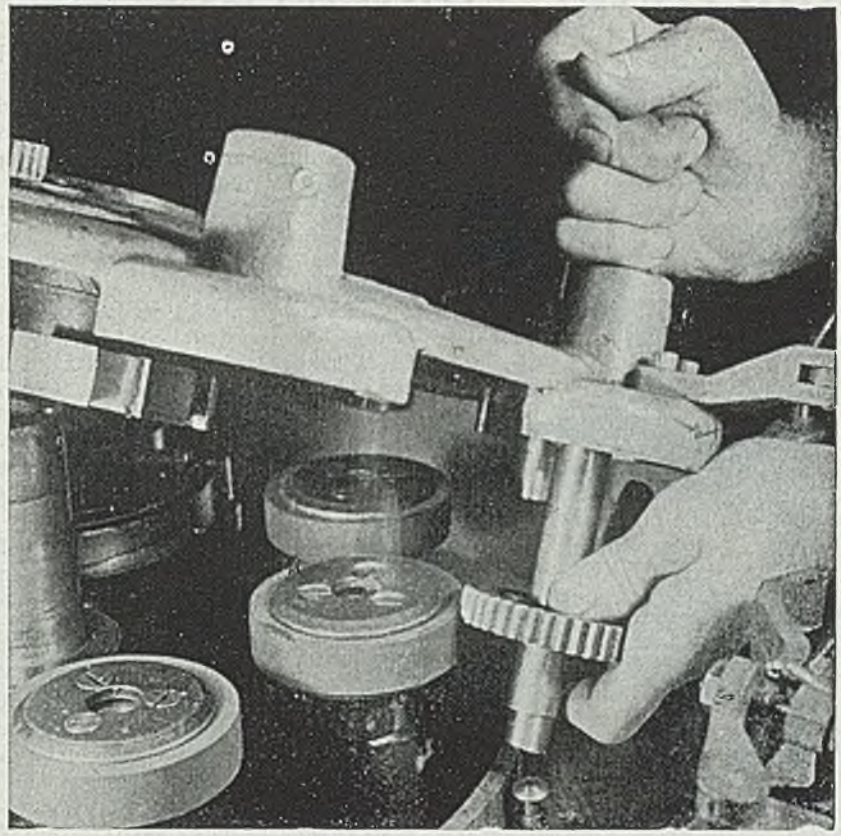
Detrimental to Gas Flow: On "B" furnace tests were conducted during the fall of 1944 using coke made from different coals. No changes in the burden were made and the wind was kept as constant as possible at 72,000 cfm. Therefore it can be assumed that differences in furnace performance were due to the different grades of coke. Table V shows the data for three runs.

Operating results indicate that Cokes II and III are superior to Coke I. Wind and coke consumption were about the same. The physical quality of Cokes II and III were slightly superior. It is immaterial for this study why Cokes II and III were better; the fact remains that the furnace took a higher burden and produced more iron. What is interesting here is that it was considerably harder to control the gas flow on the more efficiently working furnace. This is shown by the higher flue dust production and particularly by the fact that the filling mark had to be changed three to four times as often as before. Changing the filling mark is one of the most common ways of controlling the gas flow and the number of filling mark changes therefore reflects the smoothness of furnace operation.

In this case the impairment of the gas flow with more efficient operation did not go as far as on No. 5 furnace where operation suffered severely. In the case of "B" furnace the situation could be brought under control by an increased effort to regulate the gas flow which had been impeded by the increased ore burden.

Dry Blast Operation: T. F. Plimpton* in reviewing dry blast operation under winter conditions at the Inland Steel Co. showed that by stabilizing the moisture at a low atmospheric level of about 30 grains cu ft nothing was achieved.

During warm weather No. 2 stack was put on dry blast at 1 grain moisture for the first time and after 6 days suffered a severe kicking spell. Not much attention was paid to this at the time and the kicking was stopped in the routine manner by checking the furnace and cutting wind. Neither was much significance attached to the fact that the burden carried by the furnace had climbed 8 per cent during the 6 days of operation.



MOLDED RING CAN TAKE IT: A tough, long-lived ring molded from a vinyl resin derivative compounded by Resistoflex Corp., Belleville, N. J., is being used to prevent gear breakage in event jamming occurs during operation of revolving turret machinery. In application shown these gear "cushions" have service life five times that of rubber rings previously used

In August 1943 No. 1 stack was put on 1 grain dry blast. The coke consumption dropped slightly, the amount of burden charged increased somewhat, but the tonnage did not improve and, as during the winter test, nothing spectacular happened. Care was taken to operate the furnace in a normal manner with the general foreman and the blowers deciding when the furnace would take additional wind or burden. It was reasoned that if the after compression drier removes moisture and thus cuts the amount of wind blown, it will be obvious before long that the furnace is underblown and if the furnace is fed too much heat she will warm up and will naturally be given more burden.

Since nothing was achieved this way, it was decided to attempt to force on the furnace additional wind equivalent to the moisture removed and at the same time force the burden up if possible.

How to figure this equivalent is controversial. It can be done in three different ways.

1. Replace the volume of the water removed by the same volume of air. In this case the oxygen removed is replaced to 42 per cent by weight.
2. Replace the weight of oxygen removed in form of water by an equal amount of oxygen in the form of air. In this case every pound of water removed is replaced by 3.86 lb of air.
3. Blow enough additional wind to obtain the same amount of gas flow up through the stock as was blown before applying dry blast. This is done when the volume of water removed is replaced by air with 10/6 of this volume.

A correction table was prepared using the third, or the middle-of-the-road method. On Sept. 9, the operators following this table were instructed to try to raise the wind 2000 cfm in 500 cu ft steps as fast as feasible, and also to do everything possible to get the burden up and maintain high blast temperatures in order to prevent any waste of heat.

The furnace took the increased burden, but unusually violent kicking followed. Heat and wind cuts were unavoidable. For two weeks attempts were made to get wind, burden, and heat up. The kicking persisted, and repeatedly the furnace had to be straightened out in the conventional manner. Instead of blowing an extra 2000 cu ft of wind, the average wind was lower than before. The

(*Please turn to Page* 184)

INDUSTRIAL EQUIPMENT

Elevating Table

Revolvator Co., North Bergen, N. J., introduces a new hydraulic elevating table. Among its uses are the raising of heavy material and dies to a level con-

venient for the operator and raising sheets for press feeding.

Operation is by hydraulic mechanism using foot pedals. Running gear consists of two rigid and two swivel rollers and ball bearing casters of semisteel or composition rubber tires. A removable handy push bar is usually furnished with the table.

Milling, Boring Machine

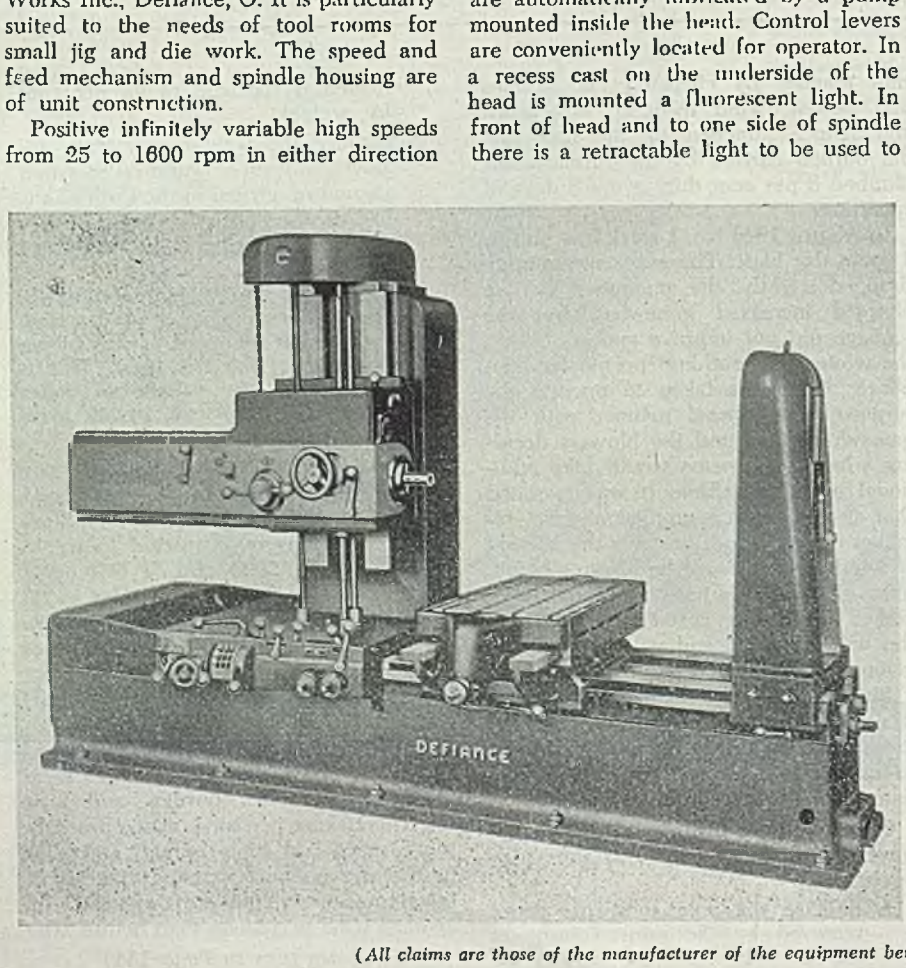
A new 2½-in. horizontal boring, milling, drilling and tapping machine, model No. 22, is announced by Defiance Machine Works Inc., Defiance, O. It is particularly suited to the needs of tool rooms for small jig and die work. The speed and feed mechanism and spindle housing are of unit construction.

Positive infinitely variable high speeds from 25 to 1600 rpm in either direction directly on the main spindle are obtainable with this machine. It has a direct reading indicator for spindle speeds and direct reading feed chart. Spindle and sleeve bushings are nitralloy. It is equipped with brake to stop spindle.

Unit has 18 feeds in geometrical progression, ranging from 0.002 to 0.125 per revolution of spindle. Five feeds are standard tapping leads.

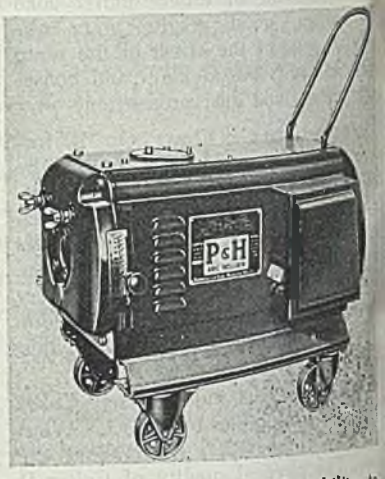
Column ways are 5 x 1½ in. and 18 in. across; bed ways are 5 x 1½ in. and 24 in. across; table ways are 4 x 1½ in. and 21 in. across. Table has working surface of its entire area with T-slots and cross slots. The backrest with boring bar support has one V-way and one flat way. Saddle is guided on inside of bed ways.

Spindle head has been given a substantial bearing on the column and counterbalanced to relieve the elevating screw of undue strain. Actuating screw is located in center of column ways between a dovetail guiding edge and a tapered take up gib which is on the inside edges of column ways. Clearance is allowed on rear edge of slide and front edge is provided with a binder. This arrangement brings the guiding edge as well as the clamping surfaces, close to spindle nose and work, which effects a rigid support for cutting tools. All gears, shafts and clutches are made of a high grade alloy steel. All helical drive gears are balanced and shaved. Bearings are automatically lubricated by a pump mounted inside the head. Control levers are conveniently located for operator. In a recess cast on the underside of the head is mounted a fluorescent light. In front of head and to one side of spindle there is a retractable light to be used to light up working tool and for inspecting work. Directly above spindle a 8-in. overarm can be pulled out and a high speed milling or drilling unit can be mounted for vertical work. Spindle has positive infinitely variable speed range from 25 to 1600 rpm. A Bijur oiling system is used for lubricating feed screw and head ways on column.



Square Frame Welder

Square frame welder, model WA-300, provides a welding service range rating of 60 to 375 amp. It has two part construction, single heat control, visual



current calibration and adaptability to parallel operation where higher amperage is desired.

Features of the unit include weatherproof construction, polarity reversing switch, removable stator, overload protection both for contacts and for new low-voltage magnetic starter. It is available from the Harnischfeger Corp., Welding Division, Milwaukee 14.

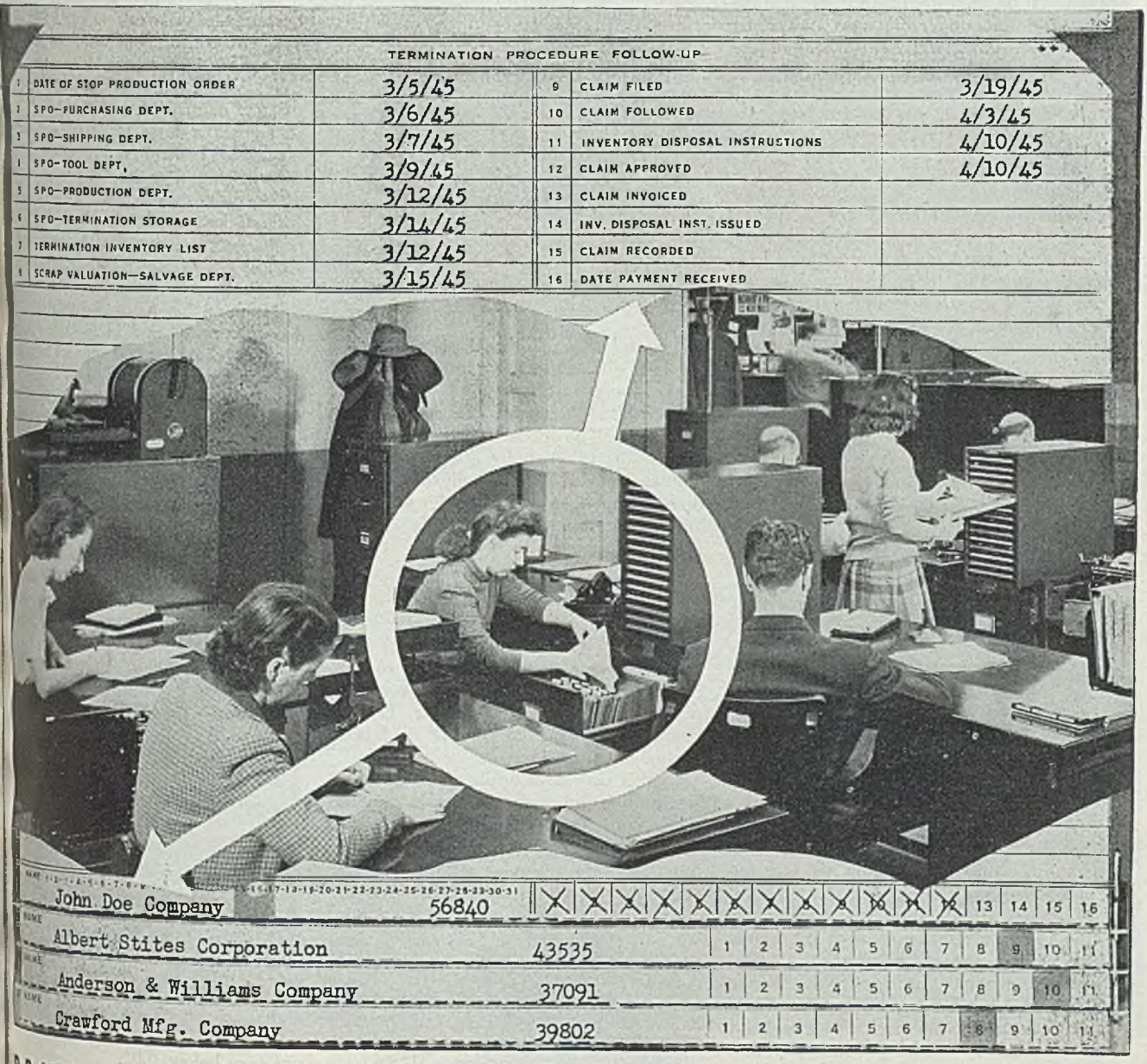
Automatic Sweeper

Model Moto-Sweeper, offered by Moto-Mower Co., 4600 Woodward avenue, Detroit 1, includes a device for clean-

ing out corners and close to the wall. A blower with a properly directed flexible metal tubing attached cleans dust out, blowing the refuse and dirt into the path of revolving brush. Other im

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

CONTROL makes short work of TERMINATIONS



P.R. MALLORY & CO., INC. knows how to avoid delays, speed settlements... Key to their operation is effective use of KARDEX VISIBLE Record Control

Precision electrical and electronic parts produced by P. R. Mallory & Co., Inc. of Indianapolis will play an enormous role in peace, as they do in war.

But a first essential to peace-time operation is the settlement of terminated war contracts. To eliminate lost motion, protect assets and obtain early settlements, P. R. Mallory employs a very simple Kardex contract termination record and procedure follow-up control.

The follow-up record provides a history of the sixteen steps incident to each termination. On the visible margin the exact status of any settlement is revealed at a glance, each stop being checked off as it is accomplished. Follow-up on the next operation is controlled by the colored signal on the 1-to-31 day scale. Termination records for vendors follow each contract card, centralizing all data for ready reference and orderly procedure.

Correspondence and other pertinent papers are wisely protected from fire in Remington Rand Safe-Files upon which the Kardex Cabinets are placed, and are filed in our Follow-up Folders that operate as a double check.

Our wide experience in furnishing effective contract termination controls will gladly be placed at your service through our nearest Branch Office.

SYSTEMS DIVISION

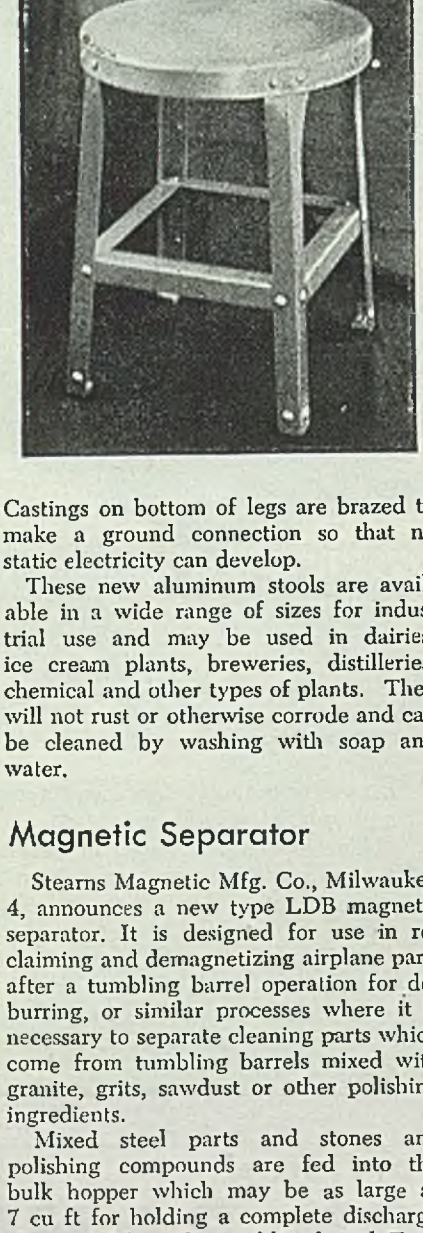
REMINGTON RAND

315 Fourth Avenue, New York 10, N. Y.

provements include an improved method of laying the dust; where before air was pumped into water tanks to produce a fine spray it is now applied at the nozzle, providing a more positive control that eliminates necessity of building up undesirable high air pressure in water tank. It is easy to operate as it turns right or left under its own power by a separate clutch on each wheel of the tractor controlled at handlebar.

Aluminum Stools

Aluminum Ladder Co., 154 Carbis street, Worthington, Pa., announces a new line of aluminum stools for industrial use. No. 1318 stool, illustrated here, is made of hard alloy aluminum, 13 in. in diameter and 18 in. high and weighs 2½ lb. This stool is nonsparking and was developed for use in powder plants.



Castings on bottom of legs are brazed to make a ground connection so that no static electricity can develop.

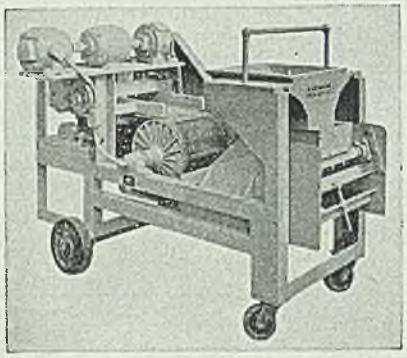
These new aluminum stools are available in a wide range of sizes for industrial use and may be used in dairies, ice cream plants, breweries, distilleries, chemical and other types of plants. They will not rust or otherwise corrode and can be cleaned by washing with soap and water.

Magnetic Separator

Stearns Magnetic Mfg. Co., Milwaukee 4, announces a new type LDB magnetic separator. It is designed for use in reclaiming and demagnetizing airplane parts after a tumbling barrel operation for deburring, or similar processes where it is necessary to separate cleaning parts which come from tumbling barrels mixed with granite, grits, sawdust or other polishing ingredients.

Mixed steel parts and stones and polishing compounds are fed into the bulk hopper which may be as large as 7 cu ft for holding a complete discharge of material from the tumbling barrel. Feed from bulk hopper to shaker pan feeder is controlled by an adjustable, weighted swinging gate to accommodate a uniform feed of either large or small parts. Shaker pan feeder feeds mixed parts in a continuous uniform layer into the magnetic field and underside of the drum incorporated into the machine.

At this point the steel parts are lifted up out of the feed and carried over the

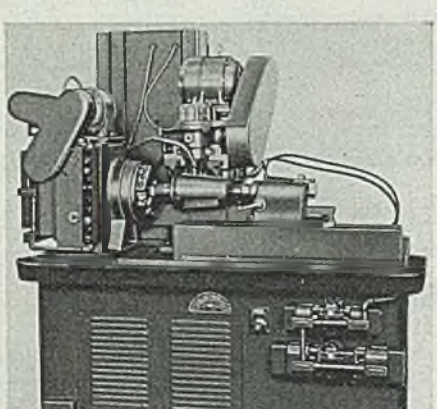


drum and through the demagnetizer by cleated belt for discharge into a collecting tank. Stones and compounds fall off the end of the shaker pan feeder in a suitable receptacle. The feeder is individually adjustable as to pitch by a hexagonal nut adjustment and also is adjustable as to distance between end of feeder and magnetic drum to accommodate various sized steel parts.

Milling Machine

Designed to process workpieces from ¾-in. diameter by 4 in. length up to 6 in. diameter by 24 in. length, a new milling machine is offered by Snyder Tool & Engineering Co., 3400 East Lafayette avenue, Detroit 7.

In this particular application it is used for milling lubricating slots in tapered valve plugs. Two of these slots reach from a circular groove near the large end of the taper into a similar groove on other end. Two other slots are cut between but



not into these circular grooves. Workpiece is held in machine between centers and is positioned radially from square end of valve plug and stem. Tailstock center is spring loaded. Indexing is by a motor driven Geneva mechanism, including a positioning pin and a master control drum governing the length of travel of milling cutter head. This mechanism automatically selects a long or short cut to be taken along the workpiece. Reaming cutter is held in an arbor in a worm driven spindle.

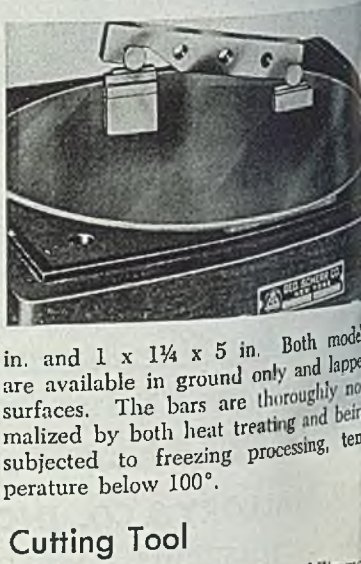
Spindle housing is installed on a cross slide which is adjustable for depth of cut and respective diameter of work. Lower portion of this cross slide is used for longitudinal feed and length of feed stroke is adjustable according to the requirements of work length.

Each cutting operation with cutter in a location near the center of the slide. When the machine is started the master control drum (being positioned for either a long or short cut) sets up electrical control devices, cutter head travels to end of its limit switch setting, cross slide moves into work and feeds for full length of valve body to its other limit switch setting. Cut being completed spindle slide retracts and returns to center position.

Machine then automatically indexes workpiece 90° and in so doing selects the long or short cut setup and repeats the cutting cycle until all slots are cut. Hydraulic equipment is in the base which is of welded steel. Coolant tank is separate from the machine.

Sine Bar

George Scherr Co. Inc., 200 Lafayette street, New York 12, announces two new models of sine bars which are used for determining and measuring angles. They are available in sizes 1 x 5/8 x 5



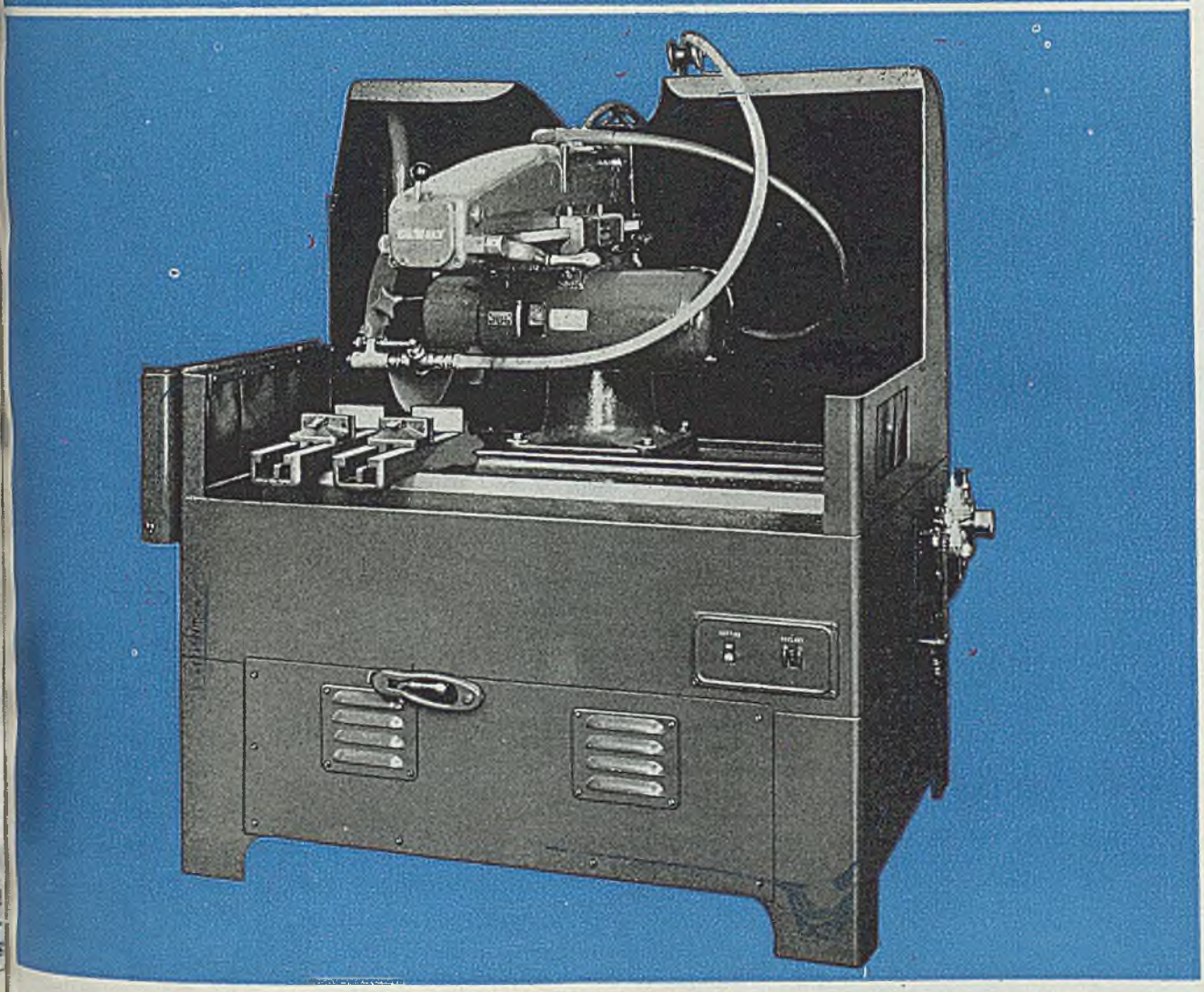
in. and 1 x 1¼ x 5 in. Both models are available in ground only and lapped surfaces. The bars are thoroughly normalized by both heat treating and being subjected to freezing processing, temperature below 100°.

Cutting Tool

Zim cutter No. 2, a product of Zimmerman Packing Co., Cincinnati, and offered by William-Leonard & Associates, 8 Caxton Bldg., Cleveland, is designed to cut one or a hundred rings to very accurate sizes from any coil or spiral packings. Asbestos, rubber, duck, cotton, fiber, leather, lead, copper and particularly all types of plastic packings can be cut. Square butt or beveled butt joint rings can be cut most effectively. Regular beveled and even step joints can be made. The measuring device can be set immediately to exact length desired. Circular knife can be adjusted to give eight different cutting edges. Tool weighs 17 lb and can be attached to bench or carried to any location.

It can also be used when an ex

DE WALT offers cut-off power to spare!



The new DeWalt "Wet-Cut" Metal Cutting Machine:

- cuts wet with coolant or dry if desired
- cuts off wide stock and odd shapes
- also cuts metals on an angle

Power is the keynote of the new DeWalt "Wet-Cut" Heavy-Duty Metal Cutting Machine. Its 15 H. P. DeWalt-built motor, driving an 18" diameter abrasive wheel or steel saw blade, makes it possible to "walk" through the toughest kind of metal. It is this same power that keeps abrasive wheels operating at a constant speed, thus increasing wheel life and accuracy of cut. It is power like this that saves time and lowers cutting cost.

If you have a heavy-duty metal cutting job to do, investigate this DeWalt. Write for full information.

DEWALT PRODUCTS CORPORATION

228 Fountain Avenue — Lancaster, Penna.

length is wanted from a strip of any pliable material up to 1½ in. in width or diameter. Knife has a razor edge and because it is round, goes through material on a 45° angle.

Telescopic Towing Handle

Lyon-Raymond Corp., 2146 Madison street, Greene, N. Y., offers a telescopic towing handle for use with their hydraulic elevating table. Extended, the handle provides means for moving table from place to place. Collapsed, handle is

below and under table top where it will not interfere with operations involving transfer of materials across table or support of overhanging pieces. Table can be maneuvered without use of handle, but long hauls are easier with it.

Black Light Lamps

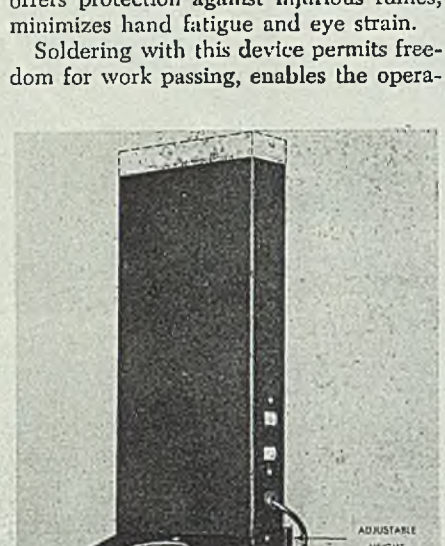
Black light lamps for industrial, aircraft and marine instrument illumination and other applications are available from Sylvania Electric Products Inc., New

York, for operation on 120 v ac and 24-28 v dc visible light filter where a light weight, compact lamp is required. It is equipped with a polarized bayonet base and may be operated in any position for use with aircraft instruments, inspection or other industrial equipment. Red-purple series tubular lamps require no visible light filter and operate with standard fluorescent lamp accessories on 120 v ac circuits. They are supplied with miniature bipin bases in five sizes ranging from the 6 in. T5 rated at 4 w to the 36 in. T8 rated at 30 w.

Soldering Stand

Model SS11 soldering stand, developed by Ess Specialty Corp., Bergenfield, N. J., embodies flexibility required for soldering with either iron, torch or soldering pot. The hood and fume stack can be raised and lowered to accommodate any of three heating elements used in soldering. This stand permits interchangeable soldering, offers protection against injurious fumes, minimizes hand fatigue and eye strain.

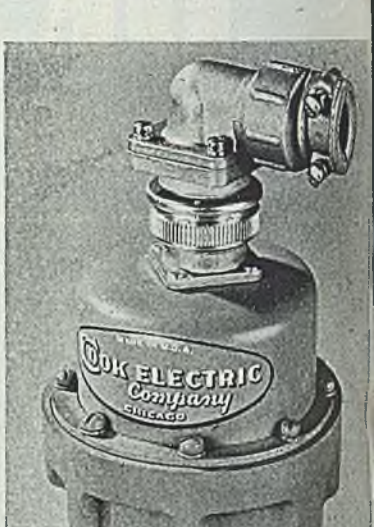
Soldering with this device permits freedom for work passing, enables the operator to focus attention on soldered joint by the plate glass window (or magnifying glass) in the hood. This model is supplied with a cast bracket for mounting on assembly tables or if desired it can be supplied mounted on a wood base. Fume stack is 3 x 9¼ x 32 in. high and can be raised 2 in.; hood is fitted with plate glass window or magnifying glass; its exterior is finished in black crackle while the underside of the hood is finished in white.



Pressure Detector

A new pressure detector adaptable for hydraulic systems for controlling hydraulic pressures and cutting off circuits at predetermined pressures and for controlling surge loads is offered by Pressure Switch Division, Cook Electric Co., 2700 Southport avenue, Chicago 14.

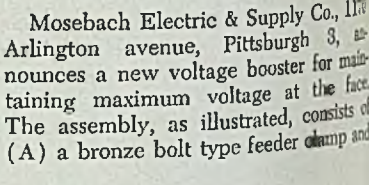
Designated as Hi-Pressure switch, it is capable of withstanding 3000 lb surge load with a range of adjustment from 100 to 2000 lb with a 20 lb differential at 100 lb pressure which increases proportionately at higher pressures. Electrical capacity of this device is 10 amp

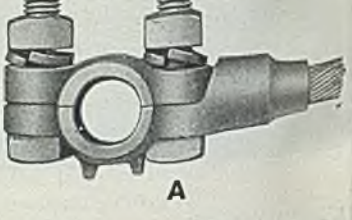


at 125 v ac, S.P.D.T. with either an Amphenol connection or a standard conduit fitting. Pressure connection can be with 3/8 or 1.8 standard pipe thread.

Voltage Booster

Mosebach Electric & Supply Co., 1170 Arlington avenue, Pittsburgh 3, announces a new voltage booster for maintaining maximum voltage at the face. The assembly, as illustrated, consists of (A) a bronze bolt type feeder clamp and



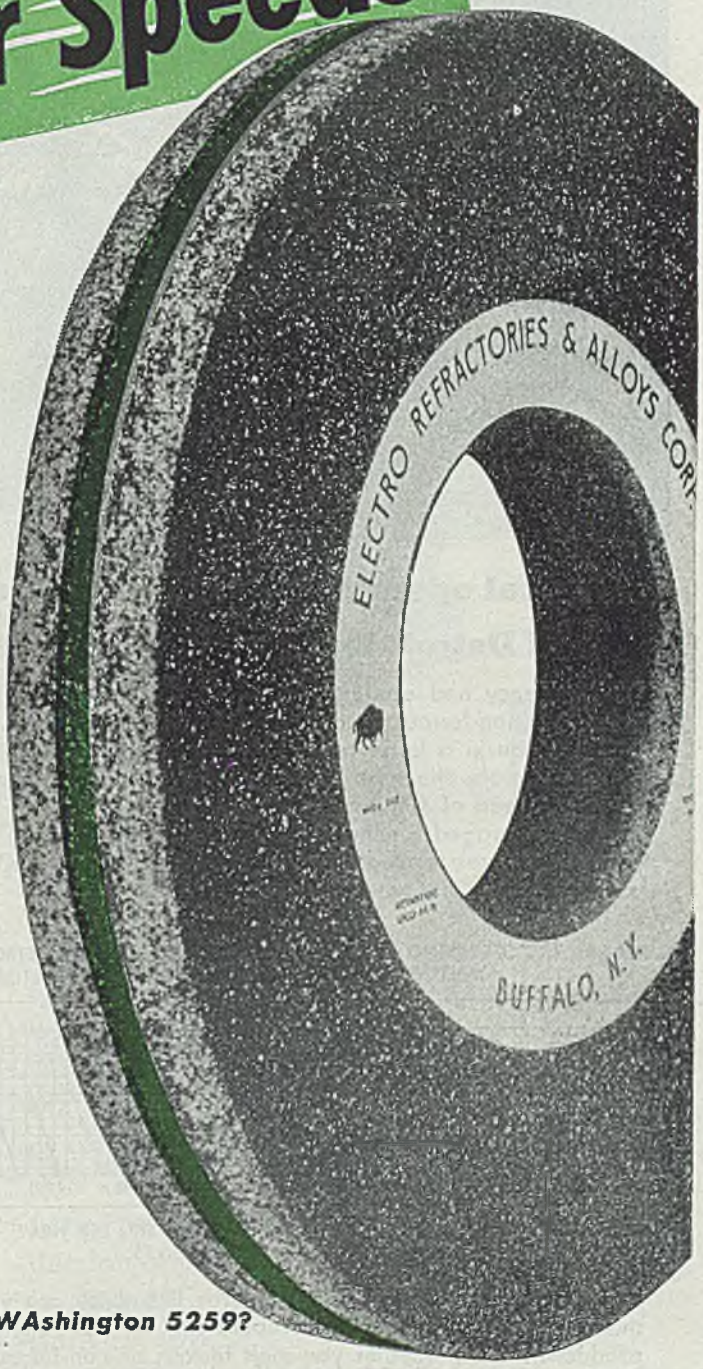


(B) a bronze trolley clamp which are connected by a flash welded 4/0 flexible strand copper cable. The booster is hooked to the feeder line with the clamp held by two bolts, to equalize the voltage between the feeder and trolley line. The boosters can be provided with connections for any size feeder and trolley wire.

COOLER CUTTING at Higher Speeds

THESE new Electro High-Speed Grinding Wheels afford faster cutting without troublesome heat development whether the grind is for snagging or for fine finishing.

We believe that war demands made it possible for ELECTRO to show cooler cutting at higher speeds, and present high state of perfection will be the basis for further gains. All we ask is opportunity to prove the cooler cutting at higher speeds of our wheels.



Will you wire us?—or phone us at Buffalo, WAshington 5259?

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Gear "Rolling"

(*Continued from Page 127*)

rolling fixtures such as the unit for checking helical gears, shown in Fig. 4.

This illustration is a view of the unit in position to check backlash. Runout is checked by disengaging the bayonet locking plunger and allowing the part gear and master to mesh at zero backlash. Then when the gears are revolved by hand, runout will be indicated on the dial gage in right foreground.

Such a fixture necessarily is built for large production testing of one part only.

Internal Spur Gears: Fig. 5 shows setup for examining internal spur gears—one of the modifications that is increasing greatly the usefulness of the gear rolling method. Note that its method of operation is very similar to the basic design in Fig. 1 but that backlash is checked by engaging a portion of the master which is allowed to extend up above the internal gear with which it is engaged. As in other fixtures, runout is checked by disengaging the bayonet locking plunger and allowing the master and part gear to mesh at zero backlash while they are revolved by hand. This fixture, too, is built primarily for a large production check of one part only.

Worms and Worm Wheels: Backlash and runout of worms and worm wheels are checked easily on the type of fixture shown in Fig. 6. For checking worms, it is not necessary that the master employ the conventional throated worm wheel design. It is possible to use an angular cut spur gear as master since only point contact is required in making the test.

The single fixture, Fig. 6, can be used for various sizes of worms or worm wheels simply by resetting the center distances to accommodate the job. This feature increases the usefulness of the method considerably.

Master Gears: Of course the accuracy of the gear rolling method is completely dependent upon the accuracy of the master gear. So let's see what goes into the making of masters at Vinco. As explained by Mr. Smith, master gears are made from tool steels.

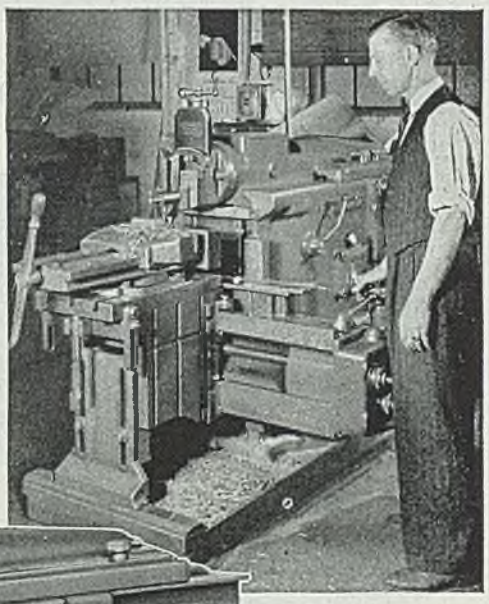
Starting from bar stock, the master gears are rough and finish turned, then hobbed and heat treated. Cycle includes hardening to 60-64 rockwell C, drawing and chilling to 120° below zero for stabilizing the metallurgical structure.

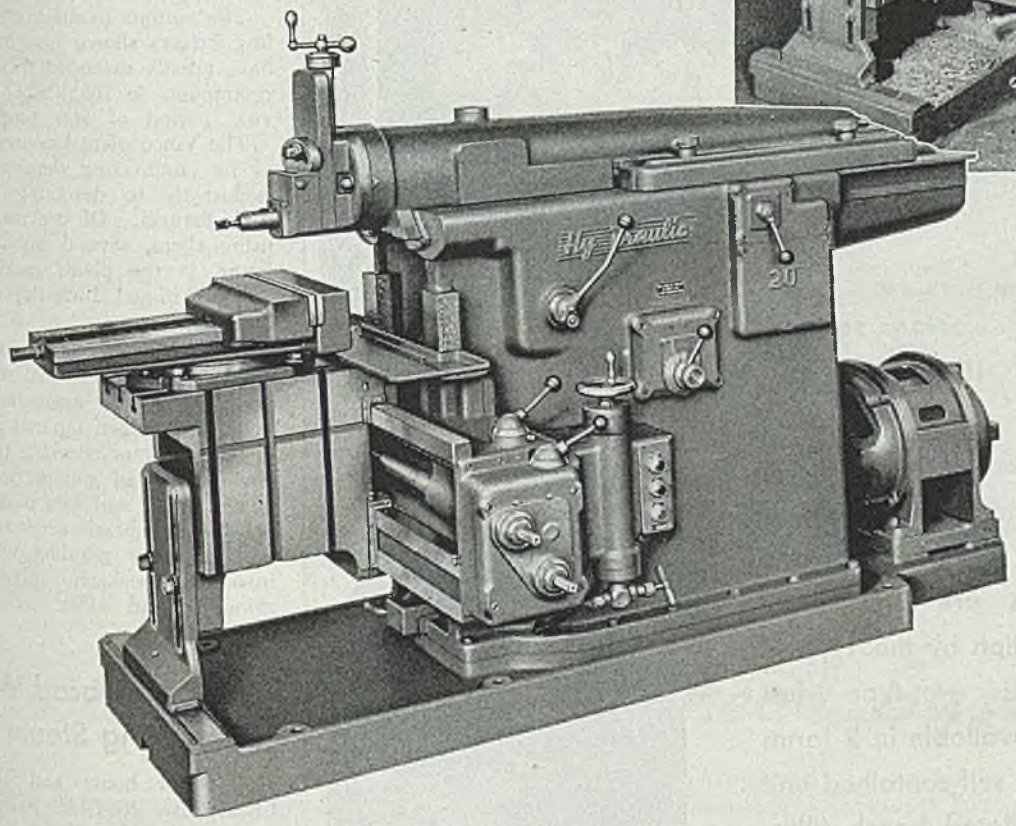
Then the face, outside diameter and hole are ground, followed by the lapping of the hole. In finish grinding the teeth, which is the next operation, the formed wheel method is used on spur and angular cut gears. This method has proved most satisfactory over many years in obtaining a consistently high degree of accuracy on tooth form, tooth size, spacing and concentricity. The generating method of grinding is used on all worms, helical and spiral gears. Wheels from 200 to 400 grit are used.

Extreme accuracy is required. Typical specifications are those for master spur gears which call for tooth-to-tooth spacing error less than 0.0002-in. in size

You Couldn't Beat that Baby"

SAID PAUL AT S & B TOOL CO.



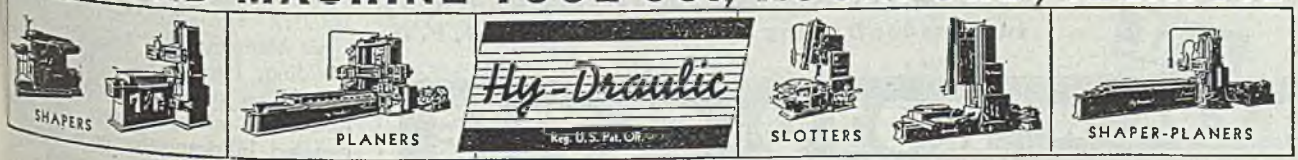


BUY UNITED STATES WAR BONDS AND STAMPS

The "baby" is one of the Hy-Draulic Shapers in the plant of the S & B Tool Co. where Paul is foreman. By way of proof, Paul put the Hy-Draulic Shaper through its paces for the visitors and their camera. Easy set up was demonstrated by use of centralized controls, rapid traverses; quick, easy establishment of desired cutting speed and feed, setting ram-stroke length and position in one simple manual operation with hardly a pause in its movement. In less time than it takes to describe, chips rolled off the job and Paul stood at ease ready for the next operation. In shops like this, where fine work is put out around the clock seven days a week steadily month after month, the easy, fast operation, accuracy and stamina of Hy-Draulic Shapers pay off in high production and economy of effort. For present and future tool and die work, maintenance or production operations that include shaping — buy Hy-Draulic Shapers. Write to us today, for Bulletin 2902.

4411

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS



up to 4-in. pitch diameter; accumulated spacing error within 0.0005-in.; runout within 0.0003-0.0005-in. total indicator reading; hole tolerances of 0.0001-0.0002 in. and other dimensions to a similar order of accuracy.

Typical master gears are seen in the various fixtures illustrated. In Fig. 2, the large wide single gear is the master. In Fig. 4, the gear mounted on the vertical axis is the master. These, as in Figs. 5 and 6, show the master carried on the movable arm of the fixture while the part gear or unit being checked is arranged to be quickly fitted over an adapter bushing mounted on the heavy baseplate of the fixture or on a special stationary arm supported from the base.

The various modifications of gear rolling fixtures shown here are reported to have greatly extended the speed of gear production in many shops during this vital period of war production.

The Vinco plant has one entire section of its engineering department assigned exclusively to designing and detailing such fixtures. Of the many companies using them, several hundred units are found in the plants making the gears for the famed Rolls-Royce Merlin aircraft engine.

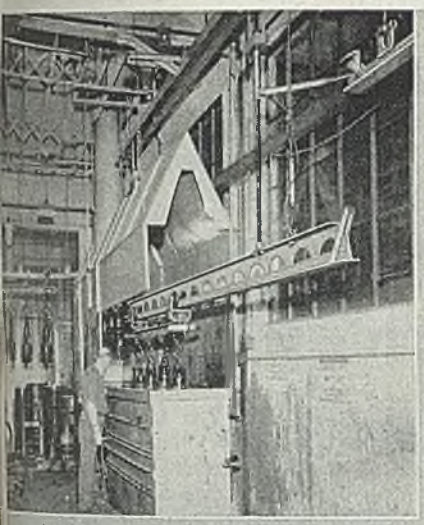
In addition to the gear rolling fixtures and master gears, Vinco manufactures a wide variety of gages including plug cylindrical gages, tapered plug and ring gages; units for checking propeller hubs, concentricity of gun parts; bullet profile gages spline and hex plug gages; optical dividing heads accurate to 2 sec of arc; precision grinding wheel dressers; involute checkers; spline and gear grinders; and other extremely precise equipment.

Boilers Replaced Without Interrupting Steam Supply

A boiler house and boiler of the Chesapeake & Ohio Railway Co. are being replaced without interruption of railway operation by Rust Engineering Co., Pittsburgh. Four of six old, existing boilers will be removed, with the remaining two continuing to furnish power. Half of the building will be torn down and replaced by a new structure. Two new boilers will be installed and steam generated to take over the power supply job. In the second stage, remaining two existing boilers and remaining section of the old building will be removed, and replaced by two new boilers and a new structure. The four new boilers will represent more steam generating capacity than did the six removed.

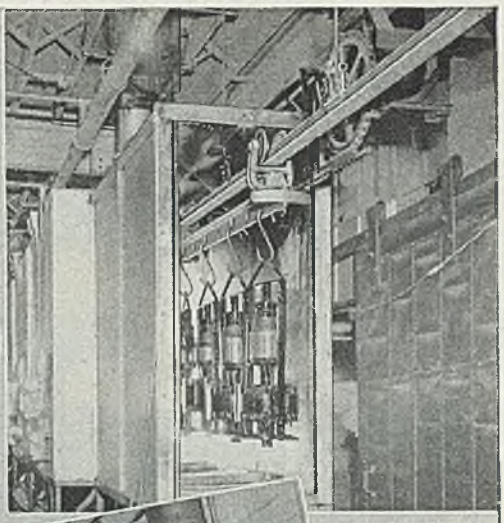
—o—

AGMA Standard Specification 250.01 entitled "Lubrication of Enclosed and Open Gearing" and its supplement 250.01A are available from American Gear Manufacturers Association, Empire Building, Pittsburgh 22. It includes on lubrication of enclosed gear units, on lubrication of open gears, and recommended lubricants for open gearing of all types, including worm gears.

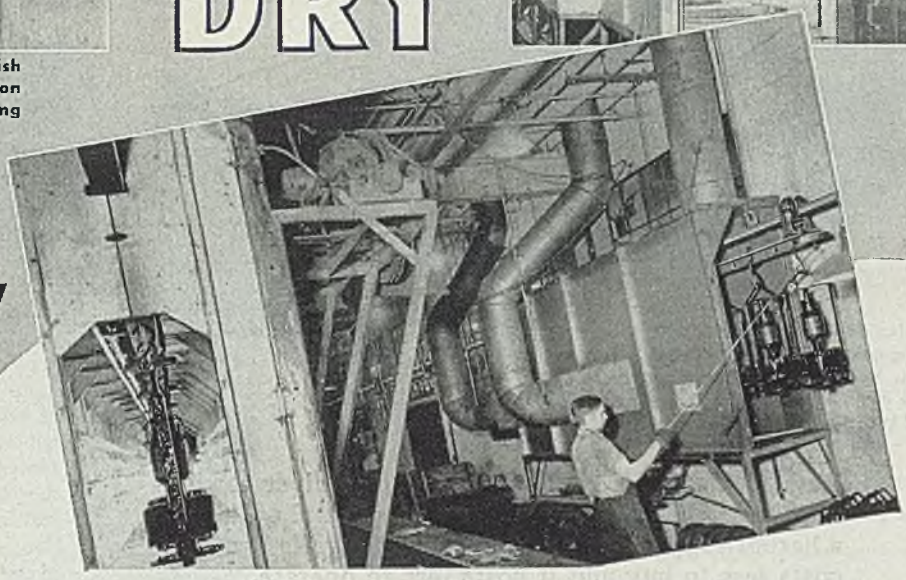


Armatures are dipped into varnish by use of a tramrail drop section which later is raised permitting carrier to travel forward.

After draining, armatures are advanced to oven. Carriers are traveled slowly through oven by motor-driven chain drive.

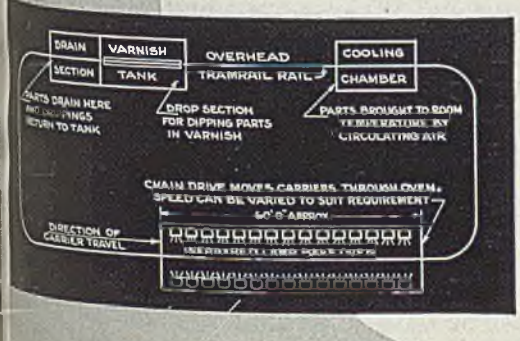


DIP-BAKE-DRY



In cooling chamber armatures are cooled to room temperature.

It's FAST, CLEAN and EASY with this Simple Overhead System



Many man-hours are saved by a simple, efficient and inexpensive overhead loop Cleveland Tramrail system in the Varnish Insulation Department of the Arrowhead Plant of D. W. Onan & Sons, Minneapolis, large manufacturer of electrical generating plants.

Armature and other parts are dipped in varnish, drained, baked and air cooled without manual handling. Only when they are hung onto or taken off the tramrail carriers need they be handled. Every trip around the loop completes a varnish application.

The system makes the work fast and easy. More parts are treated at lower unit cost. Both workers and room are kept clean and free of sticky varnish.

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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Evaluating Grain Size

(*Continued from Page* 131)

of the distribution of spatial grain sizes from the observed planar distribution. From Scheil's data, the distribution of planar grain sizes arising from an aggregate of grain having uniform volume (not necessarily shape) was calculated. It was found that if the constant spatial size is, say, No. 1, then 72.8 per cent of the area of a plane section would be occupied by grains of size No. 1; 20.8 per cent by size No. 2; 5.1 per cent by size No. 3, etc. Furthermore, if spatial grains of size No. 1 occupy only a fraction, f, of the volume of the specimen, they will contribute planar grains of size No. 1 to the extent of f 72.8 f per cent of the area of a plane section; of size No. 2 to the extent of 20.3 f per cent, etc. Thus, if the percentage of the area covered by planar grains of the smallest grain size number (larger grains) is measured experimentally, the percentage of the volume occupied by spatial grains of the same grain size number is given by a simple calculation, i.e., division by 0.728.

The same calculation cannot be applied directly to grains of smaller size because they arise partly from cutting large grains away from their maximum cross-section. This difficulty is surmounted easily by carrying out the analysis in steps. After the amount of the largest spatial size is determined, its contribution to the plane distribution is calculated, using the standard plane distribution for a single spatial size. When the values thus found are subtracted from the observed distribution, the result will be distribution arising from all the spatial grains except those of the largest size. The remaining amount of the next largest planar grains then can be used to determine the amount of spatial grains of that size, and by simple repetition of these steps the whole analysis can be accomplished.

This work is greatly facilitated by using a standard computation form that permits the successive subtractions to be carried out systematically. Since the subtraction process requires a knowledge of the percentages of the area of the field occupied by the several planar sizes arizing from a given volume percentage of a costant spatial size, it has been found convenient to list these values for amounts of the spatial size increasing in steps of approximately 1.4 per cent as in Table III. In this table the entries on any row are treated as a group; the first entry is the percentage of the field occupied by the largest planar size present; the second entry is the percentage by volume of spatial grains of that grain size number; the third entry is the percentage of the field occupied by the next largest planar size present arising from these spatial grains, etc.

Inasmuch as a suitable logarithmic relationship exists between the physical dimensions of a grain and its grain size number, the tabulated values appl

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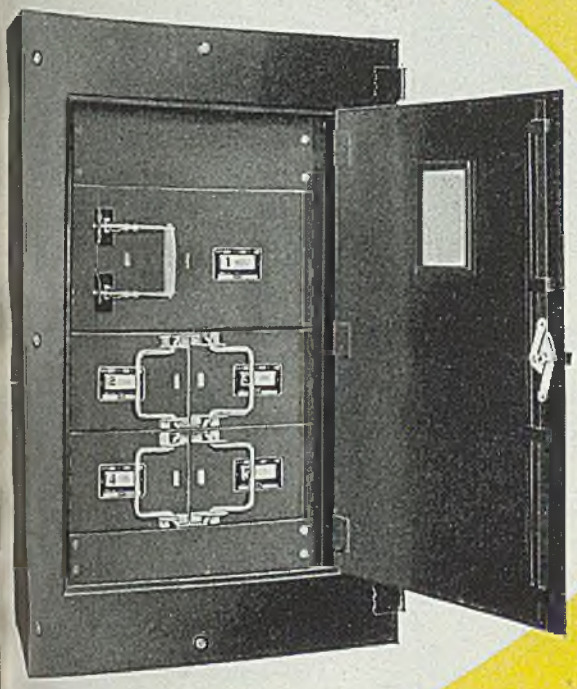

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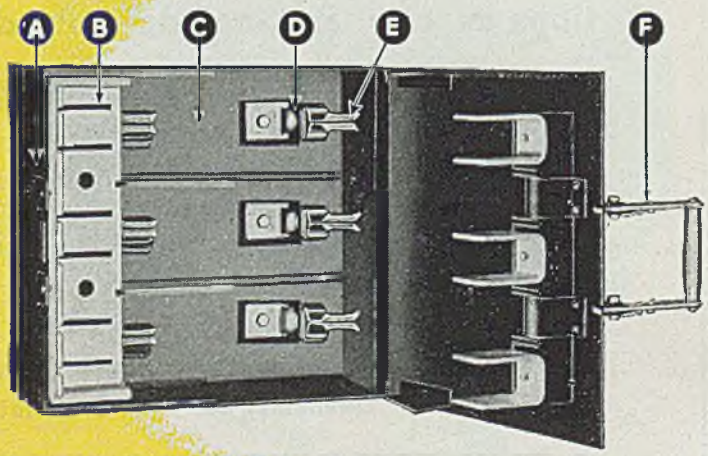

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equally well to any grain size, a tremendous convenience as compared to the tables given by Scheil. The distribution of planar sizes, obtained as previously shown, now is entered on a standard form, lines 1 and 2. The number representing the percentage of the largest size, 18.2, is located in the first column of Table I, and the row of figures associated with it copied on the third line of Fig. 3. For best accuracy, it is necessary to obtain these by interpolation between 18 and 19; the numbers thus are found to be 25.0, 5.1, 1.3, 0.3, 0.1, 0.0. The significance of these numbers is that 25.0 per cent of the volume of the specimen is of spatial grain size No. 1, and these grains contribute to the planar distribution 18.2 per cent of size No. 1; 5.1 per cent of size No. 2; 1.3 per cent of size No. 3, etc. Note that the first of the figures, minus all the rest, must always equal the number looked up, i.e., 25.0 - 5.1 - 1.3 - 0.3 - 0.1 = 18.2.

To determine the amount of spatial grain size No. 2, it must be realized that the planar grains of size No. 2 arise partly from spatial grains of size No. 2, and also partly from grains of size No. 1. In the present example, 28.5 per cent of the surface is of size No. 2, of which it has already been determined that 5.1 per cent arise from spatial grains of size No. 1, the remainder of 23.4 per cent thus being produced by spatial size No. 2. For this reason, the whole row of figures copied from Table I must be subtracted from the observed data. Next entry now is found to be 23.4, then 20.7, etc. Since each subtraction removes one figure from the row of Fig. 3, there eventually may be fewer spaces in Fig. 3 than there are entries in the table. When this happens, all extra entries are lumped together in the last column of the form, since this represents size No. 6 and smaller.

The calculation may be carried out with whole numbers as shown in Fig. 4, without serious loss of accuracy, although slight irregularities may appear toward the end of the work.

Underlined numbers in Figs. 3 and 4 represent percentages by volume of the different spatial grain sizes in the specimen. There are several ways to determine an average spatial grain size from this distribution, but it has been assumed that the most significant value is obtained by averaging on the basis of spatial grain boundary area. Thus, an average will be determined such that a uniform specimen of that average size would have the same total grain boundary area per unit volume as there is in the specimen itself.

Percentages by volume of the various spatial sizes as determined by the subtraction process as demonstrated are multiplied by a set of numbers each of which increases by a factor of $\sqrt{2}=1.414$, as the grain size number increases by one unit. These products are added together and each product divided by the sum; the resulting figures multiplied by 100, will be the percent

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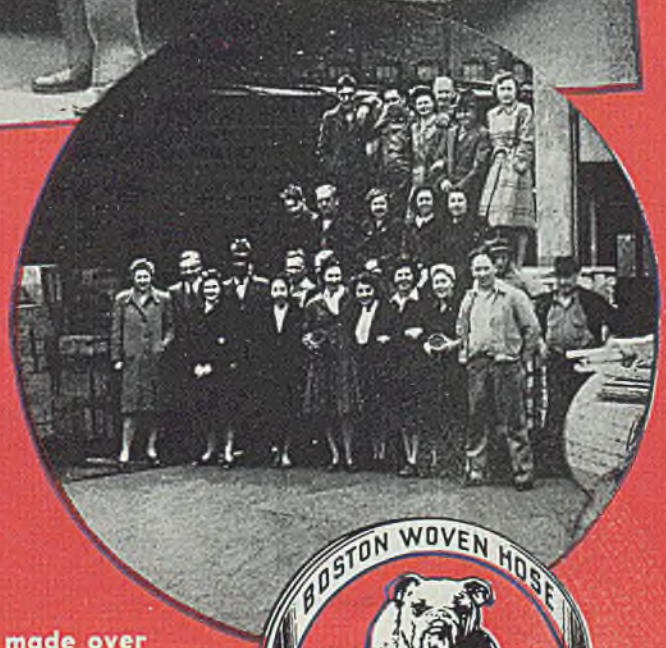

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ages, by grain boundary area, of the different grain sizes in space. The cumulated percentages (See Fig. 3) are plotted on the small graph shown on the lower corner of the form and a smooth curve drawn through the point. From this curve, grain sizes corresponding to ordinates of 16, 50 and 84 per cent are determined and entered on the form. The grain size at 50 per cent is taken as the average spatial grain size and one-half the difference between the size at 84 and 16 per cent as the standard deviation. In the example given, spatial size is thus 2.2, plus or minus 1.1, meaning that average spatial size is No. 2.2, and 68 per cent of the total grain boundary area arises from grains of size No. 1.1 to 3.3.

While a plot of cumulative percentage of grain boundary area versus grain size is most satisfactory for determining the mean spatial grain size and standard deviation, it is not a particularly graphic means for portraying the type of distribution of sizes present in the sample. For this purpose, it is better to plot the amount of each spatial size, either in terms of volume or grain boundary area, as shown in graph, Fig. 3. Specimens analyzed here may be regarded as typical of those specimens showing a rather narrow and symmetrical distribution of spatial sizes.

Whenever spatial distribution of sizes is symmetrical with respect to the average size, and the standard deviation is not too large, grain size number calculated by this procedure will agree closely with the ASTM number. In the example stated, ASTM size is No. 2.25. Under other circumstances, however, agreement may be poor, and in any event the spatial grain size brings out information not disclosed by the ASTM grain size number.

Common Difficulties: The only difficulty likely to be experienced with the proposed analysis is an irregular behavior in the subtraction process. Irregularities may be expected if too few grains are examined to give a good statistical average, or if a specimen has a duplex structure. In the latter case, it may be found that grains near one average size occur in streaks or clusters in a background of grains all near a quite different average size. It has proved most satisfactory to apply the analysis to each mean size separately and to express the grain size of the whole specimen according to the principle illustrated in the following hypothetical example:

70 per cent of 2.3 = 1.3

and

30 per cent of 6.8 = 1.5 (streaks)

Many other schemes, perhaps better suited to a particular problem, may be used in special cases.

The second, and most common, irregularity results from too few data. If a total of only a hundred or fewer grains is counted, there is a strong possibility that serious errors may appear in the larger sizes where only a few grains occur. Suppose that two measurements of a single specimen gave the data pre-

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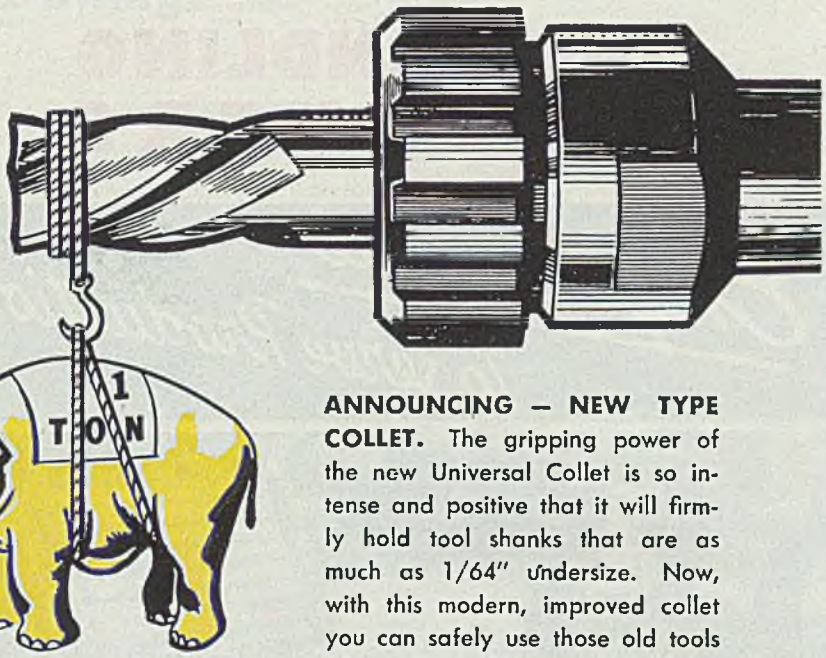

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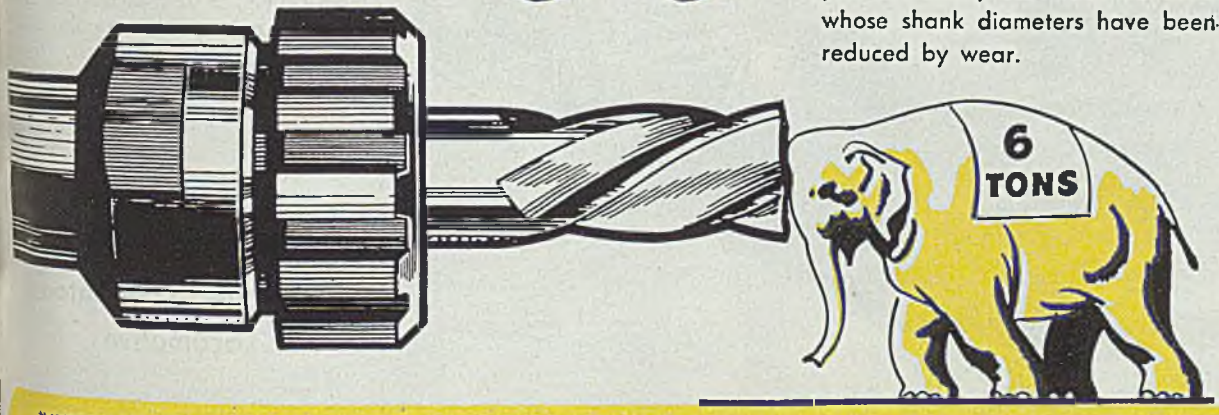

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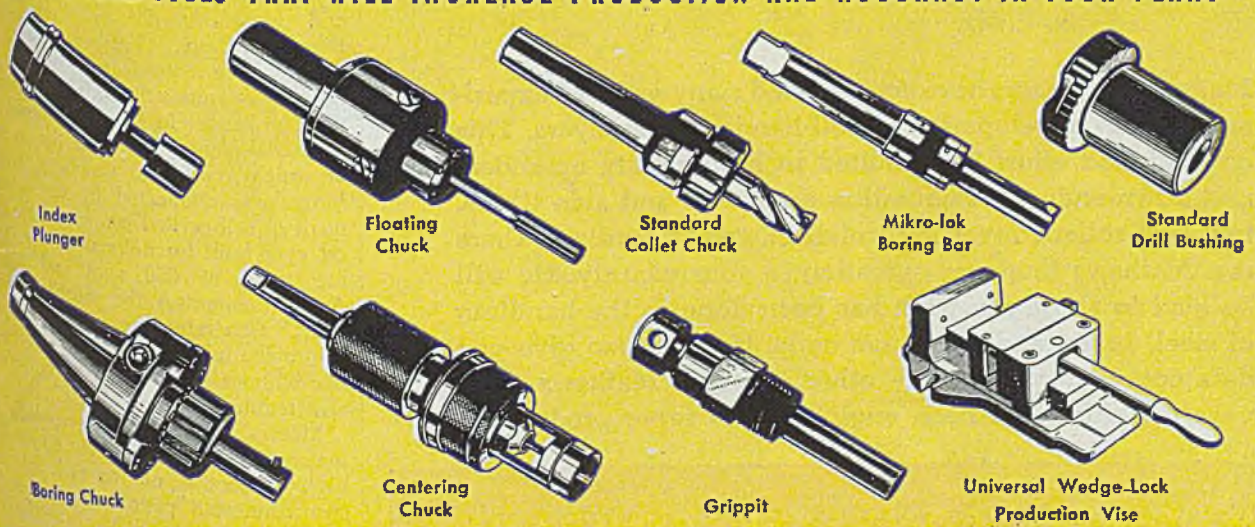

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sented in Table IV. These data are analyzed for series A in Fig. 5, series B in Fig. 6, and the average in Fig. 7. Only in the case of the average can a smooth curve be drawn through the points, the smooth curve in Figs. 5 and 6 missing several of the points. However, unless the highest accuracy is desired, curves similar to Figs. 5 and 6 may be considered satisfactory. In some cases the curves should have irregularities, but they should not be drawn unless many grains were counted, perhaps 400 or 500. In this event, it probably is better to consider the specimen as a duplex structure.

Occasionally, difficulty arises in the subtraction process in that some of the percentages may come out negative. If the grains are approximately equiaxed this may be taken to indicate a non-representative sample, and additional areas on the specimen should be counted. Alternatively, the cumulative percentages of areas on a plane may be plotted (the graph on the standard form may be used), a smooth curve drawn through the points, and appropriate values taken from this for the subtraction process.

This whole calculation, exclusive of the taking of data, can be carried out by a trained worker in not over 10 min even in cases where insufficient data cause irregularities to appear.

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E. Scheil and H. Wurst, Ztschr. Metallk., 28 (1936) 340.
E. Scheil and A. Lange-Weise, Archiv Eisenhuttenw, 11 (1937) 93.
[2]E. C. Bain and J. R. Vilella, 1939 Metals Handbook, 754.

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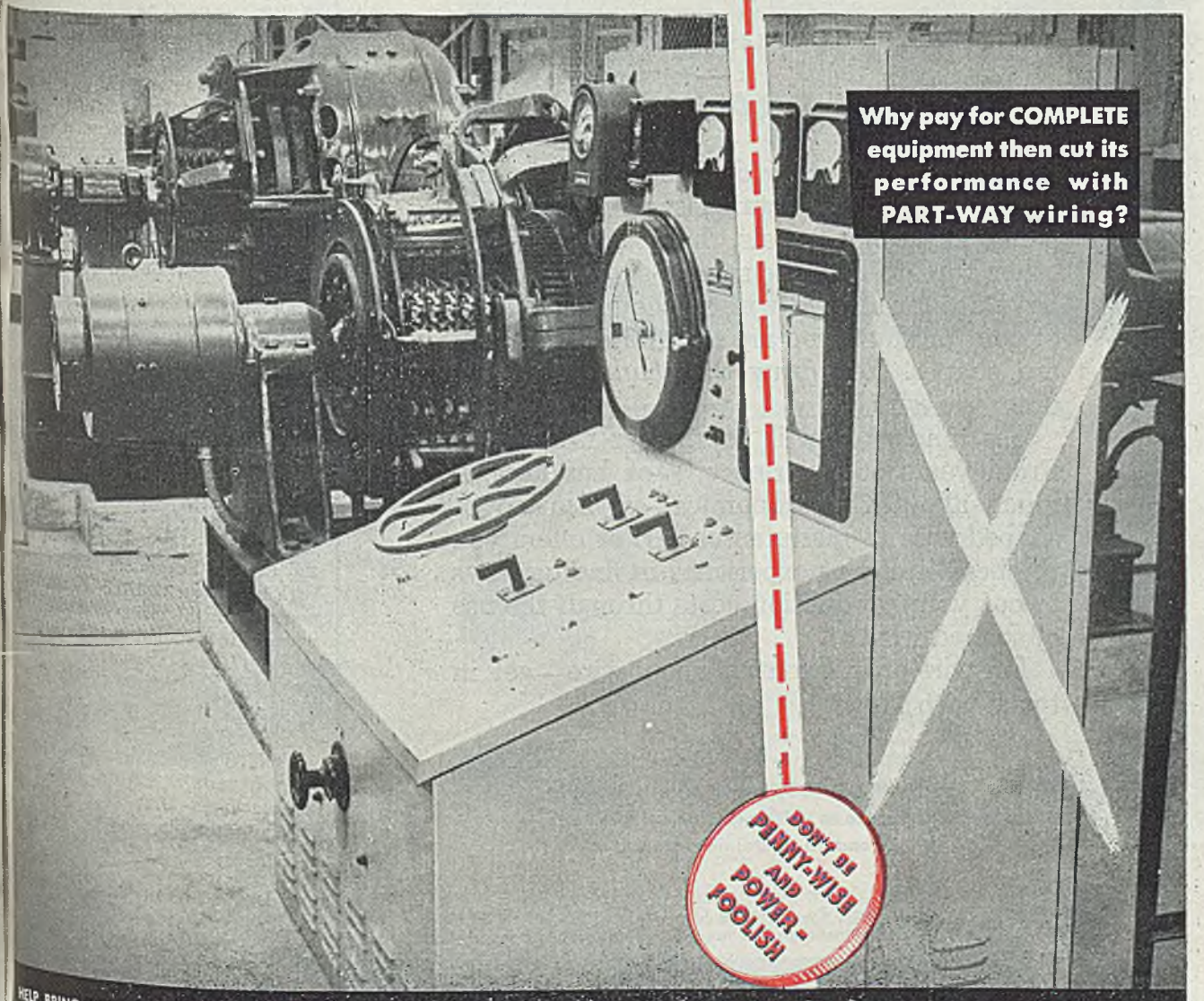

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Jig Grinders

(*Continued from Page 133*)

processing of the gear. Thus the angular position of the gear in the fixture is determined and uniform grinding allowance is maintained in all radii and holes.

Each fixture is equipped with an adjustable wheel-dressing diamond, as depicted by Fig. 4. The position of the diamond is such that a pass of the wheel over the diamond dresses it to an exact predetermined diameter, so that the radius is automatically ground to size. The diamond is pre-set to its calculated position by means of a setting block located in a hole in the top of the diamond-holding arm. When it is advanced to the point where it just touches the pin in the block, its position is correct. While this must be rechecked occasionally, gaging time is cut to the minimum.

In view of the fact that this machine does have planetary motion, the question may be raised as to how the angular position of the main spindle is maintained during the dressing so that the wheel is dressed to the correct size. The answer is an interesting part of this discussion. The main spindle is as a matter of fact allowed to rotate during the dressing. It would seem at first thought that this would tend to promote irregular, bumpy dressing. Actually, however, steadiness of main spindle and high relative speed of rotation of the wheel spindle with respect to the main spindle and to its down travel, prevent this.

Method Found Accurate

Observation of the wheel, and of the work produced by it, show this method to be highly effective and accurate. This is true because the wheel is dressed under actual operating conditions. Accordingly, the machine is not stopped from the time the gear is loaded until it is unclamped and removed from the fixture.

Each fixture is equipped with clamping devices which are foolproof, so that the hole to be ground is entirely clear with no danger that the operator will have any part of the clamp with the grinding wheel. In addition, as will be observed in Fig. 7, pick-out slots and a lifter are provided, just in case a gear should stick its locator snugly, or in case a particle of dirt should make removal difficult.

Protection of slides, ways and other moving parts is essential in any grinding machine. Dust from grinding floats lightly in the air. It settles everywhere and manages to get into the most obscure places. Many kinds of protective guards have been devised. They have met with varying degrees of success. None entirely prevents infiltration of dirt. Some are difficult to clean. Neoprene aprons are used on the Model jig grinder. They are good, although admittedly not 100 per cent effective in elimination of the dirt. They do have

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the advantage of being easily lifted t facilitate cleaning.

Wherever possible dirt should be re moved at its source. It will be noted in Fig. 5 that, integral with the diamond wheel dressers, there are air inductors designed to draw off the particles dressed from the wheel or ground from the work. This flow of air also acts as a coolant, maintaining proper work temperature, and minimizing clogging or glazing of the wheel. The fixtures themselves, including rotating mechanism, gear locating devices, and plungers, are sealed against dirt.

Although the jig grinder has accurate measuring devices for both directions of the table travel, it was decided for this work to use only one. There are two reasons for this, the first being to facilitate setting up. Angular positions of the indexing stations are so arranged that once the center of the fixture is located with respect to the main spindle, it merely is necessary to move the table forward a pre-calculated amount (stamped on each fixture). • Locating plugs on all fixtures, held against the table when clamping them in place, assures correct angular relationship. Once set, the table position need not be changed as long as it is set up for any particular gear.

The second reason is, to prevent interference with diamond dressing. Since the diamond holder is attached to the fixture, any movement of the table—carrying the fixture with it—would move the diamond into an incorrect dressing position.

Fixtures Promote Simplicity

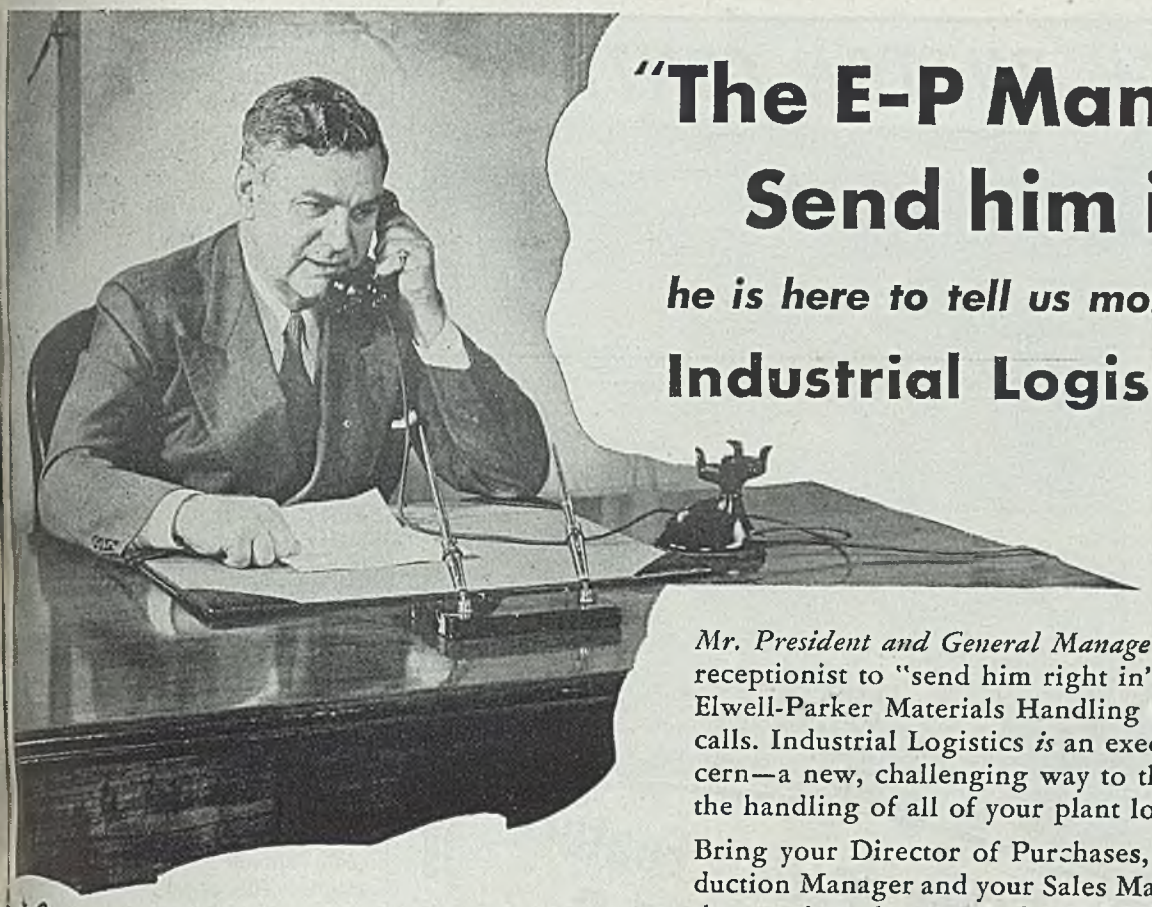
In addition to their quick setup features, the fixtures promote simplicity in the work cycle described in the following paragraphs. Except for variations in hole sizes and shoulder grinding, the work cycle is almost the same for all gears.

Loading and clamping procedure is as follows: The gear is dropped over the central locating plug or into a pocket. Next, the angular locating plug is inserted between the proper gear teeth. Clamps are now dropped in place and tightened, as indicated in Figs. 6 and 7.

Then comes wheel dressing and automatic sizing. Obviously the wheel must be dressed more frequently for some of the gears than for others. For instance, gear D, with its thick web, requires wheel dressing after every two passes. All the holes in gear A, on the other hand, are ground with one dressing of the wheel for roughing and another dressing for finishing.

The fixture for gear A is equipped with a turret, mounting two diamonds, one for roughing and one for finishing as shown in Fig. 3. The holes are first roughed alike to 0.001-in. undersize, the wheel re-dressed, and the holes finish ground.

Dressing is done during the time the operator is indexing the fixture between cuts, therefore, it adds no appreciable amount of time to the work cycle. T



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wheel is brought high enough by means of the hand wheel to start above the diamond, in order to assure complete dressing. Then it is allowed to feed downward across the diamond. Thence it passes down through the work in a single stroke. It is unnecessary to stop the machine during the work cycle, either for indexing, wheel dressing, or gaging.

One pass of the grinding wheel finishes each hole or radius in most cases. Removal of stock and required finish are achieved by "plunge grinding" in a single operation except for gear A. Plunge grinding, as employed here, differs from the conventional kind wherein the periphery of a large wheel is fed, or "plunged", into the periphery of the workpiece. In the jig grinder, it is the bottom corner, or edge, of the wheel that does the "plunging." This is a very rapid method of removing stock and, if the wheel is carefully dressed, produces excellent finishes.

Work Stays Cool

The sharp cutting action which results from the small contact area keeps the work cooler than would be the case with outfeed grinding. In plunging into the work in this manner, both the main spindle and the wheel spindle rotate. The wheel is fed into the work slowly. For this reason, the power feed gears in these particular machines have been altered to give the necessary slow rate of traverse.

The gage for checking hole position and size consists of a pair of go and no-go plugs mounted the correct distance apart in a holder. This effectively and simultaneously checks the positions and sizes of the radii or holes ground. It is unnecessary to stop the machine for gaging. Each pocket or hole can be checked during the time the succeeding pocket is being ground. Any possible spoilage, therefore, is detected immediately and the part eliminated before any further work is done on it.

In addition to the regular automatic reverse feed, which is sufficiently accurate for through holes, there is a positive adjustable depth stop, shown in Fig. 8. When this is set at the proper position, it need only be touched to be sure that the shoulders in gears C and E are ground to the correct depth. Compensation for wheel wear is achieved by backing off the limiting screw.

To facilitate unloading, the diamond dresser, in each case, is set at a sufficient height to give necessary clearance. After removal of the clamp, the gear simply is lifted off, or, if necessary, the lift is employed in the slots shown in Fig. 7.

Time required for the operations described varies with the types of gear. The longest time, that for gear D, is 5 min. The shortest is for gear E, 15 min. This in each case is "floor to floor" time.

The principal advantages of the grinder on this gear job or on similar work are derived from its vertical construction and planetary action. Among these advantages are: Accuracy, speed

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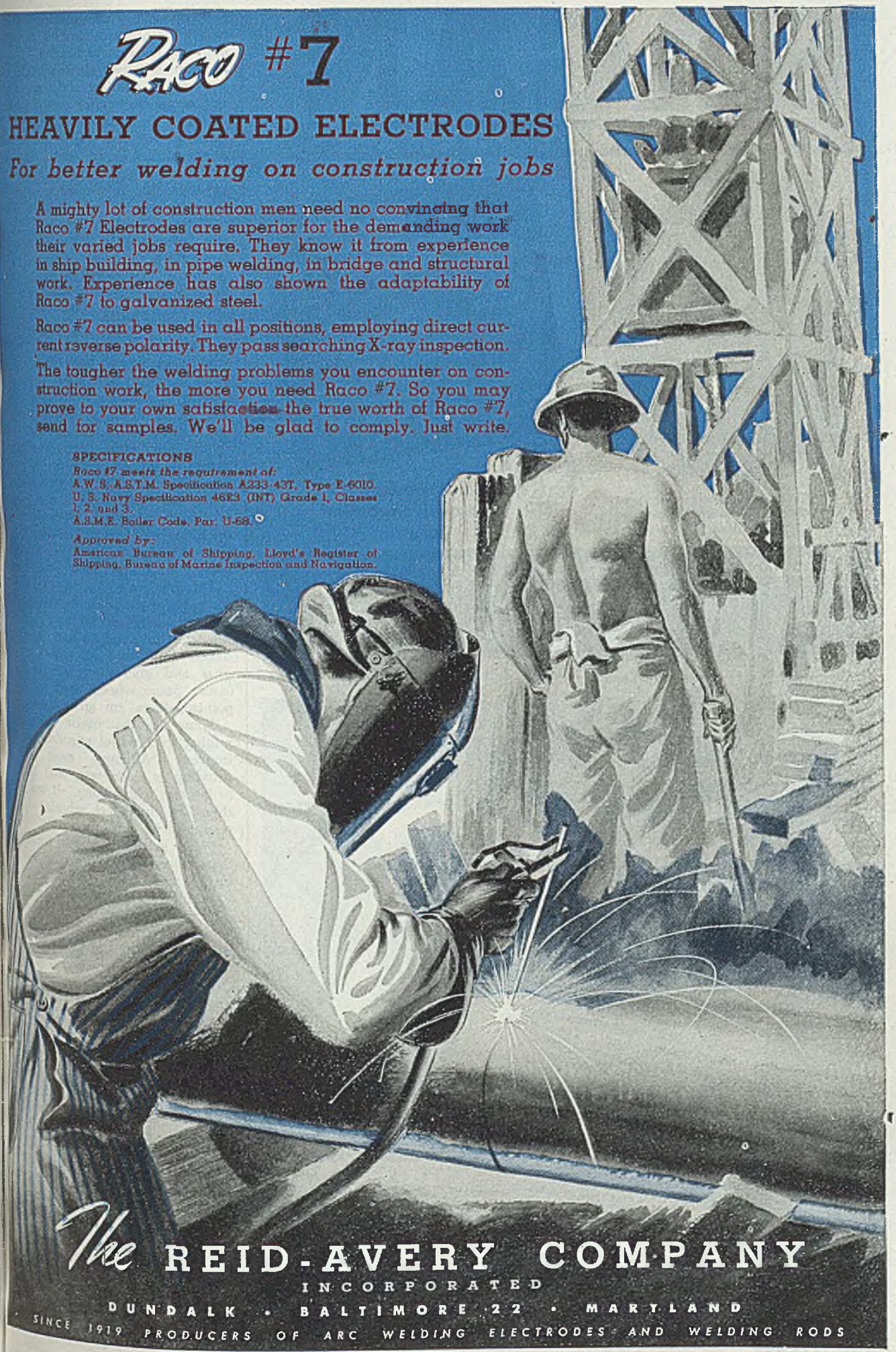

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and operating convenience. Requirements for accuracy involve two considerations, location and sizing.

Because it uses stationary fixtures, the jig grinder eliminates the necessity for any compensation for centrifugal forces either in the location of the fixtures, the gears in the fixtures, or in the mechanism of the fixture itself. Location is achieved with jig borer precision.

No trouble is encountered with automatic sizing through diamond dressing because the diamond is held rigidly in close proximity to the work, thus maintaining a high degree of accuracy.

The planetary mechanism, with its light, precision built parts, safely can be rotated at the high speed necessary for effective grinding.

Inasmuch as the gears are ground by women operators, bending, lifting, and other physical efforts must be minimized. Operators work conveniently in comfortable sitting position. Loading, indexing and operation of all machine controls require very little effort. The stationary fixture permits easy observation and gaging without stopping the machine.

On any grinding job, use of correct wheels is a potent factor in attaining operating efficiency. Selection of proper type of wheels is, therefore, a matter deserving of study and experimentation.

On this gear job, the wheel selection for each operation represents a compromise of several controlling factors. Since the work involved on some of the gears differs from that on others, the same grits and grades are not used in all cases. Some wheels used are mounted points, others are arbor mounted.

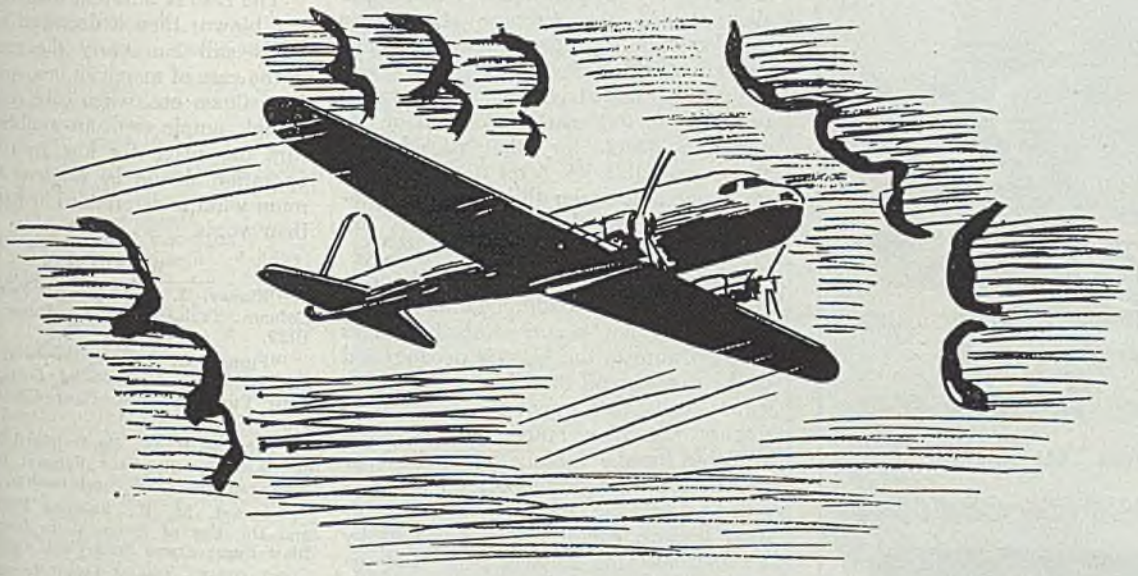
Some of the major factors determining final wheel selection may be of interest. Although most production grinding is done wet, that is inclined to intefere with gaging. It was decided, therefore, to select wheels which could operate dry.

Softer grades of wheels are employed than otherwise would be the case. This insure that sharp cutting particles are constantly exposed, aiding free cutting.

This correct wheel "breakdown" also is necessary in order to generate automatically a radius at the shoulders and the bottom of the pockets in gears B and C. Plunge grinding tends to produce this radius on the corner of the wheel. Therefore, a wheel of proper hardness automatically generates desired radius.

—o—

A 78-page operation and maintenance manual, describing the Master Lathe Converter, may be obtained from Master Mfg. Co., Hutchinson, Kans. It offers information on various types of lathe converters, including illustrations and specifications. Among subjects covered are: Operating procedures and safety precautions, description of various operations—milling, grinding, thread milling, tools and supplies for Master converter, lubrication; preparation of machine for initial operation; operation under normal conditions; preparation of machine for storage; repair section; and parts section.



Across TOMORROW'S *Horizons*

American industry and business stands ready to deliver the world of greater comfort and security that American fighters have insured.

Across tomorrow's peaceful horizons will come a wealth of better living for all . . . industry will interpret the inventive genius of the engineer and designer into new things that will spell simplicity, happiness, freedom . . . and American business men, the wholesalers, retailers, salesmen and advertising men will bring those things to a greater number of people in every walk of life.

Carrying on as they have through war years, bringing the best thinking of the leaders in each field to all, American business papers, *like the one you are reading now,* will continue to give business and industry one of the greatest information services the world has ever known.

Your business paper will make your work, your thinking, your planning easier. Read every issue carefully. Remember this: *the business paper reader is a better business man!*

One of a series of messages prepared by the Business and Industry Department of St. Joseph's of Indiana, college for men, at Collegeville, Indiana.

Coke Consumption

(*Concluded from Page 157*)

average blast temperature was lower and the average burden was higher because of the heavy kicking and increased flue dust. While the tonnage stayed the same and the coke consumption was improved, the quality of the iron was definitely unsatisfactory and continued operation in this manner was out of the question. Data for the period are shown on Table VI. After this there was no doubt that under the conditions prevailing at Inland, low moisture dry blast promotes kicking.

The question is why does this happen and what are the conditions under which this would not occur? Nobody denies that moisture in the blast is decomposed at the tuyeres and that this reaction consumes heat. This is not the occasion to discuss just how much heat becomes available for the furnace when the heat loss by moisture decomposition is eliminated. That the moisture actually affects furnace conditions is indicated by the fact that the average blast heat ordered during summer months for the last 15 years at Inland has been 52° higher than during the winter months. Nobody denies that the elimination of any uncontrolled variable is of advantage.

That the variation of moisture affects the furnace is shown as follows:

Daily moisture variation, grains	Avg. No. heat changes/day
under 1	3.33
1 to 2	3.46
2 to 3	3.80
over 3	4.17

No. 5 stack at Inland had a period of unusually stable operation during the summer of 1943. No burden increase or cut was necessary for 5 weeks, the furnace being kept in line by changes of blast heat alone. During this period the number of heat changes ordered followed the severity of the atmospheric moisture variations. This indicates a small but nevertheless definite effect of both moisture level and moisture variation on furnace operation.

Still, in spite of the elimination of the foregoing handicaps the dry blast did not work. What was different at the plants where the dry blast was a success? Some furnaces were operating on high-silicon iron. The greatest successes were claimed with merchant iron. Others may not have been blown at maximum rates.

At Inland during the period considered all the wind the furnaces would take was blown all the time. That means all the wind was blown that the voids in the stock column would permit to pass. It was shown before how a small cut in voids available for gas flow is sufficient to disrupt the orderly gas flow.

Exactly the same thing happened in the case of the dry blast. An increased amount of heat available was promptly met by the operator with a higher burden which indirectly meant lower coke consumption. A higher burden means a thicker ore layer and a smaller percentage of void forming coke in the stock. Consequently the amount of gas traveling up the stock must be cut to prevent kicking.

The case is different when full wind is not blown; then a decreased amount of voids still can carry the gasses. Also in the case of merchant iron, spiegeleisen, ferrosilicon etc. when coke consumption is high, ample voids are available. Therefore the place for low grain dry blast operation should be wherever the maximum wind is determined by factors other than voids.

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Press Operation Straightens Bent Ties

Badly bent steel ties used under track in the mines and quarries of the Pittsburgh Limestone Corp. are straightened easily and quickly by a simple wheel press operation. Formerly, when ties were badly bent, they often were scrapped, or slowly heated and hammered straight by hand on an anvil. Method now used, devised by Joseph P. Pfaff, shop foreman at the company's Buffalo Creek mine, Armstrong County, Pa., calls for the tie to be placed in two steel dies in a wheel press. Lower die has an inside width equal to the outside width of the tie, which is placed in the die with its flanges extending upward. The upper die, fitting between the tie's flanges, then is pressed down by the press until the tie is forced flush against the flat surface of the lower die.

New Capacitor Nomograph

A Pulse Service Capacitor Nomograph Sprague Technical Bulletin No. 11, has been prepared in convenient form by the Engineering Department of the Sprague Electric Co., North Adams, Mass. It is offered by them, free of charge, to engineers and others involved in pulse service capacitor applications. Although the Nomograph is primarily designed for determining the volt-amperes through a capacitor used in regular pulse service it finds also, as an intermediate step, the dc (unit pulse) energy content.

Deep Drawing Lubrication

(*Concluded from Page* 138)

pound should be removed to prevent difficulties in pickling after the annealing process.

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ACKNOWLEDGMENTS

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Master Disk Standards Effective Sept. 15

The National Bureau of Standards announces that the Commercial Standard (Emergency) CS(E)124-45 for master disks is effective for production from Sept. 15, 1945. This standard provides minimum essential requirements for master disks for sellers and buyers and, as a basis for fair competition and identification of master disks.

These disks cover essential requirements as specified by American Gage Design Committee from above 0.105-in. to and including 8.010-in. in diameter.

The accuracy of the master disks, ground and lapped to specified diameter (nominal size), is to be within the gage makers tolerance class XX, X or Y. The style of this standard is to be in accordance with the designs adopted by the American Gage Design Committee as made known in the latest revision of Gage Blanks, Commercial Standard CS8.

—o—

Increased lumen output is available in standard 20 and 40-w T-12 white fluorescent lamps manufactured by Sylvania Electric Products Inc., Salem, Mass. Rating for total lumen output from 20-w lamps after 100 hr of operation is increased to 880, the previous rating being 860. In the 40-w size the corresponding rating has been increased from 2080 to 2160 lumen. Rated average lamp life for both sizes is 2500 hr in 3-hr cycle service, 4000 hr at 6-hr cycle, and 6000 hr at 12-hr cycle. Lamps are supplied with molded plastic bases with visible indicators to facilitate correct positioning of lamp in sockets.

THE BUSINESS TREND

Business Unprepared For Early End of War

UNEXPECTED early end of the Japanese war will for several months challenge industry's best ability to adjust from wartime to peacetime production and will produce a decline and temporary erratic action among a number of business barometers until adjustment of the economy is achieved. Business in general was not prepared for an early end of war.

Quick adjustment is imperative, for prolonged transitory unemployment would make it necessary for many individuals to spend all of their wartime savings for bare costs of living, thus reducing the potential power for purchasing goods that improve the standard of living. Such a condition would produce additional depressive effects on employment and business in general.

In the week that early end of the Japanese war became highly apparent some fluctuations were noted among business indicators. The stock market was one of the few barometers susceptible to immediate effect from the week's news.

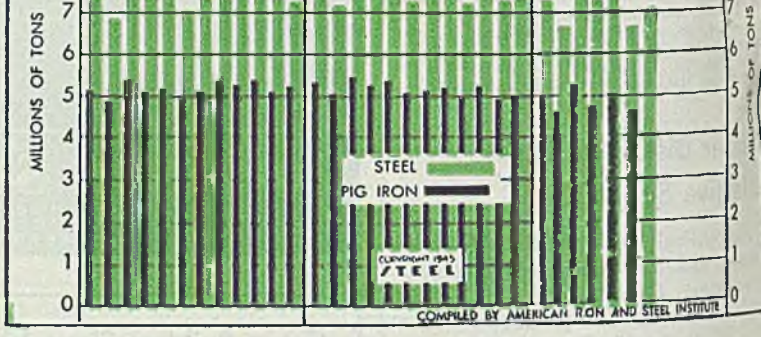
STOCKS—Despite previous fears in some quarters, the stock market did not give way during the week's events that brought near the end of the Japanese war. The Dow-Jones industrial-share average closed the week for a gain of 2.08 points and the railroad-share average ended with a loss of 1.17 points.

STEEL PRODUCTION—Steel ingot output continued to decline while the reconverting automobile industry clamored for steel sheets and strip. The ingot decline was a result principally of manpower shortage.

CONSTRUCTION—Volume of construction awards totaled only $30,184,000 in the latest week, 60 per cent below the 1945 high of the previous week. However, increased activity in construction in the past two months compared with that for the corresponding months in 1944 has brought the 1945 seven-month construction volume to $1,047,139,000, within 0.3 per cent of that reported for the same period last year. The July, 1945, total of $170,984,000 tops the July, 1944, total by 8 per cent.

AUTOMOBILES—For the second consecutive week, the reconverting automobile industry reached a new high for production of cars since manufacture of civilian autos was resumed July 1. Output in the latest week was 20,790.

CASTINGS—June production of malleable iron castings declined 13.5 per cent from May but was 1.1 per cent greater than that of June, 1944. However, heavy cancellations of outstanding orders cut net new orders in June 57.3 per cent from May and 65.6 per cent below that in June, 1944.



Iron, Steel Production
(Net tons—000 omitted)

	Steel Ingots			Pig Iron	
	1945	1944	1943	1945	194
January	7,206	7,593	7,425	4,915	5,3
February	6,655	7,194	6,825	4,563	5,0
March	7,708	7,826	7,675	5,228	5,4
April	7,292	7,594	7,374	4,786	5,2
May	7,452	7,703	7,550	5,016	5,3
June	6,842	7,234	7,039	4,605	5,0
July	7,000	7,498	7,408	....	5,1
August	....	7,499	7,586	....	5,2
September	....	7,235	7,514	....	4,9
October	....	7,621	7,814	....	5,2
November	....	7,279	7,374	....	4,9
December	....	7,366	7,266	....	4,9
Total	....	89,642	88,873	....	61,8

FIGURES THIS WEEK

INDUSTRY	Latest Period°	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	88.5	89.5	90	97.5
Electric Power Distributed (million kilowatt hours)	4,430†	4,432	4,295	4,415
Bituminous Coal Production (daily av.—1000 tons)	1,887	1,988	1,343	1,993
Petroleum Production (daily av.—1000 bbls.)	4,920†	4,922	4,944	4,667
Construction Volume (ENR—Unit $1,000,000)	$30.2	$76.4	$49.0	$39.5
Automobile and Truck Output (Ward's—number units)	20,790	18,690	16,500	18,895

°Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	860†	864	883	$96
Business Failures (Dun & Bradstreet, number)	8	18	25	16
Money in Circulation (in millions of dollars)‡	$27,269	$27,130	$26,932	$22,910
Department Store Sales (change from like week a year ago)‡	+22%	+15%	+32%	+5

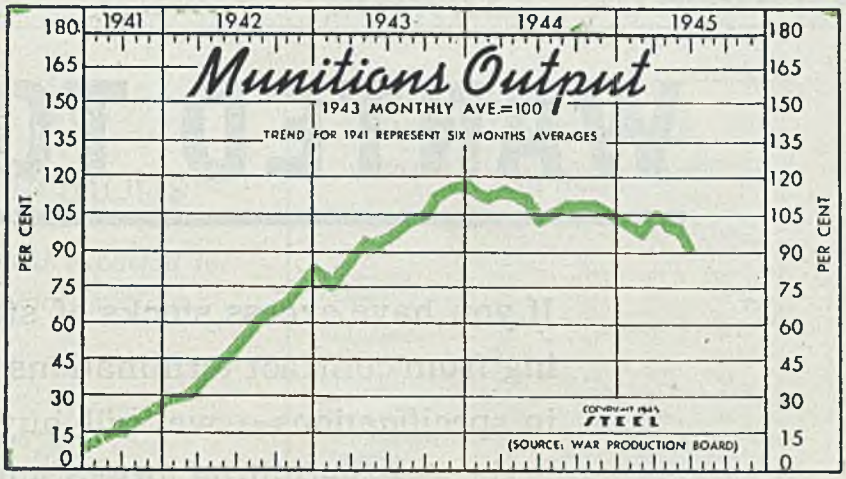
†Preliminary. ‡Federal Reserve Board.

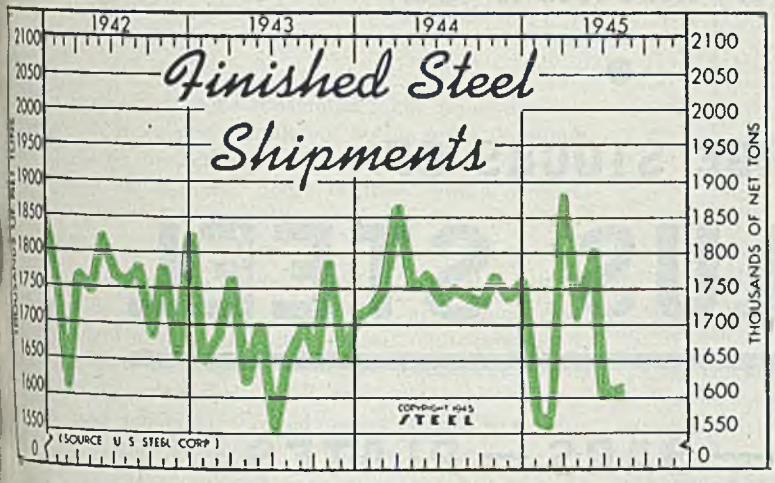
WPB's Munitions Output Index

(Ave. Month, 1943=100)

	1940	1941	1942	1943	1944	1945
Jan.	..	..	29	79	112	103
Feb.	..	..	31	82	111	100
Mar.	..	..	36	90	115	106
April	..	12	43	97	111	100
May	..	..	48	95	111	99
June	..	..	53	97	104	92
July	..	..	59	101	106	...
Aug.	..	..	66	103	108	...
Sept.	..	..	69	106	108	...
Oct.	..	6	17	70	114	108	...
Nov.	..	..	73	117	106	...
Dec.	..	..	85	117	105	...

*Estimated.





U. S. Steel Corp.'s Finished Steel Shipments

(Net Tons)

	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,597
Mar.	1,980,612	1,857,795	1,772,397	1,780,938
Apr.	1,722,815	1,758,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,798,513	1,834,127
June	1,802,882	1,767,769	1,532,662	1,771,068
July	1,608,994	1,751,875	1,690,762	1,765,719
Aug.	.....	1,743,185	1,704,289	1,788,650
Sept.	.....	1,770,982	1,684,577	1,703,570
Oct.	.....	1,774,189	1,791,968	1,787,501
Nov.	.....	1,743,753	1,680,591	1,695,545
Dec.	.....	1,767,600	1,719,824	1,819,635
Total	.....	21,150,788	20,244,830	21,004,157
Adjustment	.....	.....	*97,214	*449,020
Total	.....	.....	20,147,616	20,615,137

*Decrease.

Foundry Equipment Orders

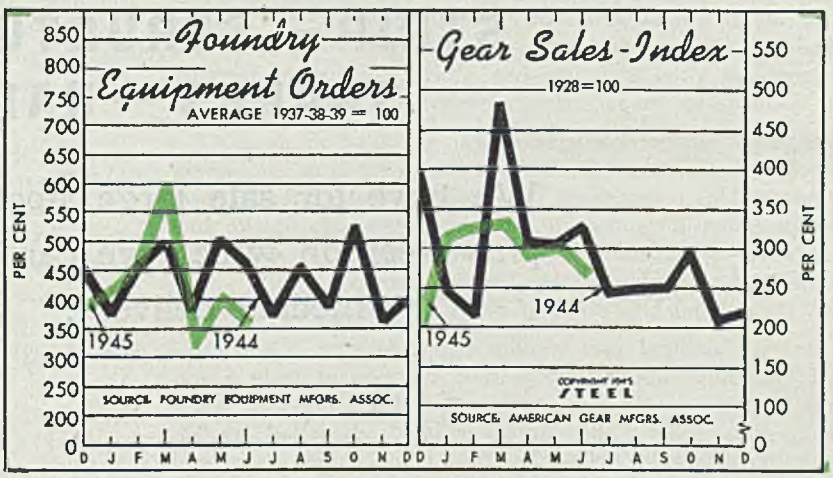
Monthly Average (1937-38-39=100)

	1945	1944	1943
Jan.	482.1	442.8	429.8
Feb.	485.3	378.3	399.5
Mar.	604.7	498.4	502.7
Apr.	523.0	385.7	362.7
May	404.7	503.9	348.9
June	575.4	466.1	413.6
July	....	375.8	379.4
Aug.	....	450.5	390.4
Sept.	....	388.0	316.6
Oct.	....	526.5	436.6
Nov.	....	369.5	388.0
Dec.	....	397.4	442.8
Ave.	....	426.9	440.3

Gear Sales

Index (1928=100)

	1945	1944	1943
Jan.	323	216	268
Feb.	331	214	303
Mar.	339	485	334
Apr.	296	308	240
May	309	305	342
June	271	328	401
July	...	212	374
Aug.	...	247	312
Sept.	...	248	320
Oct.	...	293	368
Nov.	...	209	387
Dec.	...	219	337
Ave.	...	279	336



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,837	$10,477	$11,648	$8,868
Federal Gross Debt (billions)	$262.7	$262.5	$261.6	$210.5
Bond Volume, NYSE (millions)	$25.2	$19.6	$27.8	$30.5
Stocks Sales, NYSE (thousands)	5,335	3,541	4,478	5,641
Loans and Investments (billions)†	$63.7	$63.9	$64.3	$57.0
United States Gov't. Obligations Held (millions)†	$47,000	$47,312	$47,122	$42,488

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	105.7	105.8	105.8	103.6
Industrial Raw Materials†	118.1	118.5	118.3	112.9
Manufactured Products†	101.9	101.9	102.0	101.0

†Bureau of Labor Statistics Index, 1926 = 100.

WANTED TO BUY

If you have excess stocks of steel resulting from contract terminations or change in specifications — we will buy for cash at very little loss to you.

LARGE STOCKS OF

SURPLUS STEEL

SHEETS — BARS — PLATES
STRIP — STRUCTURALS
SHAPES — RAILS

We have for sale large stocks of surplus steel on which we can make immediate delivery.

ROBINSON BROTHERS & CO.

135 SO. LASALLE ST.
CHICAGO

FISHER BUILDING
DETROIT

Send Us Your Inquiries For What You Need

Civilian Steel Needs To Cushion War Cancellations

Output to drop sharply but rebound expected to follow promptly . . . Victory observance cut deeply . . . Prices show no change

CANCELLATIONS of steel orders are certain to follow government orders for cessation in manufacturing implements of war now that the Pacific phase is closed, but these are not expected to cause more than temporary interruption of steel production.

The drop is expected to be substantial while schedules are being revised to meet new conditions but a quick rebound is foreseen. Some predictions are for a decline to 70 per cent of capacity but a higher figure is likely within a short time and 90 per cent is seen by some observers for later months this year.

Within a short time automobile production will be well under way, with such other durable goods as washing machines, mechanical refrigerators, railroad cars, agricultural implements, increased building construction, container manufacture and many other lines. All these lines have been pressing for steel supply on unrated orders, which were impossible to fill as long as war needs held precedence.

Industry needs only an opportunity to go ahead, with materials, labor and a speedy reduction in wartime regulations. Washington is removing the bars necessary during wartime and a free hand is likely to be given soon in practically all lines.

War surplus of steel is not regarded as an obstacle, although substantial stocks will result from cutbacks and cancellations. However, steel rolled for specific purposes and no longer required is a difficult commodity to dispose of, clearly demonstrated during the war when pressure for steel was at an extreme high. Jobbers and many consumers, as a result of efforts on the part of Washington and their own management, have done much recently in reducing inventory to reasonable bounds.

Cancellations currently overshadow those experienced at the end of the European phase. Even in ship work, much of which was worked off long ago, Navy cancellations in the immediate past have been about $7.2 billion. However, it is to be borne in mind that even during the peak of the war much steel went into essential civilian products and this will be immediately increased as soon as industry has time to reconvert and resume normal output.

Due to confusion resulting from observance of the two-day Victory holiday last week actual figures on steelmaking operations were impossible to obtain from some districts, but from such figures as were obtainable a tentative estimate of 60 per cent of capacity is reached, subject to revision when actual figures are obtained. In most cases open-hearths were cooled immediately on receipt of the announcement of the holiday Tuesday night and resumption Thursday night and Friday was irregular. A strike at Inland Steel Co. plants in Chicago was an additional factor in the rate in that area, an estimate of 72 per cent being made for production there. Other estimates are: Pittsburgh 59, down 27 points; Wheeling 64.5, off 32; Buffalo 65, off 16.5; eastern Pennsylvania 77, down 10; St. Louis 50, off 18; Detroit 60, off 29; New England 82, down 2; Cleveland 50, down 42; Birmingham 95, unchanged; Youngstown 53, off 27; Cincinnati 58, down 29.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Aug. 18	Change	Same Week 1944	Same Week 1943
Pittsburgh	59	—27	91.5	100
Chicago	72	—21	99	98.5
Eastern Pa.	77	—10	95	95
Youngstown	53	—27	95	98
Wheeling	64.5	—32	95	95
Cleveland	50	—42	93	94
Buffalo	65	—16.5	90.5	90.5
Birmingham	95	— 0	95	95
New England	84	— 2	70	97
Cincinnati	58	—29	92	97
St. Louis	50	—18	87	89
Detroit	60	—29	89	86
Average	60	—22.5	97	98.5

*Based on steelmaking capacities as of these dates.

First reaction of the scrap market to the sudden end of the Pacific war has been to maintain demand and prices. Mill inventories have been uncomfortably low and an eye is being kept to probable supply for the winter. Also, it is foreseen that during the process of reconversion industrial scrap will be less than normal. Just what will happen in the future is uncertain but observers believe the situation will not undergo any sudden change and will hold fairly steady until a better view of the steelmaking situation can be obtained.

Demand for basic pig iron is expected to ease somewhat as steelmaking goes to lower levels during reconversion. However, foundries have practically no reconversion problem and with plenty of demand for civilian castings it seems likely that needs for merchant iron will continue heavy for some time. With automotive, railroad and general demand pressing for castings there will be no slump in demand for iron.

Relaxation in government controls over building construction is likely to release a large amount of structural steel inquiry, indications being that shape mills will be pressed for delivery before the building season ends. While some mills have space for standard shapes for September delivery this condition is expected to change rapidly when new work begins to come out. This demand is relied on to cushion the effect of shell cancellations. Considerable bridge work in connection with highway improvement is now under consideration and close to contracting.

Platemakers probably will feel the effect of the war's end less than those making any other major steel product. The situation in plates had been fairly well liquidated before peace was declared and reconversion of sheet and strip mills to their normal product was practically complete. Some cancellations of Navy tonnage have been made as a peace move, which will cut into plate schedules of some eastern mills.

Average composite prices of steel and iron products are unchanged, end of the war not yet having opportunity to affect actual prices and ceilings remaining at the prevailing levels. Finished steel composite is $58.27, semifinished steel at $37.80, steelmaking pig iron $24.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Aug. 18	Aug. 11	Aug. 4	One Month Ago July, 1945	Three Months Ago May, 1945	One Year Ago Aug., 1944	Five Years Ago Aug., 1940
Finished steel	$58.27	$58.27	$58.27	$58.27	$57.73	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	36.45	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.07	19.13	19.17	18.65

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	Aug. 18, 1945	July, 1945	May, 1945	Aug., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.20c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.49	2.47
Steel bars, Chicago	2.25	2.25	2.17	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.22	2.10
Plates, Philadelphia	2.30	2.30	2.26	2.15
Plates, Chicago	2.25	2.25	2.22	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.65	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.65	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.64	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.82	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$34.50	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	34.50	34.00
Rerolling billets, Pittsburgh	36.00	36.00	34.50	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.05	2.00

Pig Iron	Aug. 18, 1945	July, 1945	May, 1945	Aug., 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$25.19
Basic, Valley	24.50	24.50	24.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	24.69
No. 2 foundry, Chicago	25.00	25.00	25.00	24.00
Southern No. 2, Birmingham	21.38	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	24.30
No. 2 fdry., del. Phila.	26.84	26.84	26.84	25.84
Malleable, Valley	25.00	25.00	25.00	24.00
Malleable, Chicago	25.00	25.00	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.58	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.50	$7.50	$7.00	$7.00
Connellsville, foundry ovens	8.25	8.25	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 11, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bll) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—47-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c. (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		4100 (.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.87c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.9

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	.....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 carbon, 2.50c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin, $4.75.

Terne Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Manufacturing Terne: Pittsburgh, Chicago, Gary, No. 24, uncoated 3.80c; Pacific ports 4.55c.

Manufacturing Terne: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Terne: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $14.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; Steelton, Pa., del. 2.44c; Phila., del. 2.30c; St. Louis 2.49c; Boston, del. 2.57-82c; Pacific ports 2.80c; Gulf ports, 2.60c.

Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. Lukens Steel Co. Inc., 3.20c, f.o.b. Los Angeles.

Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, Pac. Port. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Sheared Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, Pa. export; Sheffield Steel Corp., 2.55c f.o.b. Kansas City, Geneva Steel Co., 3.25c, Pac. ports; Lukens Steel Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham, (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.75c

Spring wire 3.35c

(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, base, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth, $2.90; galvanized, $2.55; Pac. ports .....

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland .....$3.40 and $3.05

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.20c

Woven fence, 15½ gage and heavier, per net column 3.55c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted square wire, column 70. .....67c

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $46 net ton, base. Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
†347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F.	19.50	22.50	29.50	18.75	24.50
440A.	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅛ and ⅜ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	58 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

*Operators of hand-drawn ovens using trucked coal may charge $8.00, effective May 26, 1945.
†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[21]	4.715	6.012[22]	6.01
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[26]	4.172[21]	4.772	5.816[22]	5.66
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[28]	4.152[22]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.485[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.85[21]	4.669	5.60[22]	5.75
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[22]	5.75
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[12]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[12]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[22]	5.65
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.900[21]	4.659	5.93[22]	5.93
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.543[22]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[12]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[22]	5.85
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[16]	4.337[24]	3.987[21]	4.787	5.987[22]	6.08
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[22]	6.18
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[22]	6.19
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[22]	6.23
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[3]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[20]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[9]	3.763[3]	4.313[6]	4.313[3]	5.313[20]	4.10[10]	3.75[22]	.....	.....	.....
Los Angeles	4.40[6]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.683[22]	5.613	5.85[22]	5.95
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.333	8.304[22]	8.40
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.80[15]	5.683[15]	.....	.....	8.00
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[4]	5.95[15]	7.05[15]	5.883[21]	.....	.....	

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 1999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [26]—1000 to 1999 pounds; [28]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail) 48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Co 91.0c; prices include duty on ported ore and are subject to miums, penalties and other pr sions of amended M.P.R. No. effective as of May 13. Price basing points which are also po of discharge of imported man nese ore is f.o.b. cars, shipside, dock most favorable to the bu

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric fur Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Bil per
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$2
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.30	
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.15	
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.30	
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.55	
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00		

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton. No prices quoted on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del.				
No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 4.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty	
Pa., Mo., Ky.	$68.50
First Quality	
Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70
Second Quality	
Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases	63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	32.90
Wire cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.) war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller: $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese: eastern zone, low carbon, bulk c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 36.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $162.50, 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.1% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferro titanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80, highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern contract basis, carloads in bulk or package, per lb. of alloy 14.00c, gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si, Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 1[illegible] of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp Bundles	20.00
Short Shovel Turnings	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.32
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	12.[illegible]
Shoveling Turnings	14.[illegible]
Rerolling Rails	21.50-22.[illegible]
Steel Car Axles	21.[illegible]
Steel Rails, 3 ft.	21.[illegible]
Steel Angle Bars	20.[illegible]
Cast Iron Wheels	20.[illegible]
No. 1 Machinery Cast	22.[illegible]
Railroad Malleable	16.[illegible]
Breakable Cast	19.[illegible]
Stove Plate	15.[illegible]
Grate Bars	15.[illegible]
Brake Shoes	15.[illegible]
(Cast grades f.o.b. shipping point	16.[illegible]
Stove Plate	16.[illegible]

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.[illegible]
No. 2 Heavy Melt. Steel	18.[illegible]
No. 1 Comp. Bundles	18.[illegible]
No. 2 Comp. Bundles	9.50-10.[illegible]
Machine Turnings	11.50-12.[illegible]
Shoveling Turnings	11.00-11.[illegible]
Cast Iron Borings	10.50-11.[illegible]
Mixed Borings, Turnings	20.[illegible]
No. 1 Cupola Cast	16.[illegible]
Breakable Cast	21.00-22.[illegible]
Low Phosphorus	20.50-21.[illegible]
Scrap Rails	16.00-16.[illegible]
Stove Plate	16.[illegible]

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$1[illegible]
No. 2 Heavy Melt. Steel	1[illegible]
No. 1, 2 Deal. Bundles	1[illegible]
Machine Turnings	1[illegible]
Mixed Borings Turnings	2[illegible]
No. 1 Cast	2[illegible]

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$1[illegible]
No. 2 Heavy Melt. Steel	1[illegible]
No. 1 Busheling	1[illegible]
No. 1, No. 2 Bundles	1[illegible]
No. 3 Bundles	1[illegible]
Machine Turnings	1[illegible]
Billet, Forge Crops	2[illegible]
Bar Crops, Plate	2[illegible]
Cast Steel	2[illegible]
Cut Structural, Plate, 1", under	2[illegible]
Alloy-free Turnings	1[illegible]
Tin Can Bundles	1[illegible]
No. 2 Steel Wheels	2[illegible]
Iron, Steel Axles	2[illegible]
No. 2 Cast Steel	2[illegible]
Uncut Frogs, Switches	2[illegible]
Scrap Rails	2[illegible]
Locomotive Tires	2[illegible]

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 13.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 12.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c sows, pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 5000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 12 grade) 10.50c; chemical warfare service grade (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 10c. Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and 760, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 1, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11X, 17X, 25.00c; ASTM B-107-41T, or B-94T, No. 8X, 23.00c; No. 18, 23.50c; No. 27, 25.00c. Selected magnesium crystals, rods, and muffs, including all packing materials, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Nickel: Prices ex-dock, New York in 5-ton lots, 35c cent for 2240-11,199 lbs., 1¼c 1000-2239, 300-999, 3c under 500. Grade A, 99.8% nickel (includes Straits), 52.00c; Grade B, 99% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum cobalt, 51.87½c; Grade C, 99.65-99.79% incl. 51.87½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 99.5c; 99.8% and over (arsenic, 0.05%, max. all other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload 30,000 lb.; ½c for 9999-224 lb.; and 2c for 224 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Cobalt: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot 0.50c cent for additions to cast iron, 34.00c; nickel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $101; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Free market, spot, New York, nominal for 50 to 200 flasks; $158 to $163 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, discs, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.46c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high-grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 190

With heavy cancellations about to be made as war contracts are ended sheet mills are in doubt as to their obligations and it will require some time to clear the situation. Civilian demand that has been building up over the past few months is expected to cushion the drop but it will require time to remake schedules.

Pittsburgh — As in other steel products the rolling schedules on sheet and strip mills will undergo much readjustment in the immedtate future, with a substantial reduction in order backlogs indicated as a result of abrupt cancellation of war contracts. It is estimated that about one-third of the total steel production was channeled into direct war contracts prior to V-J Day, the balance going into supplementary war supporting lines and essential civilian goods programs. Mills have a large volume of unrated orders which will be immediately placed in production schedules, while a flood of new orders for civilian goods output is expected, now that the Pacific war is over.

A sharp increase in demand is anticipated from the construction, railroads, farm equipment and other industries, which have been operating on a minimum basis throughout the war, due to limited supply. The automotive industry, for example, possibly might be able to produce 500,000 cars by the end of this year, against previously authorized quota of 260,000. Increased demand from household appliance manufacturers is expected to take 4 to 6 months to develop in any significant volume, although output of refrigerators, stoves, washing machines and radios will be given the green light with result that present production quotas are likely to be discarded or substantially augmented in the immediate future.

The answer on the immediate steel production outlook must await a clearer indication of the time required for automotive, and other durable goods civilian industries to get plants in order and back to peacetime operating levels. The overall objectives of the master WPB V-J Day plan is aimed at an orderly resumption of civilian goods production which would incorporate a close inventory check to prevent hoarding of raw materials to the detriment of the small manufacturer. Amount of idle sheet and strip stocks, steadily increasing in the months just prior to V-J Day, is now expected to reach unprecedented volume. The Navy Department Materiel Redistribution and Disposal office has listed over 400 tons on these items up for bids in its latest report. Disposal of this type material is expected to present a serious problem for the immediate future. Considerable sheet steel tonnage is involved in contracts recently let for American Bridge Co.'s plants at Ambridge, Pa., for storing of heavy artillery equipment in hermetically-sealed containers.

New York — Sheet cancellations here probably will not involve large individual tonnages. In fact, some sellers believe that cancellations of unrated tonnage due to duplication of orders, will be impressive, even in comparison with military cutbacks.

The full force of military cutbacks, is thought here, will fall with greater force in the Middle West than in the East.

Sellers anticipate easing of schedules but expect civilian work to take up considerable slack before the end of the year. In general they regard their position as much better than producers of other major products. Cold-rolled sheets are expected to be in particular demand not only from the automotive industry, but from manufacturers of household appliances and other products. Stainless steel sheet demand, once restrictions are lifted should actually spurt, some sellers believe.

Galvanized sheets should withstand the shock of postwar adjustment fairly easily as considerable light construction work is in prospect. Galvanized delivery promises have been running well into the year, although there have been some setbacks which temporarily opened up slots in fall schedules and undoubtedly there will be many more.

Cincinnati — Cutbacks in military requirements have not yet reached steel mills in expected volume and mill interests are unable to appraise the near future accurately. Another complication is the duplication of unrated orders for which there is no present computation as to how much unrated tonnage is on books, however, much of it for prompt delivery when the order can be filled, that prospects are good for an indefinite period.

of capacity schedules. The backed-up domestic demands are so broad they cover all classes of sheets.

Philadelphia — Sheets and strip, and especially cold reduced material, should withstand the shock of reconversion better than all other major steel products, particularly because of the requirements of the automobile and household appliance industries. Nor should tin plate and most other coated sheets be subject to severe stress. With prospects for a further lifting of requirement restrictions, stainless steel and certain other alloys should soon fare better as time goes on. Full demand over coming months should increase sharply, now that the pressure for shell steel has ended.

Birmingham — A marked gain in sheet production is evident in the South over the past several weeks, although mills report one of their greatest difficulties lies in securing appropriate labor, especially openers, since the long drawn out shift to higher priority goods.

Steel Bars . . .

Bar Prices, Page 190

Heavy requirements for steel bars for civilian needs, including automobiles, agricultural implements and a number of other important products will cushion the drop in ammunition and other war programs. Heavy unrated tonnages are under order and mills now will be able to formulate schedules and proceed to production at once.

Philadelphia — Commercial bars, of the major products, should not fare too badly, especially in the light of large requirements for automobiles and agricultural machinery and the diversity of uses that normally contribute to bar demand. However, they, particularly hot-rolled quality bars, will reflect considerably the cancellations in shell requirements, and also the spotty situation that is expected to continue for some time in the machine tool industry.

Boston — Earlier reductions in war requirements cushion cutbacks in bars. Aircraft needs are most affected in latest ammunitions. Volume of unrated orders with mills for fabricators in this district is not heavy. Substantial delivery improvement on cold-drawn stock, both alloy and carbon in a broader range of sizes is indicated when production schedules are revised. Backlogs of unrated cold-drawn are not considered over-large. General industries, notably textile mill equipment shops, have been slowly gaining momentum in reconversion and are covered on bars through fourth quarter. Range shop consumption is below peak, lagging more under impact of aircraft cuts. Automotive and normal civilian demand to take up the slack is still some weeks off. Three of the largest war-time consumers, chain shops, Watertown arsenal and Springfield armory, will contribute little to postwar volume.

New York — Bar sellers here do not look for V-J Day cancellations to run as heavy as might be anticipated, as much tonnage may be kept on mill schedules for conversion to civilian work, although accompanied in many cases by changes in specifications. There is little doubt, however, that there will be considerable reshuffling of schedules and a general easing in practically all grades. Alloy bars may hold their own fairly well as limitations for civilian requirements are lifted, not only with respect to steel but to other materials required for manufactured products.

Many cancellations, especially in shell work, will be paper cancellations and should affect rather drastically the present extended position of most producers on hot-top quality steel. Some larger sellers have been quoting as late as April of next year. Cold-drawn carbon bar schedules should be sharply affected by cutbacks in the rocket program. This program has virtually dominated demand for larger sizes of cold-drawn bars, from 2¼ inches up, for some time.

Pittsburgh — Sharp increase in demand for alloy and carbon hot and cold-rolled bars is probable over the next few weeks from automotive, railroad and farm equipment industries, offsetting to a considerable extent abrupt cancellations of war contracts on mill books. Fairly large volume of unrated tonnage will be scheduled immediately. Railroad and farm equipment requirements are expected to be augmented considerably sooner than that of the automotive industry, due to the tremendous preliminary reconversion preparations necessary in the latter instance. Bar mill production schedules will be hit hardest as result of complete cancellations in heavy shell, aircraft and tank production programs. Just prior to V-J Day most sellers were booked through the year on hot-rolled

carbon grades and on larger sizes into February; cold-finished bars were promised for November and December, with alloy deliveries available in September. Extent that war contract cancellations will reduce order backlogs is unknown at this time, except that an immediate downward revision of substantial proportion in the more extended delivery items will undoubtedly occur.

Steel Plates . . .

Plate Prices, Page 191

Reductions in plate requirements for several months past have brought production to a level so low that further cutbacks because of end of the Pacific war will have relatively little effect. Navy cancellations have been sent to several yards, which will result in cuts in plate requirements.

New York — V-J Day cancellations will prove less hard on plate producers than those of most other leading products, as they have already experienced such a heavy reduction in war work; nevertheless they will come in for cancellation of a considerable tonnage, as a result of Navy withdrawals within the past few days, with others to follow, to say nothing of cutbacks in various other directions. These cancellations should affect production over the remainder of this quarter and beyond and, all in all, the transition from peak war time operations to full peacetime pr duction should be greater in plates th in any other major product. At one ti plate production was heaviest of all, d to great demands for shipbuilding. T increase was accompanied by substan expansion in plate mill capacity; ho ever at one time diversion of strip c pacity to plates accounted for appro mately half of the plate tonnage p duced. Peak plate production w reached in the late spring of 1944.

Boston — Cancellation of combat s contracts at five yards affects forwa plate tonnage for the most part, but the aggregate enough nearby volu is involved to open space for some ad tional third quarter deliveries. New bu ing is light and aggregate orders in an unrated basis are not impress meager compared with war years' v ume. Plate mills have been seek orders for some weeks and sales for are re-established and strengthen premiums have been waived for so time. Pullman-Standard Car Mfg. C Worcester, Mass., will resume passeng car assembly sooner than expected; t shop is completing 323 air-condition trolley coaches. First of the type ev built, delivery for test has been ma to Georgia Power Co., Atlanta. Carri Corp., Syracuse, N. Y., designed the a conditioning equipment. Navy plans use the Bethlehem-Hingham ship for storage and decommissioned s

Pittsburgh — Downward trend plate production is expected to be a centuated by termination of the Pac war, reflecting further cancellations war program requirements. Howev railroad car and locomotive construct increased shipment to warehouse in ests, ship repair requirements and anti pated large demand for export, are pected to offset to some extent war co tract cancellations. Mills are curren promising October delivery, but Septe ber shipments will likely be availa soon on unvalidated orders. Plate outp last week was sharply reduced, as other finished steel products, due to V Day celebrations.

Philadelphia — Plates will reflect greatest drop of all leading produc although much of the decline in dema for this product has already taken pla notwithstanding current cutbacks in Na work. However, while production w greatly expanded during the war, fu half at one time was contributed strip mills, so that there would not as much idle plate capacity over comi months as might be assumed.

Birmingham — Plate production in South has eased noticeably, althou Birmingham and Gadsden mills are tu ing out the product on what is describ as a comfortable basis. Contract c cellatons have not been noticeable th far, but the pressure, generally, is off.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Pages 191

New York — Bolt and nut makers, w had been devoting more than 90 p cent of their output to war and hig essential civilian requirements, see considerable slash in backlogs as a sult of ending of the war. Already th are experiencing cancellations from t

Signal Corps and from the Navy. Some jobber tonnage also is being canceled or set back for later delivery.

However, building construction, export demand and new railroad requirements may run fairly heavy over the next year or so, what with rehabilitation work and long deferred needs in many sections of the world. Jobber demand may not lag for long, as stocks are believed to be generally low and out of balance.

Wire . . .

Wire Prices, Page 191

Birmingham — Considerable activity is noted in wire products in the South, mill interests report. Output is estimated at better than 80 per cent of capacity, up considerably or 5 per cent over the past few weeks.

Tin Plate . . .

Tin Plate Prices, Page 191

Pittsburgh — With inventories of pig tin down to about 19,000 tons, exclusive of a small government stockpile, WPB has directed producers of all alloys containing tin to limit use of the metal to the amount of their respective quotas for any calendar quarter of the year. Formerly, a producer could exceed his allocation if his supply on hand permitted. Users of alloys containing tin, other than copper base controlled alloys, may not accept deliveries of tin alloys that would raise inventories in excess of 30 days' supply.

Tin is expected to continue in short supply for at least a year. Quick resumption of shipments of Malayan and Dutch East Indies' tin is not bright. Production will depend on the amount of destruction done by the Japanese, particularly whether any tin dredges remain and how soon replacement equipment can be made available. It is possible that lack of tin may be one of the major bottlenecks in the production of a good many civilian items. At the moment about 67,000 tons of tin are in the country, compared with annual consumption of 90,000 tons.

Fourth quarter tin mill production allotment has not yet been decided, although little change from third quarter is indicated. The trade does expect further changes in ratios of requirements of electrolytic tin plate to hot-dipped. More steel likely will be available for tinning next quarter, but the question of tin supply continues the controlling factor.

Structural Shapes . . .

Structural Shape Prices, Page 191

Pittsburgh — Lifting of WPB controls on industrial manufacturing construction is expected to be a big factor in offsetting war contract cancellations in addition to facilitating the transition to civilian goods production. Since this is primarily a steel producing district, miscellaneous plant expansion programs are not likely to reach the huge volume expected in other manufacturing centers, particularly Detroit. The tight bulding supply situation should be rectified with the end of the Pacific war, although it will be some time before an adequate amount of building materials can be distributed to contractors and jobbing outlets. Structural mills in the East and Middle West have some open space for larger size standard shapes in September, smaller mills are filled well into October. Cutbacks in war contracts are expected to alter this picture somewhat, but heavy requirements for numerous fabricators and warehouse interests, plus expected increase in plant expansion and in demand for export indicate heavy demand for structurals for some time.

Philadelphia — Any considerable loosening up in building construction, and steps have already been taken to make available all the shapes required for industrial plants, will cushion the shock resulting from cancellations of shell and ship work, particularly the latter. It appears very probable, too, that in a short time shapes will be made available for commercial construction generally and for public works such as bridges, roadways and the like. In fact, in the latter connection, some see the setting up of an organization similar to the Public Works Administration of pre-war days. Bridge work is already beginning to appear in some sections of the country.

Locally, cancellations at the New York Shipbuilding and Cramp Shipbuilding Yards in this district, are now being announced and include five cruisers at the former yard. Structural awards include 560 tons for five buildings for C. V. Hill Co., Trenton, N. J., and 115 tons for a plant addition for Narricot Co.,

Philadelphia, both going to Bethlehem.

Pending are 300 tons of bridgework, Pennsylvania State Highway Commission, and 180 tons for three beam bridges for Reading Railroad.

Boston — Terminations in structural steel are confined mostly to forward Navy tonnage, with a minimum effect on nearby delivery schedules. Tonnage for rolling this quarter has been reduced, resulting in schedule revisions with limited openings for October. Five yards building combat ships in this area have cutbacks. Industrial building inquiry includes 500 tons for a paper mill in New Hampshire, but for the most part small tonnages are required; bridge activity is also slow. Slack demand for fabricated work has lowered the level of prices quoted in competitive bidding.

New York — Fabricators expect quickening in demand for commercial and service projects of various kinds. They also expect increase in industrial work, at least an improvement compared with the past several weeks, and an increase in public works, including bridges, road work and state and municipal buildings. However, with rent controls scheduled to continue for some time it is considered likely there will be little apartment house constructon.

Inquiries include 165 tons for a milk processing plant for the Delaware County Farmers Co-operative, Delhi, N. Y., and approximately 150 tons for a plant building for the Revertex Corp. of America, Hicksville, N. Y. Some New York department stores plan branches in outlying communities. Arnold Constable & Co. propose erection of a branch in Hackensack, N. J., and R. H. Macy & Co. a branch at White Plains, N. Y.

Pig Iron . . .

Pig Iron Prices, Page 193

Shift from war to peace will be relatively easy in pig iron production and in foundries. The latter have been unable to accept all the castings business offered and loss of war contracts will make room for these. Some drop is expected in demand for basic iron but in merchant grades the loss will be much less, especially in view of smaller inventories than normal.

Pittsburgh—Post-V-J Day repercussions on pig iron shipments are expected to be only temporary for there is a huge pent-up demand for civilian production of castings, much of which has already been booked. Little disruption to foundry activity is expected to result from wholesale cancellations of war contracts, for the nature of this type production permits switching to civilian goods much faster than in most industrial lines. The time period involved for automotive and other durable goods civilian industries to get plants in order and back to peacetime operating levels will be a major factor in the near term foundry production outlook, but substantial unrated tonnage already has been booked and augmented demand is expected from the agricultural and railroad equipment industries. Overall pig iron output will likely decline over the next 60 days, however, reflecting in part the need to repair blast furnaces long overdue for relining.

New York — While the end of the war is expected to result in a substantial drop in basic demand, foundry iron is not likely to be hard hit. There will be cancellations of iron castings, but considerable civilian requirements should cushion the shock. Most gray iron foundries in this district, because of pressure for civilian needs, could have been working over recent months at twice the rate of production had manpower been available.

Reduction in basic demand in its effect on blast furnace operations should be offset in a fair degree by export demand, primarily for bessemer iron. Some substantial orders, particularly for Sweden, have already been accepted on an "if and when" basis, and as soon as Washington gives final approval this tonnage should start moving. However, just what Washington's action will be over the near future, in the matter of lifting controls on tonnage for shipment abroad remains to be seen. It is considered likely in certain quarters that there will be some official control on export quotas for some time.

Boston — Any easing in controls on inventory would result in substantial forward buying as protection against shortages which threatened during winter months last year. Tightness in boiler is expected to ease by next quarter, with more steel works iron available. Mea

while the largest Connecticut consumer is getting all iron from Buffalo by water. Foundry and malleable grades about balance demand, with melt still held down by foundry labor shortages. Textile machinery plants as a whole are not much beyond 50 per cent of 1940-41 production. To maintain this rate much subcontracting is done.

Scrap . . .

Scrap Prices, Page 194

The change in the war situation, expected to cut down steel production at least temporarily, has not affected the scrap situation yet, and some observers believe demand will continue as mill backlogs are much below normal for the time of year. Prices hold and springboards are being paid.

Pittsburgh — All scrap grades continue in active demand at ceiling prices, with supply of open-hearth items and turnings below current requirements. Full commissions and higher springboards have been paid in recent weeks, and no deferment of deliveries has been reported. This condition is likely to prevail as long as the current shortage exists. End of hostilities is not expected to result in a sharp reduction in iron and steel scrap requirements, for consumers' inventories are unusually low for this season of the year and any retrenchment in operations among mills and foundries, due to contract cancellations, is expected to be only temporary.

Wholesale war contract cancellations will cut down output of industrial scrap. However, this will be offset somewhat by increases in railroad heavy melting steel scrap supply as that industry's replacement and rehabilitation program gets under way. Turnings production will fall sharply with cancellations in the arms program and until civilian production gains full scale proportions there may be a tightness in supply of this item.

Amount of surplus war materials that will eventually find its way into scrap channels cannot be determined at this time. This factor is not expected to cause too much disturbance in the scrap trade for definite disposal plans have been formulated so as not to flood the market at any one time. Army Service Forces are stockpiling triple alloy scrap or individual alloy over 1 per cent, if it cannot be sold at ceiling prices, at a number of points throughout the country. Nearest stock depot from here will be Ravenna, O. Purpose of this move is to conserve the nickel, chromium and molybdenum for possible future use.

Philadelphia — End of war has given scrap a softer tone, with consumers moving cautiously on new orders because of the possibility of lower prices. Cutbacks at the steel mills, combined with prospects of a much heavier volume of unprepared scrap at the shipyards as a result of ship cancellations and later shipbreaking operations, are depressing factors. However, insofar as unprepared scrap is concerned, the supply going into consumption will not increase greatly until the manpower situation improves.

Boston — District steel works press for suitable grades of scrap, but new demand for heavy melting has slackened on the part of Pennsylvania consumers. Inventories are limited, under 30 days with one New England steel plant. This, coupled with dwindling supply of plant and shipyard scrap and small offerings of unprepared, would tend to support prices under any pressure which might develop; prices are currently at ceilings, with exception of some alloys. Some additional shipyard tonnage will eventually come out of contract cutbacks and disposal of surplus equipment. Tonnage from the latter thus far has been small.

Of 1170 tons of steel scrap offered by Boston navy yard, Aug. 23, 500 tons is unprepared heavy melting and 300 tons of light steel; also 100 tons of borings and turnings; 100 tons of steel flashings and 100 tons of galvanized sheet scrap.

Cincinnati — Although the iron and steel scrap market appears sound basically, with prices firm at ceiling, all interests have assumed a waiting attitude. Major melters are temporarily avoiding new commitments. Their stocks and those of dealers are light and backlogs of foundries and mills assure active demand. Shipments are moving steadily against old contracts and the supply is still tight.

New York — With the war now over indications point to easing in scrap prices. Leading cast grades may resist cut for the time being, as there still is acute shortage of this material and most gray iron foundries anticipate little recession in their demands. However, heavy melting steel may weaker percep-

tibly as steel mill requirements lag and much additional material is thrown on the market, especially by shipyards. It is true that much of the latter scrap will be unprepared and until the scrap industry can increase its manpower offerings of material suitable for mills may not be heavy.

Cold-Finished Extras Cut Only on Government Work

Reductions in extras on cold-finished steel bars provided in amendment 14 to price schedule No. 6 of Office of Price Administration, reported in STEEL, Aug. 6, page 86, apply only to material covered by Army and Navy specifications and do not affect application of the usual extras to bars for other users.

The order provides that when strain stress relieving or stabilizing by baking are specified or required to meet physical requirements of Army and Navy for shell and other ammunition components an extra of 45 cents per 100 pounds is charged, which is a reduction of 30 cents from the regular extras previously applied. The reduction of 10 cents per hundred pounds for physical inspection and testing, to 15 cents, also applies only to United States government specifications.

Sellers of cold-finished bars are allowed to charge the former extras for strain and stress relieving and for physical testing on all material except that for government use, and price lists still contain these extras, as in the past.

The increase of $2 per ton in base price of cold-finished balances the advance on hot-rolled bars granted in May and relieves cold finishers from the necessity of absorbing the increase on their raw material.

Nonferrous Metals . . .

Nonferrous Prices, Page 195

New York—Enough copper and aluminum for all civilian needs is assured from now on but tin will be short for some time, endangering reconversion in some industries and forcing use of substitutes. Expanded production and substantial stockpiles of copper and aluminum have taken these metals into the clear for resumption of civilian production. Fourth quarter production of copper, primarily because copper and brass mills will not have enough orders to justify it, will be under first quarter. First quarter supply level could have met five times the 1937 demand for copper and brass.

Exclusive of small government-held stockpiles, tin inventories have gone to 19,000 tons and additional restrictions on use and inventories are operative. Producers of all tin-bearing alloys must limit use to the amount of respective quotas for any calendar quarter. Users of alloys containing tin, other than copper-base controlled alloys must hold inventories to 30 days or less. Tin consumption this year will approximate 90,000 tons. All the tin that can be safely saved in tin plate for food and other packs has been done. For evaporated milk 0.75-pound plate is still opposed by most packers and although a large offering of spoiled milk is out at Boston for animal feed and other purposes some tests indicate that this light-coated plate might be used for turnover if not too delayed.

Heavy military cutbacks are not balanced by civilian reconversion demand and copper deliveries in July declined to 88,661 tons, lowest in many months, compared with a peak of 218,488 tons in March and with 91,031 tons in June. Deliveries are getting down to production of refined copper from domestic ore, 72,995 tons in July and 74,377 tons in June. Thus the stockpile reserve continues to increase with importations. Refineries held 76,166 tons at the end of July, against 70,738 the previous month. Consumer, warehouse and government-owned stocks are not included.

Steel in Europe . . .

London — (*By Radio*) — Sheet buying activity is maintained in Great Britain but heavy structurals are slow. Export business is expected to expand materially during the next few months. Shipbuilders are increasing purchases of steel.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

Unstated tonnage, three 200-foot steel towers, Bureau of Yards and Docks, Navy, airfields Dalton and Gila Bend, Ariz., to Bethlehem Steel Co., Los Angeles. Same fabricator also low on steel towers, Longview, Wash., Bonneville Power Administration, $52,097,80

RAILS, CARS . . .

RAILROAD CARS PLACED

Atchison, Topeka & Santa Fe, 1000 box cars to Pullman-Standard Car Mfg. Co., Chicag

Clinchfield, 1000 hopper cars, to American Car & Foundry Co., New York.

Louisville & Nashville, 1000 hoppers, to Pullman-Standard Car Mfg. Co., Birmingham.

Chronology of War's Impact on Industry

(*Continued from page 103*)

civilian production after victory over Germany.

11—President and Churchill meet at Quebec.
12—Allied invasion of Germany begins.
30—J. A. Krug succeeds Donald Nelson as chairman of WPB.

October:
3—President approves industrial reconversion and surplus property bills, sets up Office of War Mobilization and Reconversion.
10—Output of 67,375,801 tons of steel in first nine months sets new record.
11—War Labor Board refuses to recommend modification of "Little Steel" wage formula.
15—Construction Bureau formed in WPB.
20—Americans invade Leyte, Philippines.
25—Bureau of Program and Statistics and Program Controls Bureau established.

November:
16—Byrnes warns manpower shortages may cause suspension of new civilian production.
24—B-29s raid Tokyo.
27—Hull resigns as Secretary of State; succeeded by Stettinius.
29—Production Readjustment Committee established to handle changes in war program.

30—Production of electric furnace steel in November less than 70 per cent of capacity, lowest in tonnage since early 1942.

December:
1—Joint appeal for full war production made by WPB, Army, Navy, and WMC.
11—Selective Service boards review registrants under 38 to insure service in war industry or armed forces.
14—Government resumes anti-trust suits suspended in late 1942.
16—Germans break through in Ardennes.—WPB decides to hold civilian production at 1944 fourth quarter level.
23—Government bans horse racing, tightens food rationing.—Priorities Regulation 26 authorizes use of priority and allocation powers to enforce WMC manpower ceilings.
26—Allies check German break-through.
27—For fifth consecutive year, steel production hit new high in 1944, totaling 89,341,575 tons.

—1945—

January:
1—Steel capacity rated at 95,505,280 tons, gain of 14 million tons since 1940.
—Nazi offensive halted.
3—WPB announces 5-point program designed to increase war production.
8—Steel operations drop below 90 per cent for first time in war period due to manpower shortages, reshuffling of rolling schedules, transport difficulties.

February:
4—Yalta conference.
—Manila falls to U. S. troops.
7—Steel rate forced down by bad weather.
8—Steel industry payrolls for 1944 reported totaling $1,745,000,000.
26—Steel companies estimate 1945 expenditures of $204,000,000 for plant improvements, bringing total since 1940 to $1,310,000,000; government expenditures for steel expansion total $1,095,000,000.

March:
1—U. S. troops cross Rhine river.
19—Critical manpower shortage threatened in steel industry.
15—Machine tool orders, $52,569,000; shipments, $39,375,000.
31—Federal Reserve Board index 235.

April:
1—Cancellations of war steel orders beginning to reach steel mills.
12—President Roosevelt dies; Truman takes office.
25—United Nations Conference on International Organization opens.
26—Steel plate demand shrinking as maritime program goes into closing phases.
27—U. S. troops join with Russian forces in Germany.

May:
8—V-E Day.
9—Ordnance contracts cut back.
10—WPB revokes 73 orders prohibiting or limiting civilian goods production. Sets July 1 as date on which business will have unrestricted access to such steel as is not required for war.
11—WMC announces new manpower regulations effective July 1 in less critical areas.
—Consumer goods prices to be held at 1942 levels, Price Administrator Bowles announces.
16—Steel companies estimate reconversion will cost them $200 million.
17—U. S. troops occupy capital of Okinawa.
—Quota limitations on farm machinery and repair parts removed, effective July 1.
23—ICC ruling puts freight rates down in South and West and up in East on classification freight.
24—Steelmakers authorized by OPA to increase ceiling prices on 14 basic products $2 to $7 per ton.
30—Auto manufacturers authorized to resume passenger car production after July 1 on quota basis.
31—Construction restrictions eased by WPB.
—Truman asks expansion in unemployment compensation.

June:
1—Pacific Army to be doubled.
3—WPB lifts production levels on refrigerators, electric ranges, washing machines.
4—Truman asks $1.9 billion more for Lend-Lease to help defeat Japs.
5—Big 4 sets up military rule in Germany.
6—Japs concede loss of Okinawa.
7—Truman says "Little Steel" wage formula will stand for present.
11—Supreme Court grants war goods manufacturers review of validity of Renegotiation Act.—Truman asks for $39 billion for Army expenditures in fiscal year 1946.
14—Surplus Property Board plans sale of billions of surplus in foreign countries.
15—WPB says one million tons of steel available in third quarter for civilian goods.
19—SPB authorizes scrapping of unsaleable surplus aircraft.—Army takes over truck lines in Chicago strike.
20—Automakers assigned quotas by WPB for nine months starting July 1.
21—American industries plan to spend $4.5 billion for plants and alterations for year starting July 1.—Okinawa campaign completed.
27—Stettinius resigns as Secretary of State.
30—Federal Reserve Board industrial production index 222.

July:
1—Byrnes named Secretary of State.
6—Ford produces first 1946 civilian auto.
14—Kaiser proposes syndicate to operate western war born steel plants.
15—Pullman sleepers banned on runs of 450 miles or less.
17—Postdam conference.
20—Congress approves Bretton Woods agreement which was reached in July, 1944—Reconversion tax bill to save $5 billion

to business and industry passed.
22—British steel expansion and modernization plan announced. To cost half billion.
23—Morgenthau resigns as Secretary of Treasury.
25—Kaiser and Frazer organize firm to manufacture automobiles.
26—British Labor Party wins election. Attlee succeeds Churchill as prime minister.—Potsdam ultimatum to Japan.
28—United Nations Charter approved by Congress.
31—Winter coal shortage threatens. Industry may have to go on 4-day week.

August:
2—Council of foreign ministers set up at Potsdam to write peace treaties for Europe.—De-emphasizing of German industry decided on at Potsdam.
6—First atomic bomb falls on Japan. Harnessing of atomic energy viewed as most revolutionary development of the century.
8—Russia enters war on Japan.
9—Truman reports to nation on Potsdam conference.
10—Japs offer to surrender if Hirohito is retained as emperor.
14—Frantic moves under way to smooth changeover of economy to peacetime basis.
14—Japan surrenders.

Moderate Increase Seen For Freight Car Orders

(*Concluded from Page 104*)

themselves. It is thought here that much of the railroad equipment taken by Germany from the countries she had conquered would not be taken over for use in Russia, for the reason, if for no other, that it is of a different gage than Russia uses. Much still remains to be known about rehabilitation needs for equipment abroad, but the prospects are not as promising as previously contemplated, builders declare.

Russian order for 6000 flat cars is expected to go ahead. This was held up temporarily to make way for the production of 12,700 forty-two-gage freight cars which the War Department placed and which will now likely be canceled. Inquiry for 6000 freight cars for India issued by the War Department has been withdrawn.

Then, as time goes on, there will be sharp competition from foreign countries in the world markets. England, for instance, is expected to make a strong bid, and evidences of this are already being seen in South America, it is asserted.

However, on the other hand, export buying of American cars should be substantially heavier than in the prewar years. But it could still be much heavier and not be anywhere nearly as heavy as some expected several months ago. Only the better years before the war came anywhere near 3000. This number could be stepped up greatly and still not meet some of the predictions made earlier in the year.

Generally speaking, the best prospects abroad appear to lie with Russia, China and the Philippines, among certain others. Despite competition, this country should get a reasonably good share of Latin-American business. United States builders have some of this work on order now, including 1500 box cars for use on railroads in Mexico.

As for cancellations, all domestic freight car orders are likely to stick. It is among the foreign orders, of which approximately 32,000 were undelivered as of Aug. 1, that there will be certain cancellations, especially among those for the War Department, constituting perhaps two-thirds of the total. But even among these latter, cutbacks may not be as heavy as assumed, for the reason that a fairly good percentage of the work is nearing completion. Some War Department work, on the other hand, has not even been begun, and this includes the 1200 troop sleepers awarded only a few weeks ago and not scheduled to get under production before fall.

Domestic freight car awards have been increasing over the past several weeks with the possibility that the peace with Japan may temporarily break the trend although not even this is assured. Freight cars placed in July amounted to 350 and those placed in the first half of the month amounted to 6680, bringing the total for the year up close to 25,000.

Approximately 35,000 domestic freight cars were on order and undelivered as of Aug. 1, with more than 25,000 in the commercial shops and the remainder in railroad shops. On the basis of present schedules, more than 23,000 should be delivered by the end of this year.

With reconversion at hand, some war plants are considering shifting over to car construction. There has been talk in some quarters of the desirability of converting the huge government-owned Willow Run bomber plant to such purpose, and certain shipyards have been considering the possibility. However, it appears doubtful if many of these plans will materialize. After the last war, this type of work was considered by some plants, which had never engaged in such construction before, but most of such planning never got beyond the talking stage. In the case of at least one large eastern shipyard, however, actual construction was undertaken, but later the company withdrew from the field.

The situation then, it is explained, is much as it is now—too much existing capacity. At present, freight car capacity in this country is about 160,000 a year, a capacity not likely to be strained for a considerable time to come.

Industry Faces Difficult Problems As Jap War End

(*Continued from Page 99*)

fore V-J Day. Robert H. Hinckley, director of the Office of Contract Settlement, believes these terminated contracts can be settled promptly by the contractors and the contracting agencies working together.

"Coming so soon after V-E Day, the new terminations will require a maximum effort on the part of government and contractors alike if we are to achieve prompt reconversion.

"Contract settlement policies and

cedures for this purpose have all been developed. They have been given a substantial test in the settlement to date of more than $22 billion of canceled commitments. . . .

"The problem now is to raise the settlement rate to the point required to meet the greater load. For this purpose, the contracting agencies have trained staffs of more than 18,000 people. More than 30,000 contractors and their employees have taken specially designed training courses to prepare them to do their part."

Wartime controls of imports and export trade such as licensing of export and controlling imports will be eased as quickly as possible without jeopardizing the interests of military forces and domestic industry. The Foreign Economic Administration, according to Leo T. Crowley, is working closely with the military authorities and government agencies to bring this about.

"We are adjusting our procurement activities to suit peacetime needs and are screening carefully all contracts involving lend-lease," says Mr. Crowley. "We plan to adjust our lend-lease program immediately. This will be carried out on a realistic basis. Although actual fighting has ended, there remain problems of redeployment of our military forces, in the settlement of which several of our ally nations are now co-operating. We consider it fair that we continue lend-lease to these nations to help offset the expenditures of materiel and facilities which they are making in our behalf.

"The basis of lend-lease is the sharing of our assets with nations whose defense is vital to our own defense. Apart from the aid given our redeployment program there remains little justification now for continued lend-leasing of materiel by this nation. We plan to bring to a close as rapidly as possible all projects of lend-lease based on war needs thus to clear the way for private trade employing the peacetime instruments of credit which are available to governments and private interests.

"Our program will involve adjustment of many contracts both for procurement of raw materials abroad and for production at home of munitions and other instruments of war intended for shipment to our allies as lend-lease. These contracts are under study."

Steel Company Payrolls Rise Sharply in First Half

Steel company payrolls during the first half of 1945 increased sharply over the corresponding period of 1944, according to the American Iron & Steel Institute. At the same time, employment, averaging 565,700 people per month, declined from the 576,000-persons-per-month average of the first half of 1944.

Total payrolls for the first half of 1945 were $888,731,000, compared with $849,-765,000 paid by the industry in the first half of 1944. The figures, the institute pointed out, are not strictly comparable because of the extent that provisions for retroactive wage increases authorized by the War Labor Board are reflected in the monthly totals for 1945.

Wage-earning employees of steel companies earned in June, 1945, an average of 127.2 cents an hour, very close to the record of 127.3 cents per hour earned last March. Nevertheless, the industry's payrolls declined in June to $144,082,600 from $154,035,100 in May. Payrolls in June, 1944, totaled $140,484,400.

During June, an average of 561,800 employees worked in the industry, compared with 564,600 in the previous month and 569,800 in June, 1944.

Wage earners worked an average of 45.5 hours a week in June, compared with 47.3 hours per week in May, 1945, and 47.7 hours per week in June, 1944.

The average hourly earning figure of 127.2 cents in June compares with 126.4 cents an hour in the previous month and 117.7 cents an hour in June 1944.

Prefabricated Aluminum House Favored for Britain

A highly-prefabricated aluminum house is considered the most promising among the types of temporary houses designed to shelter bombed-out families in the United Kingdom, according to the U. S. Department of Commerce.

It is estimated that ultimately this type of structure will be produced at the rate of one every three minutes and the British rate of production can be attained by the end of 1945. Orders have been placed for 50,000 houses of this type.

Each house will be delivered to the place of erection in four complete sections. The houses when delivered will contain plumbing fixtures, will be painted and wired, and will weigh about ten tons. Brick and plaster houses of a similar size weigh more than 80 tons.

While the cost of the aluminum house (about $3600) is higher than for some other proposed types of temporary houses, the British government is reported to favor the structure because it provides use for secondary metal.

Canada Cuts Import Duty On Copper-Clad Steel Wire

Imports into Canada of copper-covered steel wire as specified are dutiable at the reduced rate of 10 per cent ad valorem when originating from the United States or any other non-empire area. Similar imports from the British empire are duty-free.

Formerly, such wire imports from the United States were dutiable at the rate of 30 per cent ad valorem.

The order specifies the type of copper covered steel wire and its use as follows: "Copper covered steel wire not less than one-quarter inch in diameter and rods, when imported by manufacturers of trolley, telegraph and telephone wires, electric wires and electric cables, for use

only in the manufacture of such articles in their own factories . . ."

This tariff treatment is the same as is accorded imports of copper in bars or rods (and is understood to include copper-clad steel rods) by manufacturers of such similar specified equipment to be manufactured in their own factories.

U.S. Steel Corp. Shipments Up Slightly in July

United States Steel Corp. shipments of finished steel products in July totaled 1,608,994 net tons, an increase of 6112 tons over June shipments and a decrease of 145,531 tons from deliveries in July, 1944. For seven months ended July 31 shipments totaled 11,733,953 tons, against 12,387,379 tons in the comparable period in 1944.

(Inter-company shipments not included)

Net Tons

	1945	1944	1943	1942
Jan.	1,560,115	1,730,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	1,722,845	1,756,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,706,543	1,834,127
June	1,602,882	1,737,769	1,552,663	1,774,068
July	1,608,994	1,754,525	1,660,762	1,765,749
Aug.	.....	1,743,485	1,704,289	1,788,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,680,594	1,665,345
Dec.	.....	1,767,600	1,719,624	1,849,636
Total	.....	21,150,788	20,244,830	21,064,197
Adjustment	.....	*98,609	*97,214	*449,020
Total	.....	21,052,179	20,147,616	20,615,137

*Decrease.

Ingalls Shipbuilding To Build 14 Cargo Vessels

Ingalls Shipbuilding Corp., Birmingham, has obtained permission from the United States Maritime Commission to use its shipyard for construction of 14 cargo ships for Lloyd Brasilerio, an agency of the Brazilian government. The 7500-ton deadweight vessels will be modifications of the commission's C-2 design.

West Coast Ranks Third in Plant Expansion for War

The West Coast area ranks third in the nation in number of new and expanded manufacturing plants and fourth in value of facilities authorized between July, 1940 and May, 1944, the Los Angeles office of the War Production Board announced.

Total value of war facilities built in California alone is $1,335,698,000. Expansions included: For ships, $422,507,000; for aircraft, $242,818,000; for nonferrous metals, $104,553,000; for iron and steel, $147,108,000.

Government Restraints on Unions Seen as Essential

Governmental restraints against labor are as necessary today as those long ago found necessary to prevent the dictation by monopolists of transportation, or electric power, or financial power, Donald R. Richberg, former general counsel for the National Recovery Administration last week told a luncheon meeting of the Associated Industries, Cleveland.

Speaking in support of the Federal Industrial Relations bill, which recently was introduced into the Senate by Senators Burton, Ball and Hatch, Mr. Richberg said that he was convinced that whenever any group or element in a democratic society obtains the ability to exercise dictatorial power over the lives and fortunes of others, then government must intervene to preserve an essential freedom of all the people.

Value of Manufactures May Exceed $80 Bilion Yearly

(*Concluded from Page 111*)

level of production, sales and employment will not materialize unless government, business, labor and agriculture all play their proper roles.

"So far as the role of business is concerned, that level will be attained only if the business men of the country—in all lines of business—manufacturing, trade, finance, the services—plan aggressively and boldly.

"This study strongly suggests that planning of that sort of thing is going on in the manufacturing sector of business.

"But it must be carried on in all business sectors, and the plans must not be merely plans. They must be put in effect if the production, the sales and the jobs that will be needed are to materialize."

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON—General Plastics Inc. has been incorporated with $5000 capital and 250 shares no par value to engage in general metal manufacturing, tool designing and plastics development, by Harry B. Trussell, agent, 79½ West Exchange St.

ALLIANCE, O.—Consolidair Inc. has been incorporated with 250 shares no par value to manufacture aircraft parts and accessories and has established its plant at 47 North Linden avenue, with 1200 square feet of floor space. Kenneth W. Tibbits is president, Russell E. Iden secretary-treasurer and Evan Morris is attorney and member of the board. The first two named formerly were associated with Taylorcraft Aviation Corp. (Noted July 23.)

CLEVELAND—Weldon Tool Co., 3000 Woodhill road, will build a plant addition, estimated to cost $88,000.

CLEVELAND — Patterson-Sargent Co., 18 East 38th street, awaits WPB approval of a two-story 150 x 200-foot warehouse at 34 Hamilton avenue, to cost about $60,000.

CLEVELAND—Per Metal Co., 3130 Be

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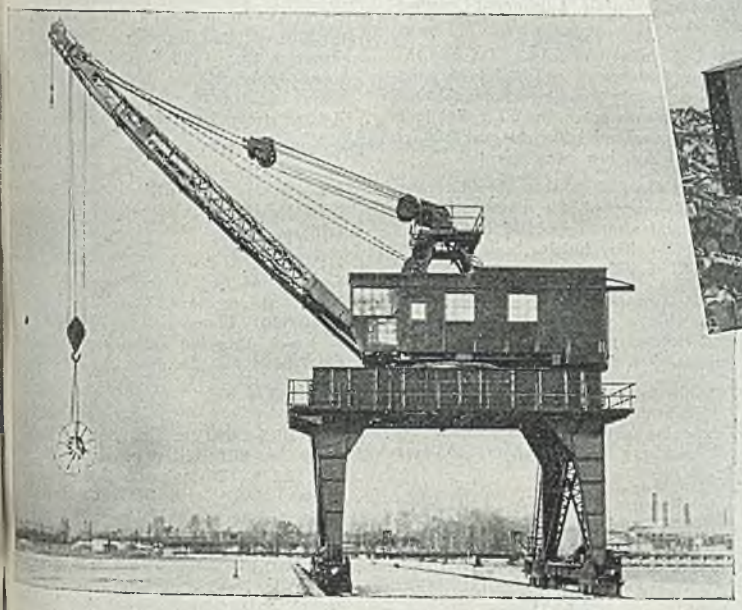

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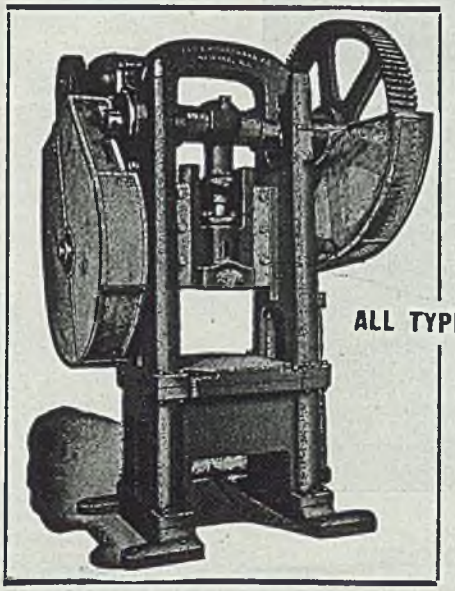

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road, Charles Foster, president, will build a one-story 35 x 110-foot foundry, to cost about $20,000.

CLEVELAND—Storm Windows of Aluminum Inc. has been incorporated with $20,000 capital and 250 shares no par value to manufacture metal and wood products, by William Graef, 3078 Becket Rd., agent.

ELYRIA, O.—American Brake Shoe Co., W. H. Old, 230 Park Ave., will build one-story office and foundry building 150 x 460 feet, to cost $1,200,000, and install equipment costing $1,300,000.

MASURY, O.—General American Transportation Co., manufacturer of railroad tank cars, will build a one-story machine shop addition 70 x 300 feet, leanto extension 20 x 300 feet and install an overhead crane to cost $247,360. WPB approval has been granted.

MIDDLEFIELD, O.—Johnson Rubber Co. has received WPB approval for plant addition 40 x 50 feet and alterations, and installation of oil circuit breaker, hoists, boiler, stoker, etc., to cost $195,473.

NEWARK, O.—Newark Stove Co. has WPB authorization for a plant addition and installation of crane, presses, etc., for reconversion preparation, to cost $207,000.

SANDUSKY, O.—Apex Electrical Mfg. Co. has received WPB approval for second-story addition and widening of plant 24 feet, for manufacture of washers and cleaners, to cost $150,000.

WARREN, O.—Peerless Electric Co., 1401 West Market St., will build plant addition and remodel present plant, at cost of $157,000. WPB approval has been granted.

MASSACHUSETTS

ATTLEBORO, Mass. — General Plate Corp., Forest street, will let contract soon for a one-story 120 x 160-foot plant, to cost about $100,000.

CONNECTICUT

BRIDGEPORT, CONN. — Aluminum Co. of America, Atlantic street, is rebuilding a four-story plant, to cost about $40,000.

GROTON, CONN.—Borough of Groton, A. M. Card, warden, 36 Forest St., is having plans prepared for postwar construction of sewage disposal plant costing $250,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, are consulting engineers.

NEW YORK

RENSSELAER, N. Y.—General Aniline Works, Riverside drive, will take bids soon on a chemical plant extension, to cost about $650,000.

PENNSYLVANIA

MONACA, PA. — Richmond Radiator Co., Pittsburgh road, Uniontown, Pa., has let contract to C. J. Jacobson, 1840 Cecil street, Sharpsburg, Pa., for rehabilitation of its enamelware plant, estimated to cost $250,000. R. C. Patterson, care owner, is chief engineer.

PHILADELPHIA—Edward G. Budd Mfg. Co., Hunting Park avenue and 25th street, has let for a storage building and two conveyor bridges, to cost about $100,000 and $43,000, respectively. Ballinger Co., 105 South 12th street, is architect.

POTTSVILLE, PA.—D. G. Yuengling & Son Inc., Mahantongo and Fifth streets, has let contract to Schneider & Davis, 319 West Market street, for a boiler house to cost $63,000.

WEST CHESTER, PA.—Corning Glass Co., Walnut street, Corning, N. Y., plans a factory here, to cost about $1 million.

MICHIGAN

LANSING, MICH.—City, City Hall, has plans under way for postwar sewage and garbage disposal plant to cost $1,300,000. Shoecraft Drury & McNamee, Ann Arbor, are consulting engineers.

ILLINOIS

ARGO, ILL.—Corn Products Refining Co., 33 North Michigan Ave., Chicago, will soon let contract for a four-story 80 x 220-foot building from plans by Schmidt, Garden & Eriksen 104 South Michigan Ave., Chicago. (Noted Aug. 13).

CHICAGO—Bienenfield Glass Corp., 152 We 35th street, has let contract to Zisken Construction Co., 4430 West Roosevelt road, to a one-story 100 x 400-foot plant, to cost about $100,000. E. Steinborn, 176 We Adams street, is architect.

DANVILLE, ILL. — General Electric Co Schenectady, N. Y., plans plant here f manufacture of small transformers for fluores cent lighting equipment, to cost about million.

DANVILLE, ILL.—F. L. Jacobs Co., manufacturer of coil springs has let contract J. W. Montgomery, Danville, to cost abo $250,000. Plans are by Blackman, Shad & Jones, Danville. Mississippi Valley Stru tural Steel Co., Decatur, Ill., has contract f steel. Edward A. Ruggles is general ma ager.

DOWNERS GROVE, ILL.—Oliver Machine Tool Co., 801 Burlington St., has let contra for 122 x 180-foot plant building to E. Husak, 833 North California St., Chicag estimated to cost $100,000, with equipme F. G. Walker, 717 Forest St., Glen Ell Ill., is architect.

FRANKLIN PARK, ILL.—Metrex Valve C 5912 West Division street, has let contr to T. Hope, 3016 North New Engl street, Chicago, for a one-story 125 x 1 foot plant, to cost about $85,000. S. K stad, 3600 West Fullerton avenue, Chica is architect.

LIBERTYVILLE, ILL.—F. G. Hough & has let contract to Campbell, Lowrie Lautermilch, 400 West Madison St., Chica for a plant building to cost about $50,000

MATTOON, ILL.—City, City Hall, W. R. K ball, chairman city planning commiss plans postwar sewage disposal plant sewer system, to cost about $500,000.

MATTOON, ILL.—Kuehne Mfg. Co. has contract to Houghland & Farrier Co., Wabash Ave., Mattoon, for a one-story a tion 70 x 250 feet and another 130 x feet, to cost about $650,000, with eq ment.

INDIANA

ANDERSON, IND.—Anaconda Wire & C Co., 32nd and Noble Sts., has plans u way for a plant addition to cost over $40, with equipment.

CLARKSVILLE, IND.—Town Board, C Devine, clerk, plans postwar sewage disp plant to cost $40,000.

ELKHART, IND.—Adams & Westlake let contract to Solid Construction Co., S Bend, Ind., for a one-story plant 140 x feet, to cost over $40,000. Graham, derson, Probst & White, 80 East Jac street, are architects.

LAGRANGE, IND.—Town Board, I. S. M president, J. A. Hostetter, clerk, plans war sewage treatment plant costing $100

MONON, IND.—Town Board, William Ro president, C. B. Hughes, clerk, plans po sewage treatment plant costing $100,0

MONTICELLO, IND.—Board of Public W S. W. Risser, mayor, chairman, E. E. M clerk, plans postwar sewage treatment costing $200,000.

DELAWARE

WILMINGTON, DEL. — Atlas Powder Delaware Trust building, plans a che manufacturing addition at its Atlas

plant, estimated to cost $1 million, with equipment. J. W. Hanson Jr., care owner, is chief engineer.

WEST VIRGINIA

SOUTH CHARLESTON, W. VA.—Westvaco Chlorine Products Co. has WPB authorization for installation of facilities for production of benzyl-chloride, including pump, storage tanks, condensers, etc., to cost $150,000.

VIRGINIA

RICHMOND, VA.—City plans two postwar incinerator plants, combined capacity 600 tons per day, to cost about $620,000.

MISSSOURI

ST. LOUIS—Mesker Bros Iron Co., 424 South Seventh St., has WPB authorization for a plant building costing about $160,000, with equipment.

ST. LOUIS—U. S. Steel Supply Co. has WPB authorization for a warehouse to cost about $1 million.

ST. LOUIS—Chevrolet St. Louis Division of General Motors Corp., 3809 North Union Blvd., has let contract to Hercules Construction Co., 8808 Ladue Rd., Clayton, St. Louis, for a plant addition, one story 81 x 81 and 42 x 81 feet, to cost about $75,000.

ST. LOUIS—American Stove Co. has let contract to Gamble Construction Co., 620 Chestnut St., St. Louis, for two warehouses and an enameling building at 2001 South Kingshighway, two-story 156 x 205 and 199 x 301 feet and one-story 347 x 507 feet. Plans by Austin Co., 510 North Dearborn St., Chicago.

ST. LOUIS—Ritepoint Co., care S. G. Lioic, 1116 South Grand street, has let contract to Fred J. Daues & Sons, 3117 Pine street, contract to Wark & Co., 1700 Sansom street, for a one-story 150 x 190-foot plant and office building at 4350 South Kingshighway, to cost about $100,000. Arch Albert, 1914 South 39th street, is architect.

MONTANA

BILLINGS, MONT.—Beall Pipe & Tank Co. has rejected bids for a plant here and will proceed under revised plans estimated at $65,000. J. G. Link & Co., Billings, are engineers.

CALIFORNIA

ALAMEDA, CALIF.—Pacific Bridge Co. is negotiating for purchase of a site of 35 acres here, to cost about $415,000.

AZUSA, CALIF.—Aerojet Engineering Corp. is having plans prepared by John Fleming, 1129 Melrose Ave., Glendale, Calif., for ten factory buildings at Azusa, to cost about $160,000.

COMPTON, CALIF.—Williamson Machine Co., 2407 South Alameda St., has building permit for machine shop 30 x 60 feet, to cost $4800.

LOS ANGELES—General Motors Corp. has bought 125 acres near Van Nuys, Calif., for large assembly plant, to cost several million dollars.

LOS ANGELES—Absco Welded Products Co., 5069 West Washington Blvd., will build plant at 1522 North Indiana street, 40 x 60 feet.

LOS ANGELES—Baker Steel Tube Co., has building permit for warehouse building 100 x 170 and 42 x 48 feet, at 1404 Calzona St., to cost $45,000.

OAKLAND, CALIF.—Oliver Tire & Rubber Co. is adding to its tire manufacturing facilities at cost of $400,000.

OAKLAND, CALIF. — Westinghouse Electric Corp. has bought three acres as a sales and service center for farm and industrial equipment

OAKLAND, CALIF.—American Tractor Co. has bought a four-acre industrial site and buildings to accommodate expansion.

RICHMOND, CALIF.—Food Machinery Co. has bought 14 acres on which to build a plant for manufacture of farm spray equipment.

SAN DIEGO, CALIF.—Griffin & Dyson, 2111 Imperial Ave., are building a machine shop 40 x 70 feet, to cost $8000. Kyle Steel Construction Co., Los Angeles, is contractor.

SAN LEANDRO, CALIF.—Pacific Can Co. has bought 25 acres for a new can manufacturing plant.

TORRANCE, CALIF.—Bechtel-McCone Corp., 816 West Fifth St., Los Angeles, is making plans for and will build synthetic latex plant near Torrance, adjacent to plant of United States Rubber Co., for Rubber Reserve Corp., estimated to cost $500,000.

VERNON, CALIF.—Armstrong Engineering Co. has building permit for plant at 4618 Pacific Blvd., to cost $80,000.

VERNON, CALIF.—Acme Steel Co., 4900 Pacific Blvd., will build warehouse 40 x 100 feet, to cost $24,500.

TORRANCE, CALIF.—Stone & Webster Engineering Co., 6601 West Fifth St., has contract for isoprene recovery plant adjacent to Shell-Union Oil Co. butadiene plant, for RFC, to be operated by Shell Chemical division, to cost $2 million.

OREGON

OSWEGO, OREG.—Oregon Portland Cement Co. plans installation of dust collecting system at cost of $71,000.

PORTLAND, OREG.—Doernbecker Mfg. Co. has WPB priorities for installation of a conveyor system at its New Era, Oreg., plant to cost $15,841.

PORTLAND, OREG.—Griffiths Rubber Mill, Nicolai and 22nd streets, has let contract to D. M. Drake Construction Co. for a $150,000 plant.

SPRINGFIELD, OREG.—Borden Milk Co. plans construction of a $200,000 waterproof glue plant here to serve the plywood industry. Site has been bought.

THE DALLES, OREG.—City plans water project, including four turbine pumps, nine miles of main pipeline and extensive laterals ranging to 36 inches. H. G. Miller is president.

WASHINGTON

EVERETT, WASH.—Everett Ship Repair Inc. has been incorporated with $40,000 capital by Cooper & Cooper, Colby building.

SEATTLE—General Construction Co. has contract for operating buildings and construction tower at Seattle naval air station, to cost $164,950.

SEATTLE — A-I Ornamental Iron & Wire Works plans 40 x 80-foot plant costing $10,000 at 212 Ninth avenue, North. William Grant is architect.

SEATTLE—H. C. Hanson, naval architect, Seattle, is receiving bids for five steel tugs, 100 feet long, 26 feet beam, involving about 100 tons of plates and shapes each. Diesel engines of 600 hp furnish power. To be operated by Pacific Exploration Co., Seattle, which is having an 8800-ton freighter converted to a floating cannery by Bellingham Iron Works, Bellingham, Wash. First bids of $327,000 to $444,000 were rejected.

SEATTLE—City plans $450,000 water system improvement in West Seattle, involving a million-gallon elevated tank, reservoir and three miles of 30-inch steel pipe, with battery of large pumps.

SEATTLE—Ford Motor Co. has WPB approval for assembly and parts plant 232 x 427 feet, costing $779,717, including boiler plant, cranes, hoists, etc.

VANCOUVER, WASH.—L. Garson, Jefferson and Twelfth streets, plans sheet metal shop, 50 x 100 feet. D. J. Stewart, Vancouver, architect.

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Help Wanted

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