

Analysis of corrosion as it takes place made possible by electron diffraction camera. Page 92

STEEL

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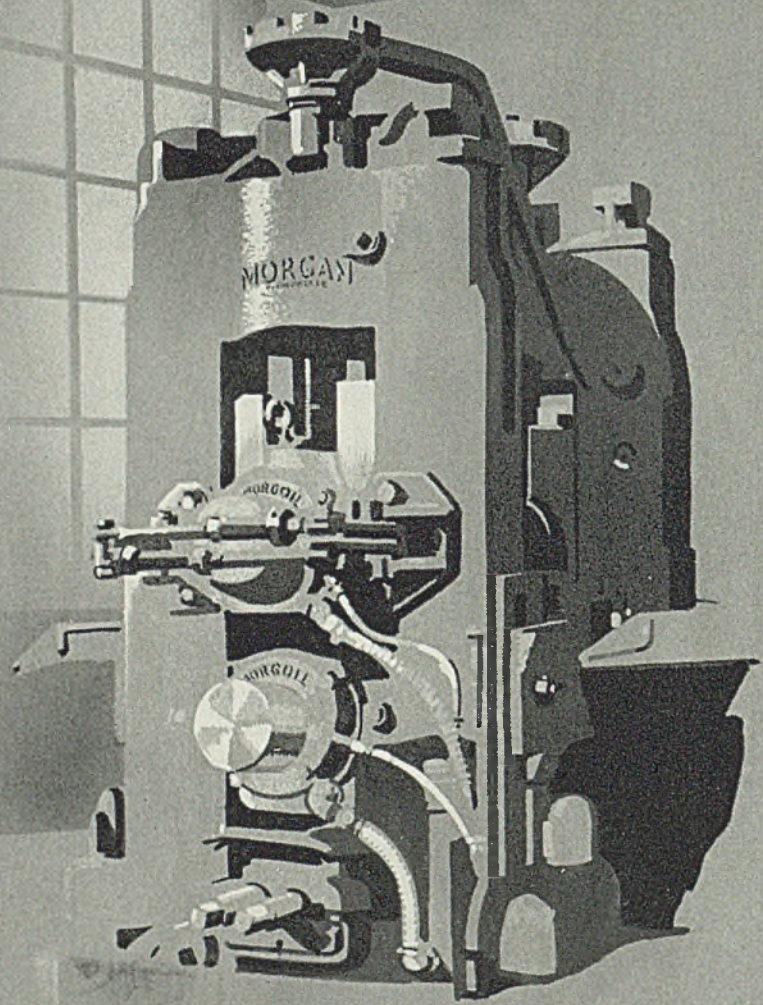
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Changing rolls is simplified, and time is saved for production, when the complete housing is replaced by one in which the rolls, guides and bearings have been set up and adjusted, ready to go. To change rolls we pull out the whole stand and replace it with a "spare"—minutes instead of hours.



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Swinging Toward the Right

If every reader of this page were accorded the privilege of dropping his job temporarily and of going into the seclusion of the north woods where he would be insulated from current events and where he could view world tendencies in broad perspective, he probably would arrive at these general conclusions:

1. The people of Germany, Italy and Japan, when released by war from the yoke of totalitarianism, will turn toward the left in their choice of a form of government.

2. The people of Great Britain, and of Canada, Australia, New Zealand, India and other British affiliates—having yielded little to the worldwide trend to the left before and during the war—will move left before again moving toward the right.

3. The people of Russia, having sacrificed more than the citizens of any other nation and having discovered the weaknesses of the original communist experiment, will embrace more of the policies of democracy after the war.

4. The people of the United States, after witnessing the disappointing results of the more fantastic features of new deal social reform, will swing back slowly toward the center between extreme right and extreme left.

Thus in all of the principal nations of the world, excepting perhaps temporarily impotent China and France, the only ones destined to move toward the right are Russia and the United States. These two, disillusioned after chasing the rainbow of reckless experiment, are conditioned for a return to the saneness of a middle ground position.

This should mean much to American business. Already Washington is evidencing signs of a more constructive attitude toward private enterprise. One by one, some of the more obnoxious enemies of business are being dropped from government payrolls. Astute politician that he is, President Roosevelt has sensed the rightish tendency of public opinion and is acting accordingly.

This should be the signal to industrialists to put forth their very best efforts to exercise the kind of intelligent business statesmanship that will rekindle and hold public confidence in private enterprise. They should be on guard against any move on the part of any element of business that would impair or injure the improved prestige which private enterprise has won by virtue of its acknowledged fine contributions to the war effort.

Industry has more than an even chance of emerging from this war with colors flying. It must not muff this golden opportunity.

FOR FAIR SETTLEMENTS: This war has precipitated an unprecedented number of problems in connection with contracts between the government and industrial companies.

Senator Murray reports that the War Department already has terminated 3764 contracts, that 2300 of these cases remain unsettled and that more than 400 of them have remained unsettled for more than six months. To facilitate fair, equitable and prompt settlement of terminated contracts the War Department has just issued procurement regulation No. 15

containing full instructions as to the method to be followed when contracts are cancelled. When the Senate reconvenes, it will take up Senate bill No. 1268, known as the War Contract Termination act, which provides for prompt payment to contractors and subcontractors when contracts are terminated.

Equally important as the production contracts are the contracts under which private companies operate plants for the government. United States Steel announces the terms of the arrangement under which it built and will operate the Geneva integrated iron

and steel works. All costs incidental to the management and operation of this property will be paid by the government and all revenue from the sale of its products will go to the government. This, we believe, is a unique setup from the standpoint of the steel industry.

Another phase of the war contract problem is renegotiation. Hearings on this important subject will be resumed before the House Ways and Means Committee on Sept. 9. Government agencies and private contractors still are far apart on some details of renegotiation.

Fair deals and prompt payments should be the objectives of all who are concerned in the settlement of contracts. It is gratifying to see that the government procurement agencies and Congress are alive to the importance of the subject. —pp. 64, 66

NEW CHANCE FOR COAL: Washington coal experts foresee a promising future for the American coal industry. They point out that the supply of coal in the ground is abundant, that new discoveries of oil pools are not likely to match those of a decade or so ago and that great opportunities lie ahead for the utilization of coal for synthetics.

Summing up these and other factors, the coal authorities do not expect to see coal take a back seat after this war and watch other fuels encroach upon its preserves, as it did after World War I. They look for the coal industry to thrive. Some of the experts go as far as to predict that if the development of synthetics from coal gets under way in earnest, it will mean more to the steel and metalworking industries than oil ever did.

We believe that much these authorities say about the encouraging outlook for coal is sound—from the technical viewpoint. Coal also had glowing prospects after the first World War, but it lost out because the coal interests were weak on economics, industry relations and merchandising.

Give King Coal good management and good labor relations and he will reascend his throne.

—pp. 70, 110

CURBS JOB SHOPPING: Tightening up the control of job shifting, which is the gist of the War Manpower Commission's latest moves, may bring about beneficial results. Previous government rulings had encouraged management and employes to "upgrade" artificially and had caused a serious depletion of the ranks of so-called common labor.

Even the dumbest worker had become a titled specialist.

No wonder incompetents shopped around for fancy wages. No wonder one employer, after hiring 3000 workers, discovered that on account of high turnover, he had increased his permanent working force by only 150. The new orders are tough, but they may discourage job shopping. —pp. 62, 75

AIDS CORROSION STUDY: During the past few decades scores of investigators have learned much about the corrosion of metals. Many of them pursued their studies under extreme difficulties. The pioneers had to time their observations to the slow pace of natural corrosion. More recently, accelerated corrosion tests have helped to expedite research.

Now a special electron diffraction camera has been developed which enables investigators to study corrosion as it takes place. The rate of corrosion can be regulated at will and its progress viewed continuously.

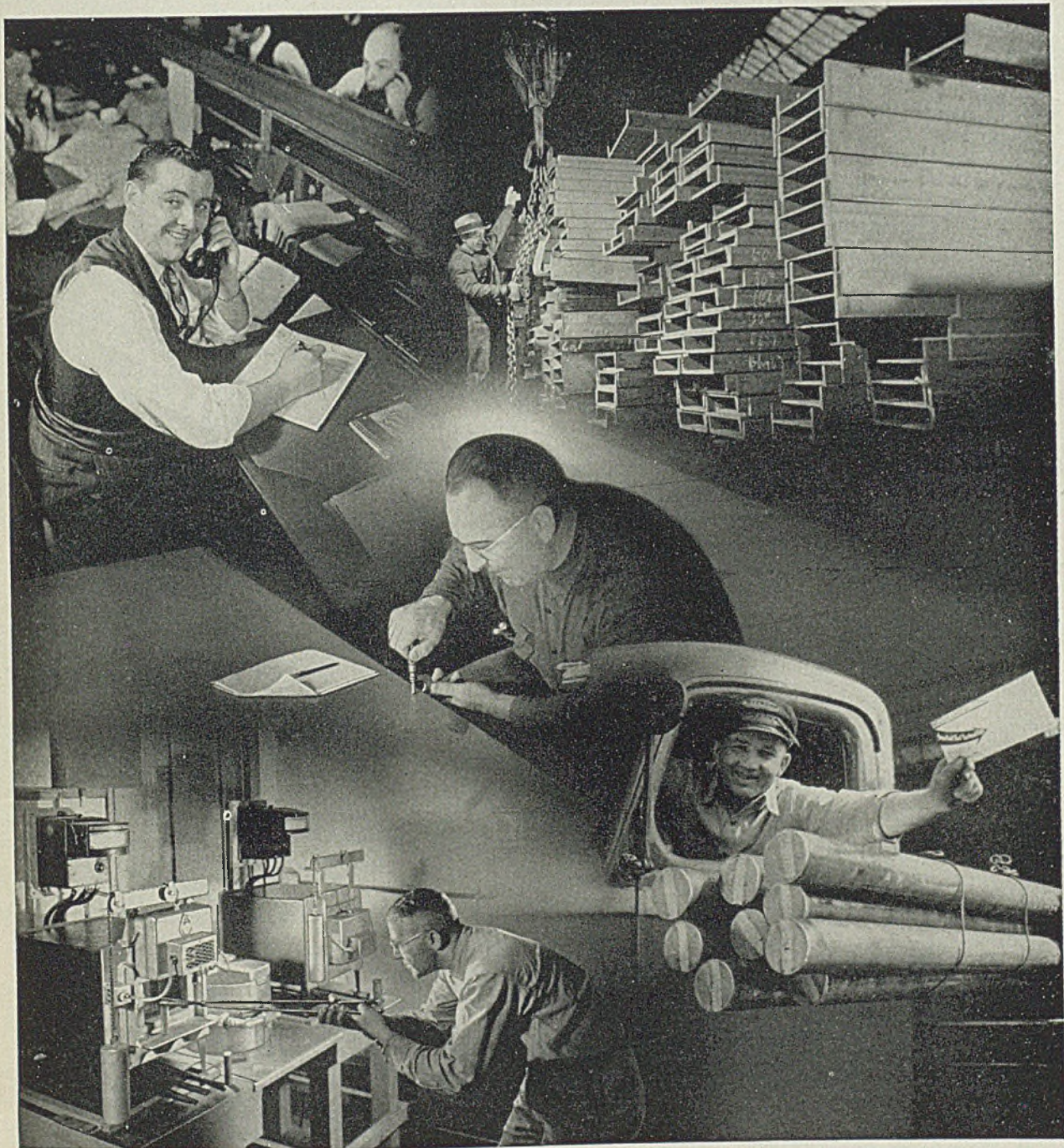
The electron camera gives promise not only of assisting the study of corrosion but also of throwing new light upon problems of metal finishing and coating for metals. The apparatus admittedly is still in the experimental stage, but it will bear watching by all who have a stake in the important problem of corrosion. —p. 92

WAGES OUTGAIN PRICES: One reason Uncle Sam is having so much trouble holding down the lid on inflation is that in spite of all of the elaborate controls inaugurated by the government, wages are outrunning the cost of living. Since January, 1941, living costs have increased about 25 per cent. At the same time the average weekly income of steelworkers has gone up nearly 44 per cent and that of employes in 25 manufacturing industries has mounted 50 per cent.

These figures confirm the impression held by almost every informed citizen, namely, that the government has done a better job of stabilizing prices than it has of stabilizing wages. They also make one wonder about the sincerity of the insistent demands by labor unions for the "roll-back" of certain prices. —p. 59



EDITOR-IN-CHIEF



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• Many skills and complete modern equipment for testing, cutting, forming, handling, shipping — all combine in Ryerson *Steelmanship*. All are devoted to the single purpose of this vast highly specialized steel warehouse system. All contribute to the job of getting the steel you want — in the quality, form, size and place — exactly when you want it. • True, there

are our war problems of shortage here and there, but most generally Ryerson Steel-Servicemen can take care of you. • Whether it is a question of selection, fabrication or just quick delivery—*call Ryerson first*. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Philadelphia, Boston, Jersey City.



BROTHER, WE CAN'T FEED THE WORLD BY HAND

Only machines can keep U. S. agriculture doing the job!

WITH THE FOOD PROBLEM more serious than ever, U. S. farmers are being obliged to produce food for us and our armies and our allies with equipment that, in an estimated 98% of the cases, was in service a year ago, two years ago, *many* years ago!

An intelligent and conscientious maintenance and repair program is now in effect — but it is strictly limited by the amount of maintenance and repair

supplies available. These, in turn, depend upon the amount of steel that can be sacrificed from the building of the more direct weapons of war.

Empire Bolts and Nuts are needed in building ships, planes, guns, tanks . . . but they are needed, too, by the men responsible for producing more food with less help — the manufacturers of new farm machinery and the farmers who must use bolts and nuts

to repair their old machinery. To both we pledge our sincerest efforts, inspired by the realization that food is ammunition and that the EMPIRE BOLTS and NUTS made for plows and tractors and reapers are equally important, in our plan for victory, to the fasteners we are making for the weapons of war. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

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STEEL

WAGES OUTRUN LIVING COSTS

Premium rates and overtime give workers more than even break under wartime economy. "Real" earnings now greater than at beginning of 1941

INDUSTRIAL workers' earnings have outdistanced increases in the cost of living during the last two and a half years. The average wage earner in the steel industry, or in almost any manufacturing industry, can buy more with his paycheck now than he could in January, 1941.

While the cost of living has advanced about 25 per cent (as measured by the U. S. Department of Labor), consider these figures:

Average hourly earnings of steelworkers have gained 30 per cent since the beginning of 1941.

Average weekly income of steelworkers has advanced nearly 44 per cent.

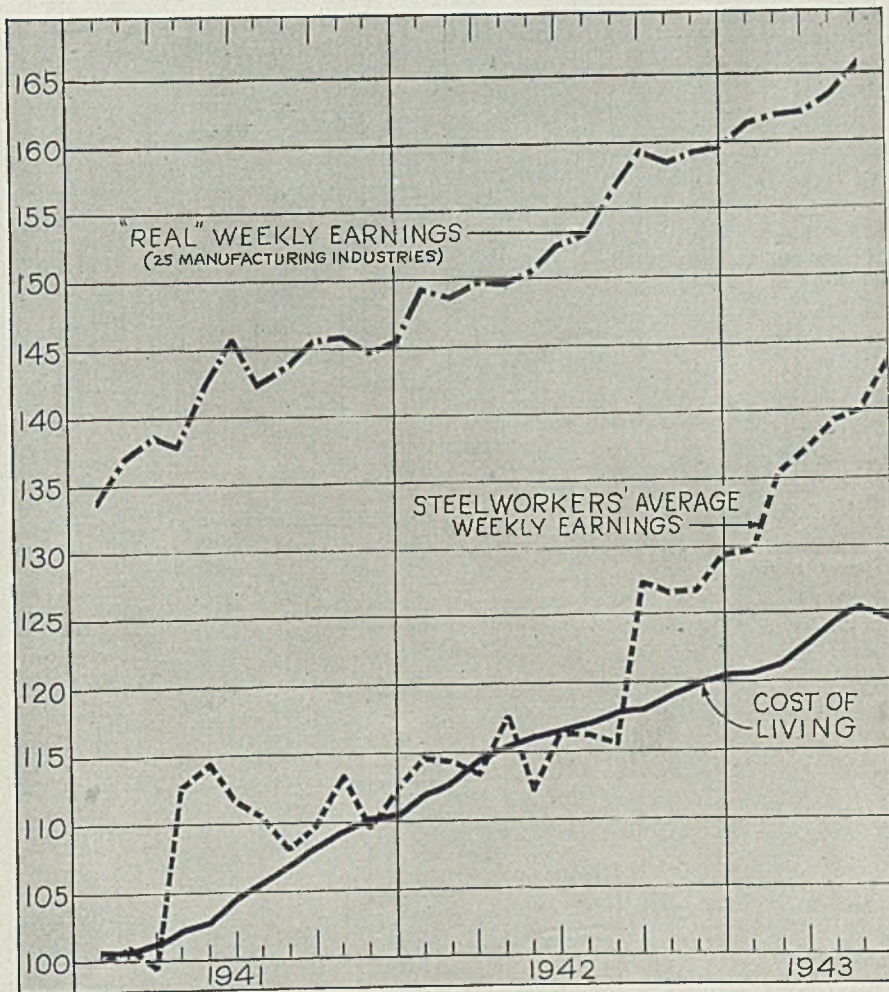
Average hourly earnings in 25 manufacturing industries have increased 33 per cent.

Average weekly wages in 25 manufacturing industries are 50 per cent greater than at the beginning of 1941.

"Real" hourly earnings—dollar wages adjusted to changes in the cost of living—have advanced from an index figure of 133.1 to 179.5, according to the computations of the National Industrial Conference Board for manufacturing industries. "Real" weekly earnings have gone up from 133.7 to 165.9. These computations are based on 1923 equalling 100.

Three major factors have combined to make this favorable picture for the wartime wage earner: (1) Increases in basic rate of pay; (2) premium wages for overtime; (3) a longer work week.

All these must be considered in studying proposals recently made by union labor leaders that wage rates should be adjusted upward to compensate for increased living costs. Obviously to hitch basic hourly rates to a cost of living index and at the same time pay premium rates for overtime on present work week schedules would cause a disproportionate increase in the workers' "real" earnings, increase his power to bid for the limited supply of commodities available,



How increases in cost of living and earnings compare. Cost of living index by Department of Labor, based on 1935-39=100. Steelworkers' average weekly earnings based on January, 1941=100. "Real" weekly earnings index by National Industrial Conference Board, 1923=100

and advance further toward uncontrollable inflation.

Thus would an unduly heavy burden be imposed on salaried workers, persons living on pensions, interest or annuities and dependents of men in the armed services receiving small allotments.

Propose Cost of Living "Bonus"

This is a point which organized labor spokesmen would like to forget when they advocate tying wages to the cost of living or propose a cost of living "bonus".

Examination of steelworkers' earnings over the past two and a half years illustrates how premium payments and overtime permit earnings to increase more rapidly than living costs even

though advances in basic rates stay close to the living cost index.

In January, 1941, average hourly earnings in the steel industry were 86.6 cents an hour. During the spring of 1941 a general wage rate increase of 10 cents an hour was granted. In the summer of 1942, the War Labor Board ordered another increase of 5½ cents an hour, making a total increase of 15½ cents in the two and a half years.

In June this year, average hourly earnings were 112.7 cents, an increase of 26.1 cents over January, 1941. Premium payments were the major factor in the advance of actual average earnings over the increase in basic rates.

Weekly earnings in January, 1941, averaged \$33.95 for an average work week of 39.2 hours. In June average weekly

earnings were \$48.79, reflecting both the increase in average hourly earnings and a longer work week—43.3 hours.

The picture for all manufacturing industry is similar. In 25 industries, the hourly earnings in January, 1941, averaged 75.9 cents; in May of this year, the average was 101.1 cents.

Average weekly earnings for a 40.2-hour week were \$30.61 in January, 1941. In May, the weekly average was \$45.90 for a 45.2-hour week.

Longer Work Week Boosts Earnings

War Manpower Commission's edict making the 48-hour week mandatory throughout the steel industry is having the effect of increasing average hourly and weekly earnings of workers still further. Earlier this year it was estimated the longer work week would add \$100,000,000 annually to the industry's payrolls.

For many workers, the longer work week will add \$7 or \$8 to weekly wages, and in some cases more.

War Mobilization Director James F. Byrnes warned against the dangers of demands for further increases in wages in his Aug. 16 broadcast to the nation. Wages as well as prices must be held if the fight against inflation is to be won, he said in pointing out that "take home"

income of factory workers has far out-distanced increases in the cost of living.

"To those who demand higher wages it is fair to recall that during the last war, from April, 1917, to November, 1918, a period of 19 months, the cost of living rose 29.5 per cent. In the first 19 months of our active participation in this war, from December, 1941, to July, 1943, the cost of living increased only 12. During approximately the same period the weekly wages of factory workers as a whole went up 34.7 per cent. This does not mean hourly wages. It means the money a man takes home each week. . . .

"Apart from those who before the war were unemployed or who were receiving substandard pay, no man or woman who is as well off as he was before the war started, has a right to complain unless he has first done his part to see that those who are less fortunate than he are justly treated.

"He should think first of the soldier's wife, the soldier's mother, the preacher, the teacher, the small tradesman, the state, county and city employes, the old folk living on small pensions whose purchasing power has gone down as the cost of living has gone up.

"There is no room in total war for the politics of pressure groups."

48-Hour Week in Mines Approved

War Labor Board acts to avert threatened fuel shortage. Higher coal prices expected

AN 8-HOUR day and a 48-hour week for the nation's coal mines was ordered last week by the War Labor Board in a move to avert a threatened fuel shortage. Miners now work a 7-hour day.

Miners would be paid time and a half for the extra hour, indicating an increase of \$9 in weekly paychecks.

The move, first announced by War Mobilization Director James F. Byrnes, is expected to enhance the possibility of restoring peace between the United Mine Workers and the operators whose dispute over wages resulted in three separate strikes, government seizure of the mines, and caused the fuel shortage.

Mr. Byrnes said the longer work week will be applied in those mines designated by Secretary of Interior Harold L. Ickes, federal custodian of the mines.

Coal prices will have to go up when the mines go on a 48-hour week it was conceded last week by Solid Fuel Administrator Ickes as he prepared the order putting the longer work week into effect in the mines wherever local conditions permitted.

Many miners now work 42 hours weekly and overtime pay for the additional six hours will mean a \$9 boost in weekly pay. How much coal prices will be permitted to advance as an offset is now being considered by OPA officials. Meanwhile Ickes has asked the War Manpower Commission to aid coal production by producing or eliminating labor turnover at the mines.

Incentive Wage Plan Causes Gary Strikes

Production at Gary, Ind., plants of Carnegie-Illinois Steel Corp. suffered a further setback recently with two unauthorized work stoppages, thereby adding to the long list of similar occurrences during recent months.

A strike of 180 men—30 cranemen and 30 hookers on each of three shifts—in the merchant mill warehouse at Gary, Aug. 9, made idle more than 1000 other workers. The dispute was over a wage incentive plan. Although the original contract calls for a 20 per cent incentive payment, the men are understood to

STEELWORKERS' EARNINGS AND COST OF LIVING

1941	°Average Hourly Earnings	°Hours a Week	Average Weekly Earnings	†Cost of Living
January	86.6	39.2	\$33.95	100.8
February	86.9	39.4	34.24	100.8
March	87.7	38.5	33.81	101.2
April	97.1	39.4	38.26	102.2
May	98.1	39.7	38.95	102.9
June	99.2	38.2	37.89	104.6
July	99.1	37.8	37.46	105.3
August	98.5	37.2	36.64	106.7
September	98.2	37.8	37.22	108.1
October	98.3	40.0	38.52	109.3
November	99.0	37.6	37.22	110.2
December	99.9	38.2	38.16	110.5
1942				
January	99.2	39.2	38.89	112.0
February	99.5	39.0	38.80	112.9
March	100.1	38.1	38.14	114.3
April	100.4	39.7	39.85	115.1
May	101.1	37.7	38.11	116.0
June	102.0	38.7	39.47	116.4
July	102.7	38.4	39.44	117.0
August	104.1	37.6	39.14	117.5
September	108.6	39.8	43.31	117.8
October	107.7	39.9	42.97	119.0
November	109.3	39.4	43.06	119.8
December	109.4	40.2	43.97	120.4
1943				
January	110.7	39.8	44.06	120.7
February	110.5	41.6	45.97	121.0
March	110.3	42.2	46.55	122.8
April	111.2	42.5	47.26	124.1
May	113.4	41.9	47.51	125.1
June	112.7	43.3	48.79	124.8

°American Iron and Steel Institute †Index of United States Department of Labor.

have been averaging 46 per cent, nevertheless they regarded this as inadequate.

Work was resumed the following day after Local 1014, United Steelworkers (CIO) union, which represents 23,000 workers in the Gary steel works, took action to prevent further unauthorized strikes. The union passed a resolution said to provide for expulsion of workers who take part in such strikes.

Second interruption occurred Aug. 11 when 18 shearmen in the sheet finishing department of the Gary sheet and tin

mills stopped work, affecting 60 other workers. Succeeding shifts also declined to work. This dispute also dealt with incentive payments. The men charged they were handling material heavier than that in customary practice, and because of this they were entitled to higher pay.

Material involved is for important military items, and as a result of the interruption in production the company stated it probably would not be able to fulfill its August commitments.

Present, Past and Pending

■ COAL MINE STRIKERS MUST STAND TRIAL

PITTSBURGH—Thirty coal miners indicted on charges of violating the Smith-Connelly antistrike law must stand trial Sept. 1, Federal Judge F. P. Schoonmaker held in overruling a motion to quash the indictment.

■ LAKE COAL SHIPMENTS TO BE INCREASED

WASHINGTON—Coal shipments to upper lake ports will be 10 per cent greater this season than in 1942, even though supplies there now are slightly lower than a year ago, according to Joseph B. Eastman, defense transportation director.

■ WHEELING STEEL HAD NO EXCESS PROFITS

WASHINGTON—Wheeling Steel Corp. has received a signed statement from the War Department which says the company realized no excessive profits during 1942 on prime or subcontracts with the major war procurement agencies.

■ AIRCRAFT PLANTS TO REQUIRE 200,000 MORE WORKERS

LOS ANGELES—Aircraft plants must find 200,000 additional workers before the end of the year if production of military planes is to be increased in quantities sufficient to defeat the Axis, Undersecretary of War Patterson declared here.

■ STEEL INDUSTRY IMPROVES SAFETY RECORD

NEW YORK—Steel industry safety records in 1942 improved slightly over 1941 despite pressure for record production and the employment of many inexperienced workers. The industry now stands third among 32 leading industries, according to a study made by the American Iron and Steel Institute from the records of the National Safety Council.

■ FORMER NONFERROUS MINERS RELEASED BY ARMY

WASHINGTON—Release of 627 former nonferrous miners from active military duty has been authorized by the War Department. They are the first lot of 4500 to be released to relieve the serious manpower shortage in copper, zinc and molybdenum mines.

■ COLUMBIA OFFERS PHYSICAL METALLURGY TRAINING

NEW YORK—Training in physical metallurgy for men and women employed in the metals industries will be given at Columbia university, beginning Sept. 13 in cooperation with the United States Office of Education.

■ 48-HOUR WEEK ORDERED IN NEWARK AREA

NEWARK, N. J.—Mandatory 48-hour week has been ordered for the Newark area effective Aug. 23 by the War Manpower Commission.

■ SMALL COMPANIES GIVEN MORE TIME TO PREPARE BIDS

NEW YORK—Naval procurement officials have revised procedure for issuing invitations to bid to provide more time for small companies to prepare estimates. Small plants in this area had complained invitations reached them ten days to two weeks later than other companies whose names appear on an approved bidders list maintained in Washington.

Steel & Wire Strike Halted by WLB Order

A three-day strike involving 4200 workers at the Cleveland plants of American Steel & Wire Co. was ended Aug. 18 by order of the Fifth Region War Labor Board. In ordering the strikers to return to their jobs, the board emphasized the new powers granted to the WLB.

Stoppage resulted from a union demand that time and a half be paid on Saturdays, regardless of whether or not the worker had been absent earlier in the week.

WLB Warning Averts Lackawanna Walkout

A strike at the Lackawanna plant of Bethlehem Steel Co. was averted last week following a warning from the War Labor Board that a walkout would violate the union's no-strike pledge.

Insisting the threatened stoppage "must not take place," the board urged the unionists to refrain from action that would prejudice their case involving wage demands and which is scheduled to be submitted to an arbitration hearing.

Walkout at Republic's Buffalo Plant Ended

Striking employes in the steel conditioning department and three bar mills at the Buffalo plant of Republic Steel Corp. returned to work Aug. 15. Walkout started in protest to the docking of two crane operators in the steel conditioning department for one hour each.

Coal Diverted to Plant Of Jones & Laughlin

Diversion of 13,500 tons of special-purpose metallurgical coal during August to a western Pennsylvania steel plant was announced last week by Solid Fuels Administrator for War Ickes. The coal will go to the Jones & Laughlin Steel Corp., Pittsburgh, which has insufficient coal for its by-product coke ovens because of reduced mine output resulting from manpower losses.

Metal Producers Granted Aid in Replenishing Stocks

Controlled materials producers now are allowed to replace such stocks in maintaining mill supplies at any time following shipments instead of within 60 days as previously. Inventories are still restricted to the level of average stocks maintained between Jan. 1 and May 1, 1943.

Get Into War Work or Fight—WMC Ultimatum

New Selective Service regulations aimed to relieve labor shortage in munitions industries and provide men for armed services. Critical skills stressed. Occupation outranks dependency as deferment claim

DESIGNED to hold essential workers on war useful jobs, to assure transfer of labor to jobs directly concerned with the war effort and to supply men needed for the armed forces without cutting war production, a series of changes in the rules for inducting men into military service under Selective Service was announced last week by the War Manpower Commission.

If anything, the new rules should serve to relieve labor supply conditions somewhat in the steel and metalworking industries. At the same time, however, it is apparent employment in these fields must be based more strictly than ever on the essentiality of the individual worker to the maintenance of war production, and that labor supply increasingly will be dependent upon the flow of men available through the United States Employment Service.

Naturally, whatever benefits result from the revision in the manpower regulations, they will be beneficial to the various industrial areas in proportion to the degree in which each is participating in direct war production. In this connection it is interesting to note that a larger proportion of the population of Ohio, Michigan and Kentucky is engaged in manufacture of armament and munitions than any other section of the nation.

Ten Per Cent in War Work

According to Robert C. Goodwin, fifth region director of the War Manpower Commission, 10.2 per cent of the population of this three-state region is now employed in turning out war materiel, a total of 1,530,900 men, women and youths—more than 704,000 in Ohio alone—being employed in the primary munitions industry. Only three other sections of the country come close to the fifth region in the percentage of their populations that are in front-line armament factories, according to Mr. Goodwin.

In the Pacific Coast states, where there are heavy concentrations of shipbuilding and aircraft construction, 9½ out of every 100 persons are working in the armament

industries, while the figure for New England is 9.1; for the Pennsylvania-New Jersey-Delaware region, 9.1; for the Illinois-Wisconsin-Indiana region, 7; and for New York State, 5.3. In all other states less than 5 per cent of the population is employed in munitions factories.

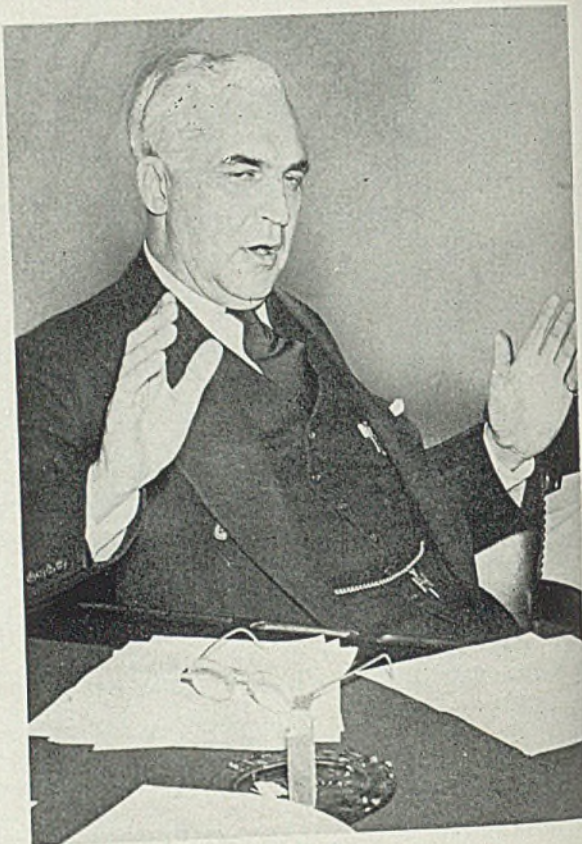
Data released by Mr. Goodwin show that in the nation as a whole 10,000,000 persons are employed in the primary munitions industry.

War Manpower Commissioner McNutt acted to tighten up war employment regulations as the nation prepared to induct pre-Pearl Harbor fathers into the military services.

It is not clear whether the move is preliminary to possible enactment of national service legislation after Congress reconvenes next month, but, as a general thing, it is felt enactment of a national labor draft law will hinge largely upon the way the latest program of War Manpower Commission works out. Lawrence A. Appley, executive director, WMC, states it is hoped a labor draft will not be necessary, but that this can not be guaranteed. The labor draft bill, known as the Austin-Wadsworth bill, was introduced in Congress last Feb. 8.

The War Manpower Commission's move last week in changing the rules applying to the induction of men under the Selective Service Act is said to involve the following four steps:

1. Establishment of a list of critical occupations covering skills urgently



PAUL V. McNUTT

"We must increase war production and at the same time give our armed forces the men they need"

needed in the war effort. (This list appears on page 63). Workers possessing such skills must get into war industry or supporting civilian activities by Oct. 1 or lose further claim to Selective Service occupational deferment.

2. Selective Service local boards are instructed to give greater consideration than ever before to occupational deferment.

Establish New Standards

3. Establishment of new standards for permitting the transfer of civilian workers from job to job. These standards are based on experience under employment stabilization plans and will be written into all such plans by Oct. 15. They are intended to stimulate transfer from less essential to more essential war jobs, and to reduce unnecessary job shifting.

4. Extension of the list of nondeferrible activities and occupations, providing that all men of military age must transfer from such jobs or be placed first on the list for induction by local boards.

In the newly established critical jobs list there are 149 occupations. On the revised nondeferrible list there are 60 occupations and 58 activities.

Commenting on the manner in which the program will be put into effect, McNutt emphasized, first, the new list does not displace the existing essential lists of activities and occupations, its purpose being to search out particular skills and

to see that they are so employed as to speed victory; second, the nondeferable list is limited and represents the type of employment which plainly is remote from the war effort; third, provisions governing the transfer of civilian workers are not greatly dissimilar to those applied in most local employment stabilization plans, and moreover, they do not apply to any person until acted upon by the area war manpower director and incorporated into the local stabilization plan; fourth, the program is based upon the best practice of local boards and local employment stabilization agreements; fifth, between essential activities and nonde-

ferable activities are many activities which are not classified.

Job transfers are controlled under employment stabilization plans developed under regulation No. 4, as originally issued April 17, 1943. Standards under which transfer will be allowed and statements of availability issued by employers are as follows:

(b) Issuance of statements of availability by employers: An individual whose last employment is or was in an essential or locally needed activity shall receive a statement of availability from his employer if:

(1) He has been discharged, or his em-

ployment has been otherwise terminated by his employer, or

(2) He has been laid off for an indefinite period, or for a period of seven or more days, or

(3) Continuance of his employment would involve undue personal hardship, or

(4) Such employment is or was at a wage or salary or under working conditions below standards established by state or federal law or regulation, or

(5) Such employment is or was at a wage or salary below a level established. (Please turn to Page 135)

List of Critical Occupations

Part 1—Production or Service Occupations

Aircraft-engine mechanic, all around; aircraft-engine tester, all around; aircraft-instrument mechanic; aircraft mechanic, all around; airplane navigator; airplane pilot, commercial; airship mechanic, all around.

Ballistician; bessemer converter blower; blacksmith, all around; blast furnace blower; blaster, mining; boat builder, steel or wood, all around; boilermaker, all around; boring-mill operator, all around; brick-layer, refractory brick.

Cabinetmaker, all around; cable splicer, telephone, telegraph or submarine cable; cable transmitter and receiver; cam-lay-out man; car inspector, railroad transportation; catalytic-converter engineer, synthetic rubber.

Cementor, oil well; chainmaker, all around; chamberman, acid; coke burner; computer, electric, seismic, or gravity; conductor, railroad transportation; converter operator, nonferrous smelting and refining; continuous-still engineer, synthetic rubber; coppersmith, marine, all around; core-maker, all around; cutting machine runner, mining.

Diamond driller, mining; diemaker, all around; die setter; die sinker; Dieselmachanic, all around; dispatcher, radio communications, telegraph or submarine cable; diver; driller, fine diamond dies; driller, oil well, cable or rotary.

Electrical tester, power equipment; electrician, installation and maintenance, all around; electrician, aircraft, marine, power house or submarine cable, all around; engineer, chief, first, second or third assistant, ship; engineer, locomotive, railroad transportation; engineer, turbine or Diesel; engineering draftsman, design.

Finisher, fine diamond dies; first helper, open hearth or electric furnace; flight dispatcher.

Foremen: included under this designation are only those individuals who are (1) utilizing in their supervisory jobs the knowledge and skills of one or more of the occupations included in the List of Critical Occupations, and (2) those who supervise directly or through subordinate foremen and supervisors production, technical or scientific work in essential activities, although the occupations of the workers supervised may not be listed. The second category includes only individuals who must be in jobs requiring an extensive knowledge of the production, technical or scientific work they are supervising, the exercise of independent judgment and responsibility for the products made or services rendered, and a training period of two or more years. In some plants, the supervisory personnel may be designated by other than supervisory titles,

and where they meet the requirements as outlined above they are included.

Form builder, scientific.

Glass blower, scientific laboratory apparatus. Heat treater, all around; heater, steel mill, all around; hoisting engineer, mining.

Inspector: Included under this designation are only those workers who are qualified to perform in one or more of the critical occupations appearing in this list, and who utilize the knowledge and skill of such occupations in inspecting work in order to insure uniformity and accuracy of products or services.

Installer, telephone or telegraph equipment.

Instructor: Included under this designation are only those workers who are qualified to perform in one or more of the critical occupations listed and because of their aptitude and experience have been assigned as instructors in training programs either in plant or vocational.

Instrument maker and repairer, electrical, mechanical or scientific.

Jewel bearing maker, all around; jointer, submarine cable.

Layout man, boilermaking, foundry, machinery or shipbuilding; lead burner, all around; lineman, telephone, telegraph or power, all around; load dispatcher, power or gas; locomotive engine repairman; loftsmen, aircraft or shipbuilding; loom fixer.

Machine driller, mining; machine tool set-up man; machinist, all around; machinists, marine, all around; mate, first, second or third.

Mechanician, communications equipment: This title includes individuals who maintain and repair telephone and telegraph equipment and circuits; technical broadcast equipment; radio-telephone and radio telegraph equipment; or submarine cable apparatus.

Miller, grain products, all around; millwright.

Miner, underground, all around. Included under this title are only those individuals whose job assignment requires them to perform the duties involved in driving underground openings including drilling, blasting, timbering. Due to standardizations of mining methods these functions may be performed by separate individuals whose occupational titles also appear in this list because the jobs meet the criterion of critical occupations. Since the term "miner" is generally used in the industry to identify underground workers, it should be clearly understood that it does not cover such workers as muckers, trammers and helpers.

Molder, bench or floor, all around; model maker, all around.

Observer, seismic; oil well gun perforator; oil well treater, acidizing; optical mechanic, all around.

Papermaking machine engineer; pattern-

maker, metal or wood; pipe fitter, marine; power shovel engineer, mining; precision lens grinder, all around; pulpit operator, steel mill; pumper, refinery, in charge; purification engineer, synthetic rubber.

Radio communications technician; radio telegrapher; radio photo technician; reactor engineer, synthetic rubber; receiver tester, radio or radar; refrigerator equipment repairman, gas or electric, all around; refrigerator engineer.

Sheet metal worker, marine, all around; shipfitter, all around; shipwright, all around; ship rigger, all around; ship captain; ship pilot; signal maintainer; still operator, chemical, all around; still man, petroleum processing; supervisor, see foreman; switchboard operator, power.

Tanner, all around.

Testing and regulating technician, telephone or telegraph; timbermen, mining, all around; tool designer; tool maker; train dispatcher; transmission engineer; tugboat captain; tugboat engineer.

Wood seasoner, kiln.

X-ray equipment service man.

Part 2—Professional and Scientific Occupations

Accountant (included under this title are certified public accountants and those who have comparable training, experience, or responsibilities).

Agronomist; anatomist; architect, naval; astronomer.

Bacteriologist.

Chemist.

Engineer, professional or technical. (This title covers persons who are actually engaged as engineers in the operating, research, or teaching phases of these professions, who are qualified either by having met the educational requirements or because of long experience. In addition, this title is intended to include those individuals who may specialize in certain phases of the professions listed below, such as mechanical engineers who specialize in the automotive, heating, or refrigerating engineering field but whose special designations have not been mentioned:

Aeronautical, agricultural, ceramic, chemical, civil, communications, electrical, marine, mechanical, metallurgical, mining, petroleum, radio safety.

Entomologist.

Forester.

Geologist, geophysicist.

Horticulturist.

Mathematician (including cryptanalyst); metallurgist; meteorologist.

Nematologist.

Oceanographer.

Parasitologist; pathologist, medical; pharmacologist; physicist; physiologist, medical; plant physiologist, or pathologist.

Seismologist.

Dominion Metal Output at Peak

Now produces 95 per cent of United Nations' nickel. . . Aluminum industry expanded 600 per cent since war's start

TORONTO, ONT.

BASE metals production in the dominion this year will reach new peaks as output of nickel, zinc and copper is expanded. A 25 per cent gain was made from 1939 to 1942, but present estimates indicate this year's showing will be even more impressive.

This big advance has not been obtained without considerable sacrifice on the part of producers.

Apart from a few concessions with respect to write-offs on new plant construction, the industry has been providing supplies at prices almost identical with those prevailing before the war.

Production of refined copper, nickel, and zinc this year is estimated to total 827,800 tons compared with 662,100 tons in 1939, according to the Wartime Information Board. Canada is now producing 95 per cent of the combined nickel output of the United Nations; 20 per cent of the zinc; 12½ per cent of the copper; 15 per cent of the lead; 75 per cent of the asbestos and 20 per cent of the mercury. For the first time since 1939 the government has presented production figures on base metals, as follows:

	1942 Tons	1939 Tons
Refined copper	270,600	232,000
Refined lead	243,800	191,000
Refined nickel	93,300	64,500
Refined zinc	216,000	175,600

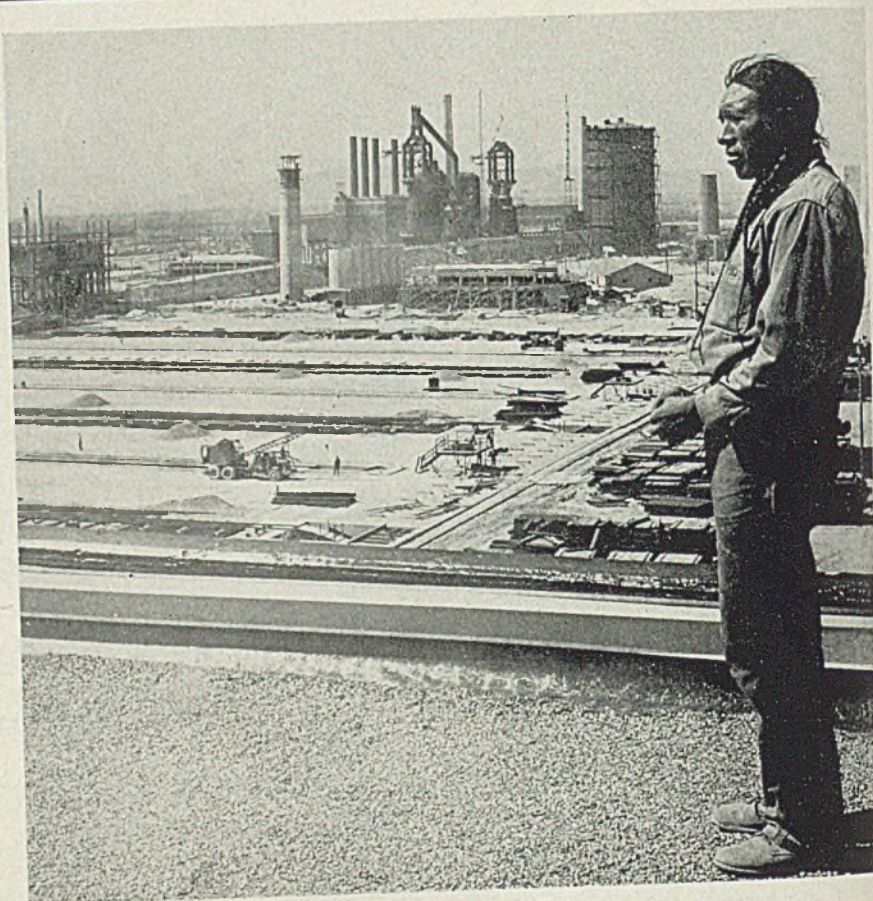
The government announcement states Canada is the greatest base metal exporting country in the world, and this year will attain the highest peak in Canadian history.

The aluminum industry probably provides Canada's most spectacular story of wartime expansion. Output is more than six times that of 1939, is more than the total output of the rest of the world in 1939, and is supplying about 40 per cent of the war requirements of the United Nations.

The search for molybdenum has met with considerable success.

J. Y. Murdoch, president, Noranda Mines Ltd., announces his company has acquired control of Canada Wire & Cable Co. Ltd.

J. H. Coffey, vice president and general manager of the government-owned Cutting Tool & Gauges Ltd., has been appointed deputy machine tool controller.



Much of the expanded steel output needed for the war must come from new facilities now nearing completion. Above, a Ute Indian construction worker at the \$180,000,000 Geneva Steel Works near Provo, Utah, surveys this bastion of steel which Columbia Steel Co. is building for the government

U. S. Steel Completes Arrangements To Operate New Geneva Steel Works

UNITED States Steel Corp. last week announced completion of arrangements with Defense Plant Corp., an RFC subsidiary, for operation during the war of the new government-owned steel mill in Utah, substantial completion of which is now scheduled for the end of this year.

Under terms of the agreement, these facilities will be operated for the account of Defense Plant Corp. by Geneva Steel Co., a newly organized United States Steel subsidiary.

No operating fee or other compensation is to be paid Geneva Steel Co. or the Steel corporation for their services in directing the wartime operation of this large plant. All costs incidental to its management and operation will be paid by Defense Plant Corp. and all proceeds from the sale of its products will be for account of Defense Plant Corp.

When completed, this works will be by far the largest integrated steel mill west of the Mississippi. It will cost approximately \$180,000,000. The site of the main plant at Geneva, Utah, known as

Geneva works, embraces more than 1600 acres. The plant is being erected for Defense Plant Corp. by Columbia Steel Co., Pacific Coast subsidiary of the United States Steel Corp.

Despite supply and construction difficulties the plant, embracing raw material facilities, coke ovens, blast furnaces and steelmaking and finishing equipment having annual capacity of approximately 1,200,000 tons of ingots, 700,000 tons of plates and 250,000 tons of structural steel, is nearing completion.

Jones Says Light Metal Output Now Adequate

Jesse Jones, Secretary of Commerce, last week announced production of aluminum and magnesium in government-owned plants is now at a rate that insures an adequate supply of these metals.

Aluminum produced in government-owned plants in July was 73,292,000 pounds; production by Aluminum Co. of

Ingot Rate Remains Unchanged at 98½%

America and Reynolds Metals Co. 77,600,000 pounds—a total of something over 150,000,000 pounds compared to pre-war monthly output of about 25,000,000 pounds.

Government-owned plants produced 31,410,000 pounds of magnesium in July; and Dow Chemical Co., the only private producer, 3,500,000 pounds. Prior to the war, total production in this country was 500,000 pounds monthly.

The total production of aluminum in government-owned plants through July amounted to 515,899,725 pounds.

July Pig Iron Output Scores 4 Per Cent Gain

Pig iron production increased moderately to 4,972,334 net tons during July, compared with June output of 4,786,944 and 4,997,670 tons in July, 1942, the American Iron and Steel Institute reports. For the year to date iron production amounts to 34,972,244 net tons, against 34,123,048 in like 1942 period.

Production of ferromanganese and spiegeleisen last month totaled 50,411 net tons, bringing aggregate output for the year to 393,944 tons. In comparable period last year production amounted to 358,973 tons.

Combined output of pig iron, ferromanganese and spiegeleisen totaled 5,022,745 net tons last month, representing 93.5 per cent of capacity. Aggregate output for the year to July 31 amounted to 35,366,188 tons, representing 96.1 per cent of capacity. In like period a year ago production amounted to 34,482,021 tons.

DISTRICT STEEL RATES

Leading Districts	Percentage of Ingot Capacity Engaged in		Same Week	
	Week Ended Aug. 21	Change	1942	1941
Pittsburgh	100	-0.5	94	100
Chicago	98.5	-1	102	101.5
Eastern Pa.	95	None	95	95.5
Youngstown	98	None	96	98
Wheeling	95	+1	83.5	92
Cleveland	94	+1.5	94.5	93
Buffalo	90.5	None	90.5	93
Birmingham	95	None	95	90
New England	97	None	90	90
Cincinnati	97	+10	88	88
St. Louis	89	None	83.5	98
Detroit	86	-4	91	92
Average	98.5	None	97.5	96.0

*Based on steelmaking capacities as of these dates.

Blast furnace at Holt, Ala., scheduled to be relighted Oct. 1; another at Ensley, Ala., Aug. 23

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week remained unchanged at 98.5 per cent of capacity.

A year ago the national rate was 97.5 per cent; two years ago it was 96 per cent, both based on capacities as of those dates.

Carnegie-Illinois Steel Corp. recently blew in its Gary No. 3 blast furnace, which was blown out July 14 for relining from the mantle up. The corporation's Gary No. 8 furnace was taken out of blast Aug. 12 for relining; while its South Chicago No. 4 furnace, taken out July 29 for relining, is still idle. Of the Chicago district's 39 stacks, 37 are active.

Tennessee Coal, Iron & Railroad Co.'s No. 4 blast furnace at Ensley, Ala., is scheduled to be back in operation Aug. 23. The idle furnace at Holt, Ala., will likely be out until Oct. 1.

Stamping Research Pushed By Pressed Metal Group

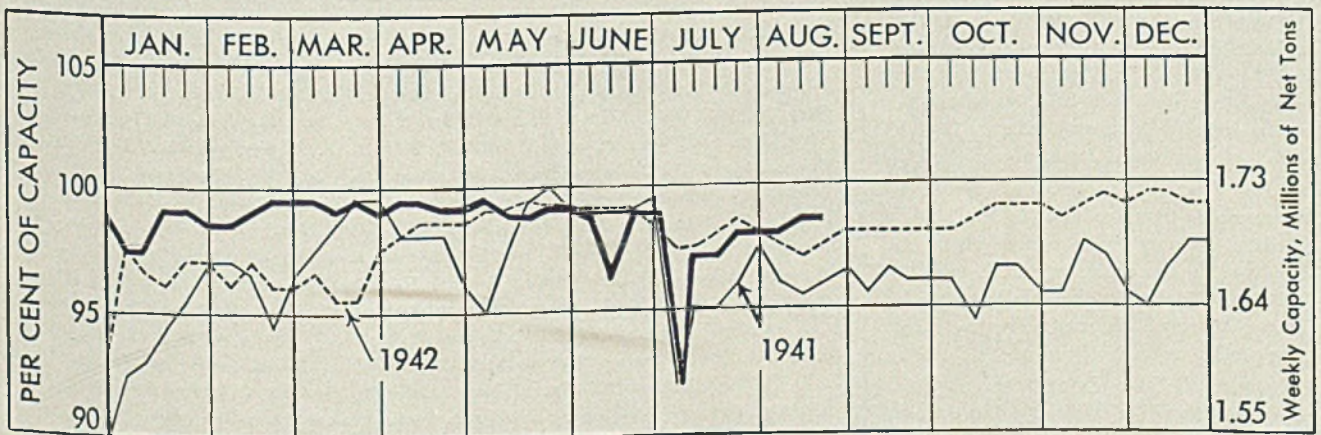
The Pressed Metal Institute, New York, has launched an intensive program of research for development of new and wider markets for stampings in the postwar period. It is believed many techniques developed during the war present interesting possibilities in production of consumer goods.

Considerable emphasis also is being placed upon redesigning of ordnance parts. In one case, changeover in the trigger housing for a light carbine from a forging to a welded stamping assembly resulted in savings of 720,000 machine hours and 28 per cent in material.

Steel Employes in Armed Services Total 165,000

Almost 165,000 steel industry employes have left their jobs to enter the armed services through enlistment or induction, recent survey by the American Iron and Steel Institute shows.

COMPARATIVE STEEL INGOT OPERATIONS



STEEL INGOT PRODUCTION BY MONTHS

	Net Tons, 000 omitted											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	7,027	7,376					
1942	7,112	6,512	7,892	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150
	PIG IRON PRODUCTION											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	5,194	4,766	5,314	5,035	5,173	4,836	5,023					
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,351	4,766	4,784	4,721	4,860	4,707	5,014

Contractors Assured by War Department of Prompt Settlement

Procurement regulation No. 15, just issued, gives full instructions as to method to be followed when Army orders are cancelled because of shifting military requirements. Congress expected to consider subject soon

WASHINGTON

FAIR, equitable and prompt settlement of contracts terminated because of shifting military requirements was assured war contractors last week by the War Department when it issued procurement regulation No. 15 giving full instructions as to the method to be followed when contracts are cancelled.

The regulation provides government contracting officers and contractors with directions as to the basis upon which prompt determination and payment of the amounts due to contractors will be made whenever war contract terminations are necessary.

In addition, an accounting manual will be issued shortly to assist contractors and government audit personnel. The manual will govern the preparation of cost information and use in negotiating termination settlements.

A postwar planning bill which is to come up for active hearings this fall is S. 1268, introduced by Senator James E. Murray (D. Mont.). Known as the War Contract Termination act, it is being studied by the Senate Small Business Committee, of which Senator Murray is chairman. Under it, payments would be made to war contractors and subcontractors upon termination of their contracts. Such payments would amount to "not less than 75 per cent of the amount certified by a contractor or subcontractor" and "the payment shall be made in not less than 30 days after the certification." It also would authorize direct or guaranteed loans above the 75 per cent minimum.

Purpose is to place cash in the hands of these contractors to enable them to keep their heads above water financially during the postwar changeover period. Senator Murray says such a law already is urgently needed.

He says, the War Department already has terminated 3764 contracts. More than 2300 cases are still unsettled. More than 400 of these have remained unsettled for more than six months. In only 44 cases have advance payments been made by the War Department—and to prime contractors only."

The committee now is preparing a report of which contents have not been revealed but which is expected to ex-

press some impatience with the performance that has been turned in to date by the Smaller War Plants Corp. Heretofore this corporation has been striving to keep small plants busy by finding war work for them. However, the committee's summary may be modified by the fact that Robert W. Johnson has resigned his commission as a brigadier general in the Army, that he is devoting his entire effort to finding work for small plants and that he now is seeking essential civilian work as well as war work for the small plants.

In connection with contract termination, the subject of contract renegotiation continues to hold top rank in the consideration of government authorities and business. So high up among important matters before Congress is the subject that the full Ways and Means Committee of the House will convene Sept. 9 to resume hearings on the matter.

Grants Kaiser Exception to Carbon Steel Ceiling Price

Base price of \$43 a gross ton, f.o.b., for rerolling grade of carbon steel ingots at Pacific coast ports has been allowed by

Office of Price Administration to Kaiser Co. Inc., Fontana, Calif. This compares with ceiling price of \$31 a gross ton, established in revised price schedule No. 6. The exception is retroactive to June 10.

Extras as published by Carnegie-Illinois Steel Corp. for semifinished carbon steel, including \$5 a gross ton extra for forging quality ingots, are to be used in calculating a net price.

Kaiser's mill is coming into production at Fontana. Exception to schedule based on customary differentials between East and West Coast prices was asked.

Restrictions Eased on Use Of Carbon Steel in Axles

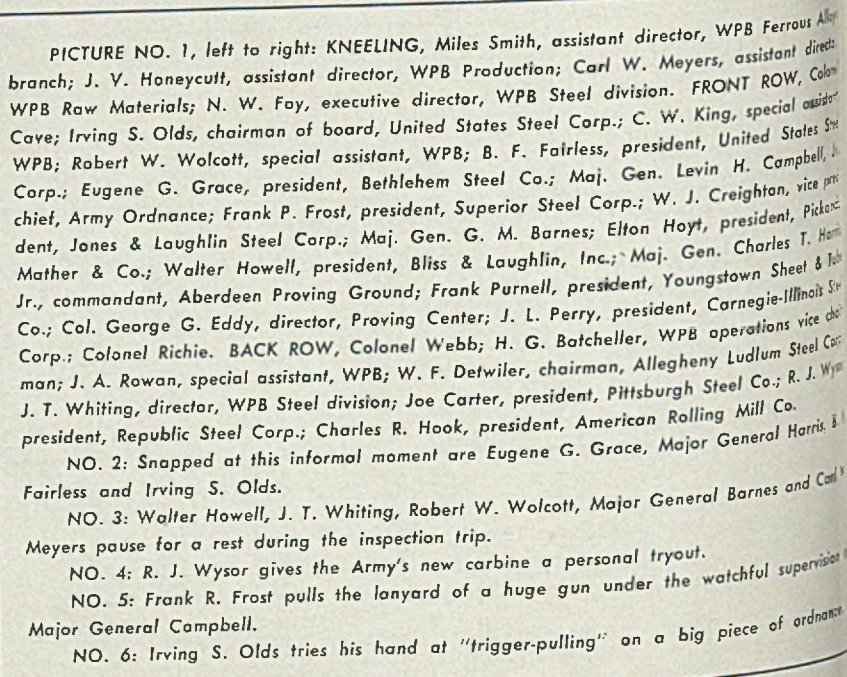
Restrictions have been removed on the manufacture of carbon steel axles and forgings in the higher tensile range for use by railroads and transit services. Changes to permit this were made in list 1 of order L-211.

Steelmen Witness Display Of Army's Fire Power

Superior quality steels give American artillery projectiles greater striking and penetration power than those of any enemy nation.

This was the consensus of members of the Iron and Steel Industry Advisory Committee of WPB during a recent visit to the Aberdeen Proving Ground, Maryland.

The steel men witnessed a demonstration of fire power of the Army's medium and long range artillery, anti-tank and antiaircraft weapons.



PICTURE NO. 1, left to right: KNEELING, Miles Smith, assistant director, WPB Ferrous Alloy branch; J. V. Honeycutt, assistant director, WPB Production; Carl W. Meyers, assistant director, WPB Raw Materials; N. W. Fay, executive director, WPB Steel division. FRONT ROW, Colonel Cave; Irving S. Olds, chairman of board, United States Steel Corp.; C. W. King, special assistant, WPB; Robert W. Wolcott, special assistant, WPB; B. F. Fairless, president, United States Steel Corp.; Eugene G. Grace, president, Bethlehem Steel Co.; Maj. Gen. Levin H. Campbell, chief, Army Ordnance; Frank P. Frost, president, Superior Steel Corp.; W. J. Creighton, vice president, Jones & Laughlin Steel Corp.; Maj. Gen. G. M. Barnes; Elton Hoyt, president, Pickens Mather & Co.; Walter Howell, president, Bliss & Laughlin, Inc.; Maj. Gen. Charles T. Harris Jr., commandant, Aberdeen Proving Ground; Frank Purnell, president, Youngstown Sheet & Tube Co.; Col. George G. Eddy, director, Proving Center; J. L. Perry, president, Carnegie-Illinois Steel Corp.; Colonel Richie. BACK ROW, Colonel Webb; H. G. Batcheller, WPB operations vice chairman; J. A. Rowan, special assistant, WPB; W. F. Detwiler, chairman, Allegheny Ludlum Steel Corp.; J. T. Whiting, director, WPB Steel division; Joe Carter, president, Pittsburgh Steel Co. president, Republic Steel Corp.; Charles R. Hook, president, American Rolling Mill Co.

NO. 2: Snapped at this informal moment are Eugene G. Grace, Major General Barnes and Carl W. Fairless and Irving S. Olds.

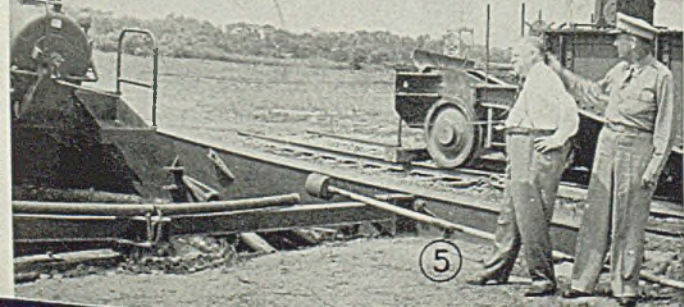
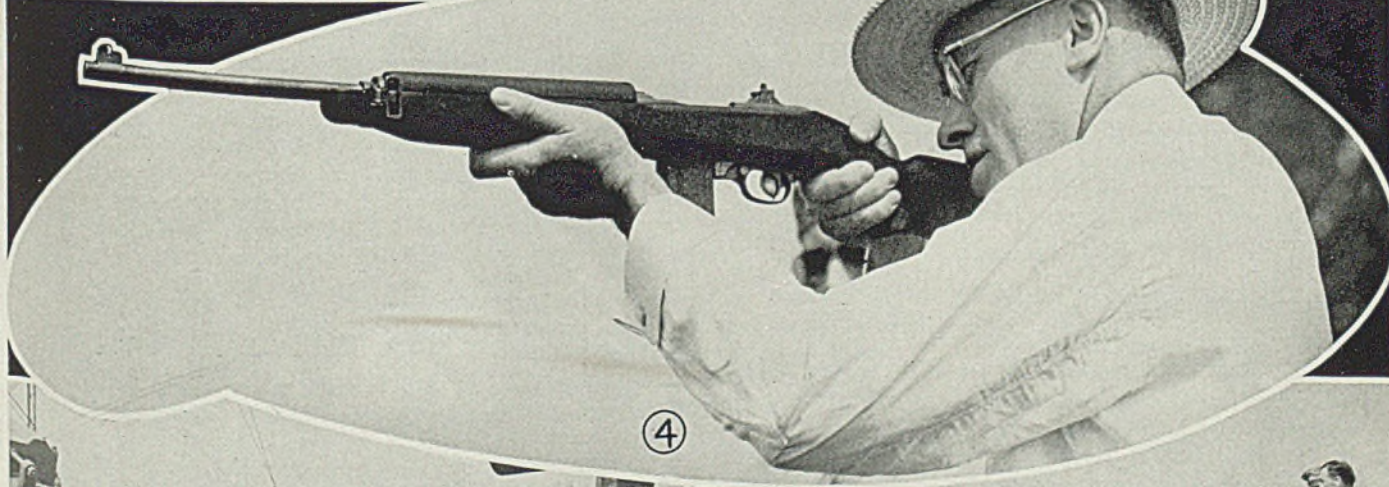
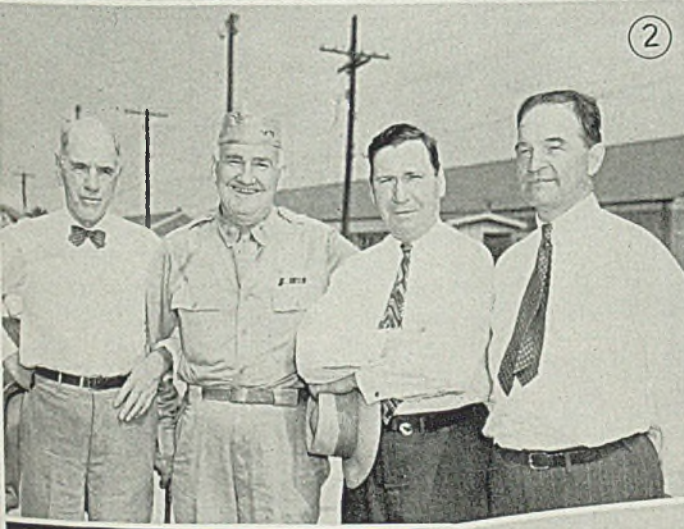
NO. 3: Walter Howell, J. T. Whiting, Robert W. Wolcott, Major General Barnes and Carl W. Meyers pause for a rest during the inspection trip.

NO. 4: R. J. Wysor gives the Army's new carbine a personal tryout.

NO. 5: Frank R. Frost pulls the lanyard of a huge gun under the watchful supervision of Major General Campbell.

NO. 6: Irving S. Olds tries his hand at "trigger-pulling" on a big piece of ordnance.

IRON AND STEEL ADVISORY COMMITTEE VISITS ABERDEEN PROVING GROUND



Against Tax Increases

AT EXPLORATORY conferences on the subject of new tax legislation, Undersecretaries Patterson and Forrestal, of the Army and Navy Departments, joined with the War Production Board in counselling against any tax increases that would discourage full production for war. This fact was revealed by Secretary of the Treasury Morgenthau in a press conference. First, the services want to keep the levies from getting beyond the point where business would begin to lose interest in fullest war production. Second, the services point out that many companies are paying bonuses for increased production and they are vitally interested that the personal income tax on employes should not be so high "it would interfere with the personal incentive to produce more."

Shock Bracer?

When the Ways and Means Committee of the House renews hearings on the Contracts Renegotiation Act this fall, one of the recommendations that it will consider is a proposal under which the Army, Navy, Maritime Commission and other government procurement agencies would be able to protect contractors against the shock of the war's end. The proposal is that the procurement agencies, upon cancelling contracts, would turn over to the contractor a Treasury credit for an amount of money equal to 75 per cent of the unfilled value of the contract. Thus the contractor, now in many cases prevented by contract renegotiation and by high excess profits taxes from accumulating comfortable reserves for the changeover period ahead, would be provided with cash money to finance reconversion and thus provide employment with minimum delay. The hearings will deal largely with safeguarding provisions that would permit fair government recovery of some portion of this money after the initial payment has fulfilled its purpose; indications are that most members of the Ways and Means Committee favor the basic idea.

Segregate Alloy Scrap

Now under consideration is a campaign to intensify segregation of alloy steel scrap. M-24-c makes such segregation mandatory at all plants generating five or more tons of alloy steel scrap monthly, or one or more tons of high-speed steel scrap. Thus it fails to cover thousands of plants that are producing scrap in quantities that are small individually but which add up to large totals. In addition, many manufacturers are not as careful about segregation as they might be. Result is a lot of mixed

scrap which causes gray hairs among dealers and at which the mills gag. The present setup must be revised sharply in order to prevent any more wastage of critical alloying elements than is absolutely necessary. As part of the campaign of intensification, the Navy color

TOUGH GOING

Pressure to swell iron and steel production by developing and using new reduction methods, such as sintering or nodulizing of iron ore in cement and brick kilns, has eased. This is because of the problem of keeping existing smelting and melting capacity supplied with metallics. Due to the late opening of the 1943 lake navigation season the iron ore movement is some 8,000,000 to 9,000,000 tons behind that of 1942.

With new lake ore carriers coming into service War Production Board spokesmen say they hope to cut this to 5,000,000 tons before the end of the season—provided we have an "average late season" this year. Most optimistic expectation is that the lake movement this year will be in the neighborhood of 87,000,000 gross tons compared with 92,000,000 in 1942. These spokesmen believe that by an intelligent distribution of the ore all requirements will be taken care of up to opening of the 1944 navigation season.

scheme of identifying segregated alloy scrap will be simplified and adopted by Army Ordnance.

Easier Said Than Done

An old plate mill superintendent stopped in STEEL's Washington office last week and expressed the opinion an additional 5,000,000 tons of plates could easily be rolled this year if plates were turned out in wide widths and then end-cropped and cut into 40-foot multiples for shipment, the rest of the cutting to be done with oxyacetylene torches at shipbuilding and other plants.

The answer is that this is the practice wherever possible. Practical considerations prevent it from being universal. Most mills lack sufficient heating capacity to keep the mills rolling at capacity. In some cases there are other bottlenecks, as in slabbing capacity. It is a fact that all the plate shipped from continuous strip mills is simply end-cropped and shipped as rolled to shipyards and other consumers—and the latter get credit for returned scrap.

Big Success

The Controlled Materials Plan has turned out to be a big success. When it first was proposed many war contractors objected to it. The automobile industry was a unit in denouncing it as a scheme aimed at helping the steel industry at the expense of its customers. When the CMP became fully effective on July 1 its proponents were highly gratified at the total absence of "squawks." They were much pleased, in a recent meeting with representatives of the automotive industry, to hear the latter admit that the CMP has turned out "well". . . . The success of the CMP device in allocating steel in an effective manner is one reason why personnel in the Steel Division has dropped from some 800 to around 700 people.

Grade-Labeling

If the war continues sufficiently long, it is possible that "grade-labeling" may figure prominently in the sale and distribution of steel products. The wartime metallurgy which has been developed to permit most effective use of our materials and which continues to be worked out is having the effect of standardizing the product of the different producers. In normal times the different producers sold tin plate, galvanized sheets and other products under trademarked names—and prestige developed for the different trademark products was a factor of great importance in winning consumer acceptance. Now, with the different producers under compulsion of meeting tightening Army and Navy specifications, differences between quality of competing lines is tending to vanish. In other words, the tendency now is to order steel to exact government specifications, irrespective of where it is to be made. A number of steel executives thinking along these lines fear that if this practice—which they all admit is sound wartime metallurgy—continues long enough it will become the custom. They feel that such a change might make the steel industry far less colorful in the future than it has been in the past.

More Cutbacks in Sight

All war agencies have been instructed by "Assistant President" James Byrnes to set up staffs to check production programs in order to make sure that all war materiel in production is usable. This came from the discovery that certain items no longer are being used in this war. As a result some further cutbacks are in sight. No specific items have been identified. Tank production is to be cut back still further according to present indications.



Your child's best friend...

THE PARASITIC FRUIT FLY, *Drosophila*, is perhaps the most important creature in the world to scientists today. Because its study may reveal what the character of our own children may be in the future.

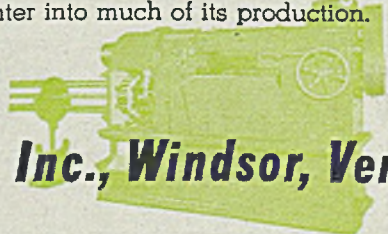
Drosophila is a perfect specimen for laboratory study, because a generation flickers past in from 8 to 12 days. As a result, scientists have been able to study and record a million breedings! And the entire mechanism of heredity has thus been revealed!

But if *Drosophila* is a friend to mankind, consider the influence of machine tools on human welfare. Do you know why it is that some countries, so rich in natural resources, still harbor hundreds of millions living close to starvation? And why the highly indus-

trialized countries represent the greatest advance in civilization? The answer is machine tools!

Machine tools have vastly increased the output of manufacturers and have shortened the customary hours of labor. They have not reduced the number of persons required to do the world's work. They have eliminated much of the back-breaking labor which would otherwise be required.

Cone Automatic Machine Company is proud to be a part of such an essential industry. Proud, also, to know that whatever we Americans build for the future, Cone Multiple Spindle Automatic Lathes will most certainly enter into much of its production.



CONE Automatic Machine Company, Inc., Windsor, Vermont

"Black Diamonds" Get New Lustre As Postwar Potentialities Develop

Long-range prospects for solid fuels considered promising with petroleum reserves shrinking and new uses for coal coming to front, principally its utilization as the source of synthetic oil

WASHINGTON

STUDENTS of the coal mining industry are convinced it is going to be a healthy industry after this war and that it will not undergo the severe curtailments it experienced after World War I. There may be a letdown in consumption immediately after the war as an accompaniment to the delays in reconverting many war industries to a peacetime status. But long-range prospects for the coal industry are considered bright.

There are several reasons for this optimistic view. The first is that new discoveries of petroleum reserves for a number of years past have averaged about 30 per cent of consumption, thus diminishing the possibility oil again will elbow coal out of the picture as it did on so vast a scale in the 20's and 30's. Geologists expect much additional petroleum will be discovered in the future but such discoveries, they feel, will not be on a large enough scale at any time to prevent coal from enjoying a large and growing demand.

Huge Reserves of Coal

Second reason is our huge reserves of coal. Writing recently in *Coal Age*, Secretary of the Interior Ickes, who also is Petroleum Coordinator for War, as well as Solid Fuels Administrator, reported 1942 consumption was equivalent only to one-3830th part of our known coal resources—and half of these reserves are of high quality. That is, we have enough coal to meet requirements for generations to come. Even though some fine deposits of coking coal are nearing depletion, he says, many large deposits of high-grade coking coal remain to be opened and developed.

Third reason is that research has shown and continues to show that coal has many uses and potential uses other than for use as fuel. Probably the biggest potential new use of coal, in the opinion of experts, is as a source of synthetic fuel oil and motor fuel. This problem has been studied since 1935 by the bureau and since 1937 oil has been produced in an experimental direct-hydrogenation plant at the Pittsburgh Experiment Station. This plant can handle only 100 pounds of coal in 24 hours,

so that about all that can be done with it is to explore the possibilities in a preliminary way.

Experience with the plant has proved that we can synthesize oil and gasoline from coal. The plant has been used with coal and lignite from fourteen of the most important deposits. The yield has ranged all the way from 65 to 136 gallons of gasoline per ton of coal or lignite. Octane rating of this gasoline has been 70 to 75, which can be increased to 85 or 90 by addition of tet-

MINE CONTROL

The Coal Mines Administration has begun survey of the productive efficiency of a large number of coal mines preliminary to determining the applicability of the provisions of the Smith-Connally Anti-Strike act relating to the release of mines from government control.

Federal managers of the mines being surveyed have been directed to submit their opinions, and factual data as to whether the productive efficiency prevailing at those mines prior to the time the government took control of them has been restored.

Under the Smith-Connally act, the government must restore possession of the coal mines to their owners as soon as practicable after restoration of the productive efficiency which prevailed prior to taking possession of the mines, but in any event not more than sixty days after such restoration.

raethyl of lead. Investigations now being made are aimed at getting a product with octane rating of 100.

Informed estimates are that the cost of producing coal gasoline would be somewhere between 12 and 25 cents a gallon or two to four times the cost of producing petroleum gasoline.

However, it is believed further research will bring down these costs. For instance, only 40 to 45 per cent of the original heat units in the coal are carried over into the gasoline; further ex-

periments may result in elimination of much of this waste. The bureau believes that costs also may be reduced sharply by producing in a single plant a range of products including not only synthetic oil and gasoline, but also the various coal tar derivatives, phenol, toluol, vylol, creosols, solvent naphtha, sulphate of ammonia and others. The hydrogenation process results in much greater recovery of these products than is possible in the coke-making process.

Coal experts expect a great increase in demand for such products after the war for new chemical uses, including their use for making styrene for synthetic rubber and their use by plastic molding industry.

It is pointed out that a great deal remains to be done to pave the way for creation of a commercial synthetic oil and gasoline industry in this country. Senator O'Mahoney introduced a bill, S. 1243, under which Congress would authorize the Bureau of Mines to construct and operate an industrial-scale pilot plant. The bureau also recently has had the benefit of methods successfully employed by the Imperial Chemical Industries in England with a direct hydrogenation plant having capacity for producing 2540 barrels of fuel oil and gasoline per day. The bureau believes that the working out of successful methods here is only a matter of time.

Coke Probably Will Be Cheaper

Bureau experts are of the opinion that after the war there is a strong possibility that by-product coke ovens can be operated at close to their present capacity. It has two main reasons for this belief. High production will be warranted by continuing improved methods of operation developed during the war, thus cutting production costs and at the same time turning out needed coal tar products. The other reason is that coke not only should be cheaper after the war, but the fact that it gives off no smoke should widen its use by industry, by public utilities and by consumers in general.

In this connection, the bureau will devote a lot of effort in the 1943-1944 fiscal year to broadening its studies of the gas and by-product characteristics of American coals. While this is a war measure, aimed at meeting coke requirements of the blast furnace industry, particularly the new blast furnaces in the West, the experience gained is expected to prove of value in the postwar era.

In addition to being a more important factor in our overall economy over the long-range future, the coal industry also will be an important one in the im-

mediate postwar period, mining engineers say. While coal mines are permitted to get some equipment under the priorities system, they are potential customers for millions of dollars of equipment.

Recently at Washington and Pittsburgh the O'Mahoney War Minerals Subcommittee of the Senate Committee on Public Lands heard testimony which may cause it to report favorably to the full committee on a project to appropriate an amount of money sufficient to permit establishment of synthetic gasoline and fuel oil. Two members of the House Mines and Mining Committee sat in these hearings and participated in developing testimony.

A typical oil industry view was that expressed by Ralph K. Davies, now Deputy Director, Petroleum Administration for War. We will always need an oil industry, he said, and without oil there can be no oil industry.

Dr. Sayers pointed out that it took the Germans from 1913 to 1926 to get their first commercial-scale plant in operation to convert coal to oil and gasoline and he would make no promise as to how long it would take to do the job here.

An idea of the great new market for steel in the various types of applications that would be opened up through crea-

tion of a commercial synthetic liquid fuel industry was obtained from a statement by A. C. Fieldner of the Bureau of Mines. Preliminary estimate is that construction of a single plant with capacity for producing only 3500 barrels of synthetic gasoline per day (365 days per year) would require about 28,500 tons of steel.

Many Products Comprise Plant

Such an establishment would comprise a steam generating plant; a power generating plant; coal receiving, storing, crushing, washing, drying, grinding and pasting facilities; equipment for manufacturing, storing, compressing and circulating hydrogen; reaction chambers, including catch pots; high-pressure type preheaters and heat exchangers; pumps for paste, middle oil, water and scrubbing oil; centrifuges; various other pumps and motors; other tanks; other piping; also cranes and other service equipment.

The steel required to produce synthetic gasoline figures out to about 8 tons per 42-gallon barrel of capacity.

From Pittsburgh the subcommittee went to Salt Lake City, Utah, to hear testimony about possibilities of extracting oil from oil shale, and its schedule calls for a hearing at Sheridan, Wyo., on

the possibilities of winning oil from lignite deposits.

Bureau of Mines representatives are encouraged by results that have been obtained at its small, laboratory-scale pilot plant at the Pittsburgh Experiment Station where the Bergius process for direct hydrogenation of coal is used. They also are encouraged by what two of their experts, Dr. W. C. Schroeder and Dr. H. H. Storch, learned about successful large-scale hydrogenation methods in a trip to England in May of 1943.

Pending legislative action on the matter of an industrial-scale pilot plant, the Bureau of Mines will continue its development work at the small Pittsburgh pilot plant, under direction of Dr. Storch. In addition, it will investigate, in another small pilot plant, now under construction at Pittsburgh, synthesizing oil by combining carbon monoxide and hydrogen by the Fischer-Tropsch process.

Experts say that if synthetic oil production comes to this country on a commercial basis it will provide a vast new market for products of the metal-producing and metalworking industries. "If synthetic oil comes to this country," says Dr. Schroeder, "it will mean more to steel than the oil industry ever did in the past."

Lightweight Spirally Welded Pipelines Carry Fluids to Army

SPIRALLY welded steel pipe for transportation of gasoline, water and other fluids, which may be laid at the rate of 10 to 30 miles per day, has contributed in a large measure to success of the Allied drives in North Africa and Sicily and is destined to be helpful in the campaigns now contemplated.

The spirally welded pipe was developed by the Naylor Pipe Co., Chicago, a number of years ago. It is fabricated from 14-gage hot-rolled

strip with a welded lock joint in 20-foot lengths, 4 inches in diameter. Standard weight line pipe nipples 4 inches long are welded to the ends of each length. These nipples are grooved so that the pipe lengths may be quickly joined by unskilled men in the field through the use of mechanical, bolted couplings designed by the Vitaulic Co. of America, New York. The couplings are of 2-piece cast steel construction, fitted with bolts on each side. Each coup-

ling has a neoprene gasket which eliminates gasoline leakage.

The pipe, made by a number of companies in addition to Naylor, has less than half the weight of conventional pipe, averaging 4 pounds per foot against 10½ pounds for standard line pipe. It is flexible to a considerable degree, and may be laid over uneven terrain and around curves. A 4-inch line has a capacity of 5000 barrels per day.

The entire system was made possible by the work of Sydney S. Smith, manager, Shell Oil Co., products pipe line department, in developing automatic controls. Only one type of product is shipped through each line and no communication system is necessary because of automatic cutoffs. Including pumping stations, the total weight of the system is only 13 tons per mile and average cost \$3000 per mile.

In accompanying photograph, Mr. Smith looks on while a 20-foot section of the pipe is carried into position.



PRIORITIES-ALLOCATIONS-PRICES

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

INSTRUCTIONS

CONTROLLED MATERIAL ORDERS: Reduction in quantity of controlled materials covered by an authorized controlled material order does not constitute placement of a new order, and the reduced order retains its place in the mill schedule. However, where the quantity of controlled materials covered by an authorized controlled materials order is reduced below a minimum mill quantity, the producer may reject the order when the reduction is made and may remove it from his production schedule. In removing orders from his production schedule, however, the producer may not discriminate among customers. (CMP No. 1)

CMP REGULATIONS

SAFETY EQUIPMENT: Employees of persons operating businesses listed in schedules I and II of CMP regulation No. 5 are eligible to use their employers' MRO preference ratings to purchase safety equipment. If this procedure is used, an employee must obtain from his employer a certificate, indicating: type and size of safety equipment required; that it is required in the employer's business; that the employer requires the employee to furnish the equipment; and that the employee does not possess any satisfactory substitute. Employer and employee must sign this certificate. (CMP No. 5)

L ORDERS

HEAT EXCHANGERS: Purchase orders for heat exchangers, authorized prior to July 9, are subject to scheduling provisions of order L-172 unless otherwise directed by WPB in a particular case. A tube bundle or shell or pressure vessel designed for replacement in a critical heat exchanger in group I or II, as defined in the order, is included in its respective group. (L-172)

CONSTRUCTION EQUIPMENT: Construction equipment dealers or distributors located outside of the 48 states or the District of Columbia must obtain authorization (WPB-1319, formerly PD-556) from WPB to purchase repair parts for stock or inventory. Branch offices or warehouses outside the continental United States must secure similar authorization even though their main offices are located in the states or the district of Columbia (L-192)

STEEL SHIPPING DRUMS: Used steel shipping drums which are suitable for reuse for packing either edible products or naval stores products may not be used for any other purpose but are restricted to the uses of those industries. Exemptions relating to steel drums used for shipments licensed by the Office of Economic Warfare have been restricted to apply only to those drums actually used for exports to points outside continental United States. Used steel drums may be used for packing turpentine. (L-197)

OIL COUNTRY TUBULAR GOODS: Schedule 9, as amended, to limitation order L-211, provides an additional permitted size of seamless casing. This order establishes national emergency specifications for steel products. (L-211)

VALVES AND VALVE PARTS: Manufacturers of brass or bronze valves now are permitted to use brass or bronze, in addition to malleable iron or steel, for union bonnet rings, union rings and stuffing box packing nuts. (L-252)

FARM MACHINERY: New production quotas and descriptions of farm machinery for export to Canada have been established in schedule X-10 of order L-257-a. Machinery

and equipment produced for Canada under the order may be carried over and shipped after the expiration date of the production period (July 1, 1943, to June 30, 1944). Goods produced for other foreign countries during the production period must be shipped by the end of the period (June 30, 1944) unless covered by a Lend-Lease order or an export permit. Production of farm machinery and equipment for the United Kingdom (schedule X-3) has been increased from 69 per cent to 87 per cent, providing particularly for additional spare parts. (L-257-a)

FOOD DEHYDRATORS: Schedule A of order L-308, which grants production quotas to various manufacturers of domestic food dehydrators on a unit basis, has been amended by removing 10 manufacturers from the schedule; by reducing quotas of four; by increasing quotas of two; and by granting production quotas to five new manufacturers. Present quotas must be filled by Sept. 1. (L-308)

INDEX OF ORDER REVISIONS

Subject	Designations
Dehydrators, Food	L-303
Drums, Steel Shipping	L-197
Equipment, Construction	L-192
Equipment, Safety	CMP No. 5
Exchangers, Heat	L-172
Farm Supplies	PR No. 19
Iron and Steel	M-126
Machinery, Farm	L-257-a
Machinery Repairs	PR No. 3
Revocation	PR Nos. 2, 4
Tubular Goods, Oil Country	L-211
Valves, Valve Parts	L-252
Price Regulations	
Abrasive Products	No. 316
Aluminum Sulphate	GMPR
Surplus Materials	No. 204

M ORDERS

IRON AND STEEL: Conservation order M-126 has been reworded in certain sections, omitting the stainless steel list but defining "iron and steel" to expressly include stainless steel. Articles originally in the stainless steel list have been incorporated in list A under the order. List A consists of items in the manufacture of which the use of iron and steel is forbidden after specified dates. (M-126)

PRIORITIES REGULATIONS

PLANT MACHINERY, EQUIPMENT: Blanket preference ratings assigned for MRO purposes may be applied by persons eligible to use them for repair of plant machinery and equipment, even if the repair job does not involve delivery of repair parts or materials, under Priorities Regulation No. 3 as amended. Blanket MRO ratings are assigned by CMP regulations 5 and 5A, certain orders in the "P" series, certain other WPB orders and regulations, and on forms and certificates where the kind and quantity of this material to which the rating may be applied is not specified. In any case where the quantity of material is specified in terms of dollar value only, the preference rating is a blanket MRO rating.

Ratings assigned on PD-1A and PD-3A certificates and other ratings assigned to the delivery of specific repair parts or materials may also be applied to installation of the parts or materials or to the repair job alone, if it is found that installing the parts and materials is

not necessary. However, in the case of ordinary plumbing, heating, electrical, automotive, or refrigeration repairs, a rating may not be applied to repair work even if it is extremely applicable to repair parts or materials.

For the purpose of this part of the priorities regulation, repair means to fix a plant, machinery, or equipment after it has broken down or when it is about to break down. It does not include upkeep or maintenance service such as periodic inspection, cleaning, painting, lubricating and other services.

Ratings for repairs, as distinct from delivery of repair parts or materials, may be applied only to persons regularly engaged in the business of making such repairs with their own tools and equipment.

Persons who have received a preference rating for the use of facilities only or for a repair job only, where no delivery of materials is involved, may not extend the rating for any purpose.

Blanket MRO ratings may not be applied to get any item included in list B of the regulation. Suppliers are prohibited from giving any effect to ratings applied to deliveries of any item on list B, if they know or have reason to believe it is a blanket MRO rating. Ratings which are not blanket ratings may be used, however, to obtain list B items. (PR No. 3)

REVOCAION: Priorities regulations Nos. 2 and 4 have been revoked by WPB. These two regulations validated actions which had been taken by E. R. Stettinius Jr. and Donald M. Nelson when each was succeeded in office as director of priorities. (PR Nos. 2 and 4)

FARM SUPPLIES: Farmers may now obtain priority for repair of farm equipment at repair shops by submitting a certificate of need. These farmers' orders, supported by the certificates, are to be considered the same as an order rated AA-5. Thirty-eight additional items have been added to the list of supplies covered by the regulation. (PR No. 19)

PRICE REGULATIONS

ALUMINUM SULPHATE: Manufacturers of war-grade iron-free aluminum sulphate are permitted, as of Aug. 23, to increase their prices only to cover total production costs. The increase is limited, however, to 50 cents per 100 pounds of sulphate produced. Resellers may increase maximum prices by amount of increase in price to them. (GMPR)

SURPLUS MATERIALS: To simplify and speed sales of surplus stores of iron, steel and copper products, and other essential war items from industrial stockpiles, OPA has revised price regulation No. 204 to cover pricing of all idle or surplus materials, regardless of whether or not they are subject to any WPB order. Utility companies now are permitted to sell materials, such as copper wire, copper plates, and iron and steel shapes and plates, to each other on the basis of book costs plus 10 per cent for handling (No. 204)

ABRASIVE PRODUCTS: Following maximum prices have been established on the basis of f.o.b. point of shipment: For resinoid bonded abrasive wheel stubs, \$20 per ton in minimum railroad carload or 20,000-pound minimum truckload; \$17 per ton for sales of 5000 to 20,000 pounds, and \$10 for sales of less than 5000 pounds; for vitrified bonded or mixed bonded stubs, \$18 per ton for minimum railroad carload or 20,000-pound minimum truckload; \$15 for sales of 5000 to 20,000 pounds, and \$8 for sales of less than 5000 pounds. These prices are applicable to abrasive wheel stubs with a grit size of 60 or coarser when the abrasive grain is silicon carbide or aluminum oxide. (No. 316)

CMPL-127 and 224 Replacing Orders in P-19 Series

Forms CMPL-127 and 224 are being generally used as substitutes for orders in the P-19 series, the War Production Board pointed out last week. Deliveries

STEEL

of materials or equipment may be made on ratings assigned on these forms, if such deliveries are permitted under WPB orders pursuant to preference ratings assigned on any order in the P-19 series.

Prior to July 1, applications on Form PD-200 were approved by the issuance of a P-19-h order or some order in the P-19 series, which assigned a preference rating to the materials required. Recently forms CMPL-127 and CMPL-224 have been prepared and put into use as substitutes for P-19-h orders. These forms not only assign a rating to the certain materials required, but serve also as instruments for allotment of controlled materials required.

Provisions of Priorities Regulation No. 3 Clarified

Limitations on the use of preference ratings, spelled out in section (F) of priorities regulation No. 3, relate only to the items appearing in lists A and B of the regulation, the War Production Board pointed out last week.

When any other order of WPB restricts delivery of a product in any way, the restrictions are applicable even though the item is not specifically listed in priorities regulation No. 3. This interpretation makes clear that restrictions in WPB orders which are applicable to items which were included in list C of priorities regulation No. 3, which was deleted Aug. 10, are still applicable to the items they are applied to by the individual regulations.

Appointments-Resignations

James G. Rogers has been appointed assistant general manager of the Office of Price Administration while James F. King has been appointed deputy administrator in charge of information.

Frank E. Marsh, formerly OPA regional administrator for San Francisco, has been appointed executive assistant for field operations.

Harold Connett has been appointed assistant director of the Textile Clothing and Leather Division, War Production Board.

James H. Aydelott, general manager of the Chicago, Burlington & Quincy railroad, has been appointed associate director in ODT's Division of Railway Transport. He replaces Oscar N. Harstad who has resigned to return to the Chicago, Milwaukee, St. Paul & Pacific as assistant chief operating officer.

Replacement of Merchant Trade Products Permitted After Oct. 1

Every order placed after effective date must be backed by record of previous deliveries from stock equal to tonnage ordered. . . Load directives will reserve percentage of base tonnage for each warehouse with supplier

MERCHANT trade steel product warehouses will be permitted to re-order for stock replacement all material sold in accordance with CMP regulation No. 4, including deliveries to farmers, after the close of this quarter.

This was one of a number of basic changes made in order M-21-b-2, effective Oct. 1, in the plan for distributing merchant trade steel products through warehouses. They were made to insure equitable distribution and permit every warehouse an equal opportunity to place orders for tonnages needed.

To assure that each warehouse receives consideration on mill schedules, the order will be supplemented by warehouse load directives for most product groups. These directives will reserve a percentage of the base tonnage for each warehouse with the supplier who furnishes material to the warehouse during the base period.

Warehouses may order replacements, on or after Oct. 1, for all merchant trade products sold from stock since April 1, plus material sold to dealers and other warehouses under order M-21-b-2, and not previously ordered for replacement on form PD-83-g (now WPB-2891) or CMP 11. Orders will be placed well in advance to permit cancellation of unwanted products, which will then be distributed to those warehouses which have not received their full requirements.

Under the amended order there is no top limit to the amount of any merchant trade product which a warehouse can handle during a given period, other than the limitation that every order placed after Oct. 1 must be backed by a record of previous deliveries from stock equal to the tonnage ordered.

No distinction is made between the different types of steel. Products of carbon or alloy steel are interchangeable as far as stock replacement is concerned.

Effective date of the order was delayed until Oct. 1 to permit the some 20,000 distributors of merchant products to acquaint themselves with the procedures under this order and to allow sufficient time for the issuance of warehouse load directives to each steel producer.

On the effective date of this order welded wire concrete reinforcing fabric will become a product group under M-21-b-2, instead of order M-21-b-1, WPB has

issued order M-21-b-1 as amended to effect this change.

WPB also has granted permission to warehouses in certain western states to increase their purchases of several steel products for farm use. Direction 1 to conservation order M-21-b-2 permits additional allowances to warehouses of nails, various wires and fence posts. These warehouses are located in Kansas, Montana, Nebraska, North Dakota, South Dakota, and Wyoming.

WPB Revises Control Over Metal Product Manufacture

Action to permit manufacturers of galvanized ware and non-metal-coated metal ware to use, during any quarter, unused iron and steel left over from their previous quarterly quota has been taken by the War Production Board in an amendment to order L-30-a.

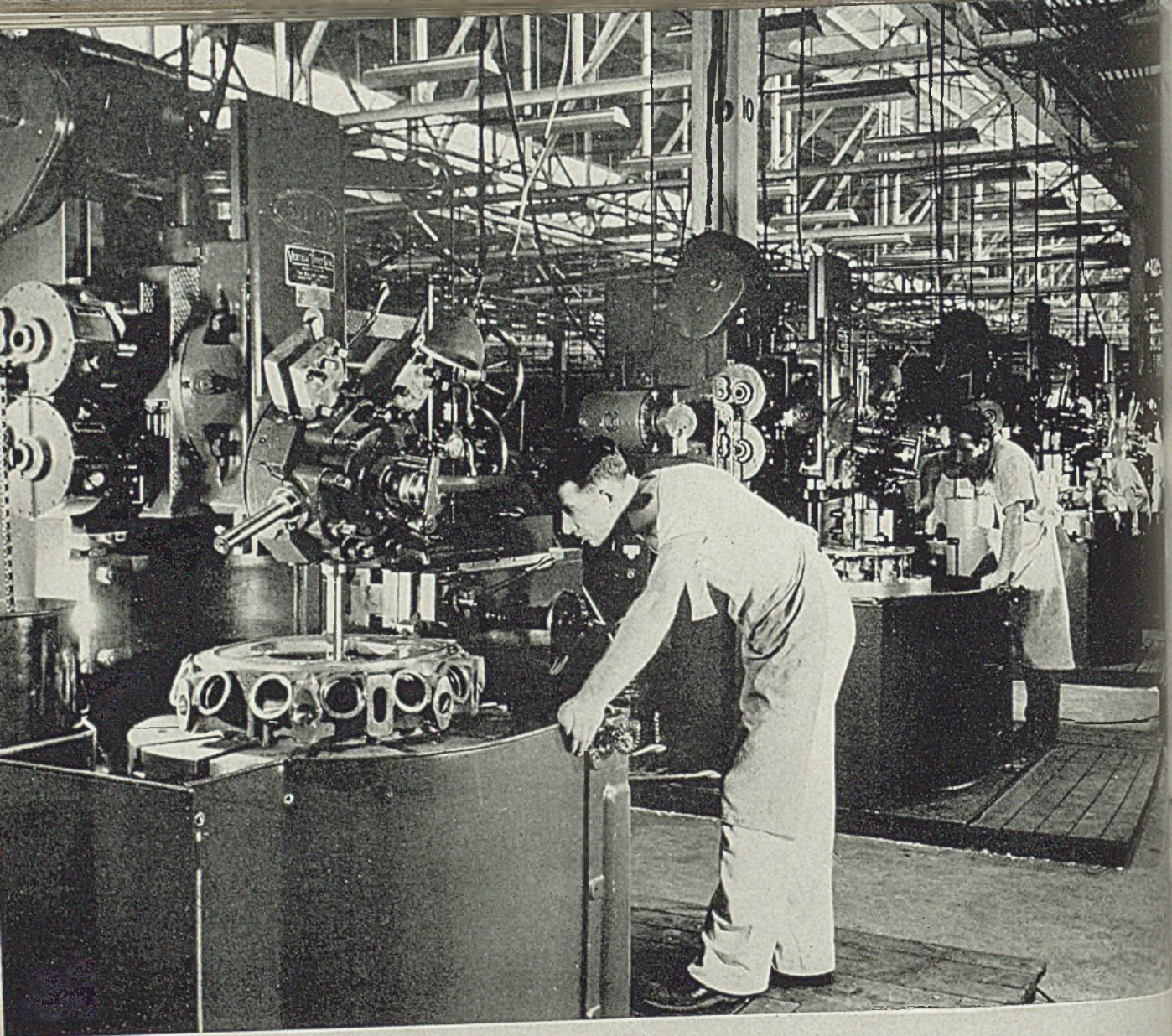
Production of certain enameled pans for experimental purposes in connection with development of standards has been authorized in an amendment to order L-30-b.

To make clear that production of cast iron wood stoves is not prohibited, WPB amended order L-23-c, Domestic Cooking Appliances and Domestic Heating Stoves.

Idle Silver Channeled Into Production by WPB

War Production Board is receiving reports from some 1400 manufacturers whose stocks of silver have been rendered idle by WPB restrictions on use. The report forms require a listing of all idle foreign silver of .999 fineness, in the form of bars, grain or clean scrap.

Owners will be asked to sell their idle inventories to authorized purchasers. In sales to a supplier, the price to be paid will be negotiated by buyer and seller, subject to the OPA ceiling of 45.00c an ounce. Owners of foreign silver not regularly engaged in the business of selling it are permitted, under priorities regulation No. 13, to make special sales of the metal to producers, preprocessors and dealers without preference ratings.



One of the important reasons the United Nations will win this war of the Air:

The hundreds of V.T.L.s now working in our major aircraft plants. Every Vertical Turret Lathe, with its two cutting heads, doubles production of the precision parts that fighters and bombers must have.



THE BULLARD COMPANY
CONNECTICUT

MIRRORS of MOTORDOM

Labor turnover presents major problem for automotive industry with workers shopping around for better paying jobs. Upgrading of workers cuts into common labor supply. Production maintained despite handicaps

DETROIT

MANPOWER now becomes the third major problem confronting war production plants. First it was machines, then materials, both of these critical phases having been cleared to shift the spotlight to the working force itself. Around Detroit at the moment it is not so much a matter of obtaining a sufficient supply of labor as it is persuading those now employed to stay on the job and quit shopping around for higher wages, and in discovering some means to fill in the depletions in the ranks of so-called "common labor."

Difficulties incident to labor turnover were supposed to have been erased by the "stabilization" plans of the War Manpower Commission, but in many respects these have been a complete flop. In the first place, the automotive industry has accomplished a near-miracle in the almost overnight upgrading of unskilled labor into skilled jobs. True, the training in many cases has not been even close to thorough, and the steady improvement in machinery design and plant mechanization has relieved the pressure for any great amount of skill on the part of operators, but still there has been a tremendous surge of employes up into the higher job classifications.

The situation today is that there are actually too many employes in skilled classification and far too few in the common labor class. In fact, it may be said that there is virtually no common labor in Detroit plants. A green hand is hired in a foundry, for example, as common labor, at rates varying from 82 cents to \$1.05 an hour (think of the shopping around for higher-rate jobs that means) and before many weeks have passed he has been elevated, usually by unions, to the class of "core carrier," "jacket shifter" or "shovel manipulator," or some equally non-sensical classification, entitling him to another 5 or 10 cents an hour. Result is that many foundries, which require from one-third to one-half of their working force in the common labor class are unable to find the necessary number of men.

It is like the old story of the plant where everyone was a vice president and there was no one left to do the work.

The very real problem now is how to fill in the ranks of common labor, and the headache to come is how these "skilled" employes can ever be downgraded to their normal level. Even assuming the fullest measure of automobile pro-

duction in postwar years, it is hard to see how the industry can retain much more than 60-70 per cent of its present 1,500,000 employes. This figure is for the entire industry and associated plants, not just Detroit units.

One solution proposed is the employment of Mexicans and Japanese, and it is likely that this has gone beyond the mere proposal stage, although no figures are available on the number of either of these nationalities now at work in Detroit plants. The delicate racial question involved makes it advisable to soft pedal this angle. Employers who have hired Mexicans report they show virtually no interest in their work, are difficult to train and are not too dependable. Japanese resettled from the West Coast may have a clean bill of health from the FBI, but no one can know what is going on in the innermost recesses of their minds.

Widely Varying Wage Scales

Much of the present unsettlement in labor springs from widely varying wage scales, and industry itself can take a measure of blame on this score. Take the case of a man working in a steel foundry who, after several years of work, now receives \$1.05 an hour. He goes home one evening to find his wife has just obtained a ma-

chine job in a new war plant and is earning \$1.25 an hour. He begins to wonder what is wrong with the plant where he works, not stopping to think that whoever set the standard for his wife's wages was just plain crazy. A woman just out of the home, trained hastily in a couple of weeks to take over a simple machine or inspection job, is by no stretch of the imagination worth \$1.25 an hour.

Or consider the case of a pipefitter in a Detroit plant who has worked at his job all his life and is now getting along in years, but earns \$1.16 an hour in the maintenance crew at his plant. What must he think when at the dinner table his wife tells him about their young niece who has just been placed on an inspection job at a local war plant at \$1.35 an hour! Can you blame him if he starts shopping around to correct this apparent inequity?

Multiply these two isolated cases by thousands and there is the picture of some of the troubles facing employers in Detroit today. It is true persons employed in war plants are not supposed to take other jobs without releases from present employers, but from all that is heard around this area it is apparently not too difficult to obtain such releases, or else new employers are not insisting too strongly on obtaining them.

Despite the labor problems, production seems to keep rolling apace, both in large and small plants. Figures already published show the steadily rising volume of output of major automotive producers, and some of the smaller plants are mak-



MUD TO MOUNTAINS: This new "low silhouette" 6 by 6 cargo and troop carrier truck is now being built in volume for the Army at the Dodge truck plant in Detroit. Accommodating 16 men with supplies, the truck will negotiate wheel-deep mud or water, climb a 62 per cent grade with full load, or—with tires deflated to 8 pounds—operate speedily through desert sands. Low overall height, combined with increased road clearance, improves the vehicle's tactical value for use in combat areas

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ing even greater strides. A local foundry last September was employing 712 and was turning out double its normal peak output. Today employment has slipped to 550, yet volume of output is unchanged. Some days the cleaning room at this plant will see its normal complement of 10-12 men shrink to only one man, yet the castings keep rolling out to customers. Another plant with peak employment of 200 has hired 495 in the past six months and still has not been able to reach peak employment, yet production has been held on even keel.

Despite emphatic and at times violent protestations by spokesmen for the automotive industry that there just is no post-war planning activity going on at the present time, these fulminations must be taken with several grains of salt, because there is definitely an increasing measure of such activity apparent. Several companies have requested quotations on machine tool equipment needed for reconversion, and have even specified deliveries within a certain period after the time when such equipment may become available.

Strong representations are made that absolutely no materials are available in the motor plants, even for experimental purposes, and that no requests for such materials have been made. The latter is undoubtedly true, but anyone familiar with the vast poundage of all types of material flowing through the motor plants for war production requirements knows

that it would not be too difficult to salvage a little here and there for experimental purposes. The amount needed is inconsequential, and can be virtually lifted out of the scrap barrel.

It is not being suggested that there is a furore of activity in the motor industry in connection with getting ready for automobile manufacture—anything but that. However, definite plans are being drawn for "R" or reconversion day. Reliable reports credit General Motors with planning on gearing up to produce 150 per cent of the previous peak production in all divisions. GM also is said to be contemplating the elimination of competition between divisions by setting up a price class for each with no overlapping. In the past there has been overlapping in the price range of nearly all divisions—Chevrolet, Pontiac, Oldsmobile, Buick and Cadillac—with the result that one division often sold against another.

Seek To Omit Price Overlapping

It is a logical move to separate the divisions each into its own price class, since the demand for cars will be virtually unlimited, and it is only smart merchandising to blanket the field rather than to sell one division against another, the latter policy being favored by W. S. Knudsen when he headed GM operations, it is reported.

Thus you may see Chevrolet in the \$800-\$1000 class, Pontiac \$1050-\$1150, Olds \$1200-\$1300, Buick \$1350-1500 and

Cadillac \$1600-\$2000. For one thing this would mean the elimination of models like the Buick 40 and 90 series, one competing with Pontiac and Olds and the other with Cadillac. The price figures just cited are purely hypothetical, for it seems almost certain automobile prices will be at least 25 per cent higher than in 1941 when production can be resumed, if present levels of wages and materials costs are to be maintained.

One of the newer types of military vehicles now in process of emerging from the drawing board of the sample stage is a "jungle carrier" which Willys Overland engineers have concocted as a lightweight motorized means for moving supplies in rough territory. Essentially the vehicle comprises four wheels with 36-inch tread, 2-cylinder 2-cycle air cooled engine, pressed wood body, four-wheel steering arrangements and total weight something like 300-400 pounds. Wheels have large airplane-type tires carrying only 5 pounds pressure so they can negotiate swampy and sandy terrain.

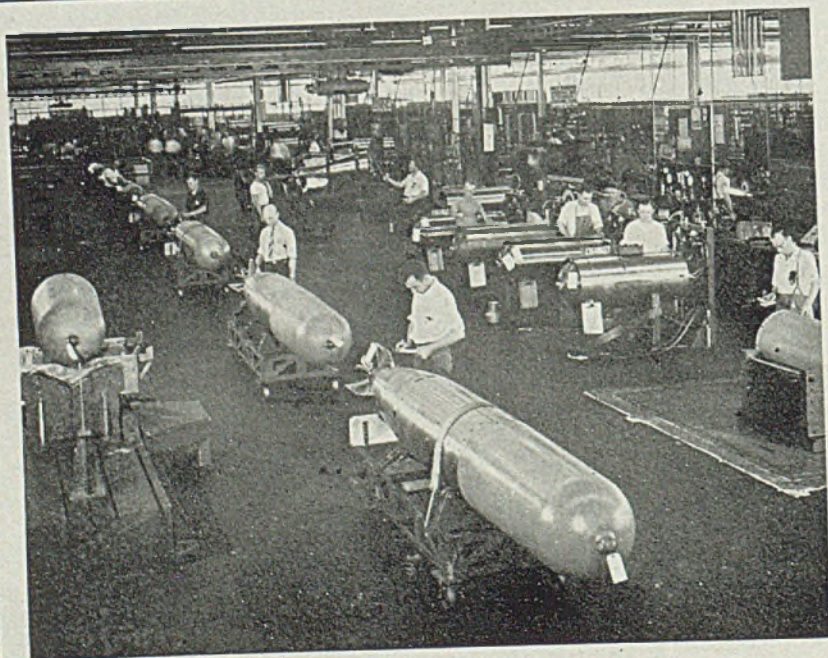
It is understood the original design was submitted to the Army but was turned down, after which the Navy became interested in it. Plans call for construction of a sample lot of eight, with future production doubtless depending upon the results of tests.

K. T. Keller, Chrysler Corp. president, points out in the corporation's most recent financial statement that Chrysler now has 26 plants doing war work, with total employes exceeding the peacetime peak. In all, Chrysler has undertaken some 5925 separate commitments for war materials, many of which have been shared with more than 8000 subcontractors in 39 states. It has also produced more than ten times as many medium tanks as were originally contracted for when the tank arsenal was projected.

Midwest Association Elects New Officers

Ernest M. Sims, president, Metal Forming Corp., Elkhart, Ind., and former president of the Indiana Manufacturers' Association, has been elected president of the Midwest Manufacturers' Associations Inc., which has headquarters in Chicago.

James L. Donnelly, executive vice president, Illinois Manufacturers' Association, Chicago, is secretary; John L. Lovett, general manager, Michigan Manufacturers' Association, Detroit, is treasurer. The following are vice presidents: W. D. James, president, James Mfg. Co., Fort Atkinson, Wis., and president, Wisconsin Manufacturers' Association; and J. A. Gibson, America Service Co., Pittsburg, Kans., and president, Associated Industries of Kansas.



SKY TORPEDOES: Assembly line of General Motors' Pontiac Motors Division, the only automobile manufacturer producing aircraft torpedoes for the Navy. These deadly missiles, designed for release by low-flying torpedo planes, contain 5000 parts and cost as much as a dozen medium-priced automobiles

PART of the War IS OVER



Part of the war . . . the terrific battle to quickly build up production capacity of war materials . . . is over. The productive capacity of many new plants has far exceeded early estimates . . . as a result the inefficient producers will be curtailed and competitive conditions will return.

And competition means that frozen designs must be thawed—developments for the future must be brought nearer the production stage. Builders must be able to offer better machines

—and in some cases must use less critical materials.

Vickers Hydromotive Controls provide a most important design resource for improvement of machines in the important fields of better control—higher production rates—wider utility—greater safety and the elimination of operational difficulties.

You will find it advantageous to have a Vickers Application Engineer discuss with you the possibilities of improved machine controls.

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WING TIPS

Manpower shortage attributed as chief reason West Coast airplane builders fell short of projected schedules in June and July. . . Plants in area must increase working force by 36,000 before December, House investigating committee told

DESCRIBING shortage of manpower as the principal reason why West Coast airplane builders fell short of projected schedules in June and July, J. H. Kindelberger, president, North American Aviation Inc., and speaking for the Aircraft War Production Council, told a House of Representatives subcommittee on military affairs in Los Angeles that aircraft plants must increase their working force by 36,000 before December to meet current schedules.

Difficulty of accomplishing this, he pointed out, is indicated by the terrific turnover of labor in plants, citing as an example that out of 150,000 employees hired since the first of this year and through June, a net gain in employment of only 12,000 was registered. Furthermore new selective service regulations make some 58,000 men vulnerable to induction, applying to 37 per cent of engineering personnel, 24 per cent of tooling department employees, and 23 per cent of inspection forces.

"These are our key men," Kindelberger said. "Production depends on this small remaining group. These men must design the airplanes, plan the production, recruit, train and supervise employees."

Opposes Blanket Draft Deferments

K. T. Norris, president, Norris Stamping & Mfg. Co., Los Angeles, told the investigating committee that blanket draft deferments for aircraft workers would drain the already inadequate supply of labor from other industries.

North American's P-51 Mustang fighter plane currently is being built in several new versions. In one of them the former Allison engine is replaced with a Packard-built Rolls-Royce Merlin engine with two-speed two-stage supercharger, and in another the conventional machine gun armament is replaced with four wing-mounted 20-millimeter (0.787-inch) cannon. The latter is specially designed for low-level attacks on locomotives and small merchant ships. Two Canadian pilots of cannon-bearing Mustangs reported recently that in a 30-minute sweep they accounted for destruction of 12 locomotives.

Some months ago a number of the P-51s were converted into dive bombers for the United States forces, changing their designation to the A-36. Earliest model of the P-51 used by the R.A.F. carried four .50-caliber and four .30-

caliber machine guns, while a later version mounted six .50-caliber guns.

One of the latest modifications in warplane design, hitherto veiled in secrecy despite the fact that it has been in production for some time, is a thermal de-icing arrangement installed in leading edges of wings, stabilizers, fins, etc., where ice formations are likely to build up in flight. Previously these edges have been fitted with rubber "boots" which are flexed by admitting pulsating air pressure, thereby cracking the ice layer.

Consolidated Vultee engineers, working in conjunction with L. A. Rodert, senior engineer of the National Advisory Committee for Aeronautics at the Ames Aeronautical Laboratories of the N. A. C. A., Moffett Field, Calif., have replaced the rubber boots with leading edges of aluminum alloy in which is incorporated a duct system for carrying heated air. Exhaust gases from engines supply heat for the air through a heat exchanger, and the warm air is circulated through wings and tail surfaces with controlled initial temperature ranging as high as 350 degrees Fahr. This main-

tains the edges at a temperature of around 60 degrees Fahr. even when outside air is 40 degrees below zero.

Since the system becomes operative the moment engines are started, it avoids the necessity for scraping accumulated ice and frost from wings and tail surfaces before flying aircraft stationed in arctic areas, a process hitherto done manually and requiring several hours. Furthermore it was found that with the pulsating rubber boot, ice would form in flight on the surface while it was flexing and actually flex with the rubber, failing to drop off.

Consolidated Catalina patrol bombers have been built for several months with the thermal de-icing system, while B-24 Liberators, the Coronado, and the P-4Y Corregidor patrol bomber all will be using it shortly. Elimination of the old rubber de-icer should simplify construction of leading edge systems.

Multiple Riveter Saves Time

A saving of 72 per cent in time and labor has been effected through installation of a multiple riveter for the 32-foot wing spar of the Curtiss C-56 Commando in production at the Buffalo plants of the Curtiss-Wright Corp.

The riveter, operated by one man, was designed by Curtiss-Wright and built by the General Engineering Co., Buffalo. Curtiss said it "compresses hundreds of heavy rivets in a remarkably short time."

Because of the outstanding saving, the corporation plans to adopt the high production capacities of the multiple riveter for other shop operations involved in production of the Commando.

To facilitate the riveting operation of the spar, Curtiss-Wright enlarged on its rivet gang-squeezing principle, which it developed and which is now in use throughout the airplane industry, and designed the automatic multiple riveter.

Fed into the multiple riveting machine by a reversing type motor acting on the carrying frame, the spar of the Commando passes through the immense riveter. Rams are automatically positioned and correct position is maintained throughout the operation.

Operated hydraulically, the bucking and riveting rams are equipped with a novel control device which corrects any variation in stock thickness at rivet level. With each stroke of the riveting monster, sixteen heavy rivets are compressed. One trip through the machine squeezes the hundreds of rivets that fasten the top and bottom spar caps.

To strengthen further the Commando's wing rib, numerous stiffeners are riveted across the spar between the top and bottom caps. In the past this was a

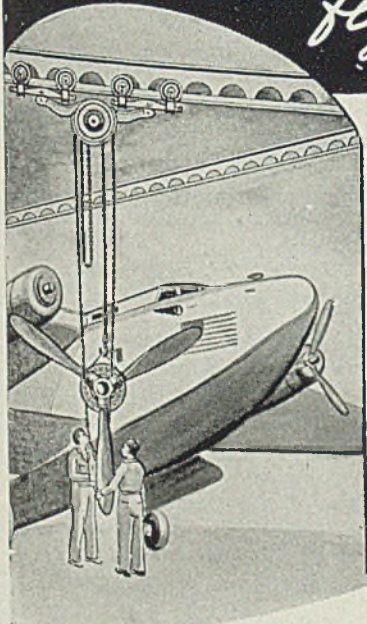


K. T. NORRIS



SERVICING the WINGS that fly the GLOBE

**These are the routes of the Pan American World Airways System previous to December 7, 1941.*



Cleveland Tramrail equipment helps Pan American service planes easier and faster at air bases in far flung parts of the world.

The Pan American Airways System in collaboration with the Air Transport Command has built air bases at strategic places in far flung parts of the world.

These bases have been equipped to service, as quickly as possible, giant Pan American Clippers, Army Bombers and other aircraft after long hops across the six continents and over vast stretches of ocean.

It was evident to Pan American engineers that much valuable time in servicing the aircraft could be saved by the use of overhead materials handling equipment. A thorough study of the various equipment convinced them that the design and quality of Cleveland Tramrail would best assure smooth trouble-free over-

tion so necessary for their remote bases.

Cleveland Tramrail knowing full well the urgent need of the equipment has cooperated wholeheartedly with Pan American. The equipment for the first base was made in record time and aboard ship before the departure deadline. Other equipment has since been built posthaste.

Thus Cleveland Tramrail is not only a major factor in the construction of planes in many plants on the home front, but is also aiding in keeping them flying to and from our many scattered war fronts.

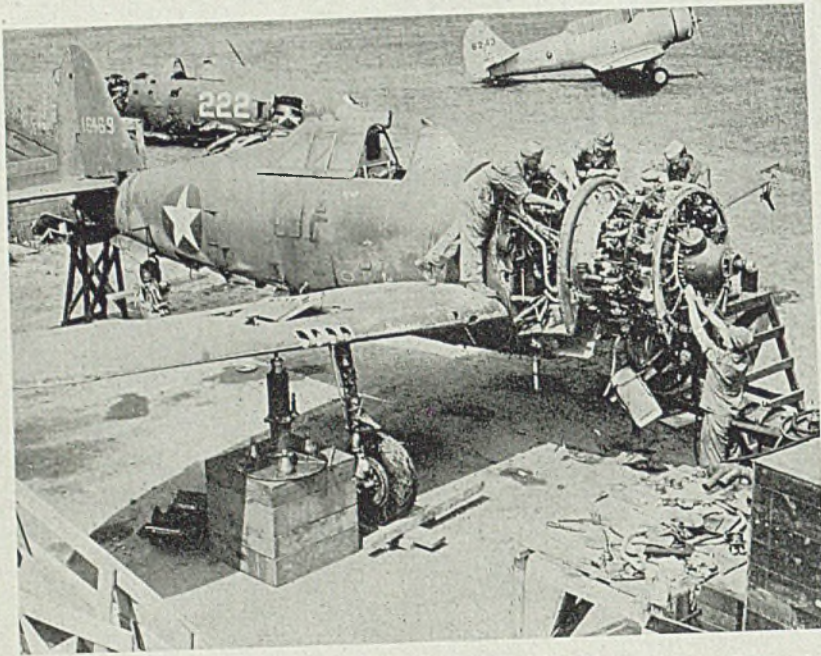
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OVERHEAD MATERIALS HANDLING EQUIPMENT



DISABLED PLANES: These aviation cadets are making a complete airplane from parts of disabled planes brought to the field. During their course of study, the cadets cover all the principles of aircraft construction. NEA photo

tedious, man-hour consuming process. Through the Curtiss-Wright development the riveter has been greatly simplified and speeded up.

After its first passage through the riveting machine the long spar is returned to its original position. A simple adjustment of the bucking and riveting mechanism is all that is required to perform the stiffener riveting operation. The reverse type motor carries the

heavy spar through the machine again. As each stiffener is riveted to the spar, the machine automatically pulls the spar forward and the next stiffener is squeezed-riveted until all the sub-ribs are attached firmly to the great rib.

Northrop Aircraft Inc., Hawthorne, Calif., is using a number of manufacturing techniques developed by the company which are either speeding production or which hold the promise of basic

changes in airframe fabrication. Magnesium is being applied extensively, not only in the form of castings, but as a prime structural material for portions of the airframe. Experimental work now on a production basis indicates that magnesium sheet and extrusions may be used for the entire airframe.

The technique of welding utilizes the "Heliarc" torch which bathes the section being welded in a flow of inert helium, thereby preventing oxidation. Butt welds made by the Heliarc process range in strength upward from 95 per cent compared to the parent metal.

Northrop is obtaining as high as 12,000 uniform spots in its spotwelding department without cleaning of electrodes. The method involves controlled pre-cleaning of subassemblies held together with "skintights", rather than the cleaning of separate components. The cleaning solutions used require substantially less dipping and rinsing than the conventional process. Close current control is a factor in speeding the operation.

The template duplication method developed by Northrop for the production of templates is a process which uses electrolytic etching to reproduce templates and related tools. This process is a purely mechanical, chemical and electrical process which eliminates chance for human error.

Northrop also is using hinged pressure plates for hydropress operations. Through the use of this type of pressure plates, consecutive forming operations are possible with but a single stroke of the ram. As many as seven different angles and joggles can be made in one operation.

They Say:

"The question of expense is being subordinated to the task of getting out finished products and as a result some managements have become less concerned than heretofore with the necessity of being economy-minded, and exhibited an indifference to expense which will make future control of this element more difficult. A start in the direction of correcting this situation should be made immediately."—Oscar N. Lindahl, vice president, finance, Carnegie-Illinois Steel Corp., Pittsburgh.

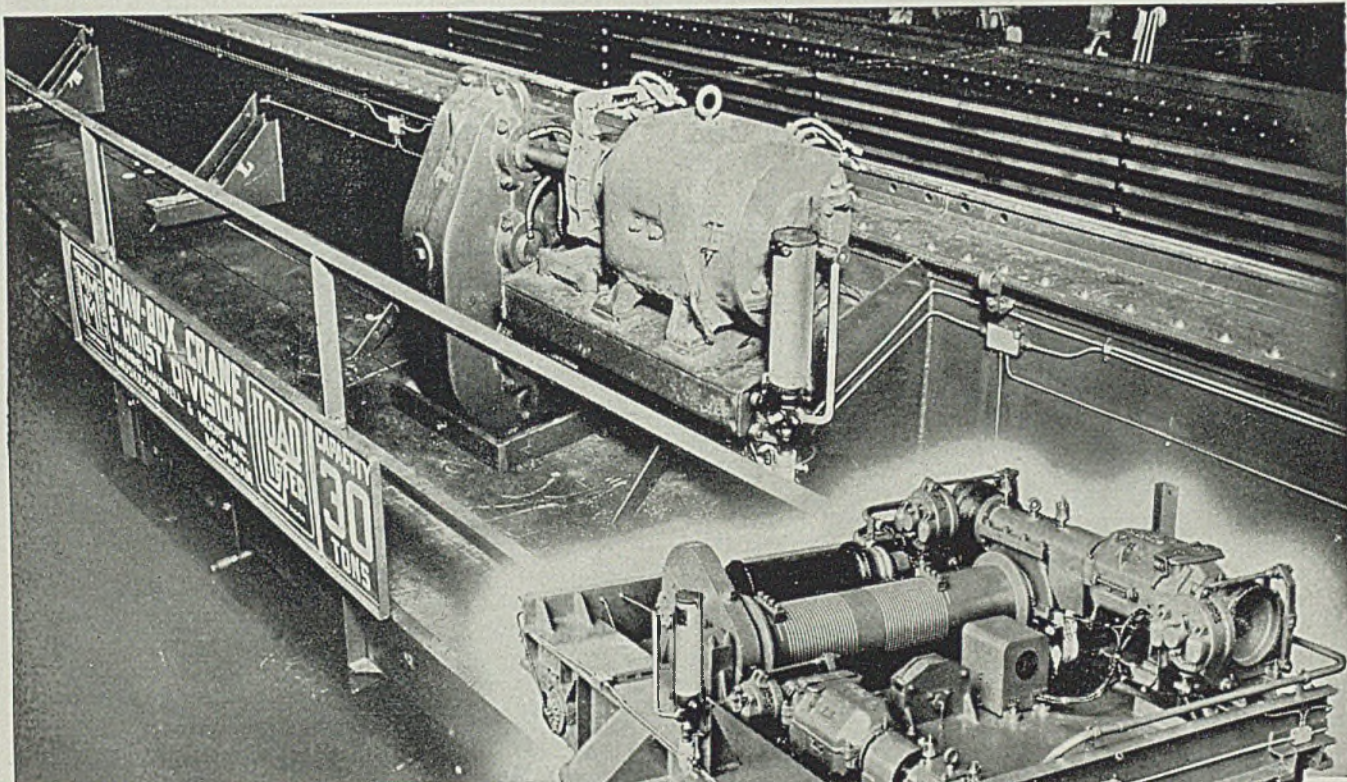
"Our efforts to secure greater production must not and will not be relaxed. Fourth quarter steel requirements are still some 4,000,000 tons greater than supply. But the success of the Share-the-Steel campaign is encouraging to us all."—Donald M. Nelson, chairman, War Production Board.

"I find that a large portion of the small plants in the United States can best be used in the production of essential civilian needs, and it will therefore, become necessary for this corporation (Smaller War Plants Corp.) to take a

strong position in support of the production of such products."—Robert W. Johnson, director, Smaller War Plants Corp.

"I can't make any predictions about fathers or essential workers—too many imponderables are involved. You tell me what the situation in Europe, in Russia and in the Pacific will be in two weeks or a month and I'll tell you how the draft will be working."—General Lewis B. Hershey, director, Selective Service.

"The general public is not sufficiently aware of the tremendous part cans are playing today in supplying our armed forces and our allies throughout the world with food and a wide variety of other products. If the public knew this story, there would be considerably less misunderstanding on the part of the many consumers when they are unable to buy—or to buy in limited quantities—many products in their customary steel containers."—Gordon E. Cole, advertising director, Can Manufacturers' Institute Inc.



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TRUCK BEARINGS ON
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prevent injuries and tie-ups . . . get longer,
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"Striking the floor with a sickening thud, a crane operator in Buffalo met sudden death a short time ago. He'd been lubricating his crane—a routine operation—slipped and fell—leaving a grief-stricken family—and more than \$18,000 compensation charges."

These accidents are unnecessary! That \$18,000 would have equipped 8 to 10 cranes with automatic lubrication—and saved the man's life—because Trabon lubrication makes absolutely certain that every connected bearing, whether large or small, moving or stationary, receives just the desired amount of lubricant, *while the machine*

is running. Trabon avoids costly downtime while a man crawls around lubricating each bearing individually,—the breakdown if he misses one,—the lost time, and costs, of accidents,—makes the bearings last longer.

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INDUSTRIAL LUBRICATION EXCLUSIVELY SINCE 1922

Electric Steel Conference Set For Oct. 1-2

Problems involved in producing high-quality metal for war effort to be discussed at Pittsburgh meeting

OPERATORS and metallurgists from most of the ingot and castings plants of the country will meet at Hotel William Penn, Pittsburgh, Oct. 1-2, for the first annual conference of the Electric Furnace Steel Committee, Iron and Steel division, American Institute of Mining and Metallurgical Engineers, to discuss the urgent need for high-quality electric furnace steel in the war effort.

Outstanding authorities of the industry and several members of the War Production Board will head an informative program. Harry W. McQuaid, assistant chief metallurgist, Republic Steel Corp., Cleveland, is chairman of the executive committee, and Charles W. Briggs, technical adviser, Steel Founders' Society of America, is chairman of the conference committee.

On the first day of the meeting, Oct. 1, the acid and basic groups will meet jointly to discuss the present status of the electric furnace steel industry, design and maintenance of electric melting furnaces and raw materials used, including electrodes, refractories, scrap and alloying metals.

Separate sessions will be held on basic and acid furnace practice on Saturday, Oct. 2. During the morning session problems involving melting and oxidizing will be discussed and the afternoon program will deal with refining, deoxidizing and finishing the heat.

A talk by a leader of the electric furnace steel industry will be held in place of the usual banquet on Friday evening. This will be followed by a motion picture showing recent operating practice.

The Electric Metal Makers Guild, which has several representatives on the Electric Furnace Steel Committee, will co-operate in the first conference and a number of its members will act as discussion leaders at the technical sessions.

BRIEFS . . .

Tomkins-Johnson Co., Jackson, Mich., is distributing to manufacturers and engineers a 92-page catalog describing its air cylinders. The catalog enables the customer to determine the exact cylinder

required for a particular job of pneumatic power movement in his plant.

National Tool Co., Cleveland, announces completion of its postwar plans. Metal cutting tools of precision are produced by the company and it will experience no postwar readjustment for the company will continue to co-operate with manufacturers of automobiles, aircraft, ships and other products.

Michiana Products Corp., Michigan City, Ind., announces addition of E. R. Dougherty for sales work in both the alloy and sheet metal divisions, and John H. Staiger has been added to the metallurgical staff.

American K. A. T. Corp., New York city, announces Eimer & Amend, New York city, and Fisher Scientific Co., Pittsburgh and Montreal, are distributing K. A. T. water conditioner for use in laboratory water stills.

Kennametal Inc., Latrobe, Pa., reports greatly improved deliveries on standard tools and tips. Many standard items can be shipped from stock in moderate quantities.

Wendnagel & Co., Chicago, fabricators of structural steel, announce that Eugene Wendnagel has acquired the interest of William Wendnagel. The latter has retired. Company will continue under its present name.

Diamond Alkali Sales Corp. will take over operation of the George Chemical Co. Inc. with C. V. Douglas as New York district manager. New headquarters have been established at 570 Lexington avenue, New York city.

Behr-Manning, Troy, N. Y., has published a handbook for distributor salesmen which gives fundamental information on the manufacture, storage, and use of coated abrasives.

Marco Chemicals, Philadelphia, announces transfer of its business to Marco Chemicals Inc., which is located at Sewaren, N. J. Continental Can Co. Inc. and Vulcan Detinning Co. have acquired a substantial interest in Marco Chemicals Inc.

Domestic Industries, Inc., Chicago, announces purchase of the Siewek Tool Co., Ferndale, Mich. Two affiliated companies, Siewek Tool & Engineering Co., Hartford, Conn., and Progressive Tool & Cutter Co., Ferndale, were included in the acquisition. The Ferndale firms will be operated as the Siewek Tool Division, Domestic Industries, Inc.

National Safety Congress To Meet in Chicago, Oct. 5-7

National Safety Congress, scheduled in Chicago Oct. 5-7, will devote this year's program exclusively to accident problems which have a direct bearing on prosecution of the war.

One of the outstanding features planned for industrial leaders is the labor and safety session on Oct. 7.

Wilfred Sykes, president, Inland Steel Corp., will address the metals section, Oct. 5, discussing "Safety for Production for Victory".

To Hold Fuels Conference In Pittsburgh, Oct. 28-29

Four technical sessions are scheduled for the joint fuels conference of the American Institute of Mining Engineers and American Society of Mechanical Engineers to be held at the William Penn hotel, Pittsburgh, Oct. 28-29.

Coal research, mining management, oil and gas, and the war program as it pertains to fuel are the four technical sessions scheduled. Many papers are included on the program.

MEETINGS . . .

American Chemical Society: One-hundred-and-sixth meeting to be held at Minneapolis, Sept. 6-10.

Society of Automotive Engineers Inc.: National tractor meeting to be held at the Schroeder hotel, Milwaukee, Sept. 23-24.

Association of Iron and Steel Engineers: Annual convention to be held at Hotel William Penn, Pittsburgh, Sept. 28-30.

American Institute of Mining and Metallurgical Engineers: First annual conference of Electric Furnace Steel Committee, Iron and Steel Division, to be held in Hotel William Penn, Pittsburgh, Oct. 1-2, to discuss urgent need for electric furnace steel.

Society of Automotive Engineers Inc.: National aircraft engineering and production meeting to be held at Biltmore hotel, Los Angeles, Sept. 30-Oct. 2.

National Safety Council: Meeting to be held at Sherman, LaSalle, and Morrison hotels, Chicago, Oct. 5-7.

Electrochemical Society: Meeting to be held at Hotel Pennsylvania, New York, Oct. 13-16.

American Society for Metals: Sponsoring Metals Congress at Hotel Palmer, Chicago, Oct. 18-22. Organizations also participating are American Welding Society, American Institute of Mining and Metallurgical Engineers, and the Wire Association.

American Welding Society: Twenty-fourth annual meeting at Hotel Morrison, Chicago, Oct. 18-23.

American Institute of Mining and Metallurgical Engineers: Regional meeting at Hotel Sherman, Chicago, Oct. 17-18. Participating in Metal Congress at Hotel Palmer, Chicago, Oct. 18-22.

Wire Association: Meeting at LaSalle hotel, Chicago, Oct. 18-21, also participating in Metal Congress at Hotel Palmer, Chicago, Oct. 18-22.

National Electrical Manufacturers Association: Annual meeting to be held at Waldorf-Astoria hotel, New York, Oct. 25-29.

American Institute of Chemical Engineers: Meeting to be held in Pittsburgh, Nov. 15-16.

American Society of Mechanical Engineers: Annual meeting to be held in New York, Nov. 29-Dec. 3.



Above: Hammond Iron Works, Warren, Pa., received the Army-Navy "E" recently in a colorful ceremony. In the picture, left to right, are : H. D. Kopf, president of the company; Col. H. D. Vogel; Com. R. G. Walling, and E. D. Huber, union local president



"M" pennant for outstanding production performance was recently awarded the Reading-Pratt & Cady and Reading Steel Castings divisions of American Chain & Cable Co. Inc., by the U. S. Maritime Commission. Col. Willard F. Rockwell, the Commission's director of production presented the pennant



Above: President R. J. Hodgson, Graham-Paige Motors Corp., accepting Army-Navy "E" award

Below: The Maritime "M" has been presented to the Martin-Parry Corp., York, Pa. Shown at the ceremonies are, left to right: T. Russ Hill, president and general manager; Della Chiesa, lyric soprano; J. J. Fiechter, works manager; J. H. Green, board chairman; J. F. McInnis, U. S. Maritime Commission

More Companies Awarded "E" and "M" Pennants

Following are the companies recently given the Army-Navy or Maritime Commission awards for notable performance in war production:

- Atlas Imperial Diesel Engine Co., Mattoon plant, Mattoon, Ill.
- Austin Road Co., Galveston, Tex., for Galveston air field construction project.
- Belle City Malleable Iron Co., Racine, Wis.
- Chicago Wheel & Mfg. Co., Chicago.
- Copperweld Steel Co., Glassport plant, Glassport, Pa.
- Ford Motor Co., Richmond Tank & Motor Vehicle depot, Richmond, Calif.
- International Minerals & Chemical Corp., potash plant, Carlsbad, N. Mex.
- J. A. Terteling & Sons, Mountain Home, Idaho, Mountain Home air base construction project.
- Jarecki Machine & Tool Co., Grand Rapids, Mich.
- McCormick & Co. Inc., Baltimore plant, Baltimore.
- Murphy Elevator Co., Louisville, Ky.
- National Standard Co., Worcester Wire Works division, Worcester, Mass.
- New Idria Quicksilver Mining Co., New Idria mine, Idria, Calif.
- Newark Stove Co., Newark, O.
- Thompson Aircraft Products Co., Euclid, O.
- Truscon Steel Co., pressed steel division, Cleveland.
- Thompson Products Inc., Cleveland, and west coast plant, Bell, Calif.
- Trackson Co., Milwaukee.
- Waterbury Clock Co., Waterbury, Conn.
- West Michigan Steel Foundry Co., foundry division, Muskegon, Mich.



MEN of INDUSTRY



K. R. BEARDSLEE



D. H. BARR



WALKER PENFIELD

K. R. Beardslee, former general sales manager, Carboloy Co., Detroit, has been named vice president in charge of sales.

D. H. Barr, former assistant to the Pittsburgh district industrial engineer, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed assistant general superintendent, Johnstown-Lorain Works, Johnstown, Pa.

Dan Schaitberger has been appointed sales manager, Northern Engineering Works, Detroit.

C. H. Linder has been appointed assistant manager, Schenectady works, General Electric Co., and F. T. Lewis has been named assistant to the manager.

A. C. Darling, former vice president and general manager, Borg-Warner Service Parts Co., Chicago, has been elected president, succeeding Mathew Keck, who is retiring as president and secretary-treasurer. Mr. Darling continues



RUSSELL B. BARNETT

Who has been appointed vice president in charge of sales, Peter A. Frasse & Co. Inc., New York, noted in STEEL, August 16, p. 73.

as general manager and Mr. Keck will continue as a director of the company. R. W. Dose, former secretary-treasurer, has been elected vice president, and P. R. Kendall has become secretary-treasurer.

Walker Penfield, former manager of engineering, Pennsylvania Salt Mfg. Co., Philadelphia, has been appointed works manager, and William F. Mitchell continues as Mr. Penfield's assistant, with the title assistant to the works manager. Floyd H. Walker has been appointed chief engineer and is in charge of the Central Engineering division, succeeding A. E. Gaydos, who has been named assistant to the vice president in charge of manufacturing. Vincent K. O'Connor has been appointed manager of the newly created personnel department.

J. M. Komp has been appointed superintendent of blast furnaces and coke plant, Cleveland district, Republic Steel Corp., Cleveland. Thomas Cosgrove succeeds Mr. Komp as superintendent of blast furnaces and coke ovens, Central Alloy district, Canton, O. Jones M. Cahill, former superintendent of open hearths, Youngstown district, has been appointed to a similar post in the company's Gulf Steel division, Gadsden, Ala.

George H. Hodapp, vice president since 1940, Standard Cap & Seal Corp., New York, has been named executive vice president in charge of co-ordinating manufacturing and sales operations in the Los Angeles, Chicago and Jersey City plants.

Robert W. O'Neal, former assistant plant industrial engineer, Irvin works, Carnegie-Illinois Steel Corp., Pittsburgh, has joined Follansbee Steel Corp. at Follansbee, W. Va., and Toronto, O., as

industrial engineer in charge of methods and standards.

Dr. Robert I. Jaffee, research metallurgist, formerly associated with Leeds & Northrup Co., Philadelphia, has been appointed to the technical staff of Battelle Memorial Institute, Columbus, O., to engage in research in the field of non-ferrous metallurgy.

C. Hart Miller, vice president, Republic Aviation Corp., Farmingdale, N. Y., has been appointed divisional manager of the Farmingdale plant. Succeeding Mr. Miller as director of the military contracts departments is Don M. Parker, former assistant.

O. F. Graebner has been named engineering and mechanical division chief, Murray Corp. of America, Detroit.

Gavin S. Younkin has been named Los Angeles district office manager, San Francisco branch, Brown Instrument division, Minneapolis-Honeywell Regulator Co., Minneapolis.

Clifford C. Stone, former vice president and general manager, Empire Tool Co., Detroit, has formed the Stone Tool Co. to represent Empire Tool as exclusive distributor west of the Mississippi and in the southeastern states. Mr. Stone has established an office in Los Angeles.

F. G. Tatnall, manager, testing equipment department, Baldwin Southwork Division, Baldwin Locomotive Works, Philadelphia, has been elected to membership on the executive committee of the American Society for Testing Materials. Mr. Tatnall is chairman of the Philadelphia chapter, ASTM.

Roger M. Keyes has been elected president of Harry Ferguson Inc., Ford tractors, Dearborn, Mich. Mr. Keyes joined the company in 1939 as sales and engineering consultant and had become successively vice president, executive vice president, and general manager.

Clayton S. Shoemaker has been appointed eastern sales manager, Dow Chemical Co., Midland, Mich., and Frederick A. Koch has been named assistant eastern sales manager. They will make their headquarters at 30 Rockefeller Plaza, New York city. Ralph E. Dorland continues as manager of the New York sales office. Other appoint-

ments are: Alexander Leith Jr., manager, Philadelphia office, and Alfred A. Lawrence, Boston office manager.

Frank De Ganahl, vice president and general manager, Fleetwings Division, Kaiser Cargo Inc., Bristol, Pa., has resigned because of ill health. W. F. Jacobs, factory manager, also has resigned.

Arthur E. Murton has been appointed manager, roll department, Continental Roll & Steel Foundry Co., Pittsburgh.

Dr. Robert F. Ruthruff has been appointed director of research for Sherwin-Williams Co., Cleveland, and allied companies. Prior to joining Sherwin-Williams Co. in 1939, Dr. Ruthruff was associated with E. I. du Pont de Nemours & Co., Wilmington, Del., Standard Oil Co. of Indiana, Chicago, and M. W. Kellogg Co., New York.

Kenneth F. Cramer has been appointed district manager, New York office, Baldwin Locomotive Works, succeeding Joseph F. Hoerner, who has been assigned to special duties in Washington.

J. V. Kirk has been appointed head of the new educational department, Addressograph-Multigraph Corp., Cleveland. In his present capacity, Mr. Kirk will also act as assistant to the company's general manager, E. F. Richter.

Dr. John J. Gorrell has joined the metallurgical and engineering service staff of Meehanite Metal Corp., New Rochelle, N. Y. Dr. Gorrell was previously chief chemist, Pressed Steel Car Co., Pittsburgh.

Fred W. Pennington has been appointed manager of publications and advertising, Kennametal Inc., Latrobe, Pa.

Walter H. Maynard, former assistant purchasing agent in charge of iron and steel scrap, American Rolling Mill Co., Middletown, O., has joined Middletown



ALBERT S. FROMM



S. R. KALLENBAUGH



JOSEPH P. MCGOUGH

Iron & Steel Co., also of Middletown.

Albert S. Fromm, advertising manager, Union Metal Mfg. Co., Canton, O., has become mayor of Canton, following the death of Mayor E. S. Folk. Mr. Fromm, who organized Union Metal Mfg. Co.'s sales promotion and advertising departments in 1925, will continue as the company's advertising manager on a part-time basis for the remainder of the year.

N. B. McLean, former general manager, Philadelphia division, Bendix Aviation Corp., South Bend, Ind., has been appointed general manager of the Marine division, which consists of plants in Brooklyn, N. Y., and Norwood, Mass. He is succeeded at Philadelphia by T. W. Tinkham, former general manager, Bendix Products division, South Bend. Other appointments by Bendix are: A. C. De Angelis, general manager, Friez Instrument division, Baltimore; H. A. Poole, general manager, Red Bank, N. J., plant; R. H. Crippen, works manager, Norwood plant; George E. Stoll, assistant general manager, South Bend plant; W. B. Paine, general manager, Owosso, Mich., plant.

Leroy K. Behr has been appointed Philadelphia district manager, Norton Co., Worcester, Mass., succeeding the

late Allan Seymour. John C. Ewer takes over Mr. Behr's former territory in Massachusetts and Maine, and he, in turn, is succeeded in the western Massachusetts, Rhode Island, Vermont and New Hampshire territory by C. Barnard Price Jr.

S. R. Kallenbaugh, former metallurgical service representative, Timken Roller Bearing Co., Canton, O., has been appointed West Coast district manager of the company's steel and tube division.

Joseph P. McGough, acting manager since 1942 at the Cleveland plant, Joseph T. Ryerson & Son Inc., has been named manager, succeeding Fred Doran, who moved to Chicago some time ago as vice president of the company.

Ray C. Fasher has been elected second vice president, Irwin Augur Bit Co., Wilmington, O.

C. W. Roberts has been named manager of the Southern district office in Birmingham, Ala., opened recently by H. K. Ferguson Co., Cleveland.

Thomas R. Coffey has been appointed manager of sales, Wisconsin-Minnesota district, Globe Steel Tubes Co., Milwaukee.

nologist, plastics division, American Cyanamid Co., New York, died Aug. 9 in Scarsdale, N. Y.

John Winters Upp, 75, retired manager, Switchgear division, General Electric Co., Schenectady, N. Y., died recently in Ardmore, Pa.

Gustave A. Maier, 65, general manager, Trenton plant, Plibrico Jointless Fire Brick Co., died Aug. 11 in Prince-

ton, N. J. Mr. Maier was a member of the American Institute of Electrical Engineers.

Joseph S. Munger, 61, president, Berkmann Mfg. Co., Chicago, died Aug. 12 in that city.

Ewald H. Schniewind, 56, president and director, Powder Metals & Alloys Inc., New York, died Aug. 11 on Nantucket Island, Mass.

OBITUARIES . . .

Carl M. Snyder, 47, assistant manager, appliance and merchandise department, General Electric Co., Schenectady, N. Y., died in New Haven, Conn., Aug. 15.

H. L. Rankin, manager, Trenton branch, American Bridge Co., died Aug. 13 in Trenton, N. J.

Dr. Kurt E. Ripper, 49, chief tech-

KAISER EMPIRE TYPIFIES

Sensational growth of numerous enterprises of energetic industrialist in steel, cement, shipbuilding, light metals and machinery only one phase of amazing industrial development on western rim of the nation in recent years

By A. H. ALLEN
Associate Editor, STEEL

TYPICAL of booming West Coast industry is the Joshua Hendy Iron Works, at Summyvale, Calif., which the energetic Henry J. Kaiser and his associates, including Felix Kahn and the dynamic West Coast machinery dealer, Charles E. Moore, bought up for a song back in 1940.

Today the company is building hundreds of triple-expansion steam engines for powering Liberty ships built in Kaiser shipyards, turbines for powering newer types of Kaiser ships, torpedo tubes and other related products.

Moore, now president of Joshua Hendy, is quoted as saying, "After the war we'll be in a position to manufacture marine engines, turbines, diesel engines,

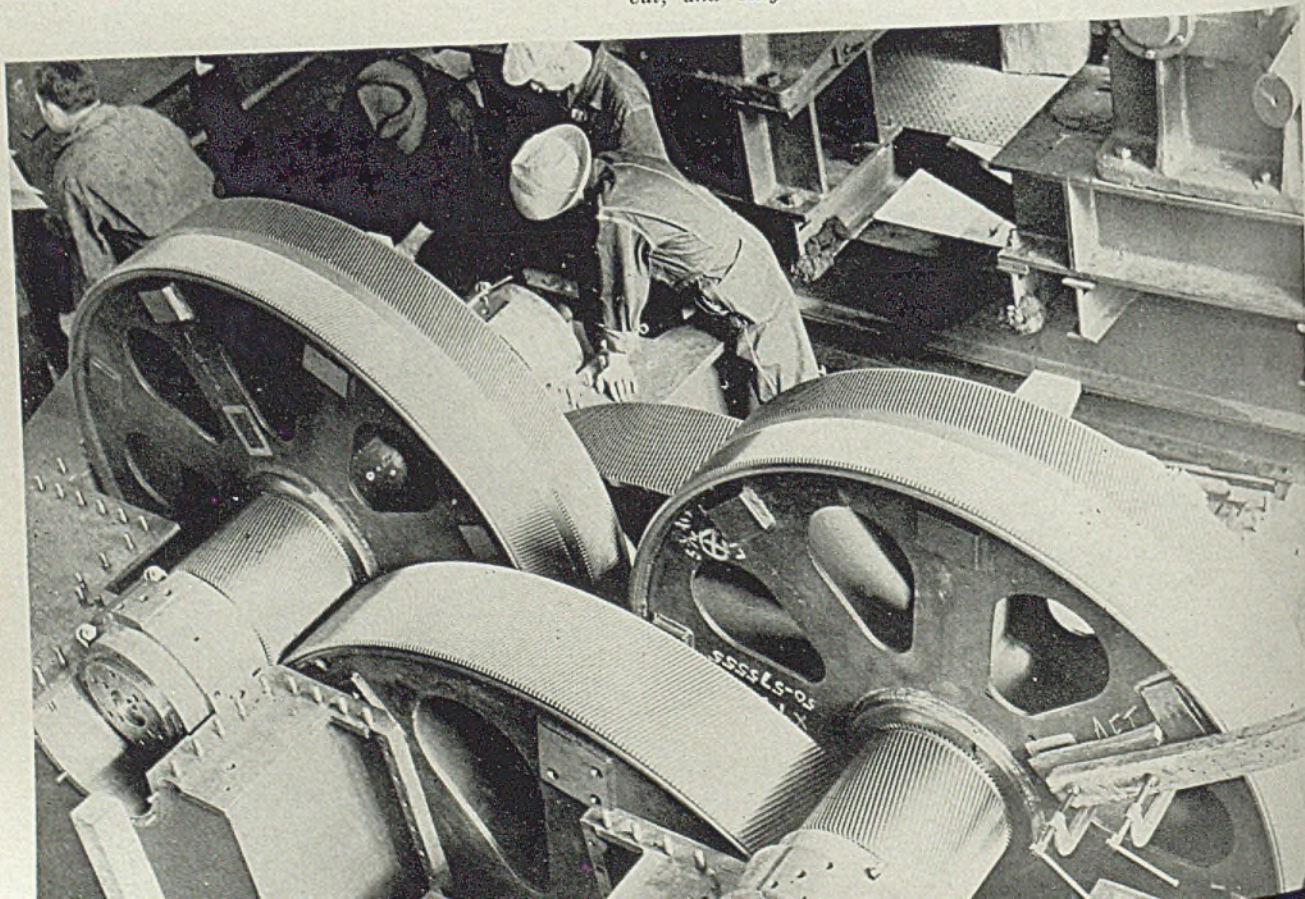
electric motors and generators, heavy mining and road equipment, dredges to improve our harbors and rivers, cranes, large refrigerating apparatus, etc. . . . We want to hold our employes, to make more jobs, to help the West produce and grow and prosper."

Few people have done more to help the West produce and grow and prosper industrially than has Moore himself, even in years before the war. He handled among other things the West Coast sales of Monarch Machine Tool Co., Sidney, O., and did such a remarkable job that Wendell Whipp, Monarch president, told a friend once that he wished he could persuade Moore to come East

and take charge of the Monarch plant. But Moore is heart and soul in the West Coast, and likely will continue that way, particularly since his close tieup with Kaiser. Furthermore, Joshua Hendy now controls the Crocker-Wheeler Electric Co. in New Jersey, which probably explains Moore's reference to motors and generators, and the Pomona Pump Co., located in the Los Angeles area.

Nine miles out of Oakland, on the bay of Richmond, are four Kaiser shipyards, one of them going under the name of the Kaiser Co. Inc., one under Kaiser Cargo Inc., and two under the Permanente Metals Corp. Richmond No. 1 and No. 2 are building Liberty ships.

Partially assembled reduction gear case used with 4000-horsepower steam turbines being built in California on a schedule of four per month by the Joshua Hendy Iron Works. The largest of these gears require 18 days to cut, and only 0.0002-inch tolerance is allowed



THE WEST

and Richmond No. 3 a new type of combination troop and cargo transport known as the C-4. Richmond No. 4 fabricates ATL landing barges and more recently has undertaken a contract for corvettes, smaller escort vessels. In fact, the word on the Coast is that Kaiser has signed up to handle the engineering and the purchasing of all supplies for the entire corvette construction program recently authorized by the Navy.

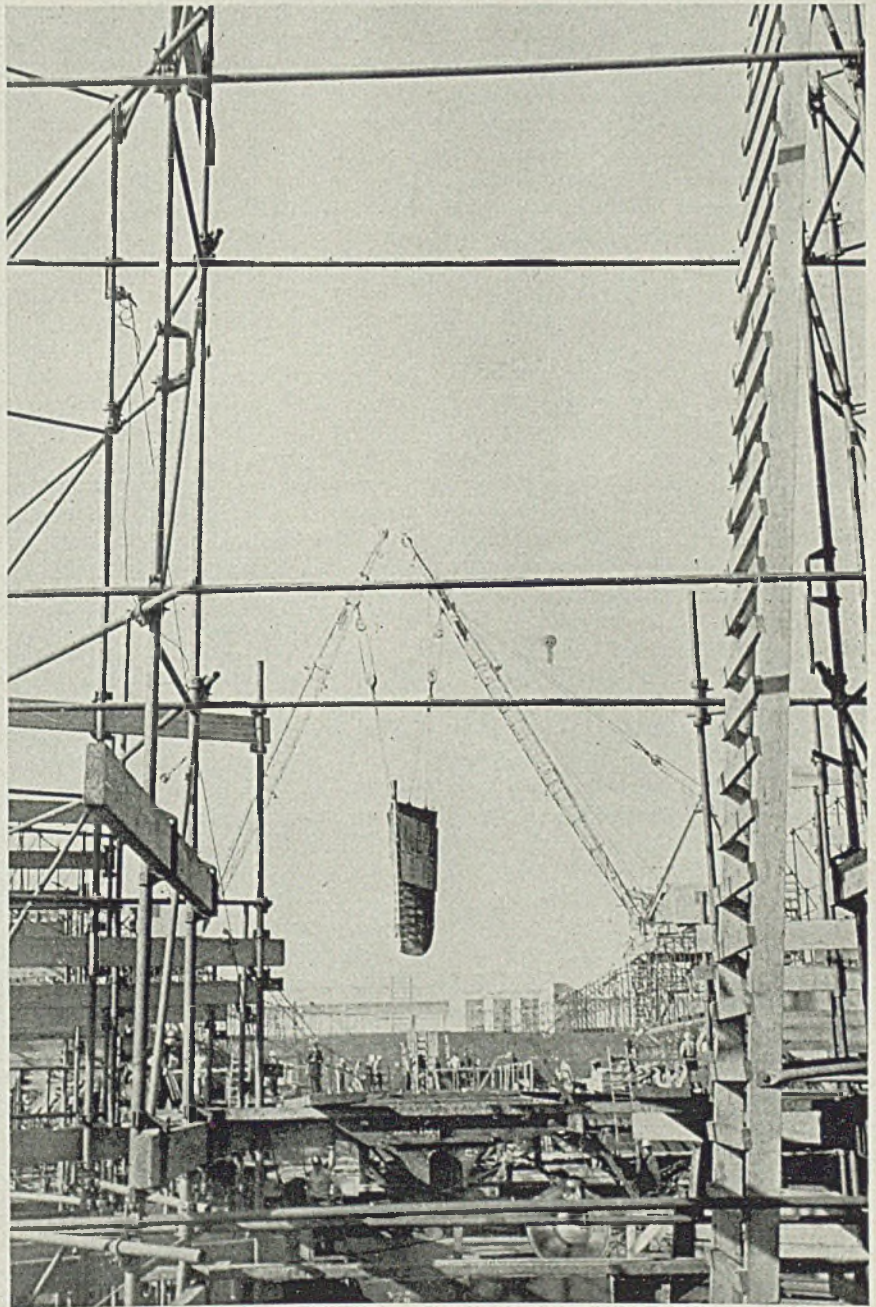
Richmond No. 3 is the largest and finest of the four Kaiser yards in the Bay area, and now employs over 23,000 workers. The four Kaiser yards employed an average of about 85,000 during May. No. 3 is the one yard designed and built to be a permanent installation, all shops being of concrete construction and the entire property being literally carved out of a mountainside by dynamite and steam shovel. It has five basin ways 610 feet long and 100 feet wide, blasted out of solid rock.

Basin Way Is Concrete "Tank"

The basin way is actually a large concrete "tank" from which the water is pumped after gates are closed at the sea end. When it is dry, the keel for a new ship is laid and the hull gradually built up of prefabricated parts, workmen operating from scaffolding alongside and supplied with materials through galleries incorporated in the upper rim of the way. When the ship is ready for "launching", the gates are opened, water rushes in and the ship is floated out of the basin to a dock where it is fitted out before delivery.

Back from the ways are the various shops and assembly bays in which sections of the vessel are welded up and assembled before being hoisted onto the hulls in the ways by giant "Whirley" cranes which travel along tracks between the basins.

To get a bird's-eye view of the Richmond yards, the best observation perch is atop the 4-story general stores warehouse at Richmond No. 3, a vantage point from which a panorama of the entire operation can be obtained. Other buildings at No. 3, each one marked by large block-letter names on the upper facade, include a fitting-out warehouse, plate and angle shop, machine shop, electric shop, pipe shop, rigging loft, compressor and acetylene station, maintenance shop



Lowering a ship section into position for one of the transports under construction at a West Coast shipyard

and administration buildings.

In the distance can be made out the ways at Richmond No. 2 and the Whirleys moving prefabricated sections to waiting hulls. These are the conventional type of sliding ways used by practically all other yards on the Coast.

Prefabrication of ship elements has been carried to great lengths in Kaiser yards, as a matter of fact by all shipyards in the current emergency. About 50 per cent of a Liberty ship is prefabricated, while up at Seattle-Tacoma Shipbuilding Corp. in Seattle, 65 per cent of a destroyer is prefabricated before installation.

There is nothing particularly striking

about the technique; it is just an example of what welded construction has made possible. Of course, organization of material flow and training of workers are important adjuncts, but the speed records which shipbuilders are ringing up in World War II would have been impossible without the advance in welding technique.

One of the largest prefabricated units for Liberty ships built at Kaiser's Richmond yard No. 2 is the forward deckhouse—a 72-ton structure, complete with piping, rails, fittings, etc. These deckhouses are built on two adjoining assembly lines in the prefabrication shop. The base floor plates first are welded to-

gether with the assembly upside down, to avoid the necessity of overhand welding. The floors move down the line on rollers, finally are turned over to receive the balance of the structure and when the deck house has been completely assembled it is cut apart by torch into four units, since the complete assembly would be impossible to handle. The four sections are rolled off the line onto a carriage which is lifted clear of the assembly line by means of electric jacks. It is then transferred to an 85-ton, 32-wheel trailer with 18-foot tread, on which it is moved to the ways for lifting onto the vessel, whereupon the four sections are again welded together. The after deck house, being smaller, is not cut apart for installation.

Clay Bedford, 36-year-old general manager for all four Richmond yards, says, "We fought and bled and died to get Richmond No. 3. It's solid, cut out of rock, and its concrete docks, warehouses, and basin are all permanent. It ought to be good for 50 years."

Kaiser has equally pretentious shipbuilding operations in the Portland area where his son Edgar manages three large yards — Oregon Shipbuilding Corp.'s yard at Portland and Kaiser Co. Inc.'s yards at Swan Island and Vancouver—built in that order. Cargo ships, landing barges, and tankers are being built in this area, and more recently a new type of BB3 aircraft carrier of Maritime Commission design. Oregon Ship employs 32,000, Swan Island 24,000 and Vancouver expects to reach 34,000.

Delivers 200 Liberty Ships

Then down south in Los Angeles on Terminal Island at the harbor is California Shipbuilding Corp., managed by John McCone of the engineering triumvirate of Bechtel, McCone & Parsons who in their own right supervise a variety of types of engineering construction work, such as aircraft modification centers, shipyards, etc. Calship has already delivered over 200 Liberty ships and is still going strong, running almost neck and neck with Oregon Ship at Portland, where the principal production records in shipbuilding at Kaiser yards have been set.

Lest anyone think Kaiser has a monopoly on West Coast shipbuilding, it should be pointed out that there are dozens of other companies in the field—Bethlehem, Moore Shipbuilding, Todd in Seattle, Seattle-Tacoma, Marinship, navy yards at Mare Island and Bremerton, Consolidated Steel, Western Pipe & Steel, Campbell Machine Co., Los Angeles Shipbuilding & Drydock, Concrete Ship Constructors, etc.

It is a strange occurrence, this West Coast shipbuilding boom, because for 20

years prior to the war there was virtually a complete absence of any kind of shipbuilding except perhaps an occasional yacht for a wealthy sportsman. Today there are over 60 companies in the Los Angeles-San Diego area alone building various types of ships and boats—ten at San Pedro, eighteen at Newport Beach, six at San Diego, six at Long Beach, seven at Terminal Island, five at Wilmington, four at Los Angeles, two at Santa Barbara, and one each at Santa Ana, Santa Monica, Maywood and National City. At the last named point is Concrete Ship Constructors building special types of barges of reinforced concrete. The concrete is 4 inches thick and amply reinforced by a maze of reinforcing steel, the barge itself being divided into "colls" by partitions for added strength.

Largest Single Cement Plant

The third and fourth phases of Kaiser operations around San Francisco take in the Permanente enterprises. The initial industry was the cement plant, well up in the Coast Range west of Sunnyvale at the south end of the San Francisco Bay, where cement was first produced in December, 1939, to be used in construction of Shasta Dam in Central California. This plant is now considered the largest single cement plant in the world, with capacity of 5,000,000 barrels a year.

From the level of the cement plant itself, you wind up a tortuous mountain road 1600 feet to the top of the range where 5 cubic yard shovels are stripping off a limestone hill and depositing their loads in huge 20-yard buggies built with sliding tops so that their loads of rock can be dropped into "surges" built into the mountain side to receive enormous tonnages of the stripped rock and feed it onto powered conveyor belts which carry it down to crushers, mixers and kilns at the mill. There is in fact a network of conveyor belts, some of them about the longest belts ever manufactured, to bring both clay and limestone from workings at both the top of the mountain and in adjacent canyons to the mill site. An intermediate primary crusher grinds the stripped material to 6-inch maximum size and deposits it on another conveyor belt as it moves down to the cement plant. Clay is dug almost next to the limestone deposit and can be switched onto the main rock conveyor at will.

Limestone traveling down the mountainside on the conveyor belts actually creates the power required for processing itself. The three belts of the "dippy-doodle" conveyor system carry the stone nearly two miles from the top of the mountain to the cement plant. Generators on the belts serve as dynamic

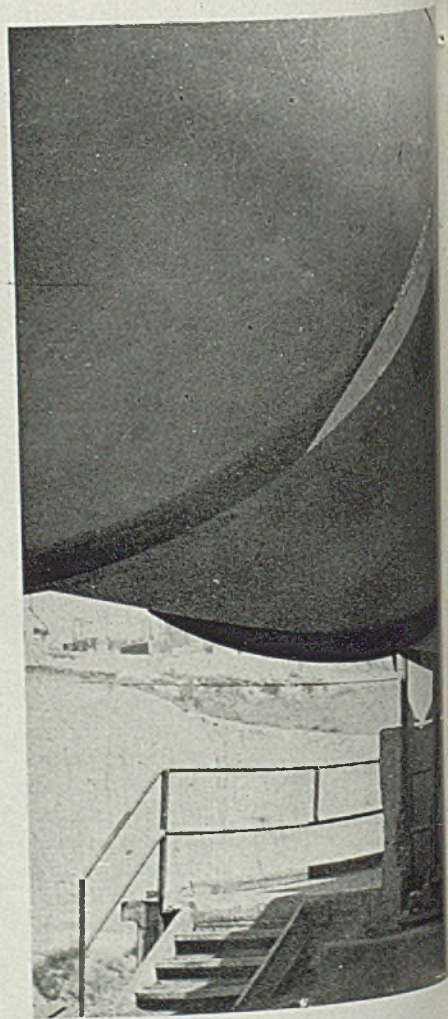
brakes and at the same time supply sufficient current to crush and grind the stone, operate the 5-yard shovels, light the plant and meet other power requirements.

Limestone and clay are ground up together and mixed with water to make a slurry which, when it has attained the proper consistency, is fed into four 12 x 463-foot natural gas fired kilns—three of them air cooled and one water cooled. The discharged clinker then is reground, mixed with gypsum and blown into 27 large concrete silos where the cement is stored before bagging and shipping.

Currently, Permanente is becoming better known as a principal West Coast source of the light metal magnesium, which is produced by the difficult Hansgirg process, purchased by Kaiser at a reported cost of \$750,000 from Emil Winter of the American Magnesium Metals Corp.

Permanente has had its troubles with magnesium, troubles which tested the mettle of the organization. Many changes in the process and equipment were made over a period of a couple of years, with the result production is now well along toward rated capacity.

Basically, the process involves the mix-



STEEL

ing of magnesium oxide and ground coke—75 magnesia and 25 coke—and pressing the powder into pellets or “beetles” as they are called, then charging these briquets into large electric reduction furnaces, sealed tightly against air infiltration. Resulting magnesium metal vapor is “shock-chilled” by natural gas—to capture the magnesium as a dust and allow the carbon monoxide to pass off as a vapor—and collected by suitable means (Hansg'rg original agglomerators have been discarded), mixed with solvent and charged into steel retorts placed in a series of electric pit furnaces much like the soaking pits in a steel plant. Here the magnesium crystallizes on the interior of the cylinder, after which the retort is opened and the metal shaken and barred out. The crystalline mass then is taken to the foundry, melted down in conventional crucible furnaces and poured into pigs or cylindrical ingots.

Hard by Permanente are five other Kaiser operations closely tied in with Permanente. At Manteca is a DPC plant producing magnesi'um by the ferrosilicon process. At Le Grand is a silica-quartz

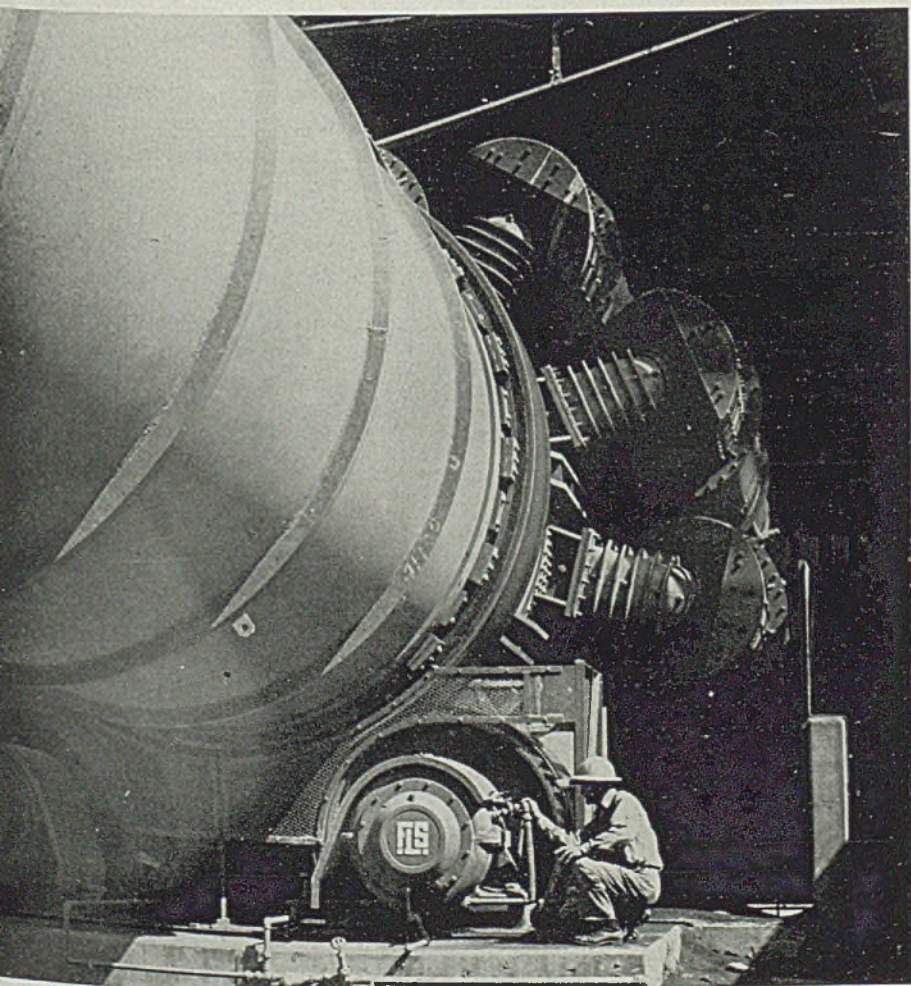
quarry. At Natividad is a dolomite calcining plant. At Moss Landing is a plant for extracting magnesia (magnesium oxide) from sea water and calcined dolomite, and finally in the group is a ferroalloys plant, located near the cement plant, which produces ferrosilicon for Manteca.

Operate Three Electric Furnaces

Permanente officials call their magnesium reduction process the carbothermic method, in contrast to the silicothermic, or more commonly ferrosilicon, process. At the Permanente ferrosilicon production plant, three electric furnaces are operated with charges of steel turnings, coke and quartz rock. Capacity is around 90,000 pounds of ferrosilicon a day.

Also at Permanente, near the cement plant, and alongside what engineers there have dubbed “Aspirin Boulevard” (because of the many headaches the project involved) is a small calcining unit which is converting magnesium carbonate (in magnesite) into magnesia or magnesium oxide, for British interests.

Firing end of one of the four giant kilns at the Permanente Cement Co. plant. These kilns, 12 feet in diameter and 463 feet long, are among the largest in the world



Permanente has no monopoly on West Coast magnesium and ferrosilicon production. Government-owned plants are operated in Las Vegas, Nevada, by Basic Magnesium Inc. (now under operating control of Anaconda Copper Co.); also a ferrosilicon and magnesium plant and a ferrosilicon plant at Spokane, Wash., operated by Electrometallurgical Co. Basic Magnesium at Las Vegas has had its difficulties but is coming along better now, using an electrolytic process with convenient and low-cost Boulder Dam power.

Another potentially important Kaiser industry is directed from the Bay area, for in the Oakland headquarters of Kaiser Co. Inc., are stationed several hundred administrators, engineers, draftsmen, expeditors, accountants and other technicians who have been responsible for the conception and growth of the Pacific Coast's first integrated iron and steel plant. This plant, located in Fontana, about 45 miles east of Los Angeles, is already a vital block in the checkered board of the nation's war production scheme, supplying substantial quantities of pig iron and steel ingots for war uses. “The Bess,” Kaiser Steel's 1200-ton per day blast furnace and the first one west of Provo, Utah, has been turning out pig since last Dec. 30 and the first of the six 185-ton open-hearth furnaces was tapped May 14. Since then, three more open hearths have been put into operation. Before the end of 1943, the 110-inch tandem plate mill and the 28-inch structural mill will be in full operation. By early 1944, shapes will be coming from the merchant mill.

STEEL will have more to report on Kaiser's steel plant and the iron and steel industry of the West in general in subsequent issues.

Projecting San Francisco's future into the postwar years brings up a number of disturbing factors, not the least of which is the major collapse which is bound to occur in shipbuilding. The Bay area now is building ships at a clip of better than a billion dollars worth a year; this pace cannot last, and the war's end might see it drop off precipitately by anywhere from 75 to 90 per cent, despite the vague plans you hear for instituting production of entire new fleets of sleek, turbine-driven, high-speed superfreighters to serve the commercial interests of the “Pacific Rim”—China, Japan, India, Australia, South and Central America, Mexico, Alaska, etc. Even the forward-talking Kaiser sees the doom

(Please turn to Page 135)



THE BUSINESS TREND

War Order Distribution Pattern Seen Changing

ALLOCATION of prime war contracts is slowly returning to the regional pattern of peacetime goods production, after deviating sharply from this standard in the early war months.

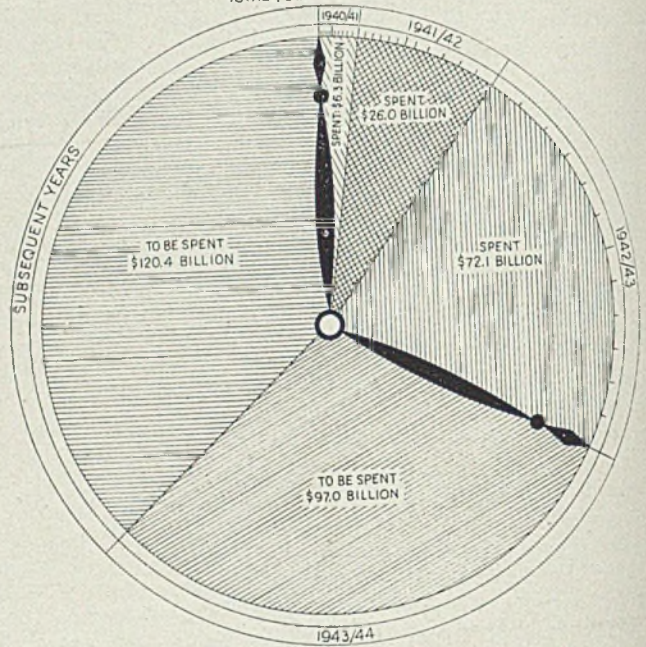
The National Industrial Conference Board's recent survey shows sharpest gains in awards this year by those areas which in 1942 received a smaller proportion of war contracts than their share in civilian goods output in 1939. Except for the southern states the trends in percentages of war contracts granted by regions are all in the direction of their percentages of total peacetime goods output prevailing in 1939.

INDUSTRIAL ACTIVITY—During the latest period production trends were mixed. Gains were recorded in steel ingot output, automobile and truck manufacture, petroleum production, revenue freight carloadings and electric power consumption. Engineering construction and bituminous coal production declined during the latest period.

DURABLE GOODS ORDERS—Manufacturers' new orders increased 16 per cent from May to June, with virtually the entire gain in the durable goods industries. The Department of Commerce durable goods orders index reached 392.7 in June, or the highest level recorded since the peak of 439.5 registered in June, 1942. Durable goods inventories also declined during June, although they remained substantially above the volume reported for the like period a year ago. Following the steady upward trend through 1942, inventories have tended to level off during the past few months. The Commerce Department's index on shipments of durable goods reached a new peak during June of 343, compared with 338 in May and 256 for the corresponding month last year.

WAR EXPENDITURES—Treasury disbursements for purchase of war materiel have increased rapidly from \$6.3 billion in 1941 to \$26 billion in 1942 and \$72.1 billion in 1943. They are expected to reach \$97 billion in 1944. Appropriations and net contract authorizations approved

APPROPRIATIONS AND NET CONTRACT AUTHORIZATIONS
TOTAL \$321.8 BILLION



and pending amounted to an additional \$120.4 billion on June 30 last.

Registering the first monthly decline since February, government war expenditures during July of \$6.7 billion were off 12 per cent from the June peak of \$7.7 billion. The daily rate of expenditures last month amounted to \$249.9 million, compared with \$295.7 in June.

The War Department recently issued regulations designed to effect prompt settlement of war contracts terminated because of changing military requirements. Although the regulations are intended primarily for the immediate assistance of government personnel, their publication is assurance to business that the department intends to deal fairly with contractors whenever contracts are canceled, the War Department states.

MANPOWER—Shortage of labor is being felt to an increasing extent as industrial plants strain to reach projected production goals. Early in the war program the lack of certain essential production facilities was industry's chief problem. Closely tied in with this condition was the acute shortage of basic raw materials.

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity).....	98.5	98.0	97	97
Electric Power Distributed (million kilowatt hours).....	4,288	4,241	4,184	3,655
Bituminous Coal Production (daily av.—1000 tons).....	1,958	2,017	1,850	1,848
Petroleum Production (daily av.—1000 bbls.).....	4,239	4,202	4,103	3,893
Construction Volume (ENR—unit \$1,000,000).....	\$31.8	\$47.5	\$104.0	\$200.6
Automobile and Truck Output (Ward's—number units).....	19,600	19,250	19,485	19,215

* Dates on request.

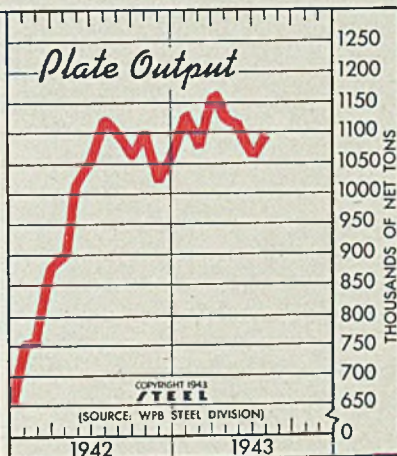
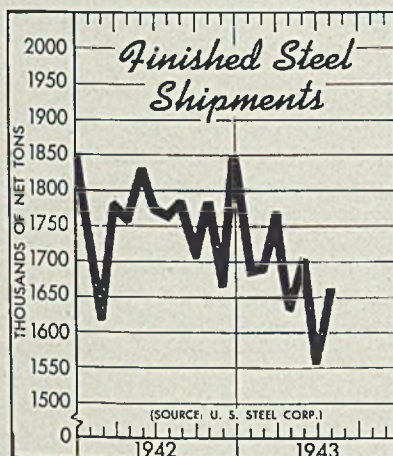
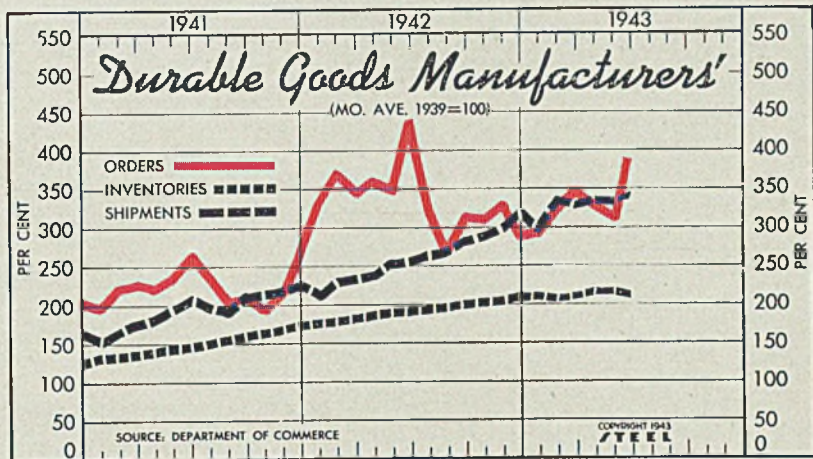
TRADE

Freight Carloadings (unit—1000 cars).....	887†	872	877	869
Business Failures (Dun & Bradstreet, number).....	60	51	48	174
Money in Circulation (in millions of dollars)†.....	\$18,101	\$18,014	\$17,658	\$12,870
Department Store Sales (change from like week a year ago)†.....	+11%	+19%	+39%	-6%

† Preliminary. † Federal Reserve Board.

Manufacturers Durable Goods

	Orders		Shipments		Inventories	
	1943	1942	1943	1942	1943	1942
Jan.	293.5	333.9	298	214	211.3	179.2
Feb.	326.6	373.4	337	232	209.6	180.8
Mar.	349.2	344.4	330	235	210.7	183.4
Apr.	329.8	362.1	338	239	213.5	186.6
May	320.0	320.4	308	224	210.5	180.2
June	392.7	429.5	343	256	211.8	193.2
July	...	321.8	...	264	...	195.8
Aug.	...	269.4	...	270	...	198.0
Sept.	...	314.5	...	283	...	200.9
Oct.	...	312.1	...	289	...	204.1
Nov.	...	334.7	...	300	...	207.7
Dec.	...	291.1	...	320	...	210.1
Ave.	...	337.1	...	263	...	194.2



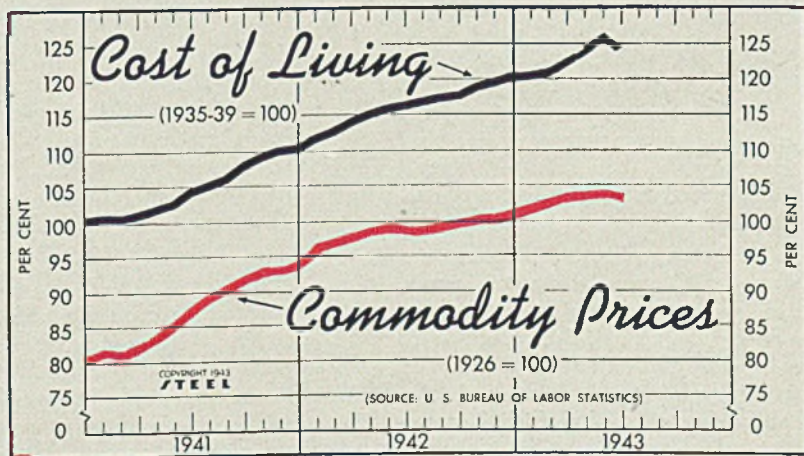
Steel Shipments†—Plate Production†
(Unit 1000 Net Tons)

	Shipments		Plate Output	
	1943	1942	1943	1942
Jan.	1685.9	1738.9	1135.4	754.5
Feb.	1691.6	1616.6	1072.0	758.7
Mar.	1772.4	1780.9	1167.7	878.7
Apr.	1630.8	1758.9	1121.0	895.9
May	1706.5	1834.1	1114.9	1012.2
June	1552.7	1774.1	1059.3	1050.9
July	1661.0	1765.7	1089.6	1124.1
Aug.	...	1788.6	...	1097.9
Sept.	...	1703.6	...	1061.8
Oct.	...	1787.5	...	1101.4
Nov.	...	1665.5	...	1013.6
Dec.	...	1849.6	...	1060.0
Total	...	21,064.2	...	11,809.7

†U. S. Steel Corp. †War Production Board.

Wholesale Commodity Price—
Cost of Living Indexes

	Commodities— (1926=100)			Living Cost— (1935-39=100)		
	1943	1942	1941	1943	1942	1941
Jan.	101.9	96.0	80.8	120.6	112.0	100.8
Feb.	102.5	96.7	80.6	120.9	112.9	100.8
Mar.	103.4	97.6	81.5	122.8	114.3	101.2
Apr.	103.7	98.7	83.2	124.1	115.1	102.2
May	104.1	98.8	84.9	125.1	116.0	102.9
June	103.8	98.6	87.1	124.8	116.4	104.6
July	...	98.7	88.8	...	117.0	105.3
Aug.	...	99.2	90.3	...	117.5	106.2
Sept.	...	99.6	91.8	...	117.8	108.1
Oct.	...	100.0	92.4	...	119.0	109.3
Nov.	...	100.3	92.5	...	119.8	110.2
Dec.	...	101.0	93.6	...	120.4	110.5
Ave.	...	98.8	87.3	...	116.5	105.2



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	\$7,812	\$8,598	\$8,906	\$6,646
Federal Gross Debt (billions)	\$146.8	\$146.4	\$141.1	\$83.3
Bond Volume, NYSE (millions)	\$37.7	\$46.5	\$63.7	\$27.6
Stocks Sales, NYSE (thousands)	2,943	4,730	6,788	1,575
Loans and Investments (millions)†	\$46,954	\$46,482	\$45,563	\$33,509
United States Government Obligations Held (millions)†	\$34,464	\$34,072	\$32,987	\$19,441

† Member banks, Federal Reserve System.

PRICES

	Latest Period*	Prior Week	Month Ago	Year Ago
STEEL's composite finished steel price average	\$56.73	\$56.73	\$56.73	\$56.73
Spot Commodity Index (Moody's, 15 items)†	245.3	245.0	243.6	231.2
Industrial Raw Materials (Bureau of Labor index)†	113.5	113.0	114.0	100.4
Manufactured Products (Bureau of Labor index)†	99.9	99.8	99.6	98.9

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

ELECTRON DIFFRACTION

New tool points way to important improvements
in surface finishes and control of corrosion

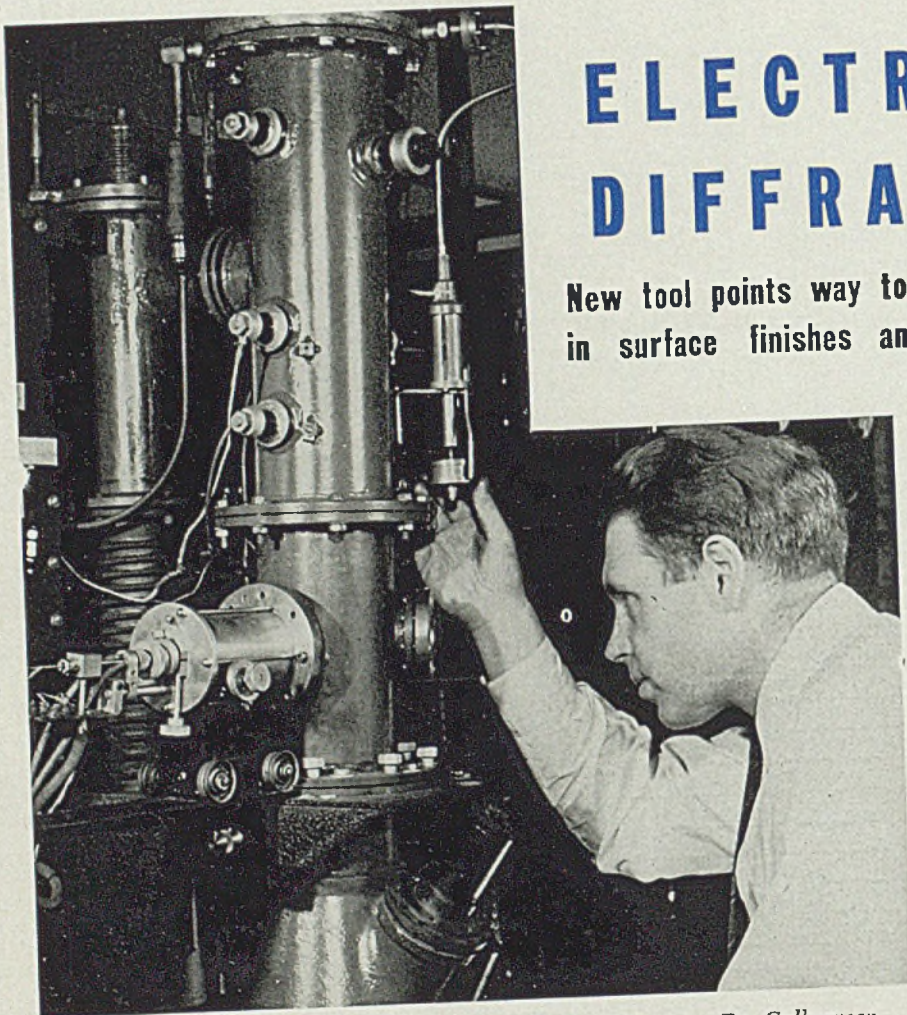


Fig. 1. (Above)—Dr. Gulbransen, designer of the electron diffraction camera, adjusts unit. At left center seen mounted on small wheels is closely controlled electric furnace and sample manipulator. Pattern is studied by looking through eyepiece mounted at angle below operator's arm

CLOSE STUDY of corrosion of metals while the corrosion is taking place is now possible through the use of a special electron diffraction camera developed in the research laboratories of Westinghouse Electric & Mfg Co., East Pittsburgh, Pa.

In its simplest form, the device fires a stream of electrons at a metal sample, which bounce off at varying angles determined by the chemical composition of the sample. These electrons then fall on a photographic plate, forming distinct rainbow-like patterns by which the material in the sample can be identified. (The patterns obtained bear some resemblance to those produced in X-ray diffraction cameras.)

The connection between this pattern-forming action and metallic corrosion lies in the fact that the pattern is formed

only by a thin layer on the surface of the sample. Beneath this thin film, whose thickness averages between 20 and 30 angstrom units (only some four or five atomic layers) the metal or metal reaction product in the sample has no effect on the diffraction pattern. Thus through the use of this unit it is possible to determine the analysis of the exterior skin of the sample to a much more exact degree than heretofore.

For the stream of electrons to form

and to be directed in the proper manner, the action must take place in a vacuum. An aluminum cathode at the top of the apparatus acts as a source of electrons when charged with 50,000 volts potential. The electron flow is guided through a chamber from which the air has been evacuated, past the metal sample and on the photographic plate. The chamber through which the electron flow occurs is so constructed that its atmosphere may be controlled. Any gas may be fed into the chamber and allowed to react with the metal in the sample for any desired length of time, after which the chamber is evacuated and diffraction patterns taken. Thus corrosion rates can be varied as desired.

This provides some obvious applications. The effects of oxygen on steel, for example, can be closely controlled and measured, to indicate what varying percentages of oxygen in the atmosphere will do to steel in varying periods of time. Through the use of small furnaces, which may also be introduced into the chamber, temperatures of the sample may be increased to as high as 900 degrees Cent. (1650 degrees Fahr.) to simulate actual conditions in a heat-treating furnace.

Another important application which is immediately apparent is a study of the effects of alloy additions to metal. Through the use of a rotary sample holder, a half-dozen samples of varying alloy content may be subjected to the same conditions of corrosion, and effects of the alloy additions on the parent metal may be observed. For example, one such test already made shows that iron forms an immediate coating of iron oxide upon exposure to the air. How-

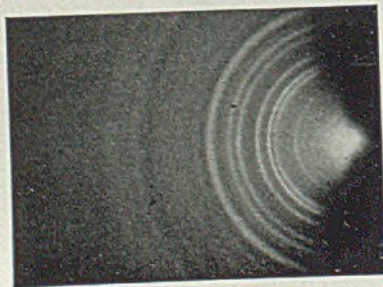
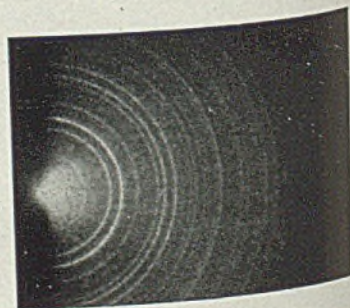


Fig. 2. (Left)—Typical pattern recorded by electron diffraction from sample of pure iron oxidized in air at 1/75 atmospheric pressure for 15 minutes at 600 degrees Cent. The oxide is Fe_3O_4

Fig. 3. (Right)—Contrast this pattern from iron with 1 per cent chromium added with Fig. 2. This illustrates how identity of surface layer can be determined by position and relative intensity of pattern rings



ever, an addition of only 1 per cent chromium changes the oxide film to chromium oxide, which acts as a natural deterrent to corrosion.

Some metals form different types of oxides, some desirable and some undesirable. With this apparatus it will be possible to determine the conditions under which each different oxide forms, and govern conditions so that the desired film is produced. This has already brought at least one important commercial result. In using aluminum pistons in aircraft engines, an English firm reported an unusually great degree of wear on the cylinder walls.

Investigation showed that the high temperature inside the engine was forming hard aluminum oxide particles resembling small synthetic sapphires. Ordinary aluminum oxide forms a protective film over the metal and hinders corrosion. It is an amorphous substance, which produces virtually no wear. In order to promote the formation of this latter type of oxide, small amounts of magnesium were added to the piston metal, and the trouble was eliminated.

Dr. Earl A. Gulbransen, designer of the electronic camera at Westinghouse Research Laboratories, feels that a study of theories regarding the formation of oxide films may bring to light some completely new angles on the problem of cor-

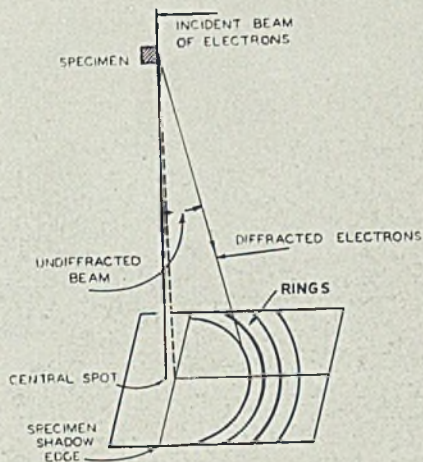
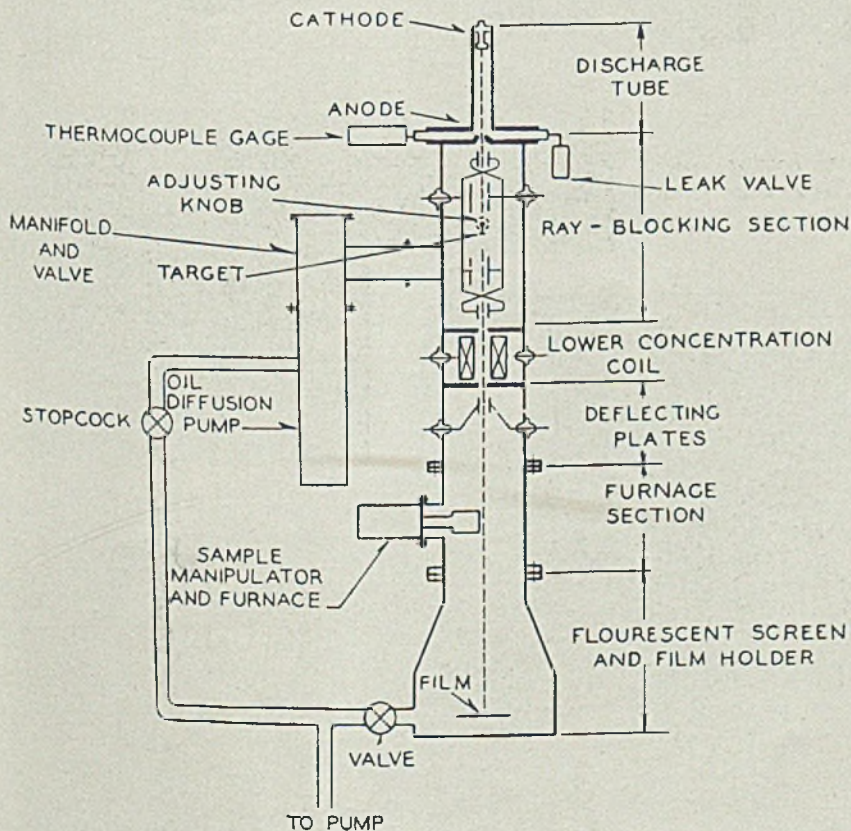


Fig. 4. (Above)—Diagram shows how incident beam is aimed at surface of specimen at small angle, resulting in electrons "bouncing" off surface at varying angles, producing the rings

rosion. According to Dr. Gulbransen, entirely new conceptions of metal finishing may result from such study. It is entirely possible that finishing operations in controlled atmospheres may provide coatings for metals far superior to any now existing.

Dr. Gulbransen also sees the possibility that studies of alloying problems with the electron diffraction camera

Fig. 5. (Below)—All functional parts of the electron diffraction camera are shown here in their approximate relation. Function of pump, not shown, is to exhaust gases from tube so vacuum necessary for uninterrupted passage of electrons can be formed



may cut months and years from the necessary testing procedure inherent in the development of corrosion resistant alloys. Most oxide films form in a matter of seconds after the metal is exposed to the atmosphere, and a determination or analysis of the film is almost an infallible key to the corrosion resisting properties of the metal.

Dr. Gulbransen's camera is equipped so that any desired atmosphere may be introduced in the chamber containing the sample. Hydrogen is first used to cleanse the specimen and make sure no coating of any kind exists. The chamber is then exhausted, and the desired gas—oxygen, air, carbon dioxide, water vapor, or any combination desired—is introduced. After the desired exposure period, the tube is again exhausted and the charge applied to the aluminum cathode.

The electron flow begins from a point on the cathode and passes through electrical fields which concentrate and focus the stream. Upon reaching the metal specimen, the electrons in the stream are diffracted by its surface and form identifying patterns. Once the pattern has been established for a given substance, that substance can always be identified by this method because the distance between the concentric rings and the relative intensity of the rings always remains the same.

The apparatus is still in experimental form, and in some ways, still crude. It is, however, an important new tool for research. Further study of its possibilities will unquestionably bring new developments of considerable importance to the metal industries.

Life of Aircraft Engines Increased by Plating Rings

Plating of airplane piston rings with 0.005-inch chromium on the cylinder contacting surface is enabling our fighting aircraft to fly five times as many hours between engine overhauls, American Hammered Piston Ring Division, Koppers Co., Baltimore, revealed recently.

The plating is so effective that the performance of aircraft, even in Africa where the abrasive-like dust of the desert apparently has no ceiling, has not made much difference, it is claimed.

Tightly locked on special arbors, the piston rings are lowered, by an overhead traveling crane, into one of a long series of tanks. The plating operation is based on the Van Der Horst process.

Chromium deposited on the airplane rings is not bright, hard plating used on automobile bumpers. Instead, it is known as Porus-Krome—permitting ample lubrication and yet resisting wear to an extent that, if applied to industrial engines after the war, it promises long-life potentialities.

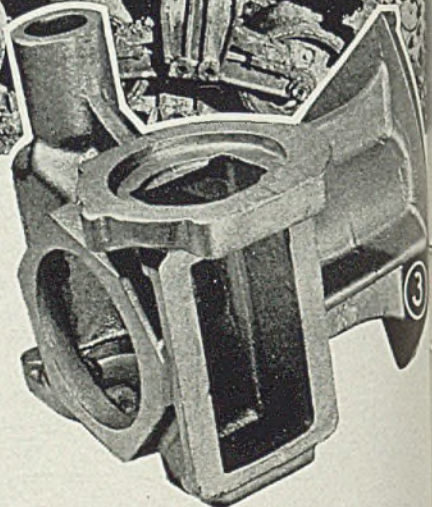
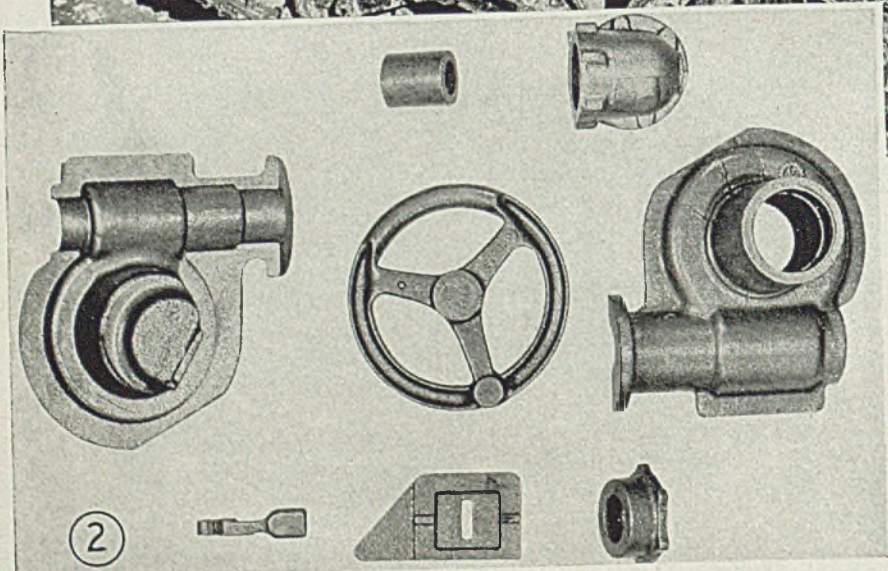
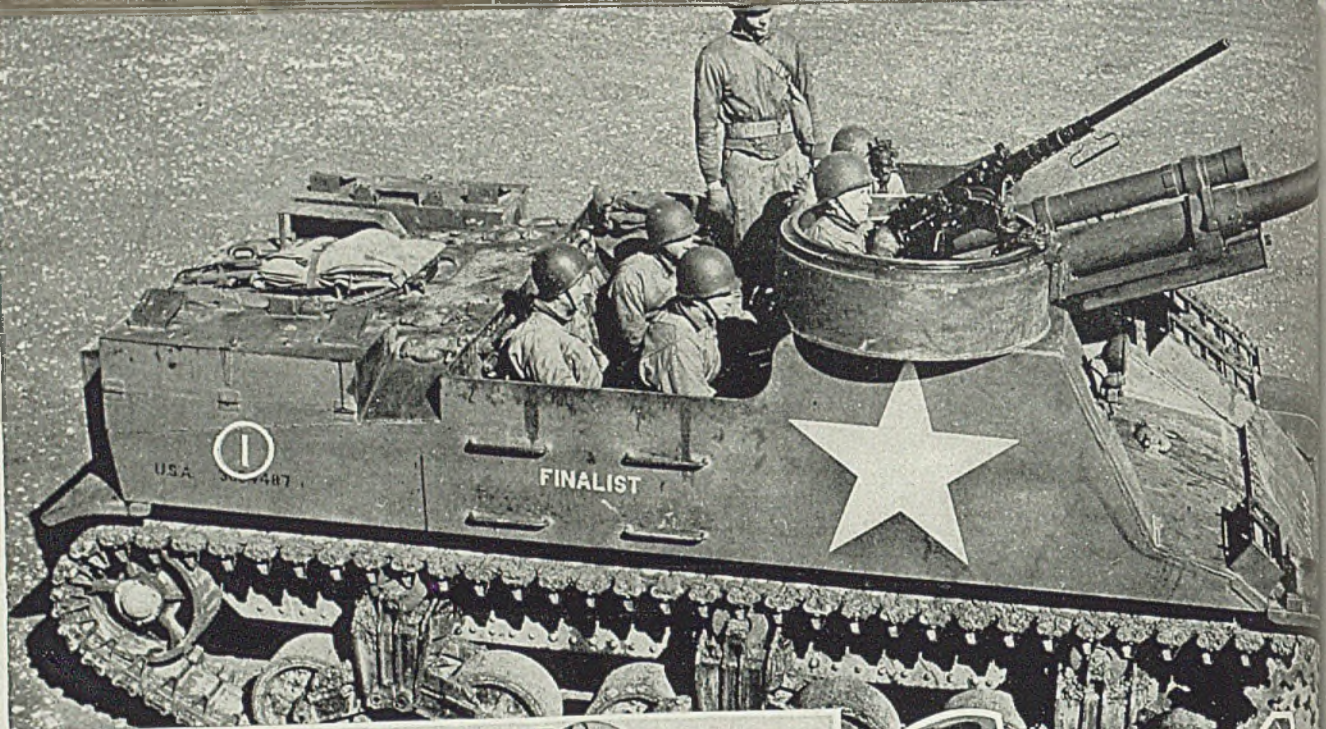
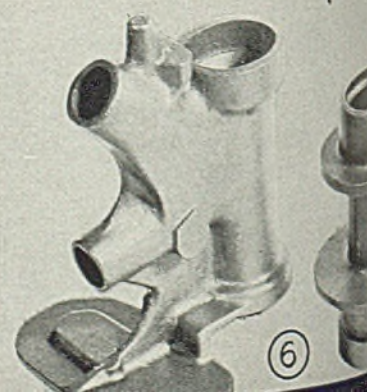
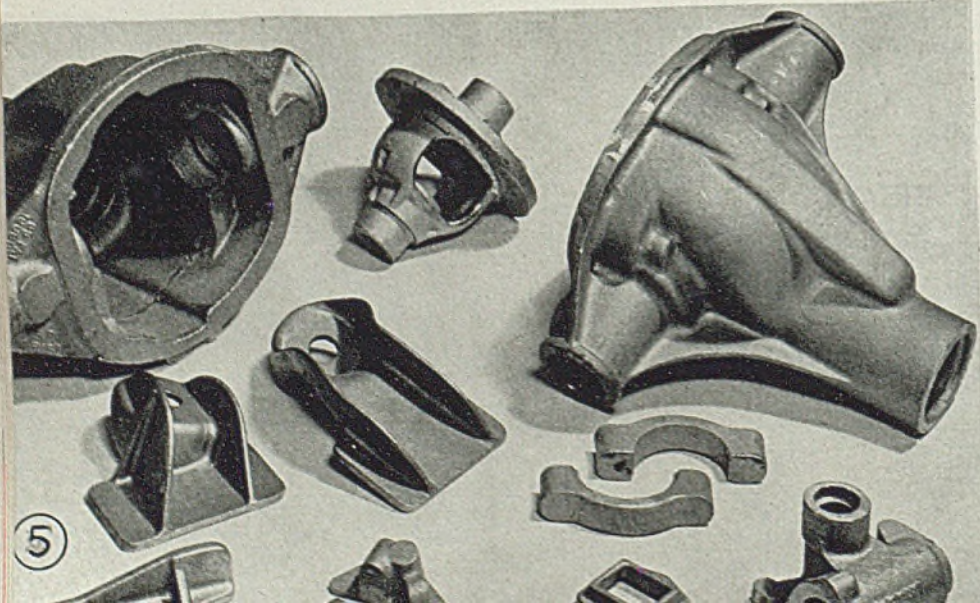
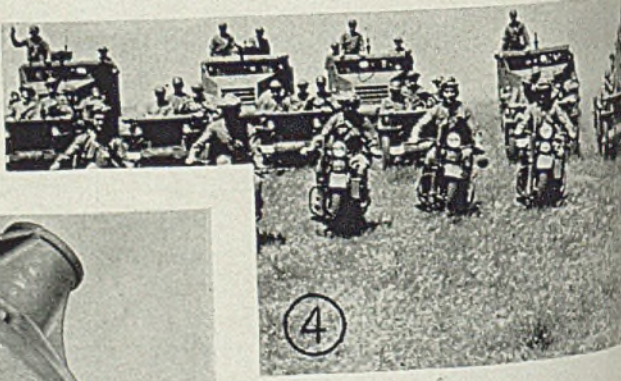


Fig. 1—Anti-tank unit with 105-millimeter howitzer uses several malleable castings. Fig. 2—Malleable castings for a gun elevating mechanism. Fig. 3—Tank steering gear housing



Malleable Iron Castings

IN ORDNANCE

By LT. COL. J. H. FRYE
 Chief, Materials Section
 Service Branch, Technical Division
 Ordnance Department
 Washington

APPLICATIONS of malleable iron in ordnance were quite limited in time of peace. The necessity for its extensive use did not seem to exist. Of course differential carriers, cases, bearing caps, steering gear housings and other parts of Army trucks were of malleable but seldom were identified as such. Illustrative of some general peacetime uses, also of mechanical properties, is a reproduction of one of a pair of technical display cabinets furnished to a number of engineering schools by the Malleable Founders Society, shown in Fig. 11.

When it became imperative to prepare rapidly for mechanized warfare on a tremendous scale, problems of material and production quickly assumed gigantic proportions. Metal conservation and the saving of every possible machine tool and man-hour became of paramount importance. Malleable iron was among the materials, the possibilities of which impressed many of us in ordnance. Some of us had a certain degree of familiarity with the product, and others became

better acquainted with it through the co-operation and contacts with the industry's representatives and through the arsenals, and the ordnance districts.

Malleable iron possesses the advantage inherent in a cast part in that it may be cored and cast into intricate shapes with a minimum use of metal. At the same time, lack of necessity of removing surplus metal saves machine tools and man-hours. A further contribution to this saving is the ease and speed with which malleable iron can be machined.

The physical properties of normal malleable iron are indicated in the present revision of Federal Specification QQ-I-666 which includes the following minimum values for two different types of malleable iron:

Ultimate Strength psi	Yield psi	Elongation %
53,000	35,000	18.00
50,000	32,500	10.00

The question of toughness and resistance to impact is quite well illustrated by the photograph of two eye-bolt lift-

ing plugs shown in Fig. 10. The manner in which one plug has been battered has resulted in a substantial closing and elongation of eye without fracture. Use of malleable iron in this application has effected a saving of at least ½-pound of metal on each plug, important not only from the standpoint of metal conservation but also when considering weight reduction in shipping heavy ammunition abroad. The weight reduction has, of course, been effected by coring needless metal from the interior of the plug. Also bar stock has been saved and machine tool time and man-hours reduced by the greater ease of machining the malleable casting, as compared with the forgings originally used.

In the production of machine gun mounts and pintles, malleable iron has replaced steel to advantage. In the production of the Oerlikon 20-millimeter gun mount, thousands of tons of strategic copper have been saved by the use of malleable iron in place of bronze castings. Of no little importance, too, is

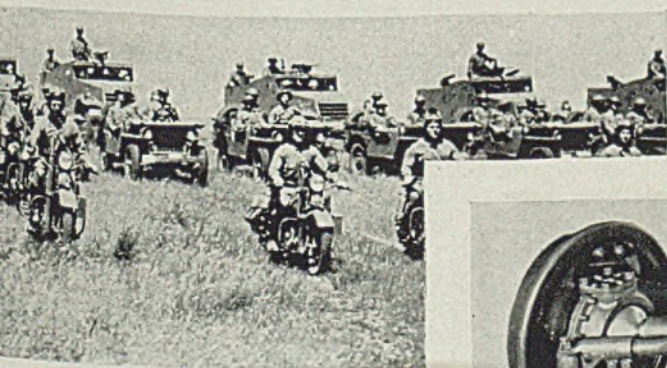
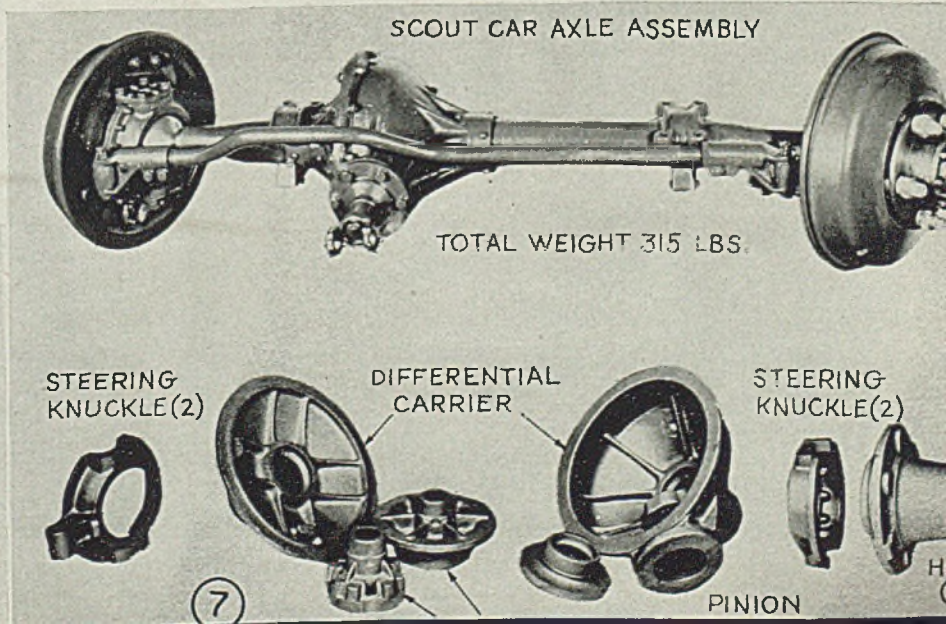
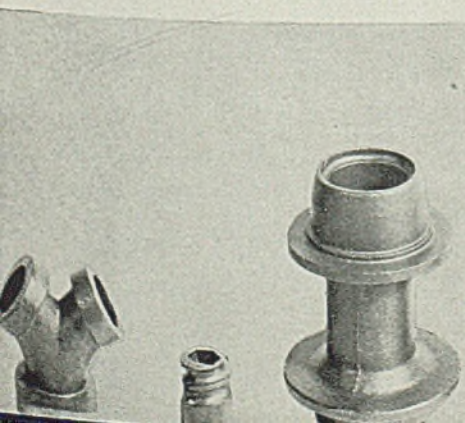
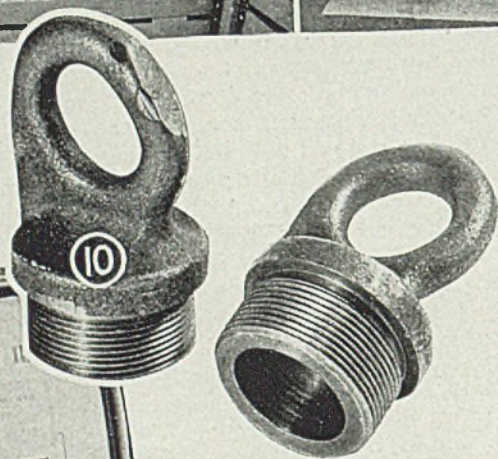
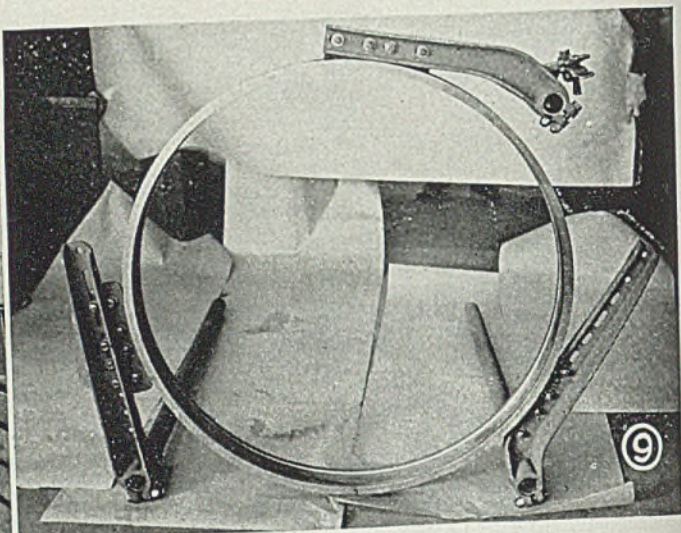
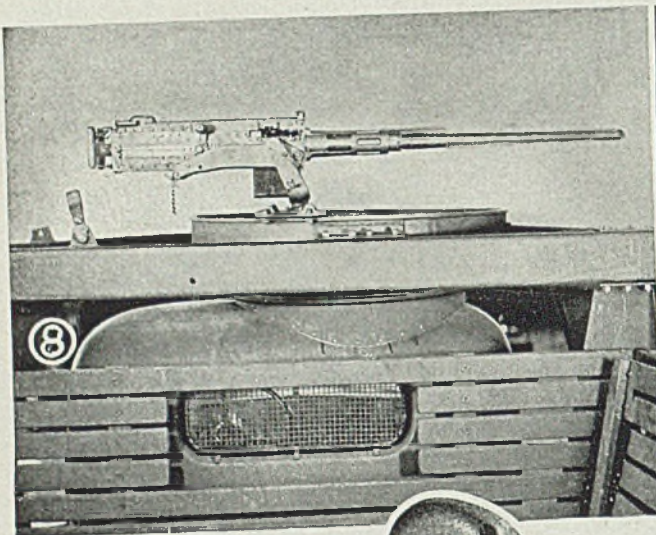


Fig. 4—Motorcycles, jeeps, scout cars, half tracs use malleable castings. Fig. 5—Malleable iron steering knuckle parts for front wheel drive. Fig. 6—Malleable iron hubs and frame members for motorcycles. Fig. 7—Differential carriers, cases and bearing caps of malleable iron

95





the saving in cost. With malleable use it was not even necessary to reduce machine speeds and feeds.

A similar case is that of the cleaning staff used in anti-aircraft guns, the fittings of which were originally machined from brass bar stock and now are of malleable iron. As a result, 10.46 pounds of brass are saved on each staff. In place of this material, but 4.90 pounds of malleable iron castings are required. Again machine tool time and man-hours are saved.

In the case of the Bofors 40-millimeter anti-aircraft gun grip, a 16-pound malleable iron casting replaces an assembly of forged parts which had necessitated a metal removal loss of 73 per cent. Substitution of malleable iron reduced the metal removal loss to 32 per cent, saving machine tools, man-hours, metal cost and time. In a similar manner a mortar gear case, originally machined from a solid forging was made of malleable iron and passed all tests. Coring the part produced savings similar to those in the other cases.

Used Widely in Mobile Units

In motorized equipment advantageous malleable uses are many. Fig. 4 shows jeeps, scout cars, half tracs and motorcycles which are fitted with malleable iron parts. In the jeeps, scout cars and half tracs, the addition of front wheel drives doubled malleable use in differential carriers, cases and bearing caps. See axle assembly, Fig. 7. Also new steering problems, involved in the driving front wheels, occasioned the use of additional steering knuckle parts of malleable iron. Motorcycle hubs and frame members are also cast in malleable iron to advantage. Many tons of malleable iron form parts of the combat vehicles shown in Fig. 4.

Separately illustrated in Fig. 3 is a tank steering gear housing in malleable iron, illustrating possibilities of design. (Please turn to Page 126)

MECHANICAL PROPERTIES OF MALLEABLE IRON

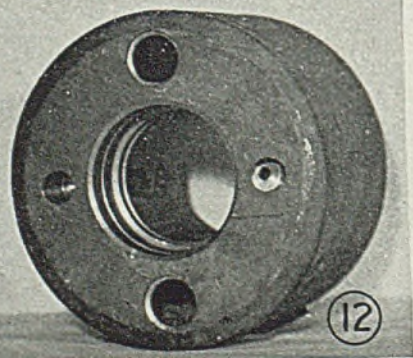
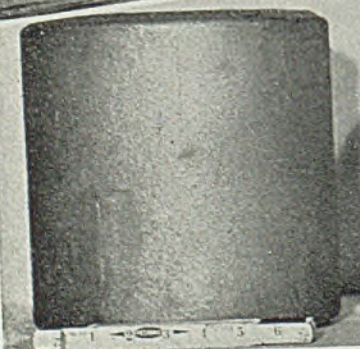
A. S. T. M. SPECIFICATION No. 113-1918



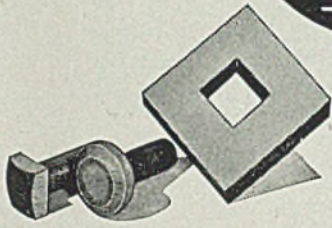
TYPICAL MALLEABLE IRON CASTINGS



Figs. 8 and 9—Malleable iron in motor vehicle gun mount. Fig. 10—Eyebolt lifting lugs. Battered one at left shows resistance to impact. Fig. 11—Display of malleable applications prepared by Malleable Founders' Society. Fig. 12—Pearlitic malleable rollers for tank track



HOW one tool engineer eliminated tool breakage and increased production



◀ This job required a tool steel with a good combination of hardness and toughness.

the tool:

A trimmer die for trimming cold forged blanks for machine bolts and cap screws of SAE 1020.

the problem:

Excessive breakage resulted when the tools were left hard enough to provide maximum wear resistance. But when the tools were drawn back far enough to eliminate breakage, they required too frequent re-dressing—resulting in considerable machine shut-down time and lost production. Several types of tool steel were tried, none of which met the requirements of the job.

the solution:

The Tool Engineer needed a tool steel that had a good combination of hardness and toughness. So using the Carpenter Matched Set Method of selecting tool steel, he found that *Carpenter No. 11 Special* promised to give a good combination of these qualities.

the results:

With *Carpenter No. 11 Special*, a straight carbon (tough timbre) water-hardening tool steel, these results were obtained.

- 1 Breakage was licked—and production was increased from 7,500 pieces to 86,000 pieces per grind.
- 2 An increase from 5 hours to 60 hours in production time between grinds.
- 3 Machine shut-down time of 1 hour and 12 minutes per day was eliminated.
- 4 Added machine capacity—1,728 pieces per machine per day.

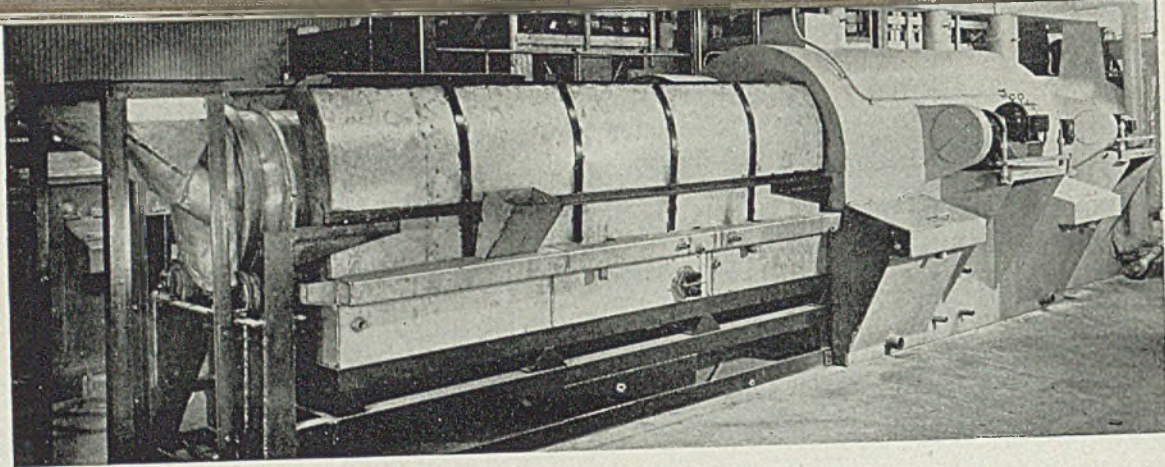
This is another example of how the Carpenter Matched Set Method of selecting tool steel has been used successfully. If you would like to know how it can help you get tools that give increased production with fewer interruptions, ask for a copy of the 167-page Carpenter Matched Tool Steel Manual. It contains much useful information to help you select the proper tool steel for practically any type of tool. A note on your company letterhead will start your copy on its way, so drop us a line today.



THE CARPENTER STEEL COMPANY
139 Bern Street • Reading, Penna.



Carpenter
MATCHED
TOOL STEELS



PICKLING STEEL CARTRIDGE CASES

Newly developed production equipment provides automatic control of critical pickling and rinsing cycle

DO YOU notice that the "it-can't-be-done" and "we-ever-aid-it-tac-way-before" experts aren't so happy these days? Lifted eyebrows expressive of doubt now manifest astonishment, for the stark demands of total war have given America further opportunity to make good its claim of accomplishing the "impossible" tasks quickly and efficiently. New techniques are being perfected, new short-cuts taken, and new materials discovered and adopted.

An outstanding example is the use of steel instead of brass in the manufacture of cartridge cases. This is truly a revolutionary development, for since 1866 when the first all-metal cartridge case was rolled out of brass strips (the drawing of cases was not developed until seven years later), brass has been used for the manufacture of cartridge cases. World War I was fought with brass. Today, however, the greatly increased fire power of our armed forces made imperative a substitute for the critically scarce copper alloy.

Two illustrations present a clear picture of why our copper supply could not meet the tremendous demand for brass. American factories are now turning out more

By **A. JAMES LEHMAN**
Production Manager
N. Rausohoff, Inc.
 Cincinnati

machine guns in one month than during the whole of the last war. In 1942 we produced 10¼ billion rounds of small arms ammunition alone. The hard logic of modern war insisted that American steel makers and cartridge case manufacturers find a substitute for brass.

Much of the work in solving this problem is still a military secret. One phase can be told now; how the difficulties surrounding the pickling of steel cases were overcome, and how a technique was developed to do the job quickly and economically.

Pickling involves the removal of scale from the cases after anneal and before drawing. Scale is removed by rolling the

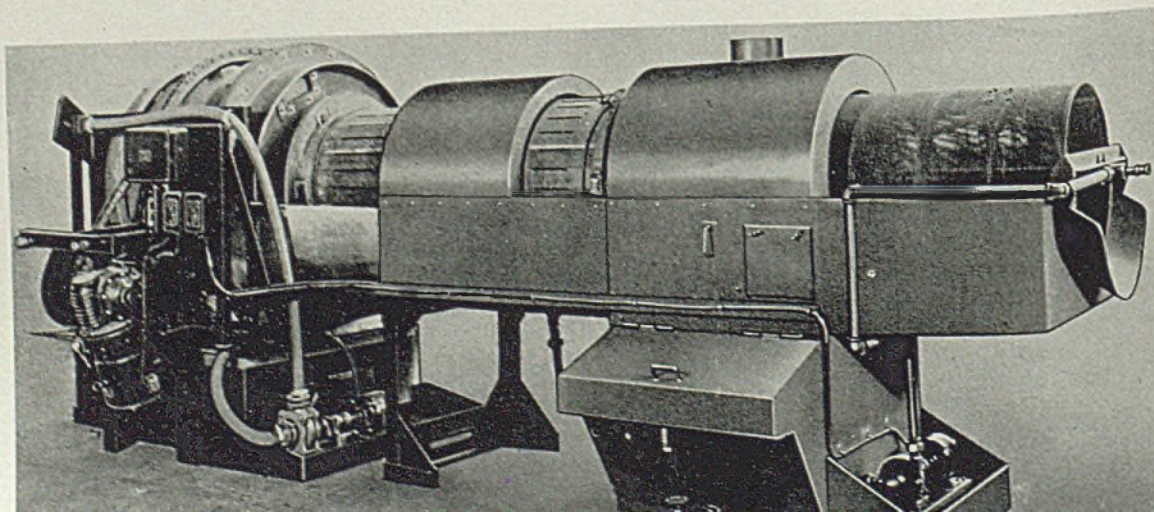
cases in a sulfuric acid solution, rinsing them and then subjecting them to a neutralizing solution to halt the action of the acid.

To understand clearly the new problems raised by steel cases, let us review briefly the type of machine developed for pickling brass. This machine, Fig. 1, consists of a cylindrical drum with spirals welded in place so that the material is carried through the drum as it rotates. The acid solution is brought into the drum by dip buckets which are attached to the outside of the drum and pick up the solution from the tank directly below. Within the drum, at each end of the pickling section, are discharge heads, patented by N. Rausohoff Inc., Cincinnati. These heads maintain a constant level of solution but permit continuous circulation.

The actual pickling of the cases in this unit is accomplished by the combination of three factors: (1) the strength and (2) heat of the acid, and (3) the agitation of the cases brought about by the

Fig. 1. (Above)—This is the older or continuous type of pickling equipment. Guide vanes on inside of revolving drum move work forward continuously. Note hopper at left for loading and ductwork at far end of equipment for drying work with air blast

Fig. 2. (Below)—New batch type pickling equipment includes provision for rinsing. Drum is driven by an electric motor through worm gear and chain drive seen at left



"To err is human"

... and costly!

Inexperience, ineptness, fatigue, ill-health, inattention, indifference—all are possible bugaboos when using fixed gages on extremely close tolerance work (i. e., checking to "tenths").

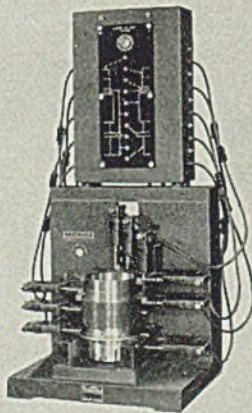
Scrap, wasted time, production slow-downs, faulty products—these are the high costs of rejecting good parts or passing incorrect parts as being good.

"Hangovers"—physical or mental—make no difference when using a Visual Gage, Multichek, Precisionaire, Electrichek or other Sheffield precision gaging instrument. Mechanical skill built into these gages eliminates the need for "top performance" individual skill to precisely and accurately inspect parts to "tenths".

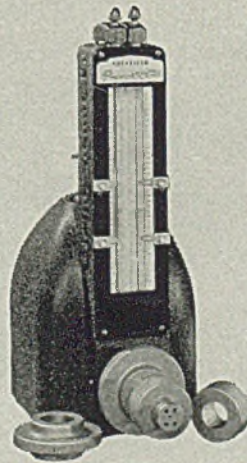
Sheffield precision gaging equipment eliminates "human" error. Write for new Folder No. 43-1 and name of Sheffield Engineering Representative in your vicinity.



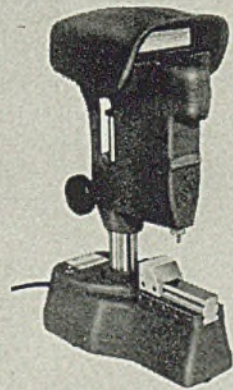
SHEFFIELD
ELECTRICHEK



SHEFFIELD
MULTICHEK



SHEFFIELD
PRECISIONAIRE



SHEFFIELD
VISUAL GAGE

THE **SHEFFIELD** CORPORATION
DAYTON, OHIO, U. S. A.



drum's rotation. It has been found that a 5 per cent dilute sulfuric acid solution, at a temperature of 140 to 150 degrees Fahr. will remove the scale from brass cases when the drum is rotating at 3 to 5 revolutions per minute. The drum may be fabricated of molybdenum bearing stainless steel. This continuous pickling unit has, therefore, proved exceptionally satisfactory for the pickling of brass cartridge cases.

With the coming of steel cartridge cases, this pickling operation offers new problems. These difficulties are due to the fact that the scale produced by the anneal on steel, unless an atmosphere controlled furnace is used, is more difficult to remove than that produced on brass. If an atmosphere-controlled or bright anneal furnace is employed and the amount of oxidation thus reduced, the scale on the cases is much lighter and the continuous machine just described may be used with good results.

But, where an atmosphere-controlled furnace is not available—and in many cartridge case plants it is not—the pickling operation can only be consummated by increasing the intensity of the pickling by raising the concentration or the temperature of the acid, or by lengthening the time of the pickling cycle. Another important factor is the necessity of agitating the cases in the solution. Increasing this agitation will definitely speed up the pickling action.

It is here that the manufacturers of steel cases have encountered one of their pickling headaches. For neither of these alternatives can be applied to the continuous drum type unit used for pickling brass cases. If the temperature or the con-

centration of the sulphuric acid is increased, the cases will be properly pickled; but, unfortunately, so will the drum. The industry has already had several examples of acid resistant metal drums which have fallen apart after a few weeks of use with a higher concentration or a higher temperature of the acid solution.

To the best of this writer's information, there is no metal which will withstand this sort of acid application and at the same time be practical for fabrication into the type of drum required for a continuous unit. Also, it is not possible to increase the pickling time. For a slowing down of the drum's rotation will reduce the agitation of the cases, and increasing the length of the pickling section would make the unit far too bulky and space consuming.

Removes Heavy Scale Easily

To meet this baffling problem, N. Ransohoff Inc., is supplying a batch type pickling unit, Fig. 2, which thoroughly removes the heaviest scale from steel cases without the necessity of increasing the temperature or concentration of the acid. This unit pickles the cases in an acid resistant metal rolling drum. The cases are rolled in an acid solution until free from scale, and then are automatically discharged from the drum through a special discharge head. This patented head holds the cases in the drum as long as it is rotating in a rolling direction, but automatically empties the drum as soon as the direction of rotation is reversed.

The drum is designed to maintain a continuous flow of acid solution on the

work. It follows the pickling operation with a water rinse while the cases are still in the drum. A tilting pan under the drum directs the acid back into a tank to be recirculated. The pan is tilted in the other direction while the cases are being rinsed so that the water drains to the sewer. When the direction of rotation is reversed, the cases pass out of the drum and are carried through a neutralizing bath. This unit may be controlled by time switches, which then make it completely automatic.

The cases are loaded into the drum and rolled in the acid solution until pickled. At this point (usually about 10 minutes after the start of the operation) the fresh water cuts in and the pan under the drum tilts so that the drum is drained into the sewer. After rinsing, the direction of the drum's rotation is reversed and the drum is automatically emptied and the cases carried into a holding drum where they are neutralized. They are carried through this drum by spirals welded in place. After neutralizing, the cases usually can be coated automatically with the drawing lubricant if the manufacturer so desires.

This unit has a number of definite advantages:

The cases may be pickled in the drum as long as is necessary without any increase in acid temperature or concentration.

The drum may rotate at a much higher speed than in a continuous machine, so that the pickling cycle is speeded up by the greater agitation of acid through and around the cases.

The unit is completely automatic and requires virtually no labor to operate.

How To Prevent Deterioration of Films

Shortage of sensitized photographic materials makes it imperative that the large stocks of films, plates and papers now stored by industry for essential requirements be carefully handled and preserved.

Heat and moisture are cited by Eastman Kodak Co. as primary factors accelerating deterioration. Exposure to various gases, X-rays or radium can also cause serious damage, and careless handling can destroy the protection afforded film packs and industrial motion picture reels by the package.

Here are some storage tips, as outlined by Eastman:

—To protect against heat, keep materials away from steam pipes and off top floors of uninsulated buildings. Refrigerated storage of high-speed and color films is recommended during summer

heat. Temperature for storing films and plates must remain below 75 degrees Fahr. if storage period is two months, below 60 degrees if six months and under 50 degrees if they are stored for a year.

—Ideal relative humidity should be between 40 and 60 per cent. This is best measured with a wet-and-dry-bulb thermometer.

—Guard against exposure to gases such as formaldehyde, exhaust from motors, vapors of solvents, cleaners, turpentine and industrial gases.

—Storage cabinets lined with an adequate thickness of lead should be used for sensitive materials kept near X-ray machines or radium, or other various gases.

—Store films marked "nitrate" separately in vented cabinets which conform to regulations of the National Fire Protection Association.

Other films do not require fireproof storage.

Welder's Check Charts Offered by Hobart Bros.

Essentials of proper welding procedure, correct electrode, correct travel speed and correct welding current, are graphically illustrated and discussed in two welding check charts recently announced by Hobart Brothers Co., Troy, O.

One chart shows illustrations and characteristics of weld deposits from electrodes under various conditions. Other illustrations show speed in feet per hour that can be obtained in a good weld using specific sizes of electrodes; how to cut rod waste and care of welding equipment.

The other chart lists 19 electrodes and describes the use and purpose of each grade of electrode for the particular welding job at hand. The back of each chart gives the alloy metals finding list of Hobart's special metals data service and list of sources.



They're setting 'em up for Smiling Billy, tonight!

SURE and there are those who'd punch the nose of the man who wouldn't lift one to Billy, tonight — in a dignified fight, of course.

For we've turned back the timeclock to March 7, 1903, when Smiling Billy had a hand in the destiny of a great American industry. . . . He fought a battle with a giant turbine, while history hung in the balance.

He was a shop foreman in one of the early plants of General Electric. His company had pioneered research in turbine engineering, and had staked its reputation on the plans of the first commercial steam turbine generator. It was to be a gigantic machine, and the Commonwealth Edison Company of Chicago had courageously designed their entire new Fiske Street generating station around the plans for this unborn behemoth. . . . The date they had set for the official test was March 7, 1903.

By February, the turbine was still months from completion. A meeting of foremen was called. "Who among our general foremen is 100 per cent qualified to complete the building of

the turbine *on time*?" they were asked. A single name had the vote of every man there.

The story of Billy's battle with the turbine is a minor classic of one man's knowledge of machinery, tools and men. Around him lay thousands of unfinished parts. Ahead of him lay the task of assembling a machine as big as a two-story house and as delicate as a lady's watch — that could shatter itself to pieces from a microscopic error in tolerance.

He won. On March 7, less than three weeks from taking over, Smiling Billy waved a grimy hand, and the first big turbine generator began to whine a brand new song of power.

History is made that way. It's being made that way today, in the biggest battle of all time, because many of the great men of industry are men with grease on their hands.

Today, Jones & Lamson machine tool engineers are working with those men on hundreds of America's most important assembly line jobs — and have been from the very beginning of every great industry in America. They were there in the days of Smiling Billy, and they'll be there tomorrow when you call!

Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Die Heads



JONES & LAMSON

MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.

Profit-producing Machine Tools

"FIRECRACKER" WELDING

Makes Arc Welds In Inaccessible Places

Long, heavily coated electrodes are allowed to burn under their own action to make fillet welds in inaccessible interiors of fabricated assemblies

HITHERTO, certain refrigerating apparatus was constructed of plate assemblies through which the cooling agent was enabled to pass by boring channels across and lengthwise and by the insertion of caulking plugs. This method of fabrication called for special boring machines and a great expenditure of man-hours; in addition, the original material used was hard to obtain and its external form necessitated considerable additional working.

Because of the length and position of the necessary welding runs and because of the restricted space, it was not previously possible to undertake the construction of such a fabrication from common, easily obtainable materials by welding flat iron cross-pieces between the two parallel plates. See Fig. 1.

But by using the Elin-Hafergut (E.H.) process commonly known as "firecracker" welding it has been possible to carry this out satisfactorily and to produce perfectly fabricated structures, without distortion. The completed assemblies could be subjected to pressures of up to 6 atmospheres without any deformation.

The plates joined by arc welding have external measurements of 43 x 54 inches. The double wall is, altogether, 1.57 inches thick, and consists of two 0.2-inch thick steel plates (covering sheets), measuring 53 x 54 inches. Then 25 flat iron bars (1.18 x 0.31-inch) are welded at right angles (Fig. 1) between

these two cover sheets. The suitably bored flat iron bars form at the same time the walls between each two channels.

As the open area in which the two welds were to be made, each 42 inches long, was only 1.7 x 1.18 inches, an ordinary arc weld by hand was out of the question, but after the first successful attempt, the E.H. process proved well suited for this purpose. The flat iron bars, (1.18 x 0.31-inch) are attached to a plate with only two or three tack welds, the second covering sheet (0.2-inch thick steel plate) is laid on the free edges of the flat iron bars, and the sheet thus formed, without any further tacking, is held between two thick steel plates clamped with channels. The tack welds are made on the underneath of the flat iron bars, so that they do not prevent the electrode from being placed squarely on afterwards. Two refrigerating

sheets are placed at the same time in each fixture.

The Elin-Hafergut process can be assumed to be well known in view of recent descriptions. See reference in STEEL, June 22, 1942, p. 92. The placing of the covering blocks can be observed from Fig. 2. Two thickly coated electrodes, 0.16-inch diameter and 47 inches long, are placed in the two corners where the welds are to be made. Then two copper covering plates are put over them. By means of wedges, these two copper blocks are pressed against the side walls and at the same time against the flat iron bar to be welded.

The free ends of the two electrodes are inserted in the electrode holders. The ground connection from the weld transformer is attached to any part of the sheet itself or the clamping fixture. By touching the free ends of the electrodes with a carbon or metal peg, both arcs are set alight in quick succession and the two electrodes burn through almost simultaneously in their channels. Each forms a perfectly even, strong and wide fillet.

During the time the electrodes take to melt—about 5 minutes—the operator has time to prepare the places in another channel for welding. The wedges and copper blocks should be carefully removed after welding. The slag on the weld falls off after a few strokes of the hammer on the outside. It is advisable to blow compressed air through the job to force out the loosened slag.

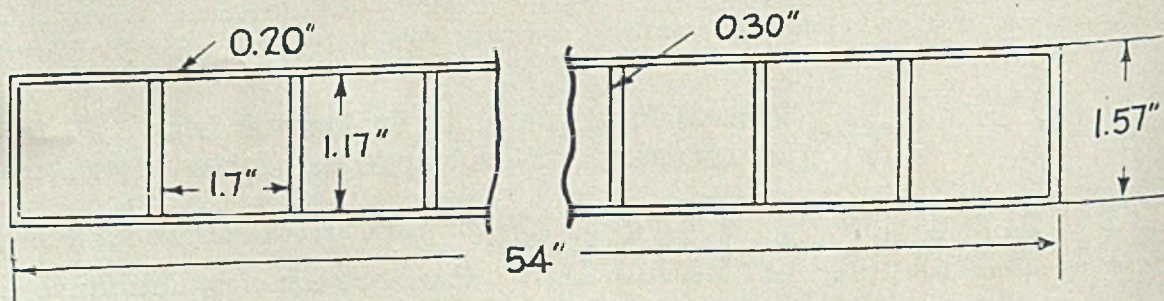
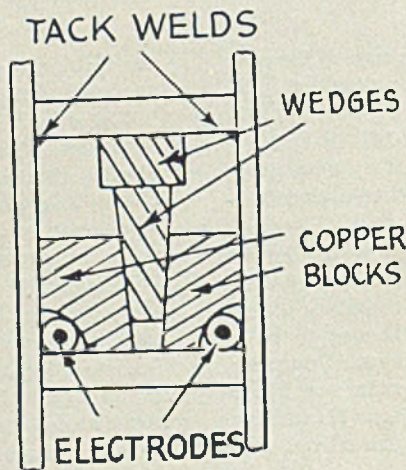
In this case, welding is done with alternating current. Welding with direct current in such narrow channels results in irregularities in the welds owing to arc-blow effects. The strength of the current for the 0.16-inch diameter electrodes is 180 amperes. It proved advantageous to coat the copper blocks with a solution of oil graphite. This prevented the slag from sticking to them, considerably reducing the time needed to clean the blocks. Paper was not used.

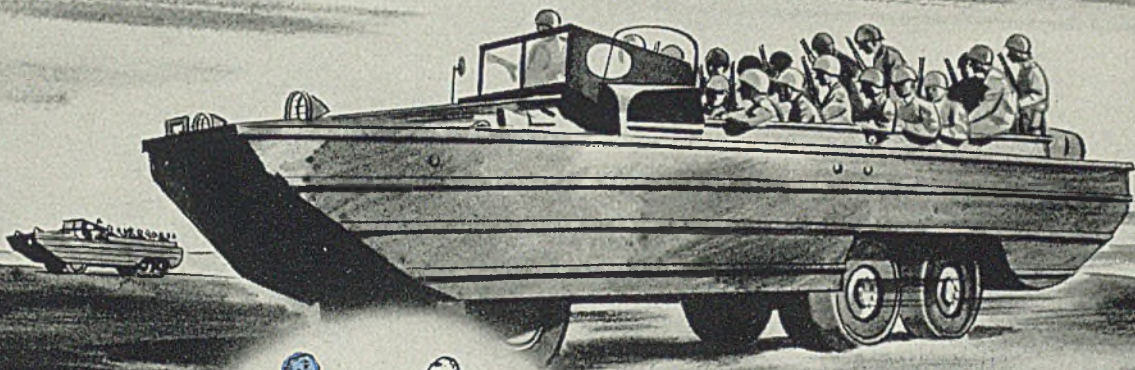
Once the E.H. welding was done, the

From an article in *Sheet Metal Industries*, translated by R. F. Tylecote and Angela Lias from Ritter, P.: *Schweissung an unzugänglichen Stellen mit dem Elin-Hafergut Verfahren*, *Elektroschweissung*, 1942, Vol. 13, No. 8, pp. 120-122.

Fig. 1. (Below)—Cross section through refrigerating sheet or double wall through which refrigerant flows

Fig. 2. (Right)—Method of placing electrodes and copper blocks





*then I said
to myself—*

Here's How to Reach That Post-war Market Quick

So you want to get the jump on competition—get to that post-war market first with the most sales features? Then take a tip from the Army's amphibious truck—the "duck".

Well, it is a versatile vehicle—carries troops or cargo across water or land—doesn't even stop in going from one to the other. Say, if only I could do likewise—drive straight ahead without a stop and with all our people aboard—in going from war products to peacetime products.

Then, hop aboard the vehicle used by builders of the "duck", the Liberty ships, the M-4

tanks, the bombers and fighters, and hundreds of other war products. They went from peacetime products to war equipment almost overnight. Their vehicle is WELDING.

Sounds logical. Welding does simplify design . . . quickens tooling up . . . speeds production . . . makes selling easier because it makes products better and cheaper.

And one more suggestion. Learn how to drive this V-day vehicle fast and straight with Lincoln's aid on welded design and procedure. Start NOW.



THE LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO

main part of the refrigerating unit was ready. The open ends still had to be closed with a cover, by normal arc welding; moreover guide taps had to be placed on the outside edges, and the connections for entry and exit of cooling liquid welded on. Some of these jobs could also have been done by using the E.H. process. This was not used because the apparatus could not be tested owing to shortage of time. Before testing the units manufactured as described, the outer seams were smoothed off by hand and then the whole unit cleaned after the pressure test had been completed.

The following details refer to an entire production of these refrigerating units, including man-hours spent on E.H. welding. The E. H. welding of the iron bars is done in two fixtures. In each, two sheets are placed side by side. The welding time for one sheet takes some

2¼ hours, with a group of three trained welders on the job together. Specialized welders are not required.

The following times were worked out:

—Fixing on the iron bars, 2 men,	0.5 hour	.....	1
—Welding the 25 bars	.....	6%	
—Cleaning and fitting the covers	.....	1.5	
—Welding covers (edges), taps	.....	1.5	
—Smoothing off outside seams	.....	2.0	
—Pressure tests	.....	0.25	
—Fitting, welding connections	.....	2.0	
—Cleaning unit	.....	1.0	

Total man-hours for complete production of refrigerating unit is 16. Preparatory work, such as cutting sheets and flat iron bars, setting up, boring, etc., is not included in these times.

The very short welding time of only 6¾ hours for 175 feet of welding done by E.H. process, including all additional work involved, was attained by having four electrodes in use simultaneously; in

other words, four welds are done at once. In this welding time, which is about 5 minutes for 4 x 66-inch length of joint, the operators need do nothing to the weld, but can prepare the next places to be welded, put in the electrodes and copper blocks, and place the next two refrigerating plates in the second fixture.

By the simultaneous application of an electrode left and right of the bar, that is by the symmetrical division of the flow of heat, as well as by the high pressure, distortion of the refrigerating plates is almost entirely prevented. Thus the work of straightening, which causes high additional costs with all other welding processes, is eliminated. The best results have since been achieved with the welded refrigerating units which have been produced in large numbers by the E.H. method.

New Flaring Tool To Improve Tube Connections

To broaden the field of applications for Bundyflex, a soft steel copper-coated tubing produced by Everhot Products Co., Chicago, the company recently introduced a new flaring tool especially designed for the 45-degree double-lap flare specified for connections on this type of tubing.

The tool consists of a pair of holding jaws and U-shaped clamp with built-in vise and does not require special wrenches or use of a work bench.

Tubes are held with a smooth, firm grip, without serrations or threads to mar or cut the tubing, according to the company.

All wearing parts and punches of the Flaremaster tool are of hardened steel. Jaws are counter-bored to provide exact length of tubing to insure correct double-flaring for each size.

ODT Releases Manual On Hard-Surfacing Methods

The hard-surfacing method of lengthening wearing life of new machine parts and of renewing the life of worn parts is fully described in an illustrated manual issued recently by the Office of Defense Transportation.

One of a series issued by ODT in collaboration with the Society of Automotive Engineers, the manual covers hard-surfacing applications and techniques for numerous automotive parts, machine shop equipment, and automotive track-type equipment.

For each application the publication specifies the material required, the way to

apply it, and the service that may be expected.

The ODT manual classifies the various kinds of hard-surfacing rods and describes their composition; specifies type of rod to use for many particular purposes; and tells what equipment is required for both the oxy-acetylene and electric processes of applying hard-facing.

Careful instructions are given for operators to follow in both methods. It also is pointed out that although the metallic and carbon arcs are widely used in coating large areas where surface finish is not important, oxy-acetylene flame is recommended for use where surface finish and limits and tolerances are important, as in automobile and truck parts. Also, in applying ferrous-base hard-facing alloys on steel, oxy-acetylene permits application without penetrating the base metal.

Comparison with standard welding methods shows that the application of hard-facing alloys requires but few variations from standard steel welding procedure. Some of the variations from standard are indicated in the manual; very few need any special attention if operators follow the careful instructions.

Copies of the publication may be obtained without charge from ODT, Washington, and from the various field offices.

Welding Flux for Alloys Has Improved Adhesion

Specialized welding of thin gage strips, sheets and tubes of stainless steel and other high chromium-bearing metals is now facilitated by Solar Flux No. 16-GH made by Solar Aircraft Co., San Diego 12, Calif.

Use in its own plant convinced the company the flux has improved adhesive

quality desirable for application to the underside and edges of metal, helping to prevent oxidation. To facilitate efficient shop procedure in mass production, it may be applied several hours before the actual welding operation. No carbon pickup is said to result from the flux itself. It can be used to promote metal flow when applied to the above-described metals.

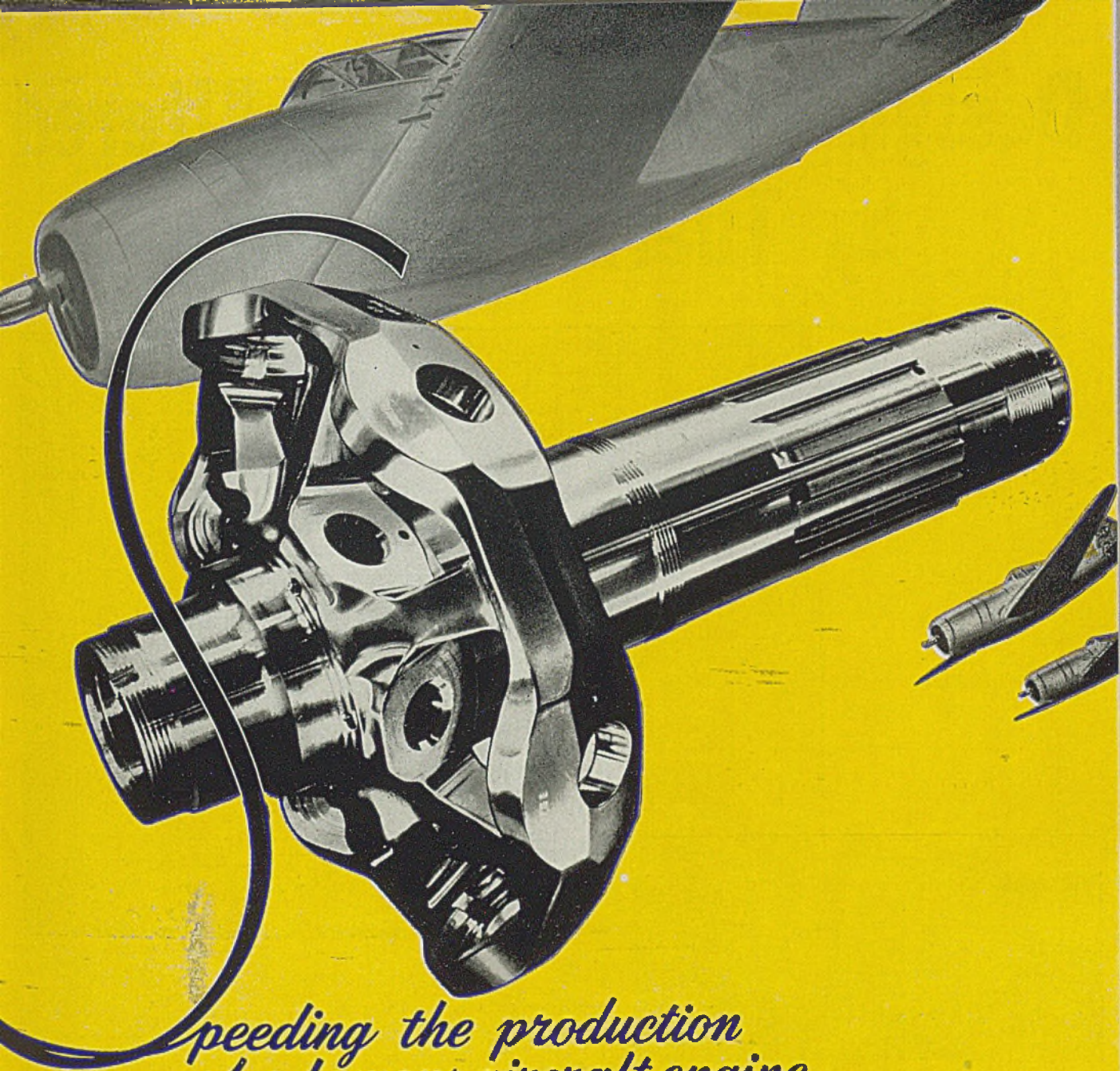
According to its maker, Solar Flux No. 16-GH qualifies under appropriate Army and Navy specifications and can be used with most welding processes.

Gyro-Stabilizer Gives Big Advantage to Tank Gunners

Tests in actual combat and on proving grounds demonstrate that the gyro-stabilizer has helped to increase the shooting accuracy of new Army tanks by as much as several hundred per cent when it is included as an item of their equipment.

Developed by Westinghouse Electric & Mfg. Co., the device keeps the gun barrel at a fixed elevation and the target within focus of the gunner's telescopic sight even though the tank is moving at full speed over a shattered battlefield. The stabilizer, in effect, places the tank gun on a floating mount. Since the tank remains in motion while firing, it becomes a difficult target.

It is pointed out by Maj. Gen. L. H. Campbell Jr., Chief of Ordnance, Army Service Forces, that the stabilizer, now in production at a rate matching all the nation's tank arsenals, makes even more formidable the 75-millimeter guns in M-3 medium tanks; that they far out-range the best the Germans have, hitting the target regardless of speed.



*speeding the production
of a famous aircraft engine*

WITH **PENNSALT CLEANER**

A leading automobile manufacturer now making Pratt & Whitney aircraft engines had done a remarkable job of mechanical production . . . and was interested in stepping up the efficiency of the metal cleaning (chemical) operations.

A wide variety of steel and brass engine parts—including the polished steel propeller shaft illustrated—had to be cleaned of mineral cutting oil, black emery, or tallow polishing compound, prior to tin or cadmium plating . . . All work went through a solvent degreasing operation. Electro-cleaning, with two kinds of cleaners, was carried on in two crane operated tanks, with both direct and reverse current. But even with this cycle, cleaning of polishing compound was not complete.

A Penn Salt technical representative was able to do a real job of improving this method. He eliminated the solvent degreaser—and with the same Pennsalt Cleaner in each tank, he used it

as both a soak-cleaner and electro-cleaner.

The resulting work was excellent. There were no rejects. The finish was judged to be the brightest ever obtained. Moreover, everybody in the plating room welcomed the elimination of the costly solvent degreasing operation.

What's *your* metal cleaning problem? Whatever the kind of metal or the type of material to be removed, you can benefit by the experienced advice of a Penn Salt technician. Let him tell you what the family of Pennsalt Cleaners is doing throughout industry today to save time, materials and labor. If you prefer, write fully to our Pennsalt Cleaner Division, Dept. S.

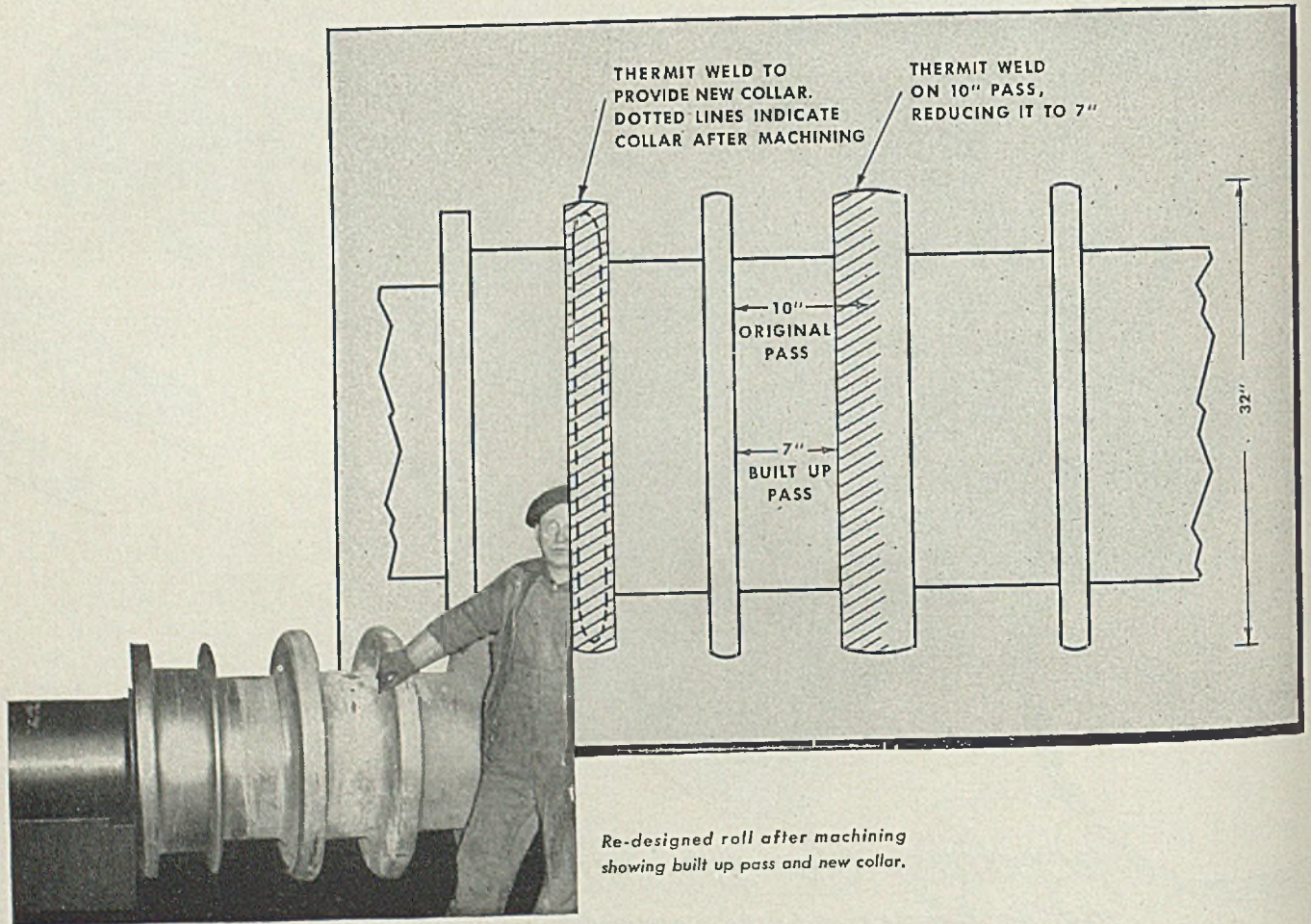


**PENNSYLVANIA SALT
MANUFACTURING COMPANY**
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tucson

Design of Large Roll Altered by Thermit Welding



Re-designed roll after machining showing built up pass and new collar.

Because of the difficulty in getting heavy castings quickly these days, large parts are often repaired, or altered in design, with little loss of time by using Thermit welding.

For example, an Ohio sheet and plate mill, lacking facilities to turn out 7" x 7" alloy billets, changed a 10" pass on a 32" diameter blooming mill roll into one of the required size by building it up with Thermit steel.

Thermit welding was also used to put a new collar on this same roll. Illustrations show how the pass was built up and the collar formed with Thermit metal and then machined to dimensions. Similar welds have lasted the life of the rolls.

Send for the booklet, "Thermit Welding," describing the repair of large castings and other parts and the fabrication of large units.

METAL & THERMIT CORPORATION



Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.



120 BROADWAY, NEW YORK
ALBANY • CHICAGO • PITTSBURGH
SO. SAN FRANCISCO • TORONTO

By **WALTER KAHN JR.**
 Assistant Director of Inspection
 Control Laboratory
 Republic Aviation Corp.
 Farmingdale, N. Y.

**User Report No. 17 Presents Experience
 of an Aircraft Manufacturer with**

NE (National Emergency) ALLOY STEELS

THERE ARE several very important factors influencing the use of substitute steels in the aircraft industry. After a certain airplane part has been designed and the stresses encountered in service determined, the particular steel for the part must then be specified. Factors such as the required strength of the steel, mass of section of the part, and whether the part will be manufactured from a forging or bar stock have to be considered. Service experience has accumulated much information as to which of the standard steels stood up best in service and what physical condition the steel should be in to give the optimum performance.

Up to the early part of 1942, the usual SAE-AISI steels were specified and complete information as to service performance of these steels was at hand. Then suddenly the picture changed. Scarcity of critical materials made it very evident that the new NE series would have to be used in place of the older steels.

Much thought was given to the types of NE steels which were being made available. It had been our opinion from the very beginning that these new steels would present little difficulty as regards substitution and handling. Subsequent experience has proved this.

Preliminary tests were made of those NE steels which were thought particularly suitable and comparisons were made

with the standard steels to be replaced.

Portions of two of these preliminary tests are shown below which presents the results of physical tests comparing a heat of NE-8739 to SAE-4140 chromium molybdenum steel. The values for SAE-4140 shown below are from "Molybdenum in Steel," Climax Molybdenum Co.

Table I shows the results of testing one heat of NE-8620 steel compared with SAE-2315 steel as a carburizing steel.

These two examples are typical as to the results obtained. They show the interchangeability of the NE steels with standard SAE-AISI types of steels. Additional tests were also made comparing

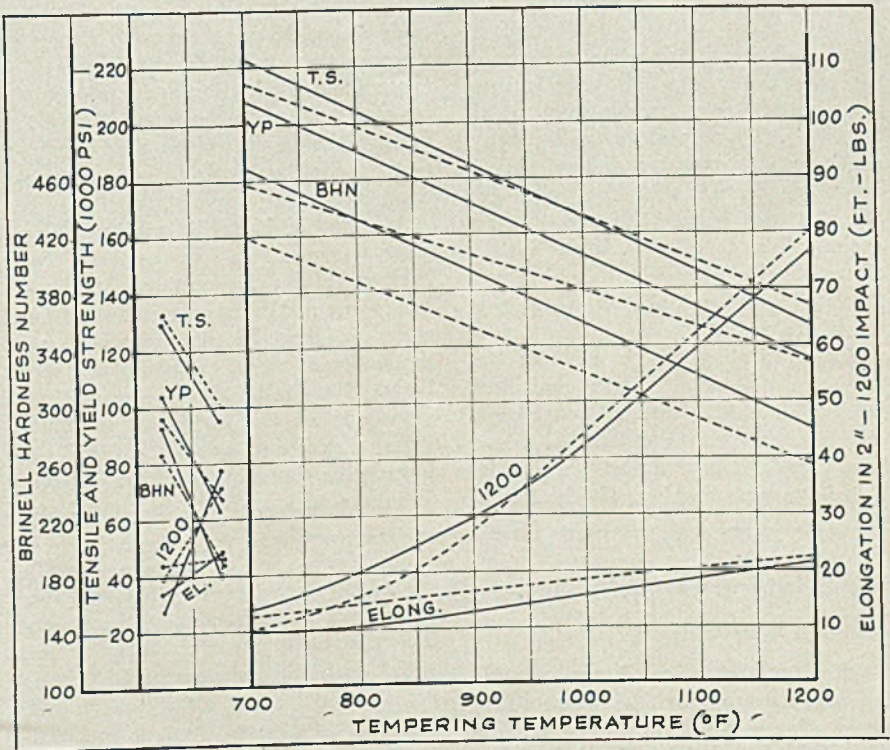
other properties such as weldability, etc.

The net results of this preliminary survey indicated that the NE steels could be substituted for practically all of the SAE-AISI steel parts used in our plant.

Table II presents a partial list of NE steel substitution in effect at Republic Aviation Corp.

Our problem of substitution for the previously used SAE-AISI steels has been relatively simple. Outside of a few special cases, where large sections of steel had been used, with tensile strength of 180,000 to 195,000 pounds per square inch throughout and parts were nitrided, we have been able to substitute the NE steels completely. No manufacturing difficulties or service troubles have yet been encountered that could be attributed to these steels.

We believe that the NE steels have a promising future for permanent usage in the aircraft industry.



Hardness, impact strength, tensile strength and yield point are shown for NE-8739 and SAE-4140 in both normalized and annealed conditions in left portion of chart. Righthand section shows how these physical properties vary with different tempering temperatures. Solid lines represent values for NE-8739, dotted refer to SAE-4140

TABLE I—Physical Property Comparison

	SAE-2315	NE-8620
Carburizing temp. (°F)	1650	1650
Carburize time (hrs.)	3	3
Cooling after carburizing	Box cooled	Box cooled
Heat treatment after carburizing	Oil Quench 1475°F Temper. 260°F	Oil Quench 1500°F Temper. 400°F
Core tensile strength (psi)	129,500	148,800
Core elongation (% in 2")	16.0	15.5
Case depth (Inch)	0.028	0.027
Case hardness (Rockwell C)	63	65

TABLE II—Successful Substitutions

Type of Part	NE Steel Substitute	Equivalent SAE Steel
Carburized Parts	8620	2315 4615
Gas or Arc Welded Parts	8630 8735 8739	X4130 X4130 4140
Heat Treated Parts (90,000 to 140,000 psi tensile strength)	8630 8735 8740	2330 X4130 X4135 4140
Heat Treated Parts under 5/8" (180,000 to 195,000 psi tensile strength)	8740	4140 X4340

Processing Short-Cuts Developed by Workers

ELIMINATION of root bead cracking in the welding of vertical seams through improvement of back-up bars resulted from a suggestion by Clarence Hood, a welding instructor at the Ternstedt Mfg. Division of Fisher Body Division, General Motors Corp. Hood's improved bar produces a convex surface on the inside of the weld instead of a flat surface, and the weld pass is strengthened at its critical point as a result.

With the old style back-up bar, considerable difficulty was experienced with the root bead cracking on the inside surface of the weld during cooling. This necessitated extensive grinding of the cracks and rewelding. Because of the difficulty of grinding inside corners, this salvage work averaged 3 hours per turret. Hood's suggestion eliminated the cracking and saved the grinding and rewelding time taken with the old type bars.

A lubri-spray gun that enables a machine oiler to more conveniently lubricate press gears has found a four-foot purpose at Detroit Stamping Unit of Fisher Body where it was suggested by a maintenance department employe. Such a device could be built by other plants where gears of large presses must be lubricated constantly, plant officials say. Primary object of the grease container is the saving of time, and it is so conducted that the oiler can carry it over his shoulder by a sling, enabling him to climb a ladder instead of waiting for a crane to lift his greasing equipment up to him in order to reach the gears.

The lubricating gun is made of two 3-quart light metal grease containers, fitted with easily fastened and removable lids. The center of each lid should have a 3/8-inch pipe thread opening for a like-size pipe bushing. The bottom of

the containers should have a 3/4-inch pipe thread opening for a similar size bushing. A metal follower is used to follow grease through the container. Gun nozzles and air control fittings can be arranged from plant supplies.

Plant officials say the adoption of the suggestion, made by Elmer H. Isaacks, has led to increased efficiency, more convenience for the oiler, saving of time usually lost by machine oilers waiting for die and production men to release a crane and also the saving of time usually lost by die and production men waiting for the oilers to release the crane.

To facilitate the moving of a large trailer from its loading docks without the aid of a tractor, a Detroit unit of Fisher Body has developed a new system. As a result of a suggestion by William S. Schulz, a general service man, a hole was burned in the platform of an electric shop truck equipped with a lift table. This hole is large enough to insert the pin on a trailer and move the latter to any desired location. Previously it had been necessary to summon a regular transport truck to move a trailer from the loading dock. But with the new method, much time is saved in making the loading dock ready to receive needed materials to keep up production.

A saving of 10 to 15 minutes in one machine operation by utilizing two hacksaw blades for cutting out a test bar is one of the many factors that has added to the efficiency of naval gun production at one of the plants of Fisher Body. Use of the two hacksaw blades grew out of the suggestion of Peter Yartz, a steel crib employe. Yartz suggested the installation of an adapter to raise a hacksaw blade so that a larger

piece could be placed under the hacksaw. The adapter allows the workmen to cut the test bars more rapidly and led to the setting up of two hacksaw blades to operate simultaneously.

As a precautionary measure to provide operators with safe access to a lower level in event of an unexpected power shutoff, all cranes at the Detroit Stamping Unit of Fisher Body Division of General Motors are now being equipped with rope ladders. The rope ladders were suggested by Harry Pomber, press room employe.

Steel aisle markers, no longer serving an important purpose have been turned over to the nation's scrap collection drive as a result of a suggestion advanced by a tool and die maker. Fisher Body plants now mark their aisles with painted lines.

Women, too, are playing an increasingly important part in the nation's war production and, in addition, are coming in for their share of suggestions to improve manufacturing processes. An example of an unusually productive suggestion, one that resulted in an 85 per cent improvement in operation; is the one made by Mrs. Helen Bering, a special detail inspector at the Ternstedt Mfg. plant of Fisher Body.

Mrs. Bering suggested a three-in-one gage for use in inspecting a bearing cup. Before the suggestion, three dimensions on the cup were gaged, one snap gage being used for each dimension. This necessitated handling either the snap gages or the part three times during the inspection cycle.

Mrs. Bering recommended that the gage be fastened permanently to a plate, thus eliminating holding of the gage or part during the inspection operation. Under the old method 290 pieces could be checked in an hour while with the new gage, it is possible to check 538 pieces an hour.

New Intensifier Aids in X-Ray Examination

Often details in an X-ray negative are so obscured by the surrounding metal of the object that they are extremely hard to detect. To facilitate examination of maximum thicknesses of metal by both X-ray and gamma radiations, St. John X-Ray Service Inc., 30-20 Thomson avenue, Long Island City, N. Y., has developed a new intensifier solution which can be used to increase greatly the amount of contrast in the negative after it has been completely developed.

Details not visible to the naked eye can be brought out, it is reported.

In examining maximum thicknesses of

metal, the negative is often underexposed, yet it is frequently these very films that circumstances will not permit taking over. Such underexposed films do not show details as clearly as desired, even after they have been given maximum overdevelopment. Leaving such films in the new intensifier solution for 5 minutes will bring out a great increase in detail. Often it is possible to reduce exposure time considerably by use of this intensifier, a particularly important advantage in gamma ray work where extremely long exposure may normally be required.

A most important application for the intensifier is in X-ray diffraction analysis where lines must be measured by means of an optical device. In the case

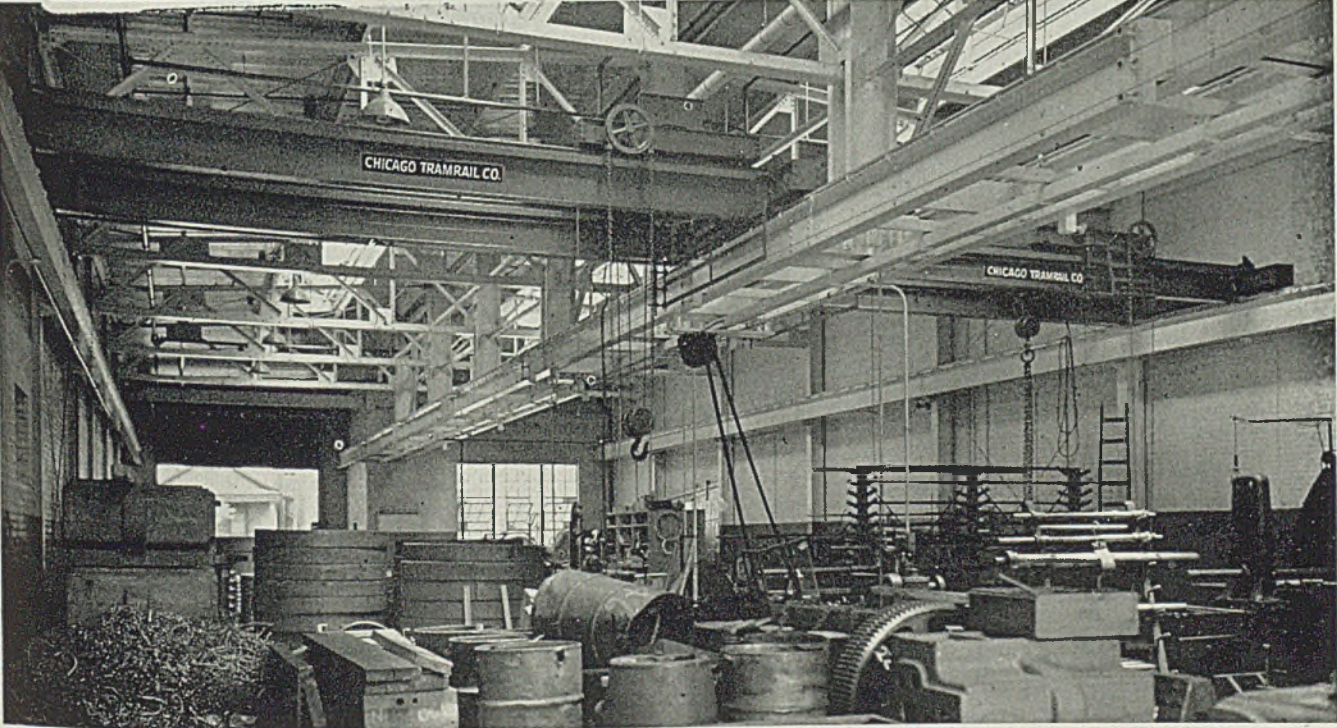
of evaluation by back-reflection patterns, 0.001-inch corresponds to residual stress of about 2000 pounds per square inch. If the lines are not sharply defined, results are inaccurate at best.

The intensifier is used after the film has been processed in the regular manner. The building up of the contrast can be viewed in bright light and can be stopped when desired by transferring the negative to running water. Too, it can be applied locally with cotton to intensify any particular portion of a negative.

The negative then will retain the intensification permanently, yet at any time part or all of it can be removed by immersing the negative in a Hypo bath (no acid or hardener).

★

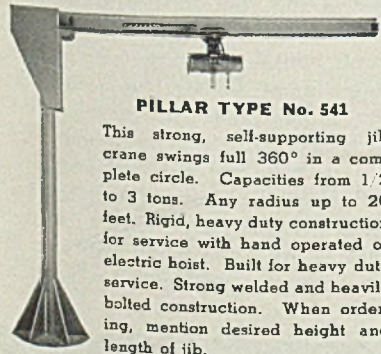
Increase Efficiency
IN STEEL STORAGE ROOMS...
via **NARROWER SPANS and MORE CRANES!**



Installation of Chicago Tramrail Double Girder Electric Cranes at Chicago Gear Mfg. Company, Chicago. Furnished in 1-2 and 3 motor types.

★ Here, a building (45 ft. wide) used for steel and rough forging storage, is divided into two equal spaces each covered by a Chicago Tramrail Electric Crane. Why not a single span crane? The answer is found on the cost sheet.

Where individual cranes are installed in multiple bays, work crews can be divided into groups and the cranes will cover more operations simultaneously over different areas. In direct contrast, one large crane covers but one point at a time, ties up the entire working force, handles less material and the costs run much higher.



PILLAR TYPE No. 541

This strong, self-supporting jib crane swings full 360° in a complete circle. Capacities from 1/2 to 3 tons. Any radius up to 20 feet. Rigid, heavy duty construction for service with hand operated or electric hoist. Built for heavy duty service. Strong welded and heavily bolted construction. When ordering, mention desired height and length of jib.

As a user of steel, your handling problem is probably parallel to installations already planned and put into operation by Chicago Tramrail engineers. We are ready to help you. *How* to do it, is our job. *When* to do it, can best be decided by considering not only the pressure of war needs, but the fiercely competitive post-war markets, when reduced cost of handling steel storage alone may represent the very margin that will enable you to meet and beat price competition. Double Girder Electric Cranes are furnished with 1-2 and 3 motors, as required.

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Most of what is recommended in this paper is the result of many years of experience and research. Much of the information was gained from answers to a comprehensive questionnaire sent to over 100 companies which make a practice of storing coal, and from investigations conducted by the Fuel Research organization

MOST industrial coals may be stored safely if a few simple principles are observed. But in certain circumstances stored coal may heat spontaneously, and even take fire. Spontaneous combustion, when it does occur, may be serious and must be dealt with drastically.

Coal may deteriorate in quality while it is in store, but provided no serious heating or spontaneous combustion occurs, deterioration is not as a rule important. Deterioration that does occur has often been exaggerated by superficial observers.

Coal that has been soaked by rain may contain about 10 per cent more moisture than when it is apparently dry; a ton of coal may therefore contain only some 1800 pounds of the original coal, although the quality of it may not have depreciated.

From a paper presented in the April issue of the *British Steelmaker*.

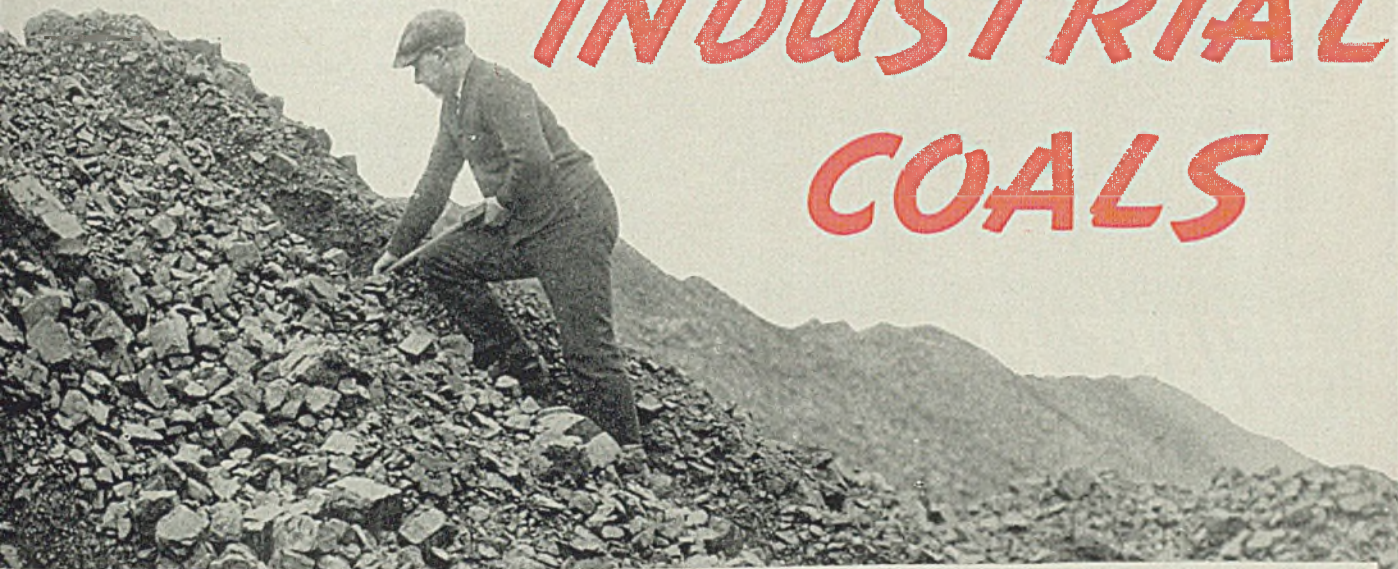
Of the numerous circumstances affecting the safety of coal in store, a few are well defined, and it is possible, within the range of each of these, to draw a line dividing conditions favorable to safe storage from conditions unfavorable. This dividing line, which must be used with some flexibility, is indicated in the accompanying box.

Evidence imputing an unfavorable character to many other conditions that have been associated with spontaneous heating is inconclusive. Such conditions are, for example, a high content of sulphur or pyrites in the stored coal; the storing of wet coal; storing on a wet site; hot weather following rain; the storing of mixed coals; the storing of unwashed coal; the laying down of fresh coal on old. Most often these conditions could be ignored. Where difficulties have been thought to be due to one or another of them, it is possible

that some different cause would be found responsible if all the factors operating could be disentangled. Thus it is possible that it is a mixture of sizes, not of kinds of coal, that contributes to spontaneous heating in mixed coals. And it must be borne in mind that a combination of adverse factors may lead to a fire, when one unfavorable circumstance might be without effect.

Size of Coal and Correct Method of Stacking: It is important to realize that the size of the coal is most often the predominant factor in determining whether a pile of coal will heat spontaneously. Fine coal—coal that will pass a 1/16-inch sieve—in all of its different forms and associations is the cause of nearly all storage difficulties. Coals of mixed sizes, including fines, run-of-mine and "through" coals, are more liable to heat than uniformly fine coal because the larger pieces of coal open the texture of the heat and facilitate the type of ventilation necessary for heating to proceed. Single nuts and larger sizes are safe, provided that fines have not been produced during transportation, handling and storing. A large coal that would be safe in storage in its original state may give trouble if small coal is

STORAGE OF INDUSTRIAL COALS



formed by reason of faulty handling.

When a coal is being stacked, it should be spread out as it is deposited so that there are no local segregations of sizes, and lump coal should be distributed as uniformly as possible among the fine. When a material of mixed sizes is made into a conical heap growing by addition at the apex, the larger lumps tend to roll furthest down the sides of the cone, so that the heap shows a gradation of sizes in a vertical direction, with the largest sizes at the bottom. It means that air can find a comparatively free passage under the heat, which can thus be ventilated in a most undesirable way. The area that the coal will cover should be decided on before the stacking starts, and the whole of this area should as far as possible be used all the time, the height of the stack being approximately uniform all over the area while the heap is built up.

Some advantage stands to be gained if a coal that is to be used in a small size can be stored in a large size and reduced as it is taken from the store for use; it would be less dangerous and suffer less deterioration.

Ventilation: Ample ventilation secures the complete dissipation of the

heat in a stack, and so makes the stack safe, but is difficult to achieve except in the smallest heaps. Attempts to achieve it in large heaps usually do not go far enough and aggravate conditions already not good. On the other hand, it is difficult to exclude ventilating currents of air, but it is possibly easier to achieve effective results in this way than by promoting ventilation.

If ventilation is aimed at, pipes projecting vertically and horizontally into the stack are used. Besides perforated metal pipes, land drainage pipes of unglazed earthenware 2 inches diameter by 1 foot long are cheap for the purpose. The pipes may be arranged at horizontal intervals 6 to 15 feet and at vertical intervals of 4 to 6 feet.

Ventilation is usually practicable only in the smaller heaps and then only when the coal is moved by hand and not by a crane and grab. To have a system forming a close enough network to give adequate ventilation will often be economically impracticable.

Unventilated air-pockets must be avoided. Uncontrolled currents of air can be reduced by packing the coal uniformly, avoiding segregations of particular sizes, packing the coal tightly and

blanketing the heap with the fine coal.

The movement of air is impeded in fine coal if it is wet, as moisture tends to close the voids. For this reason, continuously treating a heap with a fine spray of water is often effective in preventing dangerous conditions from arising, although it will not quench a fire.

Walling may be effective if it can be done. It consists of building a rough wall of the larger rectangular lumps of coal. A permanent coal-storage site sometimes has a low wall to protect the base of the stack, whence ventilating currents start, and if the coal is dumped from high railway lines or down a bank, it may be partly enclosed laterally by walls. While this helps to impede ventilation, care must be taken that the coal resting against such a wall, or against piles and pillars supporting overhead roofs or lines, has not packed imperfectly or segregated so as to leave channels through which the adjacent part of the stack may be ventilated by chimney action.

The wind naturally affects ventilation, and if ventilation is to be suppressed, an elongated stack should, if possible, be laid down end-on to the prevailing wind.

Difficulties said to occur in mixed

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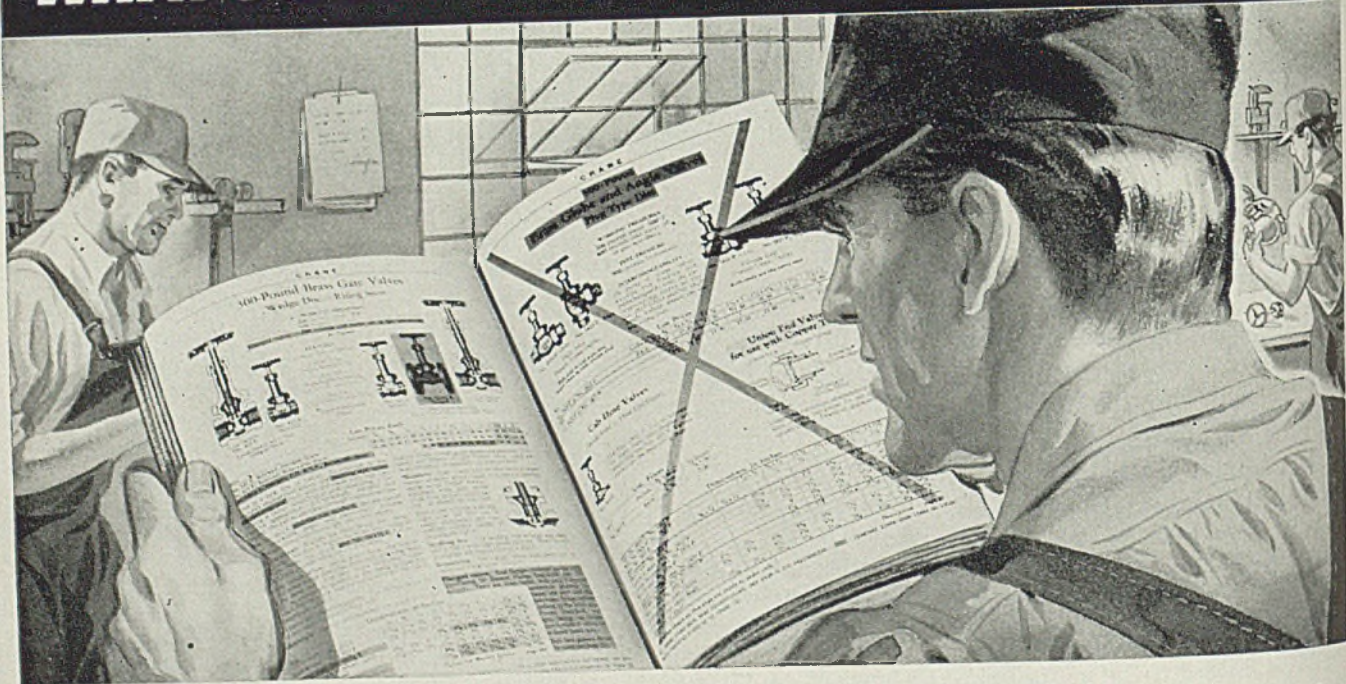
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IRON VALVES
Valve Accessories

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BRASS VALVES
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WHAT'S BEING MADE AND WHAT ISN'T



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CRANE VALVES

STEEL

coals or when fresh coal is laid down on old, may be due to ventilation effects, and if so they could be avoided by careful stacking.

Size of Stack: Coal occupies from 40 to 50 cubic feet per ton. For uniformly sized coal loosely packed the figure is remarkably constant at the upper end of this range, independent of the actual size. As the coal is more closely packed, or as the size becomes more mixed, the volume diminishes, and both factors reduce it to the lower end of the range. A thousand tons of coal will cover 1 acre 1 foot deep, or will make a heap 10 feet high on a base 80 feet square, and 60 feet square at the top with sides sloping at 45 degrees.

Spontaneous heating cannot occur in small heaps of coal, and fires have rarely been recorded in heaps of less than 200 tons. Primarily it is the height of the stack that matters. The height to which coal will be stacked depends on the means available for stacking coal and the area available on which to stack, as well as on the quantity of coal, but it should be kept as low as possible within reasonable limits. A safe height seems to be about 8 feet, although fires have been recorded in heaps as low as 5 feet; but if the coal is of a suitable size and type it may be safe up to 16 feet; for hard nut coal the height may go up to 20 feet, and for anthracite and double nut up to 20 feet.

A higher limit may be put on what is regarded as safe if a crane and grab is available.

A common practice is to build up a stack in stages; thus, increasing 6 to 10 feet after six months, or 8 to 16 feet after nine months; or increasing 6 x 1½ feet every three months. When fresh coal is to be put down on old, care should be taken to "marry" the fresh coal and the surface of the old so as to avoid segregation.

Site of Stack: The site on which coal is to be stored should be planned and prepared in advance, so as to be ready when the coal is delivered. The site of a stack should preferably be a stone floor; it may be a well-rolled floor of ashes that have been completely quenched or cooled. Open ground is best if it is hard clay or chalk; peaty ground should be dressed with a few inches of ballast or ashes.

No clear evidence is available to show that a wet site is harmful, although some observers have thought it to be. Storage under cover probably offers no advantage to compensate for the cost of providing the cover.

Miscellaneous Circumstances: Freshly wrought coal heats and fires, if at all, within four to 16 weeks. In a large and deep pile, heating may develop more

slowly and persist longer, though it will not necessarily occur to a more dangerous degree. A coal more than eight months old can be regarded as safe if there is no heating in the heap, or even if there is heating and it is not increasing.

No clear evidence is at hand to show that weather affects the tendency of coal to heat, except insofar as wind may affect ventilation. Fires often start on the windward side of a stack. Coal may disintegrate under the action of the weather, and fine or small coal may thus be formed, but this is not likely to affect the heating tendency much,

depths at intervals of a few days to a fortnight as seems appropriate. The record obtained will show whether and to what extent heating is occurring, or, if it has occurred, whether it is slackening and whether precautions may be relaxed. Such observations are particularly useful if a stack is being built in stages.

A useful method of plainly marking out threatening and dangerous zones is to color the tops of the rods or temperature tubes green for temperatures below 95 degrees Fahr., yellow from 95 to 115 degrees Fahr. and red above 115 degrees Fahr.

Factors Affecting the Safe Storage of Coal

Conditions	Favorable	Unfavorable
Size of coal	Nuts, cobbles, round coal; to the exclusion of fine coal in the same heap.	Fines, slack, run-of-mine, alone or included with larger coal; small coal formed by breakage, such as by falling from a chute.
Size of store	Less than about 200 tons.	Greater than about 200 tons.
Height of stack	Not greater than 8 to 10 feet.	Greater than 8 to 10 feet.
Ventilation	Adequately promoted; or, what seems easier, effectively suppressed.	Moderate, or natural; if due to passages caused by segregation during stacking, either by a pocket of larger coal or around pillars or against walls.
Age of coal	Greater than 3 to 6 months.	Up to 10 weeks.
State of coal	Having heated and cooled.	Freshly wrought.
Type of coal	Hard or dull anthracite, anthracitic coal, splint, cannel.	Soft and bright; bituminous, sub-bituminous, lignitic.
Site of stack	Most open situations on clean, firm ground.	Near a source of warmth such as a boiler-house wall; or overlying steam pipes, or a covered channel through which a warm fluid is passed; or overlying or mixed with oily material or other organic waste.

as it is a process that will hardly proceed faster than the diminution in the reactivity of the coal as it ages.

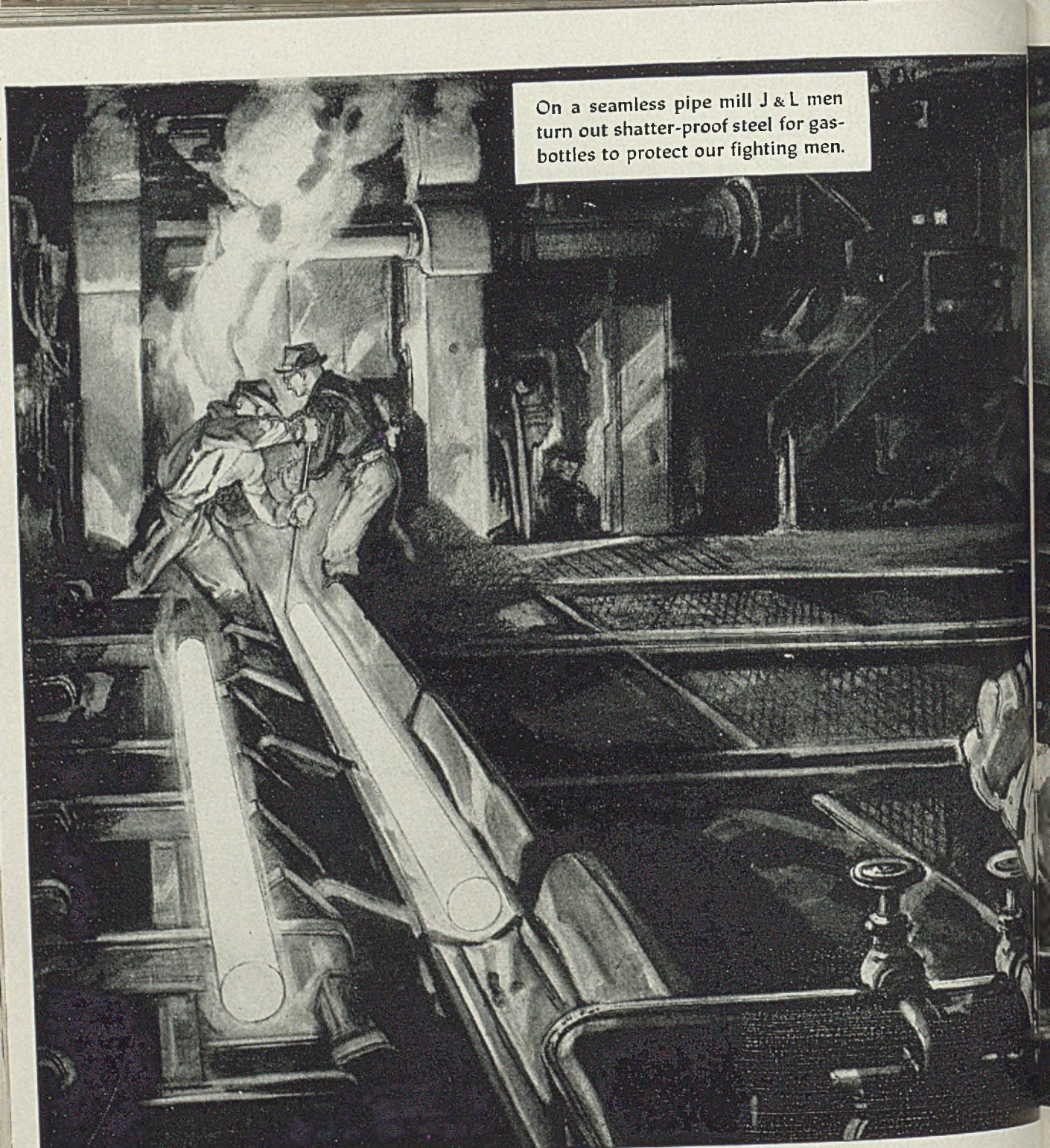
Observation of Stack Temperatures: A watch can easily be kept on stored coal to see whether it is heating. Metal rods may be inserted 10 feet to 20 feet apart in the stack with their ends projecting. It is then a routine procedure for an operative to go around at intervals of a few days to feel whether the rods are conducting heat out of the stack. This procedure, though simple, is not informative, and to exercise successful control needs experience.

A better procedure is to use wrought iron or steel pipes closed at the lower end and to take temperatures by lowering a thermometer down them. The pipes may be put in position in the stack as it is built up, or may be suitably tipped and driven in afterwards; they may be resorted to when rods, used initially, begin to indicate that more precise observations are called for. Intervals between the pipes will vary according to such circumstances as the size of the stack, the type of coal, and economic considerations, from 15 feet to 50 yards. Temperatures can be read at various

Temperature observations need not be kept up indefinitely; it has usually become clear within three to four months, if not within six weeks, whether heating is going to develop dangerously or not at all. And once a peak has been passed it is unlikely that the heating will become threatening again.

Maximum temperatures are often to be found 3 to 6 feet from the top or side surface of a stack, more especially near the bottom at the side, or at any point further in where large coal has formed passages through which air can move freely. Heated zones may in suitable weather be located by the appearance of steam long before they become dangerous.

Temperature Limits in the Stack: The limit to which the temperature in a coal stack may be allowed to rise before a state of danger is recognized varies greatly according to circumstances, say from 95 to 160 degrees Fahr. The lower part of this range applies when conditions, chiefly the type of coal, are such as to favor spontaneous heating; the higher part would apply, for instance, to semibituminous steam coals and when conditions otherwise are not



On a seamless pipe mill J & L men
turn out shatter-proof steel for gas-
bottles to protect our fighting men.

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Fearless newspaper writers, risking their lives aboard our naval vessels, bring us living accounts of the heat and fury our sailors face in battle to defeat the enemy. Flying pieces of enemy shells, smashing bomb fragments and piercing bullets from diving planes leave no area, passageway, deck or hold immune from danger. Even the steel gas-bottles of carbon dioxide carried aboard for fire fighting may be hit. These gas-bottles must be shatter-proof, otherwise they themselves would explode like bombs, dealing death and destruction to men and equipment they are designed to protect.

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FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

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AXIS' CHALLENGE

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110,000 autos make 1 battleship. It takes one hundred thousand tons of steel ingots—enough for more than 110 thousand automobiles—to make one of Uncle Sam's big battleships. Vice Admiral S. M. Robinson, Office of Procurement and Materials, U. S. Navy, told steel men recently: "For these ships we must have steel that will withstand every known stress and shock... and we must have it in quantity." The steel industry is meeting this challenge, too.

Some Shootin' Iron! The barrel, alone, of just one 16-inch naval gun in the batteries of a modern U. S. battleship requires from 500 to 600 tons of steel (exclusive of breech mechanism and turret), according to Admiral Robinson.

1 week's steel, 1 battleship. "In just one week, Jones & Laughlin's Pittsburgh Works (one of three) can produce enough steel to build a 45,000 ton battleship."—*Hiland G. Batcheller, vice chairman, War Production Board, speaking to steel labor-management committees in Pittsburgh.*

Steel Bells Ring Out on the Rails. A new series of powerful express-freight locomotives now going into service on the New York Central System—to speed movement of troops and war material—ring out the warning of their approach with bells of steel. Since early railroading days, locomotive bells have been made of brass. With copper—the base of brass—scarce, steel is now used. These new bells of steel ring with the same clear tone and strike a responsive chord in every heart that counts the locomotive the most romantic piece of machinery ever devised.

Four thousand tons of air . . . the same kind of air we breathe, but superheated, are forced into a blast furnace under pressure every 24 hours in producing molten iron for Fighting Steel. During excessively humid weather in summer often as much as 30 to 40 tons of water . . . tons, not gallons . . . ride into the furnace with the 4,000 tons of "wind," as furnacemen call the air.

Pipe line 7 times around globe could be laid with the steel pipe (casing, drill pipe, and tubing) used in the 400,000,000 feet of oil wells drilled in past five years.

so favorable to heating. Only experience will show what must be regarded as the safe upper limit. Most often it is between 115 and 140 degrees Fahr. If the temperatures are graphed or carefully logged, a slow and steady rise may at the critical temperature take a sudden upward turn indicating a sudden and greatly accelerated rate of rise, and the coal will then inevitably fire, unless precautions are taken.

Dealing with a Fire in a Coal Stack: The method of indicating heated zones by coloring the ends of temperature rods is supplemented by the application of water from a hose all over and around the area affected as soon as the "yellow" stage is reached. There has been no fire recorded for 15 years in a large gas works where this system has been applied to stores up to 250,000 tons of Durham and Northumberland coals.

If the limiting temperature in a coal stack is reached, there must be no hesitation in dealing effectively with the affected zone, or the temperature will rise with increasing rapidity, the zone will spread rapidly, a troublesome fire will result, and serious loss will ensue. It is wrong to delay in the hope that conditions will take a turn for the better.

The fire or heated zone is located at first by temperature observations or otherwise. Although heating may develop within a particular zone, a fire once started may propagate in almost any

direction. At its worst it will only appear sporadically at the surface as flames or a glowing patch. It may be recognized by the appearance of a light gray smoke and a distinctive odor, though usually at this stage the fire is established.

None but the most drastic means suffice to combat the conditions. The seat of the fire must be dug out by holing, trenching, and cutting valleys; the region must be completely exposed, and the hot coal scattered and cooled.

A crane and grab, which will often be available greatly simplifies an otherwise troublesome operation, and even allows liberties to be taken with some of the precautions recommended, such as the limit in the height of the stack, or even in the stack temperature.

Water and Other Safety Measures: It might be thought that spraying with water would quench a fire in a coal store. Generally, however, spraying seems to be useless unless an inordinately large volume of water can be used. Heavy spraying is widely practiced, but primarily as a means of retarding heating and restraining the temperature below a critical limit until the stack has been plotted through its peak heating period. To achieve this, spraying seems to be effective provided it is copious enough; it should adequately cover and wet an area likely to be dangerous. Storage under water and in bunkers flooded by

tidal water has been effectively practiced.

Deterioration: Coal undergoes some deterioration on being left in store. If there is serious heating the deterioration will be correspondingly serious. Otherwise it will be more or less in proportion to the heating that does occur, and will most often be insignificant. Coal does not deteriorate uniformly in all its properties, and what may be serious for one consumer may not matter to another.

Bright and soft coals deteriorate more than hard and dull coals; small coals deteriorate more than large coals, which, if they do not disintegrate, may not change noticeably. As to the kind of coal, the rate and extent of deterioration diminish in the order—lignitic coal, sub-bituminous coal, bituminous coal, semibituminous coal, anthracitic coal, anthracite. Splint and cannel coal may be classed, as far as deterioration is concerned, with anthracite.

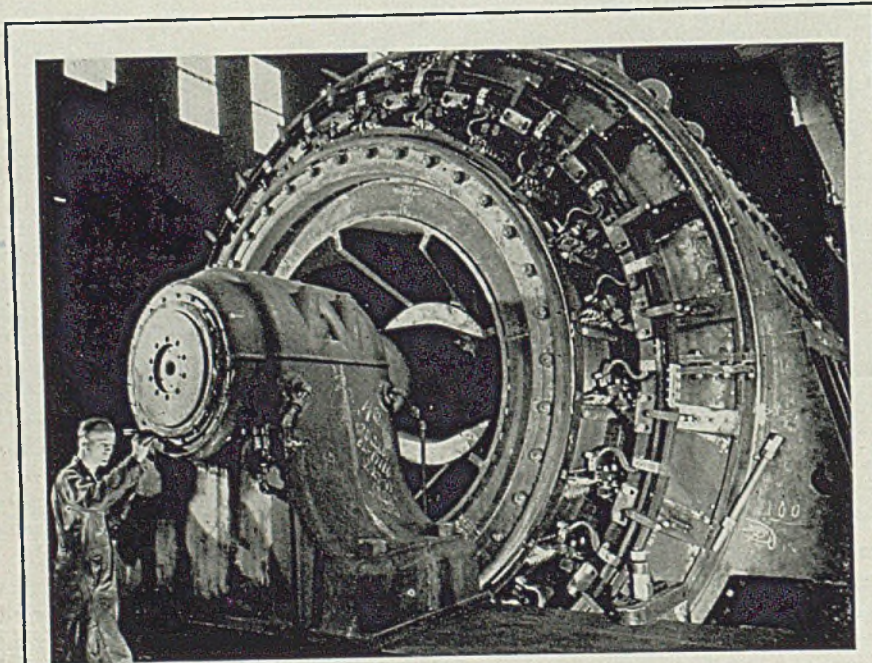
Provided that heating has not occurred or is only slight, the properties and characteristics of coal that are adversely affected on storage are limited in number. Coal changes slightly in appearance; the weather may cause it to disintegrate or become friable; its calorific value and steam-raising power may be slightly impaired; its gasmaking quality may be impaired and its coking power is reduced, often considerably.

1. **Appearance.**—Bright coal may become dull, and the inclusions of certain inorganic constituents—pyrites,ankerite—become "rusty". This is considered by some to affect the value of the coal; in fact, it does not in itself affect the quality, except that it may favor disintegration.

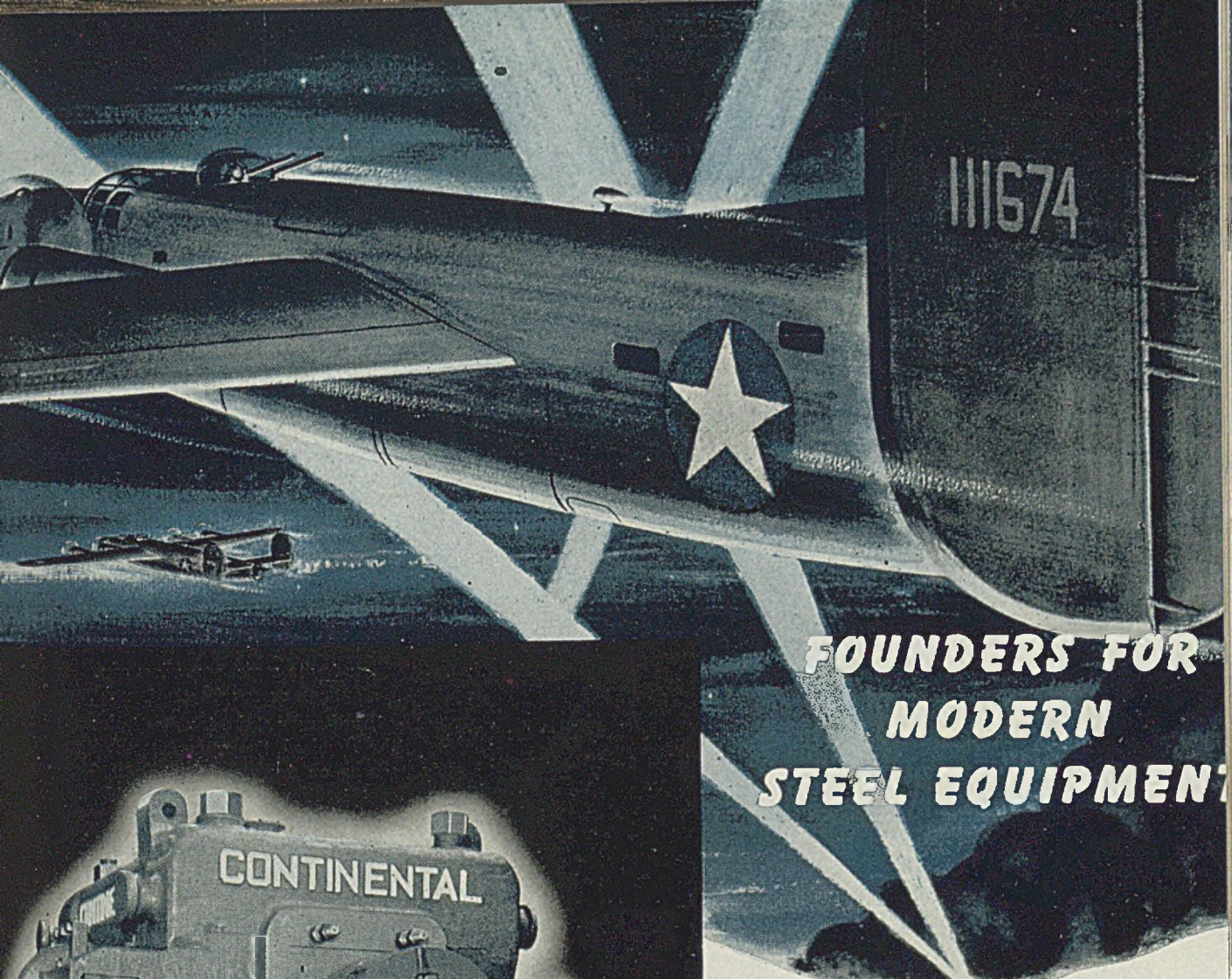
The coke from a stored coal may, even when fresh, suffer in appearance by showing "rusty" patches.

2. **Size**—A large coal, especially if it is soft, friable, fissured or cut up by mineral partings or pyritic nodules, may disintegrate under the action of the atmosphere and the weather. Disintegration differs from most other forms of deterioration in being due chiefly, if not entirely, to exposure, and is little, if at all, related to heating. Dull coals, and cannels and anthracites especially, weather only slowly if at all. With small coal, s'acks and duff, disintegration does not matter; but disintegration may be important if the original size of a nut or larger coal was an essential quality; with sized steam coals it may mean an increased loss of combustible material through the grate, and this may produce an illusion of diminished calorific value. With gas nut coal of deficient coking power, it may cause incompletely carbonized coal to fall through the ex-

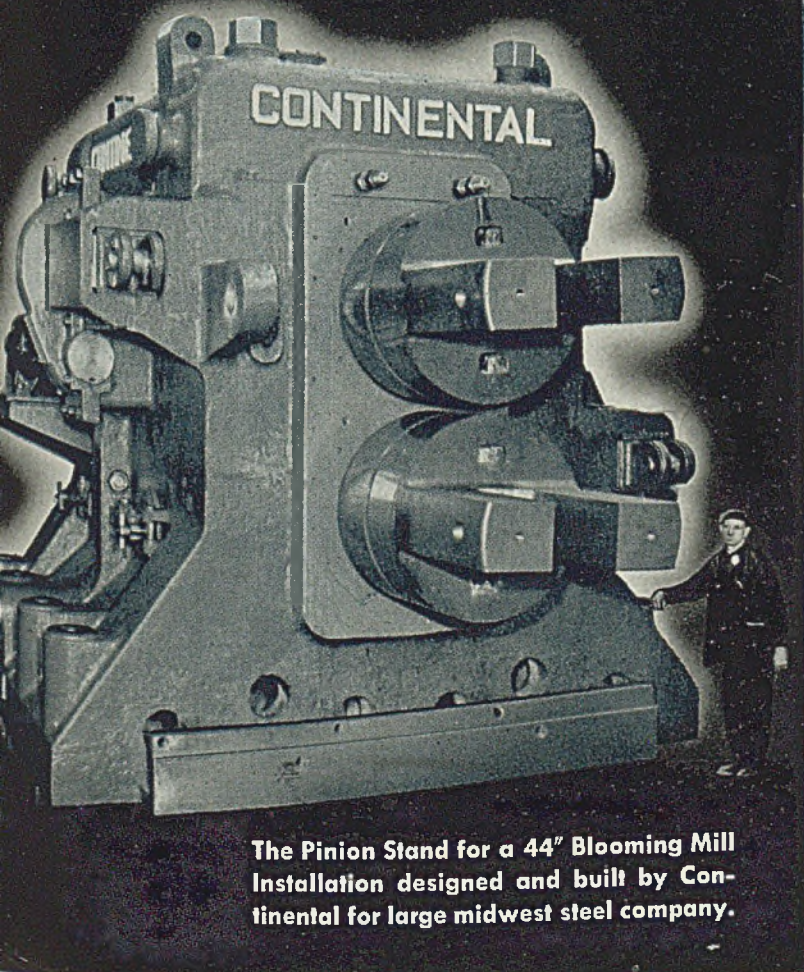
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BLOOMING MILL "POWERHOUSE": At its peak, this mighty electric motor now completing tests at Allis-Chalmers Mfg. Co., Milwaukee, can produce 19,000 horsepower to drive a steel plant's blooming mill. By means of a special control, the 500,000-pound giant is said to be capable of reversing itself in less than 1½ seconds, releasing about 900,000 foot-pounds of energy which is then reabsorbed from the flywheel on the supporting motor-generator set. In normal operations the unit produces 7000 horsepower



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STANDARD CARBIDE TIPS

... cut tool costs, assure longer tool life as well as better delivery

THAT IT always costs less to produce a standard item in mass production than a similar item to special order is of course too well known to require any explanation. That this applies to cutting tools is also becoming widely appreciated, as evidenced by the tremendous increase in usage of standard carbide tipped tools for all kinds of machining operations.

However, there are many applications where a strictly standard tool cannot be used or even where a standard tool can-

By PAUL W. MILLER
Chief Engineer
Carboloy Co. Inc.
Detroit

not be readily converted to a "special" by simple grinding operations.

For such applications most manufacturing organizations follow the normal practice of designing special carbide tools "from scratch". The selection of tip sizes in such cases is quite frequently based primarily on the "minimum" requirement for the specific machining operation, taking tool life required into consideration, of course.

Standardization Lengthens Tool Life

While this is fundamentally the correct practice, it may lead to a higher than necessary tool cost today if the ready availability of mass produced "standard" tool tips is not taken into consideration. Frequently it has been found that such tools are designed with tips that differ only slightly from the large number of standards available from stock. The net result is that the cost of producing the tool "as designed" is considerably higher than necessary, since a special tip has to be put through the shop at a considerably higher manufacturing cost.

As a matter of fact we have found that in many cases it has been possible to not only reduce the cost of the tool by adopting a standard tip size, but also to increase its life. This is due to the fact that the differential in manufacturing cost of standard as against special tips is such as to permit use of a larger standard tip at an actual saving.

At Carboloy it has now become standard practice therefore, whenever possible, to substitute or recommend the substitution of standard tip styles and sizes for special tips in specific tools whenever the resultant tool life is equal to or better than that of the tool "as designed".

Following are a few typical examples of such substitutions with the savings involved. To the reduced cost has to be added of course the lower tool cost per piece machined in order to obtain the overall reduction.

Fig. 1 illustrates the savings which were accomplished on a chamfering tool. The solid lines indicate the tip as drawn by the user's tool engineering depart-

ment while the dotted lines indicate the nearest larger size Carboloy cemented carbide standard tip.

Here the standard tip, produced in large quantities for "stock", actually costs less than the smaller special tip. The difference is quite appreciable too. Even if ordered in large quantities, the tool would have had a tip cost of 97 cents as designed, against 65 for the 1/8-inch larger standard tip. The saving is directly reflected in the total cost since the amount of labor required to grind the end of the tool to the needed special shape is the same, regardless of whether a standard or special tip is used.

Furthermore, the increase in length of the standard tip as against the special means an increase of at least 20 per cent in life of the tool, in addition to its lower initial cost.

The application of the principle of specifying standard tips to save money is also well illustrated in the offset tool in Fig. 2. Here the standard tip is 1/8-inch wider than the special tip with which the tool was designed. Yet the saving may be anywhere from \$2.73 to 49 cents depending on quantity purchased. A further saving could also be made in this case by the purchase of a standard stock offset tool, and grinding this tool to the special shape required.

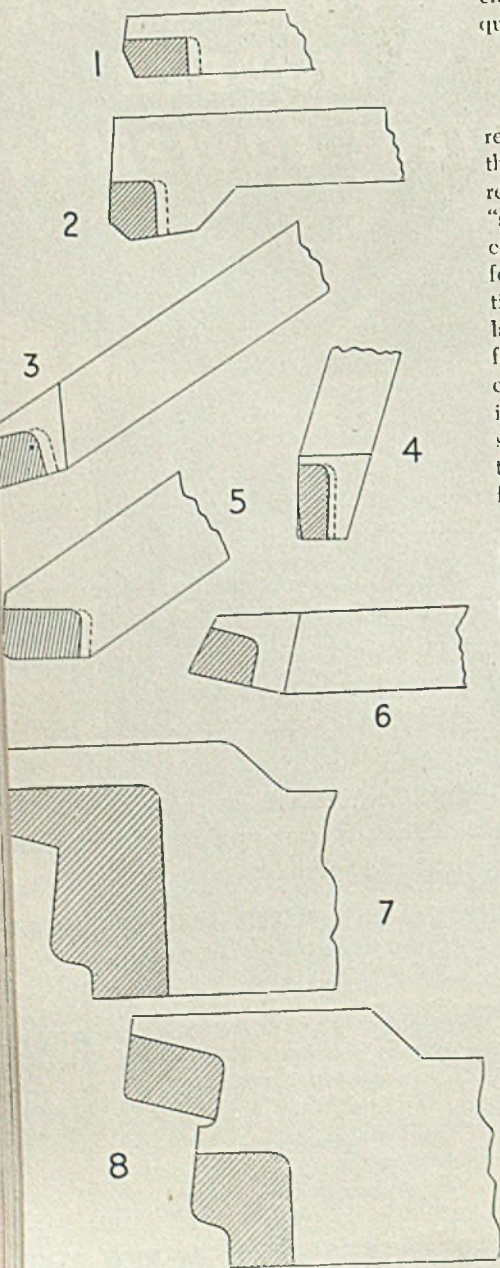
Quantity Determines Savings

On single tool orders the cost of such a standard offset tool would actually be within 5 per cent of the cost of the single special carbide tip alone. On one order for 100 such tools, the total saving in using standard offset tools would have been \$94.

In the example shown in Fig. 3, the larger standard tip indicated would again mean increase in productive life of approximately 20 per cent in addition to a saving of \$52 per 100 tools used.

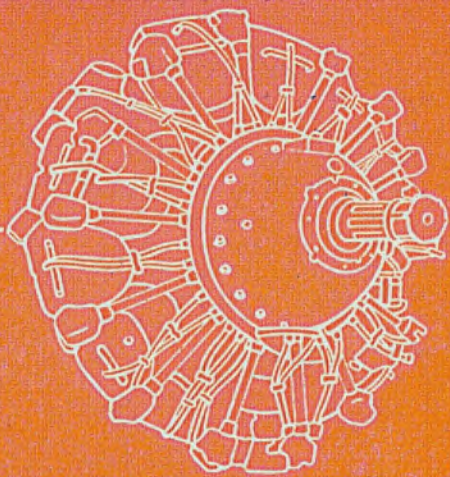
While these first three examples illustrate mainly differences in tip dimensions between standard and special tips, the cost of the tool illustrated in Fig. 4 was materially reduced while increasing life by using a slightly wider standard tip of the same length and thickness as the special tip specified. The saving per 100 tips here is roughly \$23.00, while a single tool order would

(Please turn to Page 130)





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NOX-RUST

STAUNCH GUARDIAN OF VITAL WAR MATERIALS



Truly called the Master Rust Preventive—Nox-Rust is based upon the most practical of scientific formulations—providing a non-metallic preventive coating which guards the

covered metals from all the elements that cause it to rust. Meeting the rigid requirements for protection under the most diffi-

cult situations is routine performance by Nox-Rust.

Staunch guardian of vital war materials—Nox-Rust is made in a variety of formulae to meet all U. S. Army, Navy and Maritime specifications, also, to meet the special needs caused by geographic locations, type of service, the preventing of corrosive gases or acids, or other similar factors.

We are proud of the savings this preventive protection means to America at any time, but particularly so in war time when the conservation of steel is so vital.

Write for Free Technical Bulletin

We invite you to write for complete and detailed information regarding your specific problem—and also for our new technical bulletin, entitled "Nox-Rust—A Scientific Victory Over Rust". We believe the data which appears in it will prove of very real help to you.



NOX-RUST CORPORATION

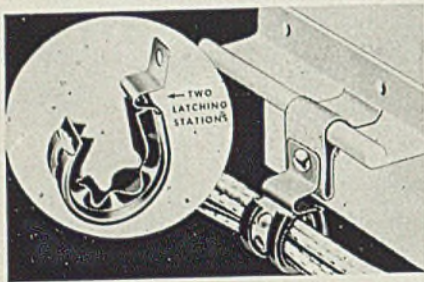
2429 S. HALSTED ST. • CHICAGO, ILL.

INDUSTRIAL EQUIPMENT

Wiring Harness Clamps

Tinnerman Products Inc., 2039 Fulton road, Cleveland, is offering new wiring harness clamps with a latching finger for use in aircraft and other equipment. These work independently of the attaching screw in the assembly of wire harnesses.

Any or all of the wires may be re-



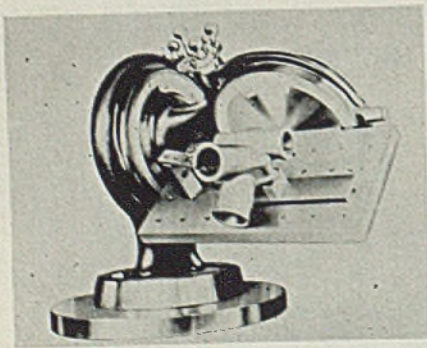
moved or replaced without loosening the screw that holds the clamps in position.

Made of spring steel parkerized and given two coats of lacquer, they are cushioned with extruded synthetic rubber channels having integral resilient ribs to absorb variations in thickness of harnesses.

Two different latching stations are provided on each clamp for size adjustment to fit varying number of wires. With the resilient ribs and the adjustment feature, six sizes accommodate wire bundles varying from 1/16 to 1 3/8 inches in diameter.

Angle Computer

Angle Computer Co., 5720 Melrose avenue, Los Angeles 38, is offering a new Studler model B angle computer with a 9 x 16-inch surface plate. It supplements the company's model A which has



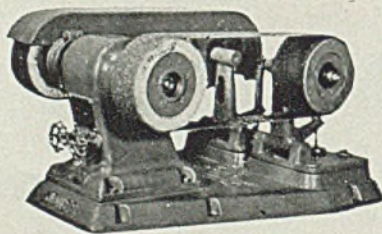
a 4 1/2 x 9-inch surface plate, and is designed to handle castings or parts weighing in excess of 75 pounds. The surface plate is provided with three individual directions of rotation—horizontal, vertical and radial. The part or casting is clamped to the plate and every angle or

compound angle is calculated or checked by means of dials equipped with verniers.

All dials are graduated from 0 to 90 degrees in four sections of the circle. Dial recording horizontal rotation is equipped with two verniers, the other two dials have one vernier each. All verniers read in five minute spacings. The frame is of an iron alloy, heat treated before and after the roughing out to minimize warpage or metal distortion. Surface plate is provided with tapped holes for clamping the plate. Bearing wear is taken up by a heavy spring pressure applied directly to the flange.

Bench Grinder

Jones Engineering Co., Ellwood City, Pa., is offering a new No. 135 bench grinder and polishing machine—a fast-cutting unit designed for production work. Ruggedly constructed, it is suitable for deburring, grinding and finish-



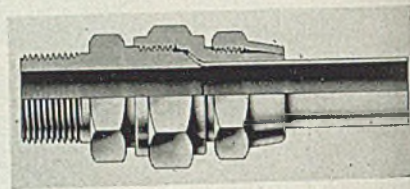
ing work, using endless abrasive belts. The unit is adaptable to any type of grinding and finishing from flat pieces to irregular-shaped parts.

The grinder, mounted on a one-piece base, features ball-bearing construction throughout. Controls are located at the front of the unit, handy to the operator for belt alignment. An adjustable spring tension device on the idler pulley maintains belt tension. The grinder may be used with any 3/4 to 2-horsepower motor.

Collet Grip

Cotter-Wilkinson Co., Logansport, Ind., has developed a new line of Collet Grip industrial and hydraulic tube fittings. The double nut series (illustrated) is available in many models for tube sizes ranging from 1/4 to 2 inches. The compression nut compresses the collet nut to the tubing, giving it a firm permanent collet-like grip that can not loosen under vibration or shock from the hydraulic system. The compression nut will also compensate for any variation in the outside diameter of tubing. The collet nut, with its long bearing surfaces, grips the tube firmly and securely without damage by digging or cutting. The Collet Grip design places the load on the tube, direct-

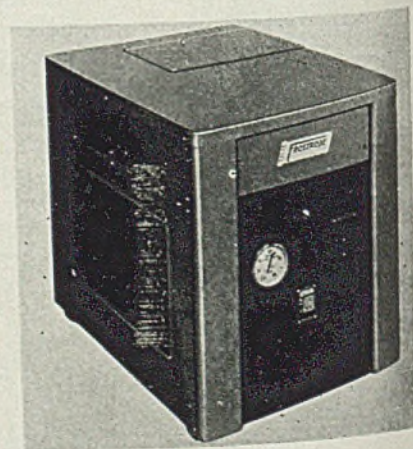
ing the pulling stresses and vibration strains away from the flare. A single nut series also is available in this new line which retains all of the features of the double nut but is much simplified for



close work. It is made for tube sizes ranging from 1/4 to 1 inch inclusive which makes short tube installations practical and is adaptable for installations where the space is limited.

Coolant Cooler

Frostrade Products, 19003 John R. street, Detroit 3, announces a "Frostrade" model 75-AC coolant cooler designed to provide accurate and automatic temperature control of coolants and lubricants in machine processing. Adaptable to most any type of machine and operation involving the use of coolants, it is especially desirable for heavy cutting and high pressure grinding operations. Work distortion due to unequal heating during grinding and other operations is minimized by use of the coolant cooler. The machine operator selects the coolant temperature by setting a dial on the panel of the cooler. Once set, no further attention is required—even variations in room temperature



are automatically compensated for by an integral differential thermostat.

Uninterrupted "streamline" flow of coolant through the cooler is obtained by single steel tube evaporator coil construction. Maximum heat transfer and compressor efficiency is provided in the cooler by use of the counter-flow principle in the evaporator unit. Coolant pressure drop in the cooler is actually less than 5 pounds per square inch at full load.

Model 75 AC is a compact, self-con-

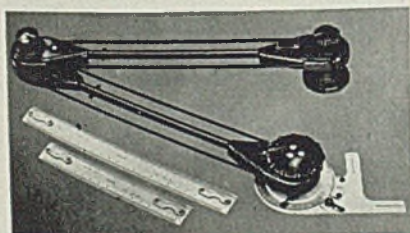
(All claims are those of the manufacturer of the equipment being described.)

tained, portable unit, utilizing an air cooled compressor and operating independent of water services. It is installed by rolling it up to the machine on its 2½-inch casters, connecting it into the coolant line and plugging into a convenient outlet. Right hand, left hand or straight-through coolant line connections can be furnished. Dimensions of the cabinet are 30¾ x 22½ x 28 inches, requiring little floor space. Standard compressor motors are designed for 220/440-volts 3-phase or 115/230-volts 1-phase, and are rated at ¾-horsepower, 60 cycles.

Motors for other voltages and for 25 and 50 cycles can be supplied. Rated capacity of the Model 75 AC cooler is 18 gallons of coolant per minute when cooled down to 20 degrees Fahr. below coolant—oil, soda, emulsions, etc.—can be handled.

Drafting Machine

V & E Mfg. Co., Pasadena, Calif., is offering a new small drafting machine that can be mounted on a portable board and used in shop or field. Called the Vemco Junior Drafter, it combines light



weight with advantages found in large drafters. Accurate, parallel motion over the entire board; a full circle baseline setting; pre-lubricated and double-sealed ball bearings; and enclosed pulleys are a few of the features of the unit. Disk brakes at anchor and elbow allow the drafter to be used on steeply inclined boards. The central skid button is plastic and will not mar the paper. Scales are in aluminum in 8 and 12-inch lengths and fit into resilient, slotted chucks in the scale holder. The protractor is 3¾ inches in diameter and graduated in degrees with figures by quadrants.

Laboratory Furnaces

Lindberg Engineering Co., 2444 West Hubbard street, Chicago 12, has developed a complete new line of laboratory furnaces which includes such types as a box furnace for drying precipitates, ash determinations, fusions, ignitions, etc.; a combustion tube for carbon determination, standard combustion, organic analyses, etc.; a crucible furnace for melting base metals, thermocouple calibrations, molten salt baths, etc.; and hot

plates for heating, distilling, boiling, evaporating, etc. They incorporate such features as the convenient door operating mechanism on the box furnace, which permits cooler working conditions; low-volt-

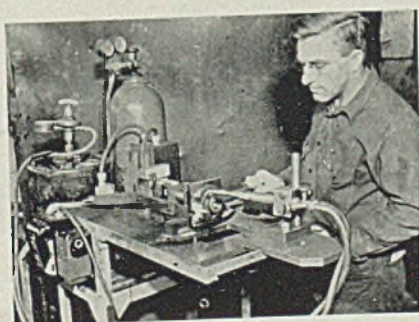


age high-temperature type heating elements; and the use of a Lindberg input control for smooth, "stepless" apportioning of heat. The furnaces are available in different sizes for operation on 110 or 220 volts, alternating or direct current.

Flame Hardening Machine

Hydraulic Machinery Inc., 12825 Ford road, Detroit, announces two new Hy-Mac flame-hardening machines—one for handling small parts, a bench model No. 501; and a floor model for the hardening of sprockets, model No. 502. With the first different shapes and sizes may be hardened by merely revising the multiple duty holder and changing the tips on the burners. After the time cycle has elapsed, an automatic switch causes the solenoid to retract, allowing the part to drop into the quenching medium immediately under the fixture.

The floor model, featuring a base of welded steel construction, is fully automatic. The indexing mechanism on one



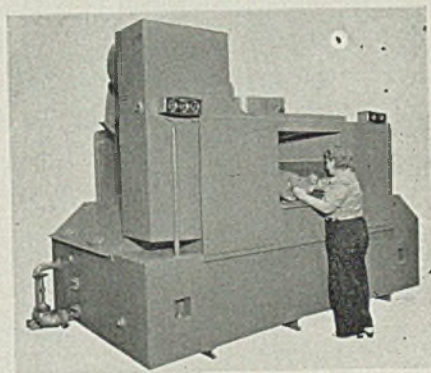
side of the machine holds the work and also has a lifting and lowering movement. On the other side is a movable platform which makes loading and unloading easier. Here also are two special water-cooled torch tips and two quenching nozzles. With the part in place, the entire heat-quench operation is automatic, since the water is also turned on at the quenching heads automatically. Forward movement of the

table engages a limit switch which starts an electric timer that determines the period of dwell to bring the teeth up to heat. At the end of the dwell period, the indexing table lowers the sprocket away from the torches and quenching heads and turns to the next position. The cycle is repeated until all of the teeth have been hardened, the machine coming to a stop for unloading and loading.

Washing Machine

Industrial Washing Machine Corp., New Brunswick, N. J., offers a new type of cleaning equipment, known as a segmented cabinet washing machine and consisting of a large mesh turntable, with or without special fixtures depending upon the nature of the work to be cleaned.

Surrounding the turntable is a housing partitioned off for the various operations of washing, rinsing and drying. The parts to be cleaned are placed either directly upon the mesh or on the fixtures. As the turntable slowly rotates, it carries



the work through the previously described cycle of operations and returns it to the operator. Production ranges from 1½ to 7½ square feet of work per minute.

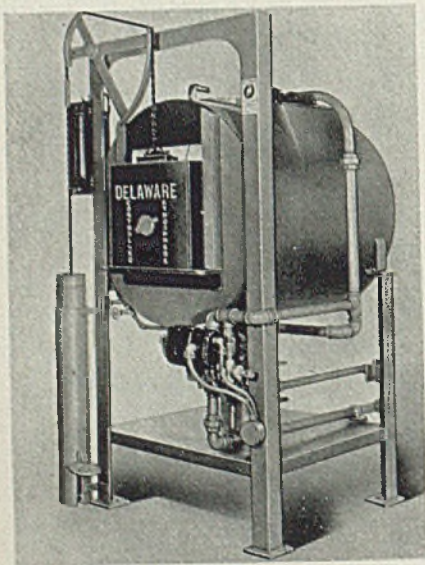
Advantages include one-man operation, minimum floor space occupied (10½ x 6½ feet), adequate spray coverage, use of any cleaning detergents now on the market.

Heat Treating Furnace

Delaware Tool Steel Corp., Wilmington, Del., is offering a controlled atmosphere furnace for heat treating tool and alloy steels. The patented design for tangential firing includes a radical change in firing methods for furnaces adaptable for propane, natural or artificial gases as is this unit. The gas takes its contour from the shape of the flame block port and emerges as a flat ribbon of heat, bent and directed around the circular wall of the combustion chamber. It so hugs the wall as to form a swirling sheet of flame which does not touch the muffle,

scated within the center of the combustion chamber tile, at any point. The burners are staggered so that uniformity of temperature of the four walls of the muffle is assured. The bottom or top of the muffle will not take a temperature higher than that of the side walls. The result is uniform heating of the work chamber. The work load is carried by the work hearth tile rather than by the muffle. Through this method of muffle and hearth tile placement, the hearth tile should at all times have the same temperature as the thermocouple. A baffle tile, placed between the front opening of the muffle and the door, confines practically all the heat generated within the muffle, and heat losses at the door are reduced to a minimum.

For all steels heat treated at tempera-

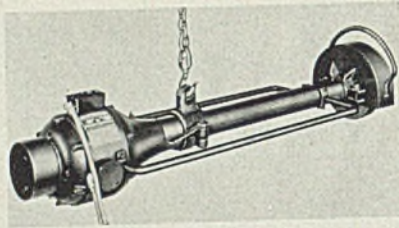


tures up to 1700 degrees Fahr., no consideration need be given to atmosphere by the operator in handling his work. Correct atmosphere—the properly balanced gases surrounding the work within the muffle—is built up within the muffle as the furnace comes to temperature. The slightly oxidizing atmosphere required for steels hardening within this temperature range is maintained. For steels hardening above 1700 degrees Fahr., the protective atmosphere contains approximately 12 per cent with no oxygen.

"In Between" Grinder

Vonnegut Moulder Corp., Indianapolis 2, is offering a new "in between" grinder for use where castings, for example, are too heavy to hold to the wheel of floor stand grinders. With this new unit, they can be set on a table or bench and cleaned up quickly. It is designed to augment large swing frame grinders, reaching surfaces of odd-shaped castings not accessible to the large machines. It

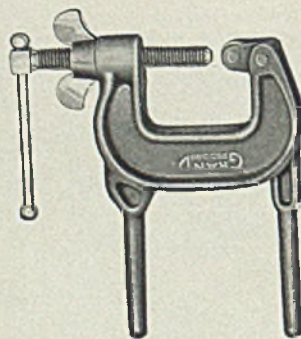
also will snag the inside of large bell housings and similar work usually done with flexible shaft machines or by chipping. The direct-motor-drive ball-bearing construction of the unit allows the



wheel to get full use of the 3-horsepower 1800-revolution per minute motor. Placement of handles, on each side and above the guard, enables the operator to supply two-handed pressure to get maximum cutting from a 12 x 2-inch wheel. The 300-pound weight of the machine and 3½-inch diameter tubing with ⅝-inch wall supply ample backbone to work motor and wheel. These features also enable the operator to angle the machine to any desired position.

Quick-Acting Clamp

Grand Specialties Co., Cleveland, announces a new Quick Lockset clamp for light, fast work featuring an instantaneous trigger release. The seat of the clamp has a swinging, locking lever, gib which is claimed to make it absolutely non-creeping and to assure a firm grip on any parallel, slanting or rounded surface. Release trigger of the unit is equipped with powerful teeth which, under spring tension, hold a firm ratchet grip on the screw, which is released instantly with trigger pressure by thumb or finger, so that

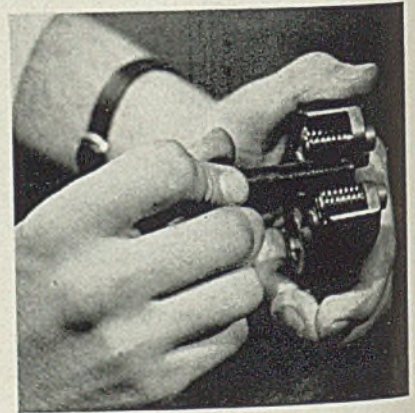


screw may be slipped to any desired position with a single motion. The clamp has a free-acting swivel with fiber face to prevent scarring and marring and can also be equipped with complete fiber jaws for work on aluminum and other softer metals. Both types are made in three sizes, all having copper plated screws and swivels to prevent damage from welding spatter. Another new clamp offered by the company, the

heavy-duty speed clamp is for welding heavy plate, building dies, bulky weldments, etc. It is a 2-handed, lever-operated clamp said to be ideal for production use on identical pieces. It is contended that with combination screw and lever action the clamp can be set and locked for a given opening and instantly applied or released with a single lever movement. It is also available in the giant size with 10¼-inch opening.

Limit Gage

Sheffield Corp., Dayton, O., reports a combined "go" and "no go" limit gage for rapidly checking male threads to both maximum and minimum limits in one operation. The instrument has a frame similar to a plain snap gage in which two sets of gaging rolls are mounted, each roll being free to rotate. One set represents the "go" limit, and the other the "no go" limit. This thread



roll snap gage, widely used in aircraft, ordnance and automobile work for checking aircraft studs and other threaded parts, not only checks the assembly of male threads with female threads but also makes possible uniform interchangeability within prescribed limits of the work passed. By exposing errors in the thread itself, such as pitch diameter, thread angle and lead, likelihood of failure in service is reduced. Fast inspection, economy due to its long life and wide range of applications are advantages. The new thread roll snap gage is furnished standard for American National form, coarse and fine series.

Lubrication System

Farval Corp., Cleveland, announces an improved Multival system to give positive lubrication of all bearings on machine tools and similar equipment, regardless of location or condition of bearings.

Complete Multival equipment consists of multiple valve blocks, each serving two to ten bearings, lubricant lines lead-

Gremlin-proof

even at high Speed

The Taylor-Wilson Cutting-off machine is smooth-running, easy to operate and may be depended upon for continuous, high speed production far beyond the normal period of usefulness.

Made in six sizes, each size with a wide capacity range. In all sizes parts and bearings are designed for heavy duty and close precision performance. Cutting off tools are hydraulically driven, allowing great flexibility in range of speed of cutting. Gears and bearings are lubricated by motor driven circulating system which strains the oil before circulating.

Immune even to the antics of those little Gremlin imps that hang around all war production plants eager to throw monkey wrenches into the machinery.

TAYLOR-WILSON MFG. CO.
15 Thomson Ave. McKees Rocks, Pa.
(Pittsburgh District)

TAYLOR-WILSON Cutting-off Machines

We also manufacture

Straightening, Burnishing & Sizing Machines

Galvanizing Equipment for Pipe

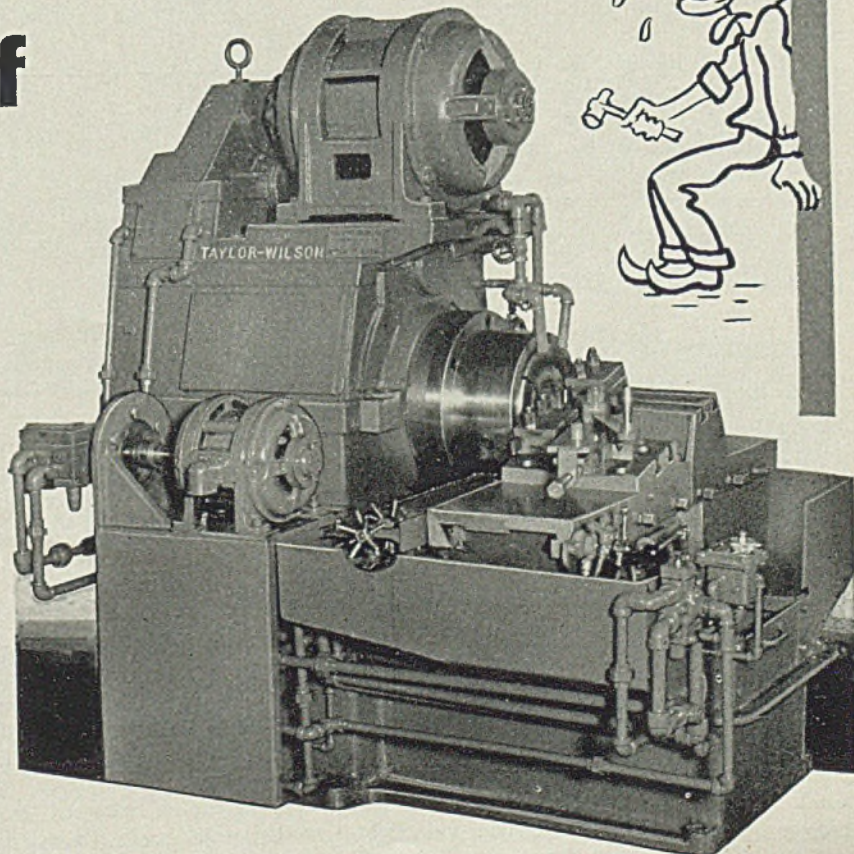
Small Seamless Tube Mills

Tube Cutting-Off Machines

Butt Weld Pipe Mills

Test Benches

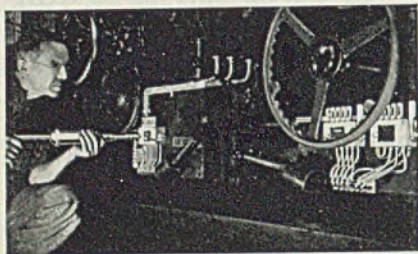
And complete line of Equipment for the finishing of Pipe



'It beats me pal!
for once we're licked!'

ing to individual points, and suitable fittings to accommodate practically any type of bearing connection. The system can be readily installed by shop maintenance crews.

Each measuring valve can be individually adjusted to deliver the exact

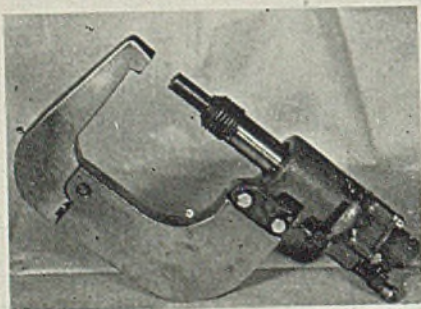


amount of lubricant required by the bearings it serves. A tell-tale on each valve piston indicates the positive delivery of lubricant to the bearing. With blocks mounted at accessible points on the machine, the operator can lubricate all bearings with complete coverage while the equipment is in full operation.

Jam Riveter

Curtiss-Wright Corp., Buffalo, recently developed a tool called a jam riveter for setting warplane rivets. Adapted to work on difficult parts, its use is estimated to cut by 40 per cent the number of two-man riveting teams when fully applied to production since it eliminates the "bucker" of the two-man team. Besides increasing output, its use insures more uniform quality of work with less rejections and salvage. To be manufactured by Ingersoll-Rand for Curtiss, the tool consists of a regular vibrator with added attachments so that its action is automatically controlled by the "travel" of the driving set. It can be used on curved cowling and other specialized parts.

One adaptation is a hand tool vibrator



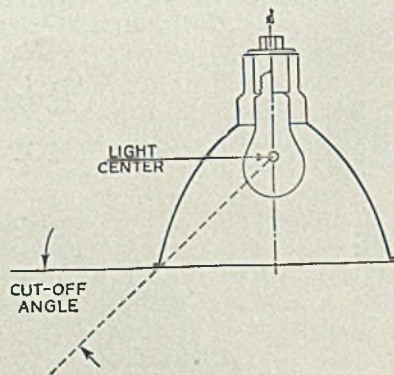
with adjustable depth timer attached to a hinged yoke. The second is a vibrator adapted to a special yoke fabricated from cold rolled steel and mounted on a pedestal. Both are easily adjusted for the correct height of the finished rivet and

automatically stop when that point is reached. The pedestal-mounted vibrator is designed to handle a particularly difficult rivet set problem in the cowl department, properly setting 5/32-inch rivets in spite of the odd-shaped yoke.

The hand tool has sufficient power to head a 1/4-inch rivet with ease, yet is substantially lighter than an equivalent squeezer and can be easily handled without the aid of a spring balance. Since the whole lower bar pivots from the hinge instead of just a small portion under the bucking area, a heavy blow is delivered on the rivet shank. Where the assembly clearances permit shank driving, these special yokes are not necessary. Height of the driven rivet controls the gun. The regulator is also part of the gun and the vibrating hammer assembly, as now perfected, is just as quick and simple to operate as a squeezer.

Deep Bowl Reflectors

Steber Mfg. Co., 2451 North Sacramento avenue, Chicago, is offering a new line of deep bowl reflectors to confine and direct light rays to the work, to prevent light losses and to reduce light



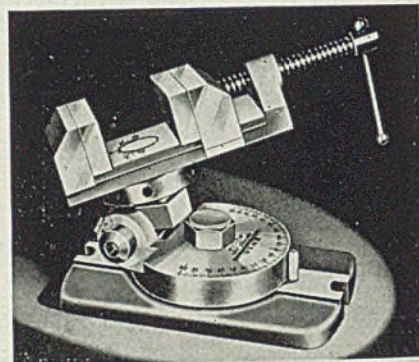
leakage outside plants, barracks and other buildings in coastal or dimout areas. With these reflectors—made in diameter sizes of 7½, 10½, 15 and 17½ inches—the light center is well inside, as is illustrated by sketch. The shade holder types are made in sizes for use with 60 to 200-watt lamps; detachable socket types are available for use with 60 to 1500-watt lamps. Standard finishes are green for the exterior and white for the interior in either ultra-enamel or porcelain enamel.

Angle Vise

Berco Mfg. Co., 429 West Superior street, Chicago, has introduced the Hilco all-angle "driv-wheel movement" vise with three highly accurate and legible protractor dials for horizontal, vertical and diagonal settings.

Features include a patented drive wheel motion which gives 2¾-inch lat-

eral clearance; double swivel construction which permits any conceivable horizontal position; right angle clearance which allows perpendicular position without base obstruction; positive horizontal setting for 180-degree accuracy; elim-

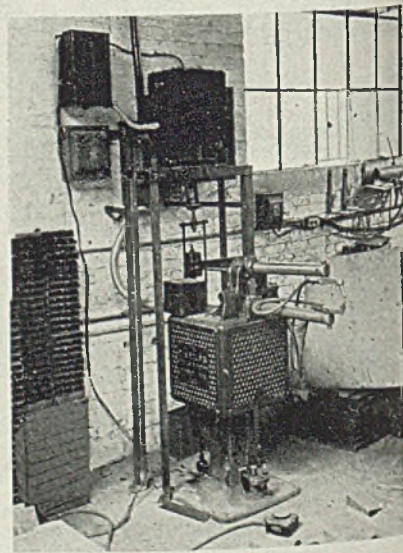


ination of excess weight and improved construction which make for easy handling by men or women workers. The vise is available in three sizes—3½, 4½ and 6-inch jaw widths.

Solenoid

Hercules Electric & Mfg. Co. Inc., 2416 Atlantic avenue, Brooklyn, N. Y., announces a new type solenoid for electrically operating the arms of spot welders.

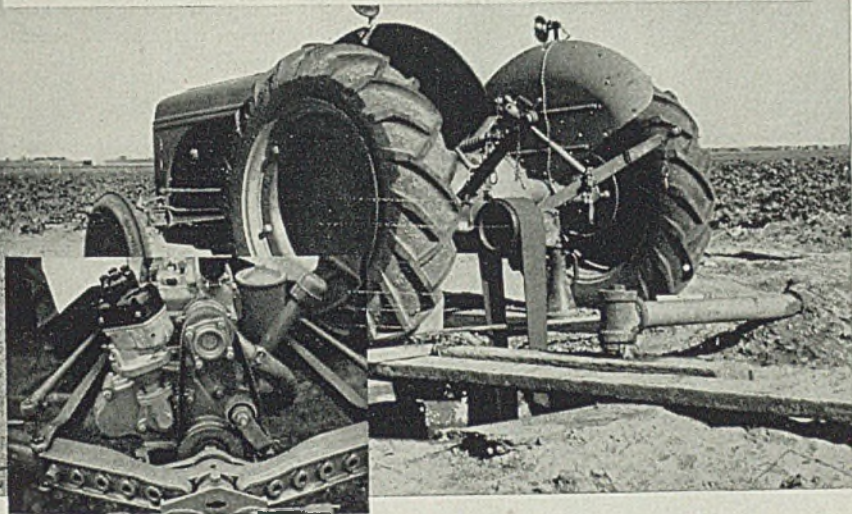
Laborious foot work is transformed into the simple pressing of a button, thereby enabling women to work machines with ease. The development insures uniform, perfect spot welds auto-



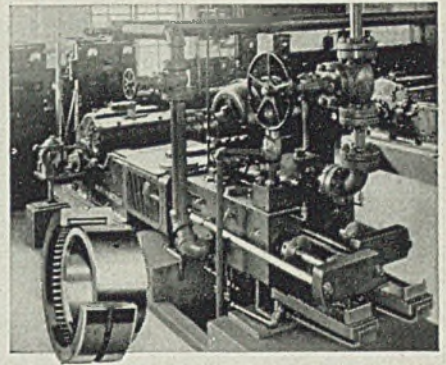
matically in two ways: By producing much greater pressure on the electrode arms; by guaranteeing uniform pressure at all times. Pressure is instantaneous and, as a result, the electrode arms open and shut faster. The unit is constructed so it can be easily and quickly attached to all makes of spot welders.

IN THE NEWS

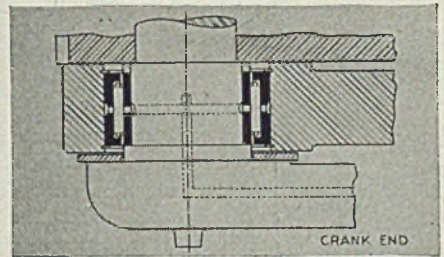
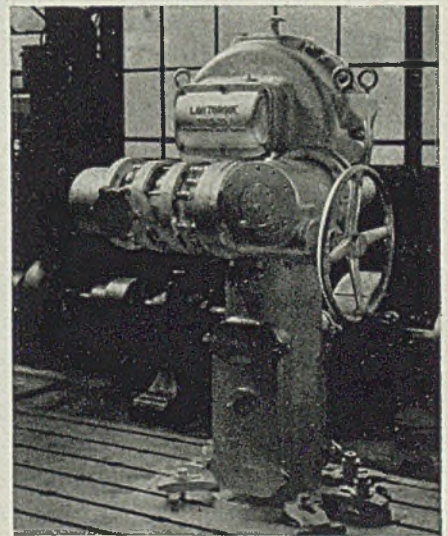
WITH TORRINGTON-BANTAM



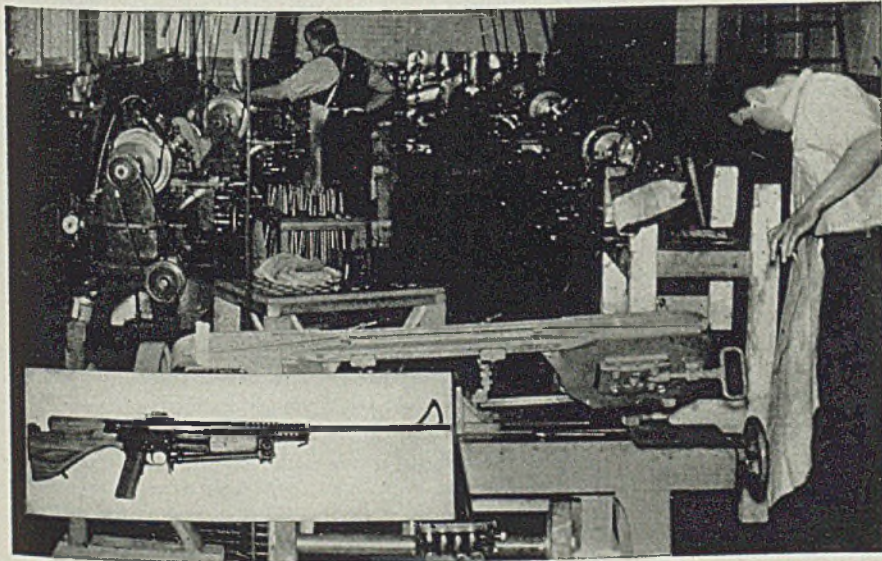
PUMPING WATER FOR IRRIGATION is just another job to the versatile Ford-Ferguson Tractor produced by Harry Ferguson, Inc. So that the fan will spin at its normal cooling rate, an "idler pulley" provides a ready adjustment for fan belt tension. Because of their high load capacity, efficient lubrication and low coefficient of friction, NCS Needle Bearings have been employed on the "idler pulley" for this frequently long-sustained job of "idler pulley" operation.



WARTIME OUTPUT OF PLASTIC MATERIALS is aided by these large pumps built by the Worthington Pump and Machinery Corporation. Here again heavy-duty NCS Needle Bearings in the wrist pins contribute to the high operating efficiency of these pumps, which are designed for a flow of 70 GPM pumped at 2000 pounds working pressure.




HIGH LOAD CAPACITY AND SMALL SIZE, which permit the use of smaller stressed parts than would otherwise be possible, are reasons given by Philadelphia Gear Works, Inc. for the application of NCS Needle Bearings in these valve controls. Used on the crank pins, these unusual anti-friction bearings permit the use of a one-piece, rather than a split connecting rod.



UTMOST PRECISION is required in the manufacture of .30 caliber Johnson Light Machine Guns. To produce these modern weapons of war, Johnson Automatics, Incorporated uses special precision equipment in which Needle Bearings are installed. These Needle Bearings were selected because of their unusually high unit capacity and ready adaptability to many machine tool operations.

A COMPLETE LINE of needle and standard anti-friction bearings—all types, for all purposes—is available from Torrington-Bantam, as well as special types and custom-designed bearings for new and unusual applications. In addition, the unbiased counsel of engineers experienced in the selection and design of bearings for every requirement is offered by Torrington-Bantam without obligation to help you meet both today's and tomorrow's needs. For assistance in the solution of *your* bearing problems, **TURN TO TORRINGTON.**



TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

THE TORRINGTON COMPANY • BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

Malleable Iron Castings

(Continued from Page 96)

Tank gun elevating mechanism castings are shown in Fig. 2. Another recent application in which malleable has been used to advantage is in the newly developed motor vehicle anti-aircraft gun mount. Here, Figs. 8 and 9, three malleable iron castings weighing 25 pounds each are employed.

Pearlitic Malleables

A discussion of malleable iron castings in ordnance would not be complete without mention of the effective part played by pearlitic malleables in a number of applications. Ordnance early recognized the possibilities of this type of malleable iron, which has increased strength and wear resistance, although of course, at some reduction of ductility and machineability as compared with normal malleable. As adequate specifications were lacking in both government and industry, it was necessary for ordnance to pioneer and develop specifications.

Three grades of pearlitic malleable were developed, ranging in yield point from 43,000 to 60,000 pounds and with elongations from 10 to 5 per cent, with corresponding hardness ranges.

An application in which pearlitic malleable has effected great saving and been of inestimable value, due to its many-times greater life, thereby "keeping the tanks rolling," is the tank track roller here illustrated in Fig. 12. Formerly these rollers were made from steel and consisted of a cast hub weighing 34½ pounds in the rough, which was machined to take a steel tube with ½-inch wall and weighing 17½ pounds. Two pounds of welding rod were required to weld the tube to the hub. The roller was then machined and weighed 48 pounds finished.

This assembly has now been replaced by a pearlitic malleable casting weighing 60 pounds in the rough and 57 pounds finished. The outer diameter is cast within a 1/16-inch limit and does not require machining. To assemble, weld and machine the steel roller required 2¾ hours time as compared with an hour of machine time for the pearlitic malleable. The average life of the malleable roller is 10 times that of the assembly first used.

Use of the pearlitic malleable roller, therefore, saved 1¾ hours of machine time and 6 pounds of metal per roller; or 10½ hours of machine time and 36 pounds of metal per tank. Due to long life obtained, the ultimate saving per tank is 105 hours of machine time and 2880 pounds of metal.

Another and possibly even better known application of pearlitic malleable



CONFETTI
AMERICAN STYLE



**DESIGNED FOR
THE AXIS!**

The more scrap we throw at our enemies, the quicker we end the war. More and more steel is needed for tanks, trucks, guns, planes, bombs, shells, and countless other war essentials. The mills have been asked to produce 90 million tons this year, which require 45 million tons of scrap metal. Regular suppliers will furnish about half that amount. The deficit must be made up from scrap now lying around idle. There's enough of it, but it will take the combined efforts of all Americans to dig it out and see that it is put to use.

Go over your property carefully. Don't pass up anything. Every pound of scrap counts, and it's needed NOW! The only way the mills will be able to meet their 1943 quota is through an enthusiastic continuation of the scrap salvage campaign. It's an individual responsibility. Everyone must enlist in this drive.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY



DIVISIONS

THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

STEEL

is the cover plate of the tank track. In this use thousands of tons of pearlitic malleable have gone into effective service. Also pearlitic malleables have saved metal and machine time in numerous small arms applications.

The ordnance department must make the most effective use of every available material if the tremendous production program is to be met. It has made a pronounced effort to replace more critical materials and to save machine tools and man-hours by the use of malleable iron. Whenever such changes are made, consideration must be given to distinctly different metallurgy and foundry practices in order to make certain that the quality and dependability of the ordnance is upheld.

The cost of service failures in war materiel differs from that of normal peacetime items—one costing dollars, the other involving lives of our own soldiers and perhaps battles. To utilize malleable iron to the maximum advantage, the ordnance department retains a consultant from industry and leans heavily on an engineering commission created by the malleable industry to co-operate with and advise on the use and quality of their product.

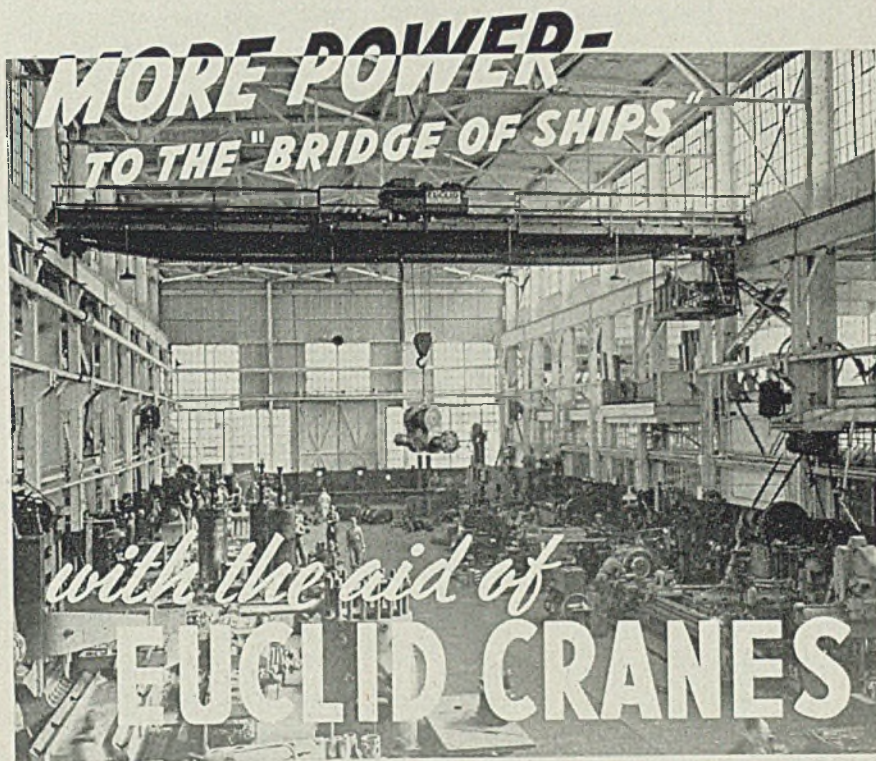
Lead-Silver Substitute

Solder Safe for Food Can

The accumulated evidence of many experiments with food can solders conducted by or in conjunction with work of the War Metallurgy Committee of the National Academy of Sciences has convinced its experts that the lead-silver substitute solder does not involve a health hazard but is safe for use in cans.

The metallurgy committee's report to the War Production Board, contained in information bulletin No. 6, describes the research to find a safe, effective, reasonably priced substitute for tin solder which in one year alone usually consumes approximately 20,000 tons of new and secondary tin.

It was found that after nine months at 98 degrees Fahr. the average part per million of lead picked up by foods from the three silver-lead and silver-tin-lead substitute solders was well within the permissible limit. Part per million in corned beef and hamburger was 0.09; in green beans, 0.03; in orange juice, 0.08; in evaporated milk, 0.34. In these tests the substitute solders used were 97½ lead and 2½ silver; 95 lead, 2½ tin and 2½ silver; and 93 lead, 2 silver and 5 tin. Similar disk experiments carried on by Continental Can Co. for eight months' storage at room temperature using 97½ lead and 2½ silver, and 95 lead, 2½ silver and 2½ tin solders bore similar results.



PARTIALLY due to this 15 ton Euclid Crane in the plant of the Maryland Drydock Company of Baltimore, **MORE POWER** in a greater number of vessels moves into the "bridge of ships".

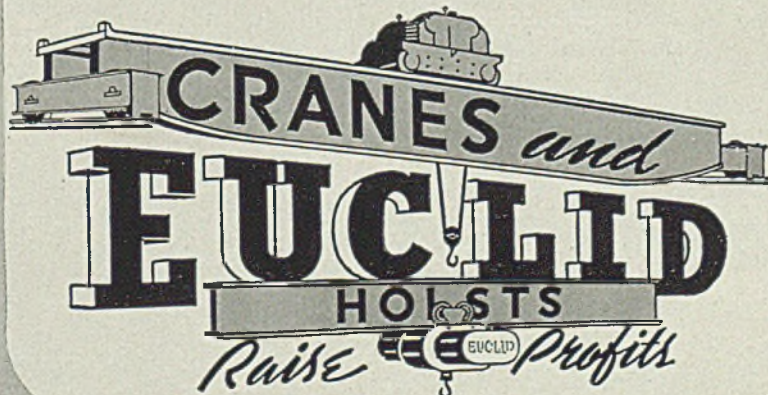
It combines two essentials—**SPEED** to meet production schedules and **SMOOTHNESS OF CONTROL** to facilitate assembly operations.

Loads can be raised or lowered as the trolley moves across the bridge while the crane travels speedily lengthwise of the building. The operator has remarkable control in lowering engine crankshafts, cylinders, etc. slowly and safely into position during assembly operations. Greatly appreciated is the auxiliary hoist for more efficient handling of light loads.

Other Euclid features include: the incorporation of: liberally proportioned parts throughout, the best type of anti-friction bearings, advanced methods of lubrication and quick, easy facilities for inspection, adjustment or repairs. These features combine to afford a long life of service with remarkable freedom from shut-downs and repairs.

THE EUCLID CRANE & HOIST CO.

1365 CHARDON RD., EUCLID, O.



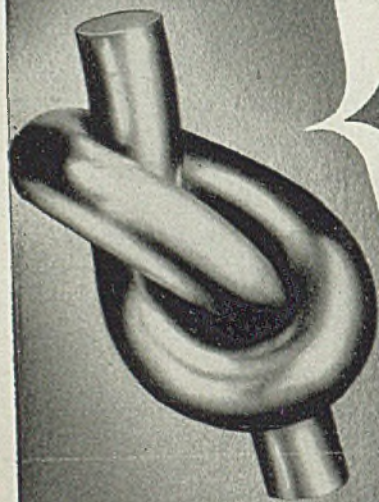
SPEED TREAT STEEL

A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

ONE

Steel that gives you . . .

ACTUAL PHOTOGRAPH
Speed Treat Steel (.45
carbon) 1-inch cold
drawn bar tied in a knot,
cold, without fracture.



1. Excellent machinability
2. Greatly extended tool life
3. Good finished parts
4. High physical properties
5. Excellent impact resistance
6. Good torsional values
7. Minimum distortion
8. Fine heat treatability

The high physical properties, excellent impact resistance, torsional values, minimum distortion and heat treatability PLUS its fast machinability (170 S.F.P.M.), extension of tool life and splendid finish all in ONE steel permit its replacing several comparable steels used in your production.

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Our metallurgists are at your service

Licensor

MONARCH STEEL COMPANY
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Licensor for Eastern States

THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO

PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

**BUY
WAR
BONDS**

Coal Storage

(Continued from Page 116)

tractor of a vertical retort. Disintegration occurs more in the winter than in the summer, and is rarely serious in a single season unless the coal is a susceptible one. There is a limit to the extent of disintegration; a coal never falls away to dust.

3. *Friability.*—Weathered coal, which may or may not have disintegrated greatly, may break easily when it is handled again. Similar considerations apply as to disintegration. An increase in friability is merely a stage in disintegration.

4. *Calorific value.*—A stored coal does lose heating power, but the loss is usually small, although it is widely thought to be serious. It averages between $\frac{1}{2}$ and 1 per cent per annum; this is often much less than variations in the efficiency with which the coal is used.

5. *Coking power.*—This characteristic is by far the most seriously affected during storage, although even this property may not suffer appreciably if the coal is large. If the coking power of a coal is an essential property a year or even six months of storage might ruin it. The coking power of a coal becomes small or even disappears completely after a long period in store.

6. *Gasmaking properties.*—Changes in gasmaking properties are discernible, and may or may not be important. There is usually a slight increase in the gas yield by volume, and a slight decrease in the calorific value of the gas, but these do not exactly offset each other, and give a small decrease in the thermal gas yield.

7. *Steam-raising power.*—A loss in steam-raising power is generally attributed to a loss of calorific value, but if the coal has not heated, this is probably the least important cause of the loss, and may be insignificant.

Changes in appearance, size and friability occur independently of heating in the stack, and they may conceivably occur extensively while other changes do not go far.

The rate at which a coal deteriorates depends on the size of the coal in an important degree; it is largely determined by the ratio between the total area of the surfaces of all the pieces of coal and the total weight of the coal. This ratio, if expressed in suitable units, is the specific surface. A large coal deteriorates more slowly than a small one of the same kind; often much more slowly, for specific surface increases greatly as size decreases. With the largest sizes of hard coals deterioration may be altogether insignificant; this provides an additional reason for storing a large coal in preference to a small one. But if with

STEEL

a large coal disintegration is extensive, deterioration will generally be more noticeable.

Deterioration occurs most rapidly at first, during the first three to 12 months of storage for example, and then its rate falls off considerably. It is, therefore, generally better so far as possible to leave a store of coal alone once it is built and to use incoming supplies, for then the total loss is less than it would be if the store were continually drawn on and replaced by fresh coal; and that is apart from the cost of labor of handling the stored coal. This applies almost universally, though it may not if the size of a sized coal is important and the coal itself is of a kind that will disintegrate under the action of the weather. If the coal is a coking coal to be used as such, a loss of coking power occurring in a short time might be permitted, but the rate at which coking power is lost is so great that the loss in a longer time might be intolerable.

It should be recognized that the more a stored coal heats the more deterioration occurs, until in the end it may take fire, and, if neglected, become an almost complete loss. Nevertheless, except for the loss of coking power, the deterioration that occurs when the temperature has followed the normal course of rising a few degrees and then falling during two or three months will scarcely be noticeable, and will be compensated for by the advantages of storing the coal.

Portable Floodlight for Hazardous Areas

Edison Storage Battery Division, Thomas A. Edison Inc., West Orange, N. J., announces a portable floodlight for lighting powder magazines, freight car interiors, warehouses containing combustibles and any area which, for safety or other reasons, cannot be provided with wired lighting. It consists of one 5-cell B4 storage battery with non-spill valves assembled in a steel box.

The steel box is provided with a carrying handle on the cover and three latches, the middle latch being fitted with a pin for applying a seal to prevent unauthorized tampering in hazardous locations.

On the positive end of the battery is located a polarized connector which is permanently wired to the battery terminals and provides quick connection to a similar plug on the charging leads. This eliminates possibility of charging batteries in reverse, and permits quick exchange of discharged for charged batteries.

The lamp housing, containing a 50 candle-power concentrated-filament type bulb, is mounted on a bracket so that the beam may be pointed in any desired direction.

KEEP 'EM FIRING—BUY WAR BONDS



"MATCH THE MACHINE TO THE JOB"

There's a new idea in the industrial world that's making production history. Just as a wily commander marshals his artillery to make every gun do its utmost, more and more American industrial generals "match the machine to the job" to step up fire power on the home production front.

They're using big machines for big jobs only—rushing in modern, fast precision tools for small parts production so capacities of larger machines will not be wasted. The Atlas F-Series 10" backgeared screw-cutting lathe is one of these compact new precision tools. Ready today to increase production and lower cost in any plant!

"Match the machine to the job" will be winning profits long after it has helped win the war. As part of your current and post-war planning get acquainted with the compact Atlas precision tools now. Write for the name of our nearest distributor.



ATLAS PRESS CO.

895 NORTH PITCHER ST., KALAMAZOO, MICH.

Atlas
F-SERIES
10" LATHES

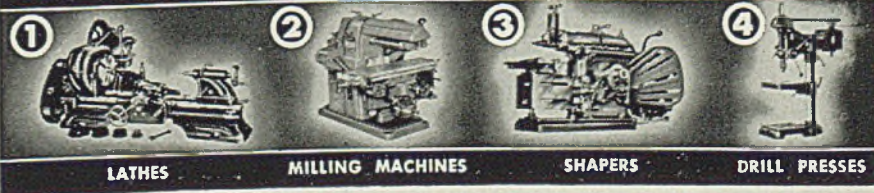
CONDENSED SPECIFICATIONS

Swing Over Bed 10 1/4"
Swing Over Carriage 6 3/8"
16 Spindle
Speeds 28 to 2073 RPM
Thread Cutting
Range 4 to 96 per inch
Four Bed
Lengths 18" to 36" centers

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- Carboloy Company, Inc.
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- Champion Spark Plug Co.
- Chase Brass and Copper Co.
- Checker Cab Manufacturing Company
- Chrysler Corporation
- Cincinnati Milling Machine Company
- C. G. Conn, Limited
- Consolidated Aircraft Corp.
- Corning Glass Works
- Cramp Shipbuilding Co.
- Crane Company
- Curtiss-Wright Corporation

Atlas 4 TOOL TEAM for Small-Parts Machining



MAN BURIED ALIVE IN COAL CHUTE

The life of _____ was miraculously saved when he was buried under five feet of coal for several hours in a hopper at the power plant.

He had been attempting to break up the bridging or arching of coal in one of the bunkers leading to the mechanical stokers. Contrary to safety regulations, he had gone onto the top of the coal surface without first having a rope with a second man on the catwalk to attend the line.

It can't happen here!

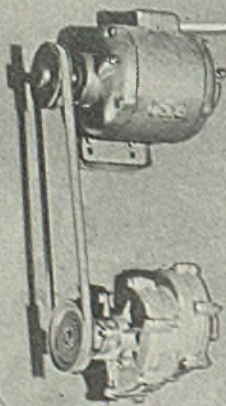
AJAX SHAKER PREVENTS BRIDGING

• Application of vibration to the side of hopper carrying bulk materials to constricted outlet eliminates hazardous bridging or arching.

The angle of slide is maintained, thus eliminating flow stoppage due to compacting of material at narrow outlet of hopper.

Application of Ajax Shakers provides safety at a price which is trivial compared to the cost of a single accident. Costly interruptions to power or production are eliminated.

Write for illustrated bulletin showing simplicity of application under various conditions.



AJAX FLEXIBLE COUPLING CO.
Incorporated 1920 WESTFIELD, N. Y.

Standard Carbide Tips

(Concluded from Page 118)

have meant a reduction of \$1.73 by substitution of the standard tip.

Here, again however, a further saving could be accomplished by also changing the shank specifications slightly to enable the use of a standard stock tool. The actual figures, in single tool lots show the special tool with standard tip almost three and one half times the cost of the standard tool, while to produce the tool "as designed" would cost roughly four and one half times as much as the standard tool.

An even larger saving in tip cost alone is shown in the shell turning tool in Fig. 5. Here again, a standard tip was available just 1/8-inch longer than the special tip indicated. The saving involved in substituting the longer lived standard tip here amounts to \$1150 on a single order of 1000 tools with an increase in life of approximately 10 to 15 per cent.

Even where special shapes are required, standard tips may be specified. The tool in Fig. 6, if produced with a standard tip, would save in quantities of 36 or more around 41 cents to \$1.27 depending on which type of standard tip is substituted. Yet each one of the possible variations of standard tip (there were five in this case) would have given equal or better tool life.

A still better example of the savings possible through the adoption of standard tips is shown in Figs. 7 and 8. The tool shown as designed in Fig. 7, is a special forming tool for machining of an alloy steel casting. The tool was redesigned as shown in Fig. 8, using a standard tip and a smaller "special" tip. The net saving per tool amounted to slightly over 50 per cent of the total original tool cost in the quantities involved. Yet the tool as redesigned with two tips was every bit as effective as the original design and had the additional advantage that if a tip should be accidentally broken, only one portion had to be replaced.

In addition it might be mentioned that the specifying of standard instead of special tips may also mean a saving in delivery time, since the availability of a standard tip from stock frequently may reduce the overall processing time.

All-Plastic Punch Forms Plane Parts

A new all-plastic punch used in combination with a Kirksite die has been developed to form sheet metal parts used in the production of warplanes by Curtiss-Wright Corp.'s Buffalo plant. First large scale test of the substitute

STEEL

punch and noncritical metal die as drop hammer equipment was recently described by officials as "highly successful."

The plastic used in the punch is a refinement of other types of plastics used previously in other experiments. Capable of becoming malleable when heat treated, the punch can be made in a quarter of the time formerly spent in tooling due to the fact it can be shaped to a perfect fit with the die in a single operation. The die is heated to approximately 370 degrees Fahr. and the punch, roughly shaped for mating contours, is placed on the hot die and pressed into it. This pressure forces the plastic to flow into the heated die and produces an exactly matched punch without benefit of machining. Another saving claimed for it is the elimination of rubber pads and strips to absorb hammer shock and the protection of metal surfaces.

As the punch wears, it may be "dressed" merely by heating the Kirk-site die again and pressing the plastic punch into it.

Transphoto Film Process Steps Up Template Making

A system of reproducing shop templates from master layouts with the aid of a new dimensionally stable photographic film is reported by its originator, Fleetwings Inc., as a remarkable time-saver. Applied to reproduction of 108 templates from 18 layouts, the new Transphoto Film process saved nearly 1100 man-hours. The film was developed jointly by Perere Photo Products Inc. and Goodyear Tire & Rubber Co. It can be used in two ways—either conventional photographic reproduction or with a high degree of accuracy by chemical pickup. In practice, accuracy in a 10-foot length is normally held within 0.007-inch, making it possible to use unskilled labor in the operation.

According to *Aviation* magazine for July, the chemical pickup process eliminates the need for photographic exposure and development and therefore is more commonly used. Procedure is to scribe master layouts on sheets of metal thinly coated with zinc-chromate or other surface coat. The Transphoto film is immersed for 1 minute in a special "pickup" solution then squeegeed emulsion-side down into close contact with the layout for 5 minutes. Next, the film is processed through a hypo solution, rinse water, and a bleach, then immersed in final transfer bath for 30 seconds. Following this the film is pressed onto a blank metal sheet or transferred to any suitable material such as plywood or Masonite which has previously been coated with Transphoto paint. This then

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ROUND . . . FLAT . . . SHAPED

WIRES TYPICAL OF ROEBLING'S
BROAD SPECIALTY PRODUCTION

☆
TEMPERED AND BLUED
FLAT WIRE
TO SPRING SPECIFICATIONS

*Spring
Steels*
EQUIPPED
FOR ACTION



Have you a "spec" problem on steel for springs? It is very possible you have, for springs are vital—large and small they serve a multitude of war jobs from opening a parachute to absorbing recoil on a gun.

But whether you have to deal with helical springs, flat springs, or stampings, Roebling Steel Round or Flat Wires can help you to a successful solution.

Take, for instance, some of the factors involved: hardness, toughness, temper, accuracy. Roebling's tempered and blued flat wire is made to meet the most exacting specifications in all of these categories. Moreover, Roebling wires are shipped "equipped for action", ready as received to go into your final fabricating operations, measuring up faithfully to all specifications of dimensions and finish, and remarkably free from defects on surface and edges.

Roebling's long experience, facilities, skill and war-won training are at your disposal. Why not submit any spring steel problem you may have to experts who will gladly advise and save you time and trouble? Prompt action on war orders.



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SILVER STREAK

Metal Working CLOTH BELTS

Silver Streak Abrasive Belts On Belt Grinders Eliminate "Traffic Jams" On Larger, Slower Millers and Shaping Machinery!

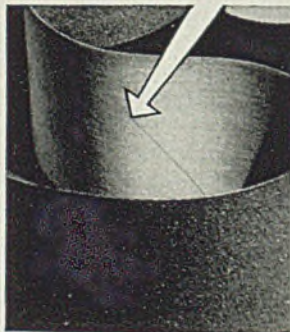
Hundreds of busy shops save up to 50% of tool and parts grinding by utilizing small, speedy and accurate belt grinders equipped with SILVER STREAK Abrasive Belts. They turn out work faster and better . . . without "tieing-up" bigger, more important shop machinery. With fine grit Silver Streak, they are able to grind down to tolerances of .0005 with ease.

MAKE A TEST . . . with FREE SAMPLES!

Give Silver Streak Belts a trial on any one of your supplementary grinding jobs . . . WE WILL SUPPLY YOU WITH FREE SAMPLES FOR ANY TEST YOU WANT TO MAKE. There's no obligation . . . just write us the details, tell us the grit and size of belt you require. We want to prove to you that no matter what kind of a grinding or polishing job you're doing, Silver Streak will help you do it better. And, you'll get longer life out of every Silver Streak Belt, besides! Abrasive Products Inc., 511 Pearl Street, South Braintree, Massachusetts.

Insulated to withstand grinding heats up to 1700°, Silver Streak Belts keep cutting long after ordinary belts have quit.

Made with AP's exclusive Velvet Joint, Silver Streak Belts won't bump or jump on the work.



ABRASIVE

SOUTH BRAINTREE
JEWELOX • JEWEL EMERY • JEWEL GARNET



INC.

PRODUCTS

MASSACHUSETTS
JEWELITE • JEWEL FLINT • NEW PROCESS

becomes the duplicate template. On removal, the duplicate has a positive image of the original layout in dark lines formed by a deposit of silver from the film image, the final transfer actually being a silver plating.

G-E Issues Rules for Safe Lathe Operation

Twenty regulations for safe operation of lathes were prepared recently for distribution to operators by the works safety committee at General Electric Co.'s Schenectady factory. They are substantially as follows:

Before Starting Lathe

—If there are red, green or yellow tags on the machine, do not move the control handle or switch.

—Use a soft hammer to hit hardened tools; never a hardened hammer.

—Put chuck or face plate on lathe spindle by hand, not by starting the lathe.

—Remove chuck wrenches from chuck before starting lathe.

—Make sure setscrews do not project from rotating parts.

—Before starting lathe, see that all guards which have been removed are replaced.

—Do not remove safeguards unless authorized to do so by foreman.

—Loose clothing, hair, neckties, long sleeves and wiping rags might catch in revolving machinery. Wear proper clothing and exercise great caution.

—Always remove tailstock center when not in use.

While Lathe Is In Motion

—Never attempt to change speed of an engine lathe while spindle is in motion.

—Beware of sharp burrs on chips or spiral chips which may snap around.

—Make sure all files are equipped with handles.

—When using emery cloth on revolving work, be careful the cloth does not overlap. This can be avoided by applying emery cloth with a flat file or piece of wood.

—Use a brush, hook, or special tool to remove chips.

—Do not use a micrometer on revolving work.

—When grinding or turning brass, toolite, or any material which may release flying particles, safety goggles should be worn.

—Stop lathe when oiling, cleaning or repairing it. Open the switch when making adjustments.

—Do not stop lathe chuck with hand.

—When a heavy chuck is on the lathe, do not stop the spindle suddenly or the chuck may fly off.

—Do not leave the lathe in motion unattended.