STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116, NO. 20 — May 14, 1945

NEWS

TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

Hardening "Moly" Hacksaw Blades
How to Clean Forgings for Magnaflux Inspection
Oxyacetylene Pressure Welding for Better Joining
Using Power Trucks for Greater Plant Output
Unusual Machining Operations in Making Jet Engines
Improving Magnesium Properties by Proper Alloying

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Catalog A-2 covers Drive and Conveying Chain. B-2 covers Finished Steel Roller Chain. FC-1 covers Flexible Couplings. Ask for your copies.

ARMY E NAVY

UNION CHAINS

STEEL
May 14, 1945

Our War

Surrender of the enemy in Europe alters the position of each of the Big Three. Russia, after more than 46 months of war, during which its cities and industries were overrun by the Nazis, finds herself at peace, with no declared war to fight. England, after more than 68 months of gruelling warfare and intense suffering, is determined to see the Japanese conflict through to the finish. Without in any way discounting her sincerity in this resolve, the cold facts are that her contributions to the final defeat of Japan must of necessity be limited in comparison to the resources the United States can marshal for this purpose.

Thus V-E Day has placed the United States in the unusual position of being the one of the Big Three still confronted with the greatest responsibility for continuing war on a grand scale. Regardless of the assistance rendered by our British allies and that which may be extended later by U.S.S.R., the Japanese war is primarily our war. It was our Pearl Harbor that was attacked; it is our chief responsibility to right that wrong.

This fact would have been much more clearly recognized by all Americans had it not been that shortly after Dec. 7, 1941, our participation in events in Europe caused a partial distraction of our attention from affairs in the Pacific. That the priority given the European war over the Japanese war by our military strategists was fully justified has been demonstrated by the results. As Chief of Staff Gen. George C. Marshall has stated so clearly, Hitler's plan was to effect a joining of German, Italian and Japanese forces in India, thus permitting the enemy to conquer Great Britain, Russia and the United States, one by one in the order named. This threat failed when the Allied forces stopped the Germans at El Alamein and the British smashed the Japanese at Ceylon. Another reason given by General Marshall for concentrating so heavily on the European war was the realization that two years would be required to build up shipping strength for the Pacific task.

Now that the fighting part of the job in Europe has ended, this nation can concentrate its energies in the Far East. It should be clear to everybody that the goal is to put anything and everything at the disposal of General MacArthur and Admiral Nimitz that will bring about the surrender of Japan at the earliest possible moment.

This is our foremost job.

CAN IT HAPPEN HERE? Writing last week under "A Lesson for Us," we stated that it would be desirable for Americans to learn as much as possible about how Mussolini and Hitler were able to entice their people into giving up their individual freedoms. We said this information would help us to detect danger signs in our own country.

One reader replies that it will be easy to understand how Hitler and Mussolini rose to power if we will examine how American labor unions gradually are gaining control. "Recently," he writes, "we were forced to discharge a few men because the union expelled them. I understand the union expelled them primarily because they do not agree with the communistic views of their union leaders."

In the same mail came a report that the union and public members of a regional War Labor Board —ignoring testimony of their own hearing officer— declared 17 voluntary resignations from a union as void and ordered a new escape period during which these 17 men must resign again if they desire to withdraw. (Some of the 17 never belonged to the union.)

Men thus coerced by government authority are

(OVER)

not free, yet we condone this infringement of freedom as placidly as the Italians and Germans condoned the acts of Mussolini and Hitler.

° ° °

NO PROFITEERING HERE: American industry can point with pride to its contributions to the war effort on two scores.

First, the volume of its production has surpassed all expectations. For instance, consider one item—military aircraft. Output of aircraft by the United States in World War I totaled 7889. In World War II, from July, 1940, through February, 1945, production of military and special purpose planes totaled 266,194.

Secondly, industry's facilities and services were furnished at prices yielding a lower profit than in any previous emergency. Many corporations who in the first World War earned from 10 to 15 per cent annually on their investments received earnings ranging from only 3 to 5 per cent annually during the period of American participation in the present war. OPA estimates that stabilization policies effected a saving of $21 billion on the cost of steel in World War II.

Obviously, these prices cannot continue long. New schedules will be announced soon, lifting steel prices from $2 to $7 per ton over levels of Jan. 1, 1945. —pp. 80, 81, 216

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TYPICAL SMALL BUSINESS: R. F. Moore, president of the National Tool & Die Manufacturers Association, made a good case for small business when he testified at a hearing of a subcommittee of the Senate Special Committee to Study Problems of Small Business.

According to Mr. Moore, the tool and die industry is composed of from 4000 to 6000 shops. The average shop employs 20 to 35 men and operates on limited capital. Much of its equipment is old and has been subjected to hard usage during three years of war.

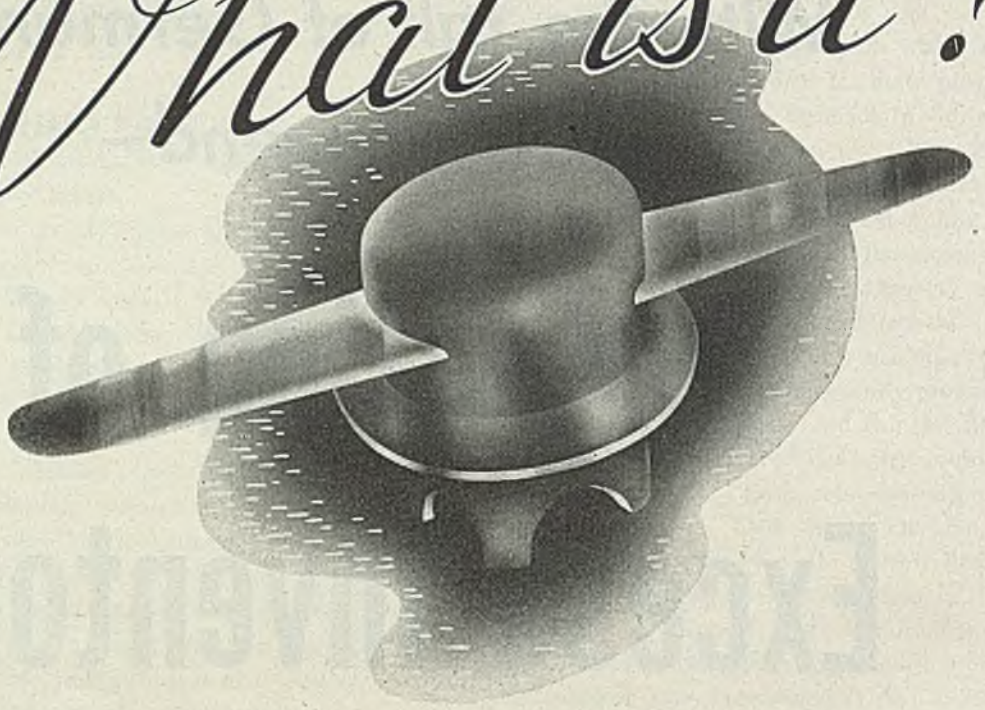
These shops constitute a national market for machine tools, consequently the tool and die industry is concerned with the policies pursued by the federal government in the disposal of its surplus machines. If the disposal authorities are looking for an industry that typifies "small business," the tool and die shops should fit this classification perfectly. They will be an important factor in the postwar prosperity of industry as a whole. —p. 82

TWO DOWN, ONE TO GO: With two of the three enemy nations defeated, the number of veterans returning to civilian jobs will be increasing steadily. The 10-step program which one large manufacturer has devised to facilitate placing the returning serviceman in the right job (p. 86) will be of interest to many employers. . . . Now that V-E Day has come and gone, automobile company executives and government officials collaborating on reconversion problems (p. 89) believe passenger car production of about 50 per cent of the prewar normal will be permitted over the next 11 months. . . . U. S. Chamber of Commerce not only has approved the labor-management partnership recently proposed by William Green, Philip Murray and Eric Johnston (p. 82), but it also has re-elected the latter as president for his fourth term. Both acts establish significant precedents. . . . Delco-Remy Division of General Motors has purchased a site at New Brunswick, N. J. for a new storage battery plant (p. 90) to be built and operated under the direction of B. A. Dollens. . . . Robot assemblers may figure prominently in postwar manufacturing. These devices (p. 103) position nuts on the under sides of assemblies, feed screws down through the assemblies, thread them into the nuts and tighten them to predetermined tensions. . . . Stocks of iron and steel scrap at plants of consumers, suppliers and producers at the end of February (p. 192) were at the lowest level since June, 1942. The situation has prompted a drive for more high-grade heavy melting tonnage. . . . From July, 1940 until just before V-E Day in 1945, American steelworks produced about 414 million tons of steel ingots (p. 77) of which 13 per cent went into shipbuilding—the nation's leading consumer of steel in World War II. . . . One of the highlights in the performance of the "arsenal of democracy" was the feat of the machine tool industry (p. 78) in stepping up its output from $200 million in 1939 to a peak of $1323 million in 1942. . . . The steel industry is congratulating Charles M. White and Earl M. Richards on their promotions to president and vice president in charge of operations, respectively, of Republic Steel (p. 216), following the resignation of President R. J. Wysor to enter an unannounced new field.

E. L. Shaner

EDITOR-IN-CHIEF

What is it?



YOUR guess is as good as ours. It might be anything from an ultra-modern secret weapon to a new peacetime household appliance. Industrial and manufacturing changes have become so accelerated during the past decade that we have come to accept the most modern industrial and household equipment as matter of fact. Whatever problems inventive genius present must be met efficiently and economically. The PARISH PRESSED STEEL CO. has facilities to aid in the development of these problems from collaboration in the initial design stage to the faithful reproduction of the most intricate modeled shapes. The use of "PARISH" regular drawing presses assures unimpaired metal structure, elimination of creases or wrinkles, increased production, economy and superior finishes. Whether it be of aluminum or of other metals, PARISH will be happy to assist you in the production of that present or post-war "must".

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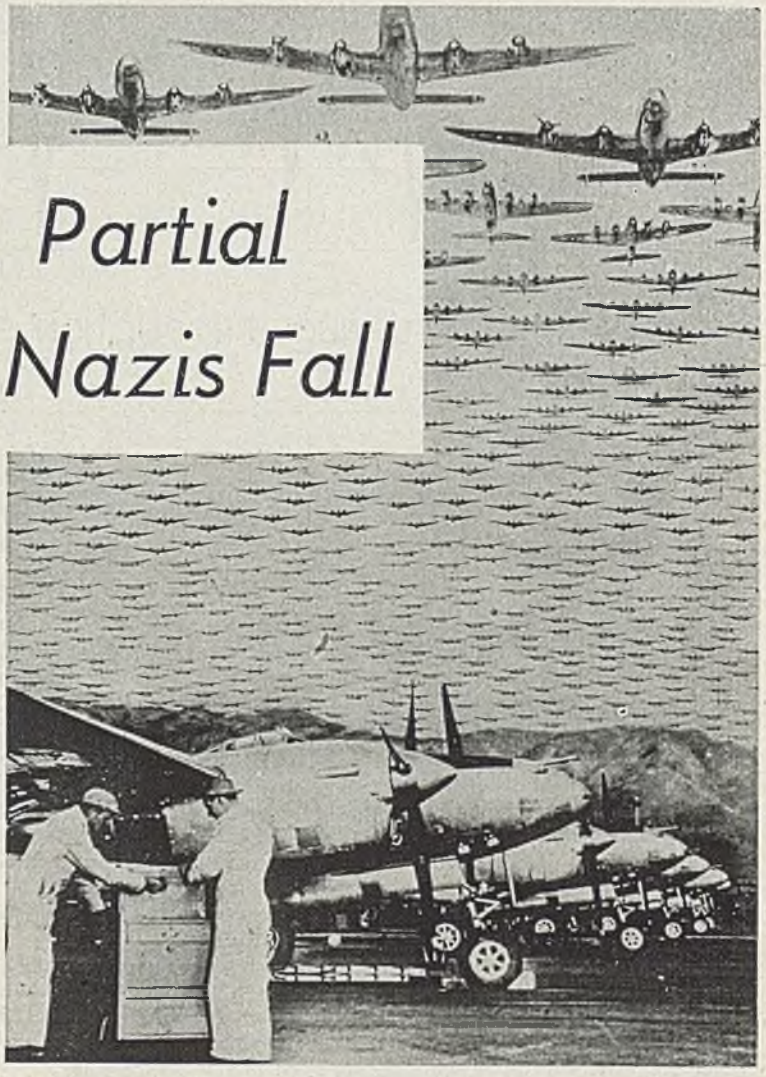
Industry Begins Partial Reconversion as Nazis Fall



"Miracle of production" in American factories made possible military victories. Munitions output in five years has exceeded $180 billion. Path now open for limited return to manufacture of civilian goods, while maintaining high rate of materiel output for campaign against Japan. Some peacetime items get green light immediately

More than 265,000 military and special purpose aircraft were produced by United States manufacturers from mid-1940, when this country's armament program got underway, through February this year

WITH victory in Europe won, industry is on the threshold of reconversion to the production of civilian goods.

A huge and costly war job remains, of course, but the task of providing men and material for two major wars at once has ended.

The next few months will witness the progressive lifting or modification of controls over materials, manpower and facilities and the gradual resumption of the manufacture of the more essential peacetime goods. At the same time a high rate of war production will be maintained.

This was apparent last week as V-E Day was proclaimed and the country paused to appraise the job accomplished and the problems ahead.

On the job accomplished, industry had good reason to be proud. In the five years since this country launched its large-scale rearmament program, an almost unbelievable quantity of war materiel has poured from American factories —plants which until that time had been devoted almost exclusively to the production of goods for peace. Without this miracle of production, the military victories of our armies and those of our allies would have been impossible.

For the task ahead, industry has reason to be hopeful. The problems of unwinding a total war economy are not to be tossed off lightly. However, production for the war against Japan will continue to occupy a large part of facilities and manpower while the transition to limited peacetime production is being made.

Pocket unemployment will develop; some plants may find war contracts canceled before a switchover to civilian output can be made. Withdrawal of bothersome controls may be delayed and impose a burden on plants in the process of reconversion. However, widespread unemployment or a deep deflationary spiral are not in early prospect.

Heads of the various war agencies began to outline their reconversion programs soon after the proclamation of V-E Day. The basic policies provide, in brief:

CIVILIAN PRODUCTION: Essential civilian items, such as farm machinery, trucks, locomotives and freight cars, oil drilling equipment, will be permitted immediately. Certain consumer items such as refrigerators and washing machines will be started immediately in moderate quantities.

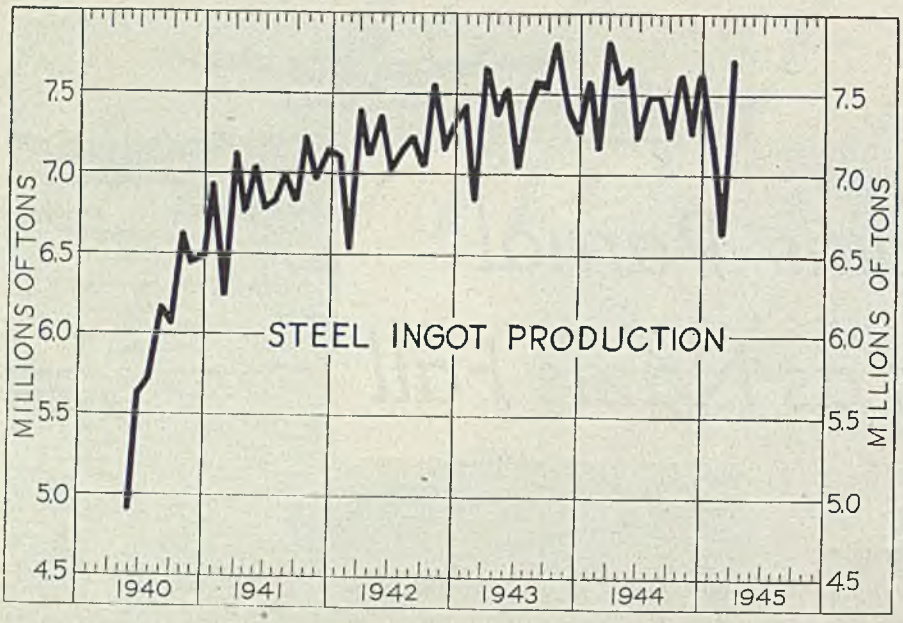
A few automobiles may be coming off the assembly lines in six to nine months. Spare parts for present cars will be produced in large quantity.

Such consumer items as electric irons and stoves which have been in production in limited quantities can be stepped up in three to six months as skilled manpower and materials permit.

WAR PRODUCTION: Within the next three months war production will decline possibly 15 per cent from present levels. A continued high rate of such output will be necessary until the long pipe lines to the Pacific have been filled. Cutbacks will be spread as evenly as possible and in general it is planned to cut back production first in tight labor areas.

After these pipe lines have been filled the rate of production will depend largely on the progress of the war against Japan.

PRICING: General objective in the production of civilian products will be to bring them back into the market at



the same price or the ceiling they had when they went out of production. On this basis manufacturers can go ahead without any application or consideration by any governmental agency.

If, however, higher costs necessitate higher prices, a formula has been prepared giving consideration to basic wage rates and raw material costs, keeping in mind the unit profit at the time the goods went out of production and the unit profit in the base period 1936-1939.

CONSTRUCTION: Restrictions on home building will not end until manpower and materials are generally available. At least 250,000 homes and apartments are expected to be built in the next 12 months but the figure may go as high as 400,000. Essential repairs can be made now.

MANPOWER: The 48-hour week will continue in many industries and communities, but as victory over Japan draws nearer, workers in consumer goods industries may return gradually to the 40-hour week. War industries will remain on the 48-hour schedule except possibly in the merchant ship program and in those industries whose orders have been cut back deeply.

TRANSPORTATION: Present governmental controls on civilian freight traffic will continue. Total freight tonnage will decrease slightly but switching of traffic to the West may add as much as 10 per cent to the present heavy load in that area.

Passenger travel will not become easier. The ban on conventions will continue. Shortage of tires, batteries and gasoline will not allow unrestricted use of private motor cars.

CONTROLS: Restrictions on the use of materials and facilities will be removed or modified as rapidly as supplies permit.

The end of the European war offers an opportunity to pause and take stock of what industry has accomplished in the emergency period to date.

Since the middle of 1940, United States war expenditures have exceeded $275 billion. Total munitions production was $180 billion. To our allies, we had lend-leased to the end of January more than $37 billion of goods and services, nearly 80 per cent more than our total war expenditures in World War I.

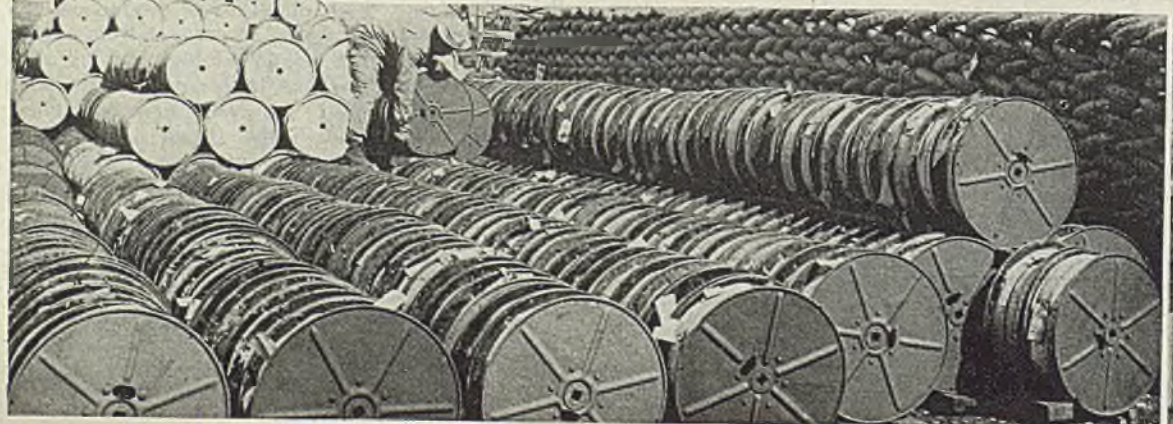
Although industry entered the armament program with a tremendous capacity, the insatiable demands of war required that industrial facilities be greatly expanded in an incredibly short time. New plants had to be built. New machine tools and other equipment installed. Production of basic materials—steel, aluminum, copper, magnesium and others—had to be stepped up. Brand new industries for making synthetic rubber and refineries for producing high-octane gasoline had to be constructed. Power and transportation facilities had to be increased. Metalworking plants which had been making goods for better living had to be converted to the manufacture of the goods of war.

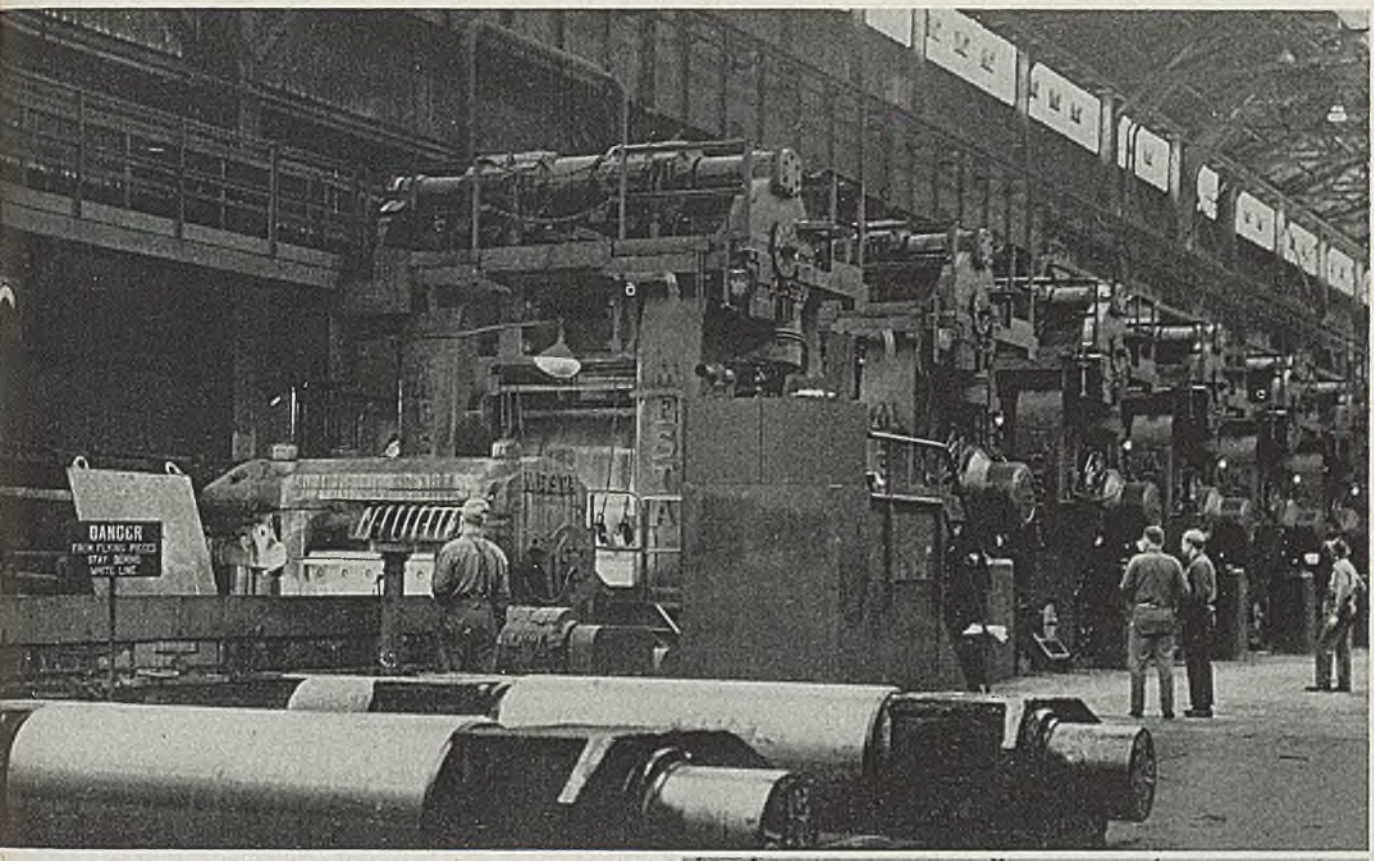
Part of the construction program was financed by the government and part by private industry. The government had expended nearly $33 billion for new construction projects by Jan. 31, of which $17.2 billion went for industrial facilities, a large portion of which were metalworking. Expenditures by private companies, although large, were considerably less than government expenditures.

The declaration of the emergency and the beginning of the armament program found the steel industry with capacity to produce 81,600,000 tons of ingots annually, fully 60 per cent more than maximum output during the first world war and one-third above the tonnage of steel produced in 1929, best peacetime year to date.

The depression of the thirties had been hard on the steel industry and during one year, 1932, output averaged less than 20 per cent of capacity. In five years of the decade the industry had operated at a loss.

Despite the depression, the period from 1930 through 1939 was one of modernization and expansion of steel plants and equipment. Larger and more efficient furnaces were installed. New techniques for making and treating steel were perfected. New machinery was installed, especially continuous wide sheet-strip mills. The industry during this decade of poor business had spent about $1 billion for modernization and expansion. Steel capacity at the start of the



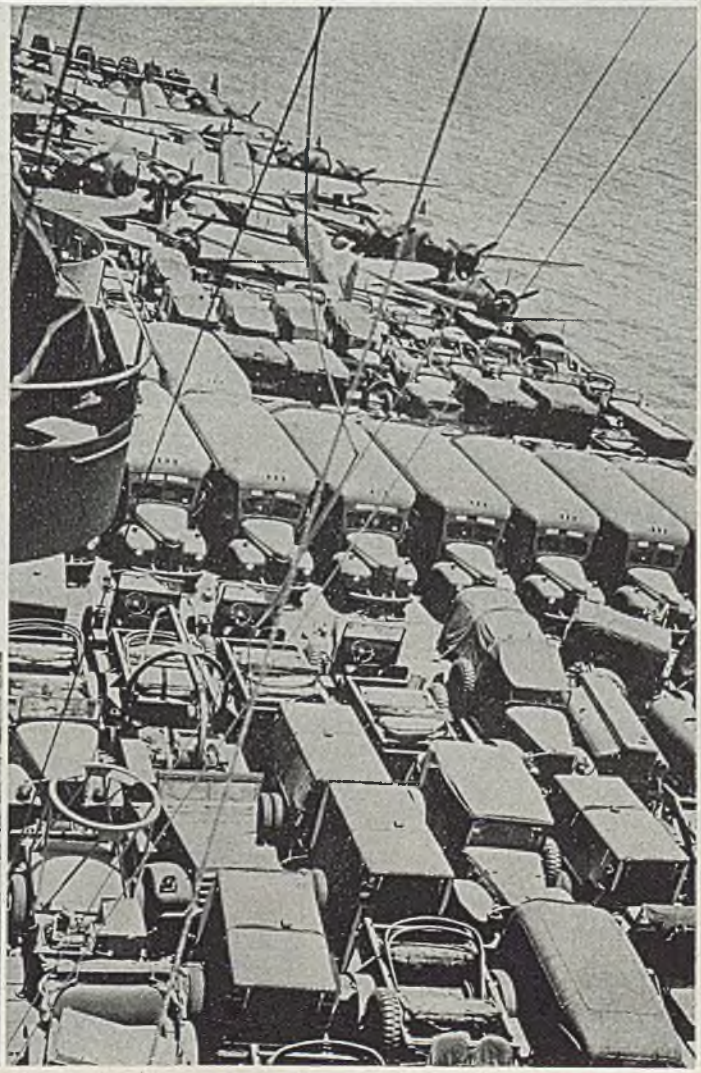


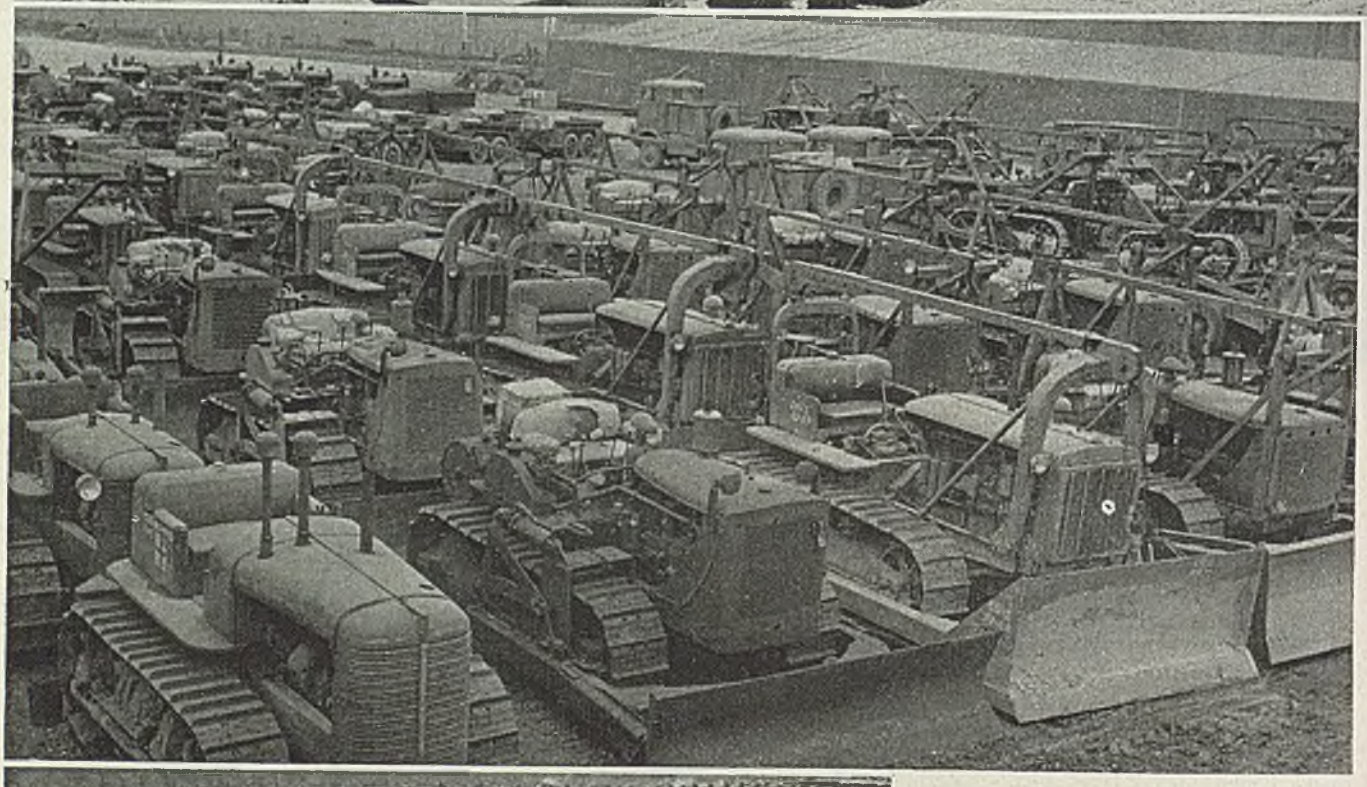
American steel mills produced 414 million tons of steel from July 1, 1940, to May 1 this year, or about the same tonnage as was produced by all other belligerents, allied and enemy. Above photo shows new rolls ready to be installed at Irvin Works of Carnegie-Illinois Steel Corp., Pittsburgh

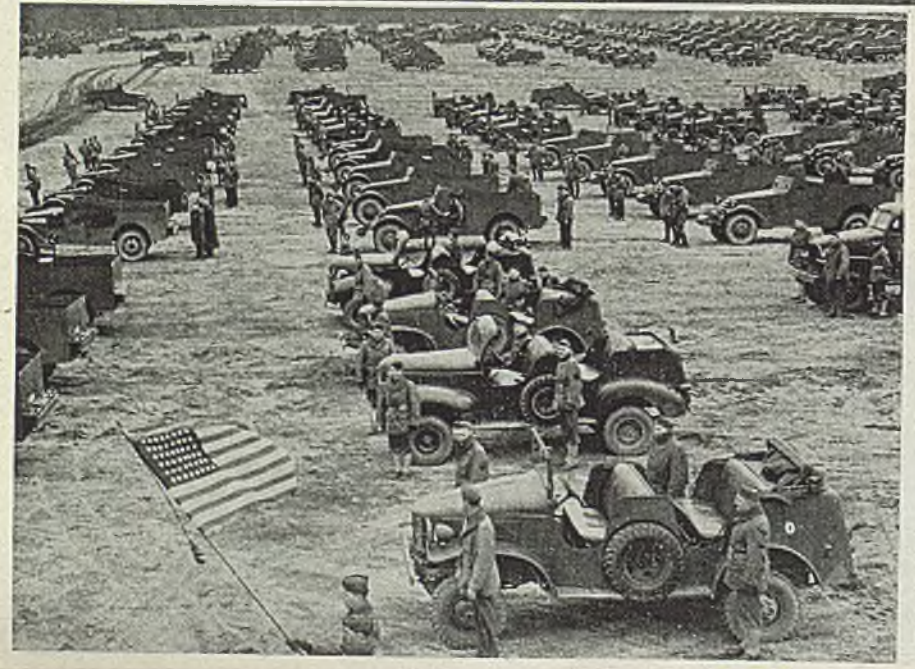
Trucks, buses and jeeps packed on the flight deck of an aircraft carrier, right, are headed for a combat zone

To handle United States supplies stockpiled in England before the invasion engineers built a 17-mile railroad, part of which is shown below

Thousands of miles of telephone wire made in the United States helped build a tremendous communications network in Europe. At lower left, drums of wire are shown stockpiled in England





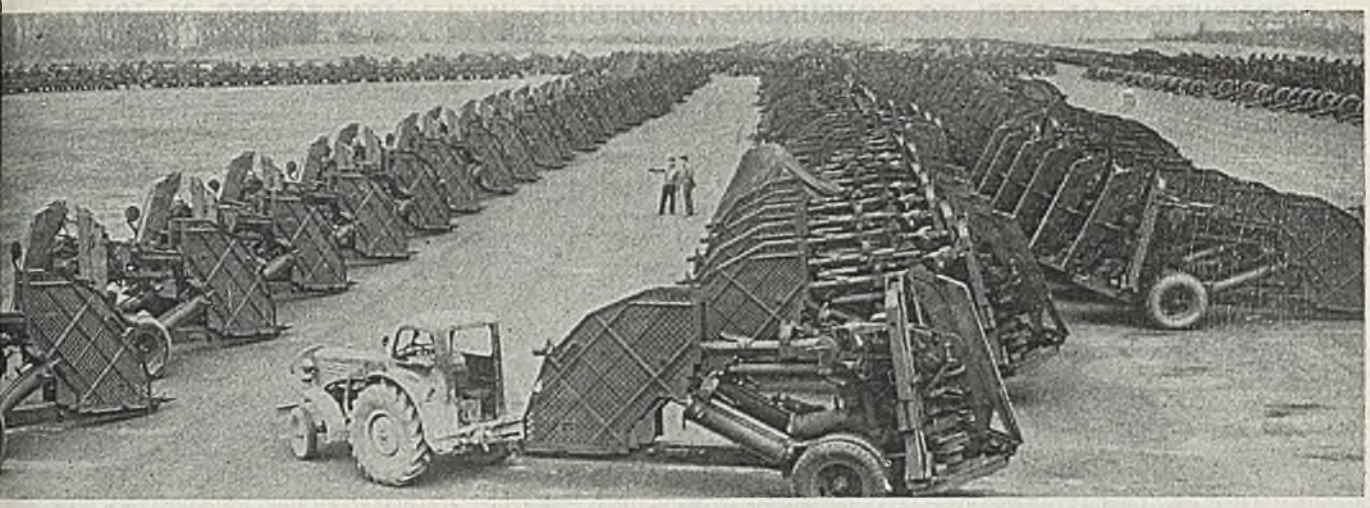


A few of the American-produced vehicles with which the Allies rolled to victory in Europe are shown at upper left

Antiaircraft guns, upper right, are prepared for shipment to battle zones. More than 700,000 artillery units have been built since mid-1940, as compared with 1826 units in the first World War

Tractors and bulldozers, above, by the thousands helped American forces build air strips, clear away rubble, and do other tasks

At left, some 2000 motor vehicles stage a demonstration at an Army camp in this country, an indication of the massed mechanized might to be thrown against the enemy



emergency was far in excess of estimated needs for defense. Notwithstanding, two large privately-financed expansion programs were started in the fall of 1940, more than a year before Pearl Harbor.

As tension increased and demands for steel for war goods increased, new expansion programs were launched, some financed by private companies and others by the government. A large part of the new facilities was designed to meet the immediate demand for special steels for war purposes.

When the program was completed, the industry's rated capacity had been increased 17 per cent, or nearly 14 million tons, to 95,505,280 tons on Jan. 1, 1945. The increased capacity alone would represent a sizable steel industry for most countries. It is about as much steel capacity as England had of its own, more than France had before the German invasion, twice as much as Japan ever admitted having, probably as much as Russia was able to keep out of German hands, and probably more than a third as much as Germany had at the height of its power.

Pig iron and ferroalloy capacity underwent a comparable expansion, from 55,723,640 tons on Jan. 1, 1940, to 67,313,890 tons on Jan. 1, 1945, an increase of about 11.6 million tons, or 19 per cent.

Slightly more than half the cost of the steel expansion, or $1151 million, was paid by the private companies and the remainder, $1063 million, by the government.

Productive capacity for the light metals was increased greatly. Since 1940, magnesium plant has been expanded almost 90-fold. The increase in aluminum has been about 600 per cent.

The expansion in the productive capacity of basic materials was accompanied by a switching over of established plants from civilian goods to war materiel. This conversion of vast industrial facilities to munitions output in a few months long will stand as one of the miracles of American management.

Automobile plants ceased to produce passenger cars and directed their facilities to the building of tanks, trucks, guns, ammunition, airplanes and aircraft engines, and other mechanized war equipment. Business machine manufacturers produced machine guns and other automatic small arms. Rubber plants made guns as well as tires for aircraft and motorized ground equipment. Stove manufacturers built parts for tanks and aircraft.

The conversion task involved the building up of a vast system of subcontracting. Munitions contracts generally ran into large figures, often greater than a small or medium size company could handle alone. The complexity of manufacturing operations was so great as to preclude one company from performing all operations. Also the capacity of the large companies which might be able to handle the contracts was inadequate to turn the materiel out in the volume required; the capacity of the smaller plants likewise was required.

So a system was developed whereby orders were placed with prime contractors who would farm out part of the contract to smaller manufacturers, who in turn might farm out a portion of their subcontracts to a still lower tier of subcontractors. Thus the entire industrial resources were mobilized for the war effort and production on a vast scale was underway.

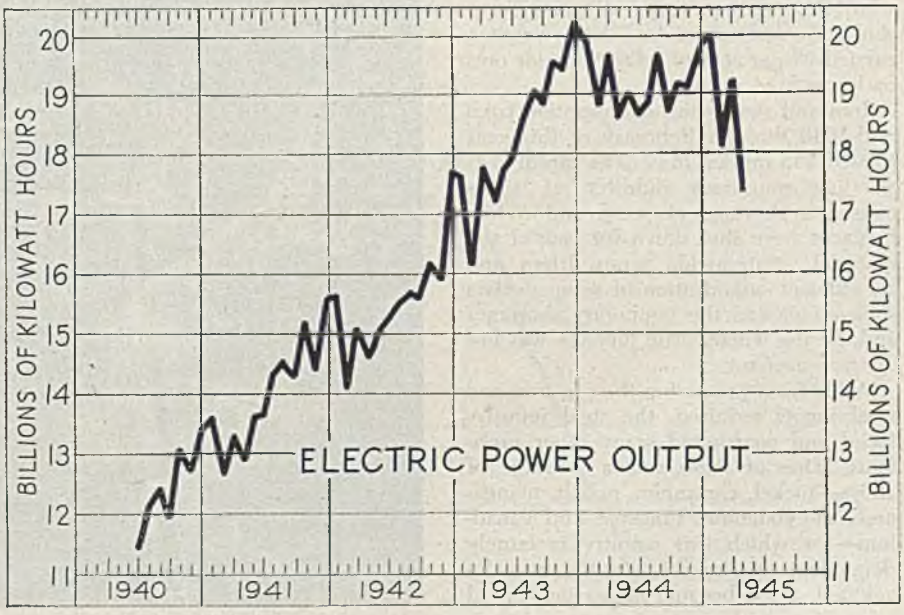
How large has this production been?

No one can say definitely when the war effort began. On May 16, 1940, President Roosevelt outlined a great armament program, calling for 50,000 airplanes a year, and other vast quantities of munitions. By the first of July that year, the program was beginning to be translated into production.

Therefore, July 1, 1940, is arbitrarily selected as the start of the armament program in compiling the figures which follow (except where otherwise noted).

From July, 1940, to the first of May, 1945, the United States steel industry produced 414 million tons of ingots. A major portion of this has gone into war production either directly or indirectly.

Shipbuilding was the largest individual consumer, taking 13 per cent of the total. Shipbuilding demands for steel reached its peak in 1943 when it re-



DISTRIBUTION OF STEEL TO CONSUMING INDUSTRIES, JULY 1, 1940, TO DEC. 31, 1944

(Thousands of Net Tons)

Year	Ship-building	Dis-tributors	Autos, Aircraft	Rail-roads	Con-struction	Con-tainers	Agri-cultural	Machin-ery and Tools	Pressing and Forming	Oil and Gas	Mining and Quarrying and Lum-bering	Steel Convert-ing and Processing	Misc. Indus-tries and Exports	Grand Total
1944	10,287	8,008	2,039	5,425	4,454	3,696	1,092	2,486	2,921	1,267	212	5,589	12,874	60,350
1943	11,509	6,824	2,519	4,527	4,485	3,574	713	2,531	2,484	1,175	205	5,170	14,191	59,907
1942	9,440	5,962	2,122	4,318	8,660	3,666	570	2,540	2,717	1,090	238	4,293	14,848	60,464
1941	2,733	9,200	6,392	5,681	8,128	4,489	1,154	2,871	6,322	1,736	249	4,798	8,731	62,484
Last half 1940	470	3,343	3,617	1,889	2,484	1,493	460	943	1,080	495	71	1,464	5,117	22,926
Total	34,439	33,337	16,689	21,840	28,211	16,918	3,989	11,371	15,524	5,763	975	21,314	55,761	266,131

quired about 20 per cent of all steel produced.

Construction took more than 10½ per cent of the total steel made during this period for building new aircraft factories, shipyards, steel plants, other munitions factories, military establishments and housing. Construction reached its peak in 1942 when it took 14½ per cent of steel produced.

Machinery and tools consumed 4.3 per cent of the total; railroads, about 8 per cent; automotive and aircraft, 6.3 per cent; containers, 6.4 per cent.

For reasons of military security, the destination of much of the steel was not revealed. Thus "miscellaneous industries and exports" received 21 per cent of the total and "steel converting and processing" took about 8 per cent.

Pig iron production during the July 1, 1940, to May 1, 1945, period approximated 286 million tons.

The production of these vast tonnages of pig iron and steel required huge amounts of raw materials—iron ore, scrap, coal, limestone. Approximately 465 million tons of iron ore have been consumed since mid-1940, about 85 per cent of which came from the Lake Superior district. Throughout the war, ore has been the only raw material which has never been in short supply. Most of the ore was supplied by pre-war mines which underwent a minimum of expansion. The remarkable production achievements of the mine operators was matched by the lake ship operators, who despite handicaps of manpower shortages and occasional bad weather, carried 98 per cent of Lake Superior ores to lower lake ports.

Iron and steel scrap consumption from mid-1940 through February of this year totaled 245 million tons. The rapidly expanding munitions industry at times caused a shortage of scrap and a few furnaces were shut down for lack of the material. Nationwide scrap drives and an efficient organization of scrap dealers soon eliminated the temporary shortages and, on the whole, little tonnage was lost on this account.

Aside from producing the pig iron and steel ingots required, the steel industry faced and confronted many other problems. One of these was a shortage of alloys—nickel, chromium, cobalt, manganese, molybdenum, tungsten and vanadium—for which this country is largely dependent on imports. As the war developed, these became increasingly hard to get, and a means had to be found to adjust alloy steel production to both requirements and to the shortage of alloying elements.

Working through the American Iron and Steel Institute, a committee of experts developed a brand new series of alloy steels which used less of the critically scarce elements but which provided the necessary strength, hardenability, ductility and so forth. These became famous as the National Emergency (NE) steels.

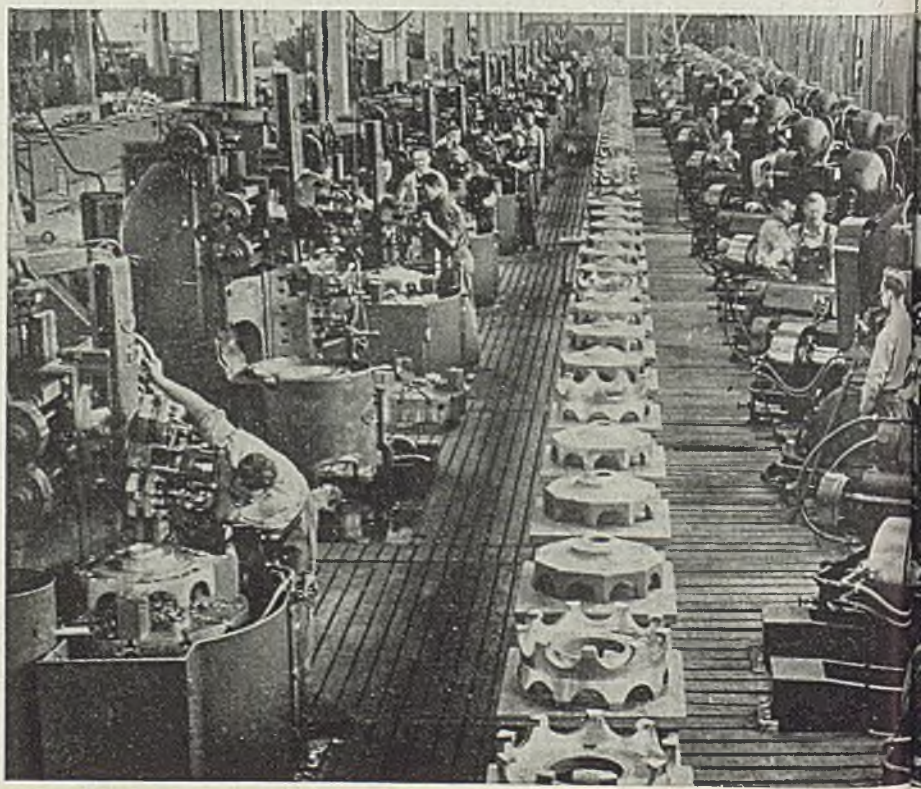
Another problem was providing steel plates for the expanded ship and tank programs. Plate rolling capacity was not sufficient to meet the greatly increased demand, nor were time, materials and manpower available to build new mills. This problem was solved by converting continuous wide sheet-strip mills to enable them to roll plates.

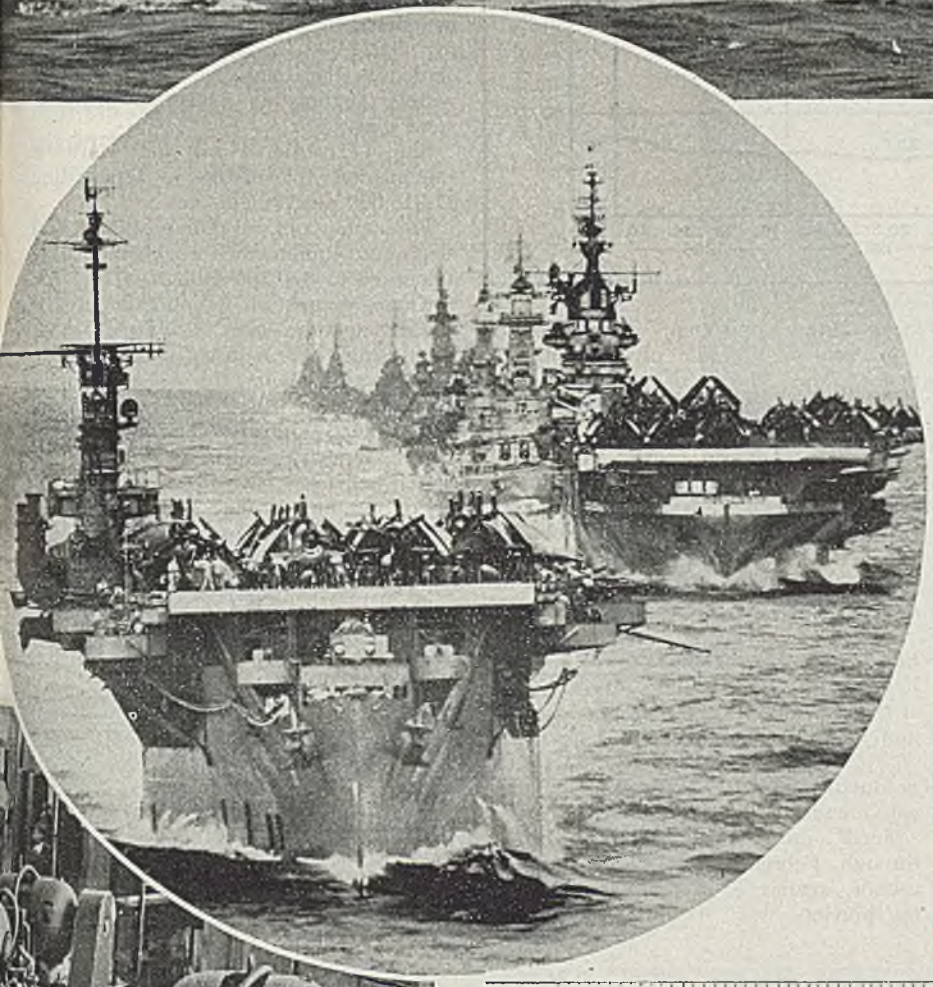
Among the most critical needs of the war was that for machine tools. New munitions industries and the converted peacetime plants required more tools than it appeared possible for the machine tool industry to produce. Time and again the industry was called upon "to do the impossible" and did it.

To meet war requirements, the machine tool industry has expanded to more than six times its maximum size in World War I. Machine tool production of $200 million in 1939 was doubled in 1940, rose to $772 million in 1941, and reached an all-time peak of $1322 million during 1942. In 1943, output eased off to $1180 million and in 1944 dropped to $498 million. From mid-1940 through March of this year, the industry's output totaled $4034 million, of which the government bought more than $3 billion. In addition, exports amounted to $850 million, mainly to England and Russia.

When the President in a special message to Congress in January, 1942, called for the production of 60,000 airplanes in that year, and 125,000 in 1943, the program was greeted with derision by Axis leaders as a fantastic and unattainable goal. Even American industrialists were staggered by the size of the program, but undertook the job.

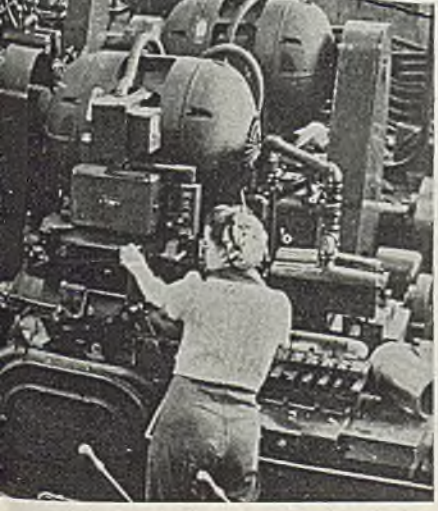
How near we came to meeting the goal is indicated by military acceptance of 47,873 planes in 1942 and 85,946 in 1943, 96,370 in 1944. Changes in design which slowed production and increasing emphasis on heavy bombers were the

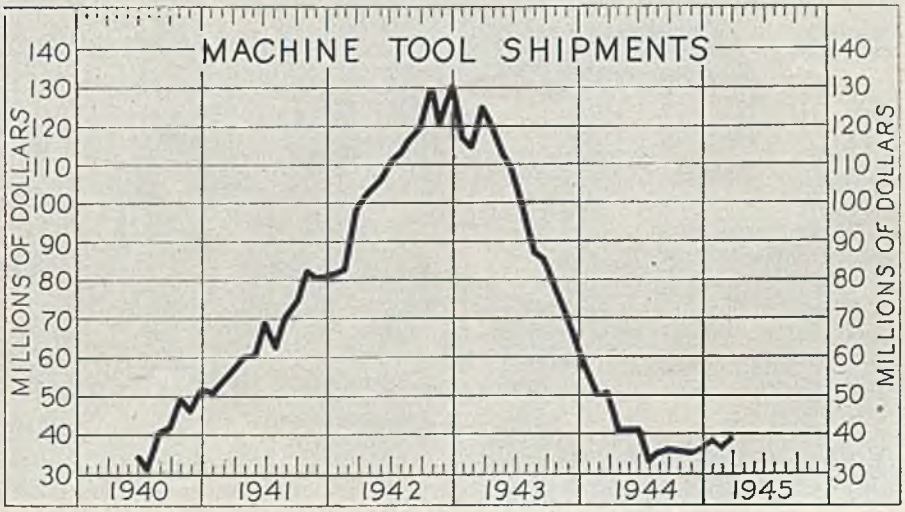


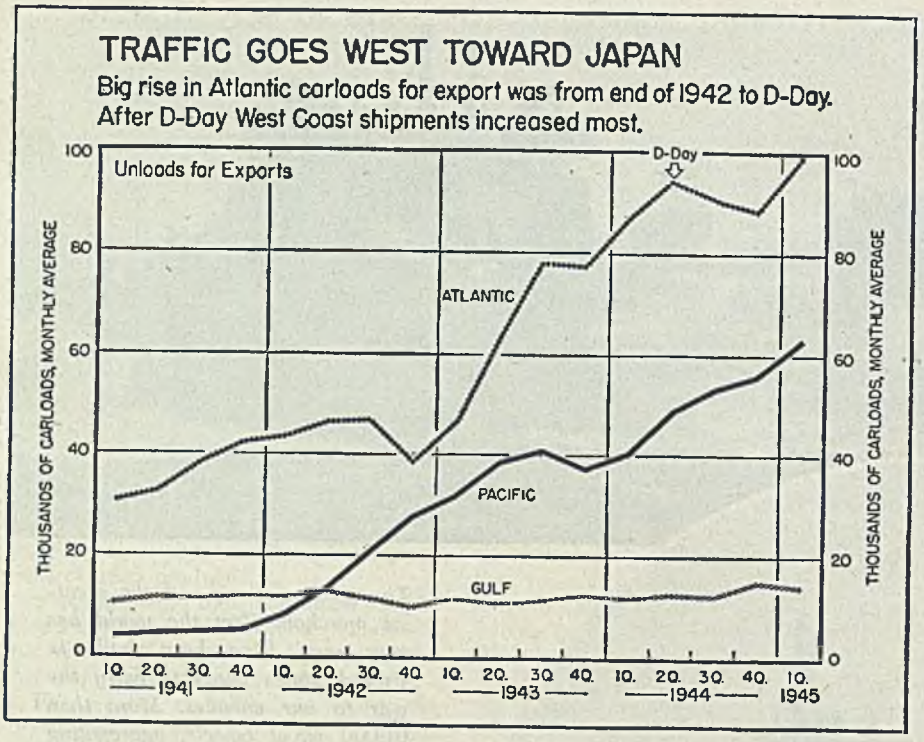


The greatest Navy and the greatest merchant fleet the world has ever seen have been built in United States yards to carry the war to our enemies. More than 61,000 *naval vessels, aggregating* 7,331,000 *displacement tons, have been completed since the middle of* 1940. *In the same period, American yards turned out for the Maritime Commission* 4878 *ships, having an aggregate of* 47,913,000 *deadweight tons. Upper photo shows a flotilla of LSTs (landing ship, tank) en route to enemy shores. Circle shows naval task force with two aircraft carriers in foreground, followed by three battleships and three cruisers*

Time after time the machine tool industry was called upon to do the impossible in providing critically needed tools for munitions factories. Shown at left below is a battery of tools machining crankcase forgings at the Dodge Chicago plant. Chart below shows the fluctuations in machine tool shipments







With Germany defeated, shipments of men and materiel will be toward the west to finish the war against Japan. Chart at left shows the history of freight movement to export ports since America entered the war

chief reasons why the goals were not fully met.

From July, 1940, through February of this year, production of military and special purpose planes totaled 266,194, having an aggregate airframe weight of 137,471,000 pounds.

In contrast, the United States Army had only 740 battle planes at the time of the armistice in 1918. Total production of aircraft in World War I, including service planes, was only 7889.

Aircraft engine acceptances from the beginning of 1941 through March of this year totaled 720,280, having an aggregate horsepower of 1,088,452,000. Average horsepower per unit has increased from 912 in 1941 to 1637 in March this year.

Tank production through February amounted to 78,730 units, compared with 64 available at the signing of the 1918 armistice.

One of the pressing needs in the European war has been for trucks to carry materiel and men. Truck production from the middle of 1940 to the first of May amounted to more than 4 million units, of which 4,385,000 were military units.

Other mechanized ground units have been produced in huge quantities during the past five years. Output of armored cars amounted to 15,393 as of Feb. 28. Scout cars and carriers totaled 82,963. Tank chasses for self-propelled guns numbered 15,231.

A total of 11,529,021 rifles and carbines was produced to the end of February, compared with 3,210,000 rifles at the end of November, 1918. Machine gun output was 2,527,521, compared with 226,557 in the first war. Artillery production totaled 701,071 pieces, compared with 1826 in World War I.

Small arms ammunitions output through February was 38,265 million rounds, against 3500 million rounds in the previous war. Artillery ammunition production was 289,519,000 rounds, compared with 18,294,000 rounds to the end of November, 1918.

America during the past five years has built both the greatest Navy in the world's history and the greatest merchant fleet ever assembled.

A total of 61,159 naval vessels was completed by the end of February, totaling 7,331,000 displacement tons. Included in this total are 55,305 landing vessels, aggregating 2,634,000 displacement tons.

Ships constructed for the Maritime Commission totaled 4878, aggregating 47,913,000 deadweight tons.

Production of communication and electronic equipment through February amounted to $10,106 million.

These figures on production in the major categories give a fair picture of what American industry has done to date toward winning the war. Although the production has been gigantic and has strained industry's capacity to the utmost, industry's earnings after renegotiation and taxes have been modest.

For example, the steel industry's profits have declined steadily since 1941 and in 1944 were less than half those realized in 1929, despite a much heavier volume of business. The industry's profits, capitalization and return on investment for 1929 and the war years:

Years	Net Profits	Capitalization	% Return on Investment
	(000,000)		
1944	$196	$4,500	5.02
1943	201	4,503	5.06
1942	221	4,494	5.63
1941	327	4,405	8.09
1940	281	4,266	7.53
1929	394	4,440	9.28

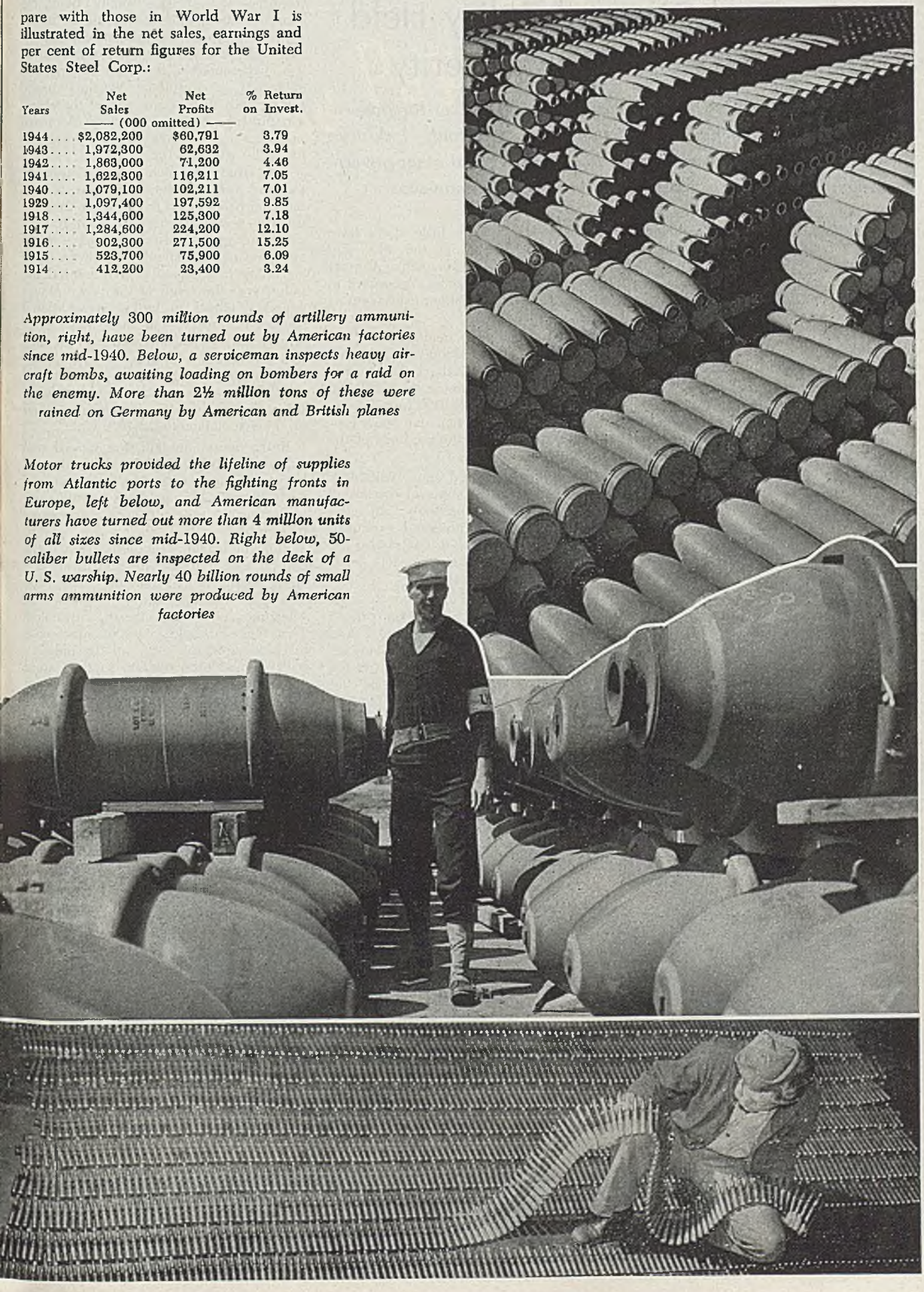
How profits in the present war com-

pare with those in World War I is illustrated in the net sales, earnings and per cent of return figures for the United States Steel Corp.:

Years	Net Sales	Net Profits	% Return on Invest.
	(000 omitted)		
1944	$2,082,200	$60,791	3.79
1943	1,972,300	62,632	3.94
1942	1,863,000	71,200	4.46
1941	1,622,300	116,211	7.05
1940	1,079,100	102,211	7.01
1929	1,097,400	197,592	9.85
1918	1,344,600	125,300	7.18
1917	1,284,600	224,200	12.10
1916	902,300	271,500	15.25
1915	523,700	75,900	6.09
1914	412,200	23,400	3.24

Approximately 300 million rounds of artillery ammunition, right, have been turned out by American factories since mid-1940. Below, a serviceman inspects heavy aircraft bombs, awaiting loading on bombers for a raid on the enemy. More than 2½ million tons of these were rained on Germany by American and British planes

Motor trucks provided the lifeline of supplies from Atlantic ports to the fighting fronts in Europe, left below, and American manufacturers have turned out more than 4 million units of all sizes since mid-1940. Right below, 50-caliber bullets are inspected on the deck of a U. S. warship. Nearly 40 billion rounds of small arms ammunition were produced by American factories



Surplus Tool Disposal Policy Held Vital Key to Postwar Prosperity

Tool and die industry offers huge postwar market for government surplus machine tools, Senate committee told. Industry's equipment should be replaced but tax relief and other government aid needed to finance purchases, spokesman says

GOVERNMENT policies and procedure in the disposal of its tremendous surplus of machine tools will have a vital bearing on the postwar prosperity of the nation and full employment, R. F. Moore, president, National Tool & Die Manufacturers Association, told a special subcommittee of the Senate Special Committee to Study Problems of Small Business, at a recent hearing devoted to disposal of surplus war property.

Studies of the possibilities of gainful employment in the various categories have revealed that if the total is even to approach the 60 million figure talked of by administration leaders, small business must absorb a far greater number of employes than would be normally expected, said Mr. Moore, pointing out that among manufacturing industries in which small enterprises predominate, the special tool and die industry is outstanding.

This industry is comprised of some 4000 to 6000 shops, including only a few with more than 100 employes. The average shop employs from 20 to 35 men, most of whom are highly skilled toolmakers, diemakers, or gage makers. No one knows how many little shops have been established during the war, employing from two to ten men. A great many of these latter shops, according to Mr. Moore, will be unable to survive during times of peace.

It is not generally realized, he told the committee, that a $3000 machine tool is rendered useless by the lack of a $30 milling cutter, for example, or a $10,000 press by the lack of a $1000 forming die. In fact, he declared, machine tools cannot be made without the products of the tool and die industry.

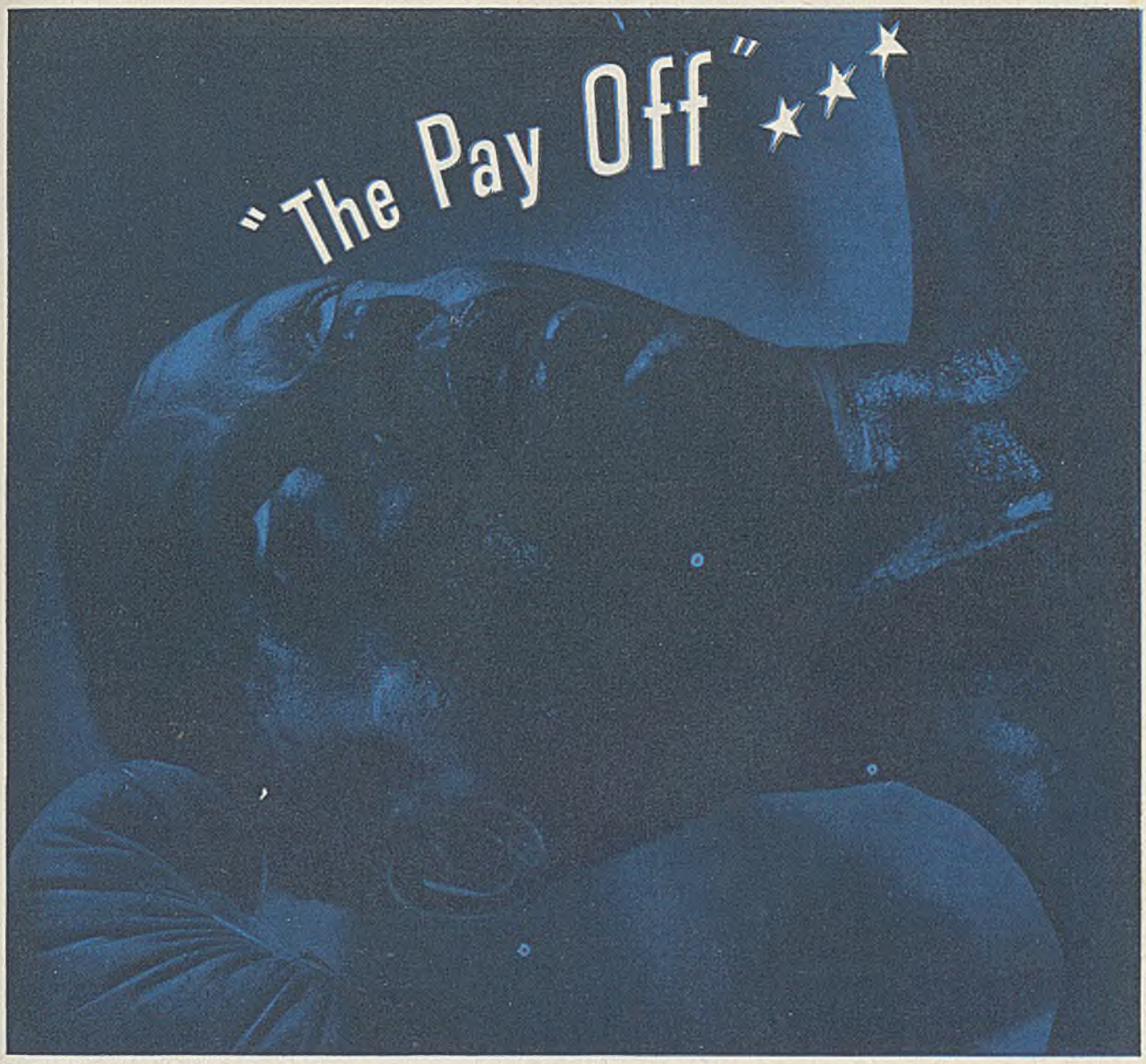
The industry is based upon availability of highly skilled manpower operating highly precise machine tools. It relies almost wholly upon universal or multipurpose machine tools, in contrast to the single-purpose equipment largely used in manufacturing plants.

Mr. Moore pointed out that the tool and die shops are operated on private capital and ordinarily are owned and managed by one or two individuals, chiefly men who have come up from the ranks of tool and diemakers. He described the trade as a "feast or famine" industry, the "feast" usually being of short duration, and the "famine" much longer. Because of this, machinery in tool and die shops was quite advanced in age at the outset of the war and has been subjected to additional wartime usage for the past three years. It is, therefore, a natural market for a considerable share of the government's surplus machine tools, he said.

The large expansion of the established tool and die shops during the war, for the most part, has been financed by drawing upon their cash resources without government aid or the installation of government-owned equipment. However, quite a number of companies have entered the industry as the result of the procurement agencies' efforts to build up additional sources of supply, and these have been largely government-financed. From such new and well equipped shops, severe postwar competition may be expected and it will be imperative that the older shops, privately financed, modernize their machine tool facilities.

Furthermore, he said, the special tool and die industry has the distinction of having its customers as its competitors. Large manufacturing plants buying their tools from the contract shops also operate tool rooms within their own plants. Within the machine tool industry and the cutting tool industry, he said, there are large producers of "standard" tools who also manufacture "special" tools as an accommodation to their customers. Therefore, he held, without up-to-date machine tools, the tool and die industry will be unable to operate to the extent necessary to support its present level of employment, to say nothing of offering

SETS PRECEDENT. In an unprecedented move the U. S. Chamber of Commerce re-elected Eric Johnston of Spokane, Wash., as president for a fourth term. He is shown with other members of the C. of C. after hearing results of the election. Left to right, are Joseph W. Evans, Evans & Co., Houston, Tex.; E. H. Sexauer, president, George P. Sexauer & Son, Brookings, S. D.; Roy C. Ingersoll, president, Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago; Mr. Johnston; William K. Jackson, vice president, United Fruit Co., Boston; Carlyle Fraser, president, Genuine Parts Co., Atlanta, Ga.; and Ralph Bradford, general manager and chief executive officer of the C. of C. Mr. Johnston announced that C. of C. directors have approved labor and management's industrial peace charter calling for a labor-management partnership to bring the highest possible production and employment at wages assuring a steadily advancing standard of living. NEA photo



This boy tried hard—but he lost.

He was searching for something. In his simple way, he believed he'd find it in the prize fight game. But he didn't seem to have the Big Plan thought out, or something. He lost.

It's that way with people, with organizations, with nations. To survive, we've got to do a lot of thinking. This is a time for it—individually and collectively.

Because this is the Second World War. A Third might reduce all of us, our hopes, our essential rightness, to a pile of ashes. This is a time for straight thinking.

We at Bryant have been trying to see things straight. Some time ago we realized that as essential suppliers to industry we had better have a pretty solid plan. A plan based upon search and research—upon a knowledge of new and better methods of building the needed things of peace—upon service to all comers who might use our specialized knowledge to build a better America. That seemed a good plan, and it has been.

For today, our engineers are working with the engineers, designers and planners of scores of successful American businesses, and many new ones, large and small—helping them to plan now, conversion of their plants, skills and machines to all-out production of new and better products for a prosperous peace.

If you are a manufacturer, we invite you to call us in today.

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

work to additional thousands of people.

Emphasizing the need for up-to-date equipment to enable these 4000 to 6000 shops to operate to the extent necessary to increase its present employment, Mr. Moore said:

"Tool and die shop owners would much prefer to pay cash for such machine tools as they need, using their own funds. The most satisfactory method of stimulating sales of surplus equipment to these shops would be a revision of the federal tax law to allow small business to retain some of its profits for capital expenditures. Raising the excess profits tax exemption from $10,000 to $25,000 would be highly desirable. Immediate negotiability of postwar excess profits tax refund bonds would be a valuable aid. In renegotiation, full consideration of the need for permitting small business to develop cash reserves would be very helpful. And the removal of the growing danger of further drains upon liquid capital, as threatened by the current repricing activities of the procurement agencies, is essential. Title VIII of the Internal Revenue Act of 1943, at least insofar as it applies to small enterprise, should be repealed.

"Even under more favorable tax provisions, many tool and die shops will still be unable to pay all cash. To aid them in buying surplus equipment, it should be made available to financially responsible firms on a long-term payment plan, at low interest rates."

Mr. Moore further recommended that special incentive for replacement of old machine tools from the government's surplus would aid in their disposal.

Reluctant To Scrap Equipment

"Owners are naturally reluctant to scrap equipment which is still carried on their books at considerable value, even though it should be replaced by newer tools," he said. "Provision for the allowance of accelerated depreciation on old machine tools now owned by tool and die shops would supply such an incentive. Or it might be more feasible to supply this incentive by a special discount on the price of any surplus machine tool sold to replace an old one then in actual use in a tool and die shop.

"It may properly be said that the tool and die industry is the cornerstone of mass production. Without the special tooling equipment which it provides to adapt machine tools to the efficient production of almost any metal or plastic article for war or peace, the factory would stand idle."

Summing up his argument, Mr. Moore said that adoption of the industry's recommendations will greatly facilitate disposal of many thousands of machine tools to tool and die shop owners. According to industry estimates, these shops could buy to advantage some 15,000 lathes, 10,000 milling and boring machines, 4000 presses and 21,000 grinders.

THOMAS B. McCABE

LIQUIDATOR: Active direction of the disposal of Army-Navy overseas surplus property has been assumed by Thomas Bayard McCabe, commissioner of the Office of Army-Navy Liquidation, a joint military and civilian disposal organization. Mr. McCabe is on leave from duty as chairman of the Federal Reserve Bank of Philadelphia and president of the Scott Paper Co. He has served in the Advisory Commission for the Council for National Defense; Office of Production Management; Lend-Lease Administration; United States Committee for Inter-American Development; and Business Advisory Council for the Department of Commerce

Zinc Industry Opposes Additional Tariff Cuts Threatened in Trade Agreement Act

OBJECTIONS to additional tariff reductions threatened by the new bill (H. R. 2652) extending the Reciprocal Trade Agreements act were made by Ernest V. Gent, secretary, American Zinc Institute, in a statement presented at a recent hearing before the Ways and Means Committee of the House.

Various zinc products have already suffered severe tariff cuts, said Mr. Gent. The Canadian agreement reduced duties on imported zinc ore and slab zinc 20 per cent, while the subsequent agreement with Mexico brought further cuts representing total reduction on these items of a full 50 per cent of the 1930 tariff rates.

The new bill in the House, introduced on March 16, provides for extension of the act for three years and authorizes reductions of 50 per cent below Jan. 1, 1945, levels.

According to the Zinc Institute, the present status of zinc duties and what could happen to certain items should the new legislation be passed, is illustrated by the following examples:

	Tariff Act of 1930	Reduced by Canadian Agreement (effective Jan. 1, 1939) to	Reduced by Mexican Agreement (effective Jan. 30, 1943 and in effect Jan. 1, 1945) to	New bill Authorizes Reductions to
Zinc-bearing Ores	Par. 393 — 1.50c lb.	1.20c lb.	.75c lb.	.37½c lb.
Slab Zinc and Zinc Dust	Par. 394 — 1.75c lb.	1.40c lb.	.87½c lb.	.43¾c lb.
Zinc Sheets	Par. 394 — 2.00c lb.	2.00c lb.	1.00c lb.	.50c lb.

(Severe tariff cuts have also affected zinc oxide, zinc sulfate and cadmium)

"It is true," said Mr. Gent, "that the Mexican agreement states that the above zinc rates, 30 days after the termination of the present emergency, are to be restored to the level which still represents a 20 per cent cut from the 1930 rates. But now the State Department requests the power, under the new bill, to reduce by 50 per cent 'any rate of duty, however established, existing on Jan. 1, 1945.'"

This, in the view of the zinc industry as stated by Mr. Gent, can only be interpreted to mean that not only will the low rates under the Mexican agreement be frozen, but also they will be further reduced by 50 per cent.

"Under these circumstances," said Mr. Gent, "and in view of the great peril which already confronts our industry and those dependent upon it for a livelihood, we must oppose the transfer from the legislative body to the executive branch of the government of the additional broad powers proposed in the new bill."

Mr. Gent quoted Dean Acheson, assistant secretary of state, who in a recent radio broadcast said, "Of course, in the long run, and not too long a run either, living standards in other countries must be brought closer to ours if we want them to be good customers. We can do this by helping them to industrialize. As their standards are raised, and become equalized with those of the United States, they will be less likely to undercut our market by producing goods that are too low in price because of sweated labor."

"But what are we going to do in the meantime?" asked Mr. Gent. "This broadcast apparently recognizes that such

foreign imports may well be at the expense of American labor."

In spite of misstatements and overemphasis upon the complete exhaustion of our minerals, our reported overnight change to a "have not" nation, this country, Mr. Gent pointed out, is still the largest producer and also the largest consumer of zinc in the world.

After reference to the thousands of persons directly and indirectly dependent upon the zinc industry, Mr. Gent mentioned the doubling of production which was required to fill American war needs and the heavy shipments to our allies under Lend-Lease.

"Surely," said Mr. Gent, "this large war demand illustrates the importance of zinc from the defense angle alone. Is it common sense to depend too much upon outside sources for such an essential raw material as zinc? If zinc imports are promoted at the expense of the domestic industry, some day we shall wake up to find that our industry has dried up and can no longer deliver the basic materials needed for the defense of our country."

Makes Four Recommendations

The Institute in its statement before Chairman Doughton's committee submitted four specific recommendations:

1. We urge that, because of the uncertainty of the times, any extension of the act should be limited to one year and that, in such extension, no additional powers to reduce tariff rates should be delegated to the President and the State Department.

2. We urge that, because the act touches upon the very foundation of the nation's economy, because of its potential bad effect upon postwar employment, if broader powers be transferred to the executive branch of the government, specific powers of review by the legislative branch should be reserved.

3. It is suggested that an amendment be incorporated in the act which will make mandatory the exercise of the so-called "escape clauses" in the various Reciprocal Trade Agreements.

4. It is suggested that an amendment be incorporated in the act which will make mandatory, adjustments in the tariff rates when fluctuations in foreign exchange are excessive.

Appointments-Resignations

John L. Beckham has been appointed acting vice chairman for labor production, War Production Board, to serve during the absence of Vice Chairman Joseph D. Keenan who is being loaned by WPB to the War Department for an assignment in Germany. Mr. Beckham will fill also the post of deputy vice chairman on production readjustment. Irving J. Brown, formerly deputy vice chairman for production readjustment, has accepted directorship of the Labor and Manpower Branch, Enemy Countries Division, Foreign Economic Administration.

PRIORITIES–ALLOCATIONS–PRICES

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

L ORDERS

PLUMBING, HEATING EQUIPMENT: The following three schedules of the plumbing and heating simplification order, L-42, have been revoked: Low-pressure heating boilers, cast iron radiators, and radiator supply valves, thermostatic, float and boiler return traps. (L-42)

SHOTGUNS: Order L-55, governing production of shotguns, has been revoked. (L-55)

OFFICE SUPPLIES: Order L-73, governing use of iron and steel in certain types of office supplies, has been revoked. (L-73)

WATTHOUR METERS: Order L-151 which limited manufacture of domestic watthour meters to quotas assigned by WPB and regulated deliveries of meters to the most essential needs, has been revoked. Direction 3 to order U-1, restricting deliveries of meters to utilities, has not been revoked. (L-151)

NON-MECHANICAL PENCILS AND PEN HOLDERS: Order L-227-b, restricting production of wood-cased and other non-mechanical pencils and pen holders, has been revoked. (L-227-b)

CIVILIAN AMMUNITION: Removal of restriction limiting the distribution of center fire ammunition for civilian use to 17 western states, under direction 1 to order L-286, has been announced by WPB. The direction extends the program for the channeling of available supplies through Dec. 31, 1945. (L-286)

M ORDERS

IRON AND STEEL: Order M-21 has been revised and expanded to establish it as the ultimate sole authorization governing the production of iron and steel during the transition to a one-front war. Currently, order M-21-a, which pertained to alloy steels, has been revoked and its major provisions have been incorporated in order M-21.

At the present time, M-21 is supplemented by orders L-88, L-211, M-6-a, M-6-b, M-17, M-18-a, M-21-b-3, M-21-i, M-21-j, M-23-a, M-24, M-24-b, M-39, M-110, M-126, M-296, M-369, and M-369-a.

Steel products have been redefined in schedule I of the revised order to include all carbon and alloy steel products as well as wrought iron. The order also covers pig iron and iron and steel scrap.

Under schedule II, the order has been expanded to include jurisdiction over all of the metallic and nonmetallic elements, the ores and chemical compounds thereof and the ferroalloys used in the metallurgy of iron and steel.

The revised order maintains broad controls not only over the production of iron and steel, alloys and ferroalloys, but also over melt schedules and the use of facilities in the production of these products. (M-21)

STORAGE BATTERIES: Order M-38 has been amended to allow producers of electric storage batteries for civilian consumption to use, during May and June, up to 80 per cent of lead consumed for the same purpose in the corresponding period of 1944. Manufacturers previously were restricted to 75 per cent of lead used in 1944. Appeals from restrictions of the order now must be screened through the WPB field offices. (M-38)

JEWEL BEARINGS: Order M-50, governing use of jewel bearings, has been revoked. (M-50)

CHEMICALS: Suppliers of perchlorethylene, used for metal degreasing, now are required to list the names of all customers ordering more than 3500 pounds of the metal cleaner a month. Orders for less than 3500 pounds a month are grouped and reported in terms of usage. Quarterly reports must be filed on form WPB-3442 of stocks and consumption in order to check actual use and inventories of customers. This report is required of customers ordering 21,000 or more pounds of the cleaner for delivery during the second quarter of 1945, and for customers ordering 10,500 or more pounds for delivery in any subsequent quarters.

Producers requesting allocations of phosphate and phthalate plasticizers for insulation of wire and wire cable now are required to specify the type of wire for which the material is required. Customers' applications (form WPB-2945) must be submitted now by the 17th of the month while suppliers' form (WPB-2946) are due on the 22nd of the month. (M-300)

CALCIUM METAL: Order M-303, establishing allocation control of calcium metal, has been revoked. (M-303)

U ORDERS

TELEPHONE SERVICE: Under order U-2, as amended, new businesses are to receive telephone service ahead of all other applications, except those for war and essential civilian needs with schedule A status, and business change of address applications. Members of the Merchant Marine and their families are now included in the revised order in the definition of schedule C applications. Provision restricting the number of telephones that were permitted in any central office to 105 per cent of capacity figured on prewar standards has been eliminated. (U-2)

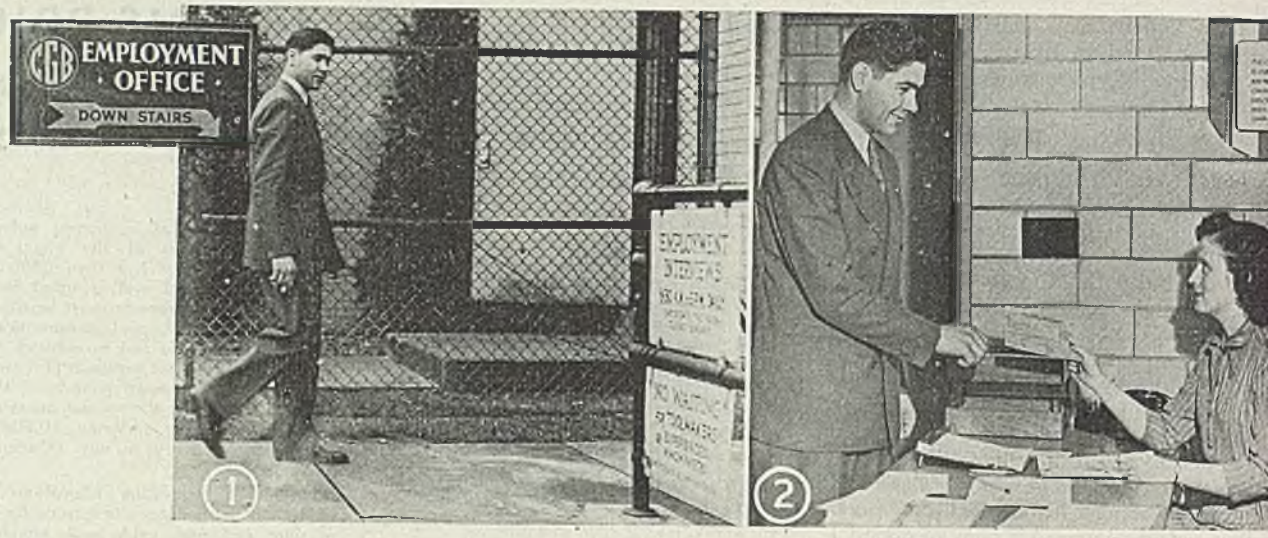
PRIORITIES REGULATIONS

APPEALS: Priority regulation No. 16 has been amended to provide for: (1) More accurate definition of "appeal" as applied to "appeals from administrative actions" as well as "appeals from orders and regulations;" (2) clear understanding of the distinction between "appeals from orders and regulations" and "appeals from administrative actions;" (3) methods for filing appeals as well as complete instructions as to what information must be submitted with all appeals. (PR No. 16)

PRICE REGULATIONS

ALUMINUM SCRAP AND SECONDARY ALUMINUM INGOT: Payment by the buyer of secondary or scrap aluminum of commissions, fees or brokerage charges to a seller or to a third person when such payment plus the price paid by the buyer exceeds the maximum price established for the particular material is prohibited. Prices for certain alloys requiring the addition of costly ingredients and for hardeners, submitted for approval, shall be deemed to be approved unless OPA specifically disapproves such prices and establishes an approved price within 15 days from the date on which OPA acknowledges receipt of the seller's application. Other modifications of the schedule include a change in the wording of the definition of aluminum scrap, an expansion of the definition of a secondary ingot and the addition of a definition of a hardener. (No. 2)

DURABLE GOODS: Electric heating pads and flashlight lanterns have been added to the list of consumer goods for which manufacturers may apply for price increases. (No. 188)



Industry Provides a Job for a Veteran

ARRIVAL of V-E Day has spurred employers to give thought to plans for employment of war veterans. To help them in their plans, STEEL herewith graphically shows the major steps in a going and tested procedure used by the Cleveland Graphite Bronze Co., Cleveland, which has done an outstanding job of progressive thinking and planning to meet a problem that gets larger day by day.

The program is considered a model one and numerous companies have asked the firm for information about it. The company aims to be helpful to every war veteran who seeks employment with it. If it has no job available it makes an effort to place the veteran with several other firms which, if they need a man, will accept him without question, for they recognize the thoroughness with which Cleveland Graphite Bronze interviews and tests veterans and rely on its recommendations.

When these pictures were made, James W. Clark, a veteran of both the Navy and the Army, was returning to a job with Cleveland Graphite Bronze.

Fig. 1—THE "EMPLOYMENT OFFICE" sign is a familiar guidepost on the route of the war veteran from service in the armed forces to a job. Many men marched away to war to the tune of martial music; they could feel strength through numbers; they didn't have to determine what they would do the next day, for everything was planned for them. On the way back to a civilian job there's no fanfare, a man is alone, he again must do his own planning, make his own decisions. This may be difficult for the war veteran. How quickly and how well he becomes readjusted to civilian life depends to a great extent on what kind of a job he gets. As he approaches the employment office the big question in the mind of every veteran, including James W. Clark, pictured above, is "What kind of treatment will I get here?"

° ° °

Fig. 2—RECEPTION of Mr. Clark at the employment office was cordial. A cheerful greeting from the receptionist helps considerably to buoy or maintain the morale of a man who wants a job. Miss Edith Mueller, receptionist, gives Mr. Clark a preliminary employment application record card on which the veteran places information including name, address, type of discharge, pension received, shifts he can work, armed service record, and last two jobs held. This card helps introduce the veteran in the next step.

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Fig. 3—INTERVIEW with Jack C. Starbuck, left, veterans counselor, welcomes back Mr. Clark, who is a former employe. Mr. Starbuck is himself a war veteran. Theory at Cleveland Graphite Bronze is that war veterans make good administrators of veterans employment programs because a veteran understands the attitude of veterans and that a serviceman seeking employment will talk more freely to a counselor who is a veteran, thereby providing information that facilitates proper placement of the serviceman. The interview determines whether the applicant for employment should be sent on through the procedure requisite for being placed on a job.

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Fig. 4—TESTING of vocational abilities is the next step if the counselor determines from the interview that the veteran should be sent through the rest of the procedure necessary before a man can be assigned to a job. Mr. Clark met all preliminary requirements and went to the testing department where speed and dexterity are being tested with a replica of a punch press. Miss Patricia Squier, testing supervisor, times Mr. Clark. Information derived from tests helps place the war veteran on the proper job.

° ° °

Fig. 5—MEDICAL EXAMINATION of the veteran helps make sure that he will not be assigned to a job on which he will injure himself or endanger other employes. A man with a heart ailment should not be placed where he might become entangled in moving machinery; a man with a head injury should not be placed where there is considerable noise; and a man with a back injury should not be assigned to heavy lifting. In the medical department Mr. Clark is undergoing a blood test administered by Mrs. Betty Roberts who returned to her former job after serving with the U. S. Army Nurse Corps.

° ° °

Fig. 6—SAFETY DEPARTMENT is the next step for Mr. Clark, the veteran. Here the report of the medical department is consulted and recommendations are made on what type of a job the veteran should be placed. Here too the importance of care and safety in his work is impressed on the veteran. The safety department seeks to keep plant hazards to an absolute minimum. H. Dudley Hanson, safety director at the plant, checks over Mr. Clark's medical report to make recommendations that will assist in proper placement of the veteran.

° ° °

Fig. 7—ASSIGNMENT TO JOB is made by the employment department to which the veteran returns after visiting the testing, medical, and safety departments. Reports from those departments are con-

sulted by Charles A. Dick, right, director of the veterans service division at Cleveland Graphite Bronze Co., who is pictured conferring with Mr. Clark, about placement. Mr. Dick also is a war veteran.

o o o

Fig. 8—INTRODUCTION TO DEPARTMENT to which the veteran has been assigned is an important step in building and maintaining good relationships with employes. Here W. R. Mogg, assistant superintendent of plant No. 5, greets Mr. Clark, the veteran, who had been escorted to the department by Mr. Dick, director of the Cleveland Graphite Bronze veterans service division.

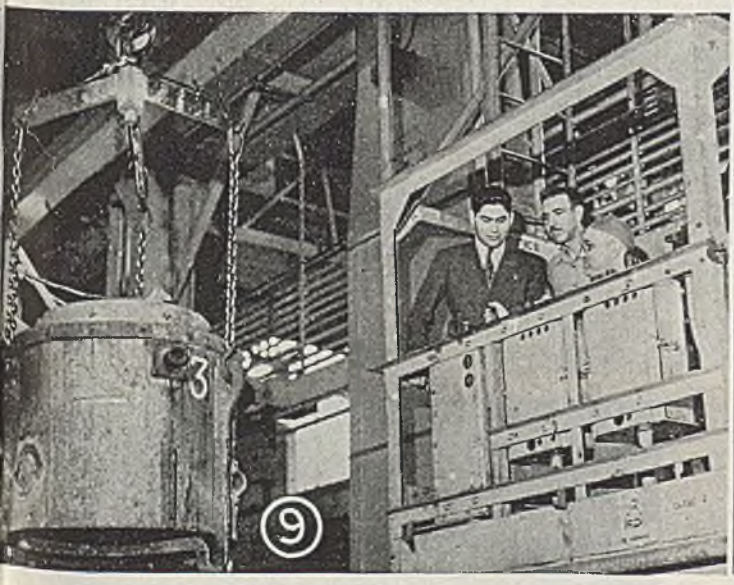
o o o

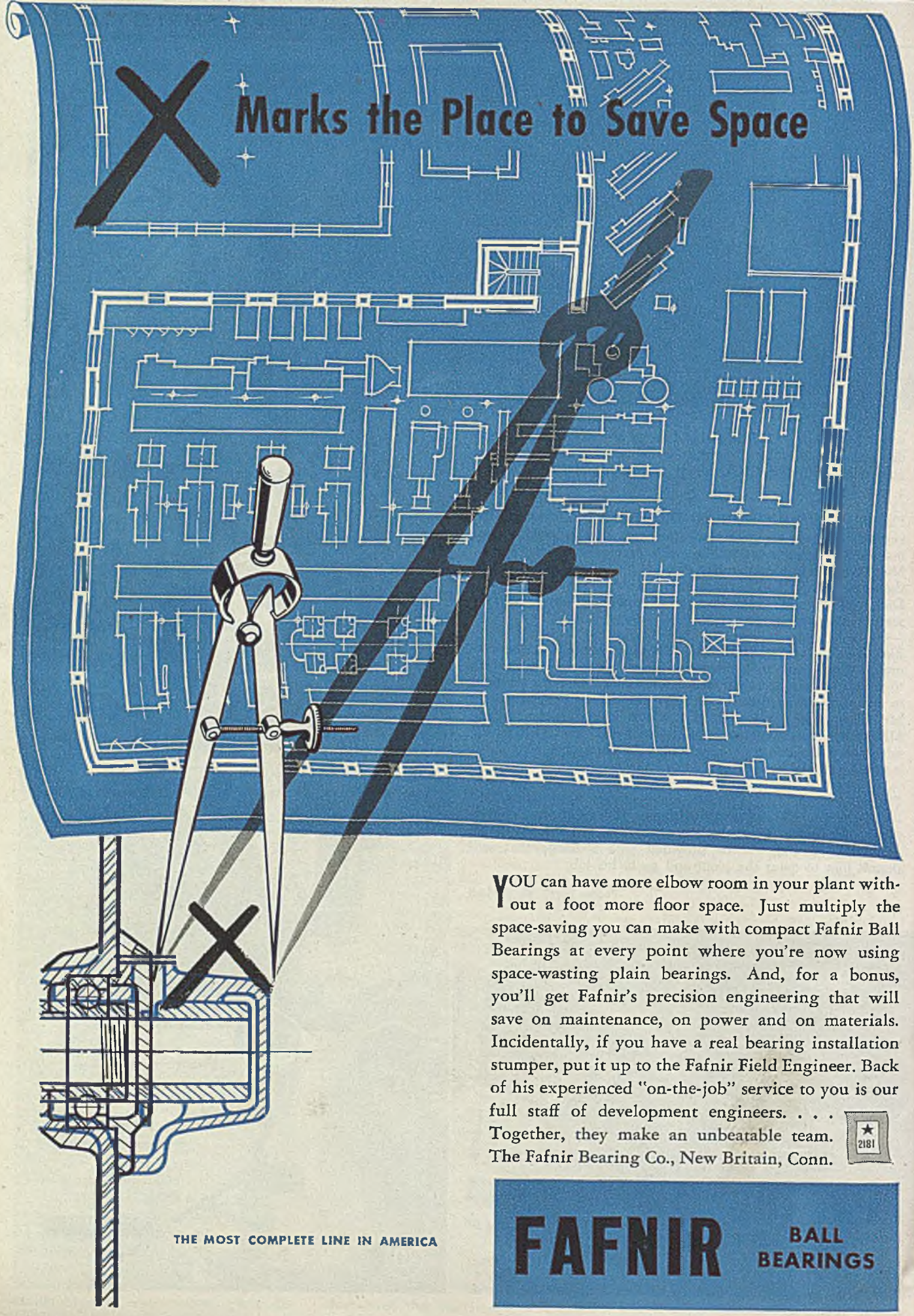
Fig. 9—INTRODUCTION TO JOB gives Mr. Clark, the veteran, an opportunity to meet the foreman and to see the job to which he has been assigned. Mr. Clark has been assigned to operating an overhead crane. To the crane's control station Mr. Clark pays a visit with J. A. MacAllister, foreman. Albert Milnickle, crane operator, is at the controls. This visit to the job gives the veteran an opportunity to determine whether it is one he thinks he will like.

o o o

Fig. 10—IDENTIFICATIONS are made by Sgt. James Giblin of the Cleveland Graphite Bronze plant protection department. Here Mr. Clark is being fingerprinted. He will be photographed and will be provided with a badge that will permit him to enter the plant and go to his job.

Photos by G. W. Birdsall





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By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Auto capital's V-E Day celebration anticlimactic. Industry's executives believe passenger car production at about 50 per cent of prewar normal will be permitted over next 11 months, and production schedules are being drawn accordingly

FORMAL announcement of V-E Day found Detroit ready to celebrate, and as was expected most of the large plants were forced to close down shortly after the President's radio announcement. Some closings were authorized with full pay for a 24-hour interruption, but many were not. Working forces, both male and female, just picked up and left quietly, with the exception of one plant where a thoughtful employe brought a trumpet to work with him and staged a one-man march up and down aisles blowing a la Harry James.

Around the General Motors building there was a brief downpouring of torn paper from office windows, but the overall flavor of the celebration was distinctly synthetic. Small groups gathered here and there, eating places were swamped at lunchtime, but there was little conviviality. Rather the question seemed to emanate from everyone, "Well, now what?"

Perhaps the reason was that V-E Day for Detroit industry was already nearly a month old, and the May 8 proclamation was anticlimactic. Cancellations and cutbacks are expected to build up rapidly over the next few weeks, but they began weeks ago and the only question now is how much and how soon. The answer is most important to an accurate determination of when first assemblies of passenger cars can be made.

Production Schedules Being Drawn

Current thinking of industry executives and government officials planning reconversion is assuming passenger car production at about 50 per cent of the industry's prewar normal output will be permitted over the next 11 months, and production schedules are being drawn accordingly. Should the Japanese war terminate at an earlier date than is now expected, the present plans would be scrapped and production goals revised upward beyond anything yet achieved. It would be most helpful if individual manufacturers could foresee what will happen to present war contracts, but of course even Army and Navy procurement officers cannot predict with any great accuracy on this score. They can be helpful in expediting the transfer of war contracts expected to remain in force from the auto plants to other producers of the same materiel.

The auto industry's machine tool problem has by no means been solved by the WPB granting AA-3 priority to bottleneck equipment needs, for while it is likely many of these 5000 machines can be shipped by midsummer, there will be critically needed equipment—possibly presses, as an example—which cannot conceivably be delivered in such short order. Still more important is the release of thousands of the industry's own tools now assigned to war production.

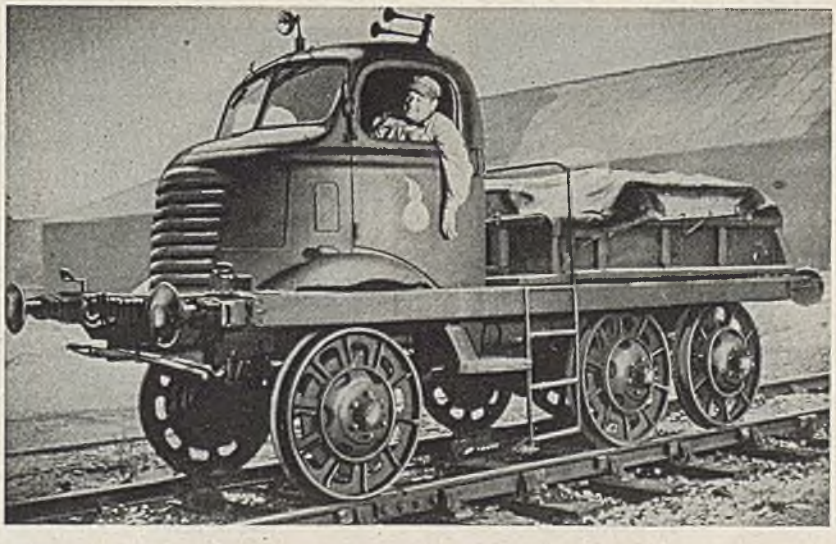
Take the case of a single company, which before the war was using 20,000 machines in its automotive operations. Shortly after Pearl Harbor, about 2000 units were turned over to other manufacturers, and 90 per cent of the remaining 18,000 have been transferred to war work in the company's own plants. For partial resumption of car production, this company needs roughly 13,000 machine tools. It plans to purchase 1000 new ones to replace those removed when the war started. An additional 12,000 must be released from war assignments. They can be released only by contract cancellations or cutbacks, or by substituting idle government-owned tools. The first recourse depends on time, the second, after a year of requests, has still to be implemented by definite orders.

Several phases of the plant clearance problem remain vexing, in spite of provision of the Contract Settlement act of 1944. Thus, even the best of regulations or directives can prove important in the face of a breakdown in their administration, or in the sudden shortage of a critically needed material, such as packaging lumber for crating inventories or parts and materials. One automobile company has estimated it will need 15 million board feet of lumber for this purpose. As yet little has been made known about the matter of protected storage space for surplus equipment and materials.

Another possible stumbling block in plant clearance activity may be the announced plans of the CIO to invade the jurisdiction of old-line AFL building trades unions throughout the country which could stir up rivalry between CIO and AFL members over which union's members will handle the job of dismantling machinery and moving it from plant to storage. Several cases of this sort already have developed. Actually there should be plenty of work for members of both unions in this field, and a jurisdictional fight would catch production workers right in the middle.

In the materials outlook, textiles appear in the worst spot, in spite of reassurances from suppliers. While a high and sustained level of military demand is one factor contributing to short supply, an even more important angle, according to E. R. Metcalf, deputy director of the WPB Textile Division, has been an overall reduction in output of textiles resulting from workers leaving an industry where the average hourly wage is 65 cents for work in war industries paying double that rate.

WPB authorities conversant with the automobile industry's large need for broadcloth, mohair, carpet, cotton sheeting, burlap and other textile products agree that the industry's needs can be met in only two ways: 1) Increasing mill



VERSATILE: Its tires swapped for flanged wheels, this cab-over-engine model General Motors truck was converted into a railroad switch engine by the Army. GMC Truck & Coach has produced nearly a half million military trucks and amphibious "ducks," the majority of which are the famous 2½-ton "six-by-six," the Army's' basic transport vehicle

output by inducing workers to take textile jobs; or (2) diversion of a portion of the civilian supply to automotive uses as a last resort, to absorb unemployed automotive workers.

There is little support for the latter policy, so automotive leaders have urged the WPB to assign a high urgency rating to textile manufacture so the War Manpower Commission can channel workers into textile mills where between 100,000 and 200,000 are reported to be needed to man looms capable of much greater production than at present. Need for early action on this problem is emphasized by the fact automobile plants must have required textiles on hand 60 days before the first cars are to come off production lines.

A number of other tight spots are sighted in the automotive materials picture. They include lead, tin, phthalic anhydride for enamels and a few others, but further clarification of war production requirements in the months just ahead may revise their present stringency. As far as iron and steel are concerned, it is believed they will be in ample supply for production requirements as now being projected.

One automotive department to watch in reconversion progress is the gray iron foundry which has probably the longest "lead" time of any. Cupolas must be reconditioned, metal handling and pouring devices checked, conveyors reinstalled or rerouted, pattern files brought up to date, banks of cores built up, to say nothing of recruitment of labor forces which many captive foundries in the motor industry have seen dissipated to machine shops and other divisions paying higher wages.

There has already been some reawakening of foundry activity but it is not yet of a pace which suggests early resumption of casting passenger car cylinder blocks, heads, flywheels, gearcases and the scores of other gray iron castings needed in volume. Some important expansion programs among foundries of the General Motors Divisions—Chevrolet gray iron, Pontiac, Buick, Cadillac—are on paper, but the go-ahead has not been sounded as yet. Part of this work may be included on the list of $35 million in construction projects approved by the WPB, but most of these projects are of lesser size and more immediate than are the foundry expansions.

New Battery Plant Planned

Delco-Remy Division of GM has announced purchase of a 27-acre tract of land in New Brunswick, N. J., as a site for a new modern storage battery manufacturing plant, to supplement facilities of the division's battery plant at Muncie, Ind. Building and operation of the new postwar plant will be under direction of B. A. Dollens, manager of Delco-Remy battery operations.

The motor industry's applications for construction work are being reviewed by D. P. Appell of the WPB Construction Bureau, who has transferred to Detroit to handle this work. Of the previously mentioned $35 million set up to cover costs of necessary construction for "turnaround" facilities, approximately two-thirds have already been approved.

Pontiac has accomplished a wartime reconversion and tooling job within 75 days, incident to production of 5-inch assault rockets for the Navy Department, a contract which seems likely to be kept in force as long as the Pacific war continues. Plant 4 at Pontiac produced its last Oerlikon 20-millimeter gun on Dec. 31, and reconversion of the plant was started immediately, entailing dismantling and removal of more than 1000 machines to make way for presses, furnaces and conveyor lines required for rocket production. The entire projectile is made at the Pontiac plant, with the exception of the nose fuse and explosive.

While the popular conception of these Navy rockets has them a fairly simple manufacturing job, with little more than a steel tube loaded with explosive and capped by a forged head, actually they appear somewhat more complicated than a shell of comparable size. The rocket is really a shell and shell case combined, with a propellant charge firing out the rear of the case to drive the missile ahead. When the "warhead" is detonated, both it and the propellant case are blown apart or fragmented, with intended disastrous effect. They are laid down on a target in a pattern, since accuracy of individual firing is not too great. However, recent important design improvements have been made on the score of accuracy in flight.

Scale-model replicas, 12 inches long, of the military jeep are being produced by the thousands by wounded service men in hospitals and convalescent centers as sales incentives for the Seventh War Loan. One of the principal suppliers, Willys-Overland, is supplying hospitals with cutout parts of wood and cardboard, plastic wheels and transparent windshields, and is paying veterans for their assembly work. Each state in the country will act independently in the award of the miniature jeeps for War Bond sales efforts.

Production of 2000-horsepower Pratt & Whitney engines at the Ford Rouge Plant has been reduced about 400 a month, affecting 4000 employes in various Ford plants. The readjustment totals $30,086,700, and to date Ford has built 53,000 of the engines.

C. E. WETHERALD

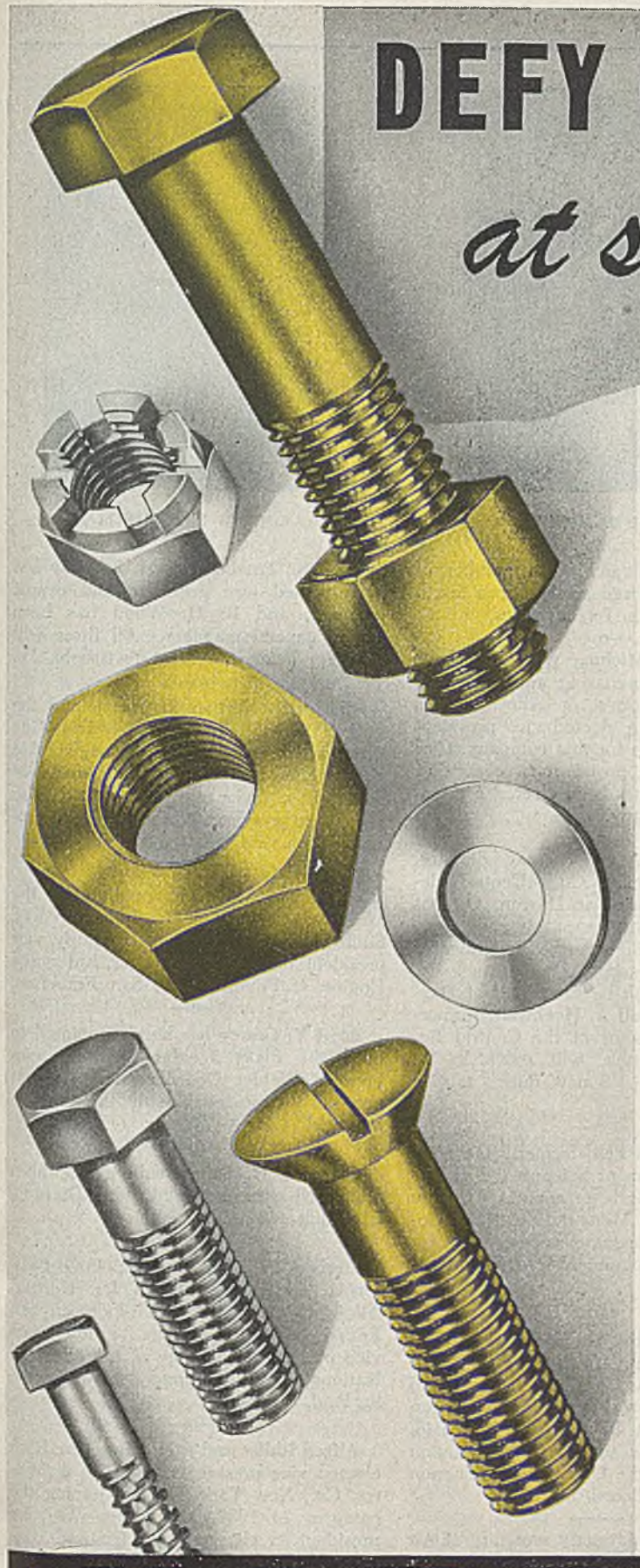
HUGH DEAN

Mr. Wetherald, general manufacturing manager of the Chevrolet Motor Division, has retired after more than 40 years with General Motors Corp., having started with Buick in 1904 when only two Buick cars had been built. He is succeeded by Mr. Dean, another General Motors veteran who in recent years has been assistant manufacturing manager. Mr. Dean's career with General Motors began in 1915 with Buick (See STEEL, p. 91, May 7)

Bright Future Predicted for Jersey's Light Metal Plants

New Jersey's light metal-casting plants will play a leading part in contributing to postwar jobs and new industrial opportunities, Anthony Cristello, manager of Bendix Aviation Corp.'s Eclipse-Pioneer division foundries in the state, predicted.

Emphasizing the urgent need for 300 additional workers in five nonferrous foundries operated in New Jersey by the corporation, Mr. Cristello said "workers who take advantage of today's opportunities to acquire practical, modern training in the new techniques of casting light metals will find their skills immensely valuable in the postwar years.



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MEN of INDUSTRY

M. C. PECSOK

GEORGE B. MICHIE

CHARLES S. NORTHEN JR.

M. C. Pecsok has been elected vice president of Osborn Mfg. Co., Cleveland. He has been associated with the company since 1912, his latest position having been sales manager of the company's Brush Division.

—o—

John C. Harrower has been elected vice president of Air Associates Inc., Teterboro, N. J., in charge of sales and engineering. Previously Mr. Harrower was sales manager, Bendix Aviation Corp.'s Eclipse Aviation Division, Elmira, N. Y. and prior to that was associated with the Export Division of Radio Corp. of America, New York.

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L. P. Schrubey has been transferred from the Accounts Service Department, Ampco Metal Inc., Milwaukee, to the Newark, N. J., Field Engineering Office, to become field representative under the supervision of **W. T. Peterson**, district manager. **W. F. Taff** has been transferred from Ampco's Newark office to its Cincinnati office, where he will work as field representative under the supervision of **E. J. Cook**, district manager. **Baxter Schroeder** of the Cincinnati office has been transferred to Milwaukee, where he will be field engineer for Ampco-Trode Department.

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Marlin W. Horton has been named district manager in the Cleveland area for Industrial Engineering Associates, Indianapolis.

—o—

R. L. Ireland Jr. and **J. H. Thompson** have been elected to the board of National Steel Corp., Pittsburgh. Mr. Ireland is president of Hanna Coal Co. and vice president of M. A. Hanna Co., Cleveland. Mr. Thompson is president of Hanna Ore Co., Cleveland, and vice president of M. A. Hanna Co.

—o—

William F. Kennedy has joined the International Nickel Co., New York, as general solicitor and assistant secretary. For the past 15 years Mr. Kennedy has been associated with Sullivan & Cromwell, New York and for a number of years was in charge of the firm's South American office in Buenos Aires.

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George B. Michie, who has been in charge of purchasing and priorities, Electro Refractories & Alloys Corp., Buffalo, has been elected vice president in charge of sales for that company. **Carl F. Leitten,** vice president in charge of manufacturing, has been elected a director of the company.

—o—

Dr. Charles Allen Thomas, director, Monsanto Chemical Co.'s Central Research Laboratories at Dayton, O., has been elected a vice president and, effective Sept. 1, will become a member of the company's executive committee. Dr. Thomas, who will be succeeded at Dayton by **Dr. Carroll A. Hochwalt,** formerly associate director of the Central Research organization, will move to St. Louis to assume his new duties as vice president.

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J. Robert Van Pelt, formerly technical director, Museum of Science and Industry, Chicago, has been appointed to the staff of Battelle Memorial Institute, Columbus, O., to assume responsibility for an expanded program of research education.

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Frank Hamilton has been elected to serve as assistant to the president of Freeport Sulphur Co.'s subsidiary, Nicaro Nickel Co., New York. Mr. Hamilton joined Freeport Sulphur Co. in 1943. Prior to that he served in Washington on the staff of the Combined Production and Resources Board.

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John A. Hill, formerly secretary of Air Reduction Co. Inc., New York, has been elected vice president, **Richard W. Ryder,** treasurer, has been assigned the additional duties of secretary, and **William Winters Jr.** has been named assistant treasurer.

—o—

T. B. Clement has been elected executive vice president of Union Switch & Signal Co., Pittsburgh. **M. L. Gray** has been named vice president and export manager, and **R. H. Wood** has been named general manager. All three will maintain headquarters at Swissdale, Pa.

—o—

Charles S. Northen Jr. has joined the staff of Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., as sales manager. He was previously vice president of Avondale Mills, Sylacauga, Ala., and also served as president of the Carded Yarn Association.

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C. G. Cox has been appointed to the executive staff, Joshua Hendy Iron Works, Sunnyvale, Calif. He was formerly vice president and general manager, Enterprise Engine & Foundry Co., San Francisco.

—o—

Boyd V. Giesey has been appointed to head the Flash Welder Division, Progressive Welder Co., Detroit. He was previously associated with the Taylor-Winfield Corp., Warren, O.

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Clarence H. Schuettenberg has been appointed sales manager, Stoker Division, Link-Belt Co., Chicago.

—o—

Herbert King has been appointed California field representative for General Alloys Co., Boston, with offices in San Francisco. Mr. King was for nine years vice president in charge of sales for the National Battery Co. and its subsidiaries, St. Paul, Minn.

—o—

Alfred Iddles and **J. H. King** have been elected vice presidents, Babcock & Wilcox Co., New York. Before joining the company in 1937, Mr. Iddles was vice president in charge of design and construction, United Engineers & Constructors Inc., Philadelphia. Mr. King has been associated with the company since 1914.

—o—

Frederick G. Schranz has been appointed vice president in charge of hydraulic and special machinery sales, Continental Foundry & Machine Co., East

OTTO G. SCHWENK

LEE A. DAINES

GORHAM W. WOODS

Chicago, Ind. His headquarters will be at 903 Grant building,. Pittsburgh.

—o—

Otto G. Schwenk has been elected comptroller of the Weatherhead Co., Cleveland. He joined the company last August as industrial engineer after 10 years association with Albert Ramond & Associates, Chicago, consulting industrial management firm.

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Russel R. Graham has been appointed New York division engineer, American Bridge Co., Pittsburgh, a subsidiary of United States Steel Corp. He succeeds **Samuel J. Ott,** who has retired. **Joseph O. May** succeeds Mr. Graham as assistant division engineer in New York.

—o—

Willard C. Kress has been elected president, Aluminum Forgings Inc., Erie, Pa., succeeding **A. Donnally Armitage,** who became chairman of the board. Mr. Kress is vice president of J. H. Williams & Co., Buffalo, which operates the Aluminum Forgings firm.

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David H. Knight has been appointed manager of the Indianapolis branch, and **J. A. Fahey** as manager of the Atlanta branch of the TelAutograph Corp., New York. **Alan E. Corbett** has joined the Philadelphia sales staff of the corporation.

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Charles C. Jarchow, vice president and comptroller, American Steel Foundries, Chicago, has been elected as a member of the board of directors, General Steel Castings Corp., Eddystone, Pa.

—o—

George Spatta has been elected president of Clark Equipment Co., Buchanan, Mich., succeeding the late **Albert S. Bonner.** Before joining the Clark organization in 1927, he was associated with General Electric Co., Schenectady, N. Y. **Dr. Leo Wolman,** professor of economics, Columbia University, has been elected to the board of directors; **Dr. John M. Clark** of the DuPont Co., Wilmington, Del., now a director, was elected to the executive committee; and **John G. Mack** was elected a vice president and director.

—o—

Lee A. Daines, since 1927 district manager in Chicago for Heppenstall Co., Pittsburgh, has been elected vice president and general manager of sales for the company. Between 1920 and 1923, Mr. Daines was associated with the U. S. Chain & Forging Co. and later in a sales capacity with the Witherow Steel Co., both of Pittsburgh. He joined the Heppenstall Co. in 1923 at the company's Detroit office and was transferred a few years later to the Chicago office. He has been district manager in that city for the past 18 years and has been a director of the company for seven years.

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Norman I. Stotz has been appointed vice president in charge of sales, Braeburn Alloy Steel Corp., Braeburn, Pa.

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Lorin L. Ferral has been appointed metallurgical director, Crucible Steel Co. of America, New York.

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Will Whitmore has been named advertising manager, Western Electric Co., New York, succeeding **H. W. Forster,** deceased. Mr. Whitmore has been associated with the company since 1929.

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Albert B. Kern has been appointed manager of the dock and vessel department, M. A. Hanna Co., Cleveland, to fill the vacancy caused by the recent death of **George H. Warner.**

—o—

Ray E. Madden has been appointed Chicago district sales and service representative, Towmotor Corp., Cleveland. **Frank Colker** and **Thomas F. Maloney** have been appointed district sales representatives for the Detroit area.

—o—

Salvatore Giordano, president of Frank J. Quigan Inc., Buffalo, has been elected president of Fedders Mfg. Co., Buffalo. **Frank J. Quigan,** chairman of the Quigan firm, has been elected chairman of the board and treasurer of the Fedders company.

—o—

Gorham W. Woods has joined the engineering staff of the Lincoln Electric Co., Cleveland, as research engineer. He will devote a major part of his time to development of electrodes. Mr. Woods was associated with the Hughes Tool Co., Houston, Tex., for 19 years and during the past three years with the Dickson Gun Plant, a Hughes-operated concern, as process engineer.

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Fort Pitt Bridge Works, Pittsburgh, has elected **John H. Sorg,** vice president and general counsel; **D. B. Straub,** secretary; **R. K. Steffey,** controller; and **R. F. Hartner,** assistant secretary and assistant treasurer. **James M. Straub** and **C. O. Miller** were re-elected president and treasurer, respectively. Directors elected are: **F. C. T. Daniels, William B. McFall, E. H. Millard, Paul B. Reinhold, Norman F. Rohrkaste, John H. Sorg,** and **Theodore A. Straub Jr.,** all of Pittsburgh. **R. E. Bakenhus** of New York and **James M. Straub** of Pittsburgh were re-elected to the board.

—o—

Norbert K. Koebel has been appointed manager of sales, Lindberg Engineering Co., Chicago. He will continue to serve also as director of research at Lindberg, a position which he has held since 1940. **Robert W. Dougherty** has been transferred to the Detroit sales office of the company.

—o—

J. C. Hamilton has been appointed service engineer for pumps of the Quimby Pump Co. Inc., Newark, N. J., and castings of the Fort Pitt Steel Casting Co., McKeesport, Pa., in Chicago and surrounding territories. He was previously with the sales department of Pittsburgh Equitable Meter Co., Pittsburgh.

—o—

P. R. Mork has been elected executive vice president, Crane Co., Chicago. He has been succeeded by **J. A. Dwyer**

as vice president in charge of sales and branch houses who in turn has been succeeded as general manager of sales and branch houses by **Lucien W. Moore. F. J. Wilkey** has been appointed manager of the valve and fitting department of the company.

—o—

Carl L. Zak has been appointed assistant general manager of sales, Pittsburgh Steel Co., Pittsburgh. Since January, 1944, Mr. Zak has been manager of tubular sales, and previously was secretary of the Seamless Steel Tube Institute, Pittsburgh. Former connections include Youngstown Sheet & Tube Co., Youngstown, O., and Globe Steel Tubes Co., Milwaukee. **E. R. Smith** has been made manager, oil country tubular sales, Pittsburgh Steel Co.

—o—

Directors of Scullin Steel Co., St. Louis, have elected the following new officers: **R. C. Geckie**, vice president in charge of sales; **B. L. Norton**, assistant vice president with offices in New York; **F. H. Spenner**, assistant vice president in charge of engineering; and **W. H. Coburn**, assistant comptroller.

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Alexander C. Nagle, president, First National Bank of New York, has been elected director and member of the finance committee, United States Steel Corp. He is filling vacancies created by the recent death of Leon Fraser.

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James J. Harris and Raymond L. Klackle have joined the Customer Research Division of Continental Can Co., New York.

—o—

Robert C. Lee has been elected vice president and treasurer of White Motor Co., Cleveland.

J. A. HOLLADAY

B. F. COURTRIGHT

Photographs of Mr. Holladay, recently elected vice president, United States Vanadium Corp., New York, and Mr. Courtright, recently appointed sales manager, Wisconsin Steel Division, International Harvester Co., Chicago, were inadvertently transposed in STEEL, May 7, p. 96.

OBITUARIES . . .

Holton D. Robinson, 82, noted bridge engineer, died recently at his home in the Bronx, New York. He was senior partner in the firm of Robinson & Steinman, consulting engineers, New York. He was identified with the erection of many famous bridges, including the George Washington, Manhattan, and Triboro bridges in this district and many others in this and other countries.

—o—

Robert Cox Post, 67, president, Post & McCord, structural steel engineers and erectors, New York, who have placed the steel for some of the country's largest structures, died May 3 in New Brunswick, Canada. Among the steel-framed buildings erected by the firm is the Empire State building, New York. Mr. Post was graduated from Stevens Institute of Technology in 1898 and shortly thereafter joined the American Bridge Co., Pittsburgh, remaining until 1903 when he formed Post & McCord.

—o—

John A. Boyink, 69, well known lakes shipping executive, died May 7 at the Ojibway hotel, Sault Ste. Marie, Mich., where he had gone on a business trip. Mr. Boyink had retired in January as purchasing agent of the Pittsburgh Steamship Co., Cleveland, and since then had been retained by the company in an advisory capacity.

—o—

Charles Gordon, 54, authority on municipal transit systems, died May 3 in Brooklyn Hospital, Brooklyn, N. Y. He organized the Electric Railway Presidents' Conference Committee which spent $1 million developing a streetcar that would take advantage of scientific advances in the field of electrical and mechanical engineering.

—o—

Emerson L. Applegate, 52, tube mill superintendent, Indiana Harbor Works, Youngstown Sheet & Tube Co., East Chicago, Ind., died recently in Hammond, Ind.

—o—

John L. Sybrandt Sr., 60, who retired last December after 12 years as Chicago district manager, Ludlow Valve Mfg. Co. Inc., Troy, N. Y., and who had served for many years prior to that as the company's representative in Kansas City, Mo., died April 30 in Chicago. At time of death, he was a civilian purchasing agent for the Navy.

—o—

John F. Duthie, 70, head of the former firm of Duthie & Co., one of the leading Pacific Coast shipbuilders in the last war, died April 25 at his home near Seattle. He established his ship construction yard in Seattle in 1911, first building steel whalers and other small craft. Following contracts from Norwegian owners in 1916, his firm built 8800-ton freighters for the U. S. Shipping Board for the next four years. Later he founded the structural fabricating firm of Wallace Bridge & Steel Co. in Seattle which was a leader in this field for several years.

—o—

Karl M. Friden, 54, inventor and industrial organizer, died recently in Oakland, Calif. Born in Sweden, he invented a calculating machine and formed the Friden Calculating Machine Co. at San Leandro, Calif., in the early 1930s.

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Victor H. Ramge, 52, widely known in automotive circles, died May 1 in Memphis, Tenn., where he was branch manager of Globe Union Inc., Milwaukee.

—o—

Charles F. Jackson, 59, mining consultant, Ventures Ltd., Toronto, Canada, died May 3 in the offices of the company. He was chief engineer, M. A. Hanna Co., Cleveland, from 1917 until 1922 and became principal mining engineer, Mining Division, United States Bureau of Mines, in 1928, a position he held until 1934. From Sept. 1, 1942, until July 1, 1943, he was consulting engineer for the American Nepheline Corp., a subsidiary of Ventures, being in charge of commercial development and application of a process for the production of alumina from clay and other alumina raw material. He was consulting engineer and project manager for the Ancor Corp., in charge of its alumina project in North Carolina, from July, 1943, to Feb. 1, 1945. He opened his own offices in New York last April 1 as a consulting engineer.

—o—

G. T. Atkins, 66, executive vice president, Missouri-Kansas-Texas railroad, died May 3 in St. Louis. As traffic manager for the Shreveport, La., Chamber of Commerce, from 1910 until 1918, he gained a national reputation in Shreveport rate case, which resulted in the Interstate Commerce Commission's taking jurisdiction of freight rates even when wholly within state borders if interstate commerce was affected.

San Francisco Area Speeding Preparations for Peacetime

Reconversion planning proceeds although San Francisco will remain as main funneling point in war against Japan. Smaller War Plants Corp. begins study to aid smaller companies in turning from war work to peace-time operations

RECONVERSION is going forward in the San Francisco area with increased rapidity despite the fact San Francisco will remain for some time to come as the main funneling point in the fight against Japan.

There have been cutbacks in war contracts, chiefly in shipbuilding, and planning for peacetime activity has been growing.

Indicative of the current trend is a survey of smaller metalworking plants in Northern California just begun by the San Francisco regional office of the Smaller War Plants Corp. This study is designed to aid the smaller companies in reconverting from war products to peacetime operations.

Inquiry forms have been mailed to each company being surveyed asking the type of war contract each is handling now and what civilian products it can turn out when allowed to reconvert.

Commenting on the programs, John D. Stanard, deputy regional director of the SWPC, said: "As the reconversion period develops and certain materials become available, we can advise them on the civilian products they should first start to turn out."

Meantime, principal effect of the shifting economy is being reflected in labor supply and demand in the Bay area. All indications are that equality will be reached within the next few weeks between the number of available jobs and the number of workers to fill them. After that time there will begin to be a growing surplus of workers in this area. Reabsorbing them into civilian industry will depend on the speed with which plants can be reconverted.

Unfilled Jobs Being Reduced

At the present time, jobs on order at the U.S. Employment Service in San Francisco total about 8000, most of them for skilled men. These unfilled jobs are being reduced at the rate of about a thousand a week and during the last two months their number has dropped from 16,000. Few war plants need unskilled workers now, although civilian factories are seeking ordinary labor. In most cases, though, they are finding it hard to get extra help.

A factor which is expected to place the San Francisco area in a better reconversion position is the official approval by the War Manpower Commission of steps to relax labor requirements.

Taking cognizance of the fact that labor shortages are far less acute than formerly, the commission announced that the San Francisco area had been transferred from the No. 1 labor shortage classification to a No. 2 grouping.

Discussing the move, local War Production Board offices said "any industries which have plans for making the shift from war to civilian production when the time comes will do well to bring their plans to us now so we can go on arranging for an orderly transition."

Both WPB and WMC officials warned against the idea of a sudden letdown of all barriers which have been designed in wartime to maintain essential production.

"The war will still be on," said a WPB official, "but of course there will be a period of adjustment between the end of the European war and the concentration on a one-front war. Present indication, now that V-E Day has come, is that there will be a cutback averaging about 20 per cent in war contracts for the country as a whole.

"All production won't be cut back, however. In the first place, as far as the San Francisco area is concerned, with the shift of labor classification from No. 1 to No. 2, the government procurement agencies now are free to place more war contracts here. In the second place, restrictions are being loosened so that the reconversion to civilian production can be made."

A No. 1 area is one in which the labor shortage for war work is considered acute. In a No. 2 area it is assumed that the shortage has ceased to be acute and that labor surpluses have appeared in some lines.

As an example of how cutbacks are affecting other production, the WPB officials cited the recent reduction in tanker contracts as helping the agricultural implement industry.

"In Northern California there are 160 manufacturers of various farm implements," the WPB said. "The reduction in needs for steel for making tankers has given these implement makers a lot more steel, and they are using it."

Other examples are loosening up of restrictions on materials and tools for building construction.

Los Angeles Industrialists Develop 325 New Products

Los Angeles county industrialists have developed since 1940 more than 325 new or redesigned products, among which are 27 iron and steel products, 34 electrical appliances, 20 items of aircraft equipment, 22 items in tools and hardware, and 35 in industrial machinery and appliances.

DESTINATION, JAPAN. This 50-ton stern section is being constructed for the 450th ship built at the California Shipbuilding Corp.'s yards, Los Angeles, and which will be used to help defeat Japan. A few of the workers gathered around to cheer the news of victories in Europe. NEA photo

WING TIPS

Naval Air Experimental Station, Philadelphia, has more than 1000 active research projects. Naval Aircraft Factory constructed more than 1600 complete aircraft and about 1575 aircraft engines under Vinson-Trammel act

ALTHOUGH it is one of the "big three" centers of military aviation research, the Naval Air Experimental Station at Philadelphia, outgrowth of the 28-year-old Naval Aircraft Factory, unfortunately is not so well known as its two counterparts—the Air Technical Service Command of the AAF at Wright Field, and the National Advisory Committee for Aeronautics in Washington. Yet its work has been a powerful factor in the superior performance of naval aircraft, with more than 1000 research projects now active.

The Naval Aircraft Factory was founded in 1917 for the sole purpose of manufacturing aircraft, both of its own design and from the designs of other manufacturers. At that time, commercial plants were unable to meet Navy requirements since most of their output was going to the Army, so the NAF was established as a department of the Philadelphia Navy Yard and completed its first plane early in 1918, a Curtiss H-16 Flying Boat.

With the establishment of the Bureau of Aeronautics in 1921, the NAF was transferred to its control, and began to concentrate its attention on experimental aircraft and accessories, joining with other naval aviation research units such as the Aeronautical Engine Laboratory which in 1924 was transferred from the Washington Navy Yard to the NAF. A landing field was built adjacent to the Philadelphia factory in 1926 and work was started on modifying service aircraft for special purposes. By this time, aircraft, ordnance materiel, catapult and arresting gear, engine and parachute manufacture were parts of the NAF program, and over the next 13 years research and experimental activities were greatly enlarged and manufacturing work was increasingly confined to pilot-line production of new types of aircraft and the development of accessories not available elsewhere.

Nevertheless, as Rear Adm. D. Royce, now commanding officer of the Naval Air Material Center, points out, "The Naval Aircraft Factory has produced many airplanes of its own design, as those familiar with its history know. Since the passage of the Vinson-Trammel act, the Naval Aircraft Factory has constructed in the past ten years over 1600 complete aircraft to eight different designs, four of which were its own. Further, the designs of other organizations assigned here for manufacture usually have many changes ordered therein, which require considerable additional design effort. Up to 1942, NAF more than fulfilled the Navy Department's obligation to supply 'one out of every ten airplanes purchased by the Navy.' The requirements of the Vinson-Trammel act have since been suspended during wartime."

This corrects the erroneous impression given by statements published in STEEL for April 9, p. 98, misquoting J. Carlton Ward Jr., president of Fairchild Engine & Airplane Corp., on the matter of "production" at the NAF.

With the start of war, even though it held a front rank in aeronautical research, the NAF as then constituted could not hope to handle the growing complications of its assigned projects. Annual budget had increased to almost $50 million and the facilities occupied 1,800,000 square feet of floor space. The payroll numbered thousands of military and civilian personnel. So, early in 1943 a swift reorganization was effected and the NAF became a single manufacturing unit of the new Naval Air Material Center, with all research, testing, and development duties turned over to the Naval Air Experimental Station. In addition, separate commands were made of the Naval Air Station, Mustin Field, adjacent to the NAES, and of the Naval Aircraft Modification unit.

Admiral Royce further explains that "The Naval Aircraft Factory had never built any aircraft engines prior to passage of the Vinson-Trammel act, and such manufacture was undertaken solely to comply with the act. As a result thereof, 1150 engines of the Wright R-760 type, and about 425 of the R-975 type were built under license from Wright Aeronautical Corp. However, the XV-715 engine was developed at NAF from 1936 to 1939, to its own design, and showed some promise on test, but never went into production."

Research, testing and development work of these large military agencies, such as the NAES, Wright Field and the NACA, is recognized as of prime importance both during the war and in the long-range future progress of aviation research. Aircraft manufacturers are unanimous in urging that funds be continued for their operation, but also foresee the possible danger of appropriations being sharply curtailed after the war under political pressure for economy.

MILE OF SUPPLY: This is how the Army Air Forces general depot, Pacific Ocean areas, looked when the Marianas Island base was established. In this pile of crates, heaped in a jungle clearing, are thousands of parts for combat aircraft used in operations against the Japanese. Under orders to get supplies sent from California off the ships, depot personnel stacked the crates along the jungle road for a mile

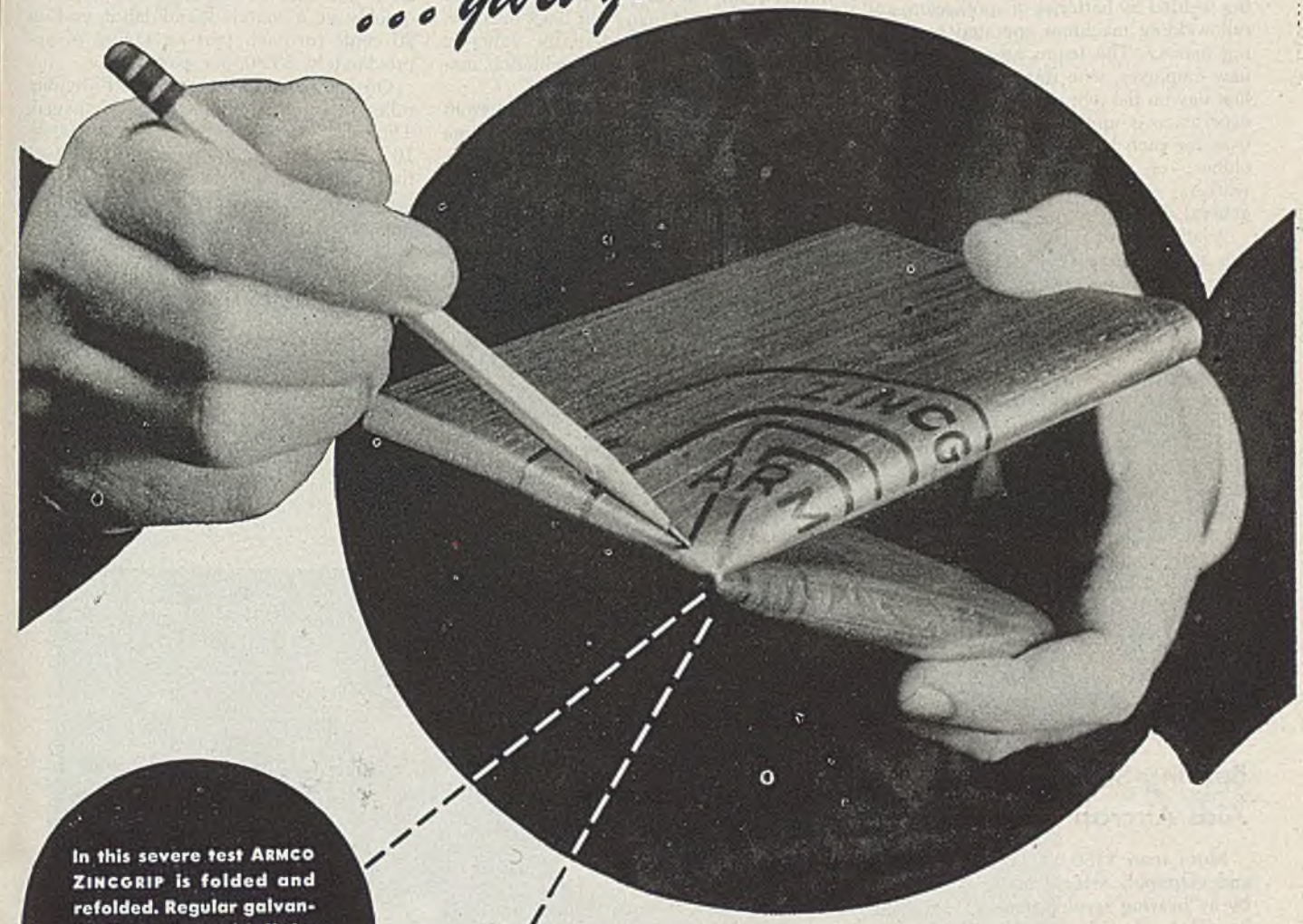
Spotwelding Praised for Savings in Plane Production

Spotwelding as a means of reducing aircraft manufacturing time, weights, and costs was praised at a recent meeting of the Buffalo section, Society of Automotive Engineers, at Buffalo. The meeting was one of several held in war production centers to facilitate dissemination of the latest war engineering information to engineers responsible for design, development, and production of motorized war equipment.

H. A. Mullen and L. Boelter of Ford Motor Co.'s Willow Run plant reported application of spotwelding techniques to 100 assemblies used in making B-24

Zinc S-T-R-E-T-C-H-E-S with the steel...

...gives you unbroken protection



In this severe test ARMCO ZINCGRIP is folded and refolded. Regular galvanized steel would flake badly at the corner to which the pencil points, but the coating on ZINCGRIP remains unbroken.

This is the famous "Handkerchief Test" on ARMCO ZINCGRIP.

It clearly shows how the special zinc coating *stretches* with the steel during severe fabricating operations. This means *unbroken zinc protection* for your products.

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ARMCO ZINCGRIP solves the problem. Its specially-applied zinc coating clings tightly to drawn corners as well as the flat parts. No bare spots are left for corrosion to feed on.

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*ARMCO PAINTGRIP, a special Bonderized surface treatment, is recommended for ZINCGRIP products requiring immediate painting.

bombers produced savings of 125 man-hours in working time per ship, a corresponding reduction in weight, and a halving of original costs.

They said that aluminum and magnesium alloys and stainless steels are being welded by batteries of spot, seam, and roll welding machines operated by welding teams. The teams are comprised of new employes, who start spotwelding the first day on the job; of control men, whose experience is applied to setting the controls for each battery of ten welding machines; of job foremen for each 25 workers; and a shift division foreman in general charge.

Availability of riveting machines which can step up aircraft construction by setting as many as 3000 rivets an hour was announced by F. J. Dietrich of the airplane division, Curtiss-Wright Corp., Buffalo.

Development of methods of predicting the cooling requirements of aircraft engines still in the design stage was described by Marcel Piry of Ranger Aircraft Engines, Farmingdale, L. I., N. Y. He said that laboratory tests with single-cylinder engines, provide accurate data on the cooling requirements of both air and water-cooled engines used in aircraft operated at altitudes from sea level to 31,000 feet.

J. W. Cunningham, Wright Aeronautical Corp., Paterson, N. J., reported that aircraft power-plant cooling has been facilitated by application to cylinder barrels of W-shaped cooling fins.

Bearing Service Station Aids Aircraft Producer

More than $150,000 have been saved and extremely critical material conserved by a "bearing service station" established by Glenn L. Martin Co., Baltimore, a year ago. The original investment in the program, originated by an employe, amounted to less than $10 and represented the cost of a few small tools.

The project started when bearing shortages began to affect parts production in the Martin plants. An employe, Earl Caudill, began experimenting with a few bearing assemblies which had been rejected by quality control division, and after repair work was completed, took them to both the Army and Navy inspectors to get their opinions as to whether the repaired parts would meet specifications. Finding that they did, he experimented with other types of assemblies and soon had developed a mental "repair manual" on practically every type.

In a short time, the "station" was set-up, and its value soon became apparent for two other employes were added and Caudill trained them. From all over the plants came assemblies for repair. The men handled emergency calls, too, when they would go to the plane and in most every case be able to repair the bearing without removing the damaged part from the ship. This was particularly valuable in cases where taking out the part would have meant removing rivets or skins.

Most common types of repair now performed by the servicemen are removing foreign matter, repairing bent shields, and remedying tight bearings. The former results in many bearing assemblies already discarded being put back into use, and the latter is particularly valuable for repairing parts of the production machines in the plant.

Sometimes the men take parts from several different assemblies and combine them to make a new one.

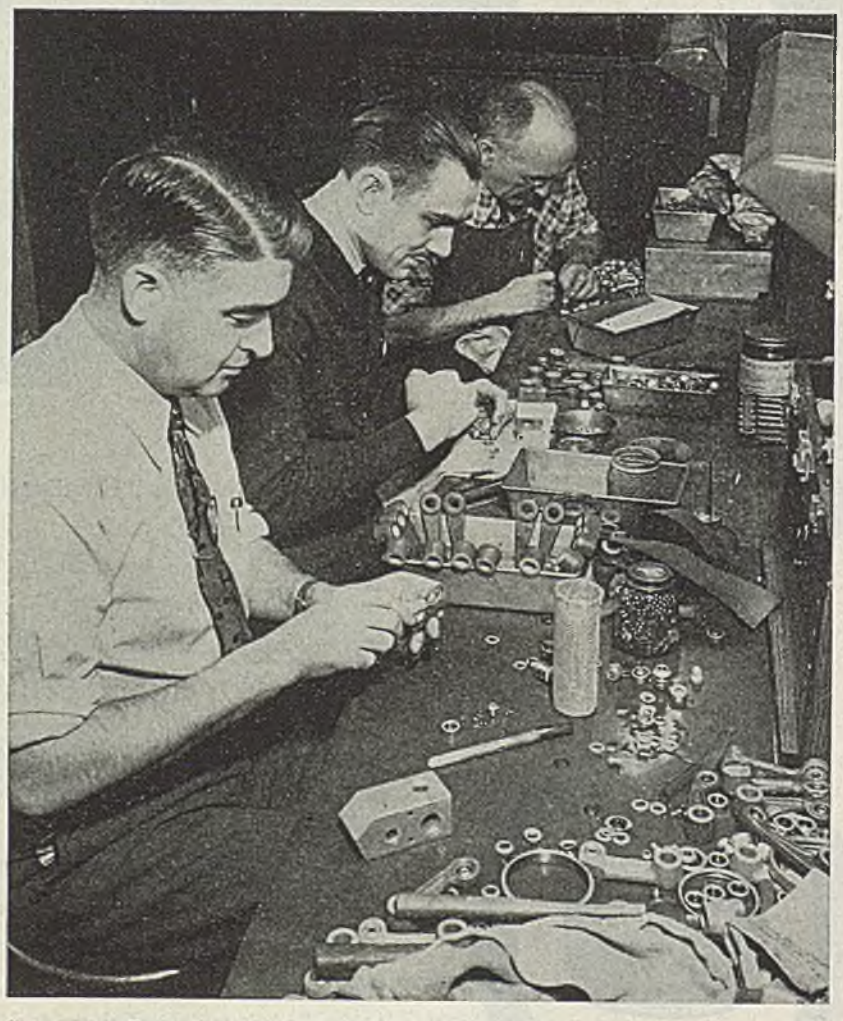
The men remove the shields, ofttimes as many as eight from a single assembly, straighten them if possible or replace them with a new one, and the assembly is as good as new. Sometimes the shields and balls "jump" out of self-aligning bearings and the bearings fall apart. Repairing these is a simple matter of cleaning and assembly. In other assemblies re-grinding the center rings to correct proportions will do the trick of freeing a tight bearing.

But the servicemen's work is not all a simple matter. In one recent case, 9000 idler bell cranks had to be repainted because the subcontractor had done a bad job. To do this meant removing the original paint, but the paint remover solution also hardened all the grease and made it necessary to dis-assemble, clean and re-assemble the bearings. The three men got them back in working order quickly at a material and labor cost of 20 cents for each part—a saving of approximately $3.80 per part.

On another occasion some self-aligning roller bearing assemblies were damaged. The cost to repair was approximately 10 cents each—and the original cost of the entire assembly was $27.50.

The repair men are "salvage" minded, too. If a bearing assembly can't be repaired they tear it down and salvage any usable parts. These they sort into proper classifications, treat them against corrosion and put them away for future use. A five-shelf cabinet at the end of their working bench is filled with jars, box and cloth bag containers of every size and description in which the parts are kept.

"Sometimes we'll have a use for these parts," is Mr. Caudill's explanation, and it serves as a motto for the group.

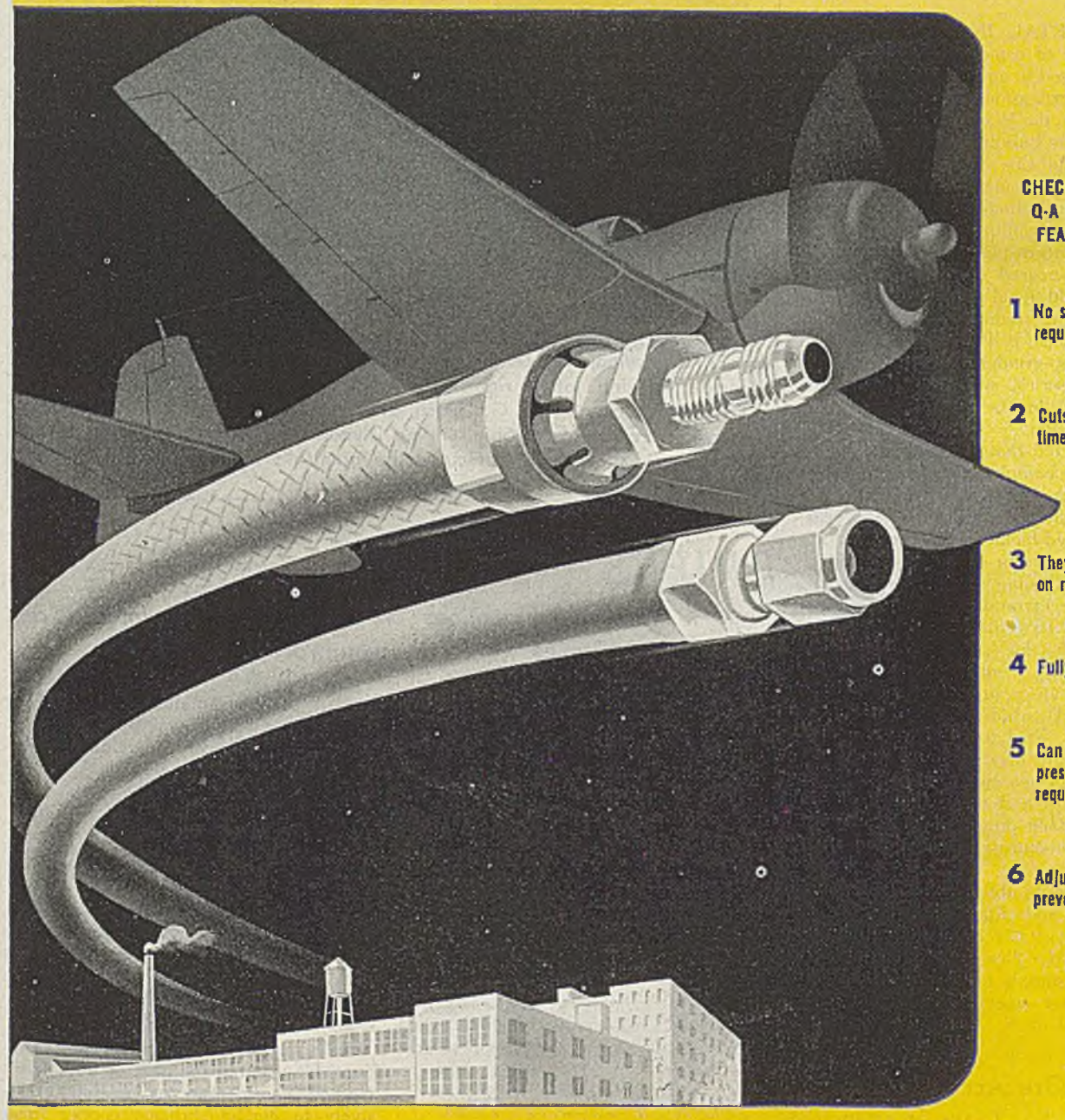


"Proprietors" of the Glenn L. Martin Co.'s bearing service are, left to right: Earl Caudill, who originated the idea, Joseph Vogt and George Monroe. Started originally as an experiment at a cost of approximately $10, the shop now saves more than $150,000 annually

Improved

QUICK-ATTACHABLE HOSE FITTINGS

Because Weatherhead quick-attachable (Q-A) hose fittings can be easily installed as either original equipment or replacement work, service-men and mechanics have stated overwhelming preference for them. They are available in two types for low pressure or for medium and medium-high pressure lines. Write or phone any Weatherhead branch office for our new Aviation Catalog. It's free!



CHECK THESE Q-A FITTING FEATURES:

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Kennametal Inc. Is Engaged in Plant Expansion

Enlarged facilities will increase capacity for making machining tools and cemented carbides for tool blanks

KENNAMETAL INC., Latrobe, Pa., manufacturer of cemented carbide products, is engaged in an extensive plant and equipment expansion program recently authorized by the War Production Board.

Several new buildings are being erected at the Latrobe site, and extensive alterations are being made in existing structures, including enlarged packing and shipping facilities, increased space for carbide processing and tool manufacture, and increased cafeteria accommodations. Additional specialized equipment, including reduction and sintering furnaces, pumps, ball mills, presses, milling machines, grinders, and many processing accessories, will be installed at Latrobe, and in the auxiliary plant at nearby Kingston.

It is expected that this expansion program will be completed in June. In conjunction with improved manufacturing techniques effected during the past year these expanded facilities will provide a 25 per cent increase in capacity for making complete machining tools, and a 50 per cent increase in production of cemented carbides for tool blanks, and for shell cores, which the company has been making in large quantities since last July.

Although an appreciable amount of the cemented carbide produced by Kennametal Inc. at Latrobe is going into shell cores, the major part of the plant facilities will continue manufacturing complete tools and tool blanks because the shell making program requires quantities of steel-cutting grades of Kennametal.

In addition to the expanded facilities at Latrobe and Kingston, Kennametal Inc. is building a factory at Santa Clara, Calif., to make files and wear resistant parts and to supply tool blanks and complete tools for emergency needs of Pacific coast plants.

Bauxite Ore Accumulates In Netherlands West Indies

Large stocks of bauxite ore have accumulated in Surinam, Netherlands West Indies, and the immediate future of the mining industry is reported to be dependent upon demand from the United States and adequate shipping facilities, according to the U. S. Department of Commerce.

SHIP HISTORY RECORDED ON FILM: "Shipways", a new motion picture which dramatizes the story of ships and shipbuilding, past and present, was released recently in New York. Above is a scene from the movie, showing, left to right: Vice Adm. H. F. Leary, commander of the Eastern Sea Frontier; E. G. Grace, president, Bethlehem Steel Co.; A. B. Homer, vice president, Shipbuilding Division; and Lieut. Comm. Richard S. Barthelmess, the admiral's aide

BRIEFS . . . .

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

McInnes Steel Co., Corry, Pa., has appointed Tool Products Co., 2036 East Twenty-second street, Cleveland, as its northern Ohio representative.

—o—

C. Tennant, Sons & Co., of New York have moved their offices to Empire State building, New York.

—o—

Aro Equipment Corp., Bryan, O., has appointed Admer Associates, 49 Central avenue, Cincinnati, as jobbers for Aro industrial pneumatic tools.

—o—

Cleveland Automatic Machine Co., Cleveland, announced that the new address for its New York sales office is Singer building, 149 Broadway.

—o—

Westinghouse Electric Corp., Pittsburgh, reported that orders booked for the first quarter of 1945 amounted to $312,116,465 and set a new all-time record for the company.

—o—

Canadian National Railways' apprenticeship program is described in a booklet available from the Bureau of Training, Apprentice-Training Service, War Manpower Commission, Washington, to aid American industry in training returning war veterans.

—o—

Atlas Steel & Supply Co., Pittsburgh, has moved its offices to the Law & Finance building.

—o—

Reliance Electric & Engineering Co., Cleveland, has received a fifth star for its Navy "E" flag and a second star for its Maritime "M" flag for continued high production of electric motors.

—o—

Salkover Metal Processing Co., Chicago, has entered the field of design and method consultation as related exclusively to electric furnace copper brazing. The new service is intended chiefly to aid companies located so far from Salkover plants that shipment of work to the plants for brazing is impracticable.

—o—

E. I. duPont de Nemours & Co. Inc., Wilmington, Del., announced completion at Louisville, Ky., of a new unit at the du Pont operated neoprene plant which

will increase production of this high priority synthetic rubber by 26 per cent.

—o—

National Carbon Co., Cleveland, has completed and made available a sound film, "Carbon—Black Treasure," a step-by-step presentation of the manufacture of electrodes and anodes for electrothermal and electrochemical applications.

—o—

Lake Shore Engineering Co., Iron Mountain, Mich., has been awarded a third gold star by the U. S. Maritime Commission to be added to the company's "M" pennant in recognition of continued war production achievements.

—o—

Buffalo Foundry & Machine Co., Buffalo, has been sold to Blaw-Knox Co., Pittsburgh, and will be known as the Buflovak Equipment Division of Blaw-Knox. There will be no changes in management.

—o—

American Car & Foundry Co., New York, recently gave a dinner in honor of F. F. Rose, vice president, who is retiring after 46 years' service with the firm.

—o—

F. H. McGraw & Co., engineering and constructing firm, New York, have appointed Richard Condon Inc., New York, as its public relations counsel.

—o—

Great Lakes Transit Corp., Buffalo, has asked stockholders to approve at a special meeting May 22 the sale of the company's four package freighters to foreign interests.

—o—

Bethlehem Steel Co., Bethlehem, Pa., has employed approximately 21,000 World War II veterans.

—o—

Purchasing Agents Association of Chicago Inc. had as speaker for its monthly meeting on May 10 Paul E. Burbank, development manager of United Air Lines' air cargo department.

—o—

American Standards Association, New York, has developed new American war standard specifications for asbestos clothing for steel mill and foundry workers.

—o—

Pacific Engineering Corp., Los Angeles, has transferred its sales division from its Los Angeles plant to the Equitable building, Hollywood, Calif.

—o—

Philco Radio & Television Corp., Philadelphia, has formed a television broadcasting division to consolidate all Philco telecasting activities. Ernest B. Loveman, formerly with Philco, has been named vice president in charge of the division.

—o—

Consolidated Steel Corp. Ltd., Los Angeles, is dropping the abbreviation "Ltd." from the corporate title.

—o—

Babcock & Wilcox Tube Co., New York, has developed and is manufacturing high carbon alloy steel tubes for tank tracks. Use of tubes in place of customary steel bars reduces weight of the tracks.

—o—

Duer Engineering Co., Youngstown, O., is the name of a new office through which Paul L. Duer and Walter Pestrak will represent Progressive Welder Co. and Knu-Vise Inc., both of Detroit.

—o—

Central Illinois Tractor & Equipment Co. is establishing in Champaign, Ill., a branch to handle sales and service for road building equipment in 29 eastern Illinois counties. The firm is a distributor for the Caterpillar Tractor Co., Peoria, Ill.

Budd Co. Plans Resumption Of Railway Car Production

Manufacturing of up-to-date, lightweight stainless steel railway passenger cars will be resumed by the Edward G. Budd Mfg. Co., Philadelphia, as soon as manpower and materials are available, Edward G. Budd, president, announced last week.

The company, which 11 years ago pioneered the building of modern streamlined trains of stainless steel, will include among its postwar products railway passenger cars for both day and night occupancy as well as all types of recreational facilities required for the well-balanced, all-purpose train.

The program includes resumption of reserved seat sleeper coaches, or chair cars, as well as dining, lounge, tavern, observation, and several types of sleeping cars.

The Budd company will give special attention to developing car types designed to provide low-cost, bedroom service, in line with its policy of furnishing equipment which would help to attract mass travel to the railroads. The company is not interested, Mr. Budd said, in producing types which would involve the crowding of a greatly increased number of passengers into a sleeping car, simply for the sake of attracting additional passenger revenue.

"We believe both the railroads and the traveling public can best be served by furnishing commodious coach and luxurious sleeper coach service at coach fares," he added. "In addition we expect there should be a substantial market for sleeping cars which would furnish more luxurious overnight service but still at moderate cost," Mr. Budd said.

The intensive development of this sort of rail travel after the war will result, Mr. Budd predicted, in maintaining the volume of travel experienced during the war, and thus enforce a great and continued demand for the type of modern, streamlined stainless steel railway cars the Budd company manufactures.

SUPPLIES MISSING LINK: Dr. Gunther Mohling, left, scientist with the Allegheny Ludlum Steel Corp., is presented a certificate of appreciation and a cash award by W. A. Givens, right, Allegheny Ludlum executive vice president, for his contribution in the development of a series of high temperature alloys, one of which provides a vital link in American jet propulsion aircraft production. In center is E. J. Hanley, secretary-treasurer of the company

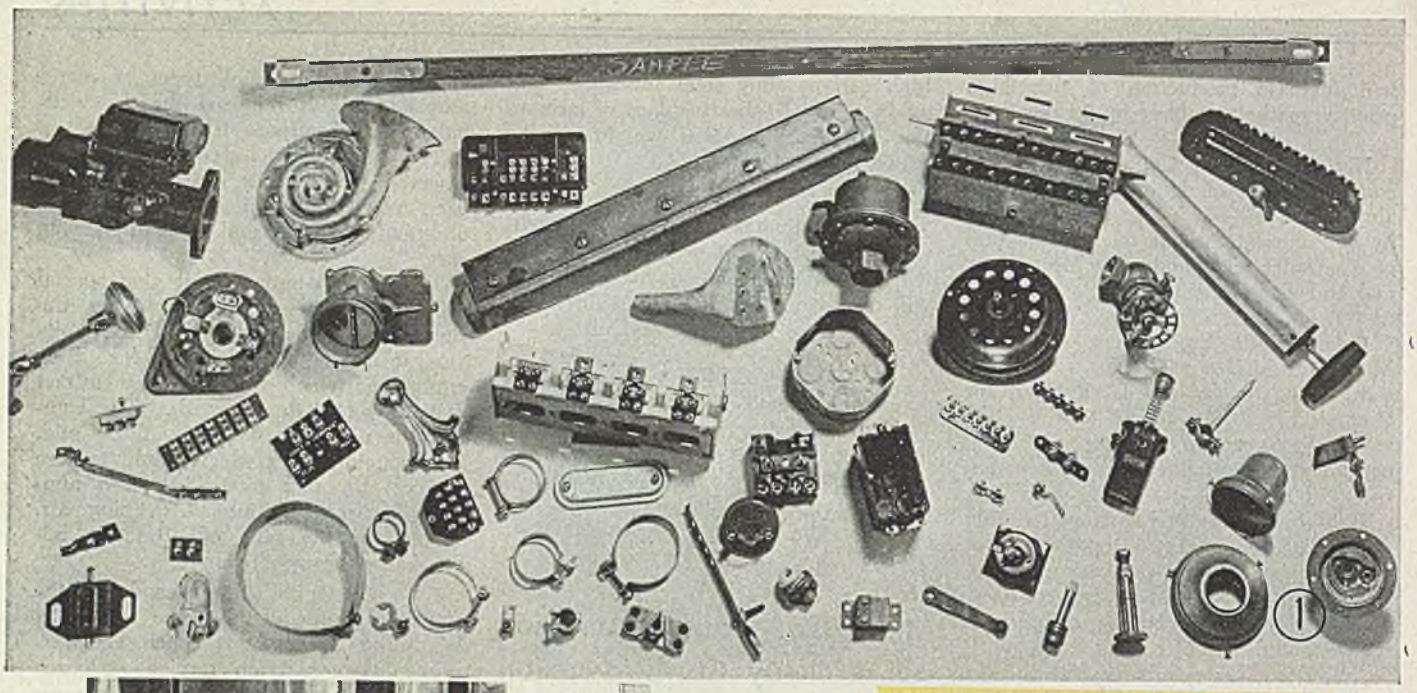


Fig. 1—Great scope of automatic assembling equipment is indicated here where elements assembled include castings; die castings; sheet steel, copper and brass stampings; spring brass; plastics and the like. Also note range in size. Detroit Power Screwdriver Co. supplied photos

Fig. 3—Simple jig with guide pin on machine base speeds assembly of this radio cabinet by allowing the screws to be driven almost as fast as the operator can slide the jig from point to point. Notches in jig engage pin to locate holes directly under driver

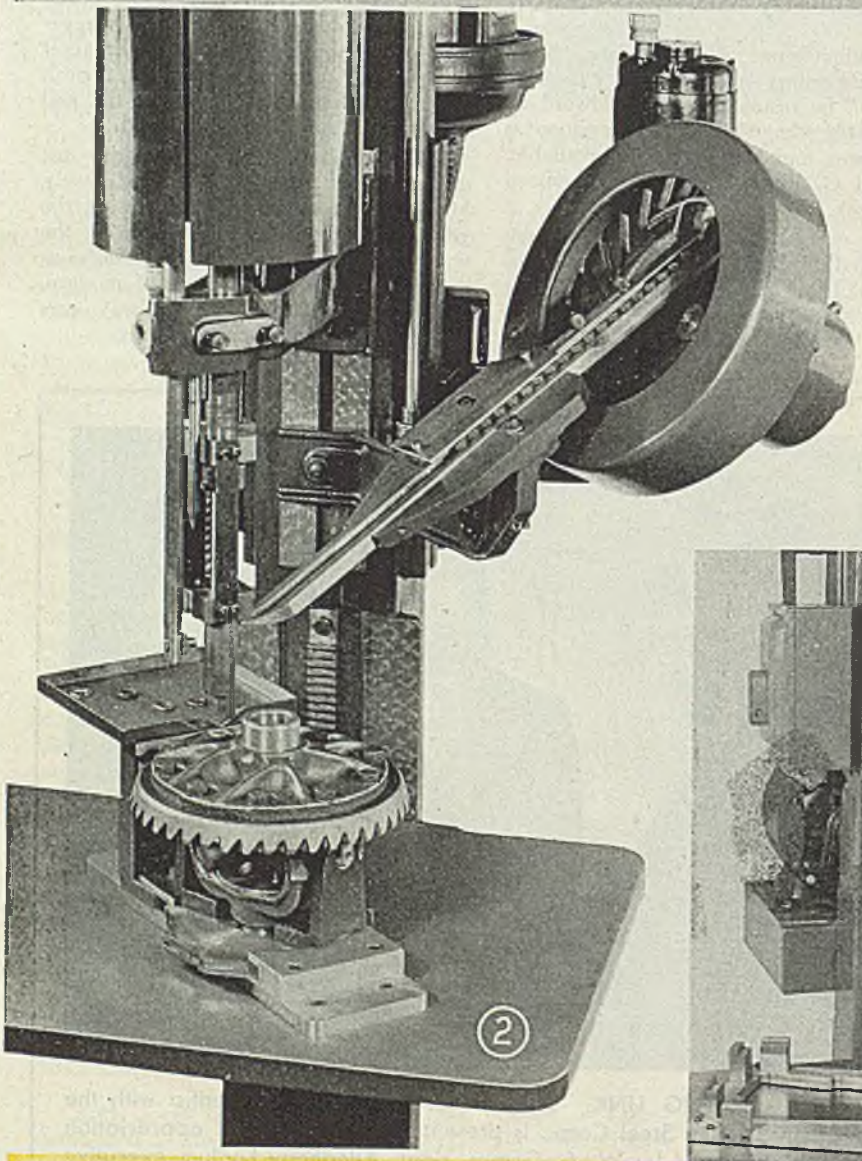
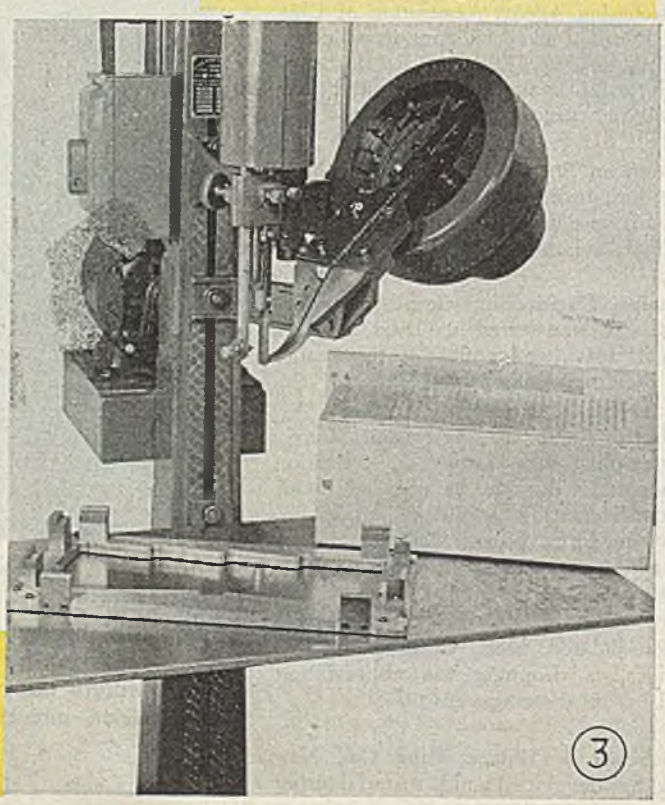


Fig. 2—Driving 3/8-inch diameter hardened cap screws in assembling ring gears, using setup tension of 55 foot-pounds. Lockwashers are fed in from tray at side



Robot "ASSEMBLERS"

By G. W. BIRDSALL
Associate Editor, STEEL

Machine automatically positions nut on under side of assembly, feeds screw down through assembly, threads it into nut, tightens screw to any predetermined tension desired; drives any type head, all types of machine, sheet metal and self-tapping screws. Typical setup drives six screws in single assembly in 8 seconds, including time to unload and reload fixture. Tensions up to 70 foot-pounds are available for driving hardened cap screws

MORE and more industries are finding that their assembly operations can be speeded greatly through use of power screwdrivers fitted with automatic feed units for placing screws and nuts and driving them automatically to any predetermined tension that may be desired. Main advantages so gained are greatly increased speed and a better assembly because the screws are always set up to the exact tension for best results.

The list of industries using such equipment now includes manufacturers of autos, trucks and auto accessories; electric, electronic and radio devices; plumbing, heating and air conditioning equipment; toys; lighting fixtures; instruments and controls; door hardware; stoves; etc.

R. H. Gladfelter of Detroit Power Screwdriver Co., Detroit, in a recent interview told how power assembling devices of this type are now available that will drive to full tightness capscrews as large as 5/8-inch diameter, sheet metal screws up to No. 1/4 and wood screws up to No. 14, 1½ inches long. Present machines are capable of driving hardened cap screws at tensions up to 70 ft.-lb. See Fig. 2.

On the other hand, small screws down to units only ⅛-inch long can be handled, even though they may have a binder head or a large diameter head that would seemingly limit their use in the machine.

And feed devices have been developed which will feed a nut in position on the bottom side of a sheet metal assembly, then feed a screw down through the assembly, thread it into the nut, and tighten the assembly to any tension desired—all done automatically in a simple and extremely fast operation, as will be explained.

Fig. 8 illustrates such a setup being used to put through-bolts in hose clamps. Note the simple positioning fixture employed. All the operator needs to do here is position the clamp in the fixture and operate the foot treadle which automatically puts the machine through its cycle.

Fig. 1 affords an idea of the great range of usefulness of such aids to swift assembling. The elements assembled here include castings; die castings; sheet steel, copper and brass stampings; spring brass; plastics, and the like. Note the range in size, also.

Positioning Speeds Work: Speed of the automatic screwdriving unit is most effectively utilized when the assembly is fitted into a jig or fixture which facilitates rapid positioning of the work under the driver head. Such a jig is seen in Fig. 3 where a radio cabinet of sheet steel is assembled on a simple base plate fitted with notches which in turn engage a pin in the base of the machine directly under the driver.

The cover for this cabinet is fastened in position by 10 sheet metal screws, five along each side, with an extra screw in the center of each end. As Mr. Gladfelter points out, the simple jig allows this work to be done almost as fast as the operator can slide the jig from point to point and operate the foot treadle bringing down the driver head. It is easy to see how the assembly is done at a much faster rate than would be possible by hand. Too, each screw is set up to the exact tension desired, preventing stripping and at the same time assuring maximum holding power.

Fig. 2 shows another unit arranged for driving 3/8-inch diameter hardened cap screws in assembling ring gears. These screws are set up to a uniform tension of 55 ft-lb. In this assembly, spring lock washers are employed under the head of the capscrews. In making the assembly, note that the lock washers are placed in a small tray just to left of the work which is positioned in a fixture that allows it to be rotated to bring the various holes directly in line under the driver.

The tray has a slot cut in it opposite

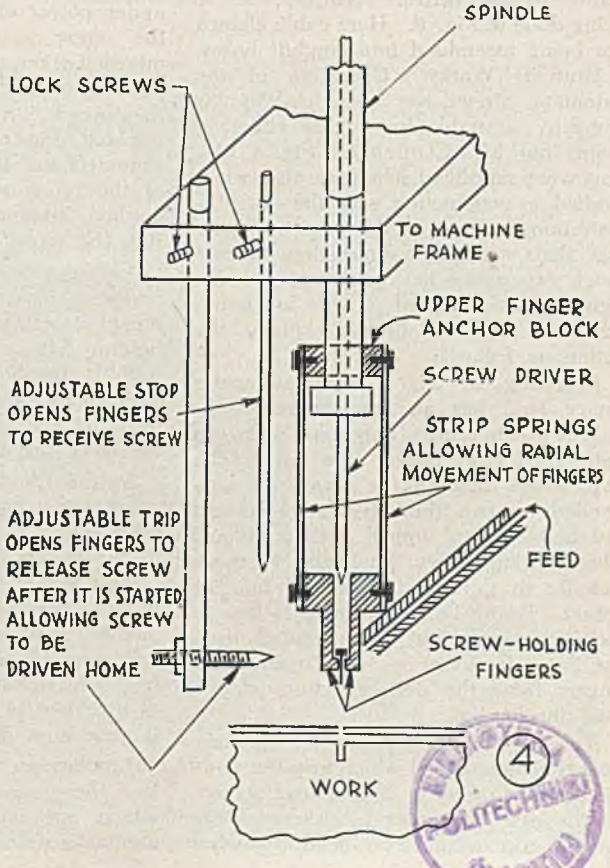


Fig. 4 — Simplified schematic of driver head. Actually radial springs and fingers are turned at angle permitting screw to fall from feed chute in between fingers held open at upper limit of travel by adjustable stop which enters and separates fingers. Similarly, adjustable trip releases screw from fingers as lower limit of travel is reached, so screw can be driven home

the hole position, making it easy to slide a washer off the tray and into the recess at top of the bolt hole in the work. Then operator moves foot treadle bringing down the driver head with its capscrew. Entire operation is very fast.

Proper Fixtures Important: Proper fixtures or jigs contribute much to assembly operations when using the automatic power screwdriver. On a bakelite switch assembly, six screws are driven, one at each of six different points, using a special fixture which has stops to quickly locate the work under the driver at each of the six different points in rapid succession. These operations are done so fast that the fixture is unloaded, reloaded, and the six screws driven in 8 seconds—almost one per second. That's rapid assembling.

Such operations can be directly tied into production lines by locating the automatic screwdriver over a conveyor belt since the supports are arranged for either simple mounting of the machine on a floor pedestal, as in Figs. 2, 3, 6 and 8, or on short legs which can straddle a belt conveyor, on a bench mounting.

To accommodate different distances from point of screw application to base or fixture (as required by work of varying height), the driver head mechanism remains fixed in its vertical position and the height of the base on the supporting column (in pedestal type mounts) is adjusted as required.

Fig. 6 illustrates the placing of screws in work at an angle. This brings up one of the limitations of such equipment. Screws must always be driven vertically. It is not possible to drive screws at an angle. But often the work fixture can be so constructed as to hold the work at an angle which in turn will permit the screw to be driven vertically, as is being done in Fig. 6. Here cable clamps are being assembled into conduit boxes.

How It Works: Operation of the automatic screwdriver developed by his company is simple but highly effective, points out Mr. Gladfelter. Fig. 4 is a somewhat simplified schematic that when studied in conjunction with the other illustrations will show the essential parts and their action. Serious thought and much experience has gone into the design of these units to provide maximum efficiency. Mr. Gladfelter explains the action as follows:

Referring to Fig. 4, the automatic rotary feed has an escapement mechanism which allows only one screw to enter the driver fingers at a time. The two fingers holding the screw are suspended on two thin strip steel springs fastened to an upper anchor block. These springs allow the fingers to move radially to provide the desired holding action. Entire finger assembly is free to move vertically but is prevented from turning. It is set so side opening of fingers faces the delivery chute of the feed mechanism.

Tubular type gripping or holding fingers are employed which grip the body diameter of round or filister head screws. In the case of binder head screws, the fingers grip around the head diameter. This type of finger permits driving screws in recesses where there is only a small amount of clearance.

In normal upward position, the fingers are held partly open by a small adjustable stop that is pointed to enter between the two fingers and separate them slightly so they will receive the screw.

Spindle is moved vertically by a foot treadle which thus controls vertical movement of the entire driving head through a mechanical linkage as can be seen in Figs. 6 and 8.

Upper part of the spindle contains a very sensitive type clutch which is adjustable to any predetermined tension. The spindle is in two sections, both above the elements shown in Fig. 4. The two spindle sections are joined by the clutch assembly which allows the upper spindle to run at full speed at all times while the lower spindle merely operates by drift until such time as the clutch is engaged, and that is only when driving home the screw.

Protect Threads, Avoid Jamming

This drifting of the lower spindle section allows the screwdriver bit to turn to seek the slot of the screw held in the gripping fingers, with no power on the spindle. Down movement of the spindle, controlled by the foot lever, is slightly faster than the finger mechanism. This vertical overtaking movement allows the bit to enter and bottom in the screw slot. Thus the screws enters the tapped hole turning but with no power applied. This permits the screw to engage the hole threads without any danger of jamming or spoiling the screw heads.

However, the pressure of the screw entering the tapped hole engages the clutch and the screw is then driven home under power at full spindle speed. As the screw is driven to the predetermined tension, the clutch slips to prevent twisting off the screw head or stripping the threads. As foot treadle pressure is released, the clutch opens, the spindle is muted and the driving bit comes out of the screw slot without power being applied, eliminating any chance of marring the screw head.

As the screw enters the hole and is ready to drive, further downward movement caused by driving results in the holding fingers being parted by the adjustable trip shown at extreme left, Fig. 4. This opens the fingers to allow the screw head to pass through them and engage the work surface below.

As the spindle returns to normal position, the escapement mechanism on the track of the feeder releases another screw to the fingers, ready for the next drive.

Any power screwdriver of the type shown here can be changed to accommodate a wide range of screw shapes and sizes by selecting proper automatic feed and holding fingers. Several sizes of machines permit a considerable range in maximum driving tensions.

Limitations: It should be pointed out that there are certain limitations within which one must work in using these automatic screwdrivers. First, there must be sufficient clearance for the fingers holding the screw to reach down in the part or assembly to start the screw. As the screw is driven, sufficient clearance must be available to allow the holding fingers to open far enough to release the screw head. This usually involves a clearance roughly twice the diameter of the screw head—a clearance easily available in most assembly work.

Second, the screw and driver must be in vertical position to operate properly. However, as previously pointed out and illustrated in Fig. 6, the work itself can be fitted into a jig or fixture at any angle desired, permitting many screws to be driven at odd angles (as far as the angle of the screw with the part is concerned).

Versatile Hopper Feeds: One of the important sections of such a power screwdriving setup is the automatic hopper feed that puts the screws into the holding fingers.

These automatic feeds are so adaptable that they have found wide application to other work in addition to use with automatic screwdrivers. For example, Fig. 5 shows one feeding drawn sheet steel stampings into a Haskins automatic tapping machine in an interesting setup. Here the parts are first dumped into the hopper. As the pickup wheel of the hopper revolves, the work is engaged in radial slots in the wheel so shaped as to pick up parts right side up.

Fig. 5—Stampings being fed automatically into Haskins tapping machine for threading

Fig. 6—Where screw is to be driven at angle, work fixture must tilt work to keep screw vertical as shown here in fastening cable clamps inside electrical conduit boxes. Screw kept vertical

Fig. 7—Dished steel slugs being fed into press automatically for further operations

Fig. 8—This automatic setup positions nut underneath work, threads screw down through work into nut and tightens to desired tension—all in a single fast operation

The pickup plate is mounted at an angle so that as it rotates, the stamped parts fall into the slots. Continued rotation brings the slots up to a point where the stamping slides out of the slot into a track or delivery chute. A guard at top of the track prevents the parts from entering the track upside down. When the track is full, parts merely drop off the slots and dump off at the end of the track instead of entering it. This prevents jamming or locking the feed. At the same time, it insures full delivery even at extremely high rates of feed.

If foreign or distorted work gets into

the hopper and causes it to jam, stripping the drive gears is prevented by the slipping of a specially designed friction bevel gear. To release the lock-up, it is not necessary to shut off the drive, merely turn the hopper backwards with the hand until clear.

A pneumatically operated escapement device in the track in Fig. 5 allows a single part to be delivered to the index plate of the dial feed. The escapement mechanism is operated by air through a valve in turn actuated by the upstroke of the tapping head, seen at top of Fig. 5.

This air valve also feeds air through another flexible hose connected to a small cylinder operating the indexing plate to move a new part underneath the tap at each upstroke of the tapping head. The indexing plate is notched around its outer periphery and a spring

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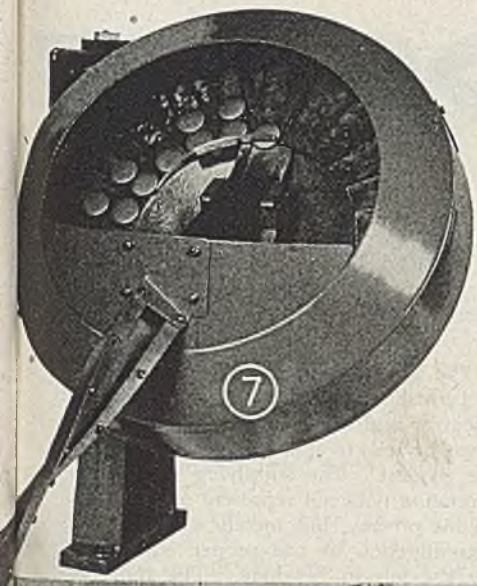

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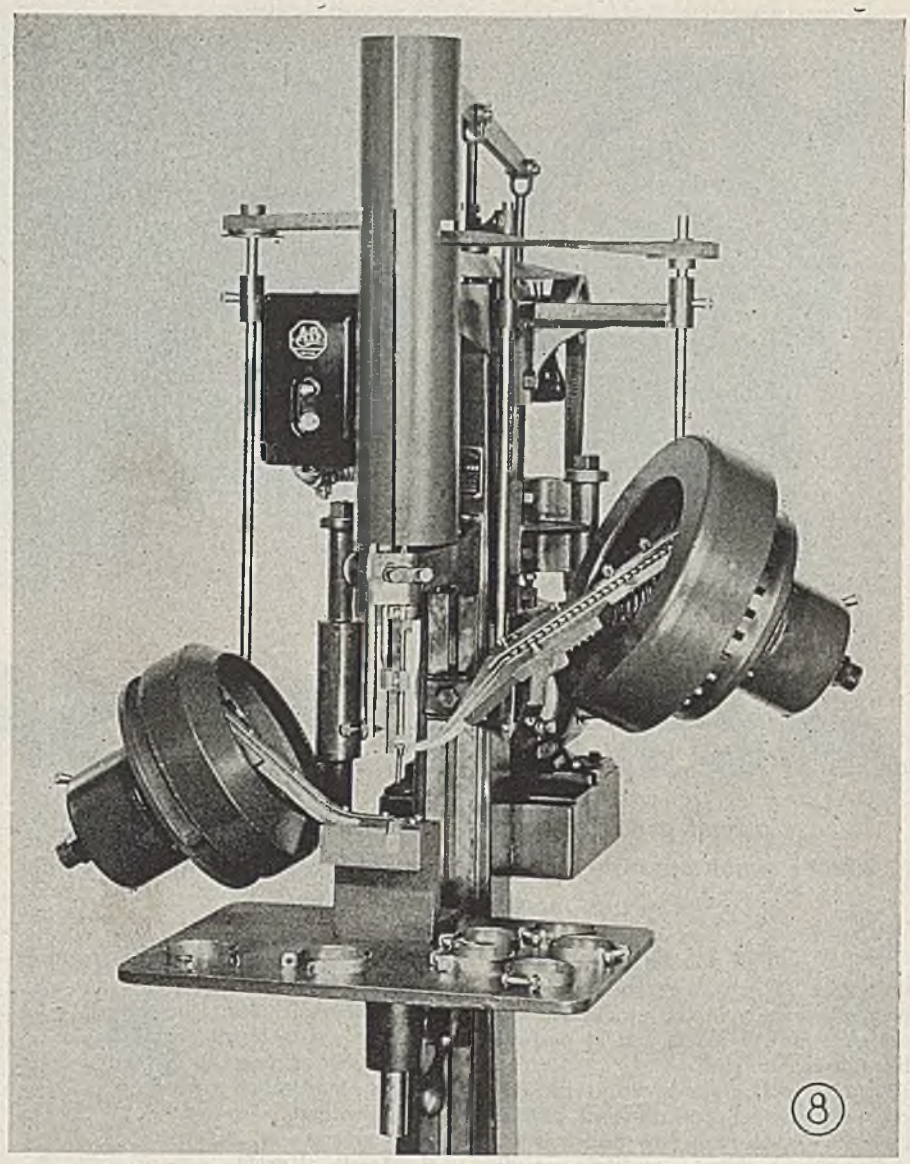

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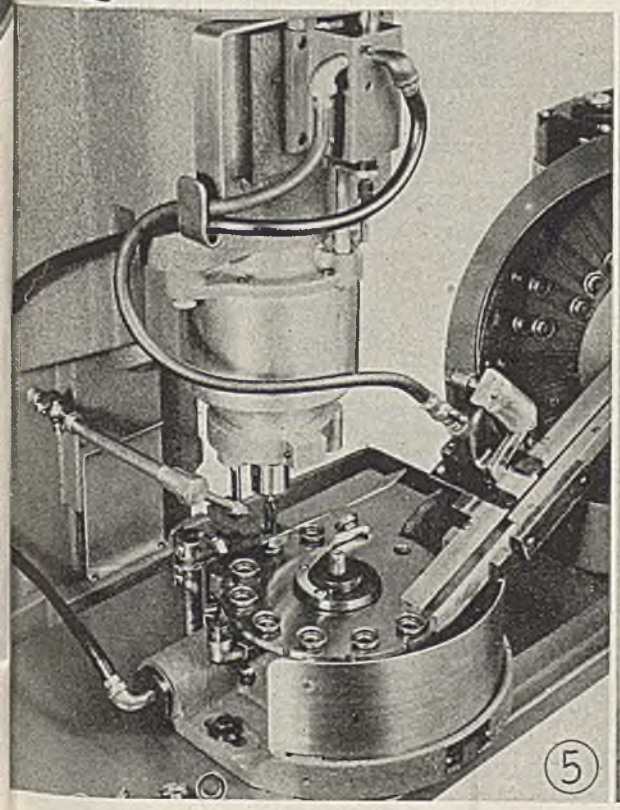

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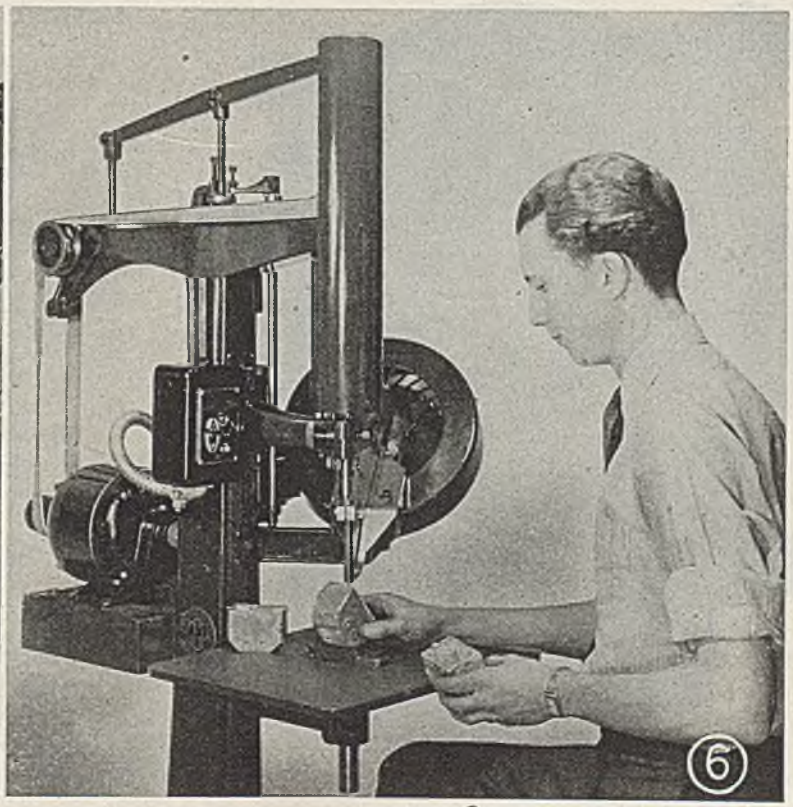

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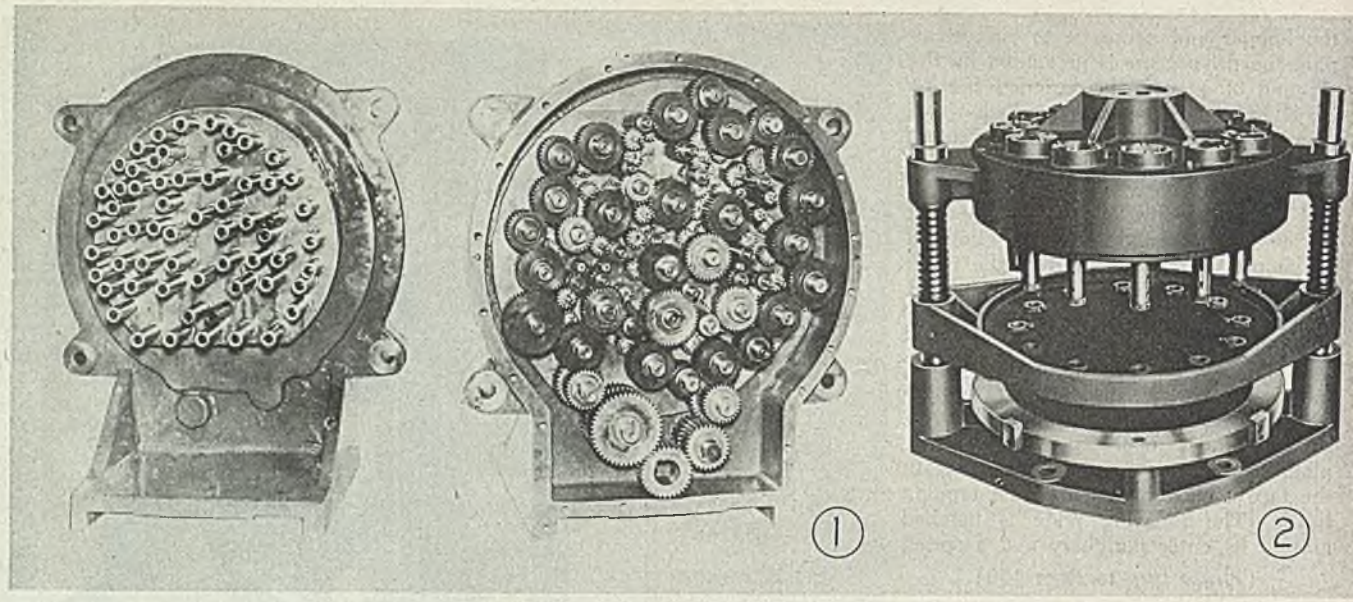


MULTIPLE SPINDLE

. . . . permit great increase in production; up to 61 or more holes simultaneously drilled in one operation; multiple station setups increase output still more

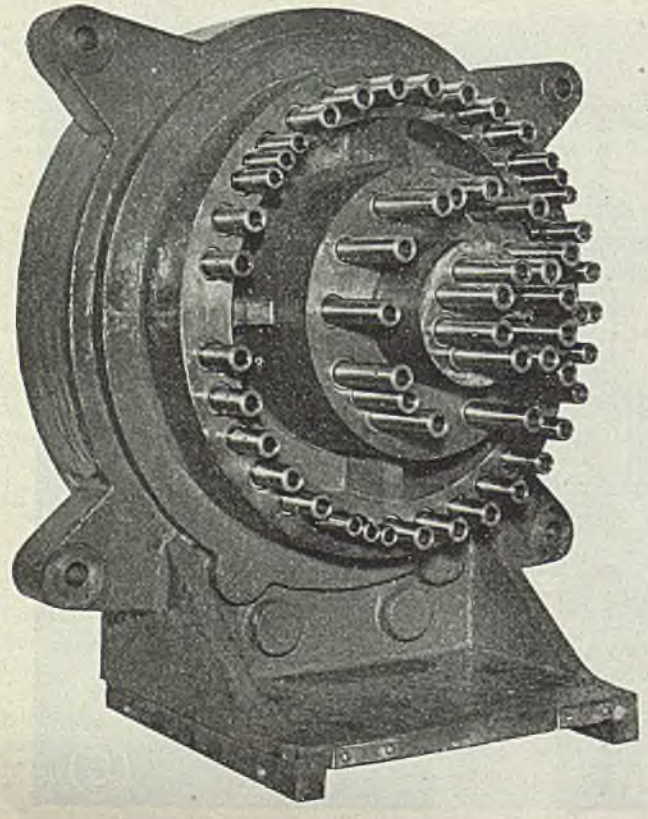
By C. A. HOEFER
Hoefer Mfg. Co.
Freeport, Ill.

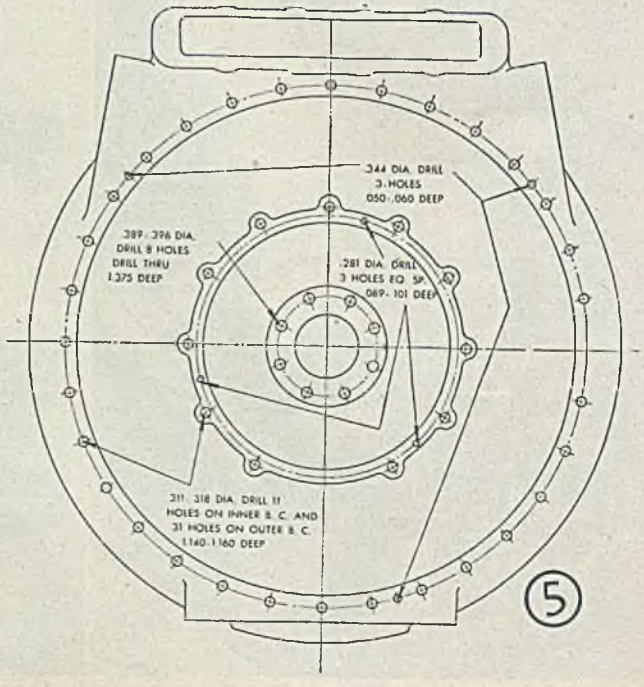
"WILL multiple spindle heads do this job better?" This is a question which is being asked daily in the production departments of war plants and at postwar planning conferences.

There is no single answer to this question, as a careful evaluation of several factors is necessary before decisions regarding the purchase of multiple spindle equipment can be made. These factors consist of:

1. Number of holes to be drilled
2. Time available for operation
3. Number of pieces to be treated during amortization period.
4. Labor cost
5. Overhead
6. Margin of profit

The average manufacturer is reluctant to furnish all of these data to the producer of multiple spindle equipment, because he fails to appreciate the validity of the request. The supplying of this information does not represent an intrusion on his privacy, but merely assists in the determination of the proper equipment for the job to be done. The multiple spindle head producer is often in the position of the doctor whose patient refuses to tell his symptoms. The co-operation of





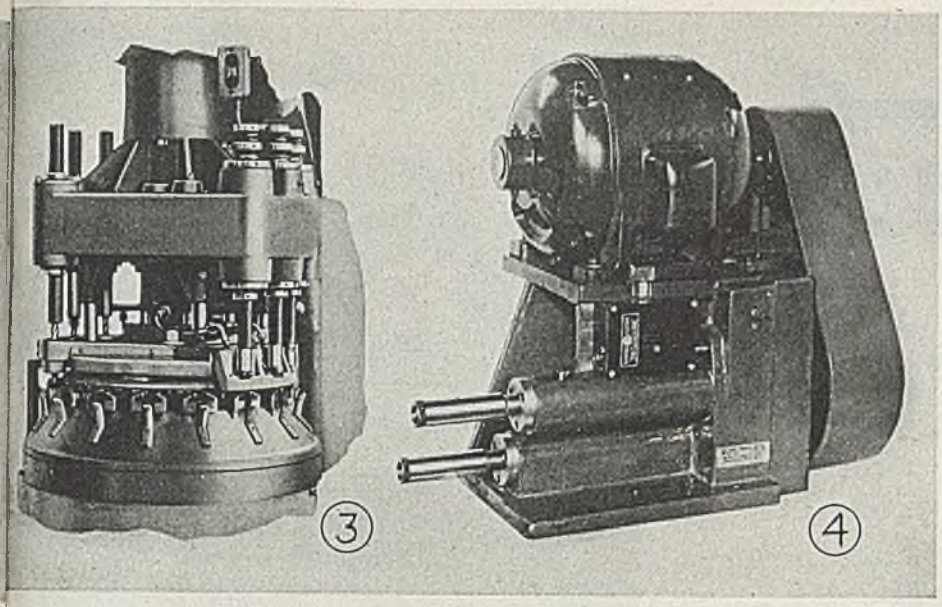


Fig. 1—Front (left) and back side (right) (cover removed) of 61-spindle head for drilling holes in face of supercharger case of double-bank radial aircraft engine. Head slides on column of vertical heavy duty hydraulic feed driller, and it has pick-up bar holes for the bushing plate

Fig. 2—Twelve ⅞-inch holes are drilled in an 18-inch tractor bull gear in this head. Gear is accurately located on pilot in center of guide bushing plate, with approximate location by buttons at rear. Important cost reduction was obtained

Fig. 3—A 12-spindle head is used with guide bushing plate and 4-station indexing jig here. Four spindles drill casting, four others tap, automatically reversing. The indexing fixture has automatic clamping and ejecting work holders

Fig. 4—Two-spindle reversing motor-driven tapping unit incorporated in a 4-station indexing machine for working aluminum windshields for shells. Tapping and threading operations are performed on individual lead screw spindles like these, which are hardened and ground from the solid

Fig. 5—Showing multiple drilling head (left) and layout of 56 holes (right) drilled in magnesium at rate of 1408 feet per minute, 1700 rpm, 0.006-inch feed, 10.2 inches penetration per minute. Actual drilling time is 8 seconds

HEADS

both parties is necessary to the proper "diagnosing" of the case.

The ultimate consumer can make a fair evaluation of his own production problems by drawing up a chart similar to the accompanying table. In this table, the problem is whether a six-spindle head should be used rather than a single-spindle unit with six passes. The results of this evaluation need little amplification as they "speak for themselves." Other factors being equal, this chart would seem to indicate that the adoption of multiple spindle drilling methods was justified.

Limitations: With present day manufacturing procedures, there is practically no limitation to the number or type of holes that can be drilled at one time by multiple spindle drilling methods, from the designer's viewpoint. However, there are some important limitations with respect to the user's equipment which must be taken into consideration when equipment is engineered for specific jobs.

The average user of multiple spindle heads is operating this equipment on existing machines. In some few cases, the prospective user of this equipment may be in a position to buy any type or size drill press or turret lathe to accommodate this drilling head, but the average manufacturer is seeking to modernize his equipment to meet increased production requirements at low cost.

The size and number of holes that it is possible to drill in one operation is, within reasonable lines, unlimited. However, it is necessary to take into consideration the horsepower available on existing machinery. It goes without saying that a 10 hp head load cannot be operated efficiently on a 5-hp machine. The speed and feed of the twist drills will have to be cut drastically, hence maximum production savings cannot be achieved and the time schedule such as outlined in the table will be definitely impaired.

Flexibility: Different sized holes in the same piece may be taken care of efficiently by running all tools, regardless of diameter, (within plus or minus 5 per cent) at the same surface speed and then compensating by means of gearing as shown in Fig. 1.

The varying locations of holes to be drilled in a single pass can be taken care of by one of two methods. All holes may be drilled in a single pass with a single head in a single position, Fig. 2, or all holes may be drilled in a single pass with a single head with work in a different position on an indexing table. As many as 24 indexing stations with either single or

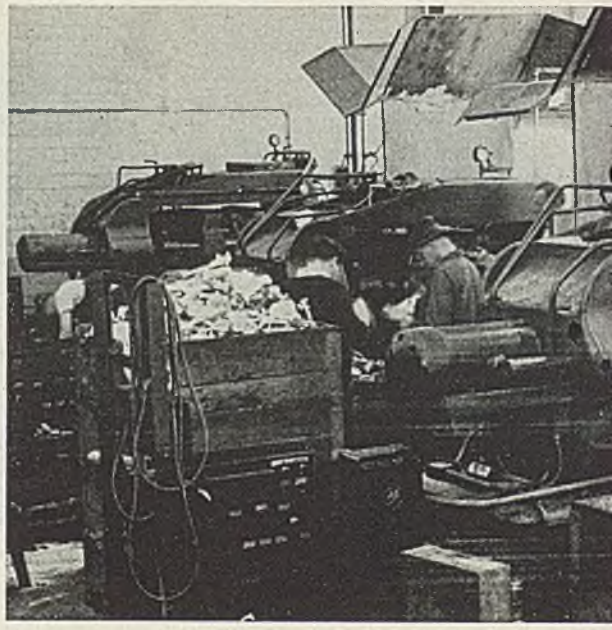
(*Please turn to Page* 140)

TIME COMPARISON CHART FOR THE DRILLING OF SIX HOLES AT ONCE AND BY SINGLE PASS METHODS

Single Hole At One Time	Seconds
Pick up and load piece	6
Shift jig to operational position	2
Rapid approach of single spindle	1
Drill hole	10
Rapid return of single spindle	1
Shift jig to next hole	2
Rapid approach of single spindle	1
Drill hole	10
Rapid return of single spindle	1
Shift jig to next hole	2
Rapid approach of single spindle	1
Drill hole	10
Rapid return to single spindle	1
Shift jig to next hole	2
Rapid approach of single spindle	1
Drill hole	10
Rapid return of single spindle	1
Shift jig to next hole	2
Rapid approach of single spindle	1
Drill hole	10
Rapid return of single spindle	1
Shift jig to next hole	2
Rapid approach of single spindle	1
Drill hole	10
Rapid return of single spindle	1
Unload jig	6
Total lapsed time	96

Six Holes Drilled At One Time	Seconds
Pick up and load piece	6
Jig permanently positioned	
Rapid approach of 6 spindle head	1
Drill six holes	10
Rapid return of six spindle head	1
Unload jig	6
Total lapsed time	24

Die Casting PRECISION PARTS



Sperry Gyroscope Co. produces millions of parts for instruments by slow-squeeze method of cold chamber injection. Tolerances on some parts held within 0.001-inch and comparatively little machining is required

By S. U. SIENA
Die Casting Superintendent
Sperry Gyroscope Co. Inc.
Great Neck, L. I., N. Y.

IN 1943 the Sperry Gyroscope Co. used approximately 4 million die castings as component parts of precision instruments built for the military forces and government departments. In 1944 it used approximately 7½ million, and as this is written, plans are going forward for additional conversion to die casting.

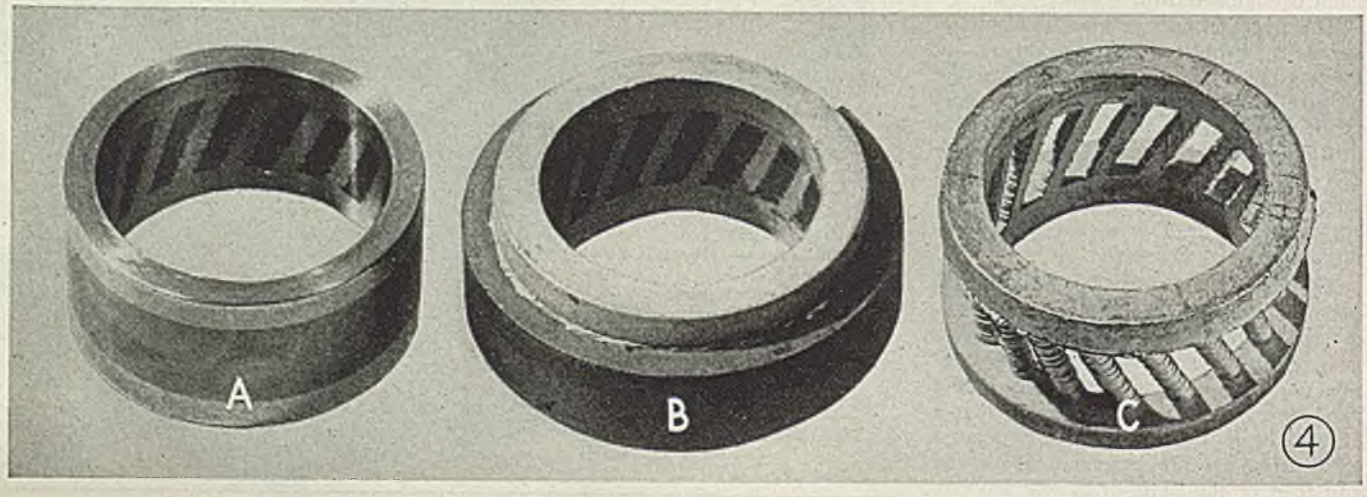
The reason for this rapid increase in die casting applications is that early in 1944 Sperry set up its own die casting department, equipped with four high-pressure die casting machines such as those shown in Fig. 1. As a result, a good percentage of die castings previously purchased outside are now made in the Sperry plant, and design engineers who have this process available in the plant are now intensely interested in its possibilities and by their new designs are causing the total use of die castings to expand tremendously.

A number of distinct advantages have been realized from the installation of our own die casting department. We have been able to speed up delivery of die castings from design to finished part, which has served as a stimulus to design engineers. Far more important is the fact that we are able to produce, day after day, first rate die cast parts which must pass the most severe inspection requirements, and we are able to make them at high speed with minimum rejection rates. We are thus able to avoid the losses resulting from machining castings which are found to be defective. Design engineers, once skeptical of die casting as a practical process for parts where high degree of density, strength, stability and unformity are involved, can now design critical parts for die casting with confidence that the finished parts will meet Sperry specifications, which are among the strictest employed in manufacture for military use.

The millions of die castings made at Sperry are all produced by the "slow-squeeze" method of cold chamber injection, most of them on machines equipped with pre-fill injection systems, which are capable of the extremely high injection pressures necessary for the uniform production of high-density aluminum alloy die castings.

These machines, designed by the Lester Engineering Co. for Lester-

Fig. 4—This unusual die casting job is a "squirrel cage" for a small induction motor with 36 annular laminations cast in place. Finished rotor is shown at 4A, piece as cast at 4B and test piece with laminations etched out with acid at 4C



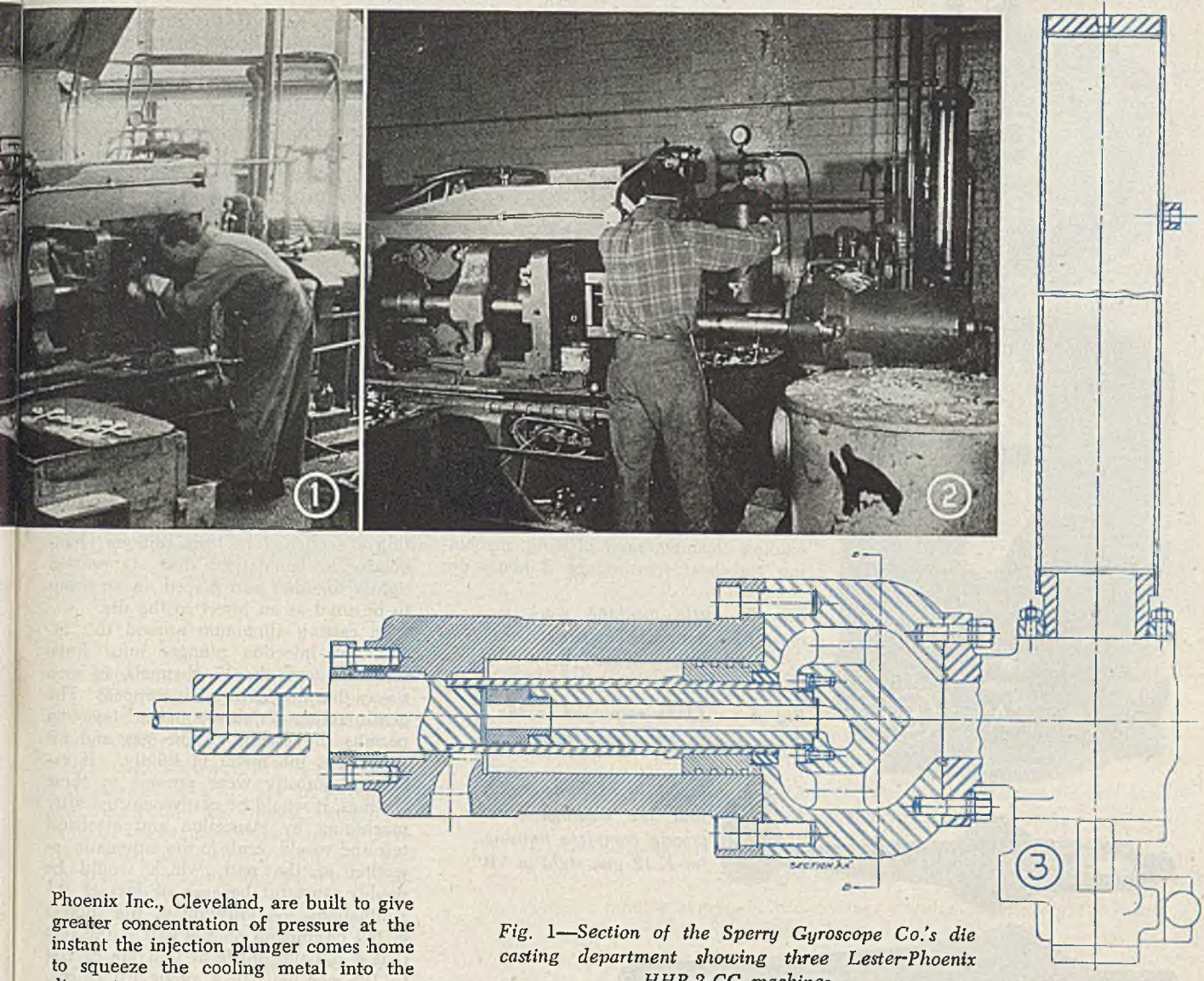


Fig. 1—Section of the Sperry Gyroscope Co.'s die casting department showing three Lester-Phoenix HHP-3-CC machines

Fig. 2—Close-up of operator pouring metal for a "shot." Note large injection cylinder with oil reservoir rising at right and massive frame and die locking mechanism at left of operator

Fig. 3—Drawing of the pre-fill injection unit shows large and small pistons

Phoenix Inc., Cleveland, are built to give greater concentration of pressure at the instant the injection plunger comes home to squeeze the cooling metal into the die cavities.

There has been considerable emphasis in the past upon high injection speeds for cold chamber die casting and hydraulic accumulator bottles have been widely used to step up the speed of injection. Actually such high speeds have been the source of considerable difficulty in the production of sound aluminum die castings.

Porosity, the chief defect of inferior castings, has two causes: (1) voids caused by shrinkage; (2) voids caused by trapped air and gases. Molten metal, shot into a die at high speed, rapidly spreads over the die walls sealing the air vents and trapping air and gases within the casting. Without high pressure to squeeze the resulting voids out of the metal and the ability to maintain such high pressure on the casting as it cools, inferior castings may result.

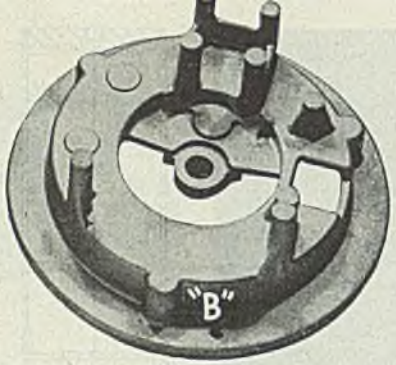
The designers of the Lester-Phoenix machines and of the pre-fill injection system, were familiar with the success of the permanent mold process, in which metal is slowly poured by gravity into heated metal dies, flowing from the bottom upward, allowing air and gases to escape ahead of metal. Castings so produced were virtually free of porosity.

The slow squeeze injection method and the pre-fill injection system were developed to simulate permanent molding and also to provide high final injection pressure on the casting as it chills. The pre-fill system (see Fig. 2) eliminates the necessity for the nitrogen filled hydraulic accumulators usually used for high injection speeds and steps up injection pressure as high as 33,000 p.s.i. in the production of 3-pound aluminum castings. Accumulators shoot the metal into the die at high velocity but have little energy left for the application of pressure on the casting at the end of the injection stroke, while pre-fill injection applies and sustains its highest pressure at that point. In the pre-fill system injection speed and pressure can be varied independently of one another, affording a variety of speed-and-pressure combinations for various types of dies and castings.

The pre-fill injection system consists (see Fig. 3) of a hydraulic cylinder fitted with a large actuating piston, the hollow piston rod of which contains a passageway to a smaller inner fixed piston. Oil under 1000 p.s.i. hydraulic pressure is introduced through the hollow piston rod, displacing at high velocity the small piston opposing it, which piston also carries with it in its forward movement the piston rod and also the attached main or large piston.

As the latter moves forward at high speed, oil flows by gravity from a vertical storage tank through the pre-fill check valve to occupy the space back of the large piston. When the die cavities have been filled and the injection plunger meets resistance, 2000 p.s.i. oil pressure from a motor driven booster pump is applied directly to both pistons, resulting in the high sustained final injection pressure which packs the metal into the die. When the injection pistons reverse, the oil is returned to the gravity tank, ready for the next cycle.

As may be seen in Fig. 2, the ma-



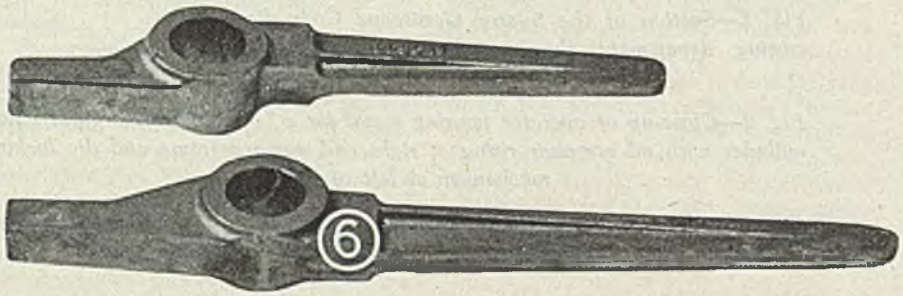
chines in this department are equipped with accumulator bottles. These are not regularly used in the die casting of aluminum alloys but are kept available for use, along with the pre-fill system, for the die casting of magnesium, which chills very rapidly and may require extremely high injection speed, particularly if thin wall sections of large area are to be filled.

These pre-fill equipped machines have enabled us to produce a great number of very difficult die castings, many of which had never been made by the die casting process. Conversion from other processes to die casting has saved considerable money on long runs and has proved practical even on short runs. For instance, a $2200 die was used to make only 200 pieces, yet the final cost of the finished part, including amortization of the die, was 10 per cent less than that of sand cast parts. Time required for production of the sand cast part (including cleaning, sand blasting, machining and heat treating) of 2 hours per piece was reduced to 5 minutes per piece, when the parts were produced by die casting.

Fig. 5—Little machine work is required on stabilizer chassis (5A) and bracket (5B)

Fig. 6 — Links employed in the mechanism of a gyro device

Fig. 7 — At 7A is shown four die castings comprising complete housing for K-12 gun sight at 7B



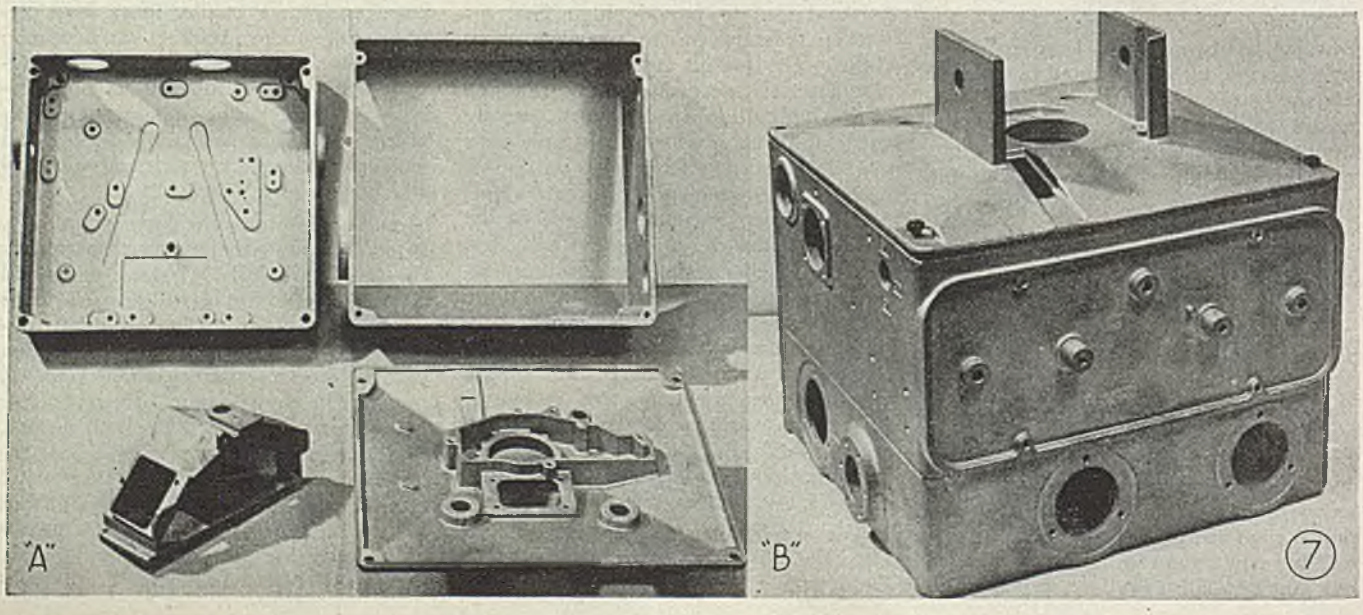
All Sperry die castings are subjected to fluoroscope, X-ray, or air pressure inspection; some of them are required to meet all three. The percentage of castings subjected to X-ray inspection ranges from 10 per cent on the average run of parts to 100 per cent on a few highly critical parts.

The castings shown in Figs. 4 to 13 inclusive are parts for gun sights, bomb sights, flight instruments, gyro-pilots, stabilized turrets, firing cut-off controls and similar instruments. Fig. 4A shows an extremely difficult part which we are now producing very satisfactorily.

It is a "squirrel cage" for a small induction motor, and is made by stacking 36 annular laminations of electrical iron, each 0.008-inch thick, in a stacking fixture in such a manner that the 17 slots around the inside circumference of each ring are aligned to form oblique channels. The laminations then are pressed tightly together and placed on an arbor to be used as an insert in the die.

In casting aluminum around this insert, the injection plunger must force metal through the 17 channels, in such a way that no gas or air is trapped. The gentle action of "slow-squeeze" injection permits the escape of the gas and air and packs the metal in solidly. If excessive porosity were present in these castings, it would be easily detected after machining by inspection and electrical test and would result in the automatic rejection of the part, which would be doubly wasteful because of loss of the laminations. A criterion of the success in the production of this part is the fact that it is being made at the rate of 100 to 125 per hour in a single cavity die, with very few rejections.

Fig. 4B shows the casting as it comes from the die, with a heavy section of the laminated insert protruding. This protuberance is machined off and then the part is ground inside and out, taking 0.040-inch off each diameter and



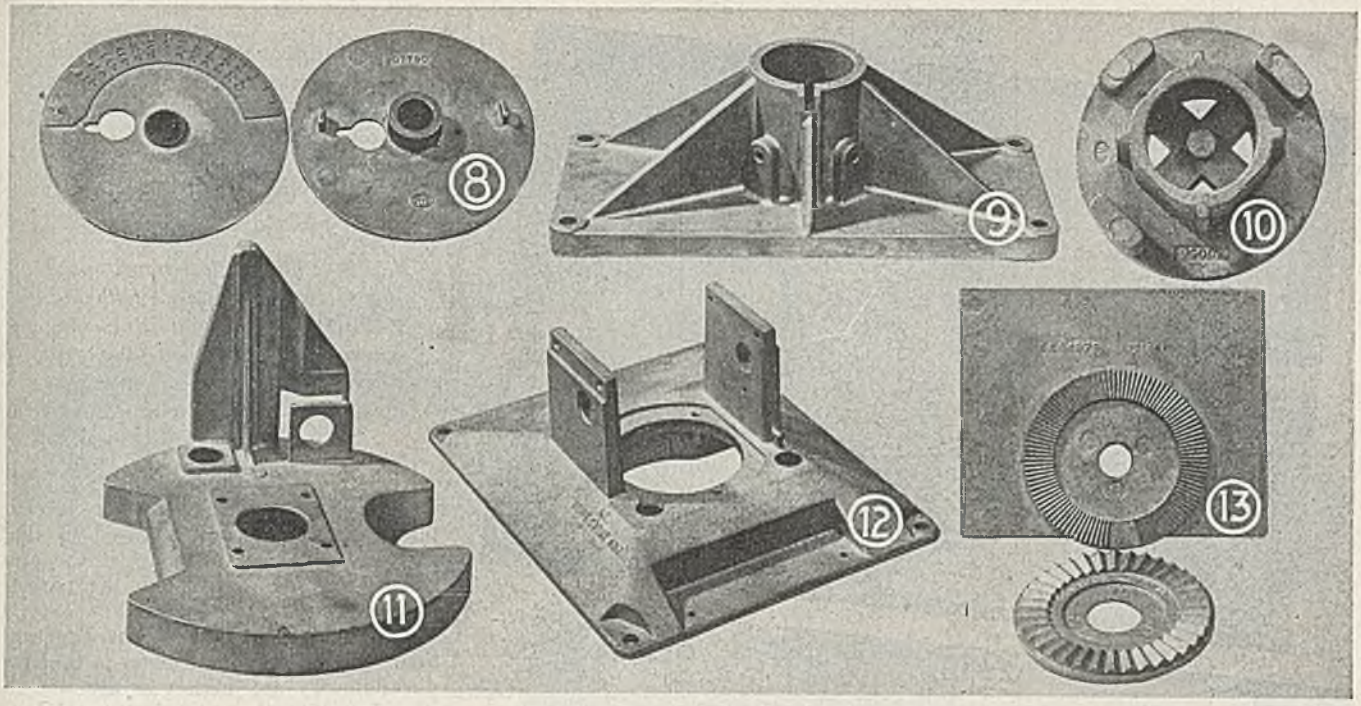


Fig. 8—Extremely close tolerances are held on this combination dial and gear blank for a K-13 Vector sight, being 0.001-inch in case of slot at left of hub. Stainless steel insert in center serves as bearing

Fig. 9—Sperry produces 40 of these gun sight pedestals per hour. Little machining is necessary

Fig. 10—Pendulum body for an A and N instrument. It must be extremely solid and sound because of machining requirements

Fig. 11-13—Sperry makes most die castings, such as these three examples, in single cavity dies

Fig. 14—The infinite variety of die castings required by Sperry for instruments is well illustrated here

producing the finished part (Fig. 4B). Fig. 4C shows the aluminum die cast portion with all the iron laminations dissolved out by acid.

The parts shown in Fig. 5 (Fig. 5A is a chassis and 5B a bracket for stabilizing unit) must also be sound structurally. In order to obtain early production, these parts were designed for both die casting and sand casting, and the latter process got into production first. The parts now are all die cast. The chassis requires no machining of its inside and outside surfaces as in the case of sand castings. On the bracket, tolerances for the adjustable parts were so close that several surfaces had to be created by machining, notably the lugs, which could not be sand cast to the correct tolerances but had to be milled individually. A bearing screws into the large threaded hole which can be seen inside the chassis, which hole must be aligned with a pivot to within 0.0003-inch. Any porosity in the casting would make this alignment impossible because holes and pits in the structure of the metal would throw off the chasing of the thread, causing inaccuracy of alignment.

Figs. 7A and 7B show a complete housing for a K-12 gun sight, which is now made of four die castings. Converting them to die casting reduced machining 80 per cent, reduced the weight 30 per cent (which is always a desirable factor in an airborne instrument) and resulted (because of the accuracy of die cast parts) in a much more compact unit, occupying less space and requiring less clearance in places where moving parts must function adjacent to each other.

Without die casting machines of adequate holding capacity and high injection pressure, it would be impossible to make castings of this size, weight and complexity, holding the required dimensional tolerances and obtaining the mi-

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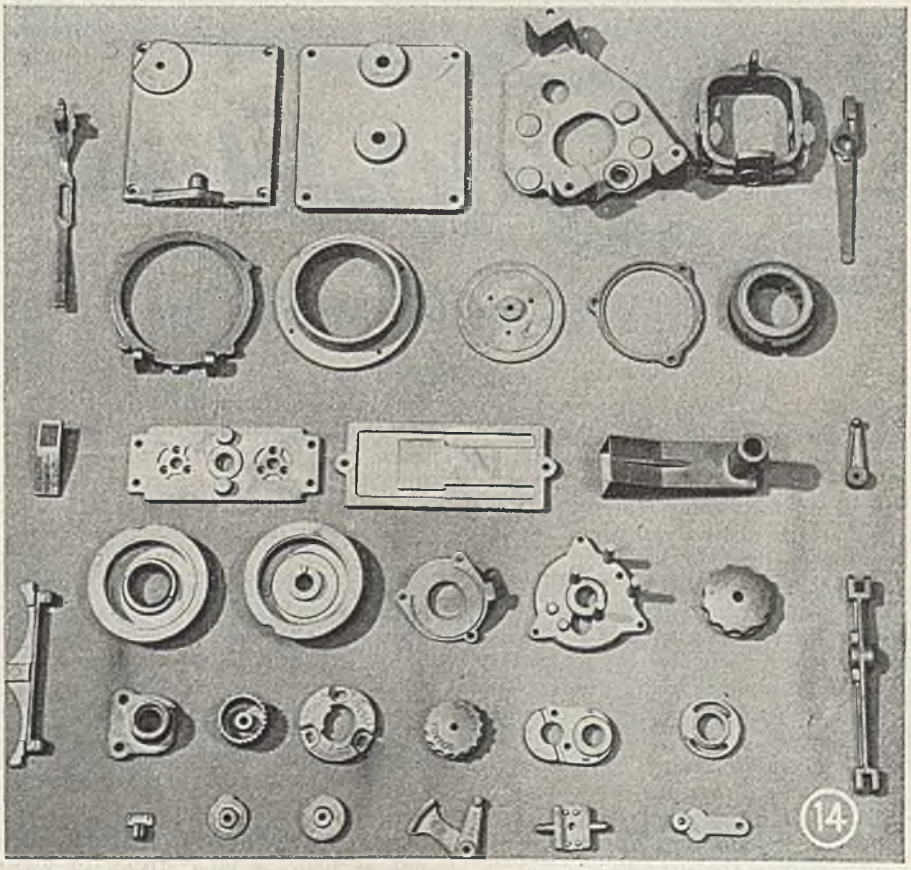


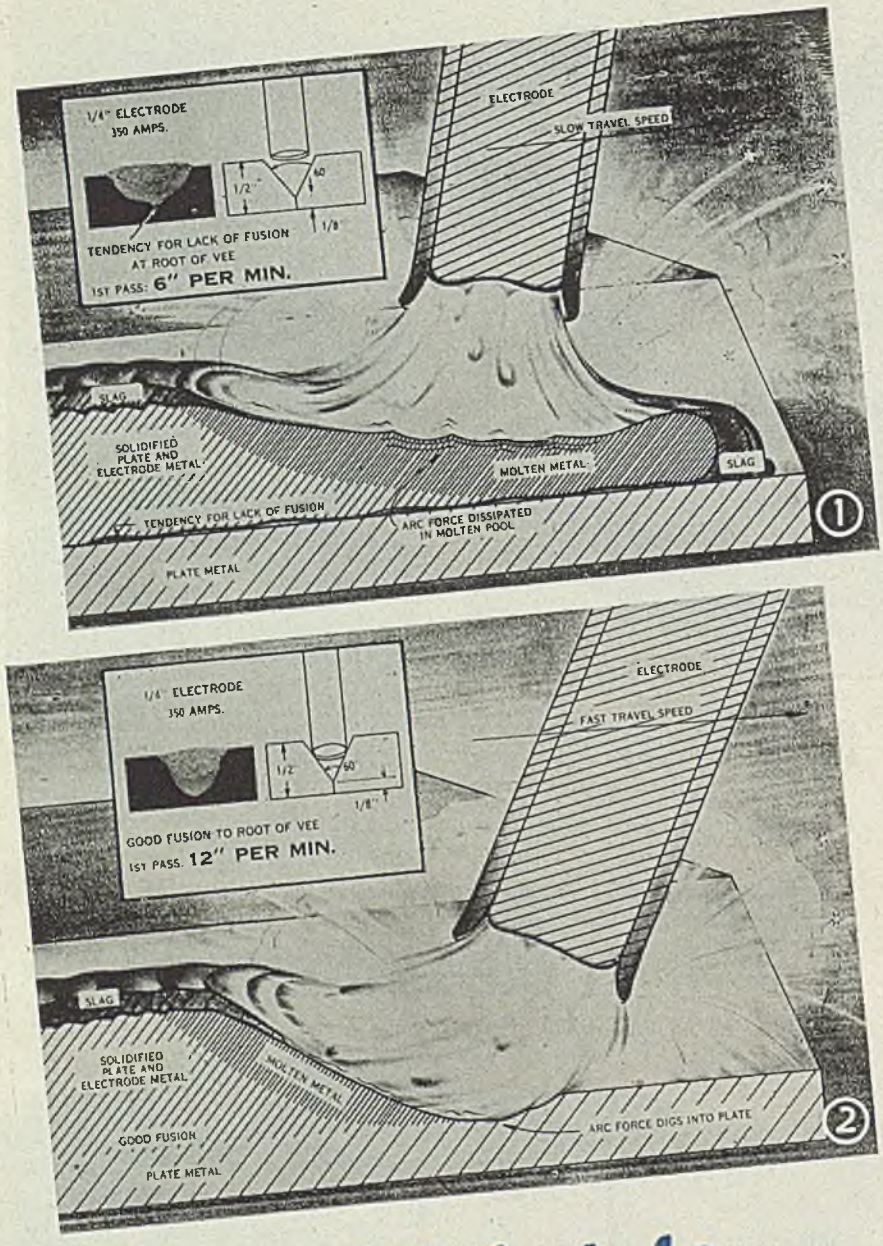


Fig. 1—Effect of slow travel speed on penetration. Insert shows cross section of weld made in 60-degree V-groove. Enlarged view is section lengthwise through same arc in action. All data from Lincoln Electric Co., Cleveland

Fig. 2—Effect of fast travel speed on penetration. Compare with Fig. 1. Insert shows result of making this type of weld in a 60-degree V-groove. Large view is action shot of a section lengthwise through same arc

Speed Welding

With the Electric Metallic Arc

FOR YEARS, perfectly sound welds have been made by conventional methods with the accepted thought that slower speeds give greater penetration. However, facts show that *faster* speeds give greater penetration, while the slower speeds tend to build up more of the metal on the surface. A fillet weld with greater penetration, resulting from faster travel speed appears smaller but its strength actually is as great or greater than the weld made at slow speed with a sacrifice of penetration for build-up.

Therefore, by using increased penetration (more current) to reduce the amount of deposited metal needed, the speed of welding can be increased without impairing the strength.

This method of utilizing the greater penetration resulting from faster arc speeds to obtain the required weld strength is the fundamental basis of speed welding technique as described by Lincoln Electric Co., Cleveland.

"Arc Force": In conventional hand welding procedures, the arc is likely to be used simply to melt the electrode and parent metal, allowing them to fuse together. However, there is an additional function of the arc other than merely melting and fusing. This is the arc's ability to *dig*.

This digging quality of the arc is called "arc force." Proper use of the arc force results in faster welding, for there is a definite force in the arc stream just as there is in a stream of water from a hose. Just as water forced through a nozzle can be used to dig away dirt, so can the force of the arc stream be used to dig into the parent metal.

Effect of Travel Speed on Penetration: The all important factor in the application of "arc force" is the necessity of making the arc travel speed fast enough to properly utilize the penetrating power of the arc. This can be further demonstrated by the comparison of water flowing from a hose. The action of digging away dirt with a stream of water is only effective when the stream is directed at the dirt itself . . . not *when directed into the pool of water* that soon accumulates. Thus, if the stream of water is to keep digging, it must keep moving rapidly enough to stay ahead of the pool, for when the stream of water is directed into the pool its force is expended in merely churning the water in the pool, not in digging into the dirt.

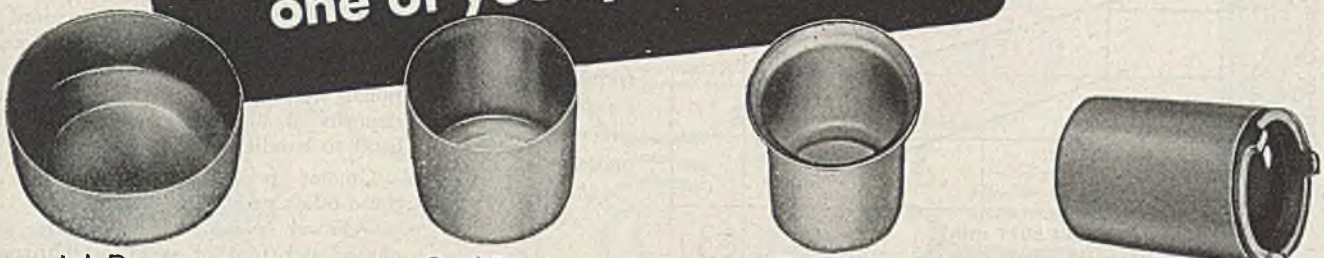
The same reasoning can be applied in welding. When the arc is moved slowly there is a pool of molten metal under the arc and the force of the arc is expended in the molten pool instead of penetrating into the parent metal at the root of the joint. This molten metal merely flows along the joint under the arc and tends to solidify in the root of the weld without fusing to the parent metal. The molten metal does not fuse to the parent metal below the depth to which the arc penetrates. See Fig. 1.

When the arc is moved forward rapidly enough, the arc force digs into the base metal and the result is good penetration. See Fig. 2. At conventional arc speeds there usually is a small puddle of molten metal under the arc, dissipating the arc force and preventing full penetration.

From these facts, it is apparent that to get greater penetration, the arc should be advanced more *rapidly* rather than more slowly. The limiting speed is usually the highest speed at which the surface appearance remains satisfactory.

Effect of Current: An increase in current increases the arc force and penetration just as an increase in the volume of water through the same size nozzle increases the digging power of the stream of water. To use higher currents, larger

is deep drawing Stainless Parts one of your problems?



1st Draw
Diameter $4\frac{3}{32}$"
Depth $2\frac{1}{16}$"

2nd Draw
Diameter $3\frac{1}{16}$"
Depth $3\frac{3}{16}$"

3rd Draw
Diameter $2\frac{15}{32}$"
Depth $3\frac{7}{16}$"

Finished Bucket

Deep drawing Stainless parts is easier when you select a uniform, ductile Stainless Strip. The job shown above is a typical example of the good results you can obtain with easy-working Carpenter Stainless Strip.

It's a steam trap bucket, the main duty of which is to eliminate condensate and entrained air from steam lines. The buckets must withstand corrosion from all types of water found throughout the country and operate in temperature ranges up to 750°F.

The manufacturer needed a metal that would provide these heat and corrosion resistant properties, yet deep-draw easily to a cup depth of $3\frac{1}{2}$".

Carpenter Stainless No. 4-A (Type 304) used in $6\frac{3}{4}$" x .026" coils, solved the problem on both counts. In addition, it provided extra bonuses. The consistent uniformity of Carpenter Stainless Strip, lot after lot, kept rejects to a minimum, cut die wear and speeded output of the parts.

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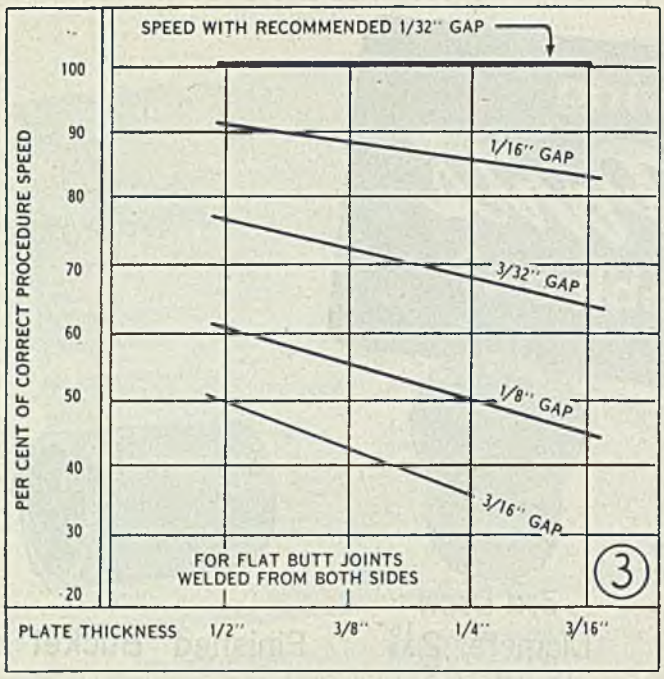

Fig. 3—Effect of fitup on welding speed of downhand butt joint (square or grooved) of various plate thicknesses. Fitup is seen extremely critical factor as it greatly influences speed and thus cost

sized electrodes may be needed. In general, the first indication of excess current will be a poor surface appearance of the weld.

Effect of Arc Length: In a further comparison of the arc to a stream of water from a hose, it is obvious that to dig deep into the dirt the nozzle must be kept as close to the ground as possible to avoid letting the stream of water spread out into an ineffective spray.

When a long arc is held, heat is dissipated into the air, the stream of molten metal from the electrode to the work is scattered in the form of splatter, and the arc force is spread over a large area resulting in a wide, shallow bead instead of a narrow one with deep penetration.

To properly control and direct this arc force, the best and easiest way to hold the electrode for most welds is to keep the tip of the coating lightly in contact with the plates and drag the electrode along the joint, moving fast enough to keep just ahead of the molten pool.

A weld can be made either by piling most of the metal on the outside of the joint or by penetrating into the root of the joint. Both welds may be equally strong, but the weld that is deeply penetrated will be of much lower cost. The amount of penetration and its resultant economy are proportional to the current used, combined with the effectiveness of the use of arc force. An increase in current will increase the arc force and penetration, but if the speed of travel is too slow, the arc force will be wasted and there will still be less penetration than could be obtained by taking full advantage of the arc force. In order to effectively use arc force for penetration, the speed of travel should be fast enough so that when the electrode is dragged along the joint, the coating touching the plates, the tip will be just ahead of the molten pool at all times, giving the arc force full opportunity to dig deep into the root of the joint.

Every weld has a certain amount of electrode metal deposited for each foot of joint. The labor cost for depositing this amount of metal is the major factor in welding cost. There are two ways in which this labor cost can be reduced:

—Reduce the amount of deposited metal in the joint.

—Increase the rate of deposit of the metal needed.

Less Deposited Metal: By getting deeper penetration, the welded joint comprises more fused plate metal and less deposited metal than in conventional welding. Since the deposited metal is relatively costly and the fused plate can be utilized at practically no cost, the joint is made at greatly reduced cost. For example: By penetrating into the corner of a fillet weld, the cross-sectional area of the deposited metal is reduced by 50 per cent, requiring 59 per cent less man-hours to make the weld.

Greater penetration allows changing from a V-butt joint in ⅜-inch plate to a plain square edge joint and cutting the amount of electrode metal deposited by 50 per cent. This in turn reduces the man-hours by 78 per cent.

Increased Rate of Deposit: For V- and U-groove butt welds, and other multiple pass welds, the speed of welding is determined by the rate at which the electrode metal can be deposited to fill the groove. Since the rate of depositing the metal is proportional to the current used, increasing the current will increase the speed of welding proportionally. In downhand welding, the limit for increasing the current is usually the surface appearance of the weld.

On welds where penetration is the major factor, such as square edge butt welds and fillet welds, the travel speed is not proportional to the current, since the limiting factor for travel speed is the rate at which the slag will follow and cover the weld. Thus, the travel speed with this type of joint is determined by the slag covering characteristics of the rod rather than the melt-off rate of the rod.

For nonpositioned welds, the limit to the amount of current used is the operator's ability to keep the molten metal in position and to avoid undercut and poor surface appearance. On fillet welds, short arc and small amount of deposited metal is much more easily handled at high currents than conventional welding with its larger external deposits of weld metal which are difficult to handle.

Greater penetration also results in these other substantial savings:

—Fewer pounds of electrode purchased per foot of weld on horizontal and flat fillets, and on butts where more economical plate preparation can be used.

—Less power per foot of weld.

—Elimination of plate beveling in some instances.

—Elimination of back-chipping in some instances.

—Decreased need for gaps between plates, minimizing weld metal and saving labor, electrode and power.

Choice of Steel: All steels are weldable under proper conditions but some are more suited to high speed welding than others. To obtain highest welding speeds it is necessary to penetrate deeply into the plate, resulting in considerable admixture of plate or parent metal with the weld metal. The analysis of the core wire in the electrode is accurately controlled to produce good weld metal and since in welds with deep penetration, a considerable amount of the plate metal becomes part of the weld, control of the plate analysis also is important.

Steel For High Speed Welding

	Low	Preferred	High
Carbon %	0.10	0.13 to 0.20	0.25
Manganese %	0.30	0.40 to 0.60	0.90
Silicon %	...	0.10 or under	0.15 max.
Sulphur %	...	0.035 or under	0.05 max.
Phosphorus %	...	0.04 or under	0.04 max.

Tests indicate that the range of steel analysis given in table is best for maximum welding speeds.

The base price steels (steels for which there is no additional charge for analysis control) ordered to the AISI Specifications C 1014, C 1015, C 1017, C 1020, C 1021, C 1023 or to the NE specifications, NE 1015, NE 1017, NE 1018 or NE 1020 and specified as having a maximum of 0.10 per cent silicon have analyses which substantially corespond to the preferred analysis. The AISI and NE limits for sulphur in these steels is 0.05 per cent but in actual practice the sulphur is generally below 0.035 per cent. Therefore, it is recommended that the steels listed above be used wherever possible.

The average physical properties of the

(*Please turn to Page* 156)

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Effect of Preliminary Heat Treatment on... NITRIDING

HARDNESS of a nitrided case is considerably influenced by the preliminary heat treatment to which the steel has been subjected, it has been found. This is particularly true of the pre-nitriding tempering treatment. To investigate this relationship, C. C. Hodgson and H. O. Waring, of Leyland Motors Ltd., Leyland, Lancashire, England, did considerable amount of testing with chromium-molybdenum and chrominum-molybdenum-vanadium steels, the types appearing to be most greatly influenced. Accompanying material is taken from their recent report to the Iron & Steel Institute, London.

Illustrations present various details of the experimental data accumulated. Fig. 1 shows the relationship between tempering temperature and hardness of case after nitriding three steels containing various amounts of chrominum.

Fig. 2 illustrates the relationship between hardness of the same three steels before nitriding and hardness of the case after nitriding. Hardness determinations were made with a Vickers machine using a diamond pyramid indentor. When depth vs. hardness curves were required, such as the one shown in Fig. 4, the specimen was taper-ground after nitriding, the ground surface polished with emery cloth and finished on French 00 paper. The angle of taper was in the region of 5 degrees.

When using small indentor loads, it is not possible to make accurate hardness determinations on the matt nitrided surface due to the difficulty of the exact width of the indentation. In these cases, the surface was prepared by making the smallest number of passes on French 00 paper consistent with accurate measurement of the impressions. When only maximum hardness was required, the nitrided surface was polished on worn 0 emery cloth, lubricated with paraffin until the gray surface layer was removed and then polished on dry French 00 paper.

Accompanying table presents details of effect of preliminary heat treatment on maximum hardness of case before and after nitriding.

Fig. 3 shows net increase in hardness due to nitriding. Note that pre-nitriding tempering temperature is plotted against values determined by subtracting core hardness after nitriding from maximum case hardness.

If was found that the two chromium-molybdenum steels, in which chromium was the principal element contributing to nitrogen hardening, possessed a maximum case hardness in the normalized and nitrided condition which was not sub-

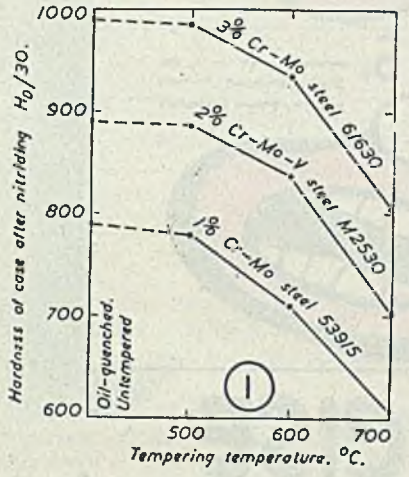

Fig. 1 — *Relationship between tempering temperature and hardness of case after nitriding*

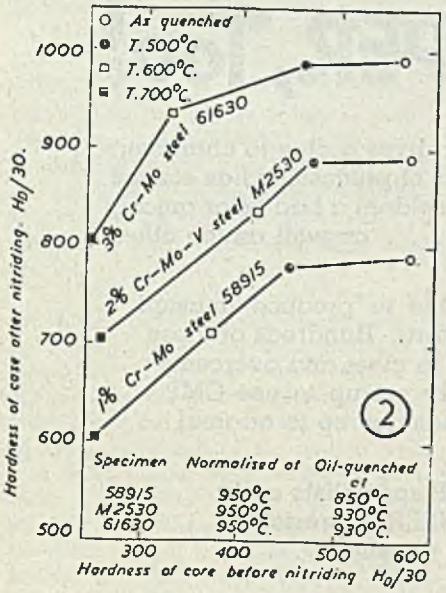

Fig. 2 — *Relationship between hardness of steel before nitriding and maximum hardness of case after nitriding*

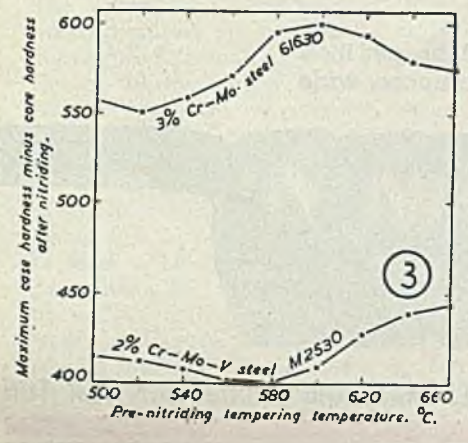

Fig. 3—*Net increase in hardness due to nitriding*

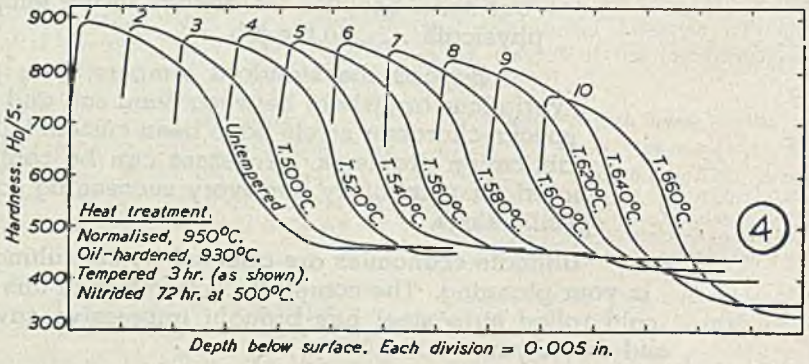

Fig. 4—*Hardness-depth curves for chromium-molybdenum-vanadium steel 2530*

DIAMOND PYRAMID HARDNESS NUMBERS

	Before Nitriding	Core, After Nitriding	Case Maximum
Normalized at 950 degrees Cent	358	381	957
Normalized at 950 degrees Cent. and hardened at 930 degrees Cent.	558	447	927
Normalized at 950 degrees Cent., hardened at 930 degrees Cent. and tempered at:			
500 degrees Cent.	447	447	927
530 degrees Cent.	447	447	891
580 degrees Cent.	423	435	908
630 degrees Cent.	381	391	825
680 degrees Cent.	306	299	766
730 degrees Cent.	241	241	739

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stantially different from that of the same steels if quenching was substituted for normalizing.

Tempering the quenched specimens at 500 degrees Cent. did not influence materially the results obtained after nitriding. The presence of a small amount of vanadium caused the maximum case hardness of specimens normalized at 850-950 degrees Cent. to be distinctly higher than in the corresponding quenched state, or quenched state followed by tempering at 500 degrees Cent.

Raising the normalizing or quenching temperature brought about an increase in the maximum hardness attained during subsequent nitriding. The increase in hardness, although not very marked, was distinct for 1 and 3 per cent Cr-Mo steels, but on nitriding specimens of a 2 per cent Cr-Mo steel containing 0.18 per cent of vanadium, an increase of 65 diamond pyramid hardness units resulted when the treatment temperature was increased from 850 to 1100 degrees Cent.

The most marked change in the maximum case hardness of the chromium-molybdenum steels studied was found when the steels had been quenched and tempered; a continuous decrease in hardness occurred as the tempering temperature was raised from 500 to 700 degrees Cent. The loss in hardness suffered after nitriding amounted to some 200 diamond pyramid hardness units over the tempering temperature range. Stated in another way, there is a direct relationship between the case hardness and the post-nitriding core hardness of the quenched and tempered chromium steels studied.

It has been reported of chromium steels, similar to those used by the authors, that wide variations in case hardness are possible even when the imposed conditions remain constant; the authors' results do not confirm this. It was found in the present work that the change in hardness follows a regular curve throughout the range of pre-nitriding tempering temperatures used, and, although it is usual to represent the hardness of the 1, 2 and 3 per cent chromium steels after nitriding at 500 degrees Cent. as increasing in case hardness by increments of roughly 100 diamond pyramid hardness units, it is actually possible, by suitably controlling the pre-nitriding tempering temperature, to cause all three steels to develop the same hardness of nitrided case, i.e., about 800 diamond pyramid hardness units. It would, therefore, be more accurate to say that the hardness of a nitrided case exceeds the core hardness by a certain value.. These values for the three steels studied (in ascending order of chromium content) are approximately 375, 425 and 575 diamond pyramid hardness units under the imposed nitriding conditions.

Vanadium Prevents Softening

The addition of a small amount of vanadium did not exert any marked influence on case hardness, but even in such a small amount as 0.18 per cent it prevented appreciable softening when an oil-hardened 2 per cent chromium-molybdenum steel was tempered in the range 500-560 degrees Cent., and, when compared with the vanadium-free 3 per cent chromium-molybdenum steel, had an even more pronounced effect on the additional softening of the core which accompanied the nitriding of the specimens previously tempered at a temperature of 560 degrees Cent. or less.

The maximum case hardness of chromium-aluminum-molybdenum was not appreciably less for specimens previously tempered at 700 degrees Cent. than it was for specimens tempered at 500 degrees Cent.

Nitriding steels are not used in the normalized condition and consequently the relationship between normalized and nitriding is not of practical importance. Similarly, practical considerations rule out the use of very high quenching temperatures during preliminary heat treatment; but, when using a nitriding steel containing vanadium, a fairly high quenching temperature assists in obtaining the best hardness from the case. The influence that the tempering temperature has on the hardness attained during the nitriding of steels, in which chromium is the principal nitride-forming element, may be used to advantage in certain practical applications.

When assessing the value of such treatments, due consideration should be given to the rather poor Izod-impact figures that are obtained from vanadium steels when these have been treated in a manner intended to produce the maximum effect of precipitation-hardening; some chromium-molybdenum steels that have been tempered at fairly low temperatures (around 500 degrees Cent.) have notched-bar impact-values that are not very impressive. There are, however, some applications for which a high notched-bar value is not of paramount importance, although a high surface hardness may be desirable; in such instances the use of a lower tempering temperature with its concomitant improvement in case hardness may be indicated. Means of economizing in the use of alloys also suggest themselves.

The hardness of a nitrided case is generally assumed to be caused by slip-interference, the hardest condition being attained when the combined effect of the precipitated constituents most nearly approaches that of the optimum number of particles of critical size. It is known that the carbide particles affect, to a considerable extent, the hardness that can be attained during nitriding; for example, one investigator found that a carbon-free iron containing 0.8 per cent of aluminum did not nitride satisfactorily, as the nitrides separated in plates and the hardness was only 310 diamond pyramid hardness units.

After normal nitriding the nitrogen content of the outer portion of the case of any o the usual nitriding steels is much greater than that needed to combine with the total special alloys present, even if the whole of these were combined with nitrogen. The excess nitrogen must, therefore, be present as iron nitride, but it exists in a form (i.e., particle shape) different from that in carbon-free iron, either pure or alloyed, or in annealed carbon or low-alloy steel. The hardness of a nitrided case is, then, the resultant of the combined influences of the particles of iron carbide, special alloy car-

(*Please turn to Page* 165)

New Caustic Soda Process Converts Scrap Aluminum Into "New" Metal

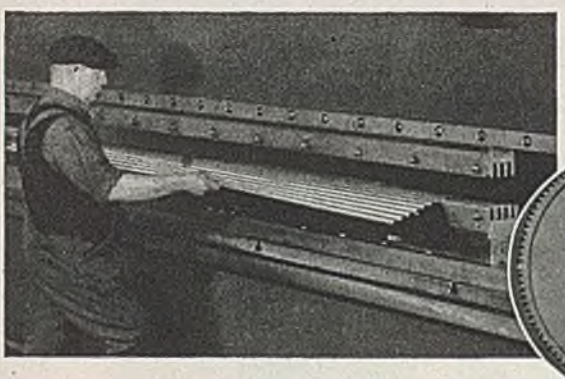
A NEW method for converting scrap aluminum into new aluminum has been developed by the Aluminum Ore Co., Aluminum Co. of America subsidiary, in conjunction with engineers of the Air Technical Service Command and the Redistribution and Salvage Office of the Army Air Forces.

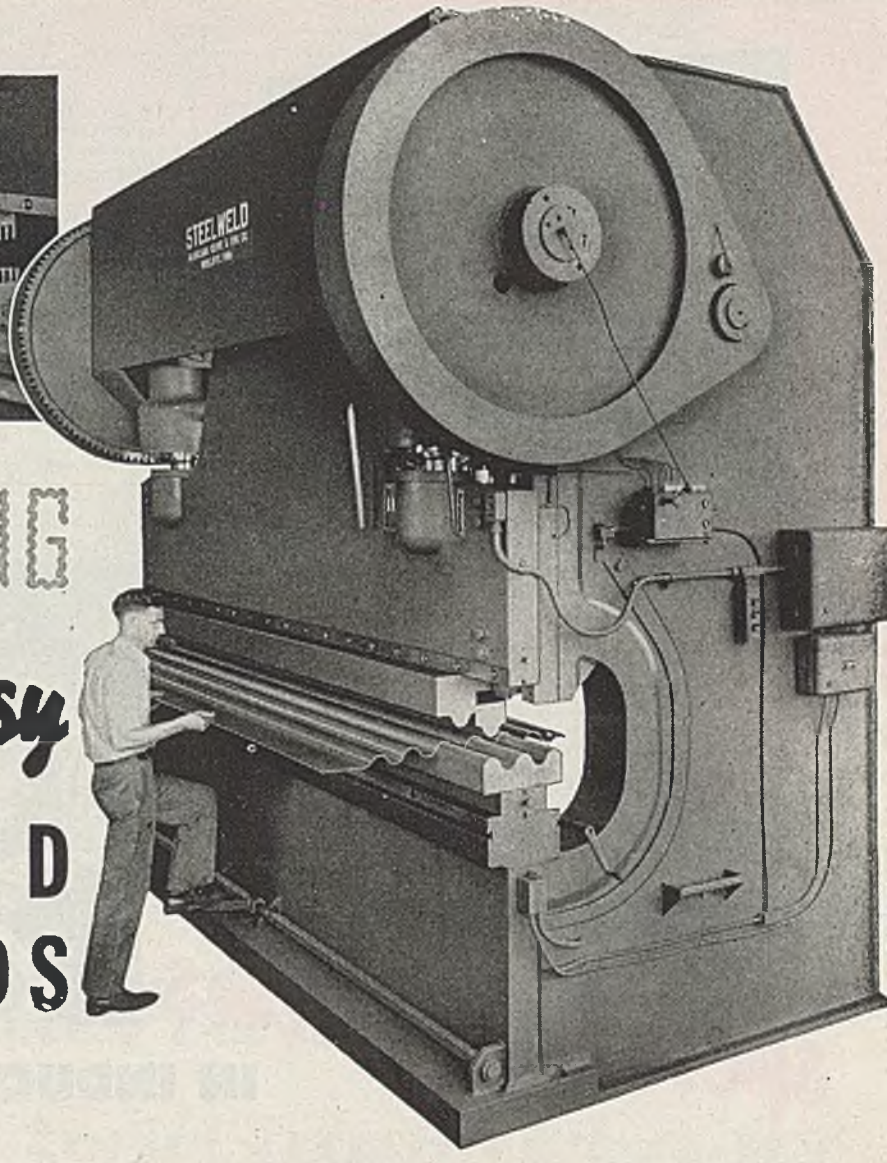
Developed primarily to permit the disposal of crashed, war weary and technically obsolete airplanes, the process appears to have commercial possibilities as a method for treating the scrap constantly flowing into the market in peacetime. Aluminum scrap now is separated from other metals, segregated by grades as well as possible and melted down in furnaces.

With the Alcoa process, the scrap material is introduced into a bath of caustic soda which dissolves the aluminum but which does not attack steel nuts and bolts, copper piping, bronze bushings, rubber or other nonaluminum parts. In the case of the aluminum alloys, the alloying elements are not attacked by the caustic, remaining in the sludge as finely divided particles.

The solid impurities are removed from the solution in filter presses. The liquor is converted by the Bayer process into pure aluminum oxide. This is done by pumping the liquor into precipitating tanks and allowing it to stand and cool. Crystals of aluminum hydroxide settle out, are removed and washed free of caustic soda which is again returned to the process. The aluminum hydroxide is heated in rotating kilns to drive off the chemically combined water and leave commercially pure aluminum oxide or alumina, which is reduced electrolytically to metallic aluminum.

Aluminum obtained by the new process is for all intents and purposes the same as aluminum manufactured from bauxite. It can be used anywhere that any other commercially pure aluminum can be used.





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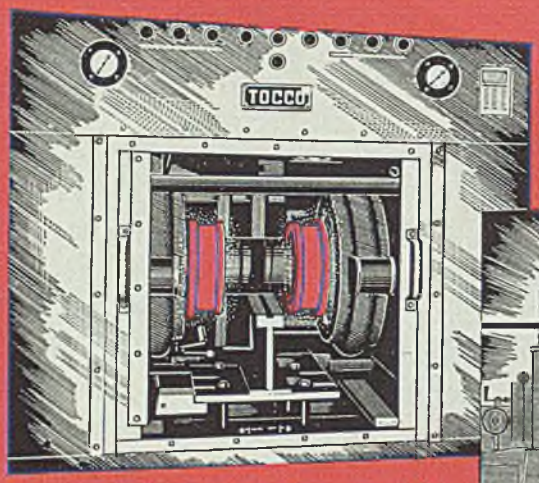
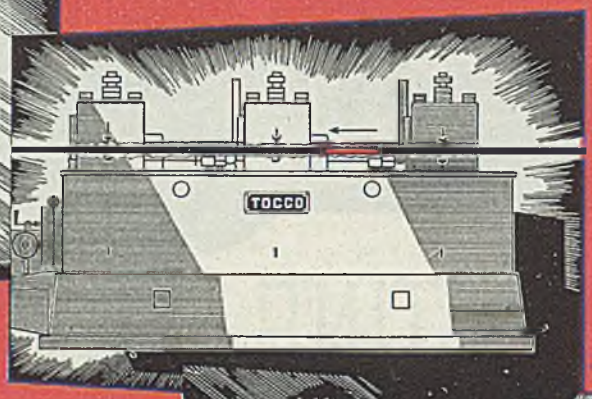
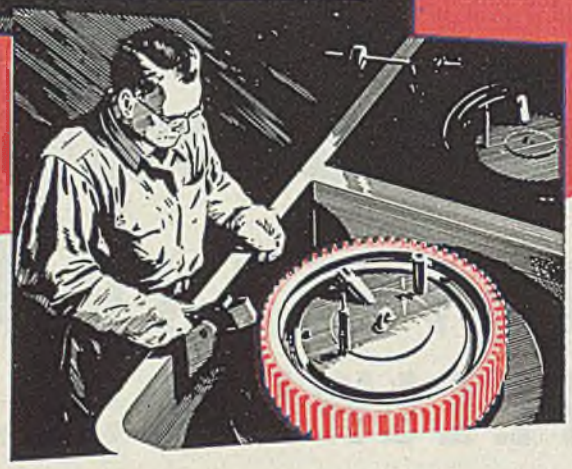


"JOB A." Tractor roller assembly. Harden rim surfaces and shrink-fit rollers on shaft simultaneously. Special TOCCO machine does this. Total heating time, 2¼ min.



"JOB B." Bar stock, 1" diam., SAE 1045 steel. Heat treat uniformly to 30-31 R.C. Special TOCCO machine does this and produces straight, scale-free stock at 50% cost saving.

"JOB C." 272-lb. tractor gear. Harden and eliminate need for scarce alloys. Special TOCCO machine does this . . . permits use of plain carbon steel. Saves 144,000 lbs. nickel per year.



THE ANSWER TO *special problems* IN INDUCTION HEATING

PROBLEM: "My application is *special*. How can I get Induction Heating equipment to match my job *exactly?*"

ANSWER: Call in the TOCCO Engineer. He can give you an unbiased analysis of your problem and prescribe special equipment to match your job exactly because he is backed by:

The TOCCO Development Laboratory—largest of its kind in the world. Completely equipped and expertly staffed, this Laboratory finds the answer to hundreds of unique problems . . . and develops *special* TOCCO machines to match the job accurately (such as "A", "B", "C", above).

Remember, too, that the TOCCO Engineer can solve the "standard" problems quickly and accurately because he has available:

The world's most complete line of Induction Heating Equipment—standard TOCCO models, including motor-generator and electronic tube types of machines. One of these units with proper TOCCO fixture provides the correct answer for average applications.

Take advantage of these features of TOCCO Leadership to assure the fullest benefits from Induction Heating. The TOCCO Laboratory is described fully in the 20-page brochure, "Research for Results." Free on request.

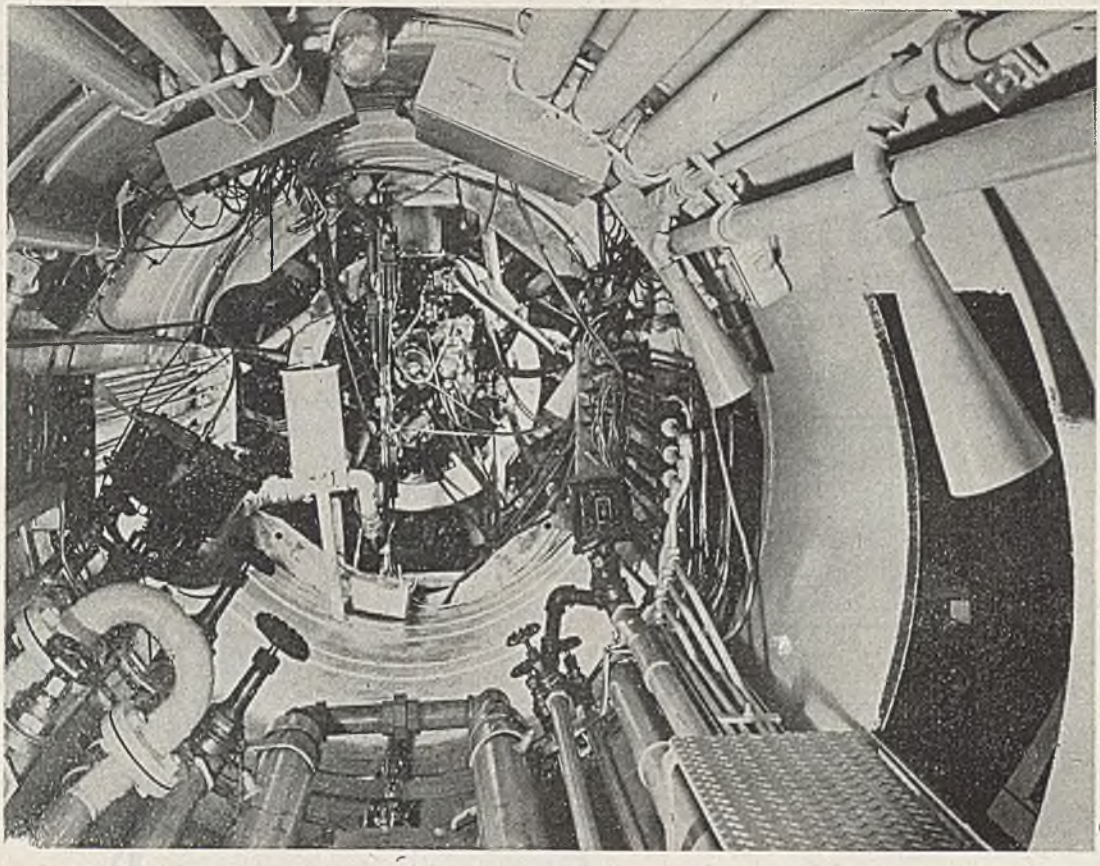
THE OHIO CRANKSHAFT COMPANY • Cleveland 1, Ohio

TOCCO

INDUCTION

HARDENING, BRAZING

ANNEALING, HEATING



Above—Interior of test cell, with carbon dioxide outlets ranged along the sides

Complete Fire Control

For New Wright Engine-Propeller Laboratory

Special installation of carbon dioxide fire extinguishing equipment raises the safety factor to a maximum for outsize twin test cells having propellers up to 30 feet in diameter turned by 2200 horsepower engines

TWIN test cell laboratory recently constructed at Caldwell, N. J., by the Propeller Division of Curtiss-Wright Corp., for testing aircraft engines and propellers has a number of "firsts" to its credit. For the first time two venturi-type or straight-through chambers are provided for testing propellers up to 30 feet in diameter. They are turned by in-line or air-cooled engines of 5000 horsepower or more—a portent of the future in aircraft, as the largest props so far designed are 18½ feet in diameter, and turned by 2200 horsepower engines. Cells formerly used for testing propellers were L or U-type, and originally were built for engine or plane model tests. The new outsized twin chambers furnish airflow that simulates the straight airstream to which propellers are subjected in actual flight. Each of the cells is 38 feet wide at front and rear, constricting to a 31-foot circular venturi in center.

A wide variety of engine and propeller sizes can be mounted on the huge steel tubes in the gasoline engine cells by means of adjustable rings which keep the propeller in the same position in the venturi regardless of engine length. Precise control of engine operation is afforded by a combination of cooling systems, with uniform uninterrupted airflow projected by blowers through the propeller disk on which engines are mounted. Two blowers totaling 1100 horsepower can be used simultaneously for cooling air-cooled engines. One of these blowers can be connected with either cell to serve as a suction or a pressure blower by operating suitable dampers. Suction or pressure air-cooling thus can be obtained on either pusher or tractor type propeller installations.

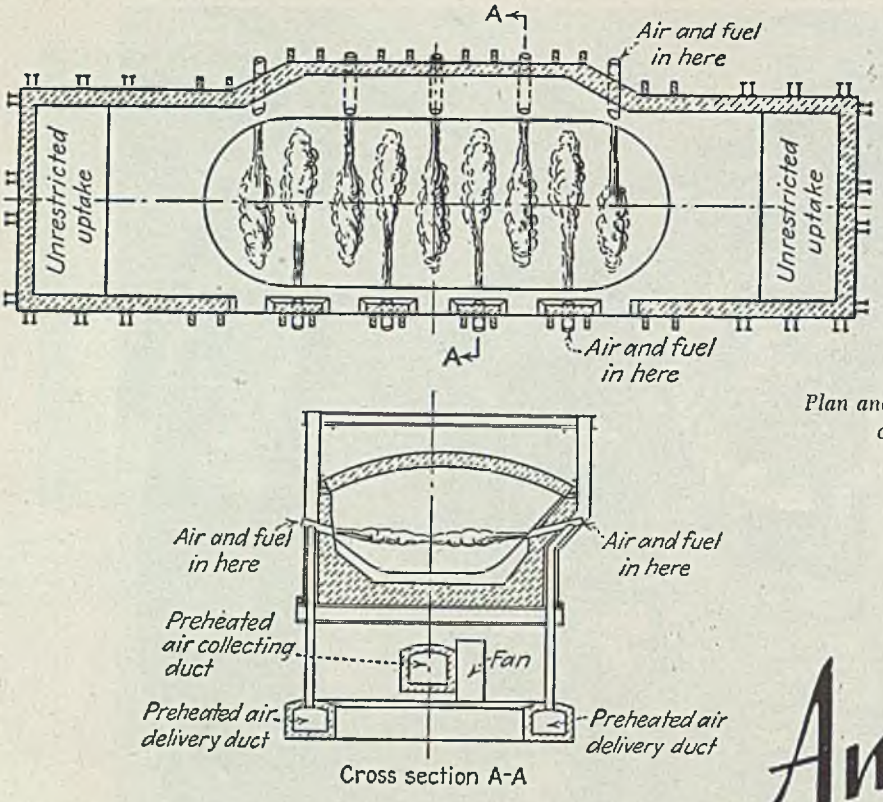
A soundproof control room is located between the twin cells, providing remote control for all equipment in both cells. For the convenience of operators, all essential gages and controls for the stress-testing of engine-propeller units are grouped together around the observation windows, one of which faces each cell.

Another "first" for this laboratory is its fire-extinguishing system, planned by engineers of Walter Kidde & Co. The high-pressure carbon dioxide system employed is especially designed for special hazards encountered. Large quantities of high-octane gas and oil are used daily in testing the performance of engines and propellers. Although mishaps are not likely to occur, a leaky valve, a broken fuel line, the backfiring of an engine or a short in the electrical wiring could cause a disastrous fire.

At the outbreak of fire, however, sufficient quantities of carbon dioxide gas can be delivered instantly at such a rapid rate that oxygen content of the air will be reduced in a matter of seconds to a point below which fire cannot exist. This protection is ensured by the built-in high pressure carbon dioxide system.

The system utilizes a bank of 28 steel cylinders, each containing 50 pounds of

(*Please turn to Page* 168)



Plan and cross section of cross-fired open-hearth furnace

By GILBERT E. SEIL
Technical Consultant
Day & Zimmermann Inc.
Philadelphia

An Analysis of OPEN-HEARTH COMBUSTION

Multiple burners firing crosswise over open-hearth bath affords increased rate of heat transfer and more tons of steel per hour. Preheated air is supplied either by checker chambers of reversible furnace or by recuperator of one-way furnace

IN a conventional open-hearth furnace with burner ports in the end walls and the preheated air entering through the uptakes, a stream of subdivided oil enters the section behind the throat surrounded with preheated air. The first fuel which meets the air burns completely in the excess of air, but the products of combustion of this portion of the fuel and portions of air dilute the rest of the necessary air, so that the oxygen concentration is exceedingly low. This lengthens the flame and decreases the rate of reaction and the B.t.u. concentration, and, therefore, the rate of heat transfer to the bath. If this condition were corrected by thoroughly mixing the air and fuel before combustion, it would be impossible to find refractories to stand the temperature, since the flame would be short and entirely too hot and, with the preheat available, the combustion reaction would take place with explosive violence. It is for this reason that furnace design has been changed to protect the brickwork. What was and is indicated is a change in combustion practice, so that intense flames can be used in such a manner that the liberated heat units will enter the bath before the flame, or the stream of products of combustion, at a higher temperature level than the bath can come into contact with the brickwork.

An analogy to consider in this respect is a comparison between a Bunsen burner and a Meaker burner, each burning the same amount of gas. The Bunsen burner has a single flame 3 or 4 inches high, which is not constant but surges back and forth. The Meaker burner has a flame ⅛-inch long, is constant and considerably hotter. The reason for this is that each fuel has a set rate of flame propagation for each temperature, or a fixed ignition velocity for each temperature. In the Meaker burner, with its 144 openings, the combustible mixture has a low uniform velocity and thorough mixing, and can burn with maximum efficiency. The velocity of the well-mixed air and gas in the Bunsen burner is not uniform, since the velocity of the center of the flame is greater than that at which the gas can ignite completely, and the center part must travel until its velocity equals or is less than the ignition velocity of the mixture. Although there are other considerations, the given explanation is sufficient for the purpose of this article.

Since all the improvements in open-hearth construction and the improvements in the quality of refractories have not solved the problems confronting the open-hearth operator, a new analysis of the combustion problem is indicated, realizing that the transfer of heat by radiation, particularly from the flame, varies directly with the difference of the fourth power in absolute temperatures and indirectly with the square of the intervening distance. The highest possible flame temperature, therefore, is essential to maximum heat exchange by radiation. To obtain the highest possible temperature, it is necessary to mix the fuel and the air in such molecular proportions that the chemical reaction can be completed in the shortest possible time and in a space as close to the bath as is practical.

The mixture of the fuel and of *all* the air should be accomplished before the combustion takes place to satisfy flame-temperature requirements in such a manner that there is no variation in quantities or proportion and so that the flame is in contact with the bath until all the heat transfer has taken place.

After the fuel and all the air are thoroughly mixed, the velocity of the

(*Please turn to Page* 172)

The top charge feature of the Moore Rapid Lectromelt Furnace offers these advantages:

- >> INCREASED PRODUCTION OF QUALITY STEELS AND IRONS.
- >> QUICK CHARGE BY DROP BOTTOM BUCKET.
- >> CHARGING BUCKET CAN BE LOADING WHILE FURNACE IS MELTING PREVIOUS HEAT.
- >> LESS TIME LOSS BETWEEN HEATS.
- LARGE, BULKY SCRAP CAN BE USED.

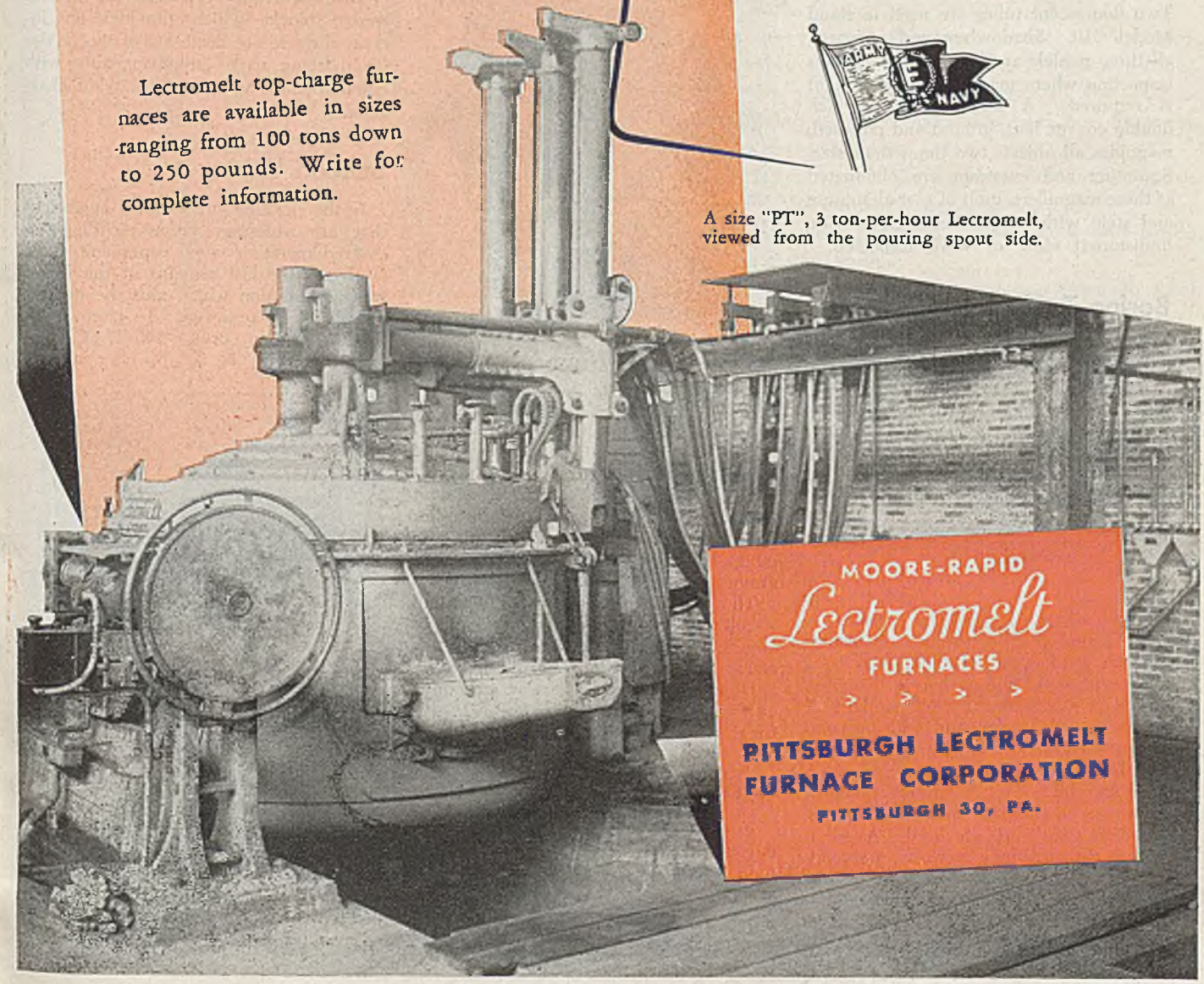
Top charging is practical and efficient because of Lectromelt's simplified design and construction, in which complicated operating mechanisms have been avoided. The large range of operations possible with Lectromelt is an important factor to consider. In addition, large or small heats may be made as desired or part of the heat may be taken out and the analysis of the remainder altered as required.

Lectromelt top-charge furnaces are available in sizes ranging from 100 tons down to 250 pounds. Write for complete information.

why *Lectromelt* top-charge *Increases Foundry Production*

ARMY E NAVY

A size "PT", 3 ton-per-hour Lectromelt, viewed from the pouring spout side.



MOORE-RAPID *Lectromelt* FURNACES

> > > >

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH 30, PA.

INDUSTRIAL EQUIPMENT

Inspection Devices

For inspection of small objects, Ullman Products Co., 857 Fourth avenue, Brooklyn 32, N. Y.., introduces three all-angle,

illuminated models of the C-Master magnifiers. Two of these are stand models and the third is a portable hand type. Lighting equipment of stand Model 410 and portable Model 610 consists of four incandescent tubes which can be lighted two at a time or all four at once. Two fluorescent tubes are used in stand Model 210. Shadowfree and compact, all three models are ideal for continuous inspection where magnification plus light is required. A large, clear 4½-inch double convex lens, ground and polished, magnifies all objects two times their size. Squinting and eyestrain are eliminated as these magnifiers, built of cast aluminum and steel with bronze bearings, provide undistorted view of work inspected.

Boring Tool

Micrometer adjustment of the dial-set boring tool, manufactured by State Mfg. & Construction Co., 1953 North Dixie Highway, Franklin, O., is accomplished through an eccentric cone and socket. With the vernier set at 0-0, the quill is

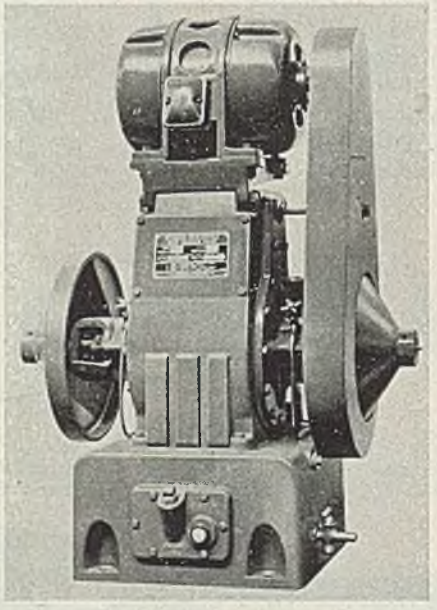
exactly centered. As the vernier is turned, the quill is thrown off center through graduations of 0.001-inch to a maximum of 0.050-inch boring diameter.

The holder, consisting of straight or tapered shank, socket and scale, accommodates a group of four or more inserts, the latter consisting of cone, vernier, quill and bit. The A kit, for example, comprises a holder and four inserts. Standard round bits are used. As bit is held in the quill by a setscrew, a second- any increase in boring diameter can be effected by extending the bit. Combination of micrometer and bit adjustments gives the following range of cutting diameters in the A kit: A-1 insert, 3/8 to 5/8-inch; A-2, 9/16 to 7/8-inch; A-3, 13/16 to 1 1/8 inches; A-4, 1 1/16 to 2 inches. By changing the inserts in the one holder, a total range of 3/8 to 2 inches boring diameters is obtainable.

These tools will bottom holes, bore to square shoulders and accurately bore intermittent cuts.

Rotary Type Pump

Designed to produce and maintain vacuum as low as 5 microns absolute pressure in continuous service, No. 212 E Microvac, a new high vacuum pump, is being marketed by F. J. Stokes Machine Co., Philadelphia 20. This oil-sealed rotary pump is rated at 100 cubic



feet displacement at 350 rpm. It has four internal moving parts; a shaft with keyed-on eccentric, a rotating 1-piece piston and slide, and the hinge bars.

The only valve, on the discharge side of the pump, is sensitive to pressure differentials and made to discharge, without injury, sudden slugs of water or other liquids which may be sucked into the pump. Valve seat is of stainless steel, ground to an accurate surface.

The unit is direct motor driven with V-belt drive and motor mounted on an adjustable hinged base. Pulley is balanced to act as a flywheel. Oil baffles are built into base to remove entrained oil from the exhaust. A patented centrifugal oil clarifier can be supplied.

Type Holder

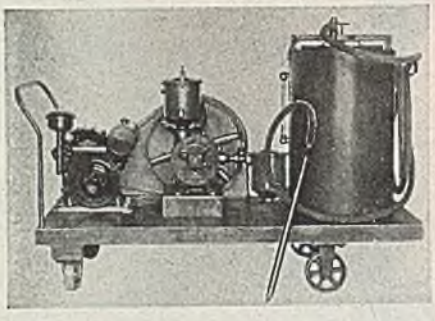
For use with automatic roll marking devices, a new design of interchangeable type holder is now available from New Method Steel Stamps Inc., 147 Jos. Campau, Detroit 7. It permits interchangeable type to be held in position firmly, eliminating possible moving and chattering of the type.

This is made possible by providing a wedge action in the assembly which is obtained by an angle groove in the marking dies which mates with a beveled male ring on the insert retaining cover. This permanent locking action holds the stamp inserts firmly in place. When small size type is used, the beveled groove helps to

maintain strength inasmuch as less metal is removed than with square or rectangular slots. Wedging action is so strong as to make unnecessary the filling of the entire type opening with type or wedge blocks which provides an increased degree of flexibility of the holder for marking parts interchangeably with either a small or large capacity of characters.

Suction Unit

In the cleaning and washing operations that are necessary before refilling industrial metal or wood containers, there is always the last remains of the liquid washing solution which must be quickly and definitely removed. To remove this liquid, Leiman Bros., 145-79 Christie street, Newark 5, N. J., offer a new



suction outfit which may be inserted into the wet spot.

It consists of a rotary vacum pump designed to create not only a high degree of vacuum, but also a sufficient volume of air to provide the necessary power to remove the residue. Vacuum pump is mounted in the form of a mobile unit powered with an electric motor or gasoline engine and is complete with rubber hose and suction tool. Truck is equipped with a wheel and handle for mobility.

The tank catches and holds the liquid

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

H.Q. FOR SMALL WHEELS

Whether you turn out fighting equipment for Uncle Sam or are re-tooling for peacetime production, you'll find Chicago Wheels just what you've been looking for to produce better, smoother finishes. The widest range of types, abrasives and bonds — wheels to do any job of grinding so accurately the finish can be measured in micro inches — rubber wheels for polishing or precision cut-off work.

You get the results of half a century of invention, tests and improvements from our modern research laboratory. And, this same laboratory is open to you — tell us about any grinding problem you have and our engineers will tell you how best to whip it.

GRINDING WHEELS up to 3" in diameter in various bonds, including the new FV, the bond with a pedigree.

MOUNTED WHEELS in every practical shape, grain and grade, each firmly mounted on a steel shank.

TRY A TEST WHEEL — Write us what material you have to finish and size wheel you'd like. We'll send one promptly.

Write for Catalog of complete Chicago Line

CHICAGO WHEEL & MFG. CO.

1101 West Monroe Street Dept. ST, Chicago 7, Illinois

*Half a century of specialization has established our reputation as the small wheel people of the abrasive industry.

CHICAGO GRINDING WHEELS AND MOUNTED WHEELS

Send Catalog. Interested in ☐ Mounted Wheels ☐ Grinding Wheels. ☐ Send Test Wheel. Size.....

Name.....

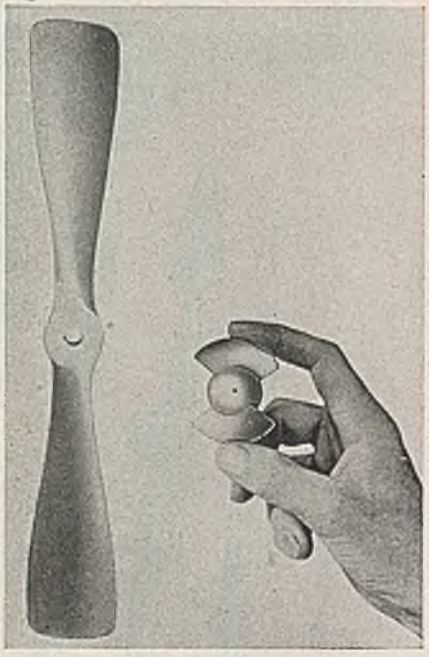
Address.....

residue and as it accumulates, a glass gage shows the quantity. It may be drawn off as desired by drain plug. The pump is automatically lubricated and has a relief valve to regulate the degree of vacuum to be used. The unit is made in sizes for cleaning one, two, or more barrels or containers at one time.

Axial Flow Fan Units

Two new axial flow fan units are announced by Dynamic Air Engineering Inc., Los Angeles. Performance by ASH & VE standard code of test is as follows: The 60-inch low pressure propeller driven with a 10 horsepower, 1150 r.p.m motor delivers approximately 60,000 c.f.m. free air and 5000 c.f.m. at ½-inch s.p.

The midget 2-inch propeller has been



developed for a complete fan unit. It will be powered by a tiny motor of approximately two thousandth horsepower and will deliver 30 c.f.m. at 0.30 inch s.p.

Both fans are built in single stand and multistage varieties. Two-stage assemblies double the single stage pressure characteristics of any given unit. When multistage assemblies are built, guide vanes or contra vanes are employed to straighten the air stream between the various stages.

Steam Jets

Youngstown Welding & Engineering Co., Youngstown 9, O., offers the Weldco steam jet for pickling tanks and water rinse tanks which is a combination mixer and agitator. Steam comes forth at high velocity from the nozzle of the jet. On emerging from the nozzle at high speed, the steam expands into a scientifically designed bell shaped housing, thus creating a strong suction at the rear of the bell. The rear end of the jet being open permits this suction to draw the

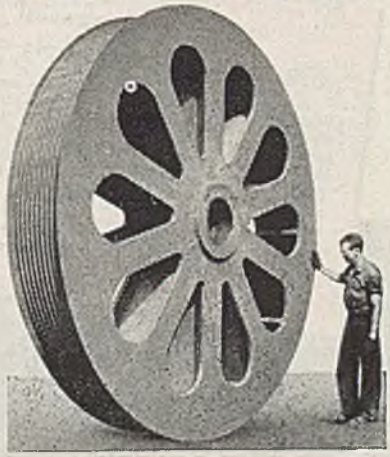
Matte Ladle for Smelter. Weight, complete as shown, approximately 29,000 pounds.

STEEL CASTINGS

OPERATED primarily to produce the wide variety of carbon- and alloy-steel castings required in the manufacture of Vulcan Locomotives, Hoists, Rotary Kilns, etc., our large Steel Foundry also serves many other manufacturers and users of heavy machinery. The fact that we are able to produce unit steel castings up to 38000 pounds net weight, and machine them in our own shops, permits meeting requirements beyond the limits of most foundries and has enabled us to build up a very high-class clientele.

Facilities include an extensive pattern-making department, with fireproof storage space for more than 50,000 patterns. We also provide any desired degree of engineering and machine-shop service—including the manufacture of complete special machinery to purchasers' designs and specifications.

Inquiries for heavy carbon- or alloy-steel castings are cordially invited and will receive the personal attention of highly experienced engineers and sales executives.



Counter-weight Sheave for Lift Span of Railroad Bridge. Weight, approximately 26,500 pounds.

VULCAN IRON WORKS

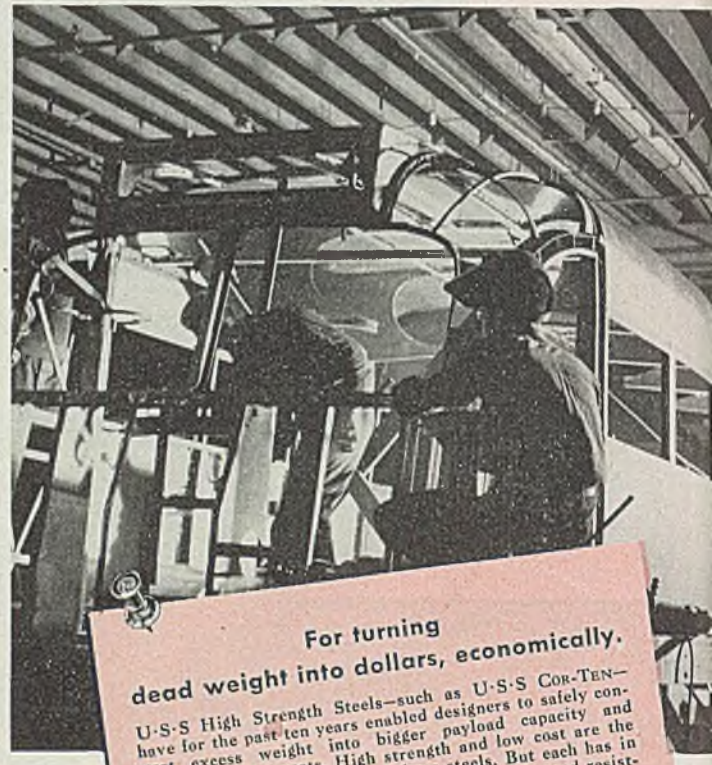
WILKES-BARRE, PENNA., U.S.A.

New York Office 50 Church St.

What's on your drawing

Does your product need heat resistance?

Among the most important developments of the war are the advances made in perfecting and applying high temperature resisting steels. In U·S·S Stainless and Heat Resisting Steels the designer has at his command a complete line of steels especially developed to retain high strength at high temperatures. Some can safely withstand temperatures up to 2100°F. U·S·S Chromium and Chrome Nickel Steels have outstanding ability to resist wear and cavitation resulting from contact with grit, turbulent vapors, etc. Designers of turbo superchargers, steam and gas turbines, and jet propulsion devices will find in these steels the answer to many of their problems.

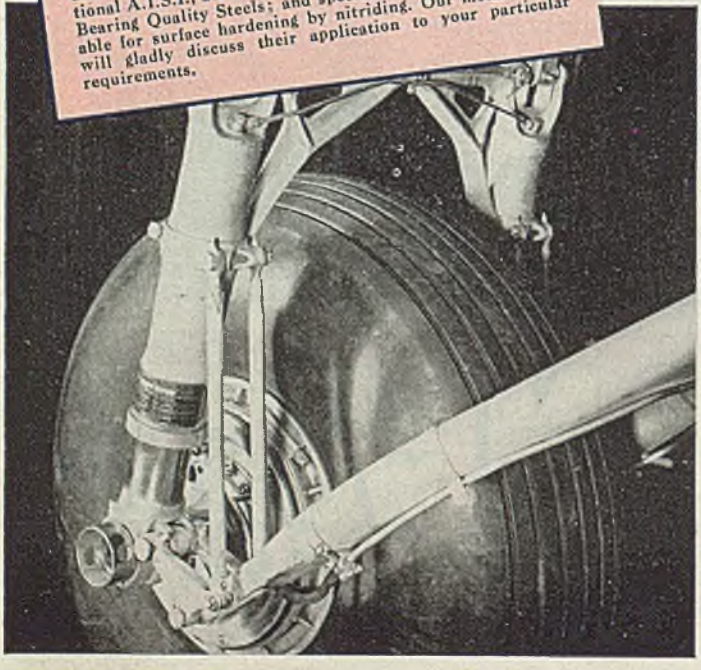


For turning dead weight into dollars, economically.

U·S·S High Strength Steels—such as U·S·S Cor-Ten—have for the past ten years enabled designers to safely convert excess weight into bigger payload capacity and lower operating costs. High strength and low cost are the outstanding characteristics of these steels. But each has in varying degree other desirable properties—increased resistance to atmospheric corrosion, to wear, impact shock, vibration or fatigue, easy fabrication—so that the designer can obtain whatever combination of properties is necessary for top efficiency.

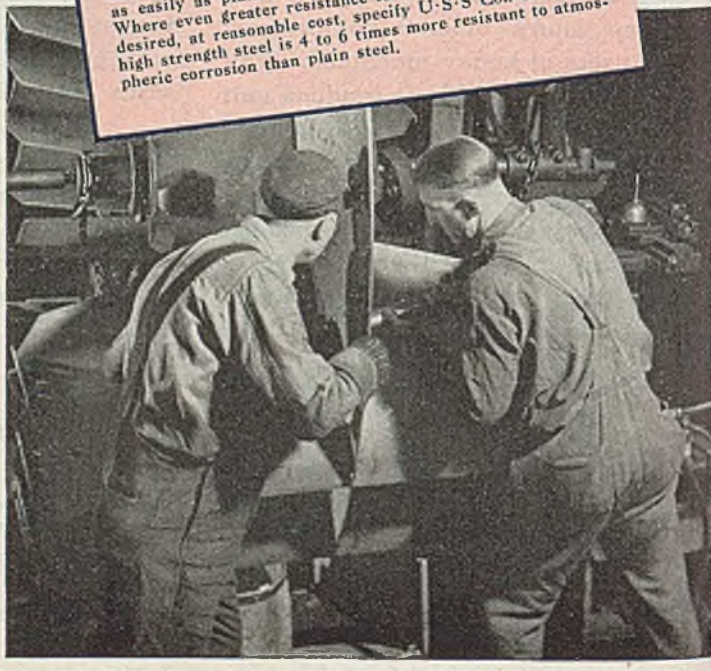
When special made-to-measure steels are needed.

What amounts to a revolution in the manufacture of steels for severe and unusual service has taken place during these war years. In U·S·S Carilloy Alloy Steels you will find the last word in these developments. Steels that will enable you to meet practically every requirement of fabrication and service—a complete range of superior quality construction A.I.S.I., SAE or NE Steels; Aircraft Quality Steels; Bearing Quality Steels; and special alloy steels most suitable for surface hardening by nitriding. Our metallurgists will gladly discuss their application to your particular requirements.



Here's low cost resistance to corrosion.

Although it costs only about 5% more than plain steel, U·S·S Copper Steel has *double* the resistance to atmospheric corrosion. By taking advantage of this fact you can economically design longer life into railroad cars, metal cabinets, centrifuges, refrigerating, ventilating and air conditioning equipment, tanks and ductwork. It fabricates as easily as plain steel. Can we tell you more about it? Where even greater resistance to atmospheric corrosion is desired, at reasonable cost, specify U·S·S Cor-Ten. This high strength steel is 4 to 6 times more resistant to atmospheric corrosion than plain steel.



boards for tomorrow?

BUSES or BABY CARRIAGES
STEAM TURBINES or ELECTRIC FANS
VACUUM TOWERS or VACUUM CLEANERS

remember—9 TIMES OUT OF 10 STEEL WILL DO IT BETTER

WITH most of the advantages of steel, product designers are well familiar. But it should be kept in mind that steel's potentialities for the future have, during these war years, been greatly enhanced.

New, finer steels have been developed. Steel producing and processing techniques have been improved. Faster and more efficient methods of applying steel have been discovered.

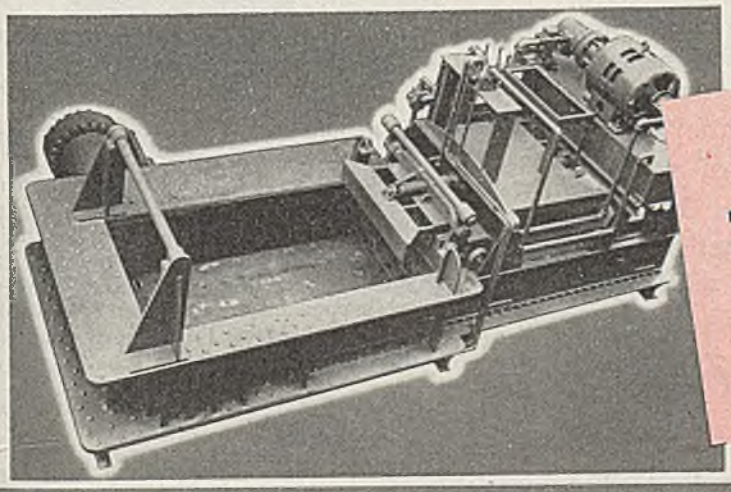
New uses for steel—either alone or in combination with other materials—have been turned up and proved practicable.

To help you in taking full advantage of the many desirable properties that steel can contribute to your postwar product—that will make it more durable, more efficient, less costly to manufacture and easier to sell—the nation's largest organization of specialists in steel is ready to assist you.

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Supply Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

USS STEEL
UNITED STATES STEEL



Do you want increased resistance to abrasion and wear?

Designers have found U·S·S Abrasion Resisting Steel ideal for the wearing parts of mine equipment, ditching machinery, dredges, grinding mills and quarry equipment. This specially developed steel is low in cost. It will greatly prolong life wherever grinding, scraping and gritty conditions wear out most materials in short order. It will pay you to explore its possibilities.

UNITED STATES STEEL

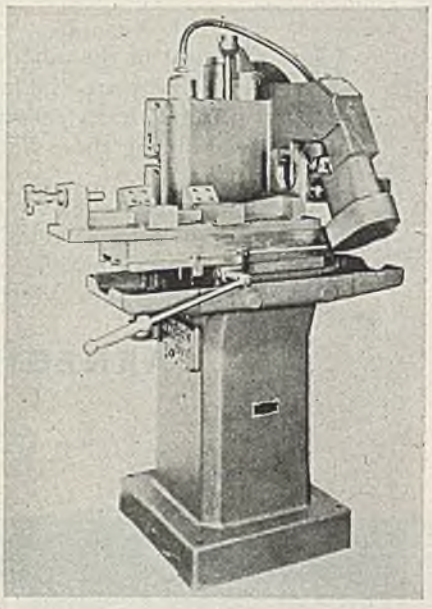
solution from the corner in back of the jet; and the suction creates an incoming current which circulates from the side of the jet. Abundance of power, generated by the steam swishing forth into the solution in a broadening diameter, circulates the pickling liquid forward and

around a pickling tank in a continuous cycle. Under this flow of steam power, the pickling acid is heated and agitated.

The jet can be attached to the steam line without any auxiliary equipment or special fittings.

Notching Machine

Kent-Owens Machine Co., Toledo, O., is marketing a new arrangement for their No. 1 M hand milling machine for milling staking notches in rockets, shells, adapters and similar parts. The machine is equipped with a special head having three spindles, each carrying a notching cutter.



These three cutters are equally spaced about the shell diameter.

Shell is located in the bore at the cutting end of the fixture. Bayonet type clamp at the rear of the fixture permits rapid clamping and unclamping of the part. When milling notches in adapters an air operated fixture is used for holding the part. With this arrangement all three notches are milled simultaneously.

Plate Deck

Factory Service Co., Milwaukee 9, offers a new four way floor plate for use with the standard Turner transport chassis. The floor plate is welded flush with the top of the chassis on the angles of the frame. It is reinforced on the under side by two heavy angles. The nonskid feature keeps metal parts from "walking"

Hurrah! The Job's Half-Done!

Yes, but *only half* . . . and don't think that the millions of workers in America's war plants and factories don't know it, either.

Sure they're cheering . . . they have a right to!

For who but they, by the labor and skill of their own hands, produced the overwhelming volume of munitions and material needed by our armies to crush the Hun?

In this great achievement, employees of United Engineering and Foundry Company can take just pride; for their record, in the production of ordnance, munitions and processing equipment so vitally needed in the manufacture of war supplies, is one that will be long remembered. Yet they know, as does every worker in America, that Victory lies still ahead . . . that there can be no slackening, no let-down, no rest until peace is wholly won.

. . . only *half* done? True; but remember this:

The men and women who have carried the job thus far are *Americans.*

And they'll *finish* it; that's *"for certain."*

The world's largest designers and makers of Rolls and Rolling Mill Equipment

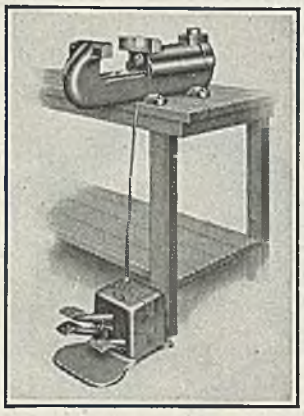
UNITED ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA
Plants at Pittsburgh • Vandergrift • New Castle • Youngstown • Canton
Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q. Canada
Adamson United Company, Akron, Ohio

Buy More War Bonds and Stamps

off when the transport is in motion. The embossments provide point contact with hot materials which allow some air space between them and the steel deck, thereby eliminating warping.

Hydraulic Vise

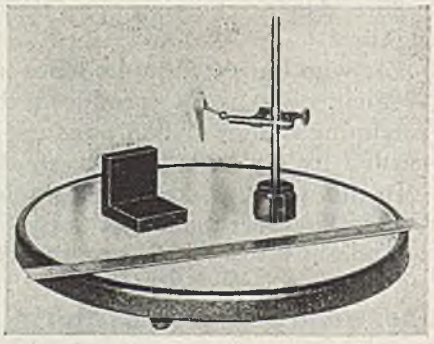
Jaw plates of the hydraulic vise introduced by Air Hydraulics Division, Beyer Machine Co., Jackson, Mich., are interchangeable and can be removed for attaching special plates for bending, swedging, forming, punching, stamping and riveting. The moving jaw is mounted on V ways, and is divided which permits



its power to be used for punching, broaching, removing pulleys, gears, etc., from long shafts. The controlled stroke may be set to give any desired stroke within its capacity. The portable unit can be installed on caster type benches or stands. It features automatic action with touch control and positive control of applied pressure.

Glass Surface Plate

A new glass surface plate has been developed by Main Electric Co. Inc., 1462 East Main street, Rochester 2, N. Y. It is a 16-inch diameter disk of heavy glass, housed in a metal standard. This precision plate is guaranteed flat within 0.0001-inch and its smooth surface allows

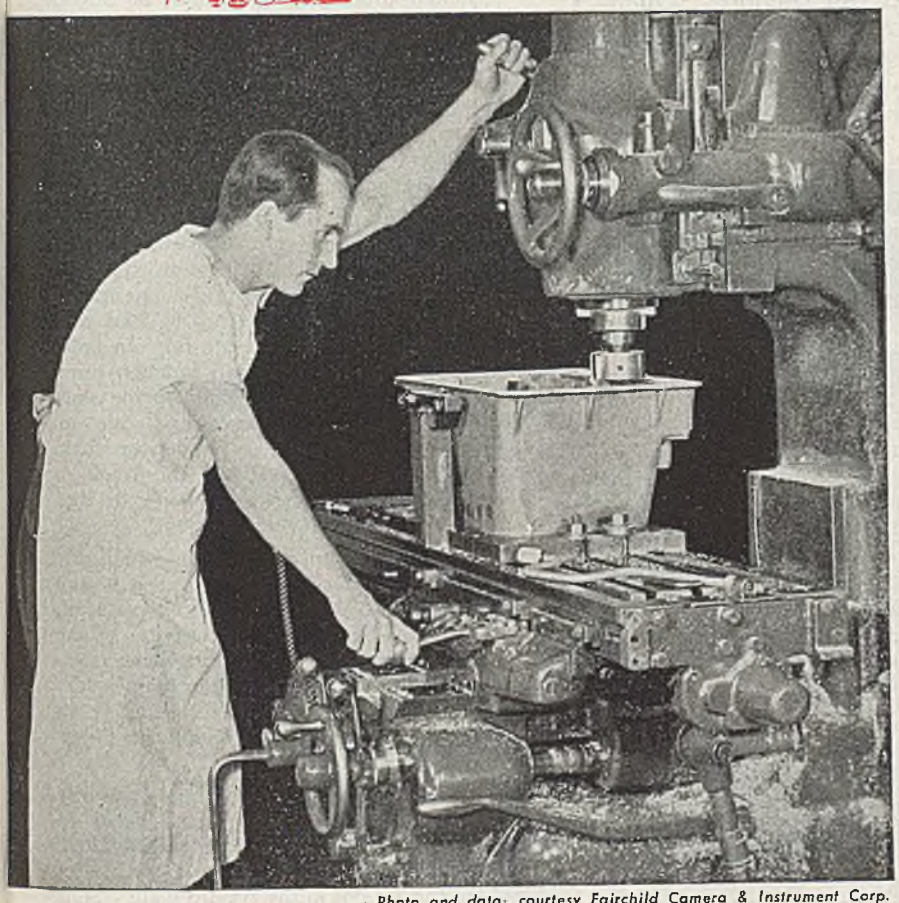


tools to glide easily without sticking or chattering. If it should become scratched, no burr is raised. It cannot be dented and is resistant to nicking. It is temperature resistant, corrosion proof and nonmagnetic which permits either magnetic or nonmagnetic indicator bases to be used with equal ease.

PRECISION AERIAL PHOTOGRAPHY MAPS THE ROAD TO VICTORY...

World War II has seen tremendous strides in aerial photography — potent weapon of modern war. Fairchild Camera and Instrument Corporation has played a leading role in the development and perfection of the precision aerial camera. The Fairchild model presented in this milling story is the K-18 — designed expressly for high-altitude intelligence photography, requiring large area coverage and large image size. Intended primarily for vertical photography, it is also used for low-altitude obliques. Equipped with lens of 24-inch focal length; 9 inches by 18 inches negative size; fully automatic or manual operation.

Fairchild CAMERA



— *Photo and data: courtesy Fairchild Camera & Instrument Corp.*

Milling a film magazine seating surface for the Fairchild K-18 camera with special fly cutter on Milwaukee 3-H Vertical Milling Machine. Material: magnesium alloy; speed: 1500 rpm; feed: 7⅝ inch per minute; cutter: 3-inch diameter with 2 tool bits; larger diameter tool bit: positive rake 20°, helix angle 15°, holder 3 inch, set-in 3½ inch; bottom tool bit: helix angle 0°, positive rake 25°, holder 3 inch, set-in 2 inch (cuts 5/32-inch lower than larger diameter tool bit); path, cutting distances: 20 inches wide x 15 inches across, cutting four sides; supporting wall 3/16 inches thick; 10 minutes milling time.

PRECISION milling of thin walled magnesium and aluminum castings is difficult. Mirror finishes are usually a must, notwithstanding the amount of stock to be removed.

On this Vertical Milwaukee Milling Machine the rate of cross feed is exactly the same as the rate of table feed—resulting in a uniformity of surface and mirror finish over the entire milled area.

Milwaukee Milling Machines are especially adapted for this type of operation. Their three bearing spindle mounting assure smooth vibrationless operation at the sustained high speeds usually used in milling these metals.

TO MILL IT WITH SPEED ... PRECISION ... PROFIT

— PUT IT ON A

Milwaukee

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN

Robot "Assemblers"

(*Continued from Page* 105)

loaded pawl engages each notch as the plate is indexed. Each index station is thus positioned accurately in turn underneath the tapping head, here fitted with a 7/16-in. tap.

As the tapped part is indexed away from the tapping station, a stationary arm kicks it off the index plate. A part being kicked off is seen in Fig. 5.

This machine in conjunction with an automatic screwdriver enables one girl to both tap the hole and drive a hex head screw into the stamping at a rate of 900 per hour, reports Mr. Gladfelter. Such speed can greatly reduce many similar processing operations, he added.

Difficult Feeds: These hopper feeds can be designed to handle an extremely wide range of applications. Each feed is built for a particular job as each size part, each different shape, each different delivery position, requires a pickup plate worked out for that specific job.

Typical of the unusual work being handled by such equipment is the feeding of crowned or dished slugs into stamping presses for further press operations. Fig. 7 shows a unit set up to feed such slugs with the hollow side up. In order that the pickup plate can function properly, it is necessary to pick up the slugs with the crowned or dished side up (hollow side down). To deliver them in the inverted positions, the track or delivery chute is simply made to turn the slugs over on their way out.

When the machine with which the hopper feed is to be used runs at a constant speed, the hopper pickup plate can be belted to the machine drive. Where machine speeds may vary, or where maximum flexibility of operation may be desired, the hopper feed may employ its own constant speed drive motor as shown in Figs. 2, 5 and 7.

The parts that can be fed automatically by properly designed hopper feeds of the type illustrated are almost unlimited. It merely requires the development of the proper slot in the pickup plate. Slots often are made at an angle instead of on a direct radius to get proper pickup action. Design of slot cross section is determined by experience and must be carefully worked out for each job to assure perfect functioning.

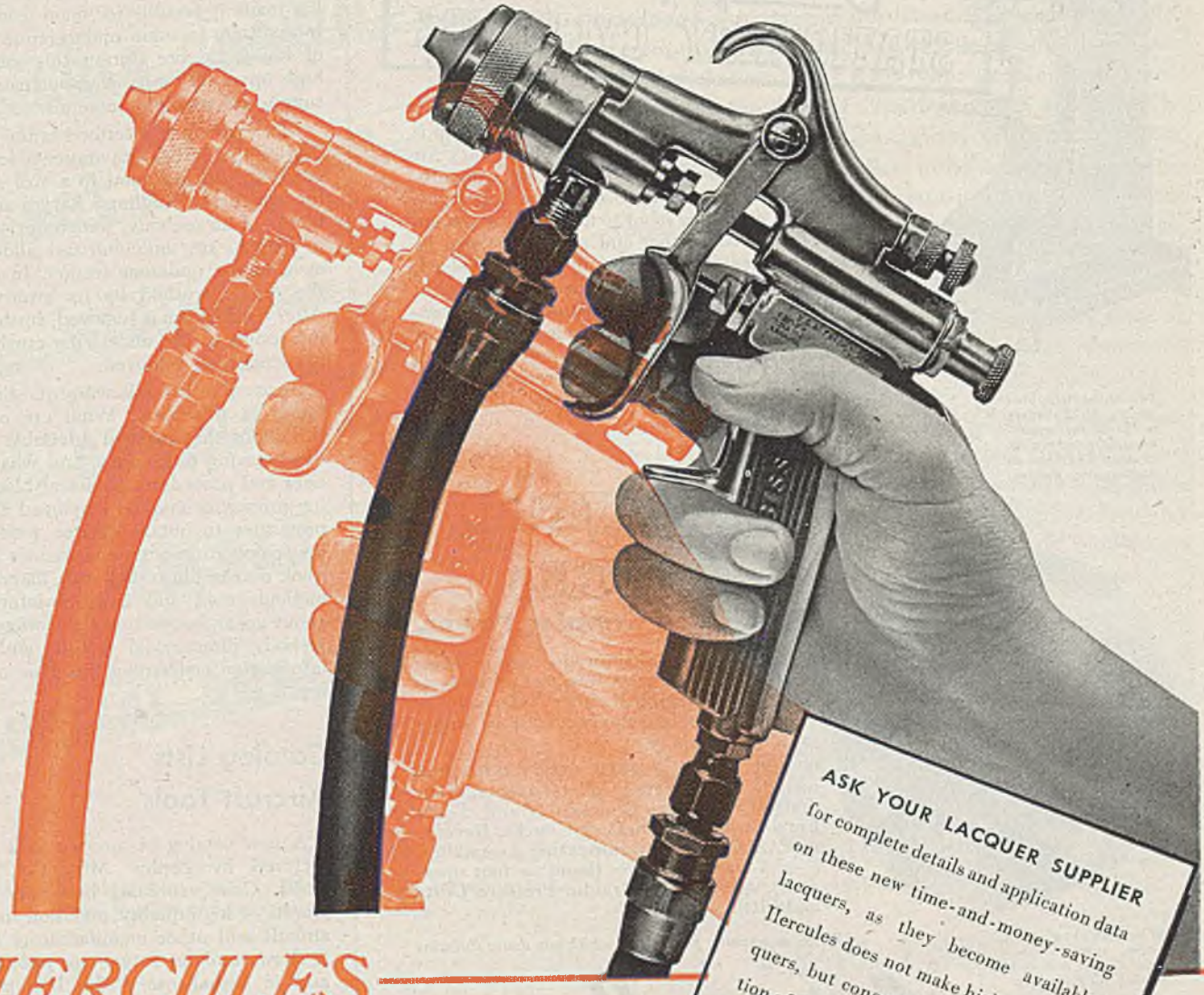
Increases Output Four to One: On a typical job where a less effective device had been employed to feed bullet cores into a centerless grinder, an improved automatic feed of the type described here was able to increase production from 1 1/4 to 5 million per 24 hours by feeding the bullet cores at a rate of 10,000 per hour. Such extremely high rates of feed have long been thought impracticable, but are actually working out successfully on many recent applications, according to Mr. Gladfelter.

In the manufacture of ball bearings, automatic hopper feeds of this type are feeding 1/4-in. steel balls at a rate of

New high-solids lacquer . . .

The new high-solids lacquers can give twice the covering power of old-style lacquers . . . enable operators to complete more pieces in a given time . . . because they provide far thicker coatings when dried. Each coat now does the work of two! The answer is more solids, less solvent. Yet, despite the new finishing speeds and economies afforded, their durability and appearance are not sacrificed. For production line finishes on metal, wood, fabric, glass, rubber, leather, paper, plastics—use high-solids lacquers and save!

» LIKE GIVING EACH SPRAY OPERATOR TWO GUNS



ASK YOUR LACQUER SUPPLIER

for complete details and application data on these new time-and-money-saving lacquers, as they become available. Hercules does not make high-solids lacquers, but concentrates on the production of the highest quality nitrocellulose from which they are made.

CL-53A

HERCULES

Cellulose Products Department

HERCULES POWDER COMPANY
INCORPORATED

930 Market St., Wilmington 99, Del.

2200 per minute. Successful operation at such high speeds depends upon determining the proper shape of the pickup slots, correct slope of pickup plate, right shape and amount of clearance at entering end of delivery chute, etc.

Such hoppers have been found extremely useful in automatically feeding all sorts of parts for processing. Some remarkable performance records in increasing output from many production operations are reported.

Book Offered on "Mining by Block Caving"

A book entitled "Mining by Block Caving," a production method used in some underground mines, by Phillip B. Bucky, professor at School of Mines, Columbia University, is available from Hercules Powder Co., Wilmington, Del. Lower operating costs and greater production possible through use of block caving has made it feasible for many companies to continue to mine underground bodies of low-grade ore during this period of high operating costs, thus increasing the supply of strategic minerals.

Block caving is described as the utilization of the earth's gravitational forces to crush ore underground to a size suitable for practical handling. Large areas or blocks of an orebody, sometimes 400 feet in height, are undercut and allowed to cave to the undercut section. In caving, the ore is crushed by its own weight. After crushed ore is removed, further caving results as the underlying crushed ore is successively removed.

Answers to the following questions are found in this book: What are orebody conditions that make it advisable to use block caving procedures; and what practices and procedures in use at block caving properties may be employed at other properties to obtain greater production, lower operating costs and greater safety? Book also is illustrated with diagrams of methods used and includes information about general operating data, wage rates, orebody dimensional factors, and other information concerning this type of mining.

Catalog Lists Aircraft Tools

A new catalog of aircraft tools manufactured by Zephyr Mfg. Co., Inglewood, Calif., contains lists and photographs of high-quality precision tools for aircraft and other manufacturing trades. It shows tools in actual-size photographs and in actual use. The line includes angle drills, drill adaptors, micrometer stop countersinks, countersink cutters and pilots, back spotfacers and countersinks, quick-change chucks for new or broken drills, drill guides, nutplate drill fixtures and other precision tools for production and maintenance use. Buyers or users of precision aircraft tools may obtain the catalog from the company.

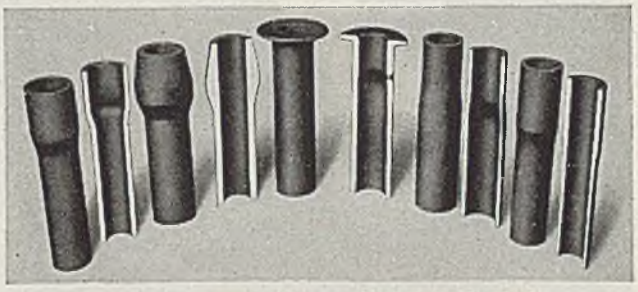
All Kinds of Steel Tubing for All Kinds of Jobs

B&W Mechanical Tubing is available in all carbon steels, NE alloys, SAE alloys, stainless and corrosion resistant steels.

Finding the right kind of tubing—Seamless or Welded—for each mechanical requirement is greatly simplified when the problem is put up to Babcock & Wilcox. Matching tubes to jobs—finding the steel analysis best suited for each purpose—is a specialty with B&W.

To this end, metallurgists and technicians are continuously searching for better alloys—testing for proper hardness and hardenability—checking yield strengths, elongation, and tensile strengths against service demands. At B&W your problems are considered in the light of experience with an unusually large variety of analyses, many of them available from no other source; first hand knowledge of the fabricating, machining, heat-treating, and other capabilities of steels from simple low carbons to high alloys. Making a complete range of both Seamless and Welded Tubing, B&W is in a position to match tubes to jobs without prejudice toward any type of materials. B&W recommendations are therefore impartial and unbiased.

Next time you have a job for tubing, chances are that B&W's experience in making and applying tubing for 35 years, its modern specialty tube mills, extensive laboratory facilities and vast fund of technical data, can save you time and trouble in finding the best tubing for the purpose.



Typical examples of special forms of B&W Mechanical Tubing

B&W MAKES BOTH

B&W TUBES

SEAMLESS. Complete range of carbon, alloy and Stainless steels. Sizes ½ in. to 8⅝ in. O.D.
ELECTRIC-RESISTANCE WELDED Carbon steel grades. Sizes: ¾ in. to 4 in. O.D.

THE BABCOCK & WILCOX TUBE CO.

Welded Tube Division, Alliance, Ohio
Seamless Tube Division, Beaver Falls, Pa.

TA-1320

6249

Multiple Spindle Heads

(*Continued from Page* 107)

multiple holes in each station and including the loading operation can be furnished for multi-drilling, Fig. 3.

Limitations on the depth of holes which can be drilled depends on the efficacy with which chips can be removed; the length of the twist drill and the position in which the piece is loaded, i.e., flat, horizontal, vertical or inverted. If the requirement for cooling can be met, one of the limitations to drilling depth will be overcome.

A typical example of the versatility of multiple spindle heads is the drilling of 56 holes in the rear housing of a supercharger using the head shown in Fig. 5. In this instance, the material to be drilled was magnesium. The actual drilling time of 8 seconds is achieved by means of a 10.2-inch penetration per minute. Four different sized holes at four different depths are drilled in a single pass of this head.

The maximum drilling feed and speed for any particular drilling operation is dependent upon four main factors: Size of the drill, feed per revolution, the material which is being drilled, and horsepower available for the operation.

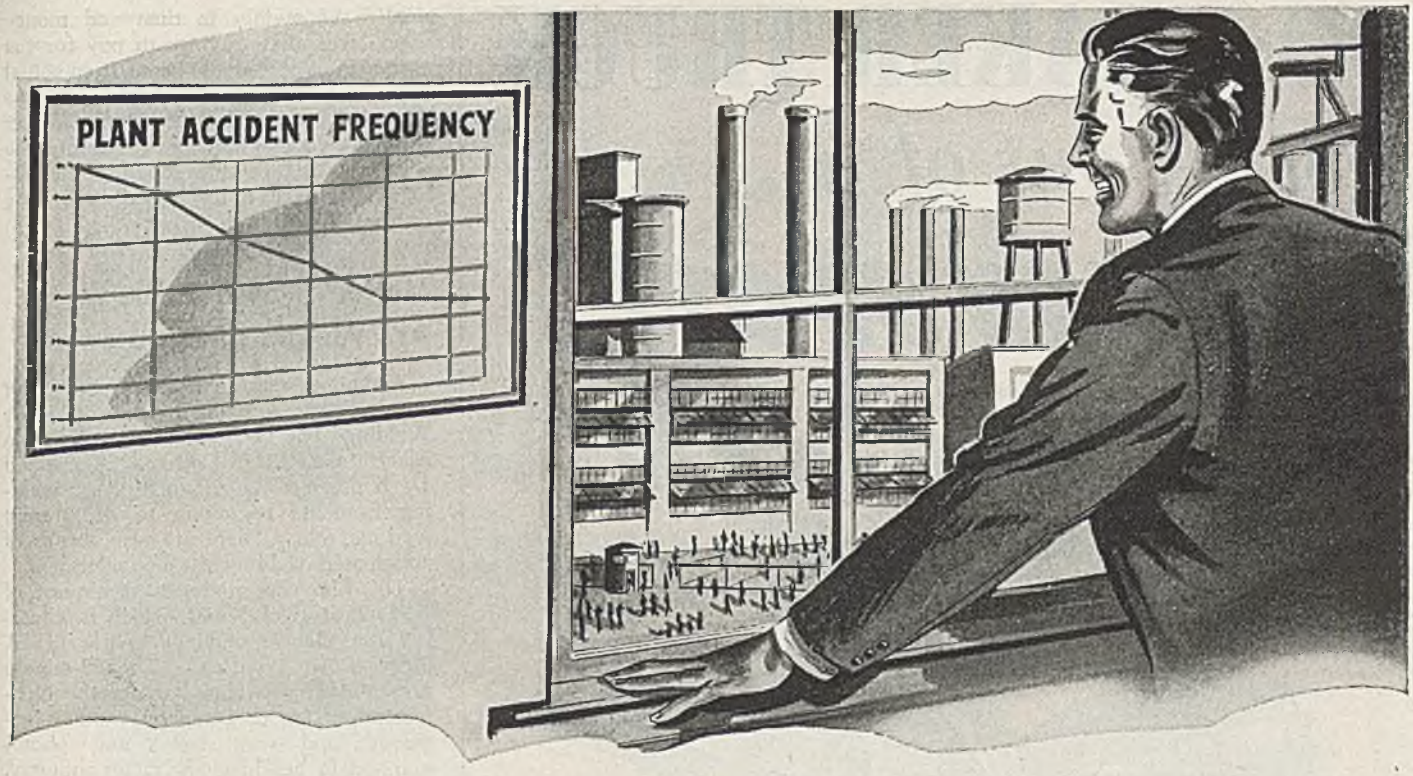
While reference has been made primarily to drilling operations, reaming, countersinking, chamfering, facing, hollow-milling and counterboring may also be performed by means of multiple spindle heads in which consideration has been given to tool diameters, centers of holes, etc.

All tapping and threading operations are performed by individual lead screw tapping spindles, Fig. 4, hardened and ground from the solid. The unit shown is a 2-spindle, reversing, motor driven tapping unit which was incorporated in a 4-station indexing machine for work on aluminum windshields for shells. The loading operation takes place in station No. 1, while the machining operations are performed in stations Nos. 2 and 3. The tapping operation takes place at station No. 4.

Applications: Individually engineered multiple spindle heads may be applied to the great variety of machines available in most factories. They may be mounted on vertical, horizontal way drilling machines, horizontal boring machines, milling machines and semiautomatic and automatic turret machines and hydraulic units.

The versatility of multiple spindle heads permits the rapid and inexpensive processing of any material, ferrous or nonferrous in multiple at an average 4:1 reduction in production time, with a resultant increase in production, lowered cost per piece, a sharp decrease in spoilage due to machining errors, and decreased floor space for production requirements.

Thus, on the whole, where two or more holes are to be drilled, reamed, tapped, bored or chamfered, the investigation of what multiple spindle heads can do for the job is worthwhile and may be pro-



YOUR SAFETY DIRECTOR

is Your Manpower Banker

How he protects your employees against risks determines the profit you make on your manpower investment. So, just as you consult your banker frequently on things financial, talk with your Safety Director often about employee protection. Keep in close touch with him. He will welcome the opportunity of keeping you posted on latest safety developments and how they can be used profitably in your plant. It is wise to start this practice now. Plants which form this closer cooperation of top management with safety departments will have a big advantage in the highly competitive era ahead.

HY-TEST Safety Shoes

. . . are time-proved aids Safety Directors bank on to cut loss of man-hours and costly expense of toe and foot injuries. Available with exclusive Anchor-Flange Steel Toe and many other protective features.

HY-TEST SAFETY SHOES

HY-TEST *Safety Shoes*

M4

HY-TEST DIVISION • INTERNATIONAL SHOE COMPANY • ST. LOUIS, MO.

ductive of savings in time and money which will allow savings to pay for the cost of multiple spindle heads from actual experience in as short a time as two months. In many cases the manufacturer drilling holes singly is paying for multiple spindle heads without securing the obvious advantages of this type of processing on the job.

Motion Picture Portrays Arc Welding Progress

A motion picture in sound and color entitled "Magic Wand of Industry—Arc Welding" has been released by Lincoln Electric Co., 12818 Coit road, Cleveland 1. It portrays the progress of arc welding from its beginning to its present wartime role. There are also scenes of anticipated welding developments.

This film was produced at request of U. S. Bureau of Mines, which is releasing the picture under the title of "A Story of Arc Welding." The 25-minute presentation was filmed under the technical direction of company welding engineers and was staged and photographed in nearly every major industry, including airplane factories, shipyards, refineries and steel mills.

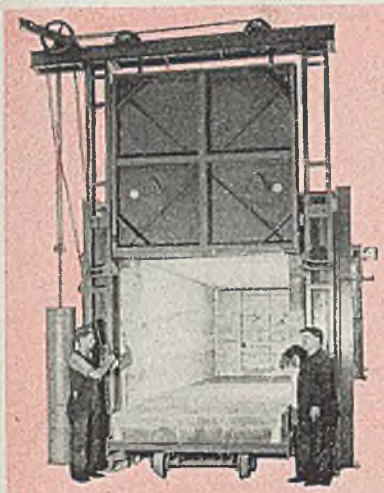
Fundamentals of arc welding, the electrical circuit, and the types of welded joints are presented. Action inside the arc is also shown in actual photography and animation, with the penetrating "arc force" assuring high strength and good fusion of metals. To obtain photographs of the arc, it was necessary to use a battery of arc lights using power equivalent to 4500 automobile headlights focused on an area of one square foot.

The picture is available from the company or from U. S. Bureau of Mines Experimental Station, 4800 Forbes street, Pittsburgh, to business groups, technical societies, schools and colleges and industrial plants in 16 and 35 millimeter prints at no charge except transportation. A short version of the picture is scheduled for theatrical showings throughout the country.

Computing Device Speeds Tax Calculations

Deductax, a device for speeding accurate computation of 1945 withholding tax deductions is announced by Systems Division of Remington Rand Inc., Buffalo 5. A patented arrangement of listing the more than 90 sets of figures in each of the weekly, semimonthly and monthly official withholding charts brings the correct deduction amount for any wage bracket directly opposite the amount earned by the employe.

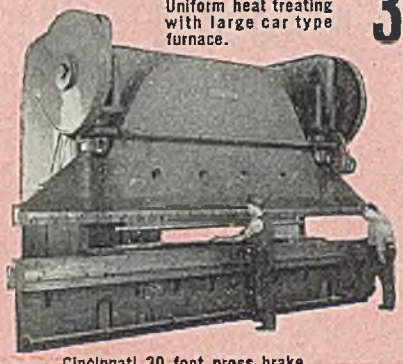
Small and compact, the instrument measures 7½ x 3½ x 3½ inches and fits into a desk drawer. It is built of 24 gage noncritical metal with precision-turned plywood roller that turns to bring chart figures in perfect alignment with a quick turn of the wrist.



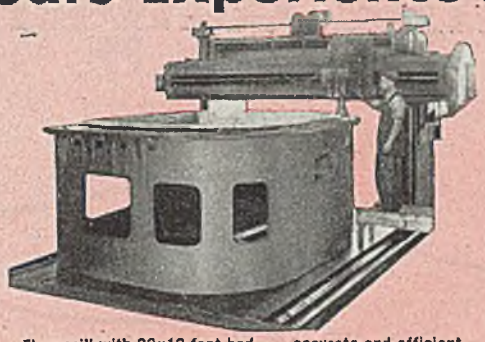
Uniform heat treating with large car type furnace.

What have you that's corroding?

WELDCO has the facilities and 35 years' Experience to help you

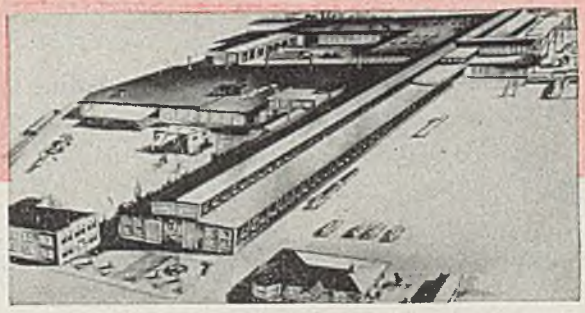


Cincinnati 20 foot press brake.



Floor mill with 22x10 foot bed . . . accurate and efficient.

Large engineering staff for designing special equipment.



Factory has 115,000 square feet of floor space.

CORROSION problems often require special Weldco equipment for a successful solution. Thus, our experienced engineering force plus broad fabricating facilities become of inestimable value to you.

For example, Weldco Engineering Department has had 35 years of experience . . . specializing on equipment and products to resist corrosion. The engineers know from experience whether Monel, Inconel, Nickel, Stainless Steel, or some other alloy will be best for your combined non-corrosion and production requirements. Thus, the production savings which Weldco experts can show you will be far less expensive than the cost of corrosion. Hence, put these Weldco engineers to work helping you. . . . Remember, too, there are many standard Weldco corrosion resisting products. You'll find it well worth your while to place your corrosion problem before Weldco engineers. Write today.

Four engineering-type Weldco folders are ready for you, describing with photos, sketches, and figures the following Weldco products . . . corrosion resisting tubing in standard and special sizes . . . chain . . . steam jets . . . and pickling baskets, crates, and accessories. Don't delay in sending for any one or all four of the folders . . . for data on covered rolls . . . or for engineering help.

THE YOUNGSTOWN WELDING & ENGINEERING CO.

3711 OAKWOOD AVE. YOUNGSTOWN 9, OHIO

WELDCO *Specialists in Corrosion Resistance*

Master of the toughest steel

FOR nearly 60 years, manufacturers seeking to reduce grinding costs have looked to Peninsular for the latest advancements in the fabrication and application of abrasive wheels.

This is only natural. For year after year, Peninsular not only has kept abreast of every new development in the engineering, manufacture and application of grinding wheels — but has pioneered many new and valuable contributions which have helped the progress of this entire field.

Especially is this true in the steel industry where wheels developed by Peninsular have reduced the production time of stainless steel conditioning from 8 to 4 man hours per ton.

No matter how tough your war or peacetime grinding problems may be, Peninsular's field and research engineers can help you master them.

A STANDING INVITATION

Our expert staff of factory and field engineers are ready today to help in your postwar preparation — with a production, engineering and cost analysis service beyond any offered up to now in the industry.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Branches:* Philadelphia, Chicago, Cleveland, Newark, Pittsburgh.

SPECIALISTS IN RESINOID BONDED WHEELS

PENINSULAR

SINCE 1889

Portable and stand grinding wheels for rough grinding


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

Die Casting Parts

(*Continued from Page* 111)

crostructure required for precision instruments.

At this point it should be noted that the high injection pressures of the pre-fill system are effective only if the machine frame, the die locking mechanism and the die are strong enough to withstand the pressure created within the die. In other words, injection pressure can be applied successfully only to the extent that it can be confined to the die cavities.

To prevent dies opening under pressure, causing flash and loss of dimensional accuracy, a machine structure must be used which when preloaded and pre-stretched to the desired die clamping pressure, will withstand the applied injection pressure.

Frame rigidity means little unless the die actuating and supporting mechanism is equally rigid and capable of resisting pressure. A metal-to-metal die support is considered preferable to full hydraulic die clamping.

Hydraulic Linkage Employed

Rapid die actuation is accomplished in our machines by hydraulically actuated, heavy double-toggle linkage; the links are fitted with hardened cam and wedge blocks which, when the die is closed, provide a solid metal-to-metal support, absorbing all the shock loading from the link pins. The only load upon link pins is the inconsiderable one of opening and closing the die. The beam type frame (with no tie bars) also offers unobstructed die space with plenty of room for core pulls.

The three parts shown in Fig. 6 are links employed in the mechanism of a gyro device. Forgings were originally specified, but it was proved that die castings could be made with the strength, stability and resistance to distortion which were required for the job. Die castings saved a great deal of time and a certain amount of weight.

All functional die castings such as these are normalized at 450 degrees Fahr. for 5 hours and cooled in still air at shop temperature. Generally speaking, all Sperry die castings are held to a tolerance of ±0.006-inch across the die parting line, other overall dimensional tolerances are held to ±0.005-inch, and —this is highly important—the variance between castings is held to less than 0.005-inch on all main dimensions. On special jobs, of course, parts may be held to much closer tolerances. A good example of this is Fig. 8, which shows the two sides of a combination dial and gear blank for the K-13 Vector sight. This part is flat within 0.005-inch on the whole surface, and the key slot in the hole to the left of the hub is held to ±0.001-inch because it acts as a stop for a moving part. The stainless steel insert which is cast into the center of this part is used as a bearing.

Fig. 9 shows a pedestal for the K-13 gun sight, a good example of the elim-

ination of machine work by die casting. This part is made at the rate of 40 shots per hour; the only machining necessary after casting is sizing and reaming of the center hole, drilling four name plate mounting holes, and tapping two screw holes. An unusual feature of this part is that slot in front is cast to size, and without machining a tolerance of 0.003-inch is maintained.

The casting shown in Fig. 10 is the pendulum body of the A and N instrument. It must be extremely solid and sound because of machining requirements; holes are drilled and reamed completely through the lugs and hub at right angles to each other, and must have smooth surfaces free of nicks, crevices and porosity.

Figs. 11, 12 and 13 are all typical Sperry die cast parts which today are being made to conform to very strict specifications and close tolerances.

Undercuts Largely Eliminated

The castings described here were designed with the parting line in a single plane; undercuts have been eliminated in every possible instance in order to make unnecessary the use of any complicated coring or loose pieces in the die. Because of the difficulty in die casting heavy sections without porosity, we have endeavored to keep wall thickness between 3/64 and 5/32-inch, and have designed to eliminate machining surfaces wherever possible. Where machining was definitely required, a machining allowance up to 0.020-inch was provided. A taper or draft of 0.007 to 0.015-inch per inch of length on side is used to make ejection easier; large, intricate parts are broken down into smaller subassemblies, where possible.

The highest quality castings are made more readily from single-cavity dies. The reason for this is that in a single-cavity die, the die caster can exert maximum control over the pressure, velocity, and the temperature of the metal as it enters and cools in the cavity. Naturally, single-cavity dies are not always economical for commercial work in ordinary times.

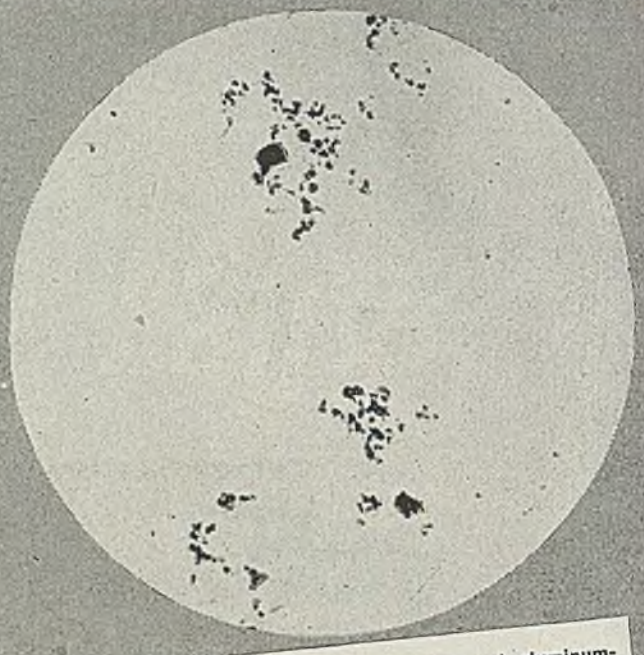
Gates are kept short, straight and free of obstruction, and their sizes are kept in proportion to the volume of the cavity to be filled. If high injection pressure is to be properly applied and utilized, the gate must have sufficient area to allow the pressure to be applied to the casting itself, and not wasted in cramming the metal into and through the gate. Vents are arranged to facilitate the easy exit of air and gases ahead of the metal. In some cases, large overflow wells and vents are provided at that portion of the die farthest from the gate, in order to allow the first metal entering the die, to overflow into the wells or pockets and carry with it excess lubricant and dross.

We have found that dies should be operated at the highest temperature possible with the type of die steels employed. Temperatures between 350 and 450 degrees Fahr. were used in making

"FERROCARBO" -S

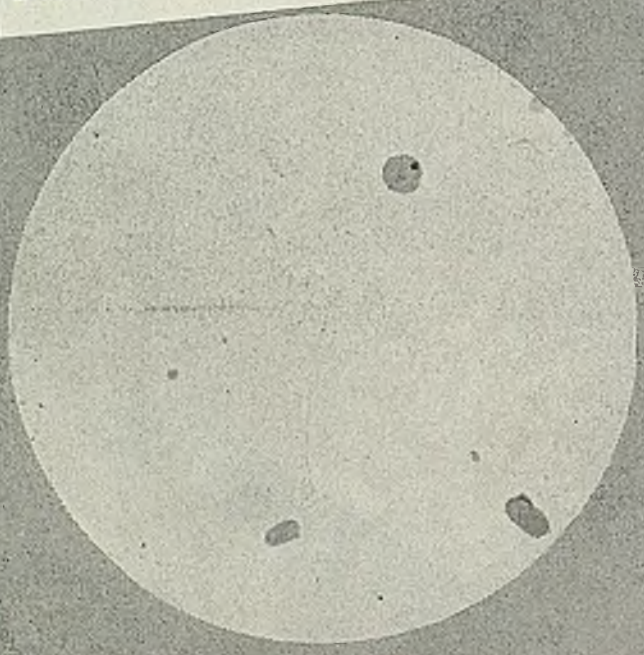
SULPHIDE INCLUSIONS in a medium carbon steel, aluminum-killed, without "FERROCARBO"-S (above). Observe grain boundary segregation of the sulphides. Magnification 200X.

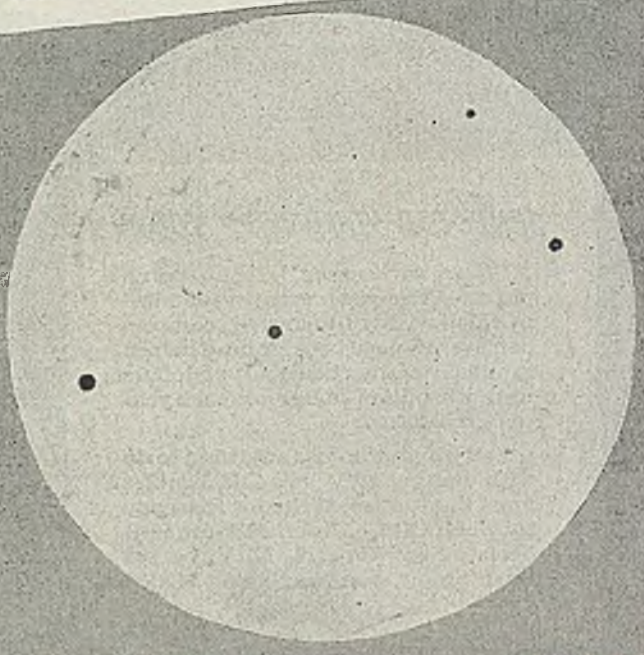
REDUCTION IN SULPHIDE INCLUSIONS in the same steel—but treated with "FERROCARBO-S" (below). Segregation eliminated—only a few globular inclusions, widely dispersed. Magnification 200X.



OXIDE INCLUSIONS in a medium carbon steel (above), aluminum-killed, without "FERROCARBO"-S, showing typical segregations. Magnification 200X.

IMFROVED DISPERSION OF INCLUSIONS in the same steel, treated with "FERROCARBO"-S (below). Grain structure unaffected, but residual oxides reduced and better distributed. Magnification 200X.

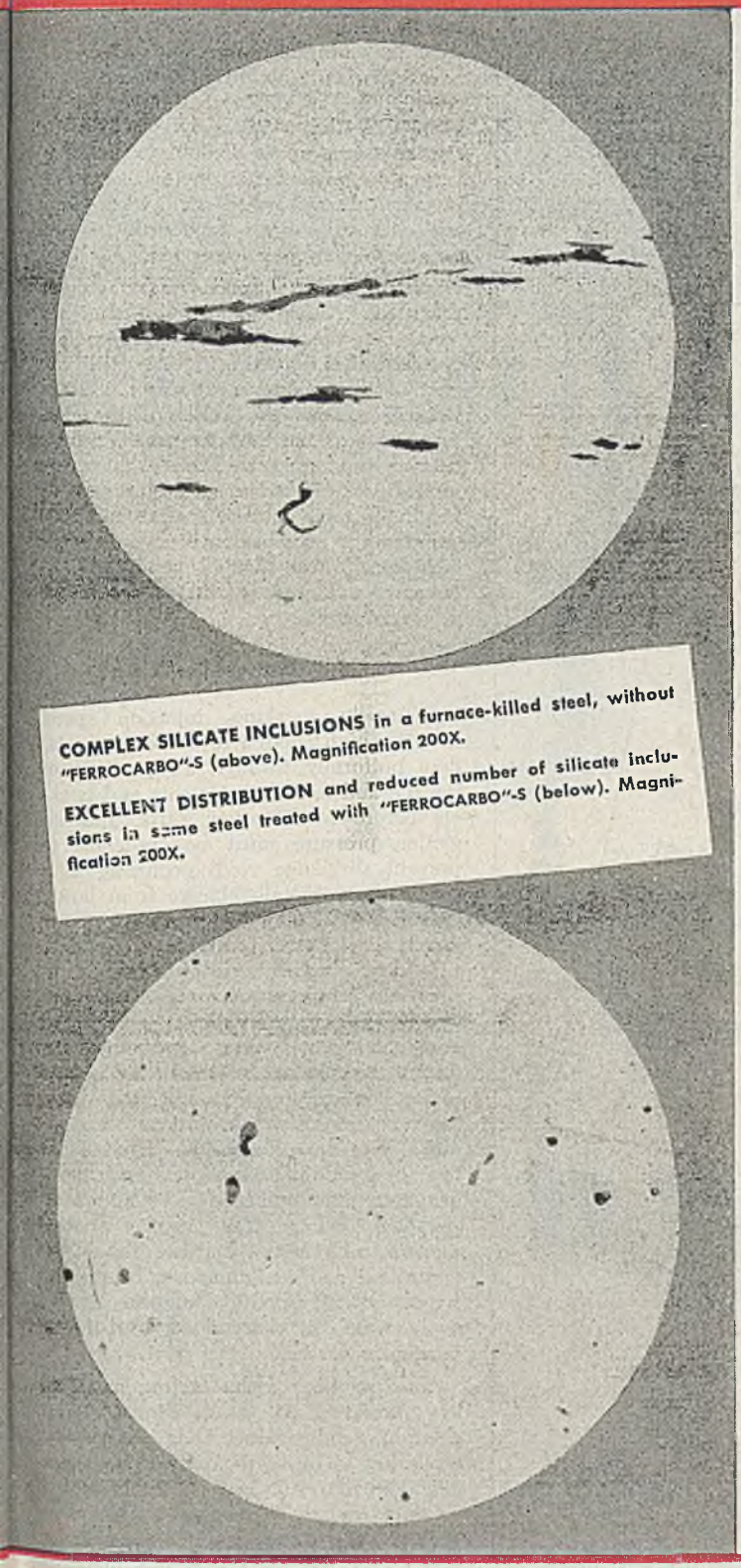




CARBORUNDUM

Ferrocarbo

gives cleaner, sounder steel



COMPLEX SILICATE INCLUSIONS in a furnace-killed steel, without "FERROCARBO"-S (above). Magnification 200X.

EXCELLENT DISTRIBUTION and reduced number of silicate inclusions in same steel treated with "FERROCARBO"-S (below). Magnification 200X.

Use "FERROCARBO"-S for cleaner steels. Deoxidizing with "FERROCARBO"-S produces steel with fewer inclusions—those remaining are widely dispersed and globular in shape, occupying the least possible space.

Photo-micrographs of electric furnace steels prove the dispersion of sulphide network inclusions, with consequent improvement in ductility, when "FERROCARBO"-S is used as the deoxidizer. Segregation of oxide inclusions is likewise shown to be eliminated.

Step-down tests, too, reveal much higher cleanliness ratings when deoxidizing with "FERROCARBO"-S.

Occurrence of oxide stringers in steel forgings, with their tendency to form hair-line cracks, is terminated by the scavenging action of this new ladle treatment. The few residual oxide inclusions are of a globular type and well-dispersed throughout the steel.

For high quality, clean steels that combine maximum physical properties with complete deoxidation, investigate "FERROCARBO"-S, the new ladle treatment that assures: *thorough deoxidation*, *reduction* and *dispersion* of *inclusions*, *prolonged increase* in *fluidity*, *control* of *oxides* in *fine-grained steel* and *added ductility*.

Our metallurgical staff will be glad to show how you can use "FERROCARBO"-S. Write The Carborundum Company, Refractories Division, Department R-4, Perth Amboy, N. J.

"FERROCARBO" distributors are:

KERCHNER, MARSHALL & COMPANY, Pittsburgh, Cleveland, and Birmingham.
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by CARBORUNDUM
TRADE MARK

the castings shown here; higher temperatures will be used when better die steels are available. Higher temperatures may slow down the casting process but will tend to make better castings.

The flexibility of equipment in affording independent control of a variety of combinations of injection speed and pressure is highly important. Both factors must be carefully controlled and correlated to obtain optimum results in the manufacture of different types of castings. We have regularly used injection pressures up to 33,000 p.s.i. with a very slow injection stroke in die casting small, heavy-walled parts, while thin-walled castings with large area require a much higher injection speed.

High injection speeds are avoided since they cause spraying of the hot metal into the die cavities and produce porous, inferior castings. Also, the impact of the molten metal, shot at high velocity against the walls of the die, is very hard on the die, causing heat checks and erosion. Dies subject to such heat shock for any considerable length of time become so checked that the castings produced are covered with "whiskers," lose their dimensional tolerances and are worthless for high-precision work.

Desired Casting Conditions

Generally speaking, injection speed must be high enough to make the metal flow uniformly through all portions of the die and into the air vents and pockets before solidification starts, and injection pressure must be sufficient to prevent shrinkage voids occurring as a result of the metal's change from liquid to solid. High injection pressure alone can not solve the problem of porosity; the ideal combinations of speed, pressure and temperatures must be sought; once the correct combination is found and good die castings are being produced, then the machine must be capable of automatically reproducing and maintaining the desired conditions throughout a long run of castings. Die casting machines should be equipped with modern automatic timing devices and temperature and pressure control instruments, and die temperatures should be controlled and maintained uniformly to secure exact repetition of the casting cycle which is determined best for a particular casting.

The practice of die casting metal in low temperature slush form, once thought good practice, has not proved advisable. The segregation of beta iron silicide will result in hard spots in the casting, greatly reducing its machinability. The temperature in the holding pot should be such that the metal is fluid at all times. Because the ideal casting temperature is not the same for all castings, it is desirable to first determine the proper temperature for a given casting, then maintain it throughout the run by automatic temperature control. The exact weight of metal required for each shot should be carefully determined

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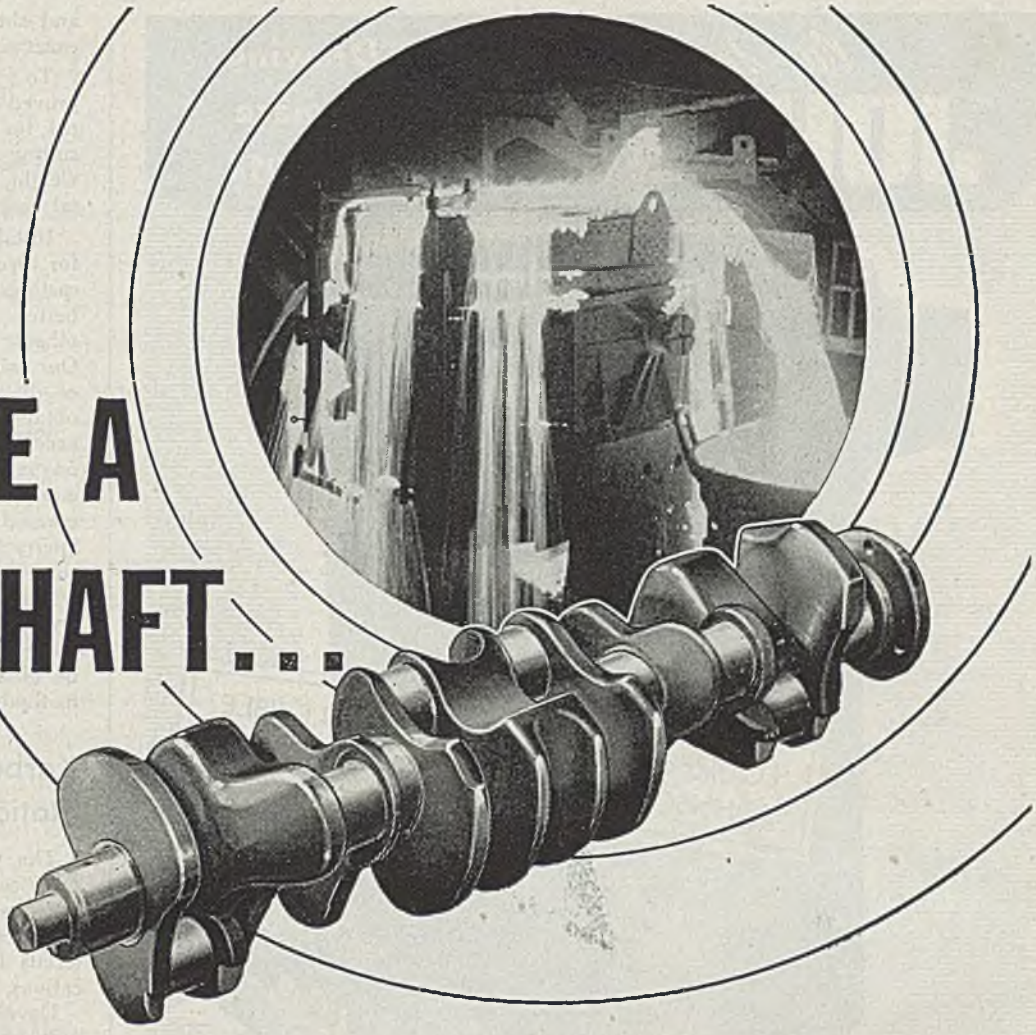

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THAT'S pretty obvious. But right here is where "Sulphite-treatment" takes place to add machinability to the metal. Because of Sulphite-treatment, all kinds of machining operations are made much easier. It produces a steel which allows a 25% greater machining speed and adds as much as 200% to tool life.

That's why Sulphite-treated steels are ideal for products that require a lot of machining. Crankshafts and gears, camshafts and axles—even shells have been successfully manufactured from this type of steel. And there are hundreds of other products in which it can be used to great advantage.

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and the operator given a ladle of the exact size to provide that weight.

To summarize, die castings have proved very advantageous and economical for use in Sperry instruments; resulting in marked saving of space, weight, machine and man hours, and total cost.

Installing our own die casting plant for investigating the potentialities of die castings and for checking and promoting better die castings, purchased from others, has been more than justified. Our engineers appreciate the advantages of die casting and have confidence in obtaining uniformly good castings and excellent performance therefrom. It is no exaggeration to say that the pre-fill equipped machines have greatly increased the scope of die casting for the Sperry Gyroscope Co., and it may be assumed from our experience that they will increase its scope throughout industry, permitting the die casting of parts which only yesterday were thought to be obtainable only by other fabricating methods.

Karbate Products Made By National Carbon Co.

The Calco Chemical Division of the American Cyanamid Co., Bound Brook, N.J., has made available information on its extensive utilization of Karbate materials for a variety of chemical applications.

Developed by the National Carbon Co., unit of the Union Carbide & Carbon Corp., New York, Karbate graphite base products possess a high coefficient of heat transfer while the carbon base products are engineered for applications where low heat transfer values are desired. All of these products are chemically inert, highly resistant to corrosion, unaffected by severe thermal shock and are impregnated to make them impervious to liquids under comparatively high pressures.

One of the first plant installations was the lining of a steel scrubber in which sodium hydroxide and sulphuric acid were used alternately.

Calco has conducted laboratory and pilot plant tests over an extended period with all available chemical construction materials, including metals, ceramics, chemical brick and Karbate. On the basis of these tests, Karbate units were selected and trial plant installations made.

In the April 16 issue of STEEL it was incorrectly stated that Karbate is a development of Calco. Actually it is a product of the National Carbon Co.

—o—

A booklet entitled "How to Heat Treat Hobbed Cavities by Midland" is available from Midland Die and Engraving Co., 1800 West Berenice, Chicago 13. It outlines procedures for heat treating developed and recommended by the company's metallurgists to insure maximum and low cost production of precision parts.

Who says "You Can't Keep a Good Man Down"?

He can't outguess the high-speed machine he operates, that's all. Sometimes, when he shuts it down at *what he thinks* should be the end of the run, he finds the run is short—and has to be set up again. Other times, he runs over into an unwanted surplus. With good men hard to find, why let their work be complicated with needless worry? If there are men in your plant who are fumbling around in this countless fog, you can readily get them out of it by giving them Veeder-Root *Count*rol on their machines. In this man's case, a Veeder-Root Predetermining Counter would do the trick. Then he'd just set the predetermining figure-wheels to the number of turns, strokes, pieces, or other units required. And when the run is exactly completed, the counter would signal him or act to stop the machine. Also for every other kind of production machine or process, there are Veeder-Root Counters that are easy to install, without interrupting production. And you can count on Veeder-Root engineers to help put *your* production under *Count*rol . . . right now.

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Speed Welding

(*Continued from Page* 114)

above steels are approximately 67,000 p.s.i. tensile strength and 32 per cent elongation in 2 inches.

Type of Electrode: The proper electrode is essential to obtain maximum welding speeds. There are three main types of electrode for welding plain carbon steels. These are as follows with the corresponding American Welding Society classification and recommended special applications. First is E6010, E6011; second, E6012—E6013, E7012—E7013; third, E6020—E6030.

Size of Electrode: Size recommended is that which will produce the most economical joint with normal ease of operation. In general, the larger the electrode it is possible to use, the lower the cost of the joint.

There has been a tendency to use small electrodes to get to the bottom of V-butt joints with the thought that it is necessary to get the tip of the electrode down to the bottom of the groove for proper fusion. While it is true that good penetration can result from this use of small electrodes, equal or greater penetration can be obtained with larger electrodes and higher currents at a great reduction in cost of welding.

Fit-Up: The graph, Fig. 3, shows clearly how various sizes of gaps affect welding speeds. Care in cutting, forming and handling of shapes to be welded to avoid poor fit-up is a major factor in welding costs. A gap of 1/64 to 1/32-inch is useful however in preventing angular distortion and weld cracking.

As an example: A square edge or single V-butt weld on ½-inch plate, when welded with a 1/32-inch gap, can be made more than twice as fast as the same weld made with a 3/16-inch gap.

Though the graph given is for butt welds only (either square or grooved), fillet welds are affected by oversized gaps in a similar manner. A fillet weld equal in strength to a 7/16-inch conventional fillet can be made at 12 inches per minute with a 1/32-inch gap, but at only 8 inches per minute with a ⅛-inch gap. A gap of 3/16-inch will require a multiple pass weld and the speed drops to 3 inches per minute.

Position of Joints: The position of the joint has considerable effect on the speed and ease of welding. With the exception of sheet metal welding, welds should be made in the downhand position with the joint level wherever practical. The change from vertical or overhead to the downhand position can result in an increase in speed of as much as 400 per cent for some joints. It also greatly simplifies welding, for the electrode is dragged along the plate in the downhand weld and it requires considerable skill of manipulation in the vertical and overhead positions.

For single pass fillet welds on plate up to and including ⅜-inch, maximum travel speed is obtained when the joint

is in a downhand position with the axis of the joint tilted down-hill. A tilt of 10 degrees will allow an increase in down-hill arc speed up to 50 per cent. However, for a given current, the weld will have about 30 per cent less strength due to the smaller concave weld section; so increase the current by 30 per cent for equal strength.

Foreign Matter in Joint: Excessive scale, paint, oil, rust, etc., all tend to interfere with welding and should be removed if the speeds indicated in the procedures are to be attained.

Build-Up or Over-Welding: Any amount of weld metal in addition to that needed for the specified strength is useless and costly. On square edge butt joints, a small build-up is unavoidable since the metal from the electrode has no place to go other than into the small gap. Even with this unintentional build-up, the square edge joint still is the most economical because of the high speed possible when there is no groove to fill and high currents can be used without danger of burn-through. The same is true of welding the back side of single V or U-groove welds when back side is welded without chipping.

Excess build-up not only is wasteful, but in some instances actually is harmful, as any sudden change in section in a structure becomes a point for stress concentration, expecially under conditions of fatigue loading.

Therefore the weld should have just enough build-up to make sure that the weld is flush with the plate. There should be no need for a build-up of more than 1/16-inch. Excess build-up on fillet welds can be avoided by making the weld as close as possible to minimum gage size, with equal legs and with the surface of the weld as nearly flat as possible.

When ½-inch plate (60 degrees V, ⅛-inch shoulder, no gap) is welded with ⅛-inch build-up on both sides instead of the preferred minimum weld metal is wasted and the weld costs 66 per cent more to make.

Inspection and Supervision: Close checking by inspectors and supervisors to see that correct procedures are adhered to not only guarantees quality of welds but also is a valuable aid in reducing costs. Obviously, to get best results, the logical time to inspect a weld is while it is being made. A check made before or during welding on the type and size of electrode and the current used, and then a check of the surface appearance of the weld tells the inspector more about the strength of the weld than measuring or gaging the weld after it has been made.

The inspector can be assured that the strength requirements will be met when the following factors are in accordance with the procedure sheet for the joint desired, given on subsequent pages.

—Plate preparation.
—Electrode size and type.
—Current.
—Surface appearance of weld.

Thus, all the factors in making a good

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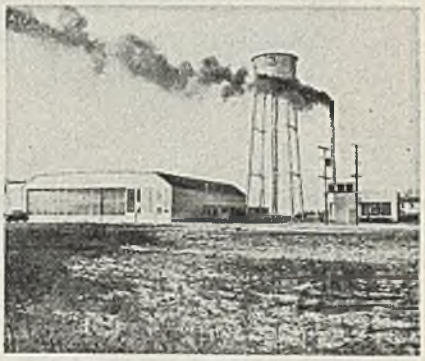

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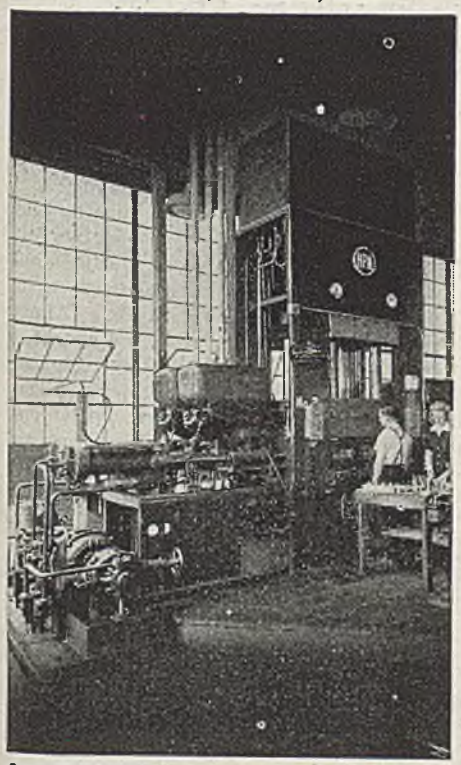

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weld can be set up by the inspector before the welding is started and occasional checks can be made to see that these factors are not altered. These steps, along with careful surface inspection, guarantee full weld strength.

It is the duty of the supervisor or foreman to see that the correct travel speed is used . . . for maximum penetration and minimum welding cost.

The proper procedure will eliminate overwelding in fillet and square-butt welds. However, groove butt welds should be checked carefully for overwelding. The cost of a weld can easily be increased as much as 100 per cent by adding useless, excess build-up of weld metal.

Instructions used by the welding departments should specify the following for each type and size of joint:

—Plate preparation.
—Type and size of electrode.
—Current.
—Arc travel speed.

When these factors are clearly defined and carefully followed, the basic advantage of speed welding will be realized; a weld with the equal or greater strength than previous conventional welds will be made at lower cost.

Book of Engineering Data Will Help Tool Engineers

Cincinnati Milling Machine Co., Oakley, Cincinnati 9, has published a book called "Engineering Data" which will be unusually helpful to those responsible for advance planning of production and tooling involving milling, broaching and cutter sharpening machines built by this company.

The object of this 8½ x 11-inch, 60 page data book is well expressed in its preface in the following words: "Many engineers who have need for machine tool catalogs desire only the technical data—specifications and drawings containing principal dimensions. Conventional sales catalogs are the usual source of this information. However, in plants having several types of machines tools of the same make, sets of catalogs are cumbersome to use, especially for tool designers, methods engineers and plant layout men who refer to them often.

"With these thoughts in mind, engineering data covering the principal products of the Cincinnati Milling Machine Co. have been gathered together in this one publication. Copies are available free of charge to engineers interested in this type of information."

—o—

A 6-page folder describing frictional properties of Bearium metal and illustrating typical bar stock sizes and individual castings is available from Bearium Metals Corp., 258 State, Rochester, N. Y. Photomicrographs show structure and lead distribution achieved in its production, accounting for its advantages for bearings, bushings, thrust washers and other applications involving rubbing friction.

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All Macwhyte PREformed Wire Rope Is Internally Lubricated! Macwhyte Wire Rope Lubricant is packed around each wire in all strands. This improves the sliding action of the wires as they move in bending around sheaves and drums. It also protects against inside corrosion.

When you select Macwhyte PREformed you are not only getting "the correct rope for your equipment," but also a personal interest in helping you get the most out of your rope.

Today a large percentage of Macwhyte PREformed Wire Rope is serving on the battlefields, in the air, on the sea and in essential industry. For this reason there is not enough to fill all requirements.

But don't stop asking for Macwhyte PREformed! Quite often it *is* available, and *when* it is, you get a rope with less internal fatigue, less friction, better balance and longer life. You get a safer, easier-to-use rope, because strands are PREformed to lie naturally in place.

The wire that goes into Macwhyte PREformed is processed under constant metallurgical control to make it tougher, more flexible. And when this wire is assembled into strands, PREformed and internally lubricated under close supervision of wire rope craftsmen, it just *has* to be the correct rope for your equipment.

We hope, as many of our friends do, that it will not be too long before we can say, "You can have all you need." In the meantime keep asking . . . not for just "wire rope," but for "Macwhyte PREformed Wire Rope." When it is available you'll have the finest!

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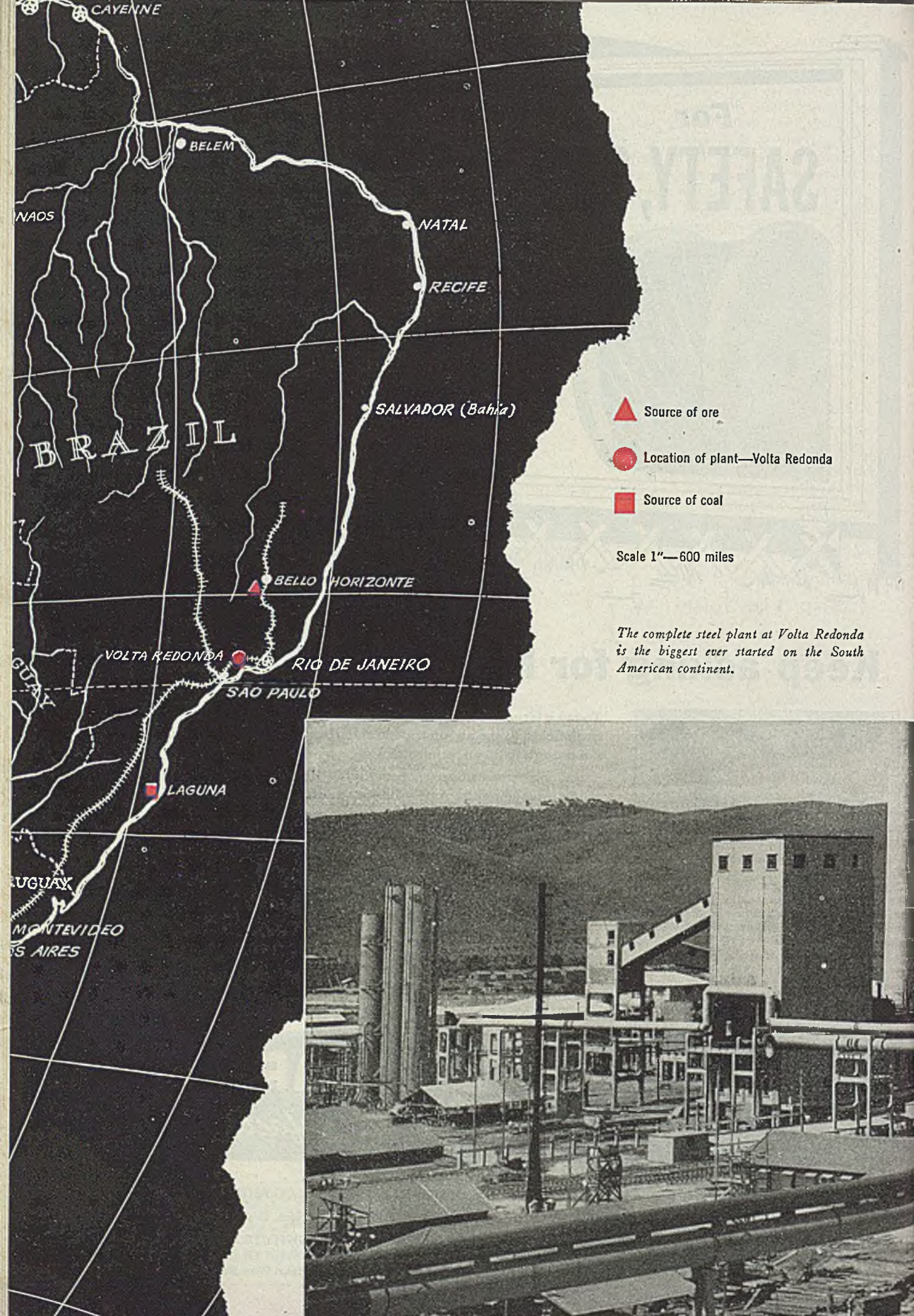

The complete steel plant at Volta Redonda is the biggest ever started on the South American continent.

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for the production of blast furnace coke from native coal

In Brazil the rate of charcoal-iron production is the highest in any nation's history. However, charcoal is not strong enough to support the burden in a big modern blast furnace. For this reason the largest charcoal-iron blast furnace produces only 100 tons of iron per day.

The Brazilian National Steel Company therefore contracted with Koppers to build at Volta Redonda in Brazil, the first byproduct-coke plant in all South America. This work has been finished and the coke plant will soon go into production.

There are 55 Koppers-Becker Underjet Ovens, with Waste-gas Recirculation. These are big ovens, 15 feet in height, holding an average charge of coal slightly in excess of 2 tons. They will be underfired with a 110 B. t. u. mixture o blast-furnace gas and producer gas from Koppers-Kerpel gas producers or debenzolized coke-oven gas as the fu balance of the mill dictates.

The plant will carbonize 570,000 tons of coal per year an will produce, in addition to coke and gas, ammonium sulfat motor fuel, nitration-pure benzol and toluol, and xylol. Koppers tar-distillation plant will make fuel tar, road ta crude naphthalene, disinfectant oil, flotation oil, creoso and paving pitch, all for use in Brazil.

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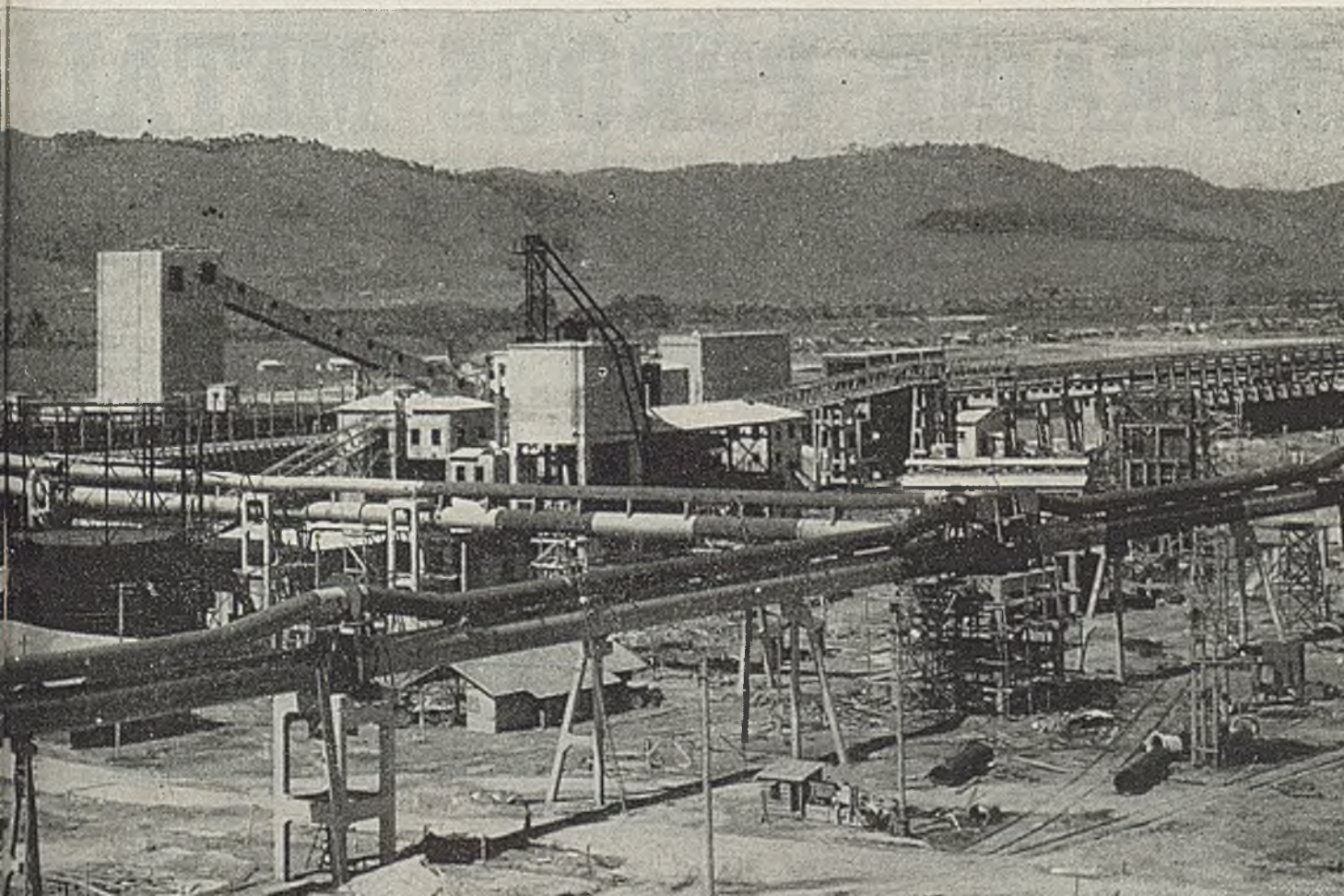

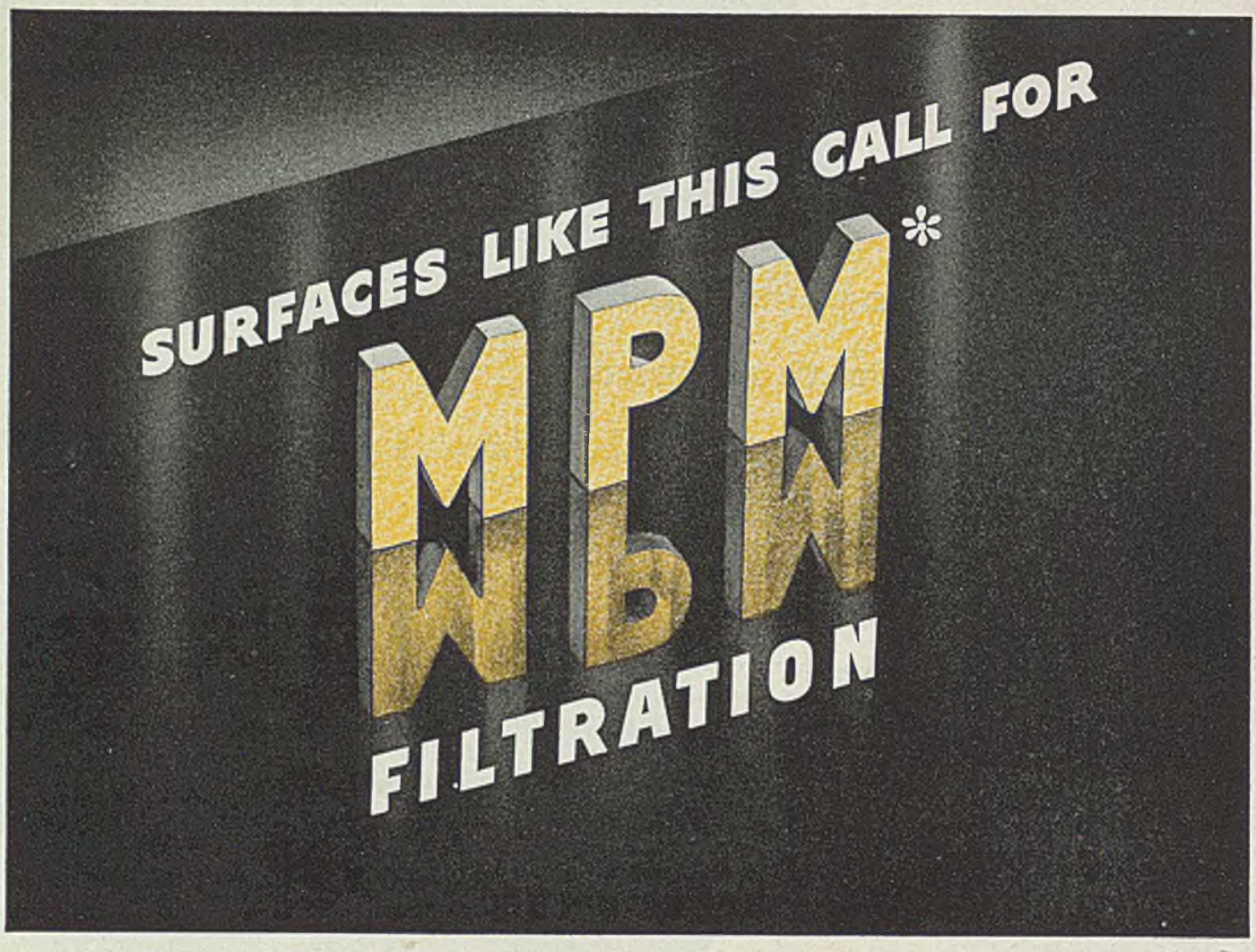

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MORAINE PRODUCTS DIVISION OF **GENERAL MOTORS**
DAYTON, OHIO

Nitriding and Hardness

(*Continued from Page* 120)

bides and iron and alloy nitrides, and is influenced to a considerable extent by the structure of the steel.

When normalized steel is nitrided, considerable variation in hardness can be expected according to the mass of the part at the time of air cooling for normalizing. In the normalized condition the 1 and 3 per cent chromium-molybdenum steels and the 2 per cent chromium-molybdenum-vanadium steel used in this investigation (in the small sections that were used for normalizing) had structures that were typical of alloy steels that had been cooled at a rate slower than the critical, but too fast for the formation of pearlite—the so-called "intermediate structures".

A few of the specimens of steels M2530 and 61630 have been examined microscopically. In the normalized condition the microstructure of the former consists mainly of an indefinite structure, etching rather readily, with smaller areas (associated with regions of micro-segregation) that have a marked acicular structure. The structure of normalized 3 per cent chromium-molybdenum steel was mainly acicular; after nitriding, the grain boundaries in the core of this steel were more clearly outlined than in the "as normalized" state. Massive ferrite was not observed to be present in the small normalized specimens of either steel. In the quenched condition the specimens were martensitic.

Structure Influences Hardness

The structure of a normalized steel can be expected to influence considerably the case hardness after nitriding, depending upon how nearly this structure approaches in fineness and homogeneity that of a quenched specimen. In the present instance, the time allowed during cooling has not been sufficient to permit appreciable diffusion of the constituents through the austenite, nor for the separation of ferrite. The structure of the steel is such that it might be expected to behave during nitriding in a manner similar to that of the fully-quenched material.

The quenched specimens which were nitrided without intermediate tempering really fall into the same class as the quenched and tempered specimens, for the rate of heating used in the nitriding experiments would permit considerable tempering to take place before reaction with ammonia commenced. The slight improvement in hardness that was found to accompany the use of high preliminary quenching temperatures may be explained by the more complete solution of the alloy carbides and the better diffusion of the alloy metals throughout the austenite. The better diffusion of the alloys should lead to a more uniform dispersion of the particles of alloy nitride. The low tempering temperature used may not have been without effect, as it would lead to a small proportion of the alloys being converted into alloy car-

bides, thus leaving more alloy available for nitride formation. At high tempering temperatures, the influence of preliminary hardening temperature may not have been as marked, but the authors have no evidence of this.

The influence of tempering temperature was the most interesting effect of preliminary treatment disclosed during the investigation, and, practically, the most important one. The difference between the behavior of the chromium-molybdenum and chromium-molybdenum-vanadium steels on the one hand, and the chromium-aluminum-molybdenum steel on the other, when nitrided after hardening and tempering at high and at low temperatures, possibly depends upon whether or not the special nitride forming elements are also carbide-forming elements. In the chromium-molybdenum and chromium-molybdenum-vanadium group, more and more of the special elements become locked up as carbides as the temperature is increased, leaving less available to form nitrides during nitriding. The aluminum of the aluminum-bearing steel is not affected in this way, all of it remains available for nitride formation. The chromium-aluminum-molybdenum steel contains carbide-forming elements also, but a greater proportion of the total nitride-forming elements remains free to form nitrides in this steel than in those of the other group.

An argument that might be put forward against this hypothesis is that, if the content of nitride-forming elements is depleted as the tempering temperature increases, then one might expect the difference between core hardness and case hardness to decrease as the tempering temperature increases, and it has been shown in this paper that this does not happen. Considerable doubt is cast on the validity of such an objection when the behavior of the aluminum bearing steel is recalled. Tempering this steel so as to produce considerable difference in core hardness did not affect the case hardness. In other words, in the presence of an approximately constant content of (available) nitride-forming elements, the maximum hardness developed during nitriding remains practically unaffected by variation in the core hardness of the hardened and tempered steel.

Booklet Describes Plastic Products

A 24-page illustrated booklet entitled "Bakelite and Vinylite Plastics" describes the many products of Bakelite Corp., 30 East 42nd, New York 17. Subjects covered include: molding and extrusion compounds; laminating plastics; sheets, sheeting, and film; rods and tubing; cast resins; glues and adhesives; bonding materials; coating products; impregnating, sealing and calendering materials; and special vinyl chloride-acetate resins.

This handbook also serves as a businessman's guide to thermoplastic and thermosetting plastics and is available from the editor of "Bakelite Review."

Number 9 of a Series: "Looking at the 5 essential things you never see in electrodes!"

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Utmost care in selecting raw materials precedes the manufacture of all "National" carbon and "Acheson" graphite furnace electrodes . . . electrodes that are strongly shock resistant, uniform in size, of high electrical conductivity, and that are consumed slowly.

Raw materials selection, however, is just one of *five* essential things you *never see* in electrodes. The others are manufacturing experience, manufacturing control, continuing research and customer service. You should insist on them all in electrodes. We welcome inquiries.

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Fire Control

(*Continued from Page* 123)

liquefied carbon dioxide under pressure of 850 p.s.i. at 70 degrees Fahr. Upon release, the gas instantly expands to about 450 times its stored volume flowing through shielded vent nozzles strategically placed near each hazard to prevent turbulence and to permit control of fire-extinguishing gas.

The cylinders, located in a supply room midway between the two cells and slightly to the rear of the control room, are manifolded in four frames. Ten cylinders deliver gas to either cell, with 10 as a reserve supply which can be diverted to either cell. The interior of one of these cells is shown here. For the oil and gas room and for control panels, one bank of four cylinders forms the primary discharge, with the other bank of four serving as a reserve for either of these areas. Each bank is operated by automatically controlled routing valves: 1¼-inch valves for each of the twin test cells; ½-inch valves for each of the two control panels; and 3/4-inch valves for the oil and gas room. A quick-acting lever valve is located in the cross-over line between cylinder frames, to shift control to the reserve supply of cylinders after the main bank has been discharged. Spring-loaded check valves control each of the four lines leading from the four banks of cylinders.

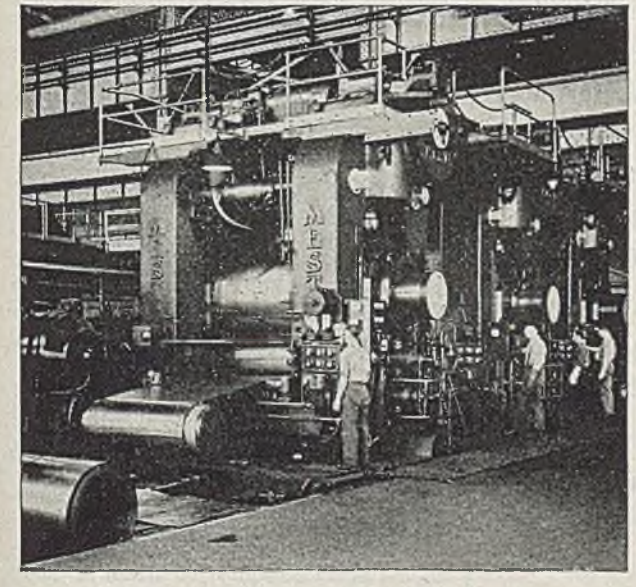
Pull Boxes in Control Room

Four pairs of remote-control break-glass pull boxes are located in the control room, one box in each pair operating the main supply of gas and the other operating the reserve supply. The entire system is both automatically and manually controlled. Two pull boxes which control the main and reserve discharges into the test chambers are located beneath each of the two control panels, within easy reach of the operators. Two pairs for the oil and gas room or the master control panels are attached to the wall, also within easy reach.

If fire should occur in either test chamber, there are three separate means of extinguishing it. The contents of ten cylinders are sent through six shielded nozzles located within the test chamber where a double hazard is presented by a maze of fuel lines feeding the engines and electric wiring connecting cell to control panel. This blanket of carbon dioxide quickly decreases oxygen content of the air from normal 21 per cent to as low as 15 or 14 per cent. In addition, the carbon dioxide floods the carburetor through vent nozzles so directed that the fuel flow stops immediately. Another vent nozzle opens directly on the air duct and automatically shuts off the blower system. If permitted to run, suction or pressure blowers would fan flames and spread fire.

Inherent hazard in the gas and oil distributing and storage room is quite different nature than that of the test chambers. Here the danger is the ignition of fumes. Pipes leading from storage tanks

Below - Three stand, 79 inch cold reduction mill on which Youngstown Enameling Sheets are cold reduced to required thicknesses.



THIS one-piece range top is an outstandingly successful job of deep drawing--as everyone who has seen it agrees.

With full credit to the skilled craftsmen who do the drawing and to the ingenious method they employ, the excellence of this product begins in the perfection of the sheet with which they start--a Youngstown Enameling Sheet.

Youngstown Enameling Sheets do the job, because their ductility and strength are exactly what a fabricator needs. They form into the desired contour, without buckling or straining. The fabricated part enamels without sagging or warping and the uniform surface takes and holds the enamel without imperfections, to result in a smooth, lustrous porcelain finish which helps so much the sale of the final product.

Youngstown Enameling Sheets will help you to put that wanted eye-appeal into your newly styled post war products, too. We are ready to work with you now. Your inquiry will receive our prompt attention.

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THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN 1, OHIO
Manufacturer of
CARBON, ALLOY AND YOLOY STEELS

Sheets-Pipe and Tubular Products-Plates-Conduit-Bars-Electrolytic Tin Plate-Coke Tin Plate - Rods - Wire - Nails - Tie Plates and Spikes - Alloy and Yoloy Steels.

QUALITY V YOUNGSTOWN SERVICE

carry highly inflammable high-octane gasoline and oil through mains to the oil and gas distribution room and thence to test cells. In this room consumption of oil and gas is measured by scales and temperature of oil is controlled. The gas and oil room, adjoining the control room, is separated only by three fire-glass doors which must be opened to admit workers. Flames originating at this point also would endanger the control room. To entirely isolate this room from other parts of the building in case of fire, a rise-of-temperature actuator is installed in the ceiling. At the outbreak of any fire this actuator sends an impulse which automatically operates the extinguishing system and pressure trips to close the glass doors as well as the louvres located near the floor below the glass doors. Contents of four 50-pound cylinders immediately are released through six shielded nozzles ranged around the wall. A blanket of carbon dioxide snuffs out the flame in a matter of seconds. A pressure-operated switch also, located in the oil and gas room, automatically shuts down either blower unit that is in operation at the outbreak of fire.

All test cell equipment is operated by remote control from two master control panels facing cells. In addition, the control room contains gages located on both sides and above windows facing cells. Fire occurring behind control panels might, of course, cripple operation of the test cell. Heat actuators are strategically placed so that any fire occurring out of sight behind the panels will result in the automatic release of the contents of four 50-pound cylinders through three shielded nozzles behind each panel, which deliver the smothering blanket to extinguish the fire within seconds. A reserve bank of four cylinders, manually operated, is available in case of emergency.

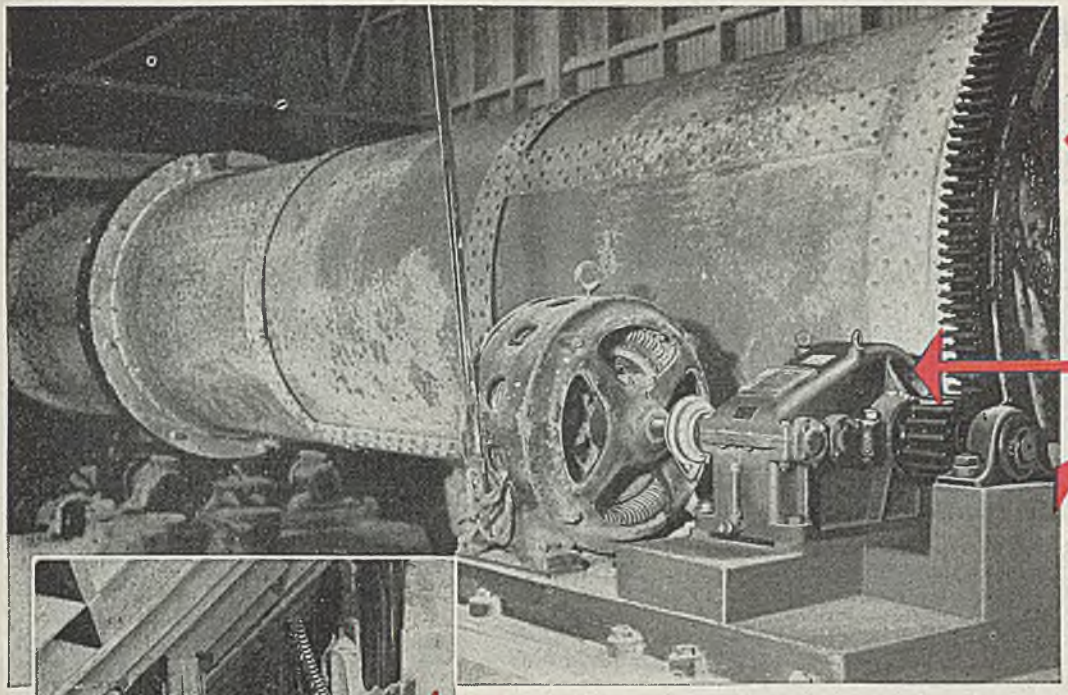
Booklet Describes Dual-Fuel Burning Systems

A full color bulletin listing advantages of dual-fuel burning systems has been made available by North American Mfg. Co. 2910 East 75th street, Cleveland 4. It contains detailed drawings showing operating features of typical installation.

According to the company, system uses any fuel oil or gas of 500 B.t.u. and higher; fuels can be changed without changing piping or burner inserts; fuel-air proportions automatically are maintained at all size fires; no steam or compressed air is required; burns both gas and oil at same time with automatic proportioning; one air valve controls amount of fire, either gas or oil.

—o—

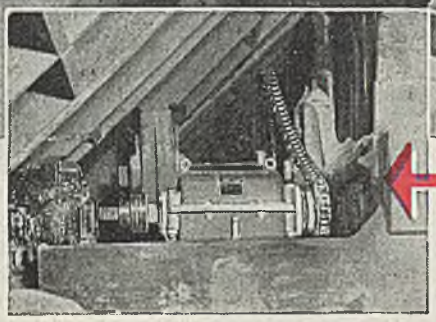
An illustrated booklet, GEA-4220, entitled "Seam-Welder Controls for Resistance Welding Machines" is available from General Electric Co., Schenectady, N. Y. It contains information on seam-welder controls, including tables, as well as the advantages of the various types.



Link-Belt ring gear and pinion furnish final drive to rotary kiln.

Link-Belt herringbone gear speed reducer is direct-connected to motor; low speed shaft, carrying pinion, is supported by . . .

Link-Belt roller bearing pillow block.



Link-Belt herringbone gear speed reducer, coupled to motor. Final reduction through Silverlink roller chain, to bucket elevator.

Link-Belt No. 5, Type B Coupling.

Cuts Maintenance 90%

WITH LINK-BELT SPEED REDUCERS!

OPERATING in a continual blizzard of pulverized limestone, these and several other Link-Belt herringbone gear speed reducers have been doing their 10 hours-per-day, year-in-and-year-out, with only the least attention, and no sign of trouble. In fact, the Waukesha Lime and Stone Company, in whose plant they are installed, states that maintenance has been cut "at least 90%," compared to the older type of drives they replaced on this equipment.

Link-Belt manufactures practically every type of speed reducer, and can recommend the type and size for every application. Let Link-Belt power transmission specialists help *you* to make your plant more efficient, reduce *your* maintenance!

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in principal cities.

LINK-BELT SPEED REDUCERS

Open-Hearth Combustion

(*Continued from Page* 124)

mixture leaving the burner should be high enough so that the ignition velocity is less than the velocity of the mixture and remains so until the mixture has reached a point at least 12 inches from the burner opening. This will protect the wall from which the burner extends and will cause the combustion reaction to take place at a fairly high rate, since the velocity of the mixture as it impinges on the bath will be converted into a pressure that will increase the rate at which the combustion takes place and, therefore, increase the rate at which heat units are liberated.

Since the distance between the flame and the bath influences the rate of heat transfer, it is well to confine the flame between the surface of the bath and a plane parallel to it to not more than 18 inches above the bath and preferably less than 12 inches above the bath. To keep the flame within these limits, it is necessary to use several locations and several individual burners.

Flame Swirls Toward Burner

When a flame impinges upon a surface at an angle of over 22 degrees, a certain portion of the flame swirls back toward the burner, the proportion of swirl depending upon the angle at which the flame impinges upon the surface. The angle between the centerline of the burner and the bath, therefore, is limited to a maximum of 15 degrees to take care of the flame expansion.

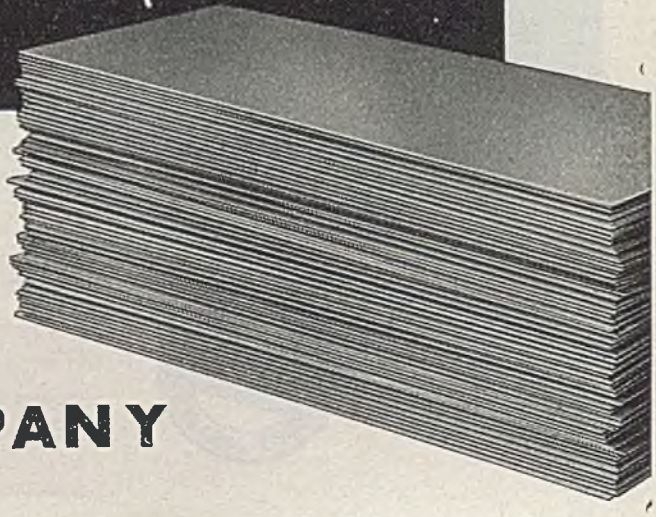
For controlled operation, it is also important to have a constant B.t.u. input per burner. To do this it is necessary to develop a method safer than constant pressure and an orifice, since temperature affects the viscosity of a fluid and therefore with a constant pressure the orifice capacity varies with viscosity. Although valves are necessary in the fuel line, it is preferable to have only such valves as are completely shut off or are completely open. Instead of controlled pressure, it is preferable to use a constant volume input instead of a valve, either on the individual burners or on the complete system. This is readily done by using a constant-speed motor, a variable-speed transmission and a pump (preferably with no slip or a known slip), then by regulating the speed of the pump, which delivers a set volume per revolution, a constant B.t.u. input is assured.

Another source of difficulty in the open hearth is the fact that steam is used to comminute fuel oil. Although the total number of heat units added to the furnace is slightly greater because of the heat in the steam, the available B.t.u. for transfer to the bath are decreased because the steam leaves the furnace at a much higher temperature than that at which it enters and, further, before combustion and during combustion it decreases the concentration of oxygen in the combustible mixture and lowers the flame temperature. Unfortunately, in the furnaces so far developed, where efforts

It WELDS Perfectly

Sheared STEEL PLATE

by WORTH



We manufacture Sheared Steel Plates subject to Navy Department specifications. . . . U. S. Navy Department hull and boiler steel. . . . Tank and structural steel. . . . Marine, pressing and flange steel. . . . Ordinary fire-box, still bottom and locomotive fire-box steel. . . . Hull plates to American Bureau specifications.

WORTH STEEL COMPANY

CLAYMONT, DELAWARE

New Powerful

ENGINEERED FOR

TYCOL NO-RUST-OLS

Tycol No-Rust-Ol "D" conforms in all respects with the requirements of the U. S. Army Ordnance Department specification (AXS-674 . . . Revision #2) for a "Medium Preservative Lubricating Oil".

No-Rust-Ol "E" meets U. S. Navy Specifications (OS-1362) for a "Light Preservative Lubricating Oil", and may be used for the protection of equipment manufactured and fabricated where corrosion from moisture and salt water spray may occur.

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DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned promptly.

INDUSTRIAL TYCOL OILS-GREASES

Rust Preventive

EASY APPLICATION

on ALL metal surfaces

Machine tool operators can now prevent or greatly reduce surface rust formations on valuable machines — small parts prior to assembly — and finished products — thanks to NEW Tycol No-Rust-Ols.

These new Tycol products are light-bodied oils with extremely powerful rust-preventive properties. Due to their low viscosity and low pour, they lend themselves readily for use at all temperatures — by spraying, brushing, swabbing or dipping. Compounded from the finest mineral oil base, No-Rust-Ols do not dry to a wax-like coating, thus they can be readily removed by simple degreasing operations.

If moisture is present — whether it be from excessive dampness in indoor storage, or mild "sweating" met during factory handling, call or write your nearest Tide Water Associated office for complete facts about the "rust protection" afforded by new Tycol No-Rust-Ols.

POUR POINT FULLY EXPLAINED IN TIDE WATER "LUBRICANIA"

This informative handbook gives clear, concise descriptions of the basic tests to determine important lubrication properties — Pour Point, Viscosity, Neutralization Number and many others. Send for your FREE copy today. Write: Tide Water Associated Oil Co., 17 Battery Place, New York 4, N. Y.

ASSOCIATED OIL COMPANY

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have been made to correct the combustion by furnace design, the steam has served a very necessary purpose. It has decreased the flame temperature and therefore has protected the brickwork. It has also lengthened the flames, so that the bath could be fairly well covered with flame slightly above the temperature of the bath. To protect the refractories, the temperature level of the flame was deliberately lowered, and so was the rate of heat transfer.

By controlling the combustion at its source instead of directing the flames by the brickwork, the refractories structures can be simplified, although the combustion system will become complicated. By the suggested change there would be little, if any, saving of fuel per ton of steel compared with the present practice,

New Flat Ground Steel Stock Is Non-Deforming

Simonds Worden White Co., Dayton, O., has developed a new nondeforming flat ground steel for use in making accurate jigs, gages, fixtures, tools, punch and die facings, and small precision parts.

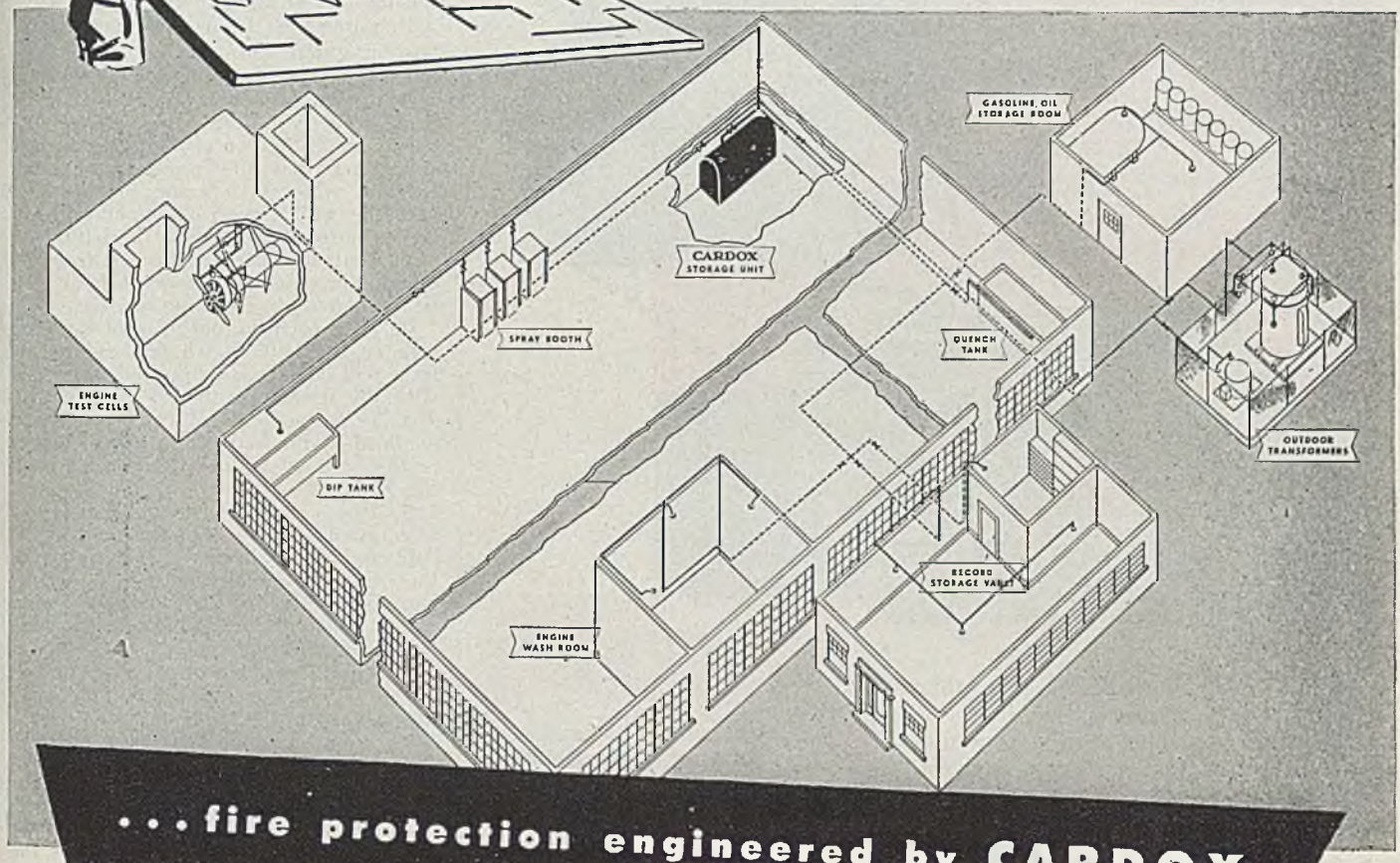
It is said that this steel, designated as Air-Tru, eliminates well over 75 per cent of all deformity formerly encountered in hardening flat ground stock. In a series of three tests, specimens were machined into shapes most likely to distort in heat treating. The specimens were quenched in air from 1450 to 1475 degrees Fahr. and tempered for 15 minutes at 400 degrees Fahr. Distortion was negligible, and cracks and breaks were entirely absent. The specimens had rockwell C hardness of 60-62.

but there would be an increased rate of heat transfer and, therefore, more tons of steel per hour per furnace. With the same refractories, the cost of refractories per ton of steel would vary with the rate of steel production. At the present rate of production per furnace, with the suggested system the cost of refractories per ton of steel produced would be materially reduced. The rate of steel production probably will be influenced mainly by the cost of refractories per ton of steel.

With the proper combustion system, it is possible to use either the reversible checkers that are now installed, with more frequent reversals, or it is possible to replace the checker chamber with recuperators and have a one-way furnace.

A clear and concise statement of the combustion problem in the open-hearth furnace, therefore, is a development of a combustion system in which controlled amounts of fuel are burned with controlled amounts of air in a controlled space in the open-hearth furnace at the highest possible temperature levels and with the flame distributed over the bath in such a manner that there is a minimum

THE BEST LAID PLANS *Include...*



...fire protection engineered by CARDOX

Inexpensive carbon dioxide is widely recognized as the ideal fire extinguishing medium for a wide variety of fire hazards. It is fast, non-damaging and inexpensive.

But, where a few pounds, properly applied, will stop one fire, another may call for *tons* . . . all released in the fire zone in a matter of *seconds!*

Through Cardox methods of control and engineered application the multiple advantages of carbon dioxide . . . supplied instantly in *pounds* for small fires, in *tons* for large ones . . . are given enhanced performance and greatly broadened scope of usefulness.

A Cardox System—engineered for the specific hazards it covers—extinguishes fires by a timed *mass* discharge of Cardox CO_2, stored at 0°F. and 300 p.s.i. in a single storage unit of ¼ to 125 ton capacity. Thus, an ample quantity of liquid carbon dioxide is available for mass application at high rate for large critical areas or for multiple hazards . . . *with ample reserves for new emergencies.*

Cardox CO_2 has uniform extinguishing characteristics regardless of plant or atmospheric conditions. Cardox applications can thus be most effectively engineered in accordance with individual hazard requirements . . . even in the case of a combination of hazards as unusually diversified as those shown in the schematic view above.

Executives now developing post-war building plans are invited to draw on the Cardox Research Division and Engineering Staff for practical cooperation in planning fire extinguishing facilities engineered for maximum protection of the specific hazards involved.

CARDOX CORPORATION
BELL BUILDING • CHICAGO 1, ILLINOIS
District Offices in
New York, Washington, Detroit, Cleveland, Atlanta, Pittsburgh, San Francisco, Los Angeles, Seattle

Cardox CO_2 is supplied instantly in pounds or tons from a single Storage Unit containing 500 pounds to 125 tons at controlled low temperature of 0°F. and 300 p.s.i.

CARDOX
CO_2 FIRE EXTINGUISHING SYSTEMS

temperature gradient from one part of the bath to the other. The combustion must be controlled so that the maximum flame temperature is attained at all times and at a predetermined and absolutely controlled rate; that the distance between flame and the bath must be minimized to the absolute limit; that the products of combustion do not come into contact with any brickwork until all the heat transfer to the bath is completed; and, finally, that there be no back swirl in the flame to dilute the flame and to injure the burners or the brickwork.

Requirements for an efficient combustion system are:

1. A design of a burning system by which maximum heat transfer can be made directly to the bath without dispersion or dissipation of the flame in such a manner that the products of combustion, when they come into contact with the wall, are at a temperature too low to transfer any heat to the bath.

2. That the burners be so arranged that any predetermined type of flame may be regulated readily and quickly.

3. That each burner control a given area on the bath in which the heat release will be exceedingly rapid compared with the usual open-hearth practice.

4. That the flame of each burner be confined by the bath and a plane parallel to the bath at a minimum distance from the bath.

5. That a constant volume of fuel and a constant volume of necessary air be delivered to each burner in such a manner that the variation in the amount of fuel and the amount of air per second, and not per minute or per longer interval, be as small as possible.

6. That these objectives can be attained without the necessity of alternating the fuel flow.

7. As an ultimate objective, a one-way furnace using a recuperator instead of reversible checkers.

8. That the direction of the flame be perpendicular to the length of the furnace to decrease the carrying capacity of the products of combustion for dust and that they act as a flexible baffle to prevent direct gas flow over the furnace to the uptakes.

9. That the length of the flame be limited to a fraction of the width of the furnace.

Advantages of this system are:

1. The maximum fuel efficiency.

2. Simplified heat transfer per unit of time.

3. Simplified furnace construction—no monkey walls, no knuckles in the roof, larger uptakes and no throat in the furnace, probably a lower roof without knuckles.

4. Quicker heat transfer during melting down period and, therefore, a real saving in furnace time.

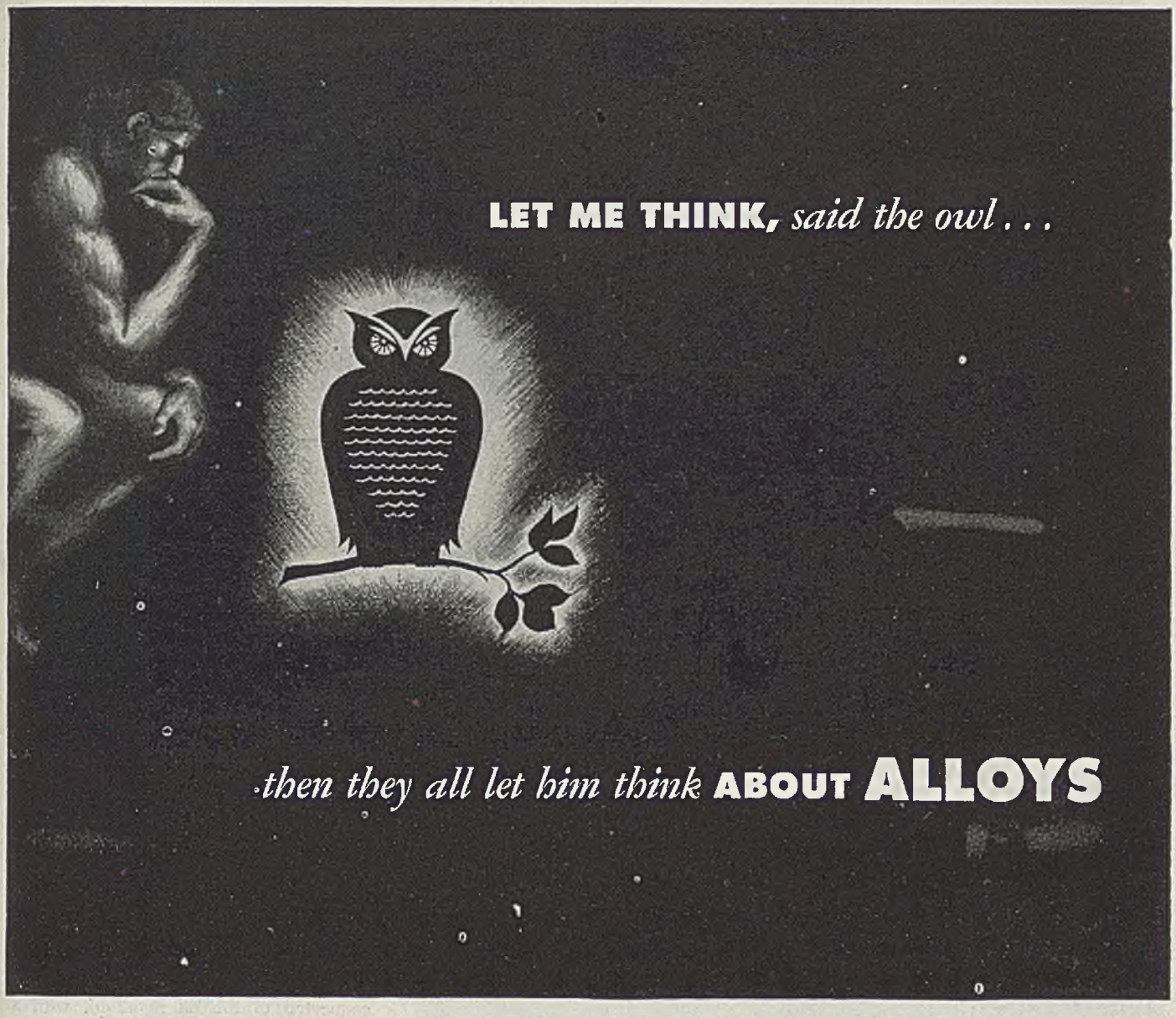
5. Higher slag temperatures and, therefore, quicker refining, or less time required for refining.

6. Better control of the temperature of the bath without increasing the temperature of the walls or roof.

7. Rapid regulation of the rate of heat exchange.

8. Rapid melting of scrap from the bottom.

Preheated Air.—Since all the preheated air enters the furnace through the burners in which the mixing takes place with the



Experience in wartime will have its values for the period to follow and all the newly developed possibilities of alloyed metals are not likely to be forgotten. When our swords are beaten into plowshares and our spears into pruning hooks, the same elements that gave matchless quality to war weapons will do likewise for the implements of peace.

It is only because they were indispensable for war that certain alloys have been withheld from civilian use and alternative materials have for the moment been made to serve. Each will find its own place before long and whatever may be said of other things it is clear that alloys will claim not only larger but more discriminating employment.

The uses of Molybdenum, Tungsten, and Boron in their various forms and combinations are described in the literature of the Molybdenum Corporation. Correspondence is invited.

AMERICAN Production, American Distribution, American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.
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MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

fuel with turbulence and high velocity, a duct is provided to carry the preheated air from either checker chamber in a reversible furnace or from the recuperator in a one-way furnace to the preheated air manifold from which the secondary preheated air enters the secondary air pipe in which the fuel source is located.

The quantity of preheated air is controlled either by a damper or by the speed of the fan.

Fuel System —The fuel system consists of a constant-speed motor connected to a variable-speed transmission, which is connected to a constant-slip fuel pump, so that the only control of the volume of oil fed to the oil manifold is the number of revolutions of the pump. The fuel input, therefore, is independent of pressure, temperature or viscosity between reasonable limits. A telltale pressure gage is placed on the fuel manifold between the pump outlet and the first burner, so that the cleanliness of the burner system can be determined by the position of the pointer on the gage. If a burner tip becomes dirty, the pressure required to force the oil through the remaining burners increases but the total volume of oil delivered to the furnace does not vary. A dirty burner, therefore, is not serious and does not influence or change the amount of fuel fed per unit of time. All valves are either wide open or completely closed, so that if it is desired to determine whether an individual burner is dirty or clean, it is only necessary to close the oil valve on the particular burner and note the position of the pointer on the gage. If the pointer does not move, the burner is dirty.

Burner Placement —The burners, consisting of a secondary air pipe connected to the preheated air manifold, a burner tip placed within the secondary air pipe connected to the oil manifold, with a high-pressure primary air manifold to subdivide the oil, are placed in the piers between the furnace doors and in the backwall in such a fashion that the frontwall burners and the backwall burners are staggered in reference to each other. They are set at 15 degrees to the bath and are placed above the bath. The more burners used, the shorter the flame for the same amount of fuel.

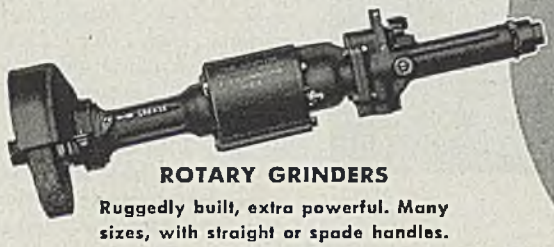
It is apparent from the foregoing discussion that the rate in tons per hour at which an open-hearth furnace can operate depends upon:

1. The difference in heat level between the flame and the bath; the heat transfer varies with the difference of the fourth power in absolute temperatures. For maximum efficiency, the temperature of the products of combustion should be as near as possible to the temperature of the bath.
2. The actual flame temperature, which should approach as nearly as possible the theoretical flame temperature.
3. The distance between the flame and the bath, since the heat transfer varies inversely with the square of the distance between the flame and the bath.
4. The rate at which the particular fuel can be burned, which depends upon the ignition velocity under the specific conditions.

CLECO TOOLS

for

TODAY'S JOB *and* TOMORROW'S



ROTARY GRINDERS

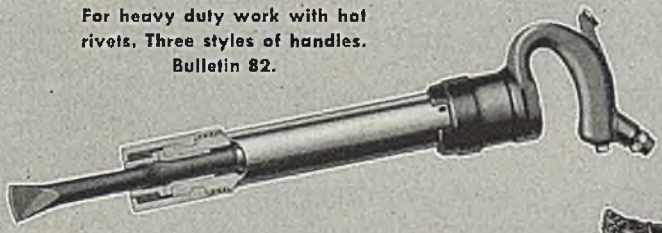
Ruggedly built, extra powerful. Many sizes, with straight or spade handles. Bulletin 80.

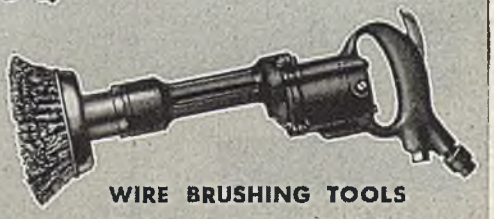
RIVETING HAMMERS

For heavy duty work with hot rivets. Three styles of handles. Bulletin 82.

RIVET BUSTER

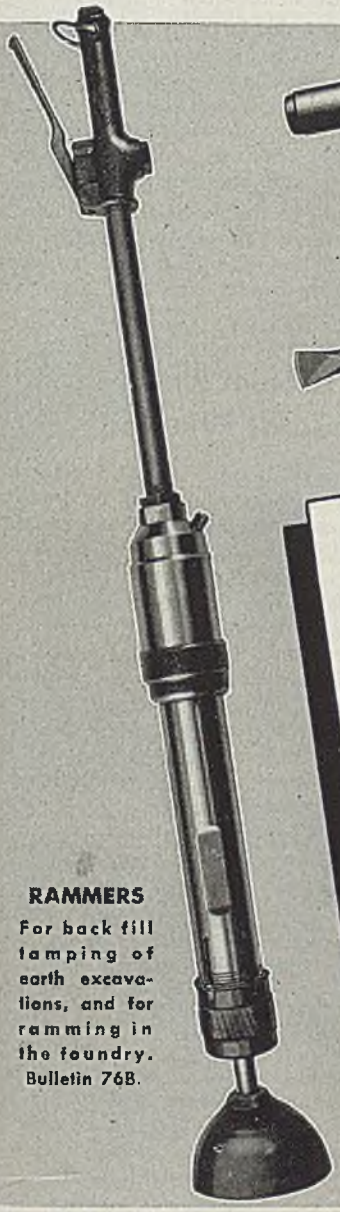
To cut off rivet heads, break down walls, drive spikes and small drift bolts. Bulletin 82.





WIRE BRUSHING TOOLS

Husky rotary machines, used with radial wire brushes or cup wire brushes. Bulletin 80.



RAMMERS

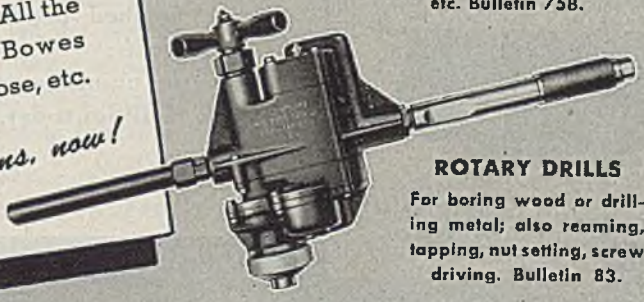
For back fill tamping of earth excavations, and for ramming in the foundry. Bulletin 76B.

• Need tools for war work now? Or are you planning your requirements for post-war jobs? . . . The complete Cleco line offers the *right* tool for many major operations. Fast workers, that take it easy on air consumption, Cleco Tools are the product of over 50 years experience in this field . . . All the accessories, too — Bowes Couplings, valves, hose, etc.

Write for Bulletins, now!

SCALING TOOLS

Handy hammers for cleaning paint, weld splash, scale from metal surfaces, etc. Bulletin 75B.



ROTARY DRILLS

For boring wood or drilling metal; also reaming, tapping, nut setting, screw driving. Bulletin 83.

THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77TH STREET • CLEVELAND 5, OHIO

Branch Offices in All Principal Cities

Carbide Milling Practice Is Explained by New Book

Cincinnati Milling Machine Co., Oakley, Cincinnati 9, announces publication of a textbook entitled, "Recommendations for High Speed Carbide Milling". This 12-page, 8½ x 11-inch book contains the boiled-down experience of this company's engineers, research and tooling specialists as to speeds, feeds, cutter angles, choice of carbide grades for efficient metal removal through application of this up-to-date milling technique.

Step-by-step directions as to what to do and what not to do are presented, along with tables, formulas and diagrams giving necessary details for carrying out each recommended step in connection with various materials under various methods of cutting.

Among the 19 main subjects covered are: Machine selection and adjustment; use of flywheels; direction of feed; how to attain rigid mounting of work and cutters; how to set work, cutter and machine; and use of fluids and air as coolants and for chip clearance.

Copies of this book are available free of charge to those who identify themselves as being entitled to it by sending formal requests on their company's letterheads.

ASTM Steel Piping Standards Released

A compilation of "ASTM Specifications for Steel Piping Materials," as developed by Committee A-1 on Steel, again is offered by American Society for Testing Materials, 260 South Broad street, Philadelphia. The 337-page handbook on widely used standards in this field is dated December, 1944, and is priced at $2 per copy, with reduced prices on quantity orders. Emergency alternate provisions have been issued for many of the standards, and these are bound in the back of the compilation. Specifications are grouped as follows:

Pipe: Welded and seamless, black and hot-dipped, electric-fusion-welded and electric - resistance - welded, spiral welded, high-temperature and high-pressure service pipe, welded wrought-iron, welded alloyed open-hearth.

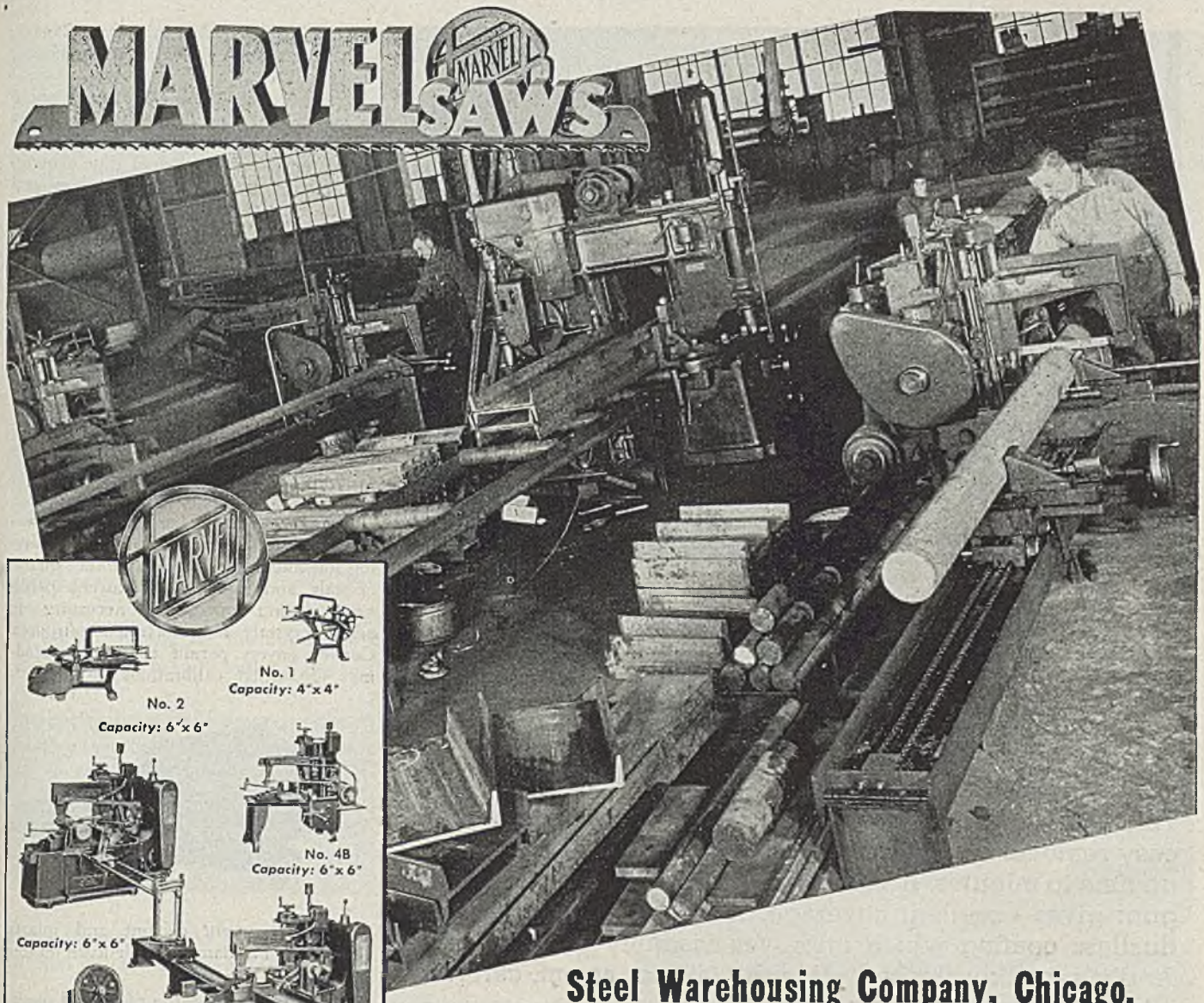
Boiler, Superheater, and Miscellaneous Tubes: Lap-welded and seamless, electric-resistance-welded, medium-carbon, high-pressure tubes, copper brazed steel tubing, stainless steel tubing (austenitic and ferritic) for general service, seamless and welded austenitic for the dairy and food industry.

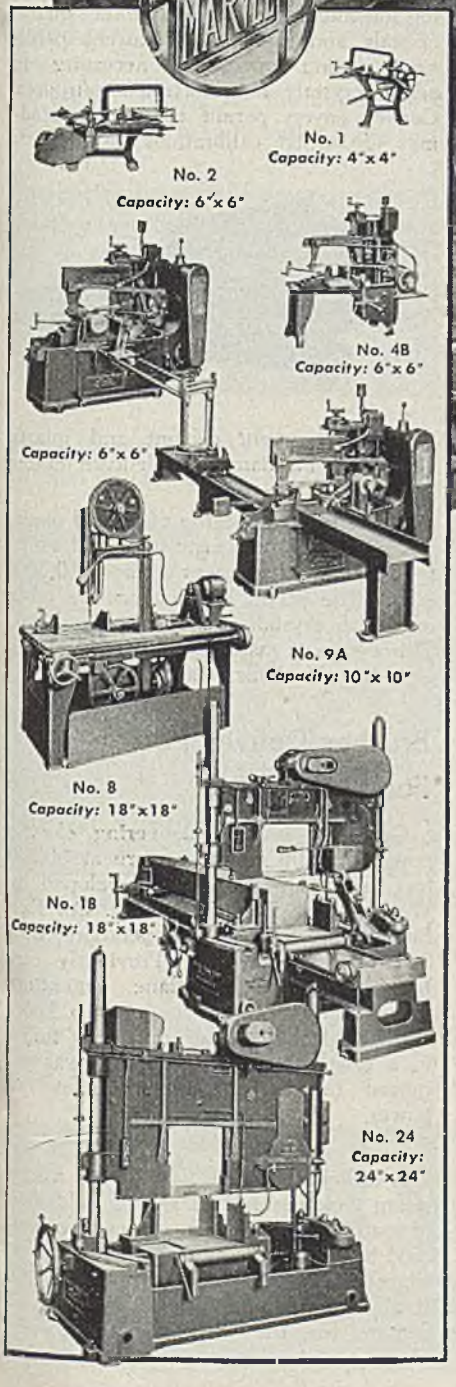
Still Tubes for Refinery Service: Seamless low-carbon and carbon-moly, seamless austenitic still tubes, etc.

Heat-Exchanger and Condenser Tubes: Seamless cold-drawn low-carbon, and intermediate alloy steel, and electric-resistance-welded steel.

Castings: Carbon steel for miscellane-

MARVEL SAWS





Steel Warehousing Company, Chicago, Features Prompt Delivery

Pieces or lengths cut from bars, tubes or structural shapes can be delivered promptly by this steel warehouse, because they have the MARVEL Saws to handle any cut-off job. Three No. 9A MARVEL Automatic Bar Feed Saws (capacity 10" x 10") which automatically feed, measure and cut-off identical lengths or slices (as gear blanks) from single or nested bars at terrific speed. The fastest hack saws built—these automatic saws require no more operator attention than an automatic screw machine. They are extremely accurate, too, and can be stopped any time in a quantity run, a miscellaneous cut made, and automatic operation resumed by simply re-engaging the bar push-up.

Structural shapes up to 18" and large bars of equal diameters are saw-cut on the No. 18 MARVEL universal Roll Stroke Hack Saws. Cuts are accurately "square" and clean with practically no burrs. This modern saw which is completely armoured to stand the rough handling unavoidable where large work is done, introduces the new roll-stroke principle which enables it to cut-off the toughest steel in the largest sizes rapidly and with extremely long blade life.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE **CHICAGO 39, U. S. A.**

Eastern Sales Office: 225 Lafayette St., New York 12, New York

ous industrial uses and for valves, flanges, and fittings for high-temperature service, alloy-steel, etc.

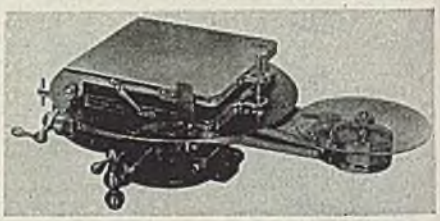
Forgings and Welding Fittings: Forged or rolled steel pipe flanges for high-temperature service and for general service, forged or rolled alloy-steel pipe flanges, and factory-made wrought carbon and carbon-moly welding fittings.

Bolting: Alloy-steel for high-temperature service and for service from 750 to 1100 degrees Fahr., carbon and alloy-steel nuts for high-pressure and high-temperature service, and heat-treated carbon-steel bolting material.

Grain Size: Austenite grain size in steels.

Plastic Cover Protects Gear Cases in Cutting

Gear case covers of methyl methacrylate resin, shown in the accompanying illustration, are used to protect quartz crystals and mechanisms during precision cutting operations necessary to adapt crystals for electronic purposes. Convex covers permit continuous readings of vernier calibrations during cutting, and prevent coolant and quartz abrasive from damaging delicate cutter parts.



Lucite is used because of optical qualities, freedom from distortion, and ability to maintain tolerances within 1/10,000-inch. The plastic part covers the table on which crystals are oriented and cut. This device is made by Robert H. Clark Co., Beverly Hills, Calif.

Brushes Deliver Power For 200 Hours

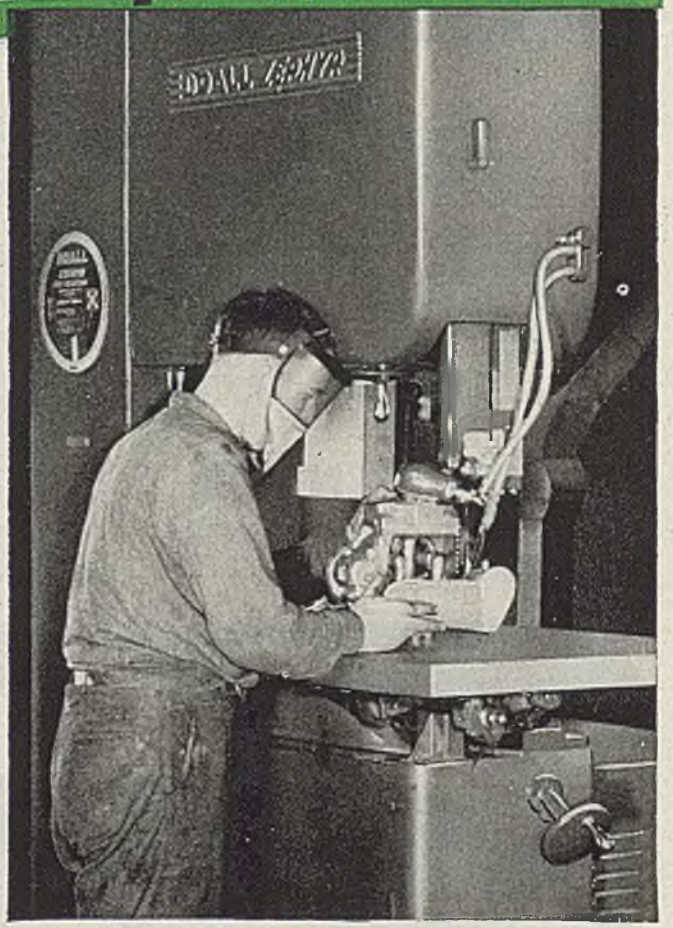
Generator brushes delivering electric power for 200 hours or more at 30,000 feet in the air have been developed by Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa., in co-operation with Stackpole Carbon Co. Previously carbon brushes for airplane generators were wearing out in one or two hours at high altitudes, and sometimes failed in a few minutes if generator was required to deliver large amounts of power.

—o—

A bulletin, No. 451, describing a new steam tank heater that speeds unloading of materials whose viscosity can be lowered by heating, is available from Brown Fintube Co., 160 Filbert, Elyria, O. It also gives dimensions and weights of heaters for use with tank cars and trucks.

DOUBLE SPEED SMOOTH AND EASY with DoALL Zephyr

CUTTING NON-FERROUS METALS PLASTICS, RUBBER, WOOD . . . .



Here's a machine every operator likes. Its performance is an attention holder every minute. Its speed is a real challenge—there's no waiting for the Zephyr to catch up. It travels just as fast as he cares to make it go, up to 12,000 r.p.m.

The 3,300 pounds of weight make the DoALL Zephyr practically vibrationless when cutting the tough new metals, alloys and laminates used today for war production and in the future for civilian needs.

Your output can be doubled without extra effort. It's just a matter of increasing the speed and guiding the work.

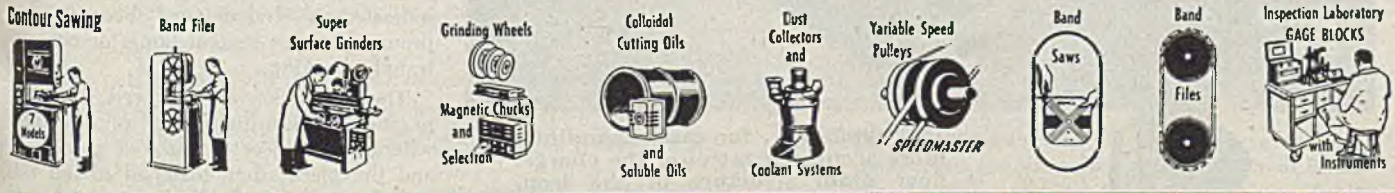
Want to see it work? Phone your DoALL man for a demonstration in your own plant, or write us.

Angle Cutting

Because of the 36" throat and tilting worktable, true angles are cut in 20% to 50% less time than by cut-off methods.

Send for Circular

Learn something about the remarkable performance of the DoALL Zephyr from our latest illustrated circular.



DoALL

INDUSTRY'S NEW SET OF TOOLS

CONTINENTAL MACHINES, INC.

1324 S. Washington Avenue • Minneapolis 4, Minn.

Sales & Service Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, El Paso, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Rockford, St. Louis, San Francisco, Seattle, Statesville, Syracuse, Toledo, Tulsa

Plastic Case Houses Motor Gears

Housing motor gears for retractable landing lights in a tough 3-piece plastic case manufactured by Plastic Research Products Laboratories for Grimes Mfg. Co. is a new development in U. S. Army aircraft. Gears raise and lower the antenna mast and adjust the landing lights. Plastic casing must be tough to resist the rugged usage and shock to which airborne equipment is subjected. High impact-resistant phenolic molding stock manufactured by Bakelite Corp., 30 East 42nd, New York 17, is used due to its high resistance to shock and light weight. Each integral part is carefully molded to retain required stability under service conditions.

New System Simplifies Wiring Diagrams

Wiring diagrams represent a major portion of the engineering time involved in making drawings for a switchgear installation. Methods of making these diagrams have varied greatly, with a trend toward simplification and standardization of circuits.

Full line diagrams with each circuit individually shown, and frequently including a full three-line primary circuit, were supplanted by diagrams where connections were grouped in functional or directional runs and individual leads were identified by coded markings.

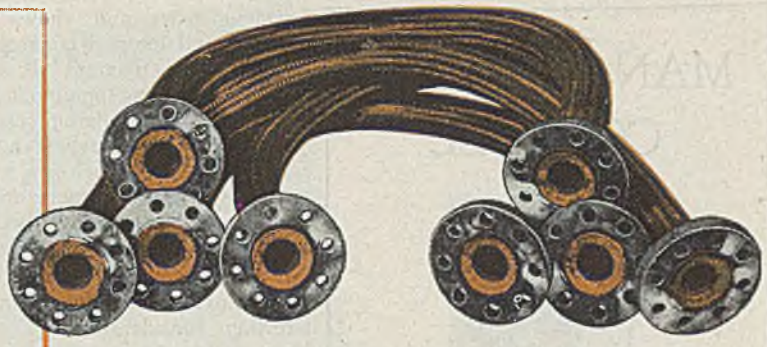
This latter system resulted in diagrams where individual circuits could be followed with comparative ease, but on installations involving several primary circuits, large, cumbersome drawings still resulted. In many cases these were cut into sections by the user to simplify their use, as the usual requirement of these drawings consisted of wiring or checking only a portion of the circuits involved. As these diagrams were made with the wiring grouped in a manner corresponding somewhat to the physical arrangement of the equipment, cutting into sections was easily done, but complete section identification was not obtained.

In an old-style drawing, the difficulty of tracing any individual relay or meter connection through the maze of wires indicated is obvious, and becomes too prominent after several hours of concentrated checking.

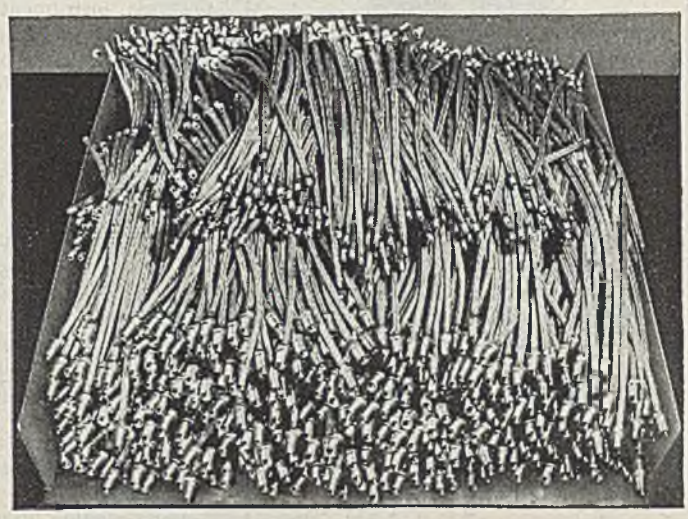
Then, a trick was borrowed from the practice of recording aerial photography where the subject is digested piecemeal and the pieces then matched to tell the complete story. Similarly a switchgear drawing scheme having separate diagrams for each component part of a switchgear unit was evolved. That is, separate drawings are made for the movable portion, fixed portion and swinging panel of each switchgear unit. An additional drawing, known as the "Master Wiring Diagram," serves as an index to the detailed drawings of the com-

Do You Build Bulldozers, Locomotives or PT Boats?

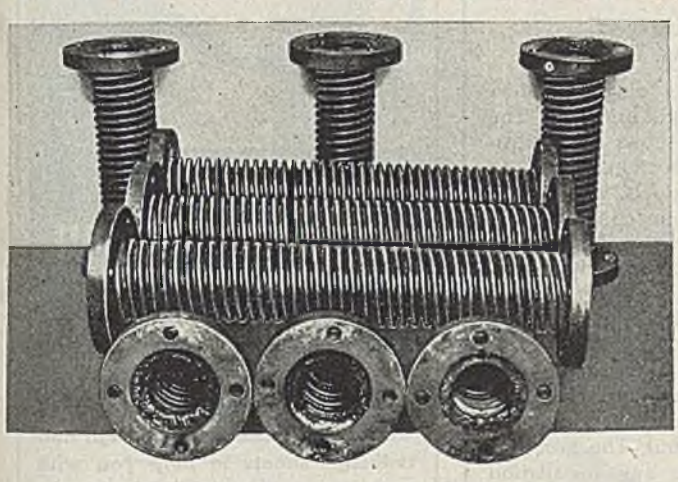
THESE TYPICAL APPLICATIONS MAY SUGGEST WHERE YOU, TOO, CAN PROFITABLY EMPLOY FLEXIBLE METAL HOSE AND TUBING



AIR STARTING LINES for locomotive diesels, involving pressures of 250 p.s.i., made of 2" I.D. bronze seamless tubing with bronze braid. Heavy duty steel flanges are Tobin Bronze welded.



HIGH-PRESSURE GREASE LINES for lubricating clutch release bearings on bulldozers and tractors, made of 3/16" I.D. TYPE M.P. steel hose, steel braid covered. Brass fittings are soldered on.

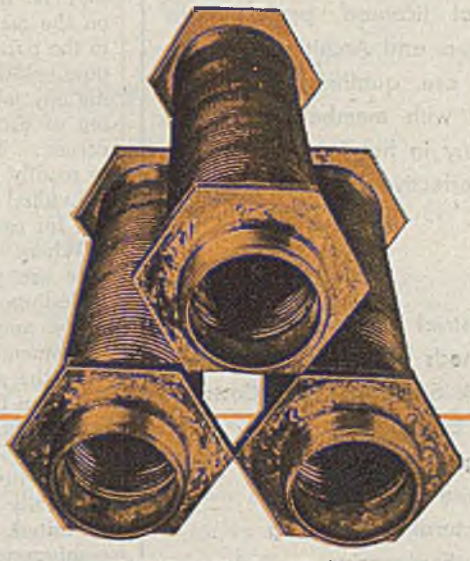


DIESEL EXHAUSTS absorb vibration, compensate for expansion and contraction. Made of 4" I.D. corrugated steel hose with welded flanges.

Gas, steam, liquid air, or grease connections which are constantly subjected to movement or vibration can cause endless grief. To make sure of top performance right from the start, use American Flexible Metal Hose or Seamless Flexible Tubing for all such connections.

"American," available in a wide range of sizes and types of construction, successfully meets almost any service requirement involving high temperatures, pressures, or severe abrasive or chemical action.

Bulletin No. SS-50, containing much useful information for manufacturers, engineers and machine designers, is yours for the asking. Write for it today.



WATER COOLED EXHAUSTS for PT boats also serve as vibration dampers to prevent line breakage. Made of 3" annular bronze seamless tubing with male fittings Tobin Bronze welded.

Keep faith with your fighters and yourself! . . .

Buy War Bonds for keeps

ANACONDA
from mine to consumer

American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • *In Canada:* ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

ponent parts and shows all external wiring and internal connections between units. This diagram shows all wiring of the switching equipment which must be done on installation, except in those few special cases where a portion of a unit, such as a panel or a superstructure, is removed for shipment or some similar reason. This drawing also carries complete identification as to adjacent units.

Each component may be checked with its drawing and then eliminated from further consideration.

A one-line diagram is normally provided for the entire installation. This drawing includes a list of meters and relays, with rudimentary schematic diagrams indicating the sequence of connection, instrument transformer ratios and polarity relationships. For complicated installations a full schematic diagram is made. Reference to the master diagram shows the external connections to be made on installation of the equipment.

Diagram Shows Wiring

The movable portion diagram shows all wiring on the circuit breaker. The fixed portion diagram shows the instrument transformer connections, leads to hinge wiring to the panels, and to the secondary wiring disconnecting contacts to the circuit breaker as well as wiring for incidental items such as limit switches, space heaters, etc., which may be included. The panel diagram shows all panel wiring.

Each section diagram is simple and easily read. In the cases of identical components, one drawing covers the wiring of more than one unit. The group of drawings required for any installation may be bound for reference, the index on the master diagram referring directly to the part drawing required for any purpose. Men wiring, modifying or checking any job need only refer to the drawing of the part in which they are concerned. This drawing is small enough to readily locate each lead and still have individual connections sufficiently spread out for easy tracing.

Where diagrams of the sectionalized type are provided, an instruction sheet including typical diagrams has proved to be ample for the use of engineers, draftsmen, wire men and inspectors.

In the short time this drawing system has been in use, according to Allis-Chalmers Mfg. Co., Milwaukee 1, the ease with which the complete wiring of metal-clad switchgear equipment can be methodically checked has been clearly demonstrated. With the new system, large cumbersome drawings with many tangled lines are no longer necessary.

—o—

A 54-page booklet describing heat treatment or cold working of stainless steels from extreme softness to high hardness is offered by Rustless Iron and Steel Corp., Baltimore 13. It includes discussion of techniques and purposes of each heat treating operation, data on methods of scale removal, and specific heat treating instructions.

How to Grind 48 EXTRA Minutes onto a clock face

Not once, but three times—if you are on a three-shift basis—and not with the unhappy expedient of overtime, either.

ELECTRO Grinding Wheels usually save 10% in cutting time (often more) *because they cut so much faster.*

Add to this higher cutting speed, their superior cutting ability with less "nursing" and less vibration, uniform and dependable quality and cooler-cutting . . . and you reduce the fatigue factor so that operators can maintain a higher average rate of production right up to the end of their shifts.

ELECTRO Grinding Wheels lift employee morale, revive operator's enthusiasm. They do it by working so fast so easy. Their heat resistance and rugged construction, command operators' confidence.

Why not phone us now for an ELECTRO Engineer's demonstration in your plant? Call Buffalo, N. Y., WAshington 5259.

K-305

Electro REFRACTORIES & ALLOYS CORPORATION

MFRS. • CRUCIBLES • REFRACTORIES • STOPPERS • ALLOYS • GRINDING WHEELS

344 DELAWARE AVENUE *Established 1919* BUFFALO 2, NEW YORK

Book Notes

Study of Aluminum in Postwar Markets

Aluminum, by Nathanael H. Engle, Homer E. Gregory and Robert Mosse; cloth, 480 pages, 6 x 9 inches; published by Richard D. Irwin Inc., 332 South Michigan avenue, Chicago 4, for $6.

This is an industrial marketing appraisal. It provides a study of the effects of war upon a basic industry, with special emphasis on the postwar outlook for aluminum. It provides a detailed analysis of aluminum production costs and covers the industry completely from raw materials to postwar markets.

Problems of the industry in its competitive relation to other metals, steel and magnesium, are analyzed thoroughly. A chapter is devoted to recommendations for public policy in a program for allocation of world bauxite reserves and proposed disposition of government-owned aluminum plants.

A bibliography and index complete the volume, with several appendixes containing material germane to the subject.

Wheeling Steel Industry Had Colonial Origin

Principio to Wheeling, by Earl Chapin May; cloth, 335 pages, 5¼ x 8½ inches; Published by Harper & Brothers, 49 East Thirty-third street, New York 16, for $3.

This is an addition to the slowly growing shelf of books based on the history of steel industry development in the United States. Other recent books of similar character are *True Steel*, a history of the American Rolling Mill Co., *Iron Brew*, dealing with the Lake Superior iron ore industry, *Iron Pioneer*, a biography of Henry W. Oliver.

Starting with Principio Furnace, established on the shore of Chesapeake Bay in 1715, and carrying the story down to the present, the writer links the two by numerous cords of family connection. An interesting sidelight on the Washington family is furnished by the fact that Augustine Washington and Lawrence Washington, father and half-brother of George Washington, were interested in iron ore mining and smelting in colonial Virginia and were associated with the owners of Principio Furnace in early iron production.

Mr. May has had access to many hitherto unknown original documents bearing on the origin and development of the steel district based on Wheeling and thus opened a new vein of historical interest. More than two centuries of iron and steel history are covered and the family tree of the Wheeling Steel Corp. is delineated.

Chapters on Wheeling and her business leaders furnish background of great interest and furnish a clue to the sort of men who pioneered and endured the hardships involved in the early days of development and the later days of changing products and competition.

Adding to the historical value of the volume is an index fully covering the subject matter and a halftone section containing likenesses of many of the key figure, ancient documents and scenes.

Guide for Management in Collective Bargaining

Management at the Bargaining Table, by Lee H. Hill and Charles R. Hook Jr.; cloth, 300 pages, 6 x 9 inches; published by McGraw-Hill Book Co. Inc., 330 West Forty-second street, New York 18, for $3.

Calling the turn on both good and bad practices in labor relations and introducing a forward-looking approach for management in the postwar period this book has been prepared by two younger members of the National War Labor Board. Lee H. Hill is vice president of Allis-Chalmers Mfg. Co., Milwaukee, and Charles R. Hook Jr., secretary and assistant to the general manager of the Rustless Iron & Steel Corp.

Both have negotiated union contracts in their own plants and as members of WLB have arbitrated disputes between labor and management. Much of the book deals with the content of the collective bargaining agreement and clauses are described which protect the union, management and employes.

It also deals with preparation for negotiation of a union contract, conduct of actual negotiations and the right and wrong way to present a case before the War Labor Board.

New Book on Aircraft Armament Covers Field

Aircraft Armament, by Louis Brichiss; cloth, 224 pages, 8¾ x 11½ inches; published by Aerosphere Inc., 370 Lexington avenue, New York 17, for $6.

Practically all important information on aircraft armament released thus far is presented in this work, though in time of war considerable data are under wraps for reasons of national security. The manuscript has been examined by government officials and approved for publication.

Much interest in military aircraft armament is shown by many individuals, equal to that in design and performance of aircraft itself. The author has written many armament articles for leading scientific and technical magazines and is an armament specialist with much knowledge and experience in this field in Europe and America.

The volume is profusely illustrated and has an adequate index.

IT'S UP TO YOU TO HELP MAKE 2=3 WITH...

A job for seasoned executives—this 7th War Loan! Especially when we've got to make 2 war loans total just about as much as all 3 in 1944! Putting this over demands the combined and *continued* efforts of the "No. 1" men of American industry.

This means marshaling your plant drive to make every payday—from now 'til June 30th—do its share toward the success of the 7th. Directing the drive is not enough. It's equally important to check to see that your directions are being carried out—intelligently!

For example, has every employee had:

1. an opportunity to see the new Treasury film, "Mr. and Mrs. America"?
2. a copy of "How To Get There," the new Finance Division booklet?
3. a new bond-holding envelope with explanation of its convenience?
4. 7th War Loan posters prominently displayed in his or her department?
5. information on the department quota—and an urgent personal solicitation to do his or her share?

Remember, meeting—and beating—your highest-yet 7th War Loan quota is a task calling for "No. 1" executive ability. Your full cooperation is needed to make a fine showing in the 7th! Do not hesitate to ask your local War Finance Chairman for any desired aid. It will be gladly and promptly given.

If you haven't a copy of this important booklet, "7th War Loan Company Quotas," get in touch immediately with your local War Finance Chairman.

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

THE BUSINESS TREND

Civilian Goods Output To Get Underway Soon

RECONVERSION of industry to production of essential civilian goods is expected to be well underway by the close of this year. Real hope is held for a substantial increase in raw materials supplies for the civilian economy over the coming months, while the indicated reduction in munitions requirements also should make available needed manpower and production facilities for the initial reconversion steps.

A big war production job for the Pacific theater, remains, of course, involving output of new equipment and the building up of storage depots for an all-out effort against Japan. However, the $4 billion monthly munitions production, generally considered necessary for the Pacific war, is an over statement of actual requirements, some observers believe. Now that V-E Day is past war contract cutbacks may be more pronounced than the 20 per cent predicted.

Steel production capacity is believed large enough to fight the war against Japan and take care of civilian reconversion requirements at the same time. Industry officials state that steel distribution can be handled through ordinary channels if all controls are removed, with the exception of priorities needed to take care of military needs.

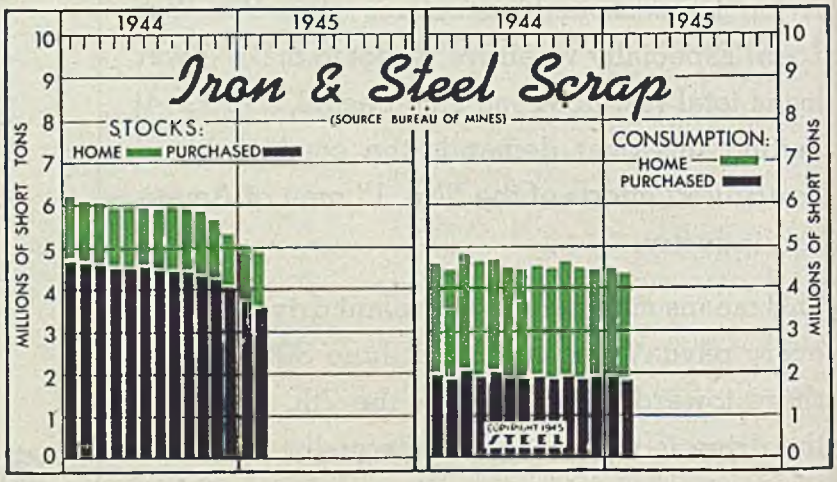
The automotive industry is drawing up production schedules for passenger car production over the next 11 months equivalent to 50 per cent of the industry's prewar normal output. The War Production Board has indicated it may lift restrictions on manufacture of farm machinery.

SCRAP—Stocks of iron and steel scrap at plants of consumers, suppliers and producers continued to decline during February, reaching the lowest level since June, 1942. Scrap inventories of 4,901,000 gross tons on Feb. 28 last, compare with 5,023,000 tons at the close of the preceding month and 6,134,000 tons on the same date last year. A decrease of 69,000 tons in stocks of purchased scrap held by consumers, and a decline of 71,000 tons in inventories held by suppliers and producers, were equally responsible for the loss in total scrap supplies during February.

STEEL FORGINGS—February shipments of steel forgings totaled 405,769 net tons, a decrease of 3 per cent from January output but remained 16 per cent above the 349,637 tons shipped in the like 1944 month.

Unfilled orders rose 11 per cent during February to 3,018,357 net tons, and represented an increase of 41 per cent over that recorded at the close of the same month last year.

Consumption of steel for forgings output in February totaled 543,984 net tons, against 555,992 in January.



Iron and Steel Scrap
Bureau of Mines
(Gross Tons—000 omitted)

	Consumers' Stocks			Total Consumption		
	1945	1944	1943	1945	1944	1943
January	5,023	6,214	6,877	4,507	4,616	4,492
February	4,901	6,134	6,871	4,209	4,414	4,178
March	.....	6,027	6,850	.....	4,827	4,787
April	.....	5,932	6,918	.....	4,629	4,642
May	.....	5,966	6,905	.....	4,683	4,723
June	.....	5,991	6,916	.....	4,460	4,493
July	.....	5,909	6,860	.....	4,423	4,670
August	.....	5,975	6,778	.....	4,533	4,686
September	.....	5,953	6,613	.....	4,471	4,657
October	.....	5,832	6,456	.....	4,684	4,830
November	.....	5,624	6,391	.....	4,527	4,581
December	.....	5,335	6,448	.....	4,487	4,449
Monthly Average	.....	5,908	6,740	.....	4,563	4,599

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	95.0	94.0	96.5	99.0
Electric Power Distributed (million kilowatt hours)	4,400†	4,416	4,322	4,234
Bituminous Coal Production (daily av.—1000 tons)	1,992	1,830	2,017	2,056
Petroleum Production (daily av.—1000 bbls.)	4,839	4,805	4,784	4,519
Construction Volume (ENR—unit $1,000,000)	$40.6	$32.3	$33.7	$41.9
Automobile and Truck Output (Ward's—number units)	20,470	20,045	20,645	15,635

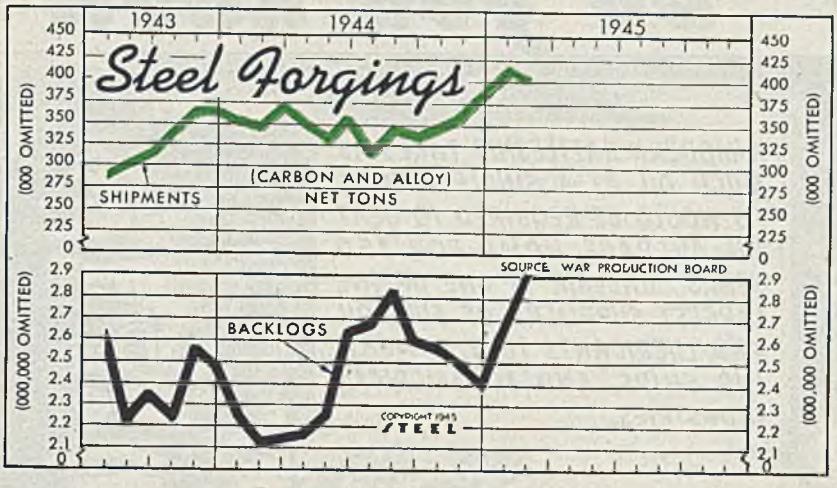
*Dates on request.

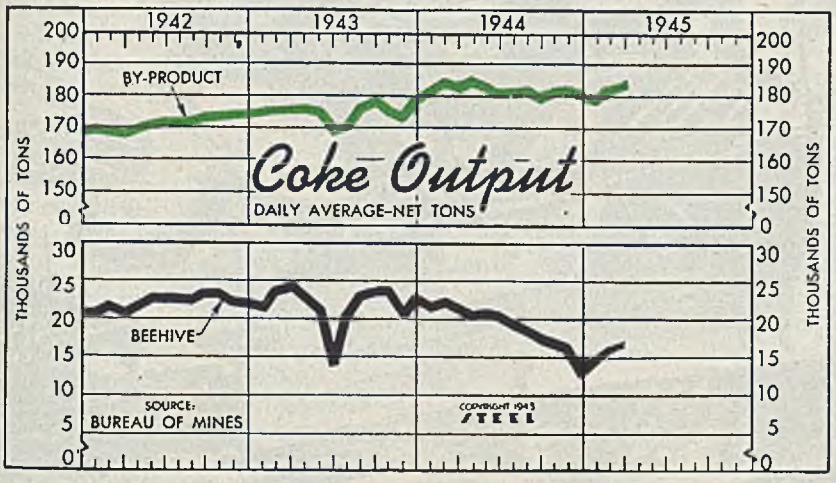
TRADE				
Freight Carloadings (unit—1000 cars)	900†	899	765	837
Business Failures (Dun & Bradstreet, number)	20	24	28	41
Money in Circulation (in millions of dollars)‡	$26,204	$26,074	$25,865	$21,614
Department Store Sales (change from like week a year ago)‡	+18%	+3%	+25%	−11%

†Preliminary. ‡Federal Reserve Board.

Steel Forgings
(000 omitted)

1945	Shipments	Backlog	Consumption
Jan.	417	2,723	556
Feb.	406	3,018	544
1944			
Jan.	355	2,256	521
Feb.	350	2,132	509
March	370	2,142	521
April	347	2,166	494
May	330	2,252	453
June	359	2,637	487
July	315	2,670	441
Aug.	341	2,821	483
Sept.	336	2,602	463
Oct.	348	2,564	488
Nov.	360	2,510	488
Dec.	377	2,408	506





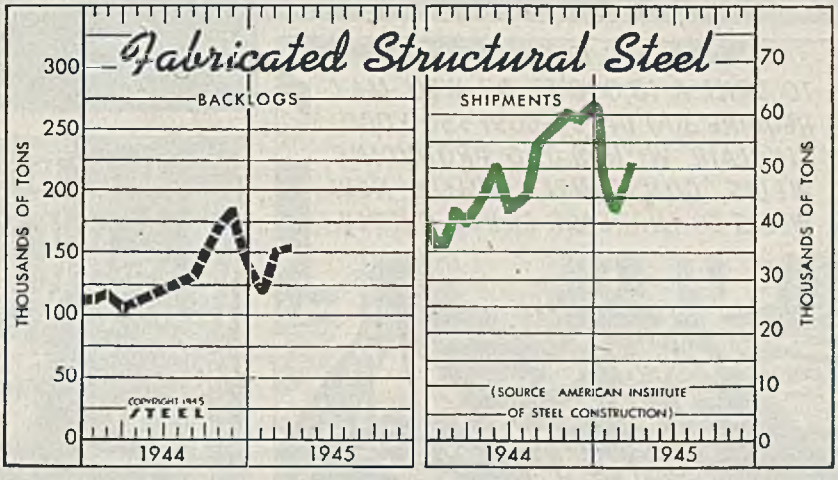
Coke Output
Bureau of Mines
(Daily Average—Net Tons)

	By-Product		Beehive	
	1945	1944	1945	1944
Jan.	179,879	181,501	14,745	21,933
Feb.	180,727	184,384	16,210	22,248
March	182,120	182,442	16,933	21,529
April	.....	185,259	.....	20,457
May	.....	184,071	.....	20,783
June	.....	181,891	.....	20,472
July	.....	181,506	.....	19,531
Aug.	.....	181,718	.....	18,572
Sept.	.....	179,234	.....	17,305
Oct.	.....	181,772	.....	16,994
Nov.	.....	182,383	.....	16,199
Dec.	.....	180,746	.....	13,066
Ave.	.....	182,359	.....	19,128

Fabricated Structural Steel
(1000 tons)

	Shipments			Backlogs		
	1945	1944	1943	1945	1944	1943
Jan.	49.5	35.2	91.9	124.4	113.1	339.1
Feb.	43.6	42.9	90.8	151.6	117.6	321.0
Mar.	51.3	41.4	94.0	153.3	106.3	299.8
Apr.	...	44.5	86.6	....	111.2	272.5
May	...	50.7	78.9	....	116.3	220.6
June	...	43.0	68.4	....	122.7	207.1
July	...	45.3	56.8	....	125.4	201.8
Aug.	...	55.2	50.2	....	130.4	195.6
Sept.	...	57.5	51.8	....	151.1	208.1
Oct.	...	61.6	80.1	....	174.4	274.0
Nov.	...	59.4	42.7	....	184.2	134.6
Dec.	...	61.3	39.6	....	142.5	113.0

Source: American Institute of Steel Construction. Figures represent members' reports only.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,023	$10,106	$10,175	$9,746
Federal Gross Debt (billions)	$235.1	$235.7	$235.0	$187.1
Bond Volume, NYSE (millions)	$83.8	$81.4	$38.5	$42.0
Stocks Sales, NYSE (thousands)	7,853	8,280	3,560	3,398
Loans and Investments (millions)†	$57.1	$57.3	$57.8	$51.1
United States Gov't. Obligations Held (millions)†	$42,854	$43,143	$43,565	$37,834

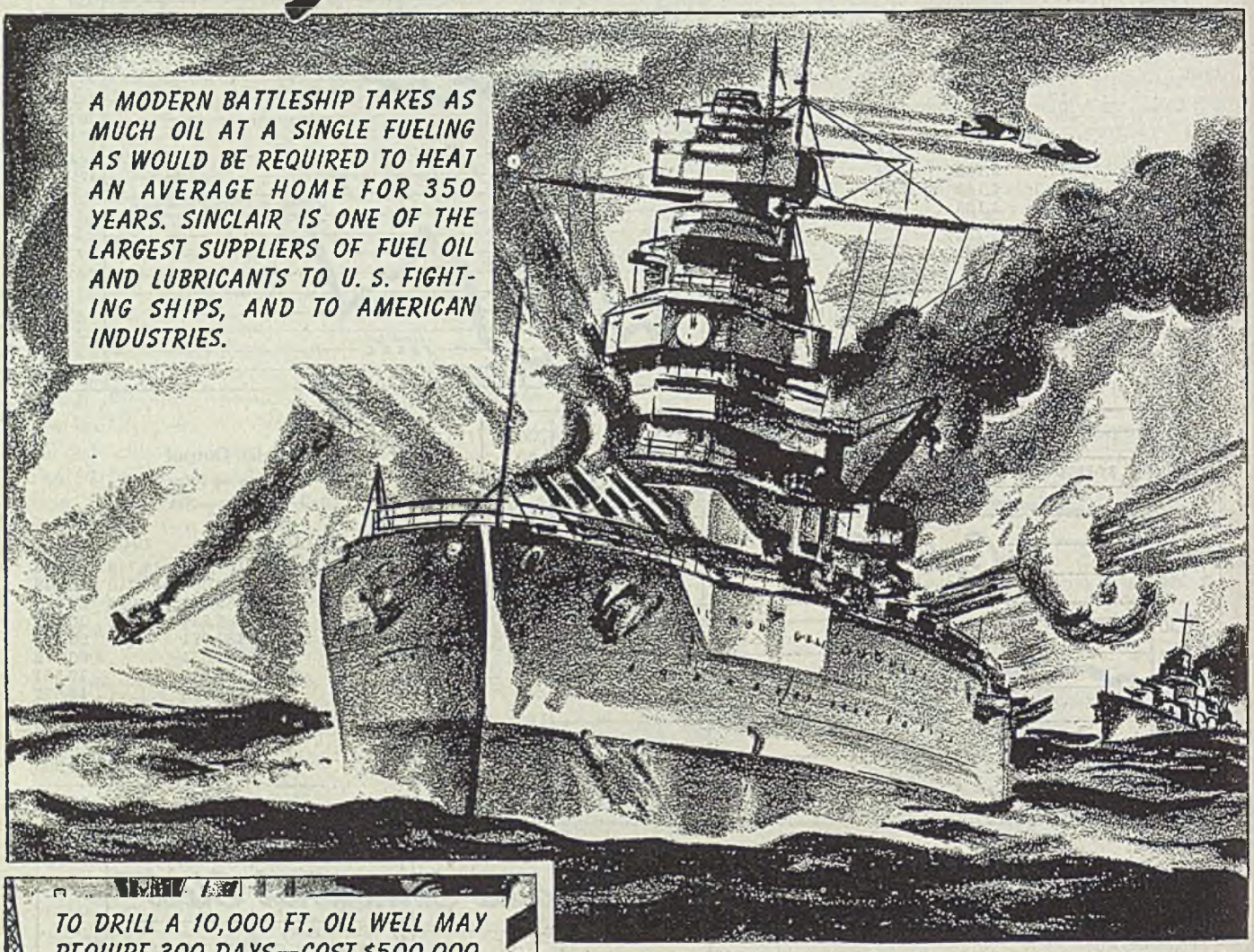
†Member banks, Federal Reserve System.

PRICES

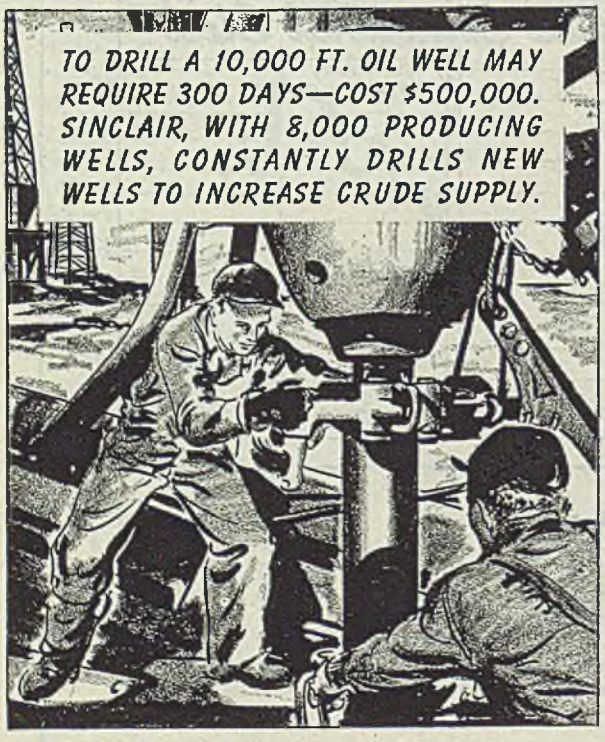
STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.7	105.6	105.1	103.7
Industrial Raw Materials†	118.2	117.7	116.2	113.2
Manufactured Products†	101.9	101.9	101.9	101.0

†Bureau of Labor's Index, 1926 = 100.

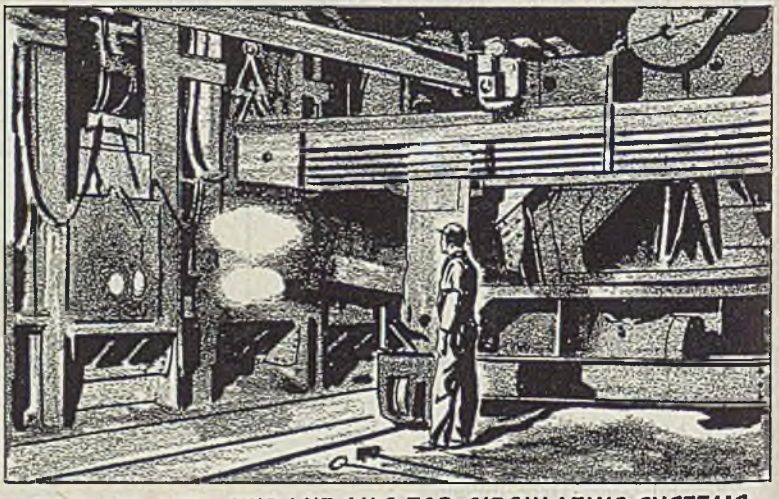
Do you know that . . .



A MODERN BATTLESHIP TAKES AS MUCH OIL AT A SINGLE FUELING AS WOULD BE REQUIRED TO HEAT AN AVERAGE HOME FOR 350 YEARS. SINCLAIR IS ONE OF THE LARGEST SUPPLIERS OF FUEL OIL AND LUBRICANTS TO U. S. FIGHTING SHIPS, AND TO AMERICAN INDUSTRIES.



TO DRILL A 10,000 FT. OIL WELL MAY REQUIRE 300 DAYS—COST $500,000. SINCLAIR, WITH 8,000 PRODUCING WELLS, CONSTANTLY DRILLS NEW WELLS TO INCREASE CRUDE SUPPLY.



SINCLAIR ANTI-OXIDANT OILS FOR CIRCULATING SYSTEMS, SPECIALIZED GEAR AND CABLE LUBRICANTS, QUALITY TURBINE AND COMPRESSOR OILS, AND A WIDE RANGE OF CUTTING OILS EFFICIENTLY MEET ALL MILL REQUIREMENTS.

SINCLAIR IS EQUIPPED TO SERVE YOU BETTER!

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

War End Cuts Steel Little; Expect Price Advance Soon

Most cancellations affect remote schedules . . . Price announcement may come this week . . . Production holds near capacity rate

WHILE considerable volume of steel cancellations has followed the close of the European phase of the war it has had little effect so far on nearby deliveries, being mainly confined to material scheduled for remote delivery.

Even with these cancellations mills are still loaded with heavy backlogs and deliveries are well extended on many products, including sheets, carbon bars, seamless tubing and some wire items. Some producers still are quoting delivery into next year on hot and cold-rolled and galvanized sheets, special quality bars and wire. Cancellations have not yet opened schedule gaps for early delivery. However, overall future positions in all these items have eased and that the remote schedules are more affected than nearby positions is ascribed to the nature of the cancellations and to the fact that producers are behind on current deliveries. Some makers of sheets and bars, as an example, are delayed a month or two months on their promises.

It was reported in authoritative quarters in Washington last week that a new schedule of carbon steel prices on which the Office of Price Administration has been working for months has finally been approved and probably will be promulgated about the middle of this week. Details of the new schedule are not yet available but it was reported the advances finally approved may range from $2 to $7 per ton through the list of carbon steel products. The increases, it was said, will include the interim advances allowed the industry in January.

Most recent contract cancellations include a further cut in shells, affecting principally 155 mm., 240 mm. and 8-inch shells, a reduction of about 10 per cent on these three types, it is said. Also affected are tanks and certain types of artillery, with cancellations spreading to numerous manufacturers of components. Cutbacks are also scheduled for trucks, ranging from light to heavy, in light tanks, armored cars and 105 mm. tank destroyers and certain types of small arms.

Despite mounting volume of cancellations most steel producers expect no sharp drop in steel output over the next several weeks because of the oversold position of mills and because too many essential civilian needs are pressing for action. It is believed that such decline as may develop over the remainder of this quarter will be due principally to changes in specifications.

Meanwhile, further limitation orders are being relaxed to facilitate shifting steel now on order for the war program into civilian work. The latest include a number discontinuing simplification and standardization controls over certain steel products and items manufactured from steel, such as portable tools, band saws, and machine tool accessories.

Little change took place last week in steel ingot production, most areas holding to prior rates and such changes as were made were minor, the estimated national rate being unchanged at 95 per cent of capacity. Cleveland gained 1 point to 93½ per cent and Detroit 2 points to 88. Youngstown dropped 2 points to 92 per cent, Cincinnati 3 points to 87 and Wheeling 5½ points to 91½. Unchanged rates were as follows: Pittsburgh 92, Chicago 98, eastern Pennsylvania 93, Buffalo 90½, New England 90, Birmingham 95 and St. Louis 80.

Pig iron shows no effect of the war's end and competent observers expect little alteration in demand. Backlogs of needs for castings for civilian products are sufficient to keep foundry consumption at as high a rate as labor supply will allow and steelmaking iron is expected to continue in demand.

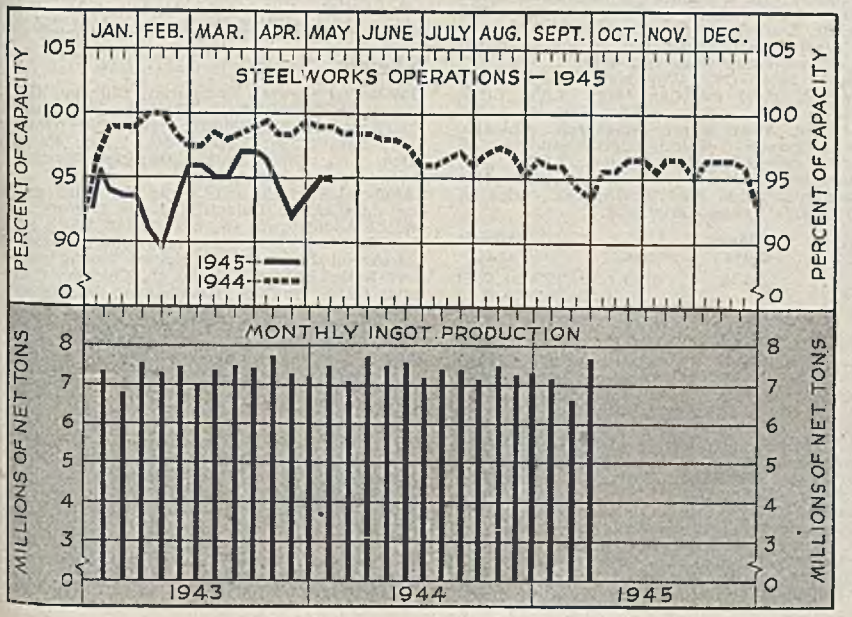
Average composite quotations on steel and iron products are steady at recent levels, based on prevailing ceiling quotations of Office of Price Administration. Finished steel composite is $57.55, semifinished steel $36, steelmaking pig iron $24.05 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended May 12	Change	Same Week 1944	Same Week 1943
Pittsburgh	92	None	93.5	99
Chicago	98	None	101.5	97
Eastern Pa.	93	None	94	96
Youngstown	92	—2	96	95
Wheeling	91.5	—5.5	102.5	87.5
Cleveland	93.5	+1	91.5	99
Buffalo	90.5	None	90.5	90.5
Birmingham	95	None	95	100
New England	90	None	90	95
Cincinnati	87	—3	89	92
St. Louis	80	None	79.5	90
Detroit	88	+2	89	96
Estimated national rate	95	None	°99	°98.5

°Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	May 12	May 5	April 28	One Month Ago April, 1945	Three Months Ago Feb., 1945	One Year Ago May, 1944	Five Years Ago May, 1940
Finished Steel	$57.55	$57.55	$57.55	$57.55	$57.55	$56.73	$56.08
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.55	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	17.30

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. 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; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	May 12, 1945	April, 1945	Feb., 1945	May, 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
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	2.20	2.20	2.20	2.10
Plates, Philadelphia	2.25	2.25	2.25	2.15
Plates, Chicago	2.20	2.20	2.20	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	3.65	3.65	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	3.65	3.65	3.65	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.80	2.80	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts	2.00	2.00	2.00	2.00

Finished Material	May 12, 1945	April, 1945	Feb., 1945	May, 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$25.69	$25.19
Basic, Valley	24.50	24.50	24.00	23.50
Basic, eastern del. Philadelphia	26.34	26.34	25.84	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.19	24.69
No. 2 foundry, Chicago	25.00	25.00	24.50	24.00
Southern No. 2, Birmingham	21.38	21.38	20.88	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	24.80	24.30
No. 2 fdry., del. Phila.	26.34	26.34	26.34	25.84
Malleable, Valley	25.00	25.00	24.50	24.00
Malleable, Chicago	25.00	25.00	24.50	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	24.69	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	18.75	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	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	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 and Feb. 4, 1942. 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, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (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, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. ports, $52.

(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; 8-12 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, $34. (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., $2. Do., over ⅜—$\frac{7}{32}$-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (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., 2.65c; Detroit 2.70c; Toledo 2.80c. (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., 5.00c, double ref., 6.25c.

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 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

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, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

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 8 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 Carb., 2.80c; .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 $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.10c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 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, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser 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, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4 15c.

Wrought 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, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis, Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet 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 2.60c

Spring wire 3.20c

(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

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 In.	Blk.	Galv.	Iron 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 In.	Blk.	Galv.	Iron 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
9-19	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
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
3"	12	18.59	21.42	17.54	29.00
3½"	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, $43.00.

*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, $43 net ton, base, Standard spikes, 3.00c.

*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
5.50	4	1.50	4	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	65¼ off
Do., ⅝ and ⅝ x 6-in. and shorter	63¼ 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	56 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

	U.S.S.	S.A.E.
Semifinished hex		
⅞-inch and less	62	64
⅛-1-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	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7 75- 8.10
New River, foundry	8 50- 8.75
Wise county, foundry	7.25- 7.75

By-Product Foundry

Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.85

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943. †13.85 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	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	4.012[1]	5.727[1]	3.874[1]	4.106[1]	5.106[1]	5.374[14]	4.744[14]	4.144[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.705[1]	5.272[1]	3.618[1]	3.922[1]	4.272[1]	5.168[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.694[1]	5.252[1]	3.494[1]	3.902[1]	4.252[1]	5.044[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.898[1]	5.341[1]	3.696[1]	4.041[1]	4.391[1]	5.346[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	4.071[1]	5.465[1]	3.871[1]	4.165[1]	4.515[1]	5.521[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.73[1]	5.26[1]	3.45[1]	3.819[1]	3.819[1]	4.90[15]	4.40[16]	3.75[21]	4.669	5.60[22]	5.75[22]
Buffalo (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.81[1]	3.50[1]	4.80[15]	4.30[16]	3.65[21]	4.35	5.60[22]	5.75[22]
Pittsburgh (city)	3.35[1]	3.40[1]	3.50[1]	5.00[1]	3.45[1]	3.60[1]	3.60[1]	4.90[15]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.50[1]	3.50[1]	4.80[15]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.50[1]	5.188[1]	3.45[1]	3.60[1]	3.60[4]	5.027[15]	4.40[24]	3.75[21]	4.45[21]	5.60[22]	5.65[22]
Cleveland (country)	3.25[1]	.....	3.40[1]	.....	3.35[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.709[1]	5.281[1]	3.550[1]	3.700[1]	3.700[1]	5.15[15]	4.500[24]	3.800[21]	4.659	5.93[22]	5.93[22]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.265[1]	5.765[1]	3.965[1]	4.215[1]	4.215[1]	5.758[15]	5.443[24]	4.443[21]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.165[1]	5.665[1]	3.865[1]	4.115[1]	4.115[1]	5.658[20]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.761[1]	5.291[1]	3.525[1]	3.675[1]	3.675[1]	4.975[12]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.55[12]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.35[1]	3.50[1]	3.50[1]	4.80[20]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.65[1]	5.15[1]	3.35[1]	3.60[1]	3.60[1]	5.381[15]	4.20[24]	3.75[21]	4.65	5.75[22]	5.85[22]
Milwaukee	3.637[1]	3.687[1]	3.787[1]	5.287[1]	3.487[1]	3.737[1]	3.737[1]	5.422[15]	4.337[24]	3.887[21]	4.787	5.987[22]	6.087[22]
Indianapolis	3.58[1]	3.63[1]	3.73[1]	5.23[1]	3.618[1]	3.768[1]	3.768[1]	5.068[15]	4.568[24]	3.98[21]	4.78	6.08[22]	6.18[22]
St. Paul	3.76[2]	3.81[2]	3.91[2]	5.41[2]	3.61[2]	3.86[2]	3.86[2]	5.407[15]	4.46[24]	4.361[21]	5.102	6.09[22]	6.19[22]
St. Louis	3.647[1]	3.697[1]	3.797[1]	5.297[1]	3.497[1]	3.747[1]	3.747[1]	5.322[15]	4.347[24]	4.031[21]	4.931	6.131[22]	6.231[22]
Memphis, Tenn.	4.015[5]	4.065[5]	4.165[5]	5.78[5]	4.065[5]	4.215[5]	4.215[5]	5.415[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.65[1]	5.903[1]	3.55[1]	3.70[1]	3.70[1]	4.90[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	4.00[4]	5.85[4]	4.158[4]	4.20[4]	4.20[4]	5.40[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[5]	4.35[5]	5.50[5]	3.868[5]	4.318[5]	4.318[5]	5.463[15]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	5.05[4]	7.20[4]	5.10[4]	4.95[4]	6.75[4]	6.15[13]	7.20[6]	5.583[20]	5.613	5.85[22]	5.95[22]
San Francisco	4.15[7]	4.35[7]	4.75[7]	6.35[7]	4.65[7]	4.50[7]	5.75[7]	6.50[15]	7.30[15]	5.333[21]	7.333	8.304[22]	8.404[22]
Portland, Oreg.	4.45[27]	4.45[27]	4.85[27]	6.50[27]	4.75[27]	4.75[27]	6.30[27]	5.90[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.05[15]	5.783[21]	.....	.....	8.00[22]
Seattle	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.80[26]	5.783[21]	.....	.....	8.00[22]

*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 18 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 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—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, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

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 furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10 .15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70 .90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton 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 0.74% 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, 1.00% 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 Quality

Pa., Mo., Ky. $66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases 61.65

Silica Brick

Pennsylvania	52.65
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

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 ton, 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.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $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 .55c; 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 .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. 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.

OMSZ 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.

OMSZ 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 5cto 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 18.00c, 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; .066c, .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 38.05c; 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 $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

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 150 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	16.25-16.75
No. 3 Bundles	14.25-14.75
Mixed Borings, Turnings	9.50-10.00
Machine Shop Turnings	9.50-10.00
No. 2 Bushelling	12.50
Billet, Forge Crops	20.75-21.25
Bar Crops, Plate Scrap	20.75-21.25
Cast Steel	20.75-21.25
Punchings	20.75-21.25
Elec. Furnace Bundles	18.75
Heavy Turnings	17.75

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	$14.33
No. 2 Heavy Melt. Steel	14.33
No. 2 Hyd. Bundles	12.83
No. 3 Hyd. Bundles	10.83
Chemical Borings	14.33
Machine Turning	6.50
Mixed Borings, Turnings	6.50
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	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	12.50-13.00
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	13.06*
No. 1 Busheling	13.06*
Machine Shop Turnings	6.50
Mixed Borings, Turnings	6.50
Short Shovel, Turnings	9.00
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents 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	16.00
Mach. Shop Turnings	14.00
Mixed Borings, Turnings	14.00
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	21.00

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	14.00-14.50
Cast Iron Borings	13.00-13.50
Machine Shop Turnings	12.00-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

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.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	10.50-11.00
Mix. Borings, Sht. Turn.	12.00-12.50
Short Shovel Turnings	12.00-12.50
Cast Iron Borings	12.00-12.50
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	13.00
Short Shovel, Turnings	15.00
Mixed Borings, Turn.	13.00
Cast Iron Borings	14.00
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	8.00- 8.50
Short Shovel. Turnings	10.50-11.00
Cast Iron Borings	9.50-10.00
Low Phos Plate	19.32-19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

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	6.50- 7.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

LOGEMANN Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

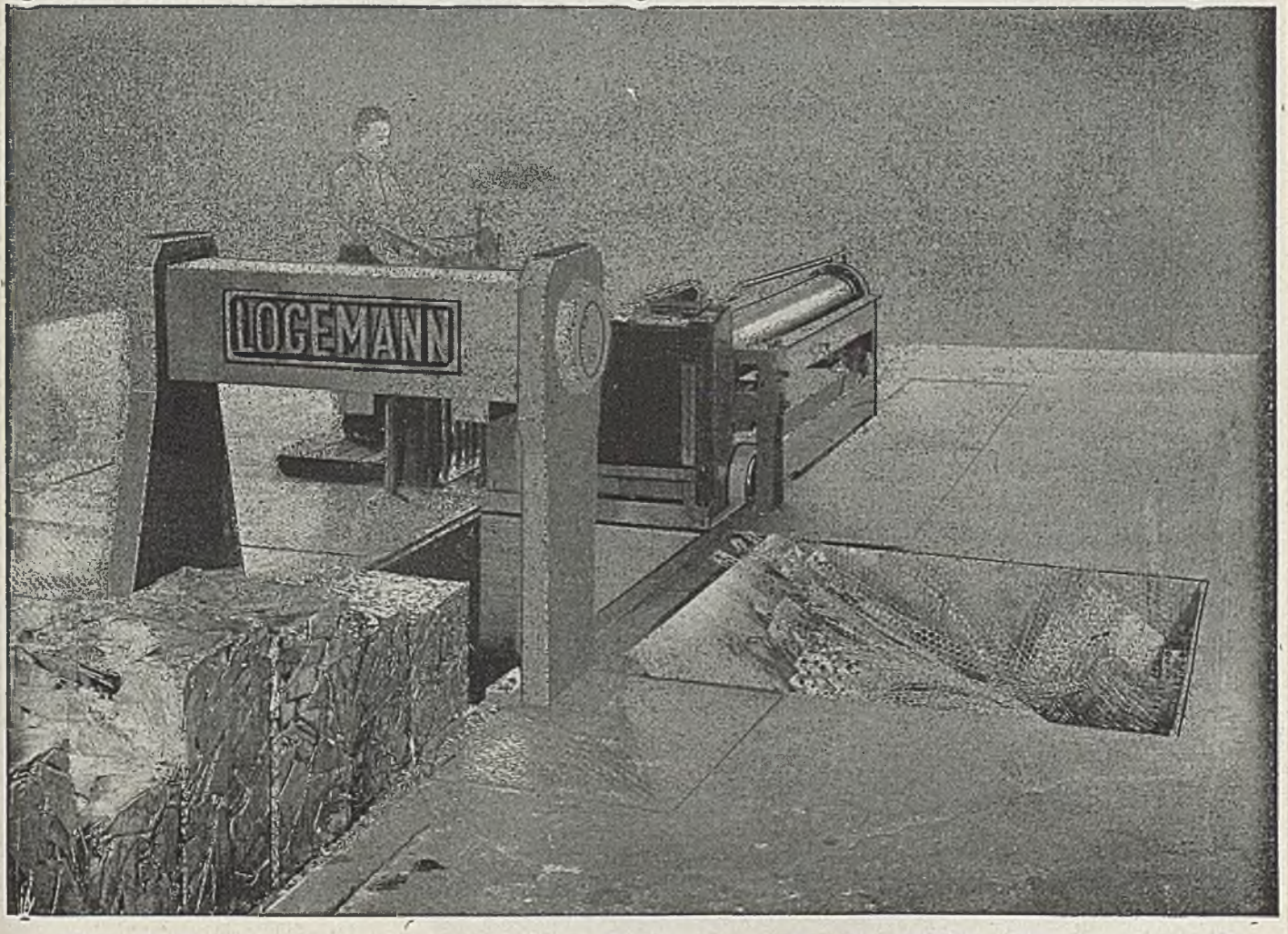
In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill Service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.* Write for details.

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

LOGEMANN BROTHERS COMPANY
3126 W. Burleigh St. **Milwaukee, Wisconsin**



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) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; 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 del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 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. 2 grade) 10.50c; chemical warfare service ingot (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 9.75c, 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 hardness, 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. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, 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.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; 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, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel 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., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 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, rods, 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% 20.40c, 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, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

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, old zinc 7.25c 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 196

Though cancellations are expected to follow end of the European war it is too soon for them to appear in sufficient volume to affect the situation. Most sheetmakers could take considerable reduction without bringing delivery dates back to a comfortable range. Buying at the moment is light. Hot and cold-rolled deliveries are promised for November and into next year and hot-rolled pickled are in February in some cases.

New York — Although sheet sellers expect more substantial cancellations now that the war in Europe is over, there have been few important developments along this line to date. As a matter of fact, most producers could accept some further cutbacks without too greatly altering their delivery promises, as they are behind on schedules. Some large producers are five to six weeks behind. New orders here are rather light.

Most producers of hot and cold-rolled sheets are quoting shipments for delivery in November on into the early part of next year. February is being quoted by at least two or three producers of hot-rolled pickled sheets. Some promises on cold-rolled are equally extended. Galvanized sheet schedules range into February and March on the more popular gages.

Pittsburgh — It is anticipated by most observers here that end of hostilities in Europe will have little immediate effect on the sheet market. The trend is to increase production and the only change V-E Day may have is to help out in this category by improving the labor situation. It is no secret that shortage of sheet mill labor and inefficiency of many makeshifts provide the real ceiling on production under present conditions. New sheet buying is active within the limits set up by current War Production Board drive to eliminate the unevenness in carry-over tonnage from one mill to another. For the most part this is accomplished by directing new buying into mills whose present carry-over situation is more favorable and away from those whose schedules have been jammed and whose carry-over now extends as much as a full month in some cases.

Cleveland—Cutbacks in war sheet and strip requirements have increased lately, but to date have had no effect on immediate production schedules with cancellations primarily affecting future rollings. Most contract cancellations or downward revisions effective immediately following V-E Day have not yet been felt at the mill producinig level. Some observers estimate downward revision in war production over the next six months will approach 35 per cent, in contrast with 20 per cent predicted earlier. Should cutbacks in war production schedules develop to the extent now expected, there will be enough steel production capacity to fight the war against Japan and take care of civilian reconversion requirements. Real hope is held for a substantial increase in raw materials for the civilian economy over coming months, while the indicated reduction in munitions requirements also should make available needed manpower and production facilities for the initial reconversion steps. A few automobiles are expected to be coming off the assembly lines in 6 to 9 months, while a good start on production of radios, refrigerators, vacuum cleaners and other household appliances, is expected by the end of this year. Most sheet sellers are still booked solidly through the remainder of this year, with pressure on current deliveries as acute as any time recently. A substantial increase in orders for civilian goods has recently been booked by steel interests, but until WPB permits scheduling of these orders, now under discussion in Washington, none of these orders will be placed on rolling schedules.

Cincinnati — Sheet mills in the district maintained full production on V-E Day. Cancellations have not been in unusual numbers or tonnage, so that on the surface no effect appears. It is too early to learn extent of changes which war end in Europe may bring. Schedules are extended, but considerable buying still is being done for delivery into first quarter. Lessened demand for plates will have a minimum of direct effect on the district situation.

Philadelphia — Many buyers of hot and cold-rolled sheets are marking time making sure first what their requirements will be. Others, a little more assured as to their own needs, are going ahead in an effort to obtain best possible position on mill books. Following recent aircraft cutbacks, demand for stainless steel has stabilized, with the possibility that it soon may become more extended as the jet propulsion program expands. Recently there have been some relatively minor cancellations in electrical sheets but the general position on these sheets still is strong, with little

available before November and some sellers booked solidly into next year, especially on low-silicon grades. Signal Corps requirements are expected to continue generally active for some time, especially in radar. General expectation is that in addition to these specialties, cold-reduced sheets and galvanized sheets will weather the transition period in generally good shape.

Chicago — Demand for sheets of all types remains virtually as strong as in recent weeks. Undoubtedly substantial cancellations will follow from the war cutbacks being made now but there is only speculation on what may be involved. One sheetmaker has been directed by WPB to remove all production of plates from its continuous sheet mills. In normal times, this producer does not roll plates on these mills. The shift now to be made, however, has little significance for the company lacks manpower to perform the further finishing necessary to produce sheets.

Steel Bars . . .

Bar Prices, Page 196

Principal interest in the steel bar market centers about changes resulting from cancellations in the shell program. Smaller demand for this purpose is expected to release capacity for various other uses which are pressing for supplies, including rails, agricultural implements and car and locomotive building.

Chicago — It is a foregone conclusion that bar mill schedules will benefit materially from last week's cutback in the heavy shell program, but it is too early to tell to what extent. Any open space resulting can be quickly absorbed by other bar requirements, as for example, for the agricultural implement industry. Alloy bars have eased slightly from cancellation of the airplane engine program, but this will be offset by expansion of engines for jet propelled craft.

Pittsburgh — Future status of the shell program is in doubt and rumors, which as yet have not been confirmed, indicate cancellation of some shell tonnages for June. This, if it occurs, will leave gaps in bar mill schedules, which can then be filled by moving up tonnages now booked for later delivery.

Cleveland—Some openings in rollings schedules on lighter gage bar stock have developed as result of cutback in ammunition program. While heavier gages have not been materially affected yet, sellers expect some openings to develop on these schedules during June. The expected overall easing in steel supply is likely to release a considerable tonnage of carbon and alloy steel bars for anticipated increased production of freight cars, locomotives, trucks and farm machinery. Sellers are booked through fourth quarter on hot-topped quality bars and only relatively few openings are available in late third quarter on regular commercial quality. Alloy bar schedules have shown little change lately, with delivery promises on electric furnace grades falling into November, and open-hearth material late in November.

Philadelphia — Common carbon bar deliveries fall principally in fourth quarter, with special quality in first quarter of next year. The tendency is definitely easier and substantial readjustments are considered likely in the near future. Electric furnace alloys are being generally quoted for October. Open-hearth alloys are quoted for November and through January on some larger sizes.

Steel Plates . . .

Plate Prices, Page 197

Easiness continues in the steel plate market and gaps in rolling schedules have made possible deliveries on current orders in May and June. Further decline in tonnage is expected to follow soon.

Philadelphia — Plate demand continues to shrink, with some universal tonnage available for May and some sheared plate tonnage for June, as a result of recent openings. Large quantities of mild steel plates, high tensile steel plates and mild welding steel I-beams were put up for sale May 11 at Camden, N. J.

Cleveland — Plate rolling schedules are expected to decline sharply over the next 60 days, in contrast to the relatively minor reduction in production through April and this month. The National Construction Co. appears the low bidder on the city of Cleveland 48-inch water pipe line project, alternate steel or concrete. The job is expected to go concrete. However, if awarded to steel, over 1000 tons will be involved. Mills are now booking tonnage for July rolling.

Chicago — Reflecting the easy situation in plates, one producer has not received a new inquiry for a week. In

its effort to maintain satisfactory operation of plate mills, WPB has directed this company to remove all production of plates from continuous sheet mills, although the space thus created can be used only for output of heavy-gage sheets and manpower deficiency is a bar to the further finishing required for this product. An additional cut in the Maritime Commission's plate reservations has reduced the company's July obligation to 20,000 tons and none for August. The 6000 tons of Maritime plates withdrawn from another local mill two weeks ago has been placed with Geneva Steel Co. Reason for the shift is understood to have been made because construction of the ships was transferred from eastern to West Coast yards.

Tubular Goods . . .

Tubular Goods Prices, Page 197

Boston — Seamless tubing over four inch is tightest among tubular products. Ordnance programs requiring seamless, mortar shell, bombs and rockets, are not expected to be materially cut back in the near future. Coupled with oil industry needs, good demand for boiler tubes and bearing rings, there is limited space on seamless mills during the balance of the year, although early fourth quarter is possible on boiler tubes. Aircraft cutbacks by the Army are showing up in alloy tubing demand; types of planes involve substantially those powered by Pratt & Whitney engines built in other areas. Butt-weld pipe is in July, with lap-weld slightly more extended. Demand is more spotty with decline most apparent in shipbuilding. Mild flurry in cast pipe buying is not impressive for this season; two Massachusetts towns bought 750 tons.

Pittsburgh — With drilling activity in the oil country now established on a level at least equal to previous periods and probably greater, it is assumed by producers of tubular goods here that there will continue to be an excess of demand over supply. The petroleum situation in general has been clouded by uncertainty as to exact volume of demand required for the Pacific war, as well as rationing on the home front. There was adequate reason to believe that drilling activity would be minimized because of the lower military demand and continued need for rubber conservation on the home front. Recent decisions in Washington apparently have eliminated that uncertainty by announcing abolition of many restrictions. This will almost certainly be translated into heavy demand for drill pipe casing and specialties. Standard pipe situation will probably remain unchanged and there is little hope for immediate relief in the zinc supply situation, which means galvanized items will remain tight. Mechanical tubing demand is already dropping, reflecting cutbacks in aircraft production. There has been little change in pressure tubing but a decline in demand is expected after the end of second quarter.

Seattle—Cast iron pipe demand has decreased because of delayed deliveries, 60 days being about the minimum. Backlogs of projects is large and promises a strong market when present conditions are relieved. Tacoma, Wash., has WPB approval for a $200,000 project, involving replacement of a mile of 46-inch with 52-inch pipe, probably steel.

Tin Plate . . .

Tin Plate Prices, Page 197

Pittsburgh — Despite the fact that all confirmable stories indicate continuation of tin plate production on present levels, there are some indications that an increase in output may be imminent. At least one producer is making plans for increased tin plate production, which seems to indicate it is more than just wishful thinking. The tin situation will be the primary factor, inasmuch as current stocks of tin are as low as they have been at any time since the beginning of the war. On the other hand, any decline in production of hot-dipped tin plate could be accompanied by an increase in electrolytic plate production of four to five times the cancelled tonnage without increasing the volume of tin required. That this may be in the offing is indicated by reports from various sources that governmental orders for products packed in hot-dipped plate have already started to decline, and as a result of V-E Day and its accompanying drop in the volume of field rations required, there will be substantial additional cuts in demand for heavily coated tin plate. Canners are prepared to use a substantially increased volume of electrolytic plate as soon as it becomes available and as soon as they have sufficient labor to pack products in the additional plate.

Rails, Cars . . .

Track Material Prices, Page 197

Pittsburgh — Rail mill operators have some hope that rumored cancellation of portions of the shell program will result in less tonnage of large rounds now being produced on rail mills. This is substantiated by reports that there will be an increase in the rail directive for June to permit production of some delayed rail tonnage dislocated by the increase in shell demand. Sources here regard it as almost certain that the rail program will be increased next month.

New York — Domestic freight car buying includes 100 seventy-ton covered hopper cars, 50 each for the Missouri Pacific and the Texas & Pacific. They will be built at the Madison, Ill., plant of the American Car & Foundry Co.

Wire . . .

Wire Prices, Page 197

Chicago — An important wiremaker in this district is passing up considerable new high-carbon wire business because of inability to obtain an adequate supply of hot-topped steel. This bottleneck is a reflection of the demand which shell steel is imposing on hot topping capacity. In general, new orders for wire are lighter than might be expected because consumers previously have ordered far in advance and WPB has not yet made allotments that far ahead.

Structural Shapes . . .

Structural Shape Prices, Page 197

Chicago — Fabricators in this area anticipate that the pronouncement of V-E Day soon will result in some freeing of general construction. It is known that much prospective business has been held up to await easier supply of steel. This includes expansion of plants for civilian goods production and public building including bridges. In a recent Illinois grade separation project, only one bid was submitted because of steel shortage. For a period of a week, a shape mill received no new inquiry. United States Gypsum Co. is planning to build a dock at its quarry to require a substantial tonnage of sheet piling.

Seattle — Fabricating shops are engaged practically 100 per cent on war work, many having airplane and shipbuilding subcontracts. No private buying is indicated, due to priorities, but the backlog of general construction held back by war building will provide heavy tonnages later. Plants manufacturing logging equipment are busy on government contracts aimed at increasing lumber output. War contract cancellations have not affected this area to any extent, shipyards and plane plants having ample backlogs. L. C. Stoll, Oregon manpower director, announces that 10,700 workers will be recruited in this area for three Kaiser shipyards at Portland and Vancouver, Oreg., where construction of troop transports and other essential ships is under way.

Philadelphia—Increasing cancellations on shell steel should be reflected more noticeably in shapes. At present shape deliveries fall in August and September and while easier than recently the change is not material. Meanwhile there is an increasing quantity of structural work on architects' boards, presaging a spurt in that direction as soon as restrictions are lifted. Recent buying includes a few hundred tons for stacks and auxiliaries for the Southwark station of the Philadelphia Electric Co., placed with Connery & Co., Philadelphia.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 197

Pittsburgh — Reduction in the backlog of unfilled orders is anticipated as a result of last week's action rescinding the limitation on quality of steel which may be used in production of reinforcing bars. Total sales reported by producers east of the Rockies in both rail and new billet steel in April amounted to 37,000 tons. This compares with 45,000 in March, 43,000 tons in February, and 78,000 tons in January. Production directive for April was 31,000 tons and the same exists for May. There is some hope that the June directive will be increased to permit working off of some unfilled orders, which now total approximately 130,000 tons.

Chicago — Awards of reinforcing steel have been light in the past few days and new inquiry is small. Supply of steel continues short and bar interests hope that new construction projects which are certain to come out now that V-E Day has arrived will not appear too quickly and in too large volume, this to provide time for both steel and manpower to be available in adequate amounts. While revocations to limitation order L-211 restore to normal the types of reinforcing steel that can be rolled,

benefit cannot be fully derived until WPB permits more steel to go into the product.

Pig Iron . . .

Pig Iron Prices, Page 199

Reduced demand for pig iron for war purposes is not expected to affect production as backlogs for civilian purposes stand ready to absorb all released capacity. Foundries are taking all iron offered in an effort to build inventories to the 30-day allowable reserve. Meanwhile, all available blast furnaces are in blast.

Chicago—Formal end of the European war is not expected to be reflected in pig iron, as demand for castings is tremendous and iron inventories are at an insecure level. Should foundries experience heavy cutbacks for direct war items, capacity would immediately be absorbed in the truck program which is behind schedule and for agricultural implements well behind production quotas. Furthermore, foundries will take all the iron they can get to bring stocks up to the allowable 30-day level. In some cases, inventories are as low as one week and transportation delays on iron in transit are a constant threat to operations. Currently 38 of the district's 41 available blast furnaces are active, the remaining three being down for repairs.

Pittsburgh — Situation remains unchanged in this area, with heavy demand for merchant iron, both basic and foundry grades. There has been no change in blast furnace activity, with 42 stacks producing in the immediate Pittsburgh district, and no further report on plans announced earlier to blow in additional stacks. The coke situation remains touchy, although apparently troubles at the mines have now ended at virtually all points. Stocks of both coking coal and finished coke are below the safety level at most points.

New York — While various adjustments are expected to follow in the wake of V-E Day, pig iron sellers report little variation in volume or nature of requirements thus far. Supply continues to ease slightly, due primarily to the fact that district foundries are still feeling the pinch of labor shortage.

Boston — Reconversion to production of normal products will more than balance cutbacks in war contracts, with larger consumers of pig iron in textile mill equipment, shoe machinery and heating industries. The cast pipe foundry at Everett, Mass., will also contribute heavier to the melt. Two builders of textile machinery, Whitin Machine Works, Whitinsville, Mass., and Draper Corp., Hopedale, Mass., have been leading purchasers recently of used tools and furnaces through RFC, rounding out facilities for increased output. All in the above groups have required less iron than normal for war production, but more steel. Inadequate supply of foundry labor is hampering rapid reconversion in most cases; dismissed shipyard workers in Maine and other points are reluctant to take foundry jobs, but are beginning to draw unemployment benefits. Number of individual deliveries are slightly higher this month without much change in total tonnage; most consumers, up to the 30-day inventory limit, are taking shipments to cover current melt and maintaining reserves.

Youngstown, O. — Carnegie-Illinois Steel Corp. has suspended No. 2 blast furnace at Ohio Works for about three weeks, for repairs, reducing the number active here to 23. Struthers Iron & Steel Co. is rushing repairs on its stack and building up its working force, preparing to resume blast about May 15.

Buffalo — No appreciable change is noted in pig iron demand or shipments but a leading producer has cleared a small accumulation of iron on its yards. With inventories of producers and consumers unusualiy light the trade expects demand to hold in the face of cancellation of war orders. Sellers state that foundries would be forced to make immediate purchases to swing into civilian production. A cut in steel output would have immediate effect on blast furnace operations, cutting production of basic and increasing foundry grades.

Cleveland — Foundries have noted no easing in pressure for deliveries, although overall order backlogs are off somewhat as result of contract cutbacks in recent weeks. An indication of the continued heavy demand for castings is disclosed by the proposed 1946 new truck equipment and spare parts program, which is higher than will be produced this year. Demand for axles, transmissions and axle housings is steadily increasing. Malleable iron supply is still critical despite increased production capacity, for manpower continues the bottleneck. Cutbacks in other war programs have not increased available manpower to the foundry industry. Production of malleable iron castings

established a new record during March of 86,000 tons nationally, while output of gray iron and steel castings have shown little change in recent months at somewhat below last year's rate.

Philadelphia — No. 2 stack of Alan Wood Steel Co. at Swedeland, Pa., is expected to resume May 15, operating on foundry for a short time and then on basic. Meanwhile demand for foundry iron is more active than for basic, a reversal of the situation only a short time ago.

Cincinnati — Foundries continue to press for deliveries of pig iron, stocks being so low that they are sometimes faced with shutdowns. Arrival of V-E Day also brought belief that the labor situation might be eased, enabling some expansion in melt if supplies are available.

Scrap . . .

Scrap Prices, Page 200

End of the war has had little effect on the scrap market, with steelmaking grades mainly unchanged and supply only fair. Buying is slow, a sign of caution, but offerings are accepted freely. Some easing is noted in eastern Pennsylvania following the reduction in offered prices a week ago.

Philadelphia — Except for cast grades demand for scrap is rather sluggish. Heavy melting steel grades are unchanged at $18.25 to $18.75, delivered, the spread which developed a week ago, and No. 2 and No. 3 bundles are also virtually unchanged at the lower levels of several days ago. Mixed borings and turnings and machine shop turnings have undergone a further decline, now holding at $9.50 to $10, delivered. There has been little to test the market on low phos scrap, although the tone is definitely easier. Billet and forge crops, plate scrap, cast steel and punchings are now nominally at $20.75 to $21.25 and No. 2 busheling at $12.50. Electric furnace bundles are off $1 to $18.75 and heavy turnings 50 cents to $17.75. Bids were closed May 7 by the Navy at Portsmouth, Va., on 3600 gross tons of unprepared steel scrap and bids are to be opened May 14 at Philadelphia by the ordnance department on about 350 tons of light unprepared steel scrap.

Cleveland — Mills have not changed buying policies materially in recent weeks with most interests accepting all good open-hearth grades available at ceiling prices. An eastern producer did offer lower prices in the Buffalo area recently without success. The same interest has recently purchased scrap delivered Buffalo from points in Florida at $24.34 on allocation. This is in contrast with the Buffalo ceiling of $18.75. Mills in Cleveland report adequate stocks, although movement of heavy melting steel remains below desired pace. Overall supplies here will be augmented materially during the summer by vessel shipments. One such cargo is due later this month, totaling over 5000 tons. Excess supply of turnings has been reduced somewhat in recent weeks as result of cutbacks in war contracts.

Pittsburgh — The scrap market here remains firm, despite rumors of weakness which when tracked down only vanish into thin air. It is true that some fringe sales have been made on minor grades, principally long turnings, below ceiling prices. It is also true that the tonnage involved in these sales has been negligible. Nevertheless, in times past such sales have been an indicator of future market activity on many occasions and as such must be watched carefully. It does not necessarily follow that because a few small sales have been made, any major tonnage will move below ceiling. On the contrary, current demand is such that offers have been made of ceiling price plus full springboard for open-hearth grades and sales have been completed at that level within the past few days. All premium grades of scrap are tight, including good cast material. Steel mill order books appear to be solid with every indication that all current orders are firm and will not be subject to cancellation. This, coupled with a lower than normal situation in scrap inventories held by consuming plants, seems to indicate a continued firm market, at least for the present.

Boston — Lighter grades of steelmaking scrap, notably turnings, have weakened; strictly No. 1 heavy melting steel is firm, with supply limited. Indications are that light industrial scrap production has probably reached a peak and in some instances may recede.

New York — While the scrap trade is marking time, with little buying to actually provide a test, brokers' buying prices on No. 1 and No. 2 heavy melting steel are holding nominally at $14.83 and on No. 2 and No. 3 bundles at $12.83 and $10.83, respectively. Machine turnings and mixed borings and turnings are nominal at $6.50. Other grades are unchanged.

Buffalo — Strength continues in the scrap market as further sales of steelmaking grades are made at ceilings. Effort of leading consumer to bear

down prices has been unsuccessful so far. Dealers report sustained inquiries instead of cancellations expected after V-E Day. Two more barge fleets with about 5000 tons of scrap were expected over the week end. An additional 7000 tons is expected by canal later this month. One mill consumer was forced to take material from its small reserve during a five-day shutdown of a blast furnace for repair.

Los Angeles — Leading mill consumers have scrap reserves for 45 days or more. Dealer collections are better than normal and the situation is easy. Some Army and Navy scrap is arriving here, mainly ordnance, but not yet in tonnage sufficient to affect the market. Cutbacks in shipbuilding is expected to affect volume of scrap from that source.

Seattle—Steelmakers still find difficulty in obtaining sufficient prepared scrap. Dealers have a labor priority but are unable to obtain sufficient workers and those available are unsatisfactory. Unprepared scrap is ample but preparation is difficult. Some foundry cancellations have been received but shops generally are busy on war work. Cast scrap is more plentiful but the ceiling of $20 still prevails. With pig iron scarce foundries are increasing proportion of scrap.

Chicago — End of the war in Europe has had no unsettling effect on scrap in this area. All heavy melting material available and offered is taken quickly by mills. Some easing in demand for electric furnace material is observed, but is regarded as a temporary condition. Purchase by a local steelmaker of machine shop turnings has been made at $11, a rise of $1.50 from the level holding for some weeks. Blast furnace material, while unchanged in price, has added to its strength as furnace operators seek to increase pig iron yield in face of strong demand for foundry use as well as steelmaking. All in all, scrap intake closely parallels consumption. Mills anticipate little change in operating rate for at least 60 days due to war cancellations and after a brief leveling off period expect an increase as mill products start flowing again into civilian goods.

Cincinnati—Some interests in the iron and steel scrap market are taking a watchful waiting attitude until the effect of V-E Day is further clarified. Mills are not prone to expand inventories and the market currently is without new tonnage buying. Brokers show no disposition to take in all material being offered by dealers, unless there is immediate outlet. Shipments continue unchecked against old orders.

Detroit — No precipitate break appeared in scrap prices following V-E day, as many had forecast earlier, probably because the day for industry arrived over a month ago. Some mill cancellations are reported, but the general feeling is one of marking time. Brokers believe it may take a week to ten days to clarify the situation, with the outlook for possible further weakness in borings and turnings only, perhaps 50 cents a ton. On the basis of recent automotive lists, these grades are slightly lower, with machine shop turnings quoted at $8.00 to $8.50 and short shoveling $10.50 to $11.00. Refusal by some buyers to pay brokers' commission on electric furnace grades is reflected in the spread now quoted on low-phosphorus plate, $19.32 to $19.82.

Warehouse . . .

Warehouse Prices, Page 198

Boston — Heavier gage galvanized sheets are slightly easier, due to spotty openings from shipyard reductions, but 18-gage and lighter are as tight as ever. Buying from warehouse is still heavy, but unbalanced inventories account for some losses in volume. Wire products, including nails, are short with most distributors. There has been a slight flurry in plate buying, although plates are inclined to lag behind other standard hot-rolled products. While warehouse load on nails is smaller next quarter, for galvanized sheets it is slightly heavier, although there is some question as to whether warehouses will get much benefit, due to heavily sold position of most mills.

Los Angeles—War plant cutbacks have not yet affected warehouse sales. While galvanized material, mainly sheets, continues short, sales show no decrease. Hot-rolled sheet deliveries are better but not yet equal to demand. Plates are easier. Manpower is no longer a problem as replacements are readily obtained.

Seattle — Warehouses are receiving steady demand for all steel products. While mill deliveries have improved, both black and galvanized sheets are still critical and orders have been placed for first quarter next year. Demand for sheets continues exceptionally strong. Re-

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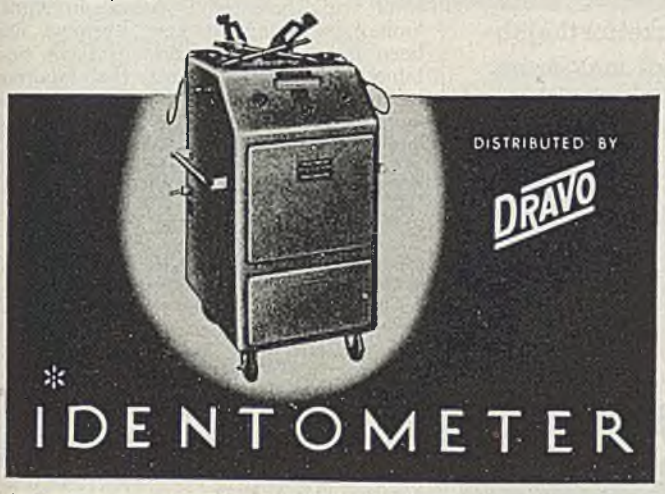

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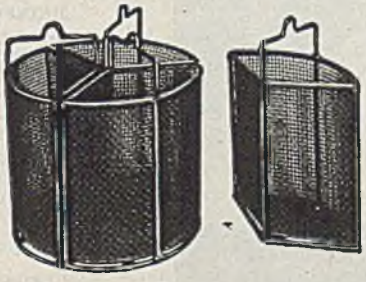

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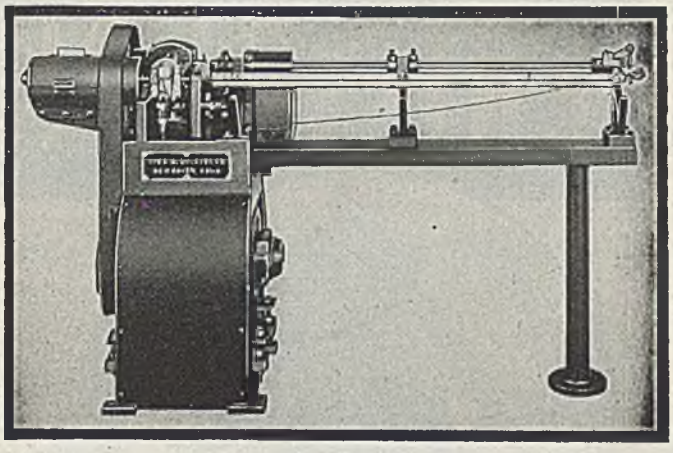

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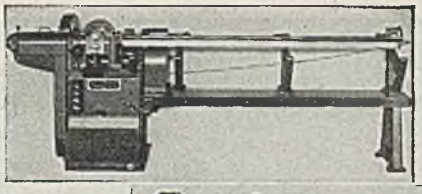

Type 1A
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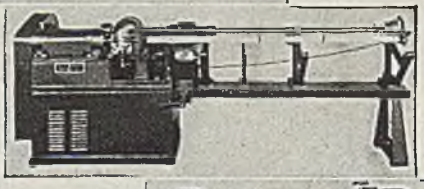

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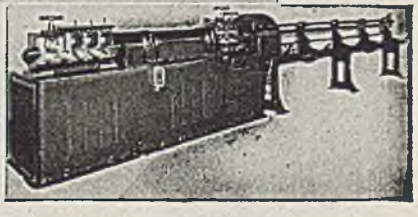

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inforcing bars from warehouse are mainly in lots of less than 100 tons. Stocks have improved within the past month on better mill deliveries.

Chicago — Scaling down of war contracts is not expected to be reflected in warehouse business for at least 30 days. So far, there is no observable influence. The situation in alloys is critical despite the fact that reduction of aircraft production already has started. Expansion in jet propulsion craft and changing trends as air power moves from Europe to the Pacific likely will keep alloys tight for some time.

Cincinnati — Shipments from warehouses are being maintained at the high level which created a record in April. Some slackening in new business has been noted. Order backlogs have sustained shipments against the tapering in orders which may or may not be temporary. Avid demand on jobbers has kept stocks out of balance.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3000 tons, boiler and turbine room additions, Calumet station, Commonwealth Edison Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; bids April 5.

590 tons, pile driver leads, various locations, for Bureau of Yards and Docks, U. S. Navy, Chicago, to Hansell-Elcock Co., Chicago; bids April 12.

196 tons, soybean processing plant, Frankfort, Ind., for Swift & Co., Chicago, to Rock Island Bridge Co.; Al Jackson Co., Chicago, contractor; bids April 23.

137 tons, grade separation over Illinois Central railroad, Kankakee, Ill., for state highway commission, to Bethlehem Steel Co., Bethlehem, Pa.; bids April 20.

800 tons, power house addition, Green Bay, Wis., for Wisconsin Public Service Corp., to Worden-Allen Co., Milwaukee; Public Utility Engineering & Service Corp., Chicago, engineer.

REINFORCING BARS . . .

REINFORCING BARS PLACED

112 tons, engineering laboratory building No. 324, Great Lakes Naval Training Station, Great Lakes, Ill., to Olney J. Dean Steel Co., Chicago; Peter Hamlin Construction Co. Inc., Chicago, contractor; bids April 10.

100 tons, freight depot, Indianapolis, for New York Central railroad, to Ceco Steel Products Corp., Chicago; Walsh Construction Co., Cleveland, contractor; bids April 29.

REINFORCING BARS PENDING

540 tons, veterans hospital, Fargo, N. D., for U. S. Veterans Administration; Hagstrom Construction Co., St. Paul, low on general contract; bids April 24.

360 tons, warehouse, A. & P. Food Stores, Chicago; bids May 1.

125 tons, warehouse, Krambo Food Stores, Appleton, Wis.; bids April 24.

PIPE . . .

CAST IRON PIPE PLACED

475 tons, 12-inch, Braintree, Mass., to Warren Foundry & Pipe Co., Everett, Mass.

265 tons, mostly 6-inch, Weymouth, Mass., to Warren Foundry & Pipe Co., Everett, Mass.

RAILS, CARS . . .

RAILROAD CARS PLACED

Missouri Pacific, 50 seventy-ton covered hopper cars, to Madison, Ill., plant of American Car & Foundry Co.

Texas & Pacific, 50 seventy-ton covered hopper cars, to Madison, Ill., plant of American Car & Foundry Co.

Four Steps Are Taken To Ease WPB Controls

FOUR MAJOR steps easing production controls were announced by Chairman J. A. Krug of the War Production Board last week.

They were: Revocation of a substantial part of 420 existing limitation, conservation and other orders; open-ending of Controlled Materials Plan effective July 1, 1945, to permit delivery after that date without CMP allotments, of steel, copper and aluminum where delivery can be made without interfering with authorized CMP orders. Orders may be placed immediately for delivery after July 1; removal of most rating floors so as to permit placing of unrated orders where production and delivery will not interfere with rated orders; giving AA-4 preference rating, and the right to place secondary CMP orders for steel, copper and aluminum to all small manufacturers, including veterans and new enterprises producing less than $50,000 per quarter.

Mr. Krug stated that additional revocations and relaxations of WPB controls will be announced shortly, including a simplified priority system and the gradual elimination of CMP. According to present plans, existing priorities will remain in effect for the balance of this year.

Director of War Mobilization Vinson earlier had announced that it is expected that two to three million tons of steel will be released during the first quarter after V-E Day, about 500 million pounds of copper and brass, and around 150 million pounds of aluminum probably will be available for civilian production during the first quarter.

WPB announced also that special sales of idle, excess or surplus steel, copper and copper base alloy or aluminum in controlled material forms may now be made to anyone without WPB authorization and without requiring the buyer to use a CMP allotment symbol or number. The restrictions are removed both as to domestic and export sales. Special sales restrictions, however, are retained on copper raw materials.

Steel Corp. Shipments Show Decline in April

Finished steel shipments by the United States Steel Corp. in April totaled 1,722,845 net tons, a decrease of 146,797 tons from March shipments of 1,869,642 tons and a decrease of 33,952 tons from the 1,756,797 tons shipped in April, 1944. For four months shipments totaled 6,724,090 tons, a decrease of 394,061 tons from the 7,118,151 tons in the corresponding period in 1944.

New Schedule of Prices on Carbon Steel Products Reported Approved

Washington—Promulgation by the Office of Price Administration of a new schedule of carbon steel product prices, which may range from $2 to $7 per ton over prices in effect at the beginning of this year, is expected possibly about midweek.

After months of study, during which time the steel industry has been pressing for increases to offset out-of-pocket losses of as much as $7 per ton on certain products, Director of Economic Stabilization Davis was reported last week to have finally approved the recommendations of OPA after a number of revisions had been made in the schedule as originally submitted. As a general thing, it was said here, the increases, when published, will fall considerably under trade hopes.

Except for a statement that a new price schedule would be announced shortly, OPA officials last week declined to comment on reports circulating in the trade regarding the proposed schedule. In informed trade circles, however, it was reported the new list would include the interim advances granted the industry last January.

The schedule of prices as originally proposed by OPA is understood to have been revised a number of times since it was submitted to Economic Stabilizer Davis. In fact, it was reported that as late as last midweek changes were being made in the recommendations. On the basis of reports in the trade the following advances are said to have been suggested by OPA: Semifinished steel $2 per ton; tube rounds and billets $4; plates $2; heavy rails $3; light rails $5; tie plates $3; bars $2; wire rods $3; manufacturers wire $3; nails and staples $7; barbed wire $2; bale ties $7; enameling and electrical sheets $2; formed roofing and siding $2; galvanized sheets $4; hot-rolled sheets $2; and spikes $5. All of these increases, it was said, are inclusive, not in addition to, the interim advances allowed in January.

If the above listed prices are those put into effect they will mean no change at all on plates and hot-rolled sheets from the prices which have applied since last January. Galvanized sheets, however, will be upped $1 over the current schedule, light rails $2, and nails and staples $2. No interim price relief was granted last January on semifinished steel, tube rounds, bars, wire, bale ties, enameling and electrical sheets, and tie plates.

C. M. White Succeeds R. J. Wysor As Republic Steel Corp. President

Charles M. White, vice president in charge of operations, has been elected president of Republic Steel Corp., Cleveland. He succeeds R. J. Wysor who has resigned to engage in a new activity soon to be announced. Mr. Wysor, who has been president of Republic since 1937, will continue as a member of the board of directors.

E. M. Richards has been elected vice president in charge of operations. He has been assistant vice president in charge of operations.

The new president of Republic, the country's third largest steel producer, was graduated from the University of Maryland in 1913. He entered the steel industry in 1915 as an employe of Jones & Laughlin Steel Corp., Pittsburgh, where he later became associated with T. M. Girdler, then president of Jones & Laughlin and now chairman of the board of Republic. When Mr. Girdler became head of the newly formed Republic Steel

C. M. WHITE

E. M. RICHARDS

Corp. in 1930, Mr. White became assistant vice president in charge of operations and was elected vice president in 1935.

Mr. Richards, a graduate of Bucknell University, entered the steel industry in 1925 as chief industrial engineer for Jones & Laughlin. He joined Republic in 1930 in the same capacity, was appointed assistant to the vice president in charge of operations in 1935 and assistant vice president in charge of operations in 1939.

Mr. Girdler, Republic chairman, recently resigned as chairman of Consolidated Vultee Aircraft Corp.

Steel Industry Payrolls Set New Record in March

Steel industry payrolls rose sharply in March to the highest monthly total on record, according to the American Iron and Steel Institute, New York. The total was $154,976,700, against $138,414,800 in February and $145,284,900 in March, 1944. The totals for both February and March, 1945, include provision for the retroactive wage increases and accrued liberalized vacation allowances authorized by the War Labor Board directive.

The number employed increased during March, but remained below the wartime peak. Average employment of 570,100 compared with 566,300 in February and 577,600 in March, 1944.

Wage-earning employes earned a record-breaking average of 127.3 cents per hour in March, compared with 125.0 in February and 115.9 cents per hour in March, 1944.

Wage earners worked an average of 47.4 hours per week in March, as against 47.2 hours per week in February and 47.7 hours per week in March, 1944.

CONSTRUCTION AND ENTERPRISE

OHIO

ASHTABULA, O.—Hershberg Products Co., Samuel Hershberg, president, 1926 Walnut boulevard, recently incorporated with $25,000 capital, has received WPB approval for rubber products factory 40 x 160 feet, 20 x 20 feet and 20 x 40 feet on a 4.45-acre site on West avenue, to cost over $75,000.

CANTON, O.—Timken Roller Bearing Co. has received WPB authorization for additional facilities for production of roller bearings at cost of $109,000.

CLEVELAND—Taylor Precision Mfg. Corp., E. R. Taylor, president, 1299 Parsons court, formerly operated as Taylor Precision Mfg. Co., has been incorporated with $10,000 capital to manufacture beverage dispensing equipment.

CLEVELAND—Cleveland Electric Illuminating Co., W. H. Hartman, purchasing agent, 75 Public Square, will build one-story 17 x 63-foot and 11 x 241-foot powerplant addition at 712 East Seventieth street, to house extension of coal conveyor, costing about $31,000.

CLEVELAND—Han-Kor Metal Products Inc. has been formed by Han-Kor Inc., 5005 Euclid avenue to manufacture and deal in metal products, by Ralph H. Behrend, 5005 Euclid avenue, who is acting as agent. Capital is $500 and 100 shares no par value.

CLEVELAND—National Advisory Committee for Aeronautics, Washington, has received WPB authorization for installation of four 25,000-gallon steel floating roof tanks at Cleveland, costing $20,000, and two test chambers in compressor and turbine research facilities, to cost $103,200.

TROY, O.—Hobart Mfg. Co. has received WPB authorization for three-story building addition and freight elevator for production of aircraft unit motors and gear motors, to cost $240,000.

CONNECTICUT

ANSONIA, CONN.—City advisory commission, City Hall, plans a sewage disposal plant Costing $400,000. V. B. Clarke, 356 Main street, is engineer.

DANIELSON, CONN.—Prefabricating Construction Co., Dayville, Danielson, has let contract to Baker & Johnson Co., 261 Richmond street, Providence, R. I., for a one-story 80 x 100-foot plant addition at Wildwood Park, to cost about $40,000.

DEVON, CONN.—Connecticut Light & Power Co., 36 Pearl street, Hartford, Conn., will install a 45,000 kw. generating unit and build a 115,000-volt transmission line from Devon to Meriden, Conn.

NEW YORK

BUFFALO, N. Y.—Anchor Concrete Products Inc., Frederick W. Reinhold, president, plans construction of new manufacturing facilities costing more than $200,000.

SCHENECTADY, N. Y.—General Electric Realty Co., 1 River road, will build a test building costing about $1,257,500, with equipment $6,500,000. United Engineers & Constructors Inc., 1401 Arch street, Philadelphia, are engineers.

PENNSYLVANIA

WARREN, PA.—Boro of Warren, M. L. Daugherty, president, Boro Hall, has plans under way for postwar construction of a sewage treatment plant to cost $175,000. J. N. Chester Engineers, 210 East Park Way, Pittsburgh are consulting engineers.

WILMERDING, PA.—Westinghouse Air Brake Co., W. C. Landis, works manager, is having plans made for a gray iron foundry. E. E. Hewitt, Wilmerding, is chief engineer.

ILLINOIS

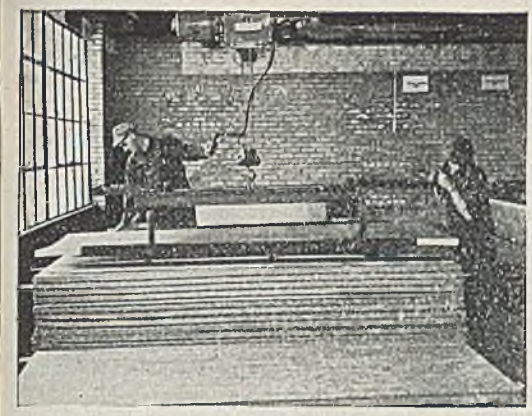
CHICAGO—Zenith Radio Corp., 6001 West Dickens street, will let contract soon for a one-story 60 x 600-foot plant. Alschuler & Friedman, 28 East Jackson boulevard, are architects.

INDIANA

COLUMBUS, IND.—Cummins Engine Co. will build a one-story 80 x 470-foot plant addition costing $625,000, including equipment. Austin Co., 16112 Euclid avenue, Cleveland, is engineer.

PLYMOUTH, IND.—Board of public works, J. A. Broman, mayor and chairman, has plans under way for postwar construction of a sewage disposal plant to cost about $200,000. Charles W. Cole & Sons, 226 West LaSalle street, South Bend, Ind., are consulting engineers.

NEW CASTLE, IND—Firestone Industrial Products Co., Twenty-eighth street and Grand avenue, has bought 26 acres and plans post-



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war plant expansion costing $75,000 or more.

VINCENNES, IND.—Board of public works, N. P. Barr, chairman, City Hall, plans postwar construction of sewage disposal plant and incinerator, to cost about $350,000. William F. Reinke, City Hall, is city engineer.

MARYLAND

BALTIMORE—Rustless Steel & Iron Corp., East Chase street, has let contract to Cummins Hart Construction Co., 2023 North Charles street, for a two-story 71 x 94-foot and three-story 114 x 125-foot plant additions, costing about $300,000.

GEORGIA

ATLANTA, GA.—Southern railway, B. Herman, chief engineer, McPherson Square, Washington 13, plans a one-story 100 x 250-foot diesel locomotive repair shop with traveling crane, estimated to cost about $500,000.

WEST VIRGINIA

MOUNDSVILLE, W. VA.—Carboloy Co. Inc., 11177 East Eight Mile road, Detroit, has let contract for a tungsten ore reducing plant estimated to cost $6 million, with equipment, on 72-acre site at Natrium, W. Va., to George A. Fuller Corp., 597 Madison avenue, New York. Smith, Hinchman & Grylls Inc., 800 Marquette building, Detroit, are engineers.

WISCONSIN

ANTIGO, WIS.—Antigo Milk Products Corp., has let contract to Hoffman Construction Co., 1519 North Oneida street, Appleton, Wis., for a one and two-story 63 x 102-foot powerhouse.

WITTENBERG, WIS.—City, A. Krohn, clerk, plans sewage treatment plant costing $25,000. J. Donahue Engineering Co., 608 North Eighth street, Sheboygan, Wis., is engineer.

KANSAS

SCOTT CITY, KANS.—City, C. J. Van Antwerp, clerk, plans a sewage disposal plant and sewer extension and has let contract to Grundeman Construction Co., Holton, Kans., to cost $70,416.

WICHITA, KANS.—Engineering Industries, Kenneth Reynolds, president, has let contract to A. W. Soderberg Construction Co. for a one-story plant 80 x 180 feet, for manufacture of oilfield equipment.

TEXAS

GALVESTON, TEX.—Black Hardware Co., 2217 Strand street, has let contract to J. W. Zempter Construction Co., 2115 Church street, for a three-story addition costing $50,000.

HOUSTON, TEX.—Garrott Brass & Machine Co., 1718 Ennis street, has let contract for a brass plant addition costing about $52,250 to Bace Marshall Construction Co., 4009 Center street. E. Werlin, 3501 Buffalo street, is architect.

IDAHO

BOISE, IDAHO—City, E. W. Little, chairman city planning board, City Hall, has plans under way for a sewage disposal plant for postwar construction, costing about $600,000. L. R. Stockman, Baker, Idaho, is consulting engineer and J. B. McBirney, City Hall, is city engineer.

MOUNTAIN HOME, IDAHO—City has received federal approval for a proposed municipal sewage treatment plant to cost about $25,000.

POCATELLO, IDAHO—J. R. Simplot, operator of phosphate fertilizer plant, has applied to War Production Board for authority to double present capacity of 80,000 tons annually.

CALIFORNIA

ALHAMBRIA, CALIF. — Clary Multiplier Corp. will build a two-story plant addition 60 x 123 feet and an office building 61 x 77 feet at Palm and Mission streets.

BEVERLY HILLS, CALIF.—Southern California Engineering Co., manufacturing machinist, has been formed by Paul A. Helms and associates and has established operations at 9026 Burton Way.

COMPTON, CALIF.—American Control Co. has been organized by Elgin R. Parker and associates to manufacture heat controls. Address is P. O. Box 629, Compton, Calif.

GLENDALE, CALIF.—Bethlehem Steel Co. has building permit for a warehouse addition 100 x 185 feet at 3350 East Slauson avenue, costing about $50,000.

GLENDALE, CALIF.—Superior Tool & Die Mfg. Co. is building factory unit at 4116 San Fernando road, at cost of about $5900.

GLENDALE, CALIF.—Superior Tool & Die Mfg. Co. has let contract to Albert Kaser, 4116 San Fernando road, for a factory building at 4416 San Fernando road, 75 x 93 feet, to cost about $6000.

LOS ANGELES—Auto-Craft Products Co. is having plans drawn for a one-story plant building at 3809 South Broadway, covering 5000 square feet of floor space.

LOS ANGELES—Mill Iron Works, 900 North Main street, has building permit for pipe supports at its plant, to cost $2500. Associated Piping & Engineering Co., 2332 East Thirty-eighth street, is in charge.

LOS ANGELES—Hydro-Speed Equipment Co. has been incorporated with $25,000 capital by Thomas E. Pickering and associates. T. G. Dalton, 215 West Sixth street, is representative.

LOS ANGELES—Western Auto Trailer Co. has obtained priorities for material and is having plans drawn by W. M. Bostock, 2534 Live Oak avenue, Huntington Park, Calif., for a plant building 40 x 60 feet at 1724 East Fifteenth street.

SAN DIEGO, CALIF.—American Mill & Mfg. Inc. has been organized with $25,000 capital by Franklin F. Evenson and associates. Ralph W. Wallace, 710 San Diego Trust & Savings building, is agent.

SAN PEDRO, CALIF. — West Coast Shipbuilding & Dry Dock Co. has permit for sheet metal shop, warehouse and gatehouse at Berth 55, 30 x 45 feet, 40 x 60 feet and 12 x 24 feet, to cost $6900.

VERNON, CALIF.—Barker Grinding Co. will build a warehouse 100 x 120 feet and an office building 36 x 37 feet at 5015 Pacific boulevard, costing about $35,000.

OREGON

MEDFORD, OREG.—City, F. Rogers, superintendent, has plans completed for postwar construction of an extension to sewage disposal plant, to cost about $200,000. John W. Cunningham & Associates, Spalding building, Portland, Oreg., are consulting engineers.

WASHINGTON

CLARKSTON, WASH.—R. H. Corey, Portland, Oreg., has prepared plans for a proposed municipal disposal plant and sewer system, with bids expected to be called within three months.

LONGVIEW, WASH. — Owens-Illinois Glass Co., Toledo, O., is having plans prepared by Austin Co. for a proposed $3,500,000 bottle plant here, including 14 buildings. Priorities are expected soon.
wood pulp.

PORT TOWNSEND, WASH.—Crown Zellerbach Corp. has received WPB authorization for a plant addition costing $22,133, including pumps, tanks, etc.

SHELTON, WASH.—Rayonnier Inc. has received WPB authorization for a $330,000 improvement, including additional machinery, furnaces, pumps and tanks for production of

SPOKANE, WASH.—City plans construction of a large modern disposal plant and is seeking allocation of $1 million from the state.

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ADVERTISING INDEX

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Table of Contents, Page 67
Classified Advertisers, Pages 223, 224, 225