STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

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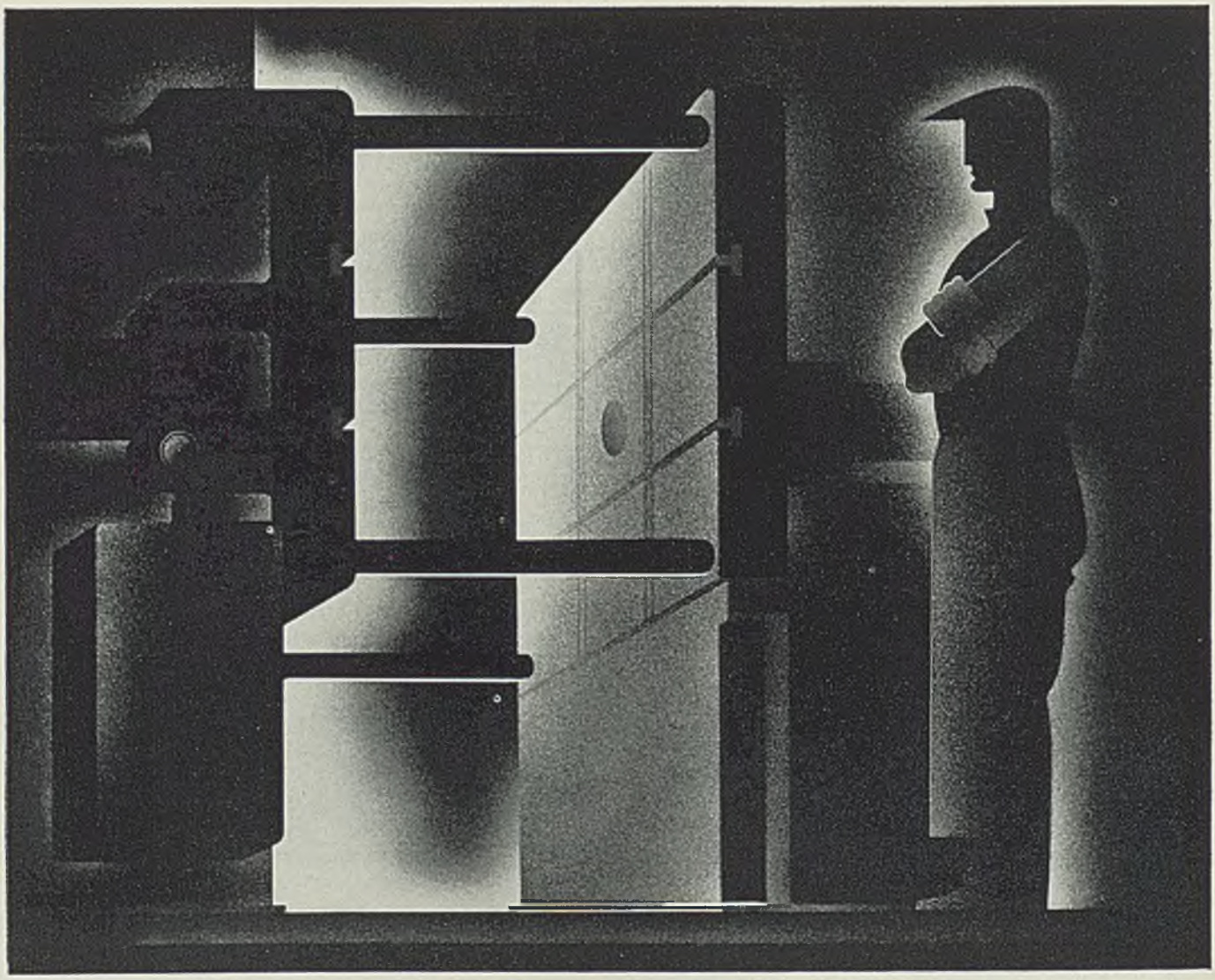

LONGER LIFE means LOWER COSTS

EXPENDABLE parts of production machines can easily be a thorn in the side of the management. . . . Parts, removal, installation and production interruptions—all cost money.

Whether parts are made from steel or iron, Moly adds to their effective life. One striking example is that of a permanent mold machine producing radiator nipples. Adding .50% Moly to the mold iron increased the production life of the molds 300%—because Moly iron is more resistant to heat impact. The unit production cost of the nipples was reduced.

Every one is interested in long life and reduced maintenance costs for production machines. Moly steels and irons have helped in many cases—in many industries. Investigate their application to the things you make or the machines you use. It will pay you.

Our technical book, "Molybdenum," and our periodical news-sheet, "The Moly Matrix," are yours for the asking; while the facilities of our laboratory are always available for the study of knotty steel or iron problems. Climax Molybdenum Company, 500 Fifth Avenue, New York City.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

CLIMAX **Mo-lyb-den-um** **MOLY**

CUTS COSTS

CREATES SALES

As the Editor Views the News

PROBABLY at no time since the lush days of 1929 has industrial news been as uniformly cheering as during the past week. The parade of prosperity gains new recruits daily. The procession, headed by declarations of increased and extra dividends has been augmented by announcements of bonuses to employes, stock distributions to stockholders, wage increases and more recently, but not least, a new flood (p. 83) of purchase orders from railroads and the authorization of expenditures for new mills, plants and equipment for industry. Fortuitously this superfluity of good news comes at a time when the automobile industry is displaying its 1937 models!

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Some cynics may say that much of this spectacle is staged, that business is making a grandstand play to the public, or that industry is extending the olive branch to new dealers in recognition of the decision of Nov. 3. Undoubtedly some of these factors enter into the picture, but in the main the present demonstration is the result of forces which have been at work for months and which have just recently broken loose from the last restraining bonds. The natural, spontaneous character of current expansion programs is more significant than the artificial forces behind some of the dividend and wage announcements.

Pent-up Demand Breaks Bonds

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It is obvious that the more liberal distribution of income, coupled with new evidence of expanding activity (p. 38), has served to take the edge off of the bitterness aroused during the recent political campaign. In fact, the display of liberality also has softened the sharp line of class distinction which was emphasized so strongly a few weeks ago. Certainly the atmosphere of good feeling which prevails today can be utilized profitably by industry and by government to prepare for constructive action which will be needed when congress convenes. Strangely enough, organized union labor, which plans to introduce numerous restrictive bills in the next session of congress, today is renewing the bitterness of the A. F. of L.—C. I. O. feud and thus is presenting to the public the only sour note in an otherwise harmonious national scene. It would seem that organized labor's unfortunate squabble at this time affords industry a good opportunity to make marked headway in its effort to rewin and hold the confidence of the public.

Opportunity for Industry!

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It is significant that an overwhelming majority of new construction in the steel industry involves facilities for products used by mass production manufacturers. Expansion announced last week by Bethlehem and Republic (p. 22), coupled with projects previously authorized or under way by other companies, will increase the continuous wide strip capacity of the country by over 50 per cent. This again emphasizes the tendency among many industries to "tie in" with the rapid development of the "more goods for more people" idea. This means highly efficient manufacture for mass markets (p. 37), and in the long run it may provide the key to some of our most pressing social problems.

More Wide Strip Mills!

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One branch of industry frequently can borrow ideas from another to its marked advantage. Paper mills were pioneers in shipping flat paper stock fastened to wooden skids by steel strapping. Recently some manufacturers of flat rolled steel, zinc anodes, and similar materials have adopted this method of shipment (p. 55) and are saving as much as $122 per carload. . . . Operating men confronted with the problem of machine vibration will be interested in studies of the effect of different arrangements of isolating felt (p. 40) upon vibration in the vertical and horizontal planes. They show clearly that the positioning of the isolating material is an important factor in reducing vibration. . . . The American Welding society is introducing standard symbols and nomenclature (p. 64) which will give industry a common language of welding. This is standardization of the most practical kind.

Esperanto for Welding

E. L. Shaner

New Strip Mills To Raise Capacity 52 Per Cent

BETHLEHEM STEEL CO.'S plan for a broad continuous hot strip-sheet mill at Sparrows Point, Md., brings the total numbers of such mills now being constructed or authorized to seven, and total annual capacity represented by these seven to 4,020,000 tons.

The significance of this may be understood from the fact that total capacity of such mills in this country completed prior to 1935 amounted to only 4,838,500 tons. Thus in the past two years new capacity, either completed or underway, is almost double that of all prior years.

In 1935 producers brought in capacity for 2.006,000 tons of broad hot strip. This year Great Lakes Steel Corp., subsidiary of the National Steel Corp., completed a mill with 600.000 tons capacity, at Ecorse, Mich. Now under construction are four mills with a total capacity of 2,520,000 tons, and in addition to this three mills have been authorized with combined capacity for 1,500,000 tons.

Hence, with the mills now under construction and authorized, present capacity will be increased 52 per cent, one of the most remarkable expansions for any product in any two-year period in the history of the steel industry.

Mills now under construction include one each for the American Sheet & Tin Plate Co., Gary, Ind., 600,000 tons capacity; Granite City Steel Co., Granite City, Ill., 600,000 tons; Jones & Laughlin Steel Corp., Pittsburgh, 600,000 tons; Carnegie-Illinois Steel Corp., Homestead, Pa., 720,000 tons.

Those authorized include Bethlehem's Sparrows Point mill, 600,000 tons; Tennessee Coal, Iron & Railroad Co.'s mill in the Birmingham district, 300,000 tons; and Republic Steel Corp.'s mill, which is to be built in Cleveland, 600,000 tons. The total capacity of these three is 1,500,000 tons. As it takes approximately a year to build one of these mills and as the two principal builders are now well engaged, it will be along in 1937 before any of the latter three is completed. Of the four now under construction one is practically finished and the other three will be ready early next year. With all of these completed, total annual capacity for broad hot strip will be 11,734,500 tons. Total capacity for all kinds of finished steel in the United States is about 54,000,000 tons.

In comparison, annual capacity for rails is 3,492,600 tons; structurals 5,727,000 tons; tin plate 2,664,000 tons; plain wire 4,000,000 tons, and bars 9,860,000 tons.

Expansion for Bethlehem

Expenditure of $35,000,000 for new construction by Bethlehem was announced by President Eugene G. Grace last week prior to his departure for inspection of the West coast properties. The major portion of the amount, which is to be spent by the end of 1937, is for expansion of sheet, strip and tin plate facilities at Sparrows Point, including a 56-inch continuous mill with an annual capacity of 600,000 tons, and additional cold reducing mills.

This is in addition to the $34,000,000 program which started last year and included such projects as the continuous sheet and plate mill at Lackawanna, N. Y., tin plate facilities at Sparrows Point, and equipment for the production of Bethanized wire at both Sparrows Point and Johnstown, Pa.

Contracts for new rolling equipment for Sparrows Point are now being negotiated for with the Mesta Machine Co., Pittsburgh; the electrical equipment will be supplied by the General Electric Co., Schenectady, N. Y., and the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

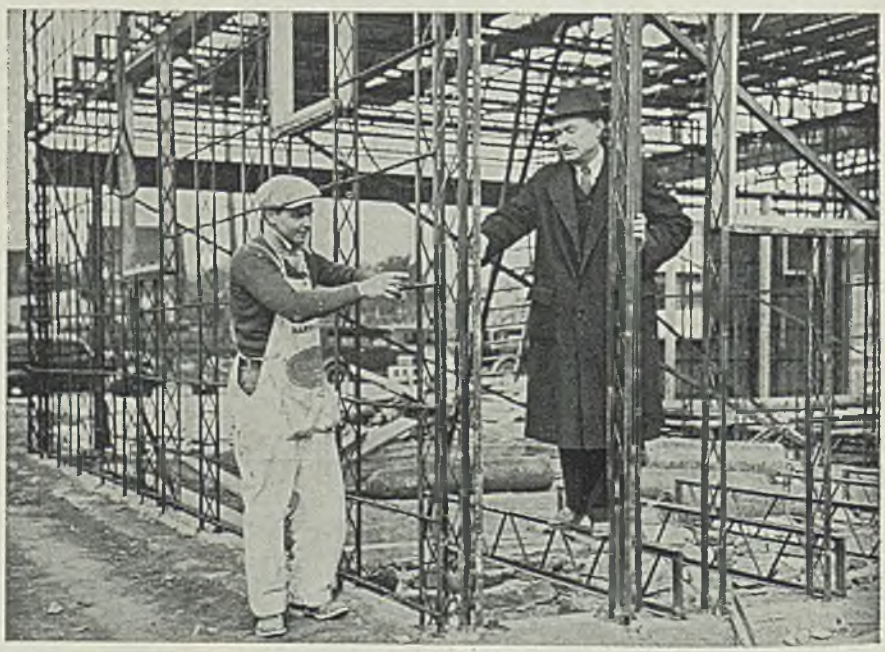
Further diversification of products increasing the ratio of light to heavy products is the primary object of the new program.

The new program, financed through the sale last October of $55,000,000 of 3¾ consolidated mortgage bonds, will also include some miscellaneous items of reconstruction and improvement.

Little new ingot capacity will be needed to supply requirements of the proposed finishing capacity, Mr. Grace indicated. He said the company's present idle ingot capacity consists of modern open-hearth furnaces and it will not be necessary to make large additional expenditures for primary equipment. The increase in finishing mills for lighter products is providing the company with an "economic balance" for its ingot capacity.

Mr. Grace also made a point of the fact that the decentralization of the automobile industry, as exemplified by the new plant of the General Motors Corp., at Linden, N. J., and similar new automobile assembly

Welded Steel Lattice Forms Framework for House



A RECENT development in home construction is the use of light-weight latticed-work steel, which it is claimed by its originator provides far greater rigidity than the conventional wood type. Thus far eight of such houses have been built. Illustration shows the architect, Richard A. Kerns Jr. inspecting framework at Wynnewood, Pa. Wide World photo

plants, will provide much business for the Sparrows Point plant.

It is the expansion of facilities, as well as shorter working hours, that has increased Bethlehem's payroll to 88,000 employes daily, compared with 73,000 men in the boom year 1929, he pointed out.

Republic Steel Corp. bonds for $25,000,000 were sold last week, most of the proceeds of which will be used for building a broad continuous strip-sheet mill in Cleveland. Official announcement of the selection of the location at the Corrigan, McKinney division is expected shortly.

The mill will have an annual capacity for approximately 600,000 tons. While full details of the expansion program were not available last week, considerable incidental improvement work will be undertaken at the Corrigan, McKinney plant.

Metal Window Group Accused of Price Fixing

The Metal Window institute, Washington, and 19 manufacturers of steel windows have been charged with maintaining a price-fixing combination by the federal trade commission. The commission alleges their purpose is "to restrain, monopolize and eliminate competition in the sale of metal window products." The corporations are said to constitute substantially all of the manufacturers of metal window products in this country.

The four companies, none of which are identified with the steel industry, against which the commission issued the first formal complaints under the Robinson-Patman act filed their answers with the commission last week, denying the allegations. Three of the four answers raise the question of the constitutionality of the act.

Wire Association Forms Nonferrous Division

Conforming to action taken at the annual meeting of the Wire association in Cleveland, Oct. 19-22. (STEEL, Oct. 26, page 24), nonferrous members of the association are organizing a division under chairmanship of E. W. Clark, mechanical engineer, wire and cable section, General Electric Co., Schenectady, N. Y.

The division will cover metallurgy and research; processes and methods of manufacture; and finishing of products, including braiding, covering, stranding, forming, fabricating and insulating.

Activities will be devoted to processes of production.

Minority, Led by Lewis, Fighting Wage Agreements

THE central committee of employe representatives in Carnegie-Illinois Steel Corp. plants in the Pittsburgh district last week elected a pro-Lewis chairman, Elmer J. Maloy, of Duquesne, Pa. This committee represents all of the 399 employe representatives in the company's Pittsburgh district plants.

One of the first acts of Mr. Maloy, in company with George A. Patterson, employe representative of the Carnegie-Illinois company's South Chicago plant, was to go to Washington, confer with John L. Lewis, and then protest to Secretary of Labor Perkins against the conditions stipulated in the company's sliding scale wage plan.

Events last week indicated that Lewis is determined to prevent as many employes as possible from signing a wage agreement. He has ordered the CIO to complete its drive for steelworks organization within 90 days.

Some Reserve Action

Some Carnegie-Illinois employe groups in the Pittsburgh district decided to reserve action, and neither rejected nor accepted the plan. Other groups refused outright, and countered with demands for at least 15 per cent, while a third class wanted to accept the raise but did not want to sign an acceptance binding them for a year to the terms of the agreement.

Employes numbering 30,200 at 13 Carnegie-Illinois plants in the Pittsburgh district have approved the offer. At the other plants, Duquesne, Vandergrift and the tin mills at Farrell-Mercer, New Castle, and Shenango, 16,100 men were on record as willing to accept the raise, providing they are not required to sign an agreement. Employes at the Edgar Thomson and Ohio works, numbering 12,000, made no move to accept or reject.

An adjunct of the central committee in the Pittsburgh district is the wage committee which reports direct to the 34-member central committee. Leadership in this group was vested last week in William Garrity of the Edgar Thomson works, who also is openly sympathetic to the CIO.

No sooner had Maloy and Garrity been elected than representatives at the Wood works, at McKeesport, which were first to sign the agreement, broke away from the council, stating they felt the chairmanships were in the hands of parties who were there for the sole purpose of nullifying the council's work.

Practically all steel manufacturers last week had increased wages, and salaries of employes in the lower brackets, 10 per cent, but except the United States Steel Corp. subsidiaries, none had adopted the sliding scale plan of compensation, or asked employes to sign an agreement.

Major George L. Berry, federal industrial co-ordinator, has invited representatives of labor and industry to meet with his council in Washington, Dec. 10 and 11, stating the conference will formulate a program for industrial legislation, looking toward long-time stabilization and recovery.

How Index Figure May Affect Wages

EFFECTIVE today, Nov. 16, for the first time in the history of the steel history, a majority of its wage earners hold the assurance that payrolls are geared closely to living costs.

Even if prices of food, clothing, rent and other items are doubled or tripled in the future, pay envelopes will advance proportionately under the new agreements between the subsidiaries of the United States Steel Corp. and their wage earners.

Here is the plan, in brief:

The index of living costs compiled by the United States bureau of labor statistics is the governing factor. Based on an average of costs in 32 cities in the years 1923-25 as 100, the index stood at 82 July 15.

The newly established wage rates, which are approximately 10 per cent higher than the rates in effect prior to Nov. 16, compensate the employes—in advance—for a 10 per cent increase in the cost of living over the July 15 base. Thus, the index must rise to 90.2, a 10 per cent advance, before the plan becomes operative. If living costs should de-

cline before attainment of the 90.2 level, no downward revisions will be made.

After the index has reached 90.2 wage levels will automatically be increased or decreased 5 per cent for each 5 per cent rise or fall in the cost of living. With the index at 94.7 the new rate of 52½ cents would become 55 cents per hour; at 99.4, the wage scale would be advanced to 57.8 cents an hour: at 104.3 the wage scale would be 60.7 cents an hour.

Provisions for the extension of the one-year plan are included in the agreements.

How this plan would smooth out abrupt changes in wage rates may be seen in a comparison of living costs and pay scales during the last ten years.

If this new plan had become effective in 1926 the rate in December, 1926, when the cost of living index stood at 102.3, would have been 57.3 cents. Actually, at that time it was 44 cents an hour for ten hours or 50 cents an hour for eight hours.

Other Calculated Rates

In October, 1931, the rate for common labor fell to 39 cents an hour. The cost of living index at this time was 86.5. If the plan had been in effect the rate per hour would have been 49 cents.

In August, 1933, the adoption of the NRA code for the steel industry advanced the common labor rate to 40 cents an hour, but if the plan had been in effect since 1926 the rate would have been 42 cents.

The index is constructed by pricing from time to time a list of the goods most important in the spending of families of wage earners and lower-salaried workers. Living costs as of July 15, 1936, were 18 per cent lower than in the base period, 1923-25, according to the index. Average weekly working hours at present are shorter.

A stabilization plan along the same lines was announced about two months ago by the General Electric Co. Effective Oct. 1 a cost of living adjustment of 2 per cent was added to the earnings on the first $3000 per year of all those receiving not more than $4000 per year. Under the General Electric plan, however, pay increases will be made only up to a maximum of 10 per cent above the level when the plan was adopted and when this point is reached the company again will give consideration to the question.

More Wage Increases And Christmas Bonuses

United Engineering & Foundry Co., Pittsburgh, has raised wages of its employes 11 per cent, retroactive to Nov. 1.

Timken Roller Bearing Co., Canton, O., increased wages effective Nov. 16, though the new rates have not been announced.

Cutler-Hammer Inc., manufacturer of electric control equipment, will distribute $225,000 among 2750 employes in Milwaukee and New York plants, Dec. 10, as a Christmas bonus.

Black & Decker Mfg. Co., Towson, Md., will pay a Christmas bonus Dec. 1 in the form of two weeks' extra salary or wages to its employes.

Stearns Magnetic Mfg. Co., Milwaukee, has announced a 5 per cent bonus for all employes, based on their earnings between Oct. 1, 1935, and Sept. 30 this year.

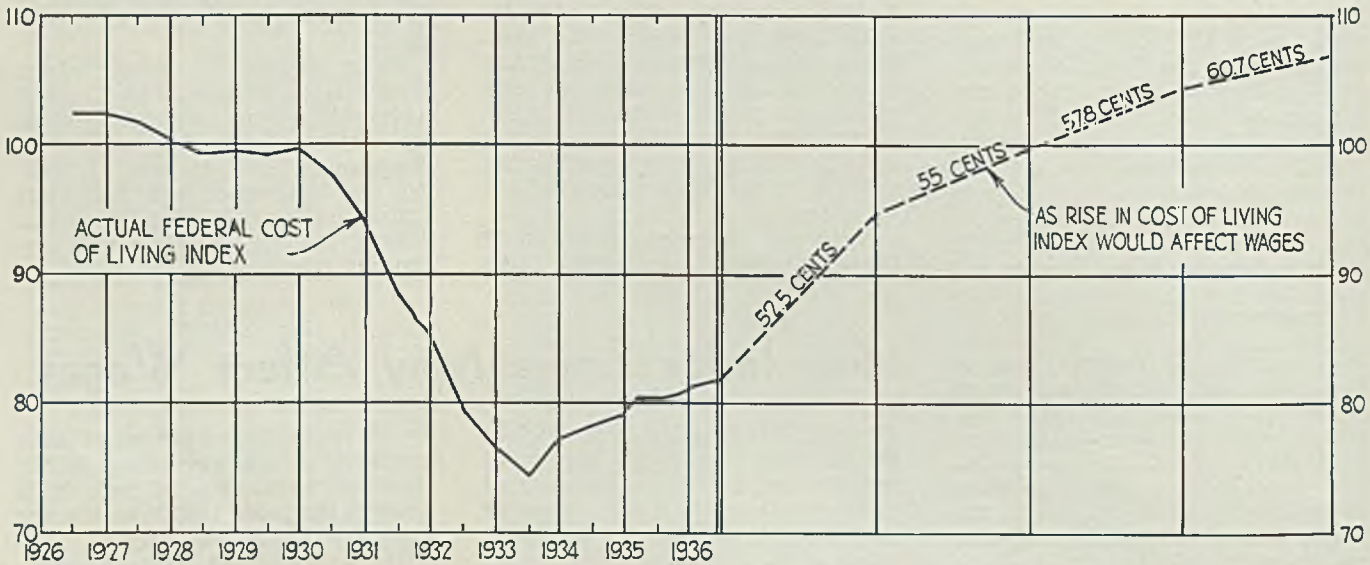
Manufacturing Income Largest of Nation's Total

From 20 to 25 per cent of the total national income is derived from manufacturing, constituting the largest industrial source, according to the National Industrial Conference board, New York. In 1935 the receipts from manufacturing in salaries, wages, dividends, interest and other payments amounted to $12,000,000,000; in 1929 a little over $18,000.000.000. Indications point to a substantial gain this year as compared with 1935.

Salaries and wages contributed by the manufacturing industry accounts for 80 to 85 per cent of its total, and dividends are the second largest type of payment, equaling 12 to 15 per cent of the total.

Index of Machine Tool Orders Shows Increase

The National Machine Tool Builders association's index of machine tool orders advanced 15 per cent, from 118.5 for September to 136.5 for October, due to a return of do-



DOTTED line at right of chart illustrates how advances in the cost of living would automatically raise the pay for common labor under the new wage plan of United States Steel Corp. subsidiaries. The cost of living index of the bureau of labor statistics (which stood at 82 last July 15 and is slightly higher today) is the governing factor. For example, if this index should rise to 95 the pay scale would increase from 52½ cents an hour to 55 cents. The employes at present are compensated in advance for a 10 per cent rise in the cost of living over the July 15 base. Thus, the plan does not become operative until the index reaches 90.2 and from then on each 5 per cent increase or decrease in the cost of living will be matched by a 5 per cent increase or decrease in the wage rate. Actual changes in the cost of living during the last ten years, as determined by the bureau of labor statistics, are shown at the left.

mestic demand to the levels of the summer months. Foreign orders declined from September, but still represent 23 per cent of the total orders placed.

More than half the member companies report bookings for October equal to or better than their 1926 average monthly shipments, the 100 per cent point on the index scale. The distribution of orders through the industry was the best on record.

Improving business for the whole group of the metalworking industries is seen in the present trend by the association.

Gray Iron Founders Amend Membership Rules

Directors of the Gray Iron Founders' society, Cleveland, have amended their by-laws creating a special membership with fixed dues for manufacturers' foundries, so that the entire industry may be represented in the society, instead of merely the jobbing foundries as heretofore. The membership dues for the manufacturers will remain on a fixed basis, unless they later go into the jobbing business.

Certain limitations on the powers of the directorate also have been approved, to safeguard interests of all members not represented on the board. Directors may now reduce dues but may not increase them except as approved by a vote of the members. Under the new setup, also, members may initiate changes in the by-laws of the society.

Carnegie Fund To Aid Status of Engineers

Trustees of the Carnegie Corp. of New York have appropriated $16,000 to the Carnegie Foundation for the Advancement of Teaching, the money to be used toward support of the program of the Engineers' Council for Professional Development during the period Oct. 1, 1936, to Sept. 30, 1937.

With an appropriation of $3450 from the Engineering Foundation and office rent in the Engineering Societies building, New York, contributed by three of the participating societies, namely, American Society of Mechanical Engineers, American Society of Civil Engineers and American Institute of Electrical Engineers, the council has a total fund of over $21,000, of which $19,450 will be applied directly to the program for enhancing the professional status of the engineer through co-operative support of national organizations directly representing the professional, technical and legislative phases of the engineer's life.

Steel Output Exceeds 1930, But Profits Are Much Less

INTEGRATED steel companies representing 90 per cent of the nation's ingot capacity show net earnings of $85,445,054 in the first nine months of 1936. On this basis the calculated total of earnings for the industry for nine months is $94,938,800, nearly two times total earnings of $49,725,600 for the industry in the full year 1935.

Nine months' financial reports of ten of the leading producers, accounting for 81 per cent of the nation's ingot capacity, were published in STEEL Nov. 2, page 22. Reports from the remainder of the 90 per cent have accumulated recently, and are listed in the table on page 26.

Earnings Best Since 1930

This year is the best since 1930 from the earnings standpoint, but in view of the close similarity between the two years' operations it is noteworthy that indicated net earnings of $125,000,000 for the full year 1936 for 100 per cent of the industry would be $60,926,500 less than the total earnings of $185,926,500 for the industry in 1930.

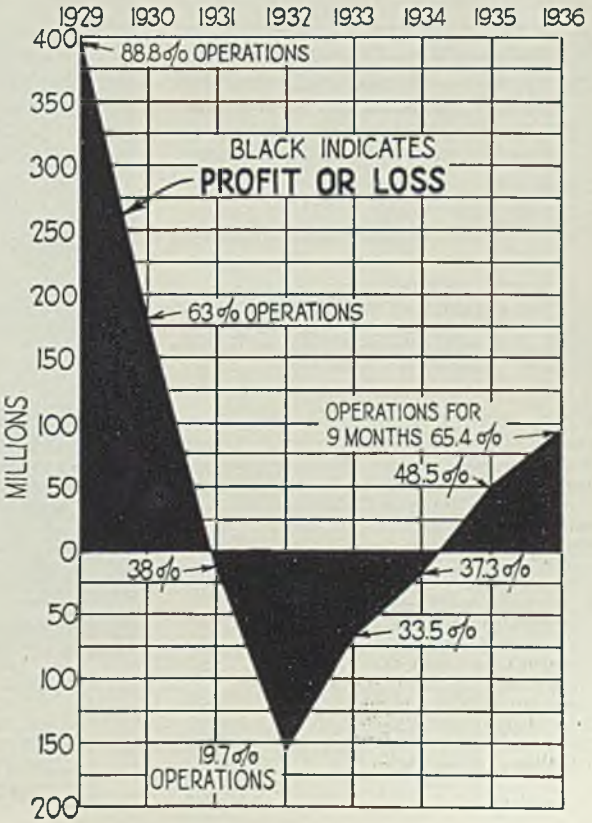
This is despite the fact that operations this year have been slightly ahead of 1930—averaging 65.44 per cent in the nine months of 1936, compared to 63.09 per cent for the full year 1930. Finished steel prices, too, have been higher than in 1930. STEEL's index shows that in 1930 finished steel prices averaged $52.31, compared to $53.01 this year.

Taxes Will Be Higher

In view of the recent pay advances it is likely that salaries and wages this year will be close to the total amount paid out in 1930. Freight rates in general are slightly higher today than they were in 1930. Taxes in the current year should be much higher than they were in 1930, when total taxes of the iron and steel industry amounted to $77,746,189. According to the American Iron and Steel institute, the industry paid $42,118,341 taxes in the first half of this year. The surplus profits tax will add to the burden.

Indicated net earnings for 100 per cent of the industry in 1929 were $396,966,800. In 1931 a deficit of $17,611,000 was incurred; in 1932 the deficit was $156,252,400; in 1933,

Steel's Operating Rates Compared with Profit and Loss



ALTHOUGH operations this year are slightly higher than in 1930, earnings in 1936 are lagging behind 1930. The chart shows estimated net earnings for 100 per cent of the nation's integrated steel producers, beginning with 1929, when earnings totaled $396,966,800, and ending with nine months of 1936, when the entire industry is estimated to have earned $94,938,800. Comparative operating rates are indicated

$69,581,400, and in 1934 the deficit was $17,654,400.

DIVIDENDS DECLARED

American Steel Foundries, Chicago, have declared a common dividend of $1, payable Dec. 15 to record of Nov. 30. The company also declared all back dividends on preferred, amounting to $17.50 a share, and a regular quarterly dividend of $1.75 on preferred. The common dividend is the first since 1931.

Harbison-Walker Refractories Co., Pittsburgh, has declared an extra dividend of 50 cents and a quarterly dividend of a like amount on common, and a regular dividend of $1.50 on preferred, the common dividends payable Dec. 1 to record Nov. 16 and the preferred payable Jan. 20 to record Jan. 7.

Directors of Consolidated Steel Corp., Los Angeles, declared a dividend of 60 cents on account of accruals against the preferred stock, reducing the arrearage to $6.67½ a share. This is the second dividend of 60 cents declared by the corporation this year. Cumulative feature of the preferred stock was discontinued last year. The 60 cent payment is payable Nov. 20 to stockholders of record Nov. 5.

EARNINGS STATEMENTS

Consumers Steel Products Co., Detroit, reports net profit of $57,617 for the fiscal year ended Sept. 30, equal to 25 cents a common share. No comparison with the previous fiscal year is reported.

Allegheny Steel Co., Brackenridge, Pa., reports net earnings of $349,276 for the third quarter, equal to 39 cents a common share, compared with net earnings of $246,009, or 31 cents a share, for the third quarter of 1935. The company declared a dividend of 50 cents on the common stock, payable Dec. 10 to Dec. 1 record, compared with disbursement of 25 cents regularly and 15 cents extra in the second quarter.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., reports net of $3,185,728, or $1.20 a share on the combined preferred and common stocks, for the third quarter; compared with net of $4,205,524, or $1.58 a share in the preceding quarter and $2,557,452 in the third quarter 1935.

Timken Roller Bearing Co., Canton, O., reports net profit of $2,029,773, or 84 cents a share, for the third quarter. This compares with $2,538,139 in the preceding quarter and $1,297,857 in the September quarter last year. For nine months ended Sept. 30, net income was $6,630,768; for same period last year net profits were $5,820,136. The company declared an extra dividend of 75 cents and a quarterly dividend of 75 cents. Both are payable Dec. 5 to holders of record Nov. 18.

Black & Decker Mfg. Co., Towson, Md., for the fiscal year ended Sept. 30, has consolidated net earnings of $898,240, compared with $486,083 for the previous fiscal year.

Building Executive Sees Great Expansion for 1937

George A. Bryant, executive vice president of the Austin Co., industrial engineer and builder, Cleveland, sees a building boom for 1937. Following a three-day conference of the company's sales engineers he expressed the belief that the record of 1936 will be doubled in industrial construction. The present situation shows that industry is progressing from the modernization stage to a period of plant expansion.

Growing business volume, says Mr. Bryant, is making inadequacy of present facilities apparent in every field. Consumer goods industries have been increasing capacities and now machinery and heavy equipment builders are in the market.

Fleet Is Organized To Handle Great Lakes Scrap

Marine Iron & Shipbuilding Co., Duluth, plans to put in operation next year a new fleet of lake vessels. Five barges recently purchased from the Pittsburgh Steamship Co., subsidiary of the United States Steel Corp., have been taken to Duluth for reconditioning, for use in the scrap iron and steel and pulpwood trade. Options also have been obtained on three steamers and a tug

Shipments of scrap from Duluth and Superior, Wis., for the first nine months this year totaled 216,000 tons, compared with 230,000 in all of 1935. Before the season closes probably 300,000 tons will be dispatched.

P.W.A. Iron and Steel Purchases $336,800,000

Of more than $3,000,000,000 spent from July, 1933, to June, 1936, by the public works administration a total of $1,288,754,991 went for the purchase of all types of materials used in construction, the administration reports. Iron and steel and their products, not including machinery, accounted for $336,814,082, of which $123,344,276 was for structural and reinforcing steel.

Machinery, not including transportation equipment, was purchased to the extent of $236,739,241. Motor trucks accounted for $9,248,674, and freight cars totaled $38,838,936. Expenditures for nonferrous metals and their products came to $7,175,875.

Financial Returns for Producers with 90 Per Cent of Total Ingot Capacity

NOTE: The following table summarizes financial reports from 17 producers with 90 per cent of the nation's ingot capacity, and net earnings of $85,150,394 in the first nine months of 1936. The original table which appeared in STEEL, Nov. 2, page 22, showed returns for the first ten producers to report, these ten representing a total ingot capacity of 81 per cent. All figures are profits, except where asterisk denotes deficit.

	Third quarter 1936	Second quarter 1936	Third quarter 1935	Nine months 1936	Nine months 1935	Ingot capacity gross tons
United States Steel Corp.	$13,636,177	$12,862,423	$1,305,205*	$29,901,904	$4,241,499*	26,657,000
Republic Steel Corp.	3,311,555	2,661,062	507,731	6,633,649	3,264,295	6,053,000
Jones & Laughlin Steel Corp.	1,870,866	1,115,738	233,914	2,053,320	516,463*	3,660,000
Youngstown Sheet & Tube Co.	2,359,998	2,588,089	574,799	6,845,386	103,788	3,120,000
Inland Steel Co.	3,788,199	3,298,191	1,801,203	9,021,022	6,668,509	2,000,000
Sharon Steel Corp.	342,418	268,335	.....	823,370	.....	450,000
Ludlum Steel Co.	270,968	271,369	11,947	705,350	447,482	38,000
Wheeling Steel Corp.	1,186,660	871,288	648,597	2,068,859	2,251,468	1,750,000
Bethlehem Steel Corp.	4,575,058	3,431,391	701,616	8,609,514	1,895,227	9,360,000
National Steel Corp.	3,359,704	2,805,570	2,287,763	8,542,418	8,603,758	2,700,000
Otis Steel Co.	495,109	751,674	27,367*	1,395,459	1,360,488	828,000
Granite City Steel Co.	84,633	44,226	102,824	190,076	415,198	400,000
American Rolling Mill Co.	2,063,603	1,561,161	552,137	4,368,668	3,011,140	2,431,720
Continental Steel Corp.	71,842	238,339	.....	364,524	.....	280,000
Gulf States Steel Co.	201,314	110,544	58,433	408,788	21,919	480,000
Colorado Fuel & Iron Corp.	338,658	856,114	10,235	1,921,042	109,252	888,000
Allegheny Steel Co.	349,276	610,805	246,009	1,297,045	746,746	476,000
Totals	$38,306,038	$34,346,319	$6,404,636	$85,150,394	$24,141,308	61,571,720

Managers Discuss Marketing Problem

THE Robinson-Patman act, and the training of sales organizations, were the chief subjects of discussion at the marketing conferences of the American Management association in the Pennsylvania hotel, New York, Nov. 12-13.

Discussion of the Robinson-Patman act related to price structures, trade allowances, standardization of products and cost accounting. Dr. Willard L. Thorpe, director, economic research, Dun & Bradstreet Inc., New York, declared that the immediate impact of the law falls upon the price structure, and that the behavior which it condemns is in the field of individual pricing policy. He thought the act will give considerable interest to price publicity and that the wise seller will move in the direction of published prices, either individually or as part of a price-filing plan. A publicly announced price structure, he said, will be a strong weapon of defense for the company endeavoring to meet requirements.

Further indicative of the character of discussions were such subjects as marginal balances, effective sales tools, profits from practical marketing research and basic problems of sales administration. Consumer co-operatives were the subject of papers by two speakers who touched on such points as the growth of the co-operative movement in Europe, what factors favor the growth of co-operatives here and what factors oppose it, how many co-operatives there are in this country and in what lines of business, measures enabling co-operatives to attract and hold men of high managerial ability.

Russia Moves To Double Automobile Production

Automobile and truck production capacity in Soviet Russia is to be doubled within the next year or two, according to Stanley Shaw, Michigan Tool Co., Detroit, recently returned from three months study of the Russian situation. Plans are under way for daily production of 500 passenger cars and 1000 trucks of 1½ tons capacity.

Intensive industrial education and abandonment of the hourly wage in favor of the merit system are prime factors in efficiency of automotive workers. The latter development is of interest in view of opposition to the merit system by labor leaders in the United States. Automobile plants are being equipped with the finest machine tools available, largely from the United States.

American Rolling Mill's Open House Attended by 24,000

OPEN house activities at the Middletown, O., and Ashland, Ky., plants of the American Rolling Mill Co. recently were attended by more than 24,000 persons. Foremen and employe representatives played hosts and also arranged the exhibits. The course through the plant was marked by arrows. Officers and guides explained the operations. Picture was taken in the Ashland plant

Armco To Build $260,000 "Lab"

CONSTRUCTION of a modern research laboratory to replace the research building which was leveled by an explosion in December, 1935, is announced by American Rolling Mill Co.

This building, to be erected in Middletown, O., of porcelain enameled sheets, other decorative metal products, and glass blocks, will cost approximately $260,000, exclusive of equipment. A multiple-story building of equal floor space but of conventional construction, would cost about $400,000, the announcement said.

The laboratory, a single-story building designed and to be erected by the Austin Co., Cleveland, is the outgrowth of extensive research which led to the use of sheet iron and steel as building materials.

"This building," Charles R. Hook, president of American Rolling Mill Co., said, "will demonstrate the full force which low-price sheet and strip steel can exert in reviving construction activities. It is only fitting that research men who will lead the way to progress and a higher living standard for the future should themselves be housed in a building applying the latest results of their research."

Stainless Steel for Trim

Six hundred lineal feet of porcelain enamel side wall, cream colored with contrasting decorative pilasters and bands of stainless steel, will enclose three street sides. Between the pilasters there will be broad areas of glass block in which horizontal steel sash with clear glass will be set to accentuate the sweep of the building which describes impressive arcs where corners ought to be.

A massive square central entrance tower will dominate the principal facade. Vertical shafts of glass block, recessed between narrow strips of porcelain, will extend upward for its full two-story height from a semicircular marquise of stainless steel at the portal.

Welded steel frame construction of a special new design will be employed. The building will provide an area of 41,900 square feet on one floor and an additional 1600 square feet for use in X-ray testing and other research in the square entrance tower. There will be more than 100 individual offices, laboratories and conference rooms. The entire building is being equipped for summer and winter air conditioning.

Men of Industry

THOMAS J. McLOUGHLIN, formerly assistant to W. C. Oberg as manager of operations for the Pittsburgh district of Carnegie-Illinois Steel Corp., has been appointed assistant to J. E. Lose, vice president in charge of all operations. Mr. McLoughlin, graduate of Stevens Institute of Technology, became identified with the company at the Duquesne works in 1913 as engineer apprentice. Subsequently he was fuel engineer at the Duquesne works from 1924 to January, 1936. He is a member of the American Iron and Steel institute and a director of the Engineers' Society of Western Pennsylvania.

♦ ♦ ♦

Conner H. Overland has been appointed assistant superintendent, Texas warehouse, Houston, Tex., for the Carnegie-Illinois Steel Corp., Pittsburgh, succeeding Evan Jones, deceased.

♦ ♦ ♦

Charles Brechemin, vice president in charge of sales, McKeesport Tin Plate Co., McKeesport, Pa., and S. L. Buschman will be named directors of McKeesport Tin Plate upon completion of the merger with National Can Co.

♦ ♦ ♦

Irving L. Kordenbrock has joined the fan sales staff, Emerson Electric Mfg. Co., St. Louis, maker of motors, fans and appliances. He formerly was manager of the electrical appliance department, Famous Barr Co., St. Louis.

♦ ♦ ♦

D. R. Donaldson, previously associated with Murray Body Corp., Detroit, has been named factory manager, Covered Wagon Co., Detroit. He has been associated with the latter company for the past year.

♦ ♦ ♦

Herman Menck, for the past year and a half assistant works manager, Harnischfeger Corp., Milwaukee, has been appointed works manager to succeed H. H. Erklenz, who has been promoted to manager of engineering and works.

♦ ♦ ♦

Charles O'Brien, formerly general manager of the Cleveland branch, Crane Co., Chicago, has returned to the company's Chicago offices. W. K. Glen has been named his successor at Cleveland. Mr. Glen has been associated with Crane Co. since 1904.

♦ ♦ ♦

E. Q. Parker, purchasing agent, Yuba Mfg. Co., San Francisco, has returned to the Pacific coast after having spent some time in the East, where he recently placed a steel hull for a gold mining dredge for shipment to Colombia, South America, with the Lancaster Iron Works Inc., Lancaster, Pa.

Thomas J. McLoughlin

♦ ♦ ♦

Frederick E. Warr has been appointed chief of the safety bureau in the Pittsburgh district for Carnegie-Illinois Steel Corp. He has been in the employ of Carnegie organization since 1903, and held various positions in the order department prior to his identification with the company's safety department in 1928.

♦ ♦ ♦

A. U. Steenrod has been appointed manager Canton, O., plant of the Milcor Steel Co., Milwaukee, effective immediately. For seven years Mr. Steenrod was in charge of Milcor's Chicago plant, having joined the company in the fall of 1929. He had been in the steel building material business for many years previous to his connection with Milcor.

♦ ♦ ♦

Charles B. Roberts III, has been named reorganization manager under the bondholders' committee plan of reorganization for Follansbee Bros. Co., Pittsburgh.

Ernest E. Swartswelter, a partner in the New York stock exchange firm of Soucy, Swartswelter & Co., and J. R. Kraus, chairman of the board of the First Cleveland Corp., Cleveland, have been named associate reorganization managers.

♦ ♦ ♦

Harold Byron Smith has been elected president, Illinois Tool Works, Chicago, to succeed his father, the late Harold C. Smith. Calmer L. Johnson, secretary of the company, has been elected to fill the office of treasurer, which had also been vacated by the death of Mr. Smith. Directors of the company are Frank W. England, Carl G. Olson, Harold Byron Smith, Solomon A. Smith and Walter Byron Smith

♦ ♦ ♦

John C. Bryan has joined the staff of Foster D. Snell Inc., chemist, Brooklyn, N. Y.

♦ ♦ ♦

James O. Matthews has resigned as assistant purchasing director, Reo Motor Car Co., and after a two months' vacation will become identified with a Detroit firm.

♦ ♦ ♦

Paul S. Lane, chief metallurgist of the American Hammered Piston Ring Co., Baltimore, division of Koppers Co., has been appointed metallurgical research engineer.

♦ ♦ ♦

John F. Miller, president, Pittsburgh Coke & Iron Co., and a director of Westinghouse Air Brake Co., Pittsburgh Screw & Bolt Corp., and Canadian Westinghouse Co., has been named chairman of the board of the newly consolidated Pennsylvania-Central Airlines Corp., Pittsburgh.

♦ ♦ ♦

George L. Knight, vice president in charge of mechanical operations of the Brooklyn Edison Co. Inc., Brooklyn, N. Y., has been re-elected president of United Engineering Trustees Inc., New York, joint agency of the four founder engineering societies. Otis E. Hovey, consulting engineer, New York, and D. Robert Yarnall, chief engineer, Yarnall-Waring Co., Philadelphia, have been named vice presidents.

The following trustees were chosen: Henry A. Lardner, J. G. White Engineering Corp.; John P. Hogan, of Parsons, Klapp, Brinckerhoff & Douglas, New York; H. R. Woodrow, Brooklyn Edison Co., and Mr. Yarnall.

♦ ♦ ♦

Wayland S. Bowser has been named manager of the recently consolidated bureaus of sales statistics for the Chicago and Pittsburgh district of Carneg'e-Illinois Steel Corp. He was formerly supervisor of office methods of the industrial engineering department.

Elmer E. Erickson, formerly manager of the bureau of sales statistics in the Chicago district, has been named Mr. Bowser's assistant. R. L. Twitchell has been appointed sales statistician, and L. E. Grubbs, chief clerk.

Died:

RICHARD M. DORSEY, 70, one-time president of M. H. Treadwell Co. Inc., manufacturing engineer, New York, with plants at Midland, Pa., and Easton, Pa., in

New York, recently. Mr. Dorsey joined the Treadwell organization in 1901 and 20 years later was elected president, in which position he served until January, 1935, when he retired due to poor health.

♦ ♦ ♦

Timothy J. Donahoe, prominent metallurgist and chemist, at his home in Roselle, N. J., Nov. 6.

♦ ♦ ♦

Charles D. Shaw, 61, sales manager, Carborundum Co., Niagara Falls, N. Y., in Niagara Falls, Nov. 7.

♦ ♦ ♦

Henry B. Joy, 72, one of the founders, Packard Motor Car Co., Detroit, in that city, Nov. 6.

♦ ♦ ♦

Charles Davis, 73, prominent in the scrap iron industry in Pittsburgh for a number of years, at Pittsburgh, Nov. 1.

♦ ♦ ♦

Roy E. Cartzdafner, for many years chief engineer, Magor Car Corp., Passaic, N. J., in that city, Nov. 12.

♦ ♦ ♦

Buckner Q. Wallingford, 67, proprietor, Walter Wallingford & Co., pig iron merchant, Cincinnati, in that city, Nov. 12.

♦ ♦ ♦

Louis C. Nichols, 59, chief engineer, transformer section of the electrical division, Allis-Chalmers Mfg. Co., Milwaukee, in that city Nov. 3.

♦ ♦ ♦

Charles A. Dietz, 57, founder, Admak Mfg. Corp., Irvington, N. J., manufacturer of metal stampings and radio tube parts, in that city, Nov. 9.

♦ ♦ ♦

Benjamin Hand Scranton, 80, chairman of the board, American Electrical Heater Co., Detroit, maker of electrical appliances, in Scarsdale, N. Y., Nov. 8. Mr. Scranton founded the American company and was its president until 1920, when he became chairman. He was a member of the Electrical Manufacturers club and Engineers Club of New York.

Clear Plant for Supper To Honor P. C. Patterson

National Tube Co. officials cleared out a large portion of the foundry building and moved over 40 carloads of pipe at the McKeesport, Pa., works recently to make room for a buffet supper for 3000 employes, to honor P. C. Patterson, who retired recently as operating vice president of the company after 50 years of service.

Officials and department heads presented him with a silver loving cup at the Duquesne club.

Mr. Patterson's successor was announced several months ago. He is C. R. Cox, formerly in charge of the Elwood works of the company.

District Steel Rates

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Nov. 14	Change	Same week 1935	1934
Pittsburgh ..	68	— 2	44	21
Chicago	76	None	57	31
Eastern Pa...	47½	None	39	20
Youngstown..	70	— 4	53	31
Wheeling	92	+ 3	84	54
Cleveland ...	80½	+ 1	77	38
Buffalo	84	None	37	24
Birmingham..	74	+ 7	58	25
New England	73	—15	93	40
Detroit	100	None	88	48
Cincinnati ...	96	+ 5	†	†
Colorado	38	None	†	†
St. Louis.....	68	+ 3	†	†
Average....	74	+ 1	52	28

†Not reported.

Production

STEELMAKING stepped up 1 point to 74 last week, reflecting heavier demand from consumers who are covering for first quarter requirements in expectation of an early rise in prices. This is the best rate for the second week in November since 1928. Details follow:

Cleveland-Lorain—Up 1 point to 80½ per cent, as Corrigan, McKinney division of Republic Steel Corp. operated 12 open hearths the first part of the week and 13 the latter.

Youngstown — Off 4 points to 70 per cent, as Carnegie-Illinois Steel Corp. suspended operations at its Farrell plant for 48 hours to permit installation of new slab conveying equipment. The plant will resume Monday, with eight open hearths, and preliminary schedules indicate operations will be up 3 or 4 points this week.

Chicago—Held at 76 per cent for the third consecutive week. The outlook is for only minor changes during the balance of November. While one steelworks blast furnace has been closed, another has been lighted, leaving 25 of the district's 38 stacks active.

Detroit—Unchanged at 100 per cent, with all 21 basic open-hearths melting.

Wheeling—Up 3 points to 92 per cent, with 34 out of 37 open-hearth furnaces in four district plants producing.

Pittsburgh—Down 2 points to 68 per cent, calculated on a 64 per cent rate for United States Steel Corp. subsidiaries, and 77-78 per cent for independents. Forty-three out of 60 blast furnaces are active, a gain of one, due to Bethlehem Steel Co. lighting a seventh blast furnace at Johnstown, Pa. Carnegie-Illinois has 18 of 32 stacks on; Jones & Laughlin, all 11; National Tube, 3 of 4; American Steel & Wire, 1 of 2; Pittsburgh Steel, 2 of 2, and Pittsburgh Crucible Steel, 1 of 2. This week it is expected that Pittsburgh Crucible will blow in its second Midland, Pa., blast furnace.

Buffalo—Continued at 84 per cent. Thirty-one open hearths are in production.

Cincinnati—Rose to 96 per cent, after a slight dip to make repairs. Twenty-three open hearths are active, and backlogs assure little change before the holidays.

Central eastern seaboard—Unchanged at 47 to 48 per cent, although an improvement may come before Dec. 31, in view of protective covering which should develop in anticipation of higher first quarter prices likely to be announced within the next two or three weeks.

Birmingham—Increased 7 points to 74 per cent. Sixteen open hearths are on active schedule, in addition to the rail mill of the Tennessee Coal, Iron & Railroad Co.

Colorado—Remained at 38 per cent, with six furnaces operating.

St. Louis—Stepped up to 68 per cent, a gain of 3 points.

New England—Off 15 points to 73 per cent, and this rate will probably hold this week.

U. S. STEEL CORP. SHIPMENTS

(Inter-company shipments not included)

(Tons)

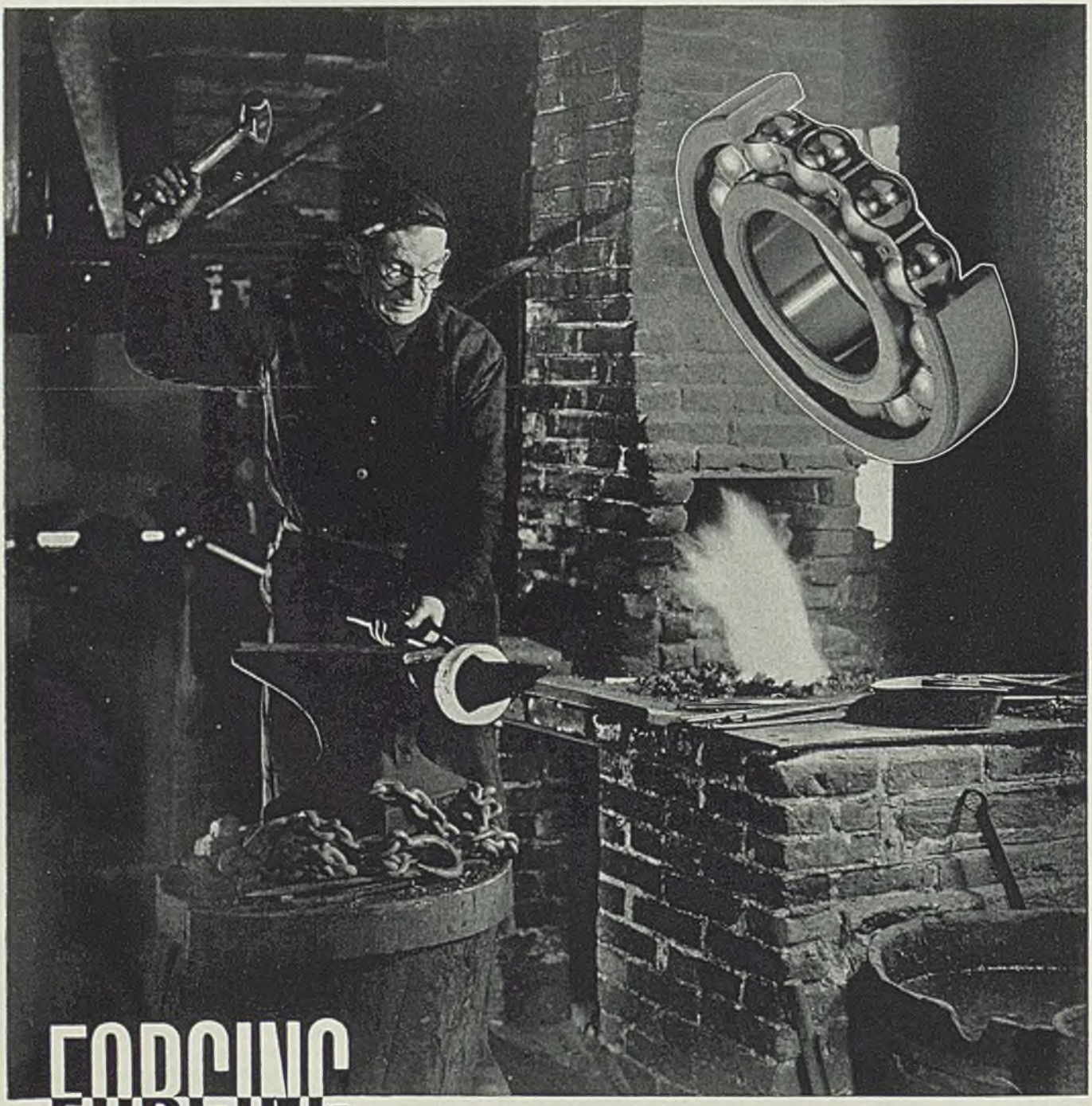
	1936	1935	1934	1933
Jan.	721,414	534,055	331,777	285,138
Feb.	676,315	583,137	385,500	275,929
Mar.	783,552	668,056	588,209	256,793
April	979,907	591,728	643,009	335,321
May	984,097	598,915	745,063	455,302
June	886,065	578,108	985,337	603,937
July	950,851	547,794	369,938	701,322
Aug.	923,703	624,497	378,023	668,155
Sept.	961,803	614,933	370,306	575,161
Oct.	1,007,417	686,741	343,962	572,897
10 mo.	8,875,124	6,027,964	5,141,574	4,729,955
Nov.		681,820	366,119	430,358
Dec.		661,515	418,630	600,630
Yearly adj....		†23,750	†19,907	*44,283
Total		7,347,549	5,905,966	5,805,235

*Addition. †Deduction.

STEEL CORP. SHIPMENTS GAIN

Finished steel shipments by the United States Steel Corp. in October were 1,007,417 tons, a gain of 45,614 tons over September. This is the best October since 1929 and the best month since May, 1930. Average daily shipments in October were 37,312 tons for 27 working days and in September 36.992 tons for 26 working days. The peak for daily shipments since 1930 was in May, 1936, at 39.374 tons for 25 working days. For ten months this year average daily shipments of the Corporation were 10.810 tons larger than for the corresponding period of 1935.

. . . Since The Days Of The Village Smithy



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NEW DEPARTURE

THE *FORGED STEEL* BEARING

MIRRORS of MOTORDOM

DETROIT

THEIR advance work completed, motordom's executives temporarily established themselves in New York last week for the "biggest and best" exhibition in the history of their industry. "Pacemaker in American history" was the slogan the show capitalized upon.

This pilgrimage was reminiscent of postmen indulging in a long walk on Sunday, but actually the annual curtain drawing deserves a far less superficial comparison.

Engineering on 1937 models has been completed, of course. Production has been given its start. But sales efforts—and therein the shows connote a beginning point—are just getting under way.

All the optimism so frequently looked for as coming from the automobile industry was in evidence. Armed, in the sense that their pockets were stuffed with heavy advance orders, leaders freely predicted a 5,000,000-car year in 1937.

Perhaps the biggest factors leading them to this prediction are the individual lots sold by those makers who predated the shows by a month or so in their 1937 announcements.

One has only to look at the magnitude of order blanks held by Packard, Buick and Hudson to see which way the wind will blow. A repetition, shared in a proportionate manner by the later announcers, including volume producers like Chevrolet, Ford and Plymouth, presages a highly favorable market ahead.

Production Rate Strong

In Detroit, production has snapped back to the 100,000-per week clip, paced by a strong rate from the various Chevrolet assembly plants now totaling 5000 a day for five days a week, or a full quarter of the industry's total.

In second place, Ford last week was picking up ground fast and made more than 12,000 models, anticipatory to a general showing by dealers this week. And, true to form with 1936's win-place-and-show, Plymouth at 11,400 assemblies last week held its money position.

Further down the scale there is considerable jockeying for position.

General Motors' position at lead-off is not under challenge, but Ford's second place is being crowded closely by Chrysler and the race for fourth position apparently is wide-open between Packard and Hudson.

It is safer to consider the near future, however. A week ago 7000 Ford dealers who were being entertained at a cost of $250,000 here in Detroit, obtained the idea that Ford would make and sell better than 1,200,000 cars in 1937, which is more evidence that 1937's race will be a close one, on which no conclusions can be drawn at this time.

Chevrolet reports orders at hand for immediate delivery of 125,000 new models. According to present assemblies this means five full weeks' production, but it must be explained that production is designed to be very close to a temporary peak.

Schedule Is Held Down

Since a falling-off two or three months after model debut is to be avoided, Chevrolet has refrained from going to a 6000-unit day, a schedule it could easily put in now. Observers will recall the slump of February, 1936. To the end that a repetition is undesirable, production is to be geared more closely with sales.

For that reason, plus the fact that storage space is at a premium, Chevrolet assembly lines are only two weeks ahead of their tributary parts plants at present. Running on the same policy, Chevrolet plants have only around two weeks' steel supply on hand, but they are obligated on orders for steel for 500,000 complete assemblies.

Ford apparently has not quite so level a keel. Inventories on many parts are heavily stocked to the comparative disadvantage of some key parts. This latter constitutes the only reason that Ford's assemblies are not nearer the Chevrolet total, at a time when it is imperative to have the field stocked. Ford, too, has been short of steel and is an active buyer of semifinished in the billet and sheet bar markets.

The new Ford commercials for 1937 will come on either a 131½ or 157-inch wheelbase and with the choice of either a 60 or 85-horsepower motor. Axle ratios and transmissions are also optional. The hood lift, differing from Ford passenger cars, still operates in the former conventional manner.

Now that Chevrolet has cleared up its fender trouble at Flint, only Olds at Lansing has any major manufacturing difficulties. The Olds troubles have centered on smoothing out various machining operations on the motor block.

A number of new machine tools were bought early this year and installed recently. By late last week, the date of Nov. 17 was mentioned as the time when machining troubles would be entirely eradicated.

A fund of $2,000,000 is now being spent by Packard for new machinery and a new drop forge department that will iron out bottlenecks within the plant. Even though a new foundry was installed this year and $5,120,000 spent for 1937 expansion, the Packard order backlog shows signs of unwieldiness.

As they contribute to assemblies, certain manufacturing departments have been running three shifts, six days a week, but other departments have been cut down to a single shift on a five-day week with the result that some parts production has been on a disproportionate footing.

Claiming unfilled orders of 16,000 cars, Packard has set up November assemblies for 11,000 and, again in round figures, 12,000 for December. Both will establish new high marks for Packard.

Packard Plant Is Busy

On a daily basis, as high as 450 finished jobs are coming out, but due to bottlenecks some days show a total of 50 to 75 cars less. Taking a representative day of 450, the splitup finds 250 sixes, around 225 "120's," and the small balance made up of large eights and twelves.

Comparisons may be invidious, but the record shows that before Packard left the lofty heights where automobile prices are high and orders scarce, the best month was around 5800, in the palmy days of August, 1929.

Because they are both "independents," because they are near the same size, and because they are both hot in pursuit of the same

Mirrors of Motordom

sized pocketbook, nearby Hudson watches closely on each Packard statement backing up a lusty growth.

At this writing Hudson has in hand some 40,000 orders from the field for 1937 models and has moved up to approximately 700 assemblies daily, compared with 600 a week or two back. On the face of it, the Hudson position by comparison with competitor Packard seems unassailable, but no one takes anything for granted in motordom.

Detroit often hears these days that when the Packard six's success seems assured a further model integration would be far from unreasonable. Proceeding on the valid assumption that nothing is static, the much-cherished cognomen of "leading independent" seems indeed a worthy slogan to corral.

There have been two cases here of parts plants' expansion programs that were shelved temporarily as a result of the Nov. 3 balloting, but in their stead are more than a few resulting from downright necessity.

One large expansion plan will make headlines shortly. An established Toledo, O., partsmaker considered locations in Adrian and Hillsdale, Mich., has decided on the latter, and has begun ordering a wide range of heavy machine tools.

Whether headquarters eventually will be moved to Hillsdale remains to be seen. This particular concern within the past few years gave up a plant operated near Greater New York and may, because of threatened labor troubles, come to establish itself entirely closer to Detroit.

Speaking of labor troubles in Toledo, Chevrolet's transmission plant there has never forgiven the hamstringing it received at the hands of strikers two years ago. The division was never abandoned outright, but now is being used mostly for a parts' storage depot.

Other expansion plans include the new $1,000,000 foundry Motor Wheel Co. is about to build at Lansing, which wil be equipped and operated by Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and ostensibly used to make centrifuse brake drums.

Long Mfg. Co., division of Borg-Warner Corp., has moved into a new plant on Dequindre street, Detroit, and now is set up to make 12,000 clutches and 3600 radiators in a 24-hour day.

Or consider the new Sleeper Coach Co., temporarily using Dow Chemical's Bay City, Mich., plant to manufacture sleeper coaches, each equipped with six upper and lower berths. Or, the report that Goodyear last week took over a Jackson, Mich., plant and will operate it as a tiremaking unit. Not to forget the previous report on Packard's $2,000,000 bill, largely for a new drop-forging shop.

For the machine tool and equipment builders the most likely prospects right now are the tool plants, the die shops and the small forge and stamping shops. Where most of the large programs of General Motors units, Chrysler and Ford have been completed, these small industrials, with a record year back of them, now have cash to plow back into plant items.

Buying Much Equipment

They are buying single pieces of machinery, single foundry, heating oven and conveyor system items here these days and their total adds up impressively. Where a $50 appropriation meant pulling teeth a few years ago, $5000 for single units is now readily disbursed.

A group of 28 automotive engineers from Germany, who are making a three-week study of American sales and production methods, spent four days last week in various motor factories in Detroit. . . . Auburn is preparing to move from Auburn, Ind., to the plant at Connersville, Ind. . . . That Reo has not devoted itself entirely to commercials is shown by a recent order for 12 buses. . . . Lincoln Zephyr's coupe model will be out about Dec. 10 . . . Michigan Bumper Corp. has acquired the Oldberg Muffler Mfg. Co., Detroit.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

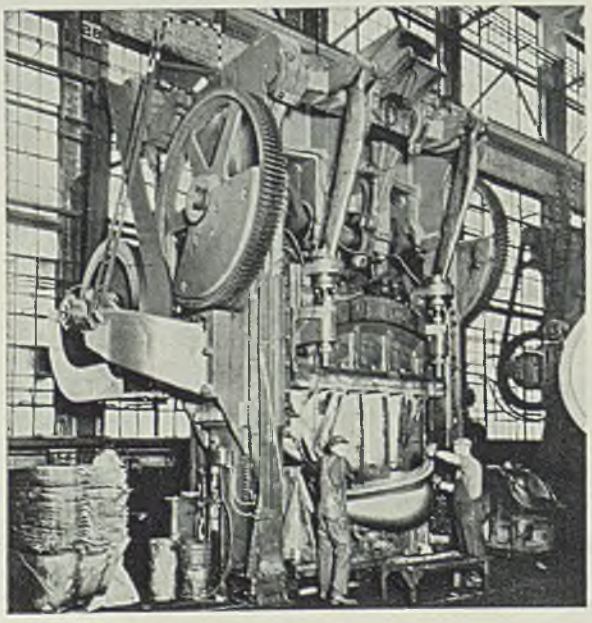
	1934	1935	1936
Jan.	155,666	289,728	364,004
Feb.	230,256	332,231	287,606
Mar.	338,434	425,913	420,971
Apr.	352,975	452,936	502,775
May	330,455	361,107	460,565
June	306,477	356,340	452,955
July	264,933	332,109	440,999
Aug.	234,811	237,400	271,291
Sept.	170,007	87,540	135,130
Oct.	131,991	272,043	*225,200
10 mo.	2,516,005	3,147,347	3,561,496
Nov.	83,482	395,059	.....
Dec.	153,624	404,528	.....
Year	2,753,111	3,946,934	.....

*Estimated.

Estimated by *Cram's Reports*
Week ended:

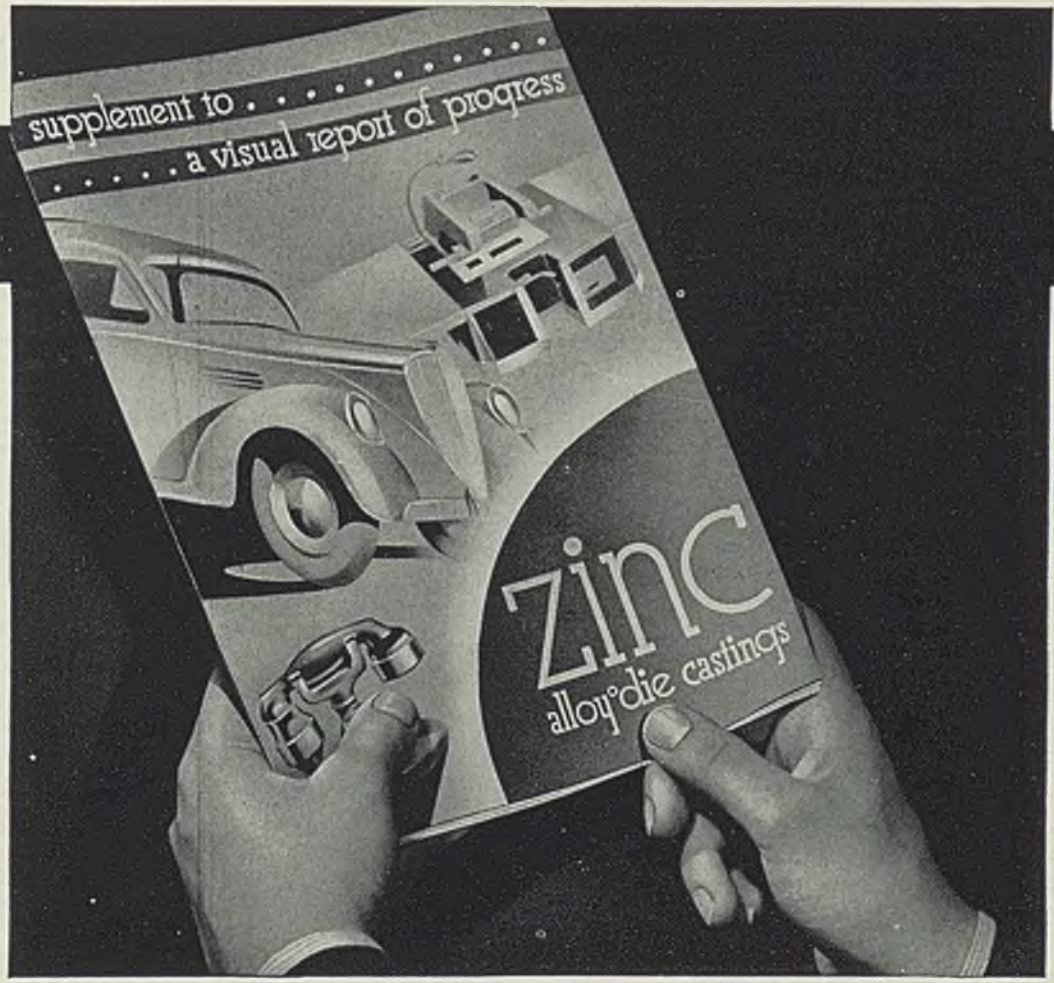
Oct. 24	59,740
Oct. 31	66,985
Nov. 7	84,305
Nov. 14	104,248

Steel Does Long Stretch in this Press



STRETCHING a steel sheet from a length of 92½ inches to 102½ inches, 11 per cent, is part of the task of this giant press in forming the new Buick front fender. At one point a square of 2 inches is stretched to 2 9/16 x 2 13/16 inches. The new fender requires 15 operations on presses and 12 finishing operations, including welding of the splasher. Buick claims a record for steel stretching in this job

New Jersey zinc



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This new book has thirty-two pages of photographs of the latest developments from eight different fields—many are so new production has only started and they will not be in actual service for several months. We feel that this "Supplement" will be of exceptional value to engineers, designers, production men—to anyone who is active in the development and fabrication of products incorporating metal parts. The designer of a new oil burner may be interested in a new die casting use, in a kitchen appliance, an automobile heater, a vending machine. The designer of metal toys may find a helpful suggestion in the section of Novelties, Radios, or Office Equipment. The book is a cross-section of die casting ideas.

We will be glad to send a copy of the "Supplement to A Visual Report of Progress" to anyone connected with the design, manufacture or sale of metal products. Also we still have a few copies of the original "A Visual Report of Progress" available for anyone who failed to receive a copy of this earlier book.

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Meetings

FARRELL ISSUES CALL FOR FOREIGN TRADE CONVENTION

IN ISSUING the call for the twenty-third national foreign trade convention to be held at the Stevens hotel, Chicago, Nov. 18-20, under auspices of the National Foreign Trade council, James A. Farrell, chairman, states it will be the task of the convention "to survey progress made during the past year and to examine carefully the conditions now existing, with a view to the formulation of proposals for the restoration of more normal commercial intercourse between the nations of the world."

Among addresses to be presented are two by Mr. Farrell on "World Trade Outlook" and "Our Trade Relations with South Africa," and one on "Machine Products in Relation to Foreign Trade" by John W. O'Leary, president, Arthur J. O'Leary & Son Co., Chicago, and president, Machinery and Allied Products institute. George C. Scott, president, United States Steel Products Co., New York, is announced as another speaker.

PROGRAM FOR ADVANCEMENT OF ENGINEERS REVIEWED

Holding its annual meeting in Chicago, Nov. 8-11, American Association of Engineers reviewed progress in its campaign initiated last year for the mobilization of engineers. Lacking a single powerful agency, engineers have worked through 90 or more societies for advancement of their interests as business men and citizens and for improved public relations.

Through this it is hoped there may be greater co-operation among engineering societies in similar or identical activities and that the objectives set up by various engineering societies may be reduced from generalizations to specific plans of action.

Resolutions commending specific organizations for outstanding achievements in 1936 were adopted.

AGRICULTURAL ENGINEERS TO HOLD MEETING IN CHICAGO

American Society of Agricultural Engineers will conduct its winter meeting at the Stevens hotel, Chicago, Nov. 30-Dec. 4. Purpose of the meeting will be to advance technique of engineering in its application to agriculture. With agricultural engineers of the United States and Canada attending, the society's four technical divisions will consider farm power and machinery, farm structures, rural electrification, and soil and water conservation.

Among specific subjects for discussion are air conditioning in farm buildings; steel in farm building construction; insurance rates as affected by types of construction; one-story, fireproof, cyclone-proof barns; farm machinery research; drop-inlet culverts and other erosion control structures; and use of drop-inlet, soil-saving dams.

Raymond Olney, St. Joseph, Mich., is secretary of the society.

DATE FOR SPRING LEIPZIG TRADE FAIR IS ANNOUNCED

The next semiannual Leipzig trade fair, to be known as the Great Engineering and Building fair, will be held in Leipzig, Germany, Feb. 28-March 8. As is the case with all Leipzig fairs, it will be international in character. Leipzig Trade Fair Inc., 10 East Fortieth street, New York, is the American representative.

PLAN OIL BURNER AND AIR CONDITIONING EXPOSITION

Oil Burner institute, successor of the American Oil Burner association, announces that the National Oil Burner and Air Conditioning exposition and convention will be held March 15-19 in the convention hall of the Commercial Museum, Philadelphia.

Exhibits will include domestic, commercial and industrial oil burners; distillate burners; and air conditioning equipment for heating, cooking and power purposes. Nearly 40 manufacturers have engaged space.

G. Harvey Porter, 30 Rockefeller Plaza, New York, is managing director of the institute.

Convention Calendar

Nov. 18-19—National Founders' association. Fortieth annual meeting at Waldorf-Astoria hotel, New York. J. M. Taylor, 29 South LaSalle street, Chicago, is secretary.

Nov. 18-20—National Foreign Trade council. Twenty-third annual convention at Stevens hotel, Chicago. Lindsay Crawford, 26 Beaver street, New York, is secretary.

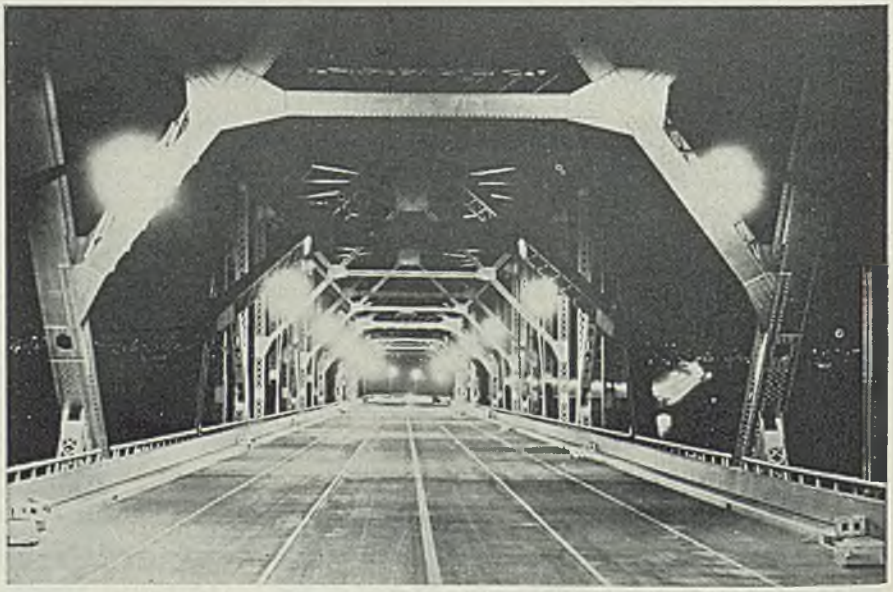
Nov. 18-20—International Acetylene association. Thirty-seventh annual convention at Hotel Jefferson, St. Louis H. F. Reinhard, 30 East Forty-second street, New York, is secretary.

Nov. 30-Dec. 4—American Society of Mechanical Engineers. Fifty-seventh annual meeting at Engineering Societies building, New York. C. E. Davies, 29 West Thirty-ninth street, New York, is secretary.

Nov. 30-Dec. 4—American Society of Agricultural Engineers. Winter meeting at Stevens hotel, Chicago. Raymond Olney, St. Joseph, Mich., is secretary.

Nov. 30-Dec. 5—National Exposition of Power and Mechanical Engineering. Thirteenth national exposition at Grand Central Palace, New York. Charles F Roth, Grand Central Palace, New York, is manager.

200,000 Tons of Steel in San Francisco Bridge



CONTAINING 200,000 tons of steel and 1,000,000 yards of concrete in its 11¼ miles, including three miles of approaches, the new Transbay bridge connecting San Francisco and Oakland, Calif., was opened to traffic last week. Its towers extend 500 feet above and 200 feet below the surface of the water. Its cost has been more than $77,600,000. Its capacity is sufficient to handle 12,600,000 automobile passengers and 42,500,000 interurban passengers annually. At night it will be illuminated by 924 sodium lighting units, manufactured by the General Electric Co.

WINDOWS of WASHINGTON

WASHINGTON

PRESIDENT ROOSEVELT, in answer to a question from a newsman at a press conference last week, said that he had "enjoyed very much" the recent steel wage increases.

Mr. Roosevelt was also asked what he thought about the new sliding wage scale. He replied that he did not know enough about it to talk at any length but that he does believe that the steel industry's sliding scale wage based on the department of labor's living cost index is a step toward a stabilized economy for workers.

He said further that he would like to work toward not a commodity dollar—a phrase which he described as being in bad repute—but something very like it; a system in which compensation, in regard to the cost of everything, was stabilized, while the good things of life were more widely distributed, thus avoiding the criticism of the steel industry's sliding scale by John L. Lewis, chairman of the CIO, who described it as "static misery."

Mention has been made several times about the proposed division of industrial economics which it is proposed to establish in the department of commerce. It is reported that this matter has been discussed at length with Dan Bell, acting director of the budget, and with the President himself. Both of them have expressed themselves as favorable to such a project. While there is no way of telling just how much money will be allocated for this purpose, it is currently reported that the commerce department is asking for $400,000 to begin this work. Of course this demand has yet to gain approval of the budget bureau and Congress before it can be effective.

FTC TO ACT SLOWLY ON ROBINSON-PATMAN CASES

Industry will watch with great interest the procedure of the cases of the federal trade commission in connection with the Robinson-Patman complaints which it has issued.

These cases will go through the regular procedure of the commission as worked out by the commission operating under its own organic act. That is, examiners will hear testimony and then there will be a final argument before the commission itself before any decision is rendered. This to be followed by court action if either the commission or the respondent feels it necessary. All this means that it will be many months before there could be any United States Supreme Court decision.

There is renewed talk here that while probably many amendments will be submitted to Congress at the coming session there is likely to be no legislation. This is based on the common sense point of view that the commission has not yet had time enough to see what is wrong—if anything—with the act as passed.

LABOR RELATIONS ACT DUE FOR THOROUGH COURT TEST

The steel industry will be especially interested in the action of the United States Supreme Court last week in deciding to hear the appeal of the Jones & Laughlin Steel Corp. in connection with the Wagner labor relations act. The court also decided last week to review two other appeals and two weeks ago it gave notice that it would hear several other cases of appeal in connection with the national labor relations board. Through the several cases up for argument before the court almost all of the constitutional questions will be involved.

Last week also the United States court of appeals refused seven injunctions against the labor board, one brought by the Bethlehem Shipbuilding Co., Bethlehem, Pa. However, in refusing to grant injunctions the court did not rule on the constitutionality of the act.

The court held that the act itself provides for judicial review of board decisions and that dissatisfied employers should adopt this means of challenging the law.

The opinion, which was rendered by the full court of appeals, treated all seven suits in the same discussion. The court said that there had been no showing of threatened injury or damage sufficient to justify injunctive relief. The labor relations act had been declared constitutional by Judge Adkins of the district court and all of the seven appeals in the appellate court were on appeal from his decisions.

MAJOR BERRY AGAIN TO FORE AS LABOR CHAMPION

A meeting of the council for industrial progress, headed by Major George L. Berry, as co-ordinator for industrial co-operation, is to be held in this city sometime early in December. The date has not yet been definitely set.

This is the organization, it will be recalled, that came into being at a meeting here last year where labor and industry were to be together and iron out all their difficulties. The meeting was a failure but Major Berry managed in some way or other to form his council, which he claims represents both industry and labor. Industry does not admit this. There is no representative of what might be termed big industry on the council.

There is a story here, apparently based on good authority, that the President is conscious of this situation and something or other will be done about it shortly. However, for the time being he is on the spot as Major Berry also headed the so-called nonpartisan league which came into being with the sole purpose of re-electing Mr. Roosevelt.

Major Berry has announced that the forthcoming meeting will discuss "immediate action toward effectuating the legislative changes which were recommended last March by the council." These changes all dealt with various phases of the labor situation and were for the benefit of labor.

WALSH-HEALEY LAW IN EFFECT ON STEEL PURCHASES

Steel purchases made by various branches of the government since the Walsh-Healey law became effective have been made public by the department of labor, charged with the administration of this law. Because these awards are for more than $10,000 each the contracts come under the new act.

Awards were made by the Ten-

nessee valley authority to the Lackawanna Steel Construction Co., Buffalo, for structural steel, at $15,559.50; to the John Nooter Boiler Works, St. Louis, for steel sheets, $19,174.

Awards were made by the procurement division of the treasury department: Jones & Laughlin Steel Service Inc., Long Island City, N. Y., for sheet steel piling, $111,701.26; to the Florence Pipe Foundry & Machine Co., Philadelphia, $11,097.31; Dudley Bar Co., Birmingham, Ala., reinforcement bars, $12,039.74; Steel Tank & Pipe Co. of California, Berkeley, Calif., steel pipe, $21,880; Baxter Steel Equipment Co., Indianapolis, metal kitchen cabinets and dressers, $23,148; United States Pipe & Foundry Co., Kansas City, Mo., cast iron pipe, $10,944.40.

Award made by the veterans administration to the Union Drawn Steel Co., Massillon, O., steel, $18,069.90.

Awards made by the Panama canal administration to the United States Steel Products Co., Washington, steel rails, $45,998.43; and to the Bethlehem Steel Export Corp., New York, steel rails, $45,998.43.

STEEL, IRON PRODUCTS AIDED BY CANADIAN AGREEMENT

The state department has made public an analysis of Canadian-American trade during the first half-year under the reciprocal trade agreement.

Dealing with iron and steel products the state department says that, including machinery and automotive products, they have long represented a "very large proportion of the total annual sales to Canada. The majority of the products in this group were directly benefited by the trade agreement, either in the form of duty reductions, which affected most of the group, or in assurance that the existing duties and charges would not be increased. Canadian imports from the United States of iron and steel products affected by the trade agreement, including machinery and vehicles, aggregated $42,900,000 in the first six months of 1936, an increase over the corresponding period of 1935 of $9,200,000. A very broad range of American producers, particularly of advanced manufactured products, participated in this enlarged volume of Canadian purchases.

"In the heavy iron and steel group, structural iron and steel, on which the existing duty of $3.00 per ton was bound against increases, made the largest gain, $255,000. Of the heavy products accorded duty reductions, moderate increases were recorded for steel rails, and for sheets, plates, and hoops. Imports from the United States of castings and forgings, on which the duty was also reduced, decreased by $234,000.

"Imports of lighter weight iron and steel products, including hardware, from the United States, which now benefit by lower rates of duty entering Canada, increased by $209,000. Steel ball and roller bearings, on which the duty was reduced about one quarter, made the largest gain, in this group, increasing $165,000, while less important increases were registered for pipes, tubes and fittings, and for hardware of various types."

TAX DATA BEING PREPARED AS AID TO CONGRESS

The technical staff of the joint congressional committee on internal revenue is making a thorough study of the revenue situation with a view to having considerable data on hand for congress when it reconvenes in January. The staff is studying the surtax on corporations, the excise taxes, many of which expire early next year, and a general revision of some of the inequalities of the present revenue laws. The report here is that the committee has not reached any definite conclusions as yet.

It is not possible to state just what kind of revenue legislation will be taken up at the next session but it is a foregone conclusion that the excise tax situation must be one of the things discussed. When a tax bill is once opened up, it is much like the old days of the tariff bills, no one can tell just where congress will go.

Regarding taxes it will be recalled that early last autumn, Secretary of the Treasury Morgenthau said that the government's fiscal situation is such as to make it "possible and timely for us now to consider revision of the tax laws with the purpose of removing any inequities or unnecessary administrative difficulties that may be inherent in the law and abating or modifying taxes that create unfairness to consumers or to trade, or for other disadvantages which outweigh the revenue yield."

IRON ORE MOTIVE BEHIND JAPAN'S PACIFIC ACTIVITY

The desire of Japan to have under its own domination sources of raw material is the recognized motive behind that country's activity in the past few years and this is particularly true of iron ore according to the American Council and Institute of Pacific Relations.

"The total production of iron ore in Japan, Korea, and South Manchuria," states the council, "is at the most 1,700,000 tons per annum; the imports from the Chinese mines in Anhwei and Hupeh, from the Malay states and from the Philippines at most amount to 1,900,000 tons annually. Yet the yearly smelting capacity of the Japanese pig iron industry is already approaching 3,000,000 tons, and for smelting these 3,000,000 tons no less than 5,400,000 tons of ore of medium quality are required. This means that normally an additional 1,800,000 tons of ore must be found somewhere. And war time needs could easily raise the requirements to 3,500,000 tons.

"An additional factor in the situation is Japan's desire to preserve her own relatively small reserves of iron ore, which it is agreed would be exhausted within a few years if fully exploited. In fact the desire to reduce the output of the Japanese mines and to increase that of the colonial mines with their cheaper labor costs can be traced in the statistics of the last fifteen years. Of the 74 mines capable of operation in Japan in 1928, 62 were in a state of conservation. The iron and steel firms involved were compensated by subsidies and by allotments of duty free imports of ore. The move for conservation and for acquiring of more ore for increasing demand are shown in figures just released."

PLAN SIMPLE GOVERNMENT

Considerable interest is being aroused here in connection with the two investigations dealing with government reorganization. Two committees are at work on this subject, one the creature of congress and the other of the President.

It is reported that much headway has been made by both these committees. They have conferred with heads of government departments and consulted with lesser government officials. Both of these committees are to make reports shortly, which it is said will be a basis for some legislation that will likely be passed at the coming session of congress.

MACHINERY EXPORTS GAIN

Exports of industrial machinery from the United States in September were valued at $13,083,350 compared with $12,171,532 in August and $9,889,000 in September, 1935, according to the machinery division, department of commerce.

The 7½ per cent increase registered in September over the preceding month was not distributed evenly over all lines, but was due chiefly to heavier foreign shipments of construction and conveying machinery, mining, well and pump equipment and power-driven metalworking machinery. Moderate declines were recorded in exports of power-generating equipment, textile, sewing, shoe, and othr industrial machinery, and in printing and bookbinding equipment, it was stated.

Editorial

"Where Do We Go From Here?" Is Live Question

GRATIFYING at the moment are the numerous announcements of wage increases, bonuses to employes and other actions which tend to give wage earners a more liberal share of the fruits of industry. Equally welcome to stockholders are the declarations of higher regular dividends, special dividends and stock issues, many of which are influenced materially by the 1936 tax law which penalizes undistributed profits.

All of these disbursements will act as a further stimulus to purchasing power and will tend to raise commodity prices. In this respect the present shower of checks has an inflationary aspect.

At the same time, the distribution of so much money should be conducive to a better feeling throughout the nation. Also it seems to fit in admirably with the progressive social philosophy which the public approved so decisively at the polls on Nov. 3.

However, thoughtful individuals must realize that only a portion of this bountiful distribution is justified by the earnings of the present period. Much of the dividend disbursement is artificial in that it is prompted by a punitive law. In some cases, wage increases may be somewhat greater than are justified.

Not All Industrial Concerns Can Participate In Large Distributions of Dividends and Stocks

To the extent that payments exceed a reasonable and justifiable level, industrial companies are borrowing from the future. Unfortunately the burden does not rest uniformly on all companies. Many of the larger corporations, which are well fortified with surpluses, are well able to participate in the current shower of disbursements without endangering their financial position. Many others, and particularly hundreds of concerns of moderate or small size, are in no position to march in the Santa Claus parade. To do so would seriously tax their pocket books.

For this reason there cannot be unanimous, unrestrained joy over the present spectacle. Throughout industry are thousands of heads of companies who are forced by the responsibilities of their offices to consider not only the immediate cost of the present demands but also future effect upon their businesses.

Executives confronted with these problems can be reasonably certain of several definite trends. First, the volume of business in most lines probably will continue at encouraging levels for some time. Secondly, the demands for higher wages, shorter hours, and more positive guarantees of social security to employes will impose a steadily increasing burden upon employers. Third, commodity prices will tend upward.

Faced with these conditions, executives cannot escape the obvious conclusion that the simplest solution of the problem lies in greater efficiency in operations. The nation has declared by its vote for a more abundant life for more people. The public has taken the word of its President that this can be done safely. Probably the implications of the President's attitude have led millions of people to expect more than can be granted to them. It is quite certain that as the true capacity of our economic system is revealed more clearly, the demands of the public will be toned down gradually to more practical dimensions. In the meantime, and until the danger of overtaxing the wealth-creating machinery of the nation is recognized generally, industry must rely heavily upon its efficiency of operation to offset as much as possible the newly imposed burdens.

Mass Production Provides Means To Help Spread Products Widely at Prices Workers Can Pay

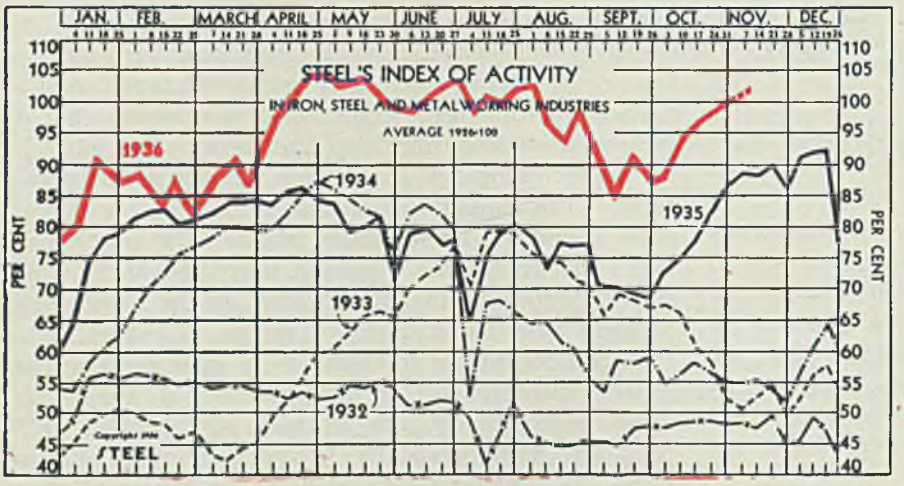
American industry has one asset which may go far in helping to solve this problem. During the past decade our executives, engineers, operating officials and others have developed a technique admirably adapted to the manufacture of articles which can be purchased by millions of people. Today this method is being used in the manufacture of automobiles, washing machines, radios, lamp globes, and numerous other articles which appeal to mass markets. In spite of the great progress in mass production in recent years, vast opportunities still exist for extending and refining this method to fit today's requirements.

The ferrous and nonferrous producing industries already are adapting themselves to the needs of their mass production customers. Most of the equipment manufacturers have been co-operating intelligently with the mass production industries to permit them to introduce new economies in their operations.

One result of this movement is seen in the current automobile shows where 1937 models, greatly improved over those of previous years, are offered at lower prices than ever before. Efficiency, to which thousands of companies in scores of industries have contributed, is the magic which enables the motor car industry constantly to offer better automobiles for less money.

Mass production of mass consumption products may prove to be the vehicle by which a great portion of industry may ride out the storm of the sudden and perhaps too precipitate demand for greater social benefits. In the long run it may become the larger vehicle which will safely carry the burdens of a social progress much more beneficial than that envisioned by the public in its vote of Nov. 3.

THE BUSINESS TREND



STEEL'S *index of activity in the iron, steel and metalworking industries gained* 3.2 *points to* 102.3 *in the week ending November* 7:

Week ending	1936	1935	1934	1933
Aug. 8.....	98.7	73.4	64.6	74.7
Aug. 15.....	92.6	77.5	61.4	74.2
Aug. 22.....	97.7	77.0	60.3	71.6
Aug. 29.....	94.0	77.3	55.1	70.3
Sept. 5.....	87.5	70.9	53.5	65.5
Sept. 12.....	83.1	70.1	58.7	69.1
Sept. 19.....	90.1	69.4	58.1	68.2
Sept. 26.....	86.2	68.5	59.3	66.9
Oct. 3.....	89.0	73.3	54.7	67.4
Oct. 10.....	93.4	74.9	56.4	66.0
Oct. 17.....	95.5	77.4	58.2	60.9
Oct. 24.....	97.1	82.4	56.3	58.0
Oct. 31.....	99.1†	86.4	55.0	52.3
Nov. 7.....	102.3*	88.4	54.9	50.7

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL). *Average for* 1926 *equals* 100, *weighted as follows: Steel rate* 40, *and car loadings, power output and auto assemblies each* 20.

Hint of Inflation Pervades Post-Election Atmosphere

INDUSTRY is making Page 1 of the nation's press more consistently than at any time in many years. The parade of dividend announcements, wage increases, bonus payments, stock distribution schemes, etc. is gratifying to wage earners and stockholders everywhere.

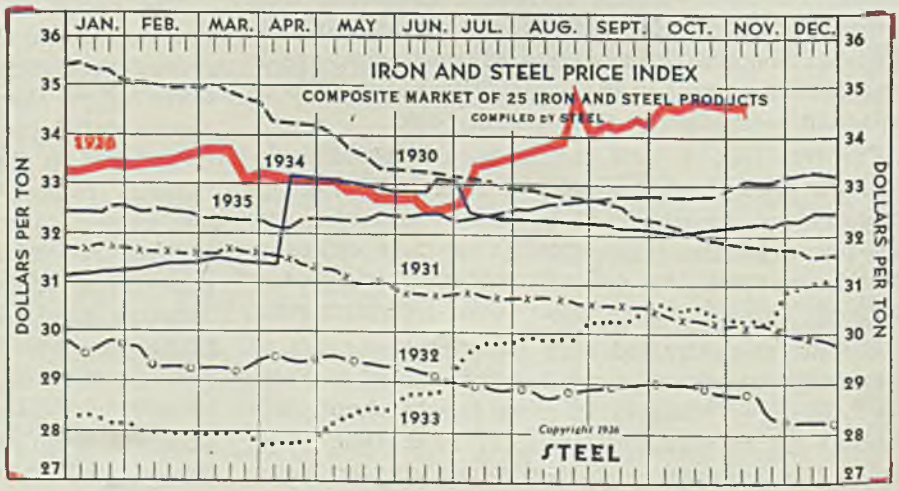
Whether or not this is a symptom of a further step toward inflation depends largely upon the degree of control which can be exercised by government, finance and industry. Certainly the disbursements make for a short-term expansion of buying power. Also they point unmistakably to higher prices all along the line.

Therefore the bountiful shower of the past few weeks is bound to influence the future trend of business. Mounting prices in the first quarter of 1937 seem assured, and this tendency undoubtedly will stimulate demand over the remainder of the current year.

This promise of sustained activity in the near future is accompanied by evidence that the present pace of industry still is accelerating. In the week ending Nov. 7, which included election day, STEEL's index of activity in the iron, steel and metalworking industries stood at 102.3, a gain from 99.1 in the preceding week.

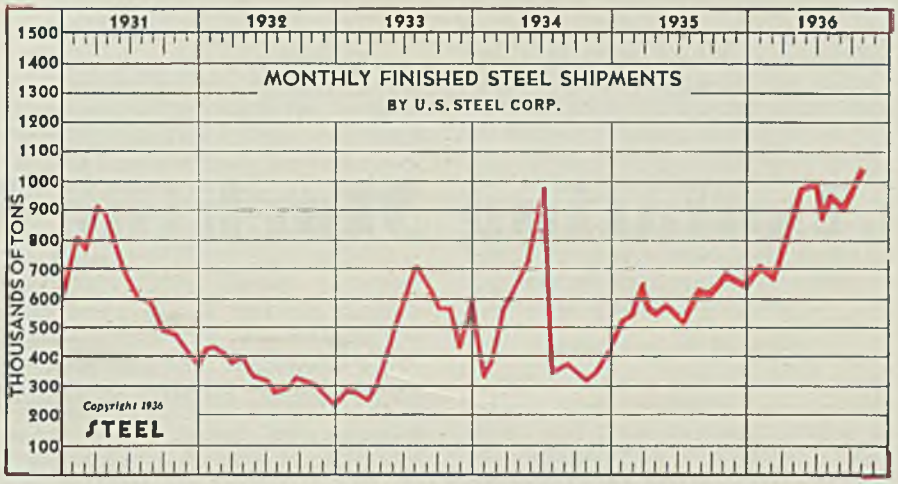
The moderate step-up was due to another increase in automobile output, and continued stability in the rate of steelworks operations, freight car loadings and electric power output. The latter was reported at 2,169,480,000 kilowatt-hours, representing only a moderate recession from the all-time high in the previous week.

	1936	1935	1934
Nov. 7	$34.60	$33.16	$32.13
Oct. 31	34.62	32.98	32.13
Oct. 24	34.66	32.85	32.12
Oct. 17	34.64	32.83	32.09
Oct. 10	34.60	32.86	32.09
Oct. 3	34.62	32.82	32.09
Sept. 26	34.19	32.83	32.13
Sept. 19	34.22	32.83	32.13
Sept. 12	34.10	32.81	32.14
Sept. 5	34.10	32.79	32.17
Aug. 29	34.03	32.78	32.17
Aug. 22	34.94	32.72	32.22
Aug. 15	33.88	32.68	32.23
Aug. 8	33.82	32.64	32.23
Aug. 1	32.72	32.59	32.28



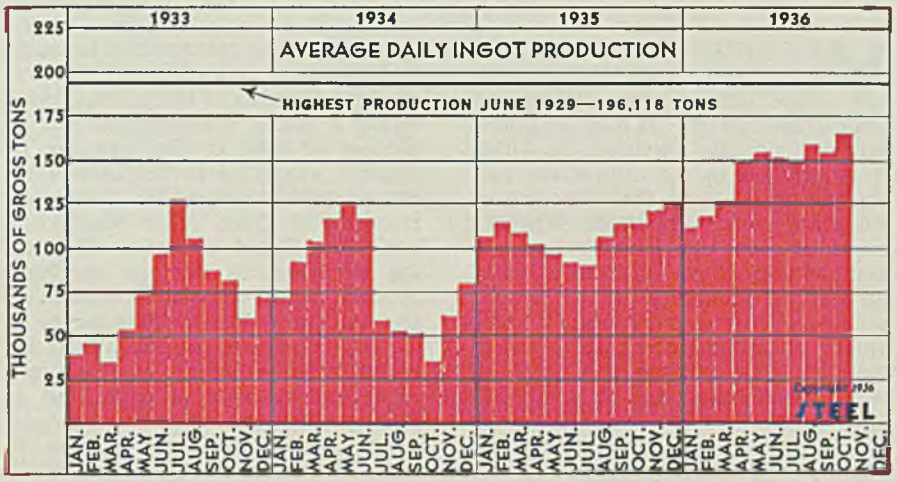
Finished Steel Shipments Advance Sharply in October

	Gross Tons		
	1936	1935	1934
Jan.	721,414	534,055	331,777
Feb.	676,315	583,137	385,500
March	783,552	668,056	588,209
April	979,907	591,728	643,009
May	984,097	598,915	745,063
June	886,065	578,108	985,337
July	950,851	547,794	331,777
Aug.	923,703	624,497	378,023
Sept.	961,803	614,933	370,306
Oct.	1,007,417	686,741	343,962
Nov.	.....	681,820	566,119
Dec.	.....	661,515	418,630



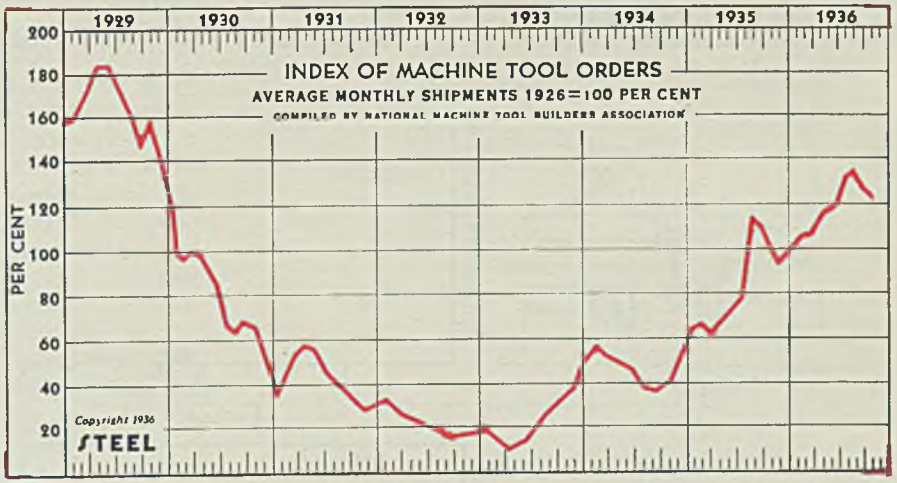
October Ingot Production Registers 5 Per Cent Gain

	Gross Tons		
	1936	1935	1934
Jan.	112,813	106,302	73,968
Feb.	118,577	115,595	92,164
March	128,576	110,204	103,646
April	151,625	101,562	117,443
May	155,625	97,543	125,907
June	153,263	90,347	117,672
July	150,874	87,224	59,578
Aug.	161,351	107,997	51,161
Sept.	160,043	113,000	50,759
Oct.	168,333	116,398	54,885
Nov.	.....	121,170	61,947
Dec.	.....	122,936	78,570



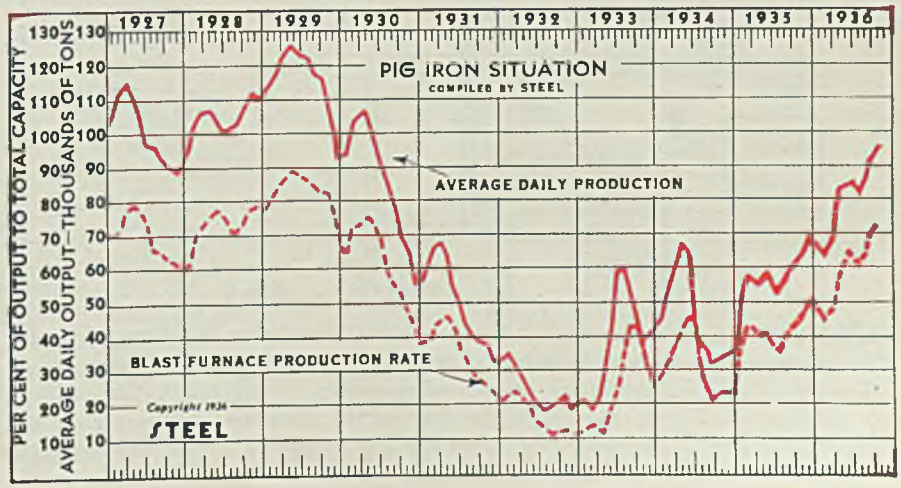
Index of Machine Tool Orders Off Slightly in October

	Three Months Average			
	1936	1935	1934	1933
Jan.	102.6	61.3	56.5	18.3
Feb.	107.1	61.5	58.2	15.2
March	109.4	60.3	50.9	11.1
April	114.4	60.3	48.5	8.3
May	116.6	67.1	46.8	10.6
June	124.5	76.7	42.6	15.5
July	132.6	94.7	38.6	22.4
Aug.	135.5	112.2	37.1	27.9
Sept.	132.0	108.5	37.4	30.9
Oct.	127.5	102.9	40.5	33.3
Nov.	.....	93.8	44.2	38.0
Dec.	.....	99.9	54.1	51.0



October Iron Output Shows Gain of 9.7 Per Cent

	Daily Average, Tons		Blast Furnace Rate, Per Cent	
	1936	1935	1936	1935
Jan.	65,461	47,692	48.2	34.2
Feb.	63,411	57,675	46.6	41.4
Mar.	66,004	57,120	48.5	41.0
Apr.	80,316	55,719	59.1	40.0
May	85,795	55,986	63.1	40.2
June	86,551	51,949	63.6	37.2
July	83,735	49,043	61.5	35.2
Aug.	87,475	56,767	64.3	40.7
Sept.	90,942	59,009	66.9	42.5
Oct.	96,509	63,818	71.0	45.8
Nov.	.....	68,876	....	49.5
Dec.	.....	68,242	....	49.0



Isolating Machine Vibration

BY LAWRENCE H. HANSEL
Vice-President, Felters Co., Boston

VIBRATION in plant machinery may, and usually does, produce one or more of several undesirable effects. It may be transmitted from the machines in which it originates to its immediate surroundings—that is, the structure of the plant—where its effects, whether rapid or slow, are nevertheless certain; it may cause crystallization of structural members or of water, steam, oil or gas piping; it may throw machinery or shafting out of line; it may damage the finish of walls or ceilings; and it invariably to a greater or less extent impairs the efficiency of workers and the quality of product.

In some cases, notably heavy trip-hammers or stamping machines, vibration may be transmitted through the earth to areas beyond the immediate confines of the plant, constituting a public nuisance subject to process of law. In the weaving of textiles, vibration in the loom may cause broken threads. Vibration transmitted from other machinery has been found a factor affecting the accuracy of certain precision ground parts on which tolerances are extremely small. This factor is worthy of serious consideration; not alone in the grinding of small machine and instrument parts, but in the generation of screw-threads, gears, worms and worm-gears in which accuracy is of prime importance.

Maintenance cost of vibrating machinery is often excessive, because an added vibration load is imposed upon the machine's normal operating dynamic load. Such extra loading may attain considerable magnitude and may result in comparatively rapid wear or failure of bearings, shearing or loosening of bolts or rivets and the like.

In all cases where vibration is present to any disagreeable or harmful degree, noise is also found; for the two are indissolubly allied. In any manufacturing plant, noise is a detrimental factor for any or all of the following reasons: it may, as in the case of transmitted vibration, constitute a public nuisance; it definitely reduces the efficiency of plant labor; it may, under certain circumstances, cause misunderstanding of signals or oral instructions, thus causing accident; it seriously affects the efficiency of draftsmen, accountants and other office workers.

Production and maintenance executives and designing engineers in a wide variety of industries are aware of the harmful effects of vibration in plant machinery. They are seeking materials and methods which will enable them to nullify these harmful effects. In increasing numbers they are finding that the answer to the problem is not found in any new and untried material, but in felt.

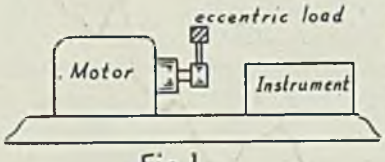


Fig. 1

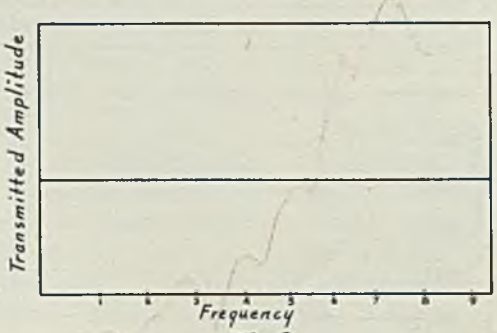


Fig. 2

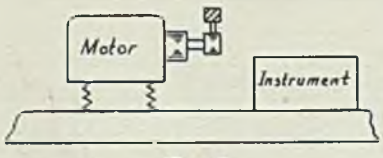


Fig. 3

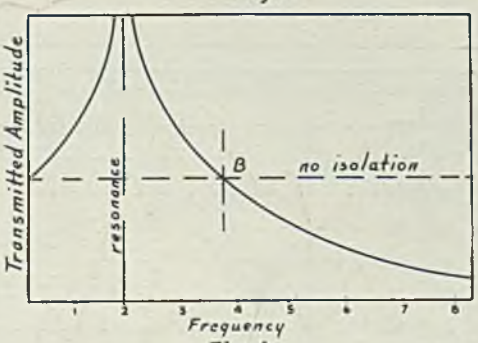


Fig. 4

FIG. 1 shows motor fastened to floor and so adjusted that at whatever speed it is operated the vibration-measuring instrument gives the same reading, as indicated in Fig. 2. After lifting motor and installing springs under it as isolators, as indicated in Fig. 3, the values for transmitted vibrations are measured and plotted as in Fig. 4; the latter also shows the line indicating transmitted vibrations when no isolator was used

Characteristics of Wool Felt

Mention of felt creates in most minds a picture of a soft, resilient material rather than of a dense substance capable of supporting ponderous machinery; yet within its own field of application, felt can be adapted to a large variety of uses. To clarify this statement, let me draw a rough analogy between felt and steel. As steel can contain varying proportions of iron, carbon and various alloying metals, so felt can have a wool-content ranging from 25 per cent to 100 per cent. As steel can be produced in varying degrees of hardness, so felt can be manufactured in varying consistencies from

springy-soft to rock-hard. Various chemical treatments such as fireproofing, waterproofing or vermin-resisting can also be applied to felt to meet technical and industrial requirements.

Like steel, felt is homogeneous. Its structure depends entirely upon the physical characteristics of the wool fibers of which it is composed. Wool fiber differs from other animal fibers in that its entire surface is covered with minute scales or barbs varying in number per inch from very few up to as many as 3500; the finer the wool, the more barbs or serrations per inch. When the fiber is heated, these serrations open; when cold, they close. Wool also possesses another unique property; it is the only fiber which curls and shrinks. Felt makes use of these two characteristics by laying the fiber side-by-side, under heat and moisture; so that when the shrinking process begins, the serrations will interlock, thus binding the fiber into a homogeneous mass.

Reviewing these characteristics of wool felt, we find that felt can be "engineered" to a great variety of jobs within its range of application. One of these tasks in which felt is giving a particularly good account of itself is the isolation of vibration in machinery.

Theory of Vibration Isolation

Let us make an experiment with the simplest form of vibrating machine, an electric motor with an unbalanced or eccentric load, as in Fig. 1. First we will fasten the motor to the floor and so adjust conditions that, at whatever speed the motor is operated, the vibration-measuring instrument gives the same reading as in Fig. 2. Now we lift the motor, install springs under it as isolators, Fig. 3, and again run it at various frequencies; measuring the values obtained for transmitted vibrations, and plotting them as in Fig. 4, which also shows the line indicating transmitted vibrations when no isolator was used.

Note that, at all motor-speeds lower than *B*, we obtain more transmitted vibration with the isolator than without it; and that the attempted isolation does not become at all effective until the motor speed is in excess of *B*. With springs, the amplitude of transmitted vibration at the resonance point may be many times that found when no isolator was used. This is characteristic of all isolators with small damping qualities. Even though the normal operating speed of the motor may be above *B* (where the isolation is effective) a very undesirable condition can exist, over the range of speeds from zero to *B*, during the starting or stopping of the motor. The resonance, or critical speed, is that speed at which the number of revolutions per second is the same as the natural frequency of the motor when mounted on the springs.

Continuing our experiment, suppose we replace the springs of low damping qualities with felt of high damping qualities and let us so load the felt that we have the same natural frequency as with the springs. The transmitted vibrations are then shown by the solid line in Fig. 5, the dotted line being the transmitted vibrations with spring isolation. Comparing Fig. 4 and Fig. 5, note that the resonance peak with felt is much lower than with the springs. The small increase in transmitted vibration in the speed-range up to *B* is not serious enough, as compared with the use of springs, to cause any practical difficulty.

Overall Performance Considered

Note, however, that the efficiency of the felt at frequencies higher than *B* is not as good as that of the springs. This is, admittedly, an inherent disadvantage of a material with high damping characteristics. But the suggestion can logically be made that, in the case of more complex machines which involve a wide range of vibration frequencies, the overall performance of the highly damped material is better than that of slightly damped materials. That is, having a wide band of frequencies to isolate, including those both higher and lower than *B*, it is better to sacrifice a small amount of efficiency at frequencies above *B* for the sake of markedly improved conditions at frequencies below *B*.

Properties of Isolators

Isolators have two principal properties; their elasticity, or *compliance;* and their damping property, or *resistance.* Compliance is expressed as the amount of deflection in feet for a load of 1 pound per square inch on a specimen 1 inch thick. For springs, it is the deflection in inches for a 1-pound load. Resistance is a more complex term and is dependent upon the rate at which free vibrations are damped.

If an isolator is placed under a machine, and measurements of vi-

THE solid line in Fig. 5 shows the transmitted vibrations after replacing the springs with felt, the dotted line representing the transmitted vibrations with spring isolation. This graph illustrates that efficiency of felt at frequencies higher than the level B is not so good as that of springs, so that overall performance must be considered by the designer. The solid line in Fig. 6 shows the vibration curve over a range of transmitted amplitudes for a machine under which an isolator has been placed. Fig. 7 is an example of "bridging," in which the holding-down bolts transmit vibrations to the floor as readily as if no isolator were used. Fig. 8 illustrates a general arrangement to overcome bridging

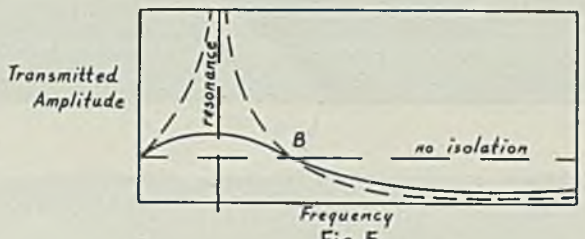


Fig. 5

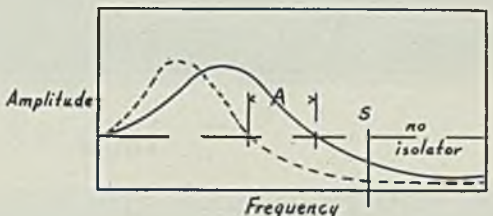


Fig. 6

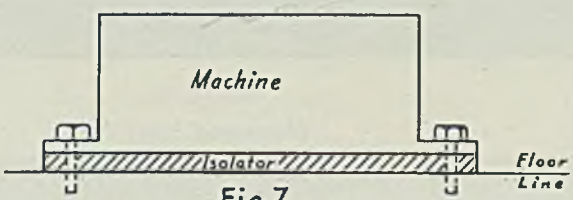


Fig. 7

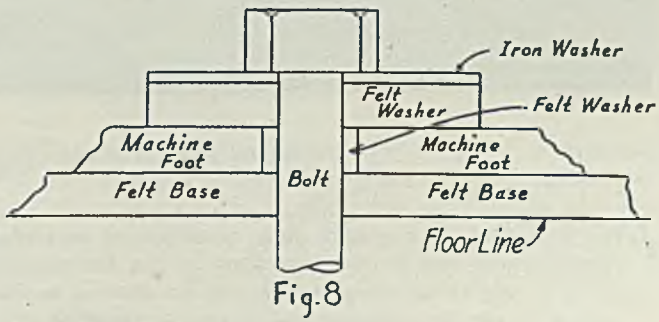
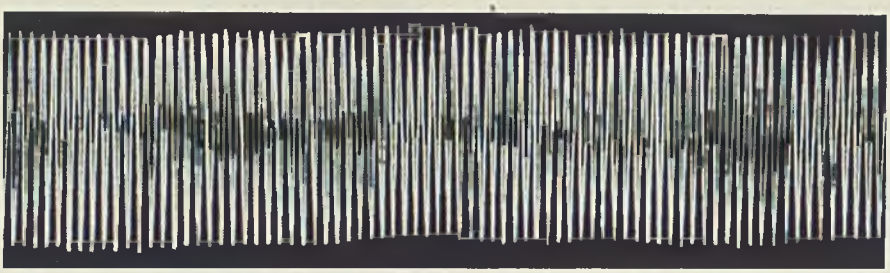


Fig. 8

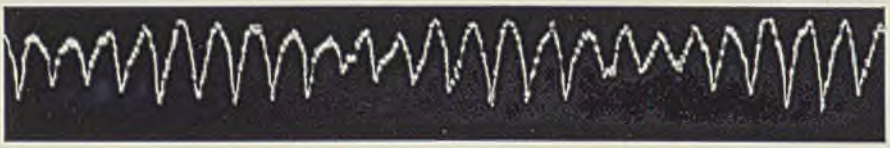


Vertical

Horizontal plane No. 1

Horizontal plane No. 2

Vertical



Horizontal plane No. 1

Horizontal plane No. 2

FIG. 9—Upper three graphs show vibrations of an unbalanced motor in the vertical plane and in two directions in the horizontal plane. Lower three graphs show the vibrations of a lathe and its attached mechanism, jack-shaft and motor, in the vertical plane and in two directions in the horizontal plane

bration taken over a range of transmitted amplitudes, the resulting curve will be similar to the solid line in Fig. 6. If now we increase the loading on the isolator, we shift the point of resonance toward the lower frequencies, as shown by the dotted line. The effect of loading is thus to increase the efficiency of the isolator over a greater range of frequencies, as indicated by *A*; and the efficiency is increased at any speed, such as *S*, within the range where the isolator is actually effective. Further increase will, theoretically, result in improved performance; but there is a practical limit to which loading can be carried. This is determined by the strength of the isolating material and its ability to withstand slow settlement and the gradual loss of its elastic properties; in other words, change in its compliance and resistance values.

Bridging Voids Isolation

In the installation of isolators, no path must be available other than through the isolator for the transmission of vibrations. If any other path is permitted, the isolator is said to be "bridged." Fig. 7 illustrates an example of bridging without value for isolation of vibration. The holding-down bolts transmit vibrations to the floor as readily as if no isolator were installed. This point must be considered in all installations where because of belt-pull or for any other reason, machinery must be fastened down to a foundation.

Fig. 8 shows the general arrangement used to overcome bridging. The upper felt washer supports the bolt-load; the center felt washer functions as a spacer to prevent contact between the bolt and the machine-foot and should be a loose fit on the bolt; the felt base-pad supports the weight of the machine, plus the bolt-load. Bridging is prevented because vibrations can reach the floor only by transmission through the isolator.

Arrangement of Isolating Material

During a long series of studies of vibrating machinery, it has been found that the vibrations in one direction in the horizontal plane are generally considerably larger than those in the same plane but at right angles to them. This is well illustrated by the two cases illustrated in Fig. 9, in which the upper three graphs show the vibrations of an unbalanced motor in the vertical plane and in two directions in the horizontal plane. The lower three graphs show the vibrations of lathe and its attached jack-shaft and motor in the vertical plane and in two directions in the horizontal plane. In both cases, the vibrations in the first direction are much greater than in the second direction which is at right angles to the first direction.

This indicates that whatever material is used as an isolator should if it is to be considered efficient be capable of reducing to a reasonable value the horizontal vibrations in the direction of their greatest magnitude; that is, the isolator should have greater resilience in the direction of the larger vibration.

Method of Placing Strips

This result may be attained by dividing the total area of isolating material into a number of rectangular strips, and placing these strips with their long dimensions at right angles to the direction of greatest horizontal vibration. For example, consider the strip of isolation material represented by Fig. 10-a to which a force is applied at right angles to the length, the base being fixed, producing a certain amount of deflection as shown by the dotted lines. If the force is now applied in the direction of the length, as shown in Fig. 10-b, the deflection is much less.

In order that it may also be efficient in the vertical plane, it is generally necessary so to design the isolator that its cross-sectional area shall support the load without danger of crushing. For any given frequency of vibration to be isolated by a given isolating material, the effectiveness of the isolator in the vertical plane depends upon the load it carries, and therefore upon its cross-section. It is thus evident that by dividing it into strips and placing these strips with their long dimension running in the proper direction we can improve the effectiveness of the isolator in one direction in the horizontal plane without reducing its effectiveness in the vertical plane.

Show Different Results

This has been proved by tests with a wool felt (trade designation No. 2310), ¾-inch thick; with results shown in Fig. 11. The upper graph shows the vibrations of a motor in the plane of maximum horizontal vibration without any isolation. The next graph shows vibrations transmitted to the surroundings through eight parallel strips of isolation, these strips being placed as shown in Fig 12-a. The third graph shows the effect obtained by using a square pad of isolating material of the same total cross-sectional area as the eight strip pads. The fourth graph shows the effect of placing the eight strips as shown in Fig. 12-b, at right angles to the direction of maximum horizontal vibration.

Though the results of this test are unmistakable, further experiments have been made with a different type of felt (trade designation No. 1260), the results of which are shown by the three graphs in Fig. 13. Since these two felts, No. 2310 and No.

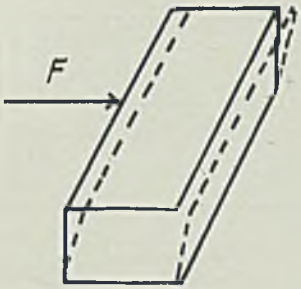


Fig. 10-a

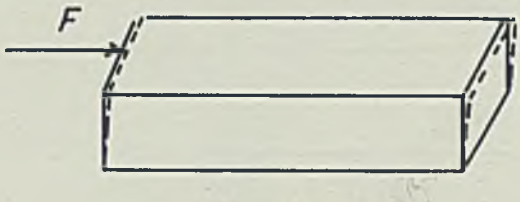
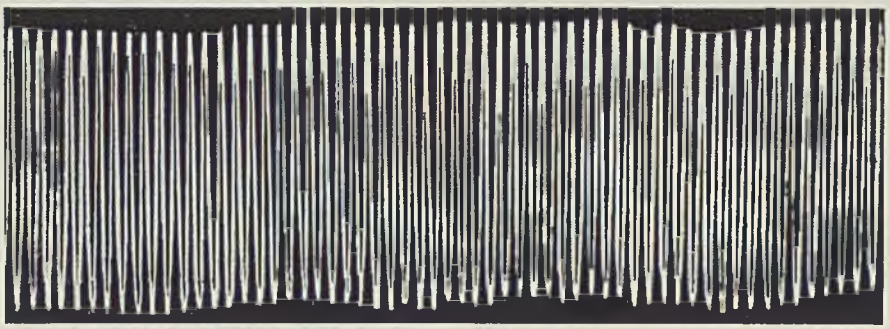
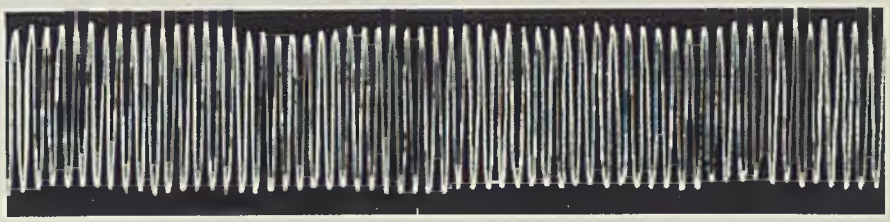


Fig. 10-b

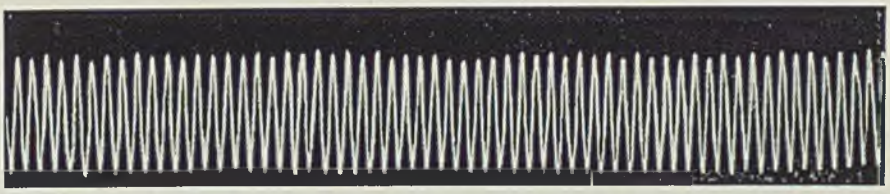
WHEN a force is applied at right angles to the length, as shown in Fig. 10-a, a certain amount of deflection, shown by the dotted lines, is produced. If the force is applied in the direction of the length, as in Fig. 10-b, the deflection is much less



No Isolation



Strips as in Fig. 12-a



Square pad of same area

Strips as in Fig. 12-b

FIG. 11—Upper graph shows vibrations of a motor in the plane of maximum horizontal vibration, without any isolation. Next graph shows vibrations transmitted to the surroundings through eight parallel strips of isolation placed as shown in Fig. 12-a. Third graph shows effect from using square pad of same total cross-sectional area as the eight strip pads. Bottom graph shows effect of placing the eight strips as shown in Fig. 12-b, at right angles to the direction of maximum horizontal vibration

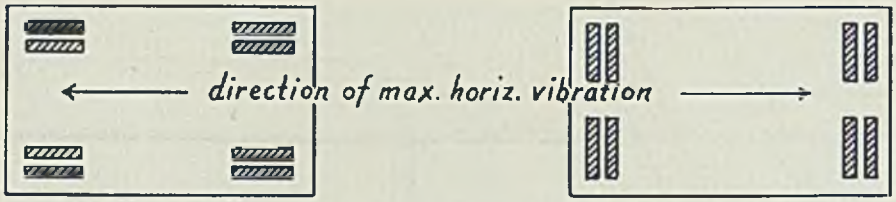


Fig. 12-a

Fig. 12-b

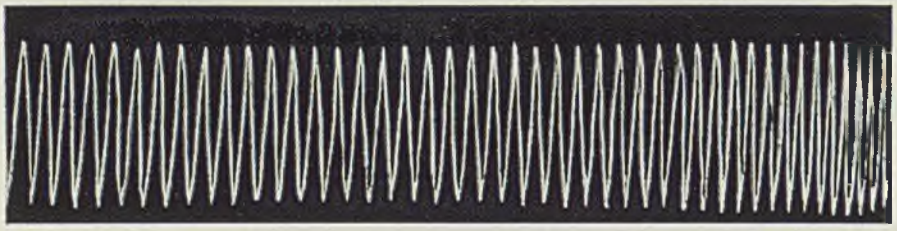
FIGS. 12-a and 12-b show how the isolator strips were placed for measuring the vibration of a motor in the plane of maximum horizontal vibration, as graphed in Fig. 11

1260, are of quite different properties, it is safe to conclude that any felt will give similar results if applied as shown.

The felt should be cut into strips as narrow as possible, consistent with their height; the ratio of width to height being determined by considerations of stability. The length-to-width ratio of the strips may be properly proportioned to suit cases where the vibrations are considerable in both directions in the horizontal plane. The arrangement of geometrical shapes of the isolating material can be varied to meet conditions. In some cases, for example, a machine will be found to have substantially equal vibrations in both directions in the horizontal plane; and such a condition should be met by dividing the isolation material into a group of squares, possibly into concentric rings.

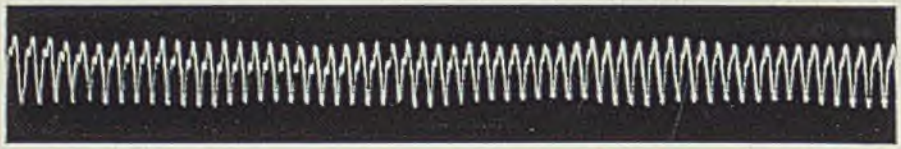
Standard Markings Given For Valves and Fittings

Manufacturers Standardization Society of the Valve and Fittings Industry, 420 Lexington avenue, New York, announces the availability of a new edition of the pamphlet "Standard Practice," covering the standard marking system for valves, fittings, flanges and unions. More comprehensive than former editions, the new booklet contains a number of tables which definitely outline the standard method of applying markings to a wide variety of products. One of a series of standard practices developed by the society, the bulletin which is known as SP-25 is published by and distributed by this organization and copies are available for 50 cents each.



Strips as in Fig. 12-a

Strips as in Fig. 12-b



No Isolation

FIG. 13 shows the same vibrations graphed in Fig. 11 but resulting with the use of isolators of a different kind of felt

New Research on Optical Glass Is Projected

A broad program of fundamental investigations on the chemistry and physics of glass surfaces to aid in the development of scientific apparatus and ophthalmic instruments has been started at Mellon Institute of Industrial Research, Pittsburgh, by the Bausch & Lomb Optical Co., Rochester, N. Y. The first studies will be concerned with the effects of environmental factors on the durability of the various types of glasses used in optical instruments.

Bausch & Lomb has maintained a fellowship at Mellon Institute since 1931 for research on various plant and production problems in optical technology. New developments in the past have included improved greases for optical instruments, cements for ultraviolet transmitting optics, improved methods for making and testing mirrors and reflectors, and standardization of the sizes of fine abrasives used in grinding lenses.

Dr. Frank L. Jones, the fellow since 1931, will be in charge of the new investigations.

How Ingenuity Solves Some Mechanical Problems

Ingenious Mechanisms for Designers and Inventors, Vol. II, fabrikoid, 538 pages, 6 x 9 inches; published by Industrial Press, New York; supplied by STEEL, Cleveland, for $5, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This is the second volume of ingenious mechanisms, a companion book to the first, although independent, the two forming an encyclopedia of mechanical movements. There are 303 illustrations and drawings in this volume, all different from the 300 in the preceding volume.

Illustrations are confined to the important elements or units found on various types of automatic machines and other mechanical devices. The descriptions apply only to the actual devices that produce the desired result.

Grouping brings together mechanisms alike in function and purpose but different in design, offering opportunity for comparison.

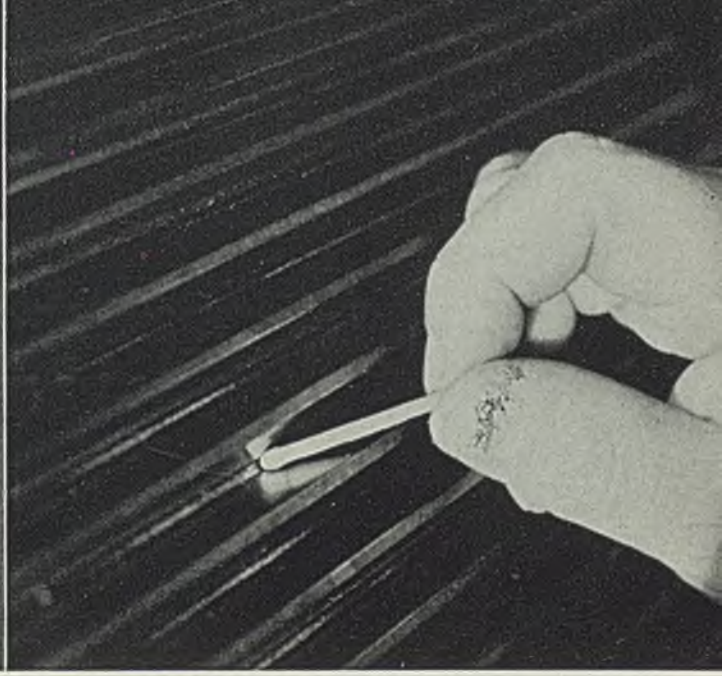


FIG. 8 (left)—Teeth of well lapped gears have a satin-like finish. Fig. 9 (right)—Polished by a new process, the teeth of this gear have a mirror-like finish which improves operating characteristics

Quiet High-Speed Gearing— Its Design and Manufacture

Part II

GENERAL satisfaction of helical gearing for high-speed work is due in large measure to the fact that the uniform transmission of motion does not depend primarily upon the perfection of the involute profiles, but rather upon the accuracy of the helical trace. Fortunately, accuracy of helical angle is obtained without great difficulty. Errors in pressure angle always produce interference and noise, whereas errors in helical angle frequently cancel each other. If the change gears chosen to cut a pinion result in an angle slightly different from the one specified, the same variation will be found in the case of the mating gear. It is more important that the helical angles be accurately matched than that their asolute values agree with the specified.

Generally, the lapping process may be relied upon to correct for slight shortcomings in the matching. It would be better to speak of lead in this respect because it is commonly known that the helix angle varies with each diameter through the teeth, whereas the lead is constant. With the improved lead accuracy now available in the new hobs and higher standards in cutting equipment there is no longer excuse for error of this type.

Ideal Is Not Attained

The primary kinematical requirement for gear tooth action is that the common normal to the curves at their point of tangency pass through the pitch point. The involute satisfies this condition in theory and if we were dealing with rigid materials and perfect tooth forms having no clearance, spur gears of that type would transmit perfectly uniform motion. Because of inaccuracies and elastic distortions which prevail in practice this ideal is not attained.

Consider a tooth just entering the zone of contact, then at the line of centers and then just leaving contact. It is evident that the distances to the point of pressure application vary for the three cases. Obviously, the linear motion at the contact point of the pinion increases uniformly during its course through the zone of action and that of the gear decreases in like manner. Uniform angular movement can be imparted to the gear only by superimposing definite quantities of corrective sliding upon these varying values. This is accomplished by the configuration of the profiles, but as stated kinematical requirements are satisfied only so long as those shapes are maintained. Any flats or imperfection will change the conditions sufficiently to effect the character of the imparted motion. An error in spacing will shift the contact from one set of teeth to another with a similar result.

This effect is further accentuated by the deformations of the profile

BY W. P. SCHMITTER
Falk Corp., Milwaukee

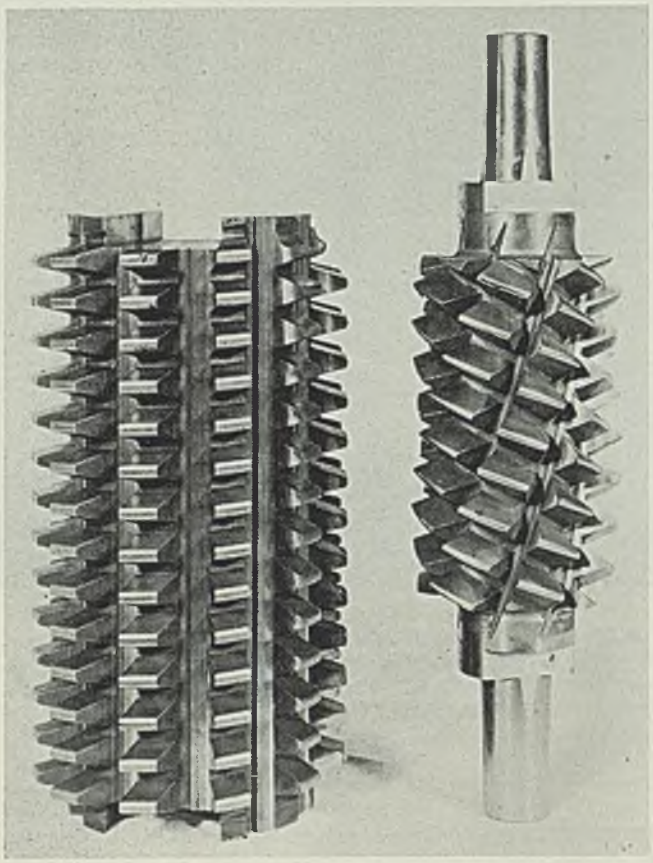


FIG. 10—Shown at the left is a new ground turbine tooth, single-thread hob; at the right is a new ground, controlled-curvature, multithread Wuest hob

which takes place under load. The curvature toward the bottom of the pinion tooth is considerably different from that at the tip, consequently wear is not uniform. Still further, the deflection of the tooth as a beam will vary, thus tending to throw greater load on one or the other tooth in the contact zone. There is a third disturbance to be reckoned with and that is the varying number of teeth which at one time or another support the load.

Errors in Pressure Angle

Fig. 11 shows a rack section of a cutter in which there is present an error in pressure angle. The gear tooth produced by the cutter is shown in Fig. 12 and it will be noted that it has a corresponding but opposite error. Since the teeth of the mating gear and pinion are not cut by the same rack section, it is obvious that there will most likely be an error in pressure angle between the two. It is significant that the pressure angle is either perfect or in error on a side which will cause variations in the angular velocity. If there is any deviation, either plus or minus, the teeth generated will show a high bearing either at the tip or at the root.

Because of these difficulties, spur gears are unsuited for high speeds. Some relief can be obtained, however, if the tooth profile be made to deviate slightly from the theoretical in order to allow for deflections under load. Premature engagement will be avoided and in addition a more uniform pressure-velocity value such as would reduce the tendency to scuff will result.

Fig. 13 shows a tooth curve which has a number of advantages over a mathematically exact involute. The theory upon which this is based is that not only are interferences in tooth action avoided, but in addition highly desirable compensating effects are obtained under the elastic yielding which takes place under load. In spur gears, such modification must be applied with extreme care because an overdose is productive of the same evil. A few tenths of thousands is all that can be permitted. In a helical gear properly designed, all phases of tooth action are present at one time. With sufficient overlap, continuity of motion is assured by the helical trace and considerably greater involute deviation is possible. Herringbone gears having an exaggerated degree of divergence have been produced for many years. This was incidental to the use of hobs having straight sided sections in the normal plane. No attempt was made to control the amount of deviation which depends mainly on thread angle, position of hob relative to blank and tooth height. As a consequence some gears had far too much, particularly the heavier pitches, with the result that load concentration at the pitch line was excessive.

About 1920, Allan Candee, who was at that time a member of the Falk organization, developed mathematically correct formulas for manufacture of hobs capable of generating theoretically correct involute profiles. Considerable experimental work was done along these lines but at that time refinements in manufacture had not reached a state which would permit practical application of these principles.

To produce a pure involute tooth curve a hob must be of involute form in its transverse plane. The normal section will contain a curve compounded of an involute and the helix. Less than two years ago development work was again resumed in collaboration with Swan Bjornberg and the Illinois Tool Co. Experimental multithread hobs were prepared and tried and the results were so satisfactory that a complete line of these hobs was developed. Two such hobs are shown in Fig. 10.

New Type Hobs Used

It has been found that gears cut with improved hobs incorporating these principles operate quieter than did their predecessors. Accordingly the idea is now being applied to single thread hobs. By proper modification of the figures obtained from the mount, a hob is produced which will develop a tooth form in the gear having any desired deviation from the theoretical.

By manner of composition all of the possible phases of spur gear action are simultaneously produced to obtain the uniform motion of helical gearing. It is generally assumed that if a little more than one axial overlap is present, full helical action is present. It can be shown

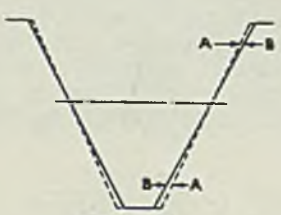


FIG. 11

"A" PROFILE FOR CORRECT PRESSURE ANGLE OF CUTTER
"B" PROFILE FOR INCORRECT PRESSURE ANGLE OF CUTTER

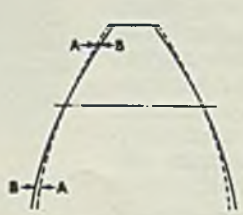


FIG. 12

"A" PROFILE OF TOOTH CUT WITH CORRECT PRESSURE ANGLE OF CUTTER
"B" PROFILE OF TOOTH CUT WITH ERROR IN PRESSURE ANGLE OF CUTTER

FIG. 13

"A" MATHEMATICALLY EXACT TOOTH PROFILE
"B" MODIFIED TOOTH PROFILE

that this is not always true. Fig. 14 shows a low angle helical tooth loaded in the characteristic fashion. At one end the loading is toward the tip with a correspondingly high deflection and at the opposite end it is toward the bottom with very low deflection. It is quite conceivable that under load one end of the tooth will yield a varying amount thus causing some angular distortion of the transverse contact planes with each other. Low helical angles are therefore not particularly well adapted to high-speed gearing.

Fig. 15 shows the nature of contact on a high angle helical tooth. The base helix angle and the slope of the plane of contact is considerably increased. A little reflection will convince one that if the ratio of A to B is small, the tooth will react substantially as though it were loaded at the center. If, on the other hand, this ratio is high, one end of the tooth receives but little support from the other.

It can be seen, therefore, that while helical gearing mitigates the effects making for velocity variations in spur gears, unless the gears are properly designed, its full possibilities will not be developed. Although circumstances will alter cases, a helical angle of 20 degrees or more should be used. Beyond that point the law of diminishing return seems to apply.

Action of Helical Gearing

Because of the elastic distortions of the teeth, there may still be present in helical gearing some of the characteristic action of spur gears. As a result of the variations in deflection there exists a similar variation in stress intensity and deformation at the contacting profiles. Since the amount of load carried by the teeth in any particular transverse plane changes with the position of the engaging teeth, there must be a transmission of energy and stress

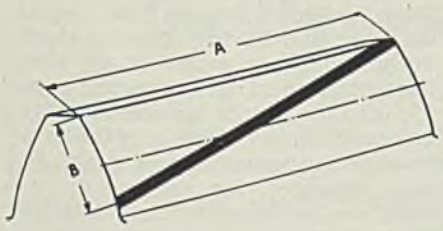


FIG.14
LOW HELIX ANGLE

axially from one plane to another. If we consider that these gears are moving at high velocities and that these adjustments and readjustments must take place continuously and at a tremendous rate of speed, we get some conception of what is happening during load transfer in high-speed gearing. There is reason

THE accompanying article constitutes the second and concluding part of a paper, "Quiet High-Speed Gearing," read before the nineteenth semiannual meeting of the American Gear Manufacturers' association held Sept. 8-10 on board the S.S. SEE-ANDBEE cruising the Great Lakes. Part I was presented in the Oct. 19 issue of STEEL. The author, W. P. Schmitter, is assistant chief engineer, the Falk Corp., Milwaukee

to believe that for this class of work energy propagation should be confined to as small a limit as practical.

Two methods of treatment suggest themselves. An extremely rigid tooth may be utilized to reduce deflections to a minimum. This involves use of a high pressure angle. The other course is to maintain a more uniform load distribution in each transverse plane, thus reducing the need for reinforcement in other planes at the instant of tooth transfer. Both methods are being used successfully by the Falk Corp.

Development of the Cox theory marked an important gear advance, not so much because of its direct application but because it has focused attention on the extremely important subject of contact cycles. As is well known, the Cox theory provides for integral contacts in either, or both, the circumferential and axial planes, this result being obtained by choice of tooth height, pressure angle, helical angle and face width.

It has been found in helical gearing that it is extremely difficult, if not impossible to obtain strictly integral contact, even in the axial plane. Bending of the teeth and variation in the deflection at the point of contact, together with errors in manufacture, are largely responsible for the difficulty encountered in attempting to achieve this ideal. These practical considerations are enough to make appreciable difference between the theoretical and the actual contact ratios.

The turbine tooth form has been developed particularly for high-speed gearing. Proportions are so chosen that there are slightly more than two teeth in transverse contact at all times. No attempt is made to modify any of the constants to suit the requirements of individual applications except that the number of teeth in the pinion is not below a certain minimum. While standard forms are rigidly maintained, the number of teeth in contact is only slightly greater than two even with large numbers of teeth in pinion and gear.

The profile of a gear tooth as it comes from the generator is not a continuous curve but consists of a series of flats. In the shaping process these flats travel diagonally up the tooth. When produced by the hobbing method, they may be described as diamond shaped. When these surfaces are brought into contact, the distribution of loading will be poor. Fig. 16 shows the imaginary stress distribution resulting under such conditions. It is apparent that when two high points contact, the stress intensity is considerably greater than the average and other areas within the flattened zone will not take their proportionate share. Furthermore, noise is apt to result from the uneven profiles sliding over each other.

Lapping Not Universal

The irregular surface resulting from the cutting process may be worked into a smooth and continuous curve by lapping. Despite its universal success, some manufacturers have not accepted lapping as a refining process and have substituted in its place a scraping procedure intended to remove the high points. Their objection has been based on the theory that the lapping material charges the tooth surface, and as a result, lapping continues after the gears are placed into service.

It is difficult to follow the reasoning advanced, because it is known that the lapping mediums

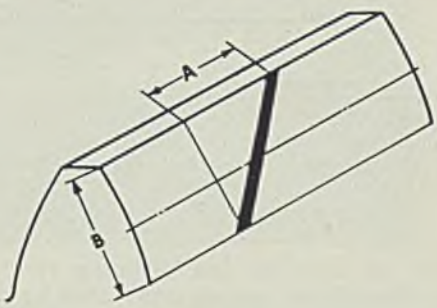


FIG.15
HIGH HELIX ANGLE

lose their sharp edges after a short time, and when the change is not renewed, lapping quickly ceases. Insofar as is known, there is not a case on record of a gear having been affected because of cutting from imbedded particles continuing after completion of the process.

Another objection sometimes voiced, is that the mass action of the lapping material is responsible for lapping in the hollows as well as on the high spots. Manufacturers using the lapping process have not incurred difficulty of that character because such action could occur only if the lapping compound was of improper consistency.

Lapping is still pretty much of

an art although considerable study has been devoted to the matter of abrasives, density of the wheels, type of motion by which the cutting is produced, etc. The practice most generally followed in herring-bone gearing is to run the pinion and gear at slow speed, introducing the lapping compound by brush. The cutting motion between the surfaces being lapped is derived entirely from the incidental sliding of involute action.

As a result, the degree of work done at the pitch line is small compared to that at the tip and root, but this is in some degree beneficial. The pitch line is established as a base and lapping continues from there to the two extremes of the profile. When properly carried out, it decreases the possibility of any point on the tooth standing proud of the involute and affecting the uniformity of motion established by the helical trace.

Where the gear cutting is of a very high order, this type of lapping is quite successful and rather elaborate machines have been developed for this purpose.

The number of teeth in the gear being greater than that of the pinion and the process being a mutual one, the extent of lapping is proportionately greater on the pinion teeth than on those of the gear, and to offset this the gear is first lapped with specially-prepared cast iron dummies. These do most of the work so that when the final lapping of the pinion to the gear takes place, its work is reduced to a matter of matching the teeth of one to the other. The depth to which contact takes place in a gear depends upon the diameter of the engaging element, being a maximum with a rack. The centers must be decreased when lapping a pinion with a dummy of diameter less than that of the gear it must later engage to avoid a high bearing at the root of the pinion tooth.

The Drummond process, in which the combination sliding of crossed axes is used, has been found very effective for small gearing.

Gears as they leave the lapper have a satin-like finish. Recently the Falk Corp. has been using a further refining process, the purpose of which is to reduce the surface to a specular condition at which friction is limited to its lowest possible values and to still further improve load distribution. Two separate and distinct methods have proven successful but they will not be discussed. Fig. 8 shows the surface finish of a well lapped gear; Fig. 9 shows the mirror-like surface of the gear after subjection to the new processes.

While this process was developed primarily to eliminate the tendency of the tips to scuff at high speeds, it has other proven benefits. The resistance to pitting is increased somewhat as a direct result of the reduction in maximum contact stress. Fig. 16C illustrates the stress distribution on a loaded gear tooth having such an extremely smooth finish. There appears likewise to be some improvement in operating characteristics apparently due to the greater ease with which the profiles slide over each other. It is a difficult matter to state at this time just how much improvement is due to the polished condition of the teeth, but improved gears processed this way have been unusually quiet. Tests are under way to determine the increase in load carrying capacity. These may be supplemented with noise tests.

Operation of high-speed gears may be affected in considerable degree by the elastic distortions of the contacting profiles, the tooth as a whole, the pinion from deflecting with reference to its gear, or from torsion across its length, and the frame in one or another of its several planes.

Distortion from bending is perhaps the most common of all and can be avoided only by using proper proportions. Arbitrary relations of diameter and face have been successfully used in the past but they cannot be relied upon entirely. The pinion deflects inversely as the fourth power of its diameter and directly as the third power of the span, which indicates immediately that empirical relations cannot be relied upon in all circumstances. Where the gear ratio is high and there is reason to believe the deflection may be critical, the safest course is to determine the amount of deflection by graphical integration.

Deflection is affected in considerable degree by the nature of the loading, position of the pinion relative to supports, the influence of additional loading from the high-speed gear in the case of intermediate pinions, whether the load is introduced at one end or both, and other circumstances peculiar to each application. In the case of bending, concentration is the same for double helical as for single helical gearing. Frequently a center bearing is found to be advantageous and when such is the case, double helical gearing is indicated.

Deflection Difficulties

Torsional deflection is of greater consequence when present but it is not as common as flexual distortion. It is conducive to faulty tooth action due to the angular displacement of the transverse planes with reference to each other. Deflections of this type depend not only upon the characteristics of the pinion but in some degree upon the rigidity of the engaging member. Two mating pinions of equal diameter and having opposite shaft drives, will not suffer much load concentration from torsion even though face widths are considerably greater than permissible in the case of a pinion contacting a gear. In such instances, the angular distortions are compensated by identical effects in the mating member.

For high-speed gearing spray lubrication at the mesh point is still considered the best practice. Considerable progress has been made with pan-type controlled, but sprayless, lubrication, invented by P. C. Day, and velocities of 5000 to 6000 feet per minute have been used successfully.

Frequently a high-speed gear unit will be found to emit periodically

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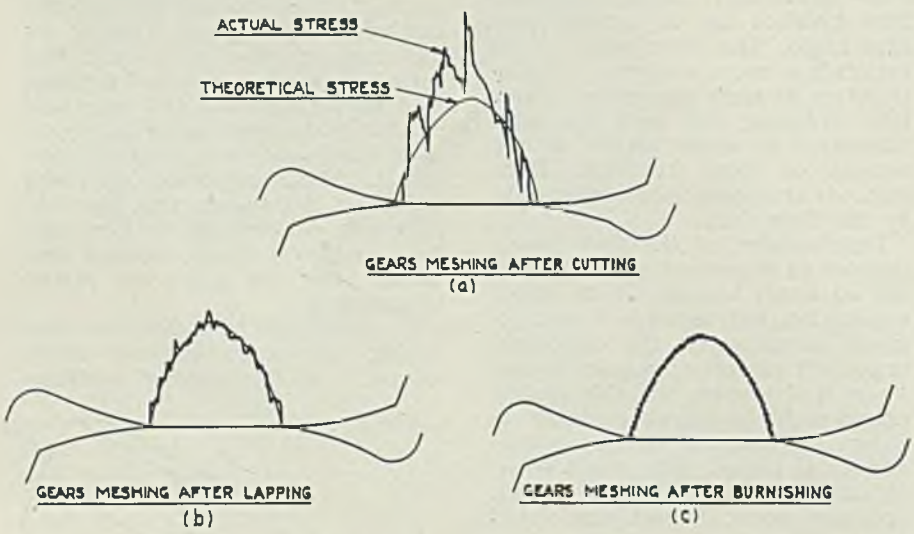


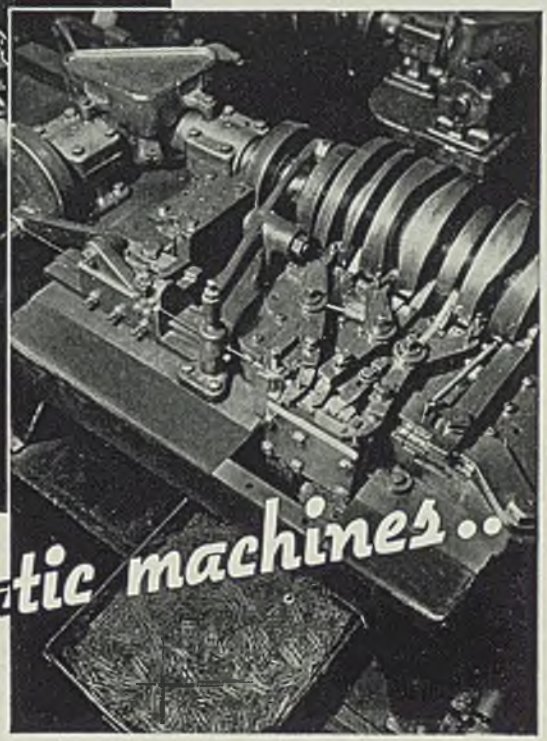
CONTACT STRESS DISTRIBUTION

FIG. 16

GULF INDUSTRIAL LUBRICATION

The high speed automatic screw machine at the left—in a modern metal working plant—produces many varieties of steel and brass parts. Gulf lubricants and cutting oils help maintain peak efficiency.

Below is a paper clip and wire forming machine. At very high speeds it manufactures clips of many designs. Gulf lubricants help preserve the close fit of all moving parts.



For high speed automatic machines...

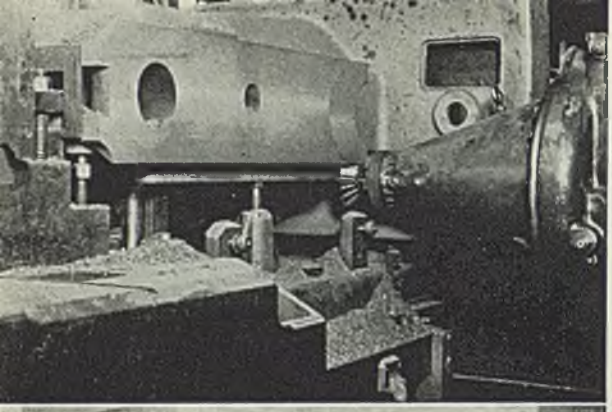
GULF QUALITY LUBRICANTS . . . Insure Continuous and Efficient Operation

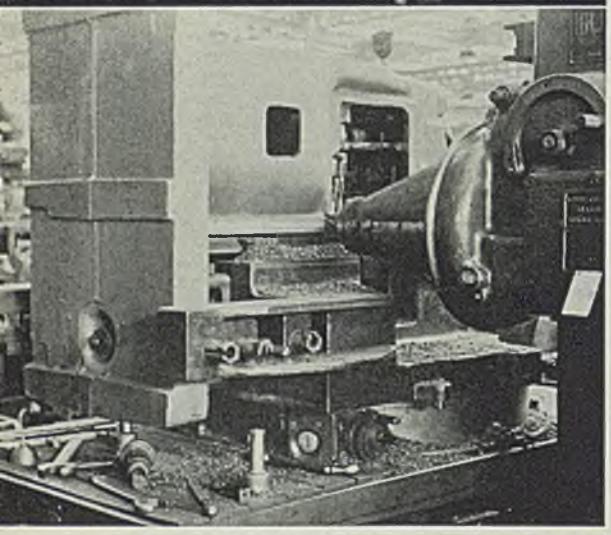
HIGH speed automatic machines like those shown above should not consume large quantities of lubricating oil—but their close fitting parts need the protection of the highest quality lubricants that can be applied.

That is why leading metal working plants have standardized on Gulf products. The Gulf engineer works with the plant personnel, not only to economize on lubricants used, but to improve the efficiency of lubrication. He recommends the right Gulf quality lubricant and its proper application for each moving part.

This scientific use of lubricants has brought real economies to many plants—in reduced maintenance expense and improved machine operation.

GULF OIL CORPORATION
GULF REFINING COMPANY
General Offices: Gulf Building, Pittsburgh, Pa.





Special Tools Speed

● Free use of jigs and special tools is tool building plant which is attempting

BY FRED B. JACOBS

Fig. 1—(above) Arrangement of milling machine column for finishing the column face. Fig. 2 (below)—Work located on a turntable for an exact 90 degree turn in milling consecutive surfaces

PRESENT day machine tool manufacturers are confronted with three major problems: The product must be accurate, its components must be interchangeable and it must be manufactured economically so as to be sold in a highly competitive market. Accuracy is of the utmost importance, for any machine tool can only duplicate the accuracy that is built into it. Interchangeability is necessary to assure to correct fitting of repair parts and also to expedite assembly in the machine tool builder's plant. A given type of machine must be constructed economically, for otherwise it will not meet with a ready acceptance in the market.

In the modern machine tool building plant these problems are met successfully through the free use of jigs and special tools. Cost of such tools is large, due to their bulk, but in the long run the results justify the means as accuracy, interchangeability of parts and economical production is assured. In this article are illustrated and described a few of the methods followed in handling heavy work at the plant of the Cincinnati Milling Machine Co., Cincinnati. This company has been making milling machines since 1884, and the present day methods are the result of long experience.

In the average machine tool building plant it is common to machine heavy work by planing. However, the company in question mills a majority of heavy parts instead of planing them. A few planing operations are performed as will be explained later.

In Fig. 1 is shown a heavy milling machine column arranged for finishing the column face. Here one V has been milled with an angular cutter. This V, the V at the top and the flat surface at the front all are milled at one setting. If reasonable care is used in setting up the work these surfaces will be parallel as they should be. To go back a step further, all castings are made in the company's own foundry by expert molders long trained on this class of comparatively heavy work.

To return to Fig. 1, the machine is a Giddings & Lewis horizontal milling machine. As the illustration shows, the milling machine column in process of finishing is held in a special fixture provided for the purpose, which is located directly on the milling machine table. One important factor that has brought about success in milling operations at the Cincinnati plant is that the engineering department through nearly a half century of experimentation with milling operations of all kinds has no end of valuable data

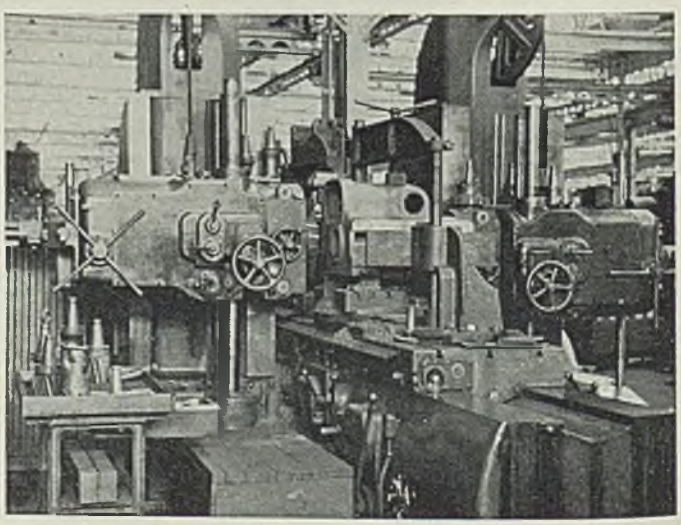


Fig. 3—Simultaneous milling of both sides of spindle carrier housings on milling machines

Production Methods

an important factor in the modern machine to reduce production time and labor cost

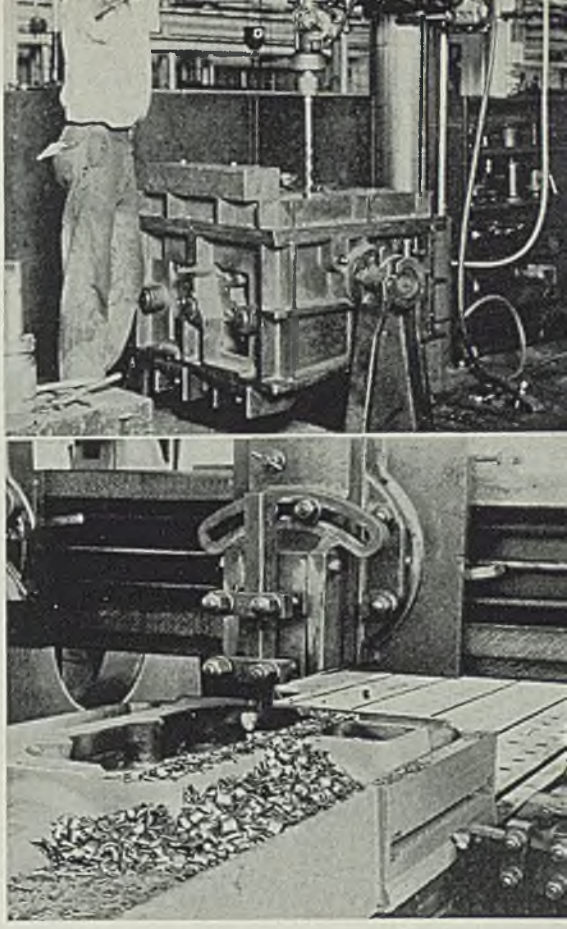


Fig. 5 (above)—Turntable jig working on four sides of a spindle carrier. Fig. 6 (below) —Planer used for planing several milling machine bases at one setting—one of few planer operations

on hand as to what types of cutters are adapted for certain classes of work. Proper cutters correctly ground, have much to do with the success of any milling operation.

In Fig. 2 is shown another set-up on a Giddings & Lewis horizontal miller. In this case the surface finished in the operation shown in Fig. 1 is used as a locating point. In Fig. 2 the work is located in a heavy turntable fixture. Attention is called to the dial indicator. By means of this indicator it is possible to turn the fixture and the work exactly 90 degrees, which is necessary for generating milled surfaces 90 degrees to mill the bottom, and another 90 degrees to finish the other side. Without such a device, accurate angular settings would be difficult to obtain.

In any milling operation, time is saved by finishing as many surfaces as possible at one setting of the work on as many parts as it is practicable to locate on the machine table. Such an operation is shown in Fig. 3. The machine is a special Cincinnati Duplex Hydromatic milling machine, while the operation consists of milling both sides of spindle carrier housings for standard Cincinnati Hydromatic milling machines. Two parts are located on the table in this setting. As the cutters are working on both sides of the parts simultaneously, the milling time is cut in half, while the surfaces thus milled will be parallel. The work is located in special fixtures provided for the purpose.

Such an operation could be done without the use of special holding fixtures, however, considerable time would be consumed in setting up the work and aligning it correctly. Again, where special holding fixtures are employed the work is supported rigidly and thus maximum cuts can be taken without danger of chattering or the work shifting its position under heavy milling cuts. The latter event would mean disaster as it would render valueless large and expensive castings.

The setting up of heavy work for drilling and boring operations always involves considerable expense, but on standard models of its products the Cincinnati Milling Machine company has solved the problem by providing massive drilling and boring jigs. Any mechanic will readily appreciate the fact that a drilling and boring jig large enough to accommodate a milling machine column is a massive unit involving considerable construction expense. Such a jig is shown in Fig. 4. This jig weighs 7½ tons while 3 tons of babbitt at one end serves as a counterbalance. As the illustration shows, the jig turns on trunnions.

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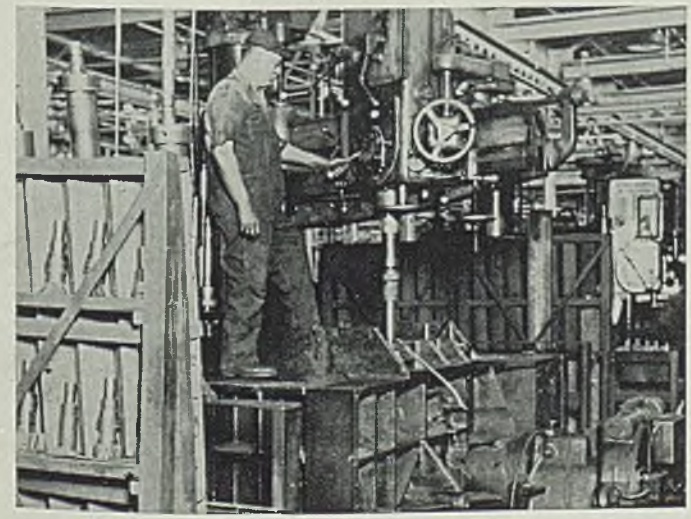
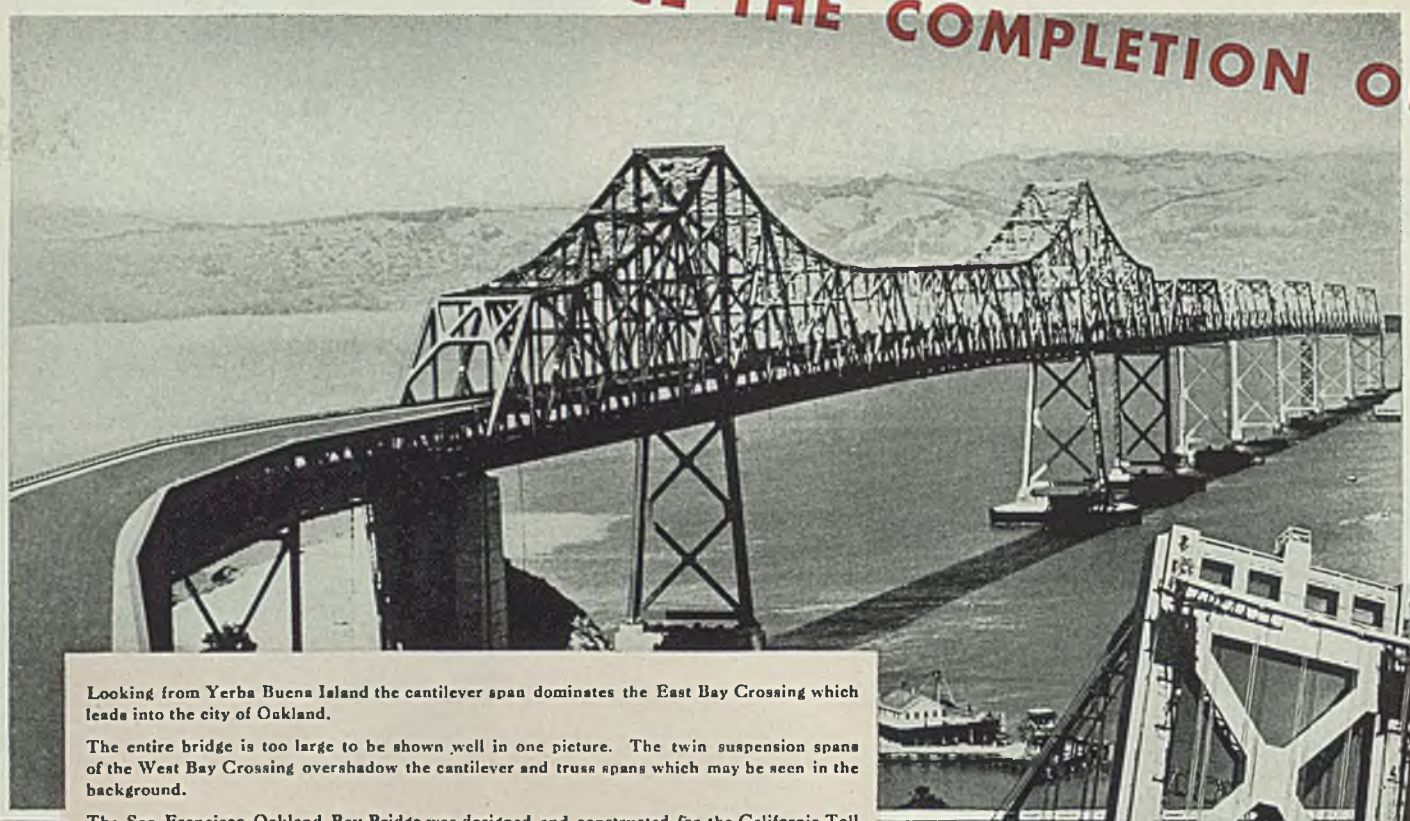


Fig. 4—Drilling and boring jig to accommodate milling machine column, weighing 7½ tons

WE ANNOUNCE THE COMPLETION OF .



Looking from Yerba Buena Island the cantilever span dominates the East Bay Crossing which leads into the city of Oakland.

The entire bridge is too large to be shown well in one picture. The twin suspension spans of the West Bay Crossing overshadow the cantilever and truss spans which may be seen in the background.

The San Francisco-Oakland Bay Bridge was designed and constructed for the California Toll Bridge Authority by the San Francisco-Oakland Bay Bridge Division, Department of Public Works: C. H. Purcell, Chief Engineer.

"THE LAST WORD IN Big Bridges"

BIGGER bridges can be built, of course, but it is doubtful if a longer bridge of equal capacity will be justified in any other part of the world for years to come.

Hence, we are proud to have established the ultimate in size for the present. The work on the San Francisco-Oakland Bay Bridge started July 9, 1933, nearly 3½ years ago, and in that time has recorded many superlatives in modern structures.

For instance, we believe it is the world's most notable bridge — 8¼ miles long between terminals with a length over water of 4½ miles. Yerba Buena Island splits it into two huge structures, a twin suspension bridge and a cantilever structure with truss and girder approaches. It is the world's costliest bridge—$77,600,000.

It required more material than any other—200,000 tons of steel, 150,000 tons of which are in the superstructure; 1,000,000 cubic yards of concrete; 200,000 gallons of paint.

1934 *Nine months after work started, suspension tower number 2 was well on its way skyward.*

It rests on more supporting piers — 51 in all—the smallest being as big as a three story house on 100-foot piles. Several, founded on bed rock, go deeper than any piers ever used before — a maximum of 242 feet below water.

The greatest variety of intricate engineering problems were encountered — the deep water, the mud and quicksand bottom, the tides and wind, tunneling through rock, the longest and heaviest cantilever in the United States, the giant twin suspension span.

1935 *Cables for the west suspension span, spun into 37 individual strands, completed and ready for compacting.*

The towers over which hang the suspension cables are of cellular construction, and range in height from 470 feet to 515 feet above water. Each tower has about 5,000 tons of steel and required 110,000 field rivets.

The cables each contain 17,464 wires, 0.195 inch in diameter. Compacted, the diameter of each cable is 28¾ inches. Weight is one ton per foot. Tensile strength of the steel is 231,000 pounds per square inch. Each cable will exert a total average pull of 40,000,000 pounds on the anchorages. The wire would wrap nearly three times around the equator.

1936 *Early in 1936, units which combine the stiffening trusses and floor beams, were being raised and attached to the rope suspenders.*

The cantilever structure of the East Bay Crossing, with its 1400-foot span and 510-foot anchor arms, sets the record for height, length and weight in this country and is the third longest in the world, exceeded only by Quebec and Firth of Forth.

The bridge has a maximum clearance of 216 feet above low water. Traffic will flow along on upper and lower decks, each 58 feet wide. The upper deck has six automobile lanes. The lower has three truck and bus lanes, and two electric railway tracks. Estimated capacity is 24,000,000 cars a year on the top deck and 6,000,000 trucks and buses on the lower, with loads up to 40-ton trucks and 70-ton interurban cars provided for.

American Bridge Company fabricated and erected the major portion of the superstructure, including spinning the cables. The general contract was placed with Columbia Steel Company. Plain steel shapes and plates were rolled by Carnegie-Illinois Steel Corporation. Cable wire and suspender ropes were manufactured by American Steel & Wire Company. Other materials came from Columbia Steel Company, Cyclone Fence Company, Federal Shipbuilding and Dry Dock Company, National Tube Company, and the Tennessee Coal, Iron and Railroad Company.

1936 *Progress view from of the towers, all steel in pla ready for concrete roadway*

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit
Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

$72.00 SAVED..!

ON EVERY CARLOAD OF TIN PLATE HANDLED

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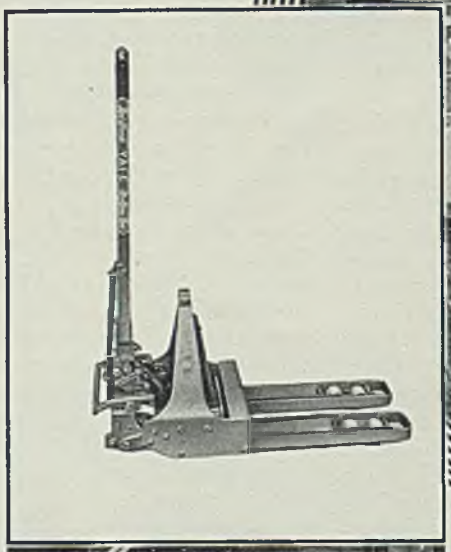


USERS of Yale Tin Plate Hand Lift Trucks report these savings—ten cents on every 100 lbs. of tin plate handled—$72.00 on every carload—economies worthy of consideration in ANY plant.

Yale Truck Users expect such savings because they know that Yale Tin Plate Hand Lift Trucks are BUILT for the job of economical lifting and hauling.

They save MONEY because—mill shipments can be made on pallets. The underslung construction enables the operator to easily roll the truck under the loaded pallet, pick it up and haul it from the freight car to its destination . . . no lost time or lost motion.

Let our representative tell you WHAT and HOW Yale Hand Lift Trucks and Skid Platforms can save on YOUR materials handling jobs.

THE YALE & TOWNE MFG. CO.

PHILADELPHIA DIVISION • Philadelphia, Pa., U. S. A.

Materials Handling

Unit Loading of Sheet Metal Effects Saving Of $122 Per Carload

THERE isn't anything particularly new about steel strapping shipments, whether that strapping is used for sealing individual crates or boxes for safer and more economical transportation, or for attaching products to a skid for similar reasons; neither is the idea of utilizing strapping for binding of loads in freight cars, or in motor trucks, into units to reduce dunnage and other costs of this year's or of last year's origin. Yet, the expansion of the use of steel strapping during the past year indicates that proved economies from this important method of handling materials have been instrumental in attracting many new converts among industrial shippers.

The pioneer in utilization of the strapped skid was the paper industry. Its success in cutting costs by this method soon attracted the attention of the automotive industry, with the result that skid shipping became a standard practice with many automotive parts manufacturers. Then the steel industry, under the influence and insistence of automobile manufacturers, began to experiment with strapped bundles of steel sheets. A more recent development was the unit load idea, and recent investigations show that the steel and metalworking industries are turning more and more to it as a producer of real economies.

The writer recently was accorded the privilege of examining some cost summary sheets applying to shipment cost of skid loads of sheet metal, unit loading of large sheets and skid loading of zinc anodes. The savings in each instance were sizeable. Unfortunately, the names of the companies whose operations were studied must be withheld, nevertheless, the figures themselves tell a story that should prove valuable to many manufacturers who may be seeking ways to further cost reduction.

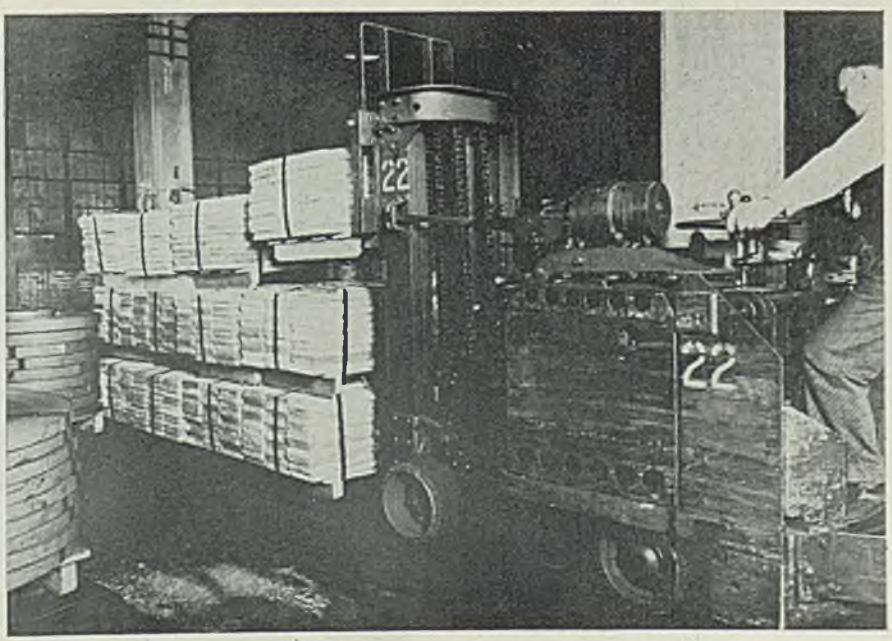
In one case studied, the total cost for preparing a shipment of nine skids of sheet metal, including cost of skids, strapping and labor incidental to preparation and loading of same into the freight car, was $37.77.

Savings Are Attractive

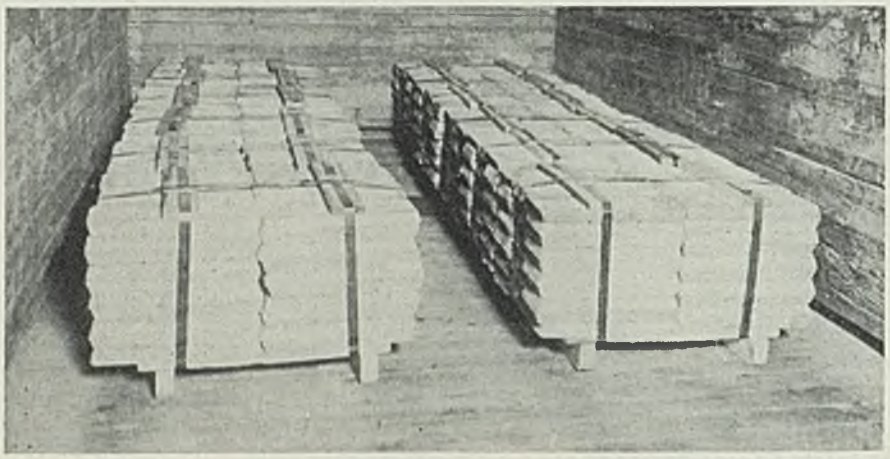
In a third case, skid loading of of packing materials and of loading a freight car of large sheets was $165.20, whereas the unit load cost was shown by the summary sheets to be only $43.17, a saving of $122.03 per carload.

In a third case, skid loading of zinc anodes cost $15.72, compared with a cost under former method amounting to $35.73. In this particular instance the totals represent the combined costs to shipper and receiver.

Following are the breakdowns of



ELECTRIC industrial truck handling a steel-strapped skid load of zinc anodes from freight car to storage. It is estimated that this method of handling results in reduction of as much as 66 per cent in warehouse space requirements for the same quantity of anodes



costs covering the foregoing three cases as taken from the cost summary sheets:

Example 1

Skid Load of Sheet Metal. Sheets 37 x 87 Inches

Skid and Top Platen

92.21 board ft. lumber @ $30 M	$2.76
318 16d C. C. nails @ $3.35 cwt.	0.175
72 6d C. C. nails @ $4.05 cwt.	0.016
59.5 ft. or 5.3 lbs. ¾ x 0.035-in. band	0.380
5 ¾-in. seals @ $2.75 M.	0.014
Material cost per skid	$3.25

Labor to Apply Five Straps to Skid Load

Average 2.5 man-minutes per strap (figured 12.5 minutes at 40c per hour)	$0.0833
1.5 man-hours of labor to cut and nail skid and top platen.	0.60
Labor cost per skid	$0.68
Total cost one skid, labor and material	$4.03

Labor Hauling Skids to Car

9 skids—40 man-minutes @ 40c per hour	$0.27

Labor Chain Tying

4 man-minutes per band x 14 bands	0.40
Labor cost to load car	$0.67

Material

14 bands, 9 ft. each..126 ft. or 11 lbs.	$0.79
14 seals	0.04
Material cost to load car	$0.83

Total Cost of Carload

9 skids @ $4.04 each	$36.27

•

ROD stock for Buick automobiles is handled readily because it is purchased in coils and is automatically fed into a reeling machine which straightens it and cuts it to required lengths. Bundles of rods are then removed from the machine by one of the overhead hoists

THIS method of stowing offers great economies over former car loading methods. In this instance, each skid is loaded with 2500 pounds of zinc anodes which are bound with steel strapping. Reduction of costs of handling in both loading and unloading results from the application of this principal of unit loads

Loading cost	1.50
Total cost for car—labor and material	$37.77

Example 2

Cost of Summary of Carload of Large Sheets. Sheets 37 x 87 Inches. Boxes Total 36,000 Lbs., 500 Lbs. Per Box

Box Weighs 112 Pounds and Has 45 Board Feet of Lumber in It.

45 board ft. lumber @$30 M.	$1.35
Two No. 8 wires—approx. cost.	0.10
150 8d C. C. nails @ $3.50 cwt.	0.05
Material cost per box	$1.50

Labor To Make One Box and Apply Wires

1 man-hour @ 40c per hour	$0.40
To apply two wires—2 man-minutes each	0.027
Labor to make and strap 1 box,	$0.43
Cost of material and labor for 1 box	$1.93

Labor Hauling Boxes to Car and Tying

72 boxes × 5 man-minutes @ 40c per hour	$2.40
To unit tie boxes in the car, 5 bands at 3 minutes per band	0.10
Labor cost per car	$2.50

Material Used to Load Car

5 ½ x 4 x 126-in. floor strips—22 board ft. @ $30 M.	$0.66
160 ft. of band	1.09
5 seals	0.01
Material cost per car	$1.76

Cost Per Unit	Boxes	Skids
Labor and material	$1.93	$4.03
Number per carload	72	9
Loading labor and material	$1.76	$1.50
Weight of dunnage, lbs.	112	200
Freight on dunnage	$0.34	$0.60

Cost per Car

72 × $2.27 + $1.76 = $165.20
9 × $4.63 + $1.50 = $ 43.17
Savings $165.20 — $43.17 = $122.03

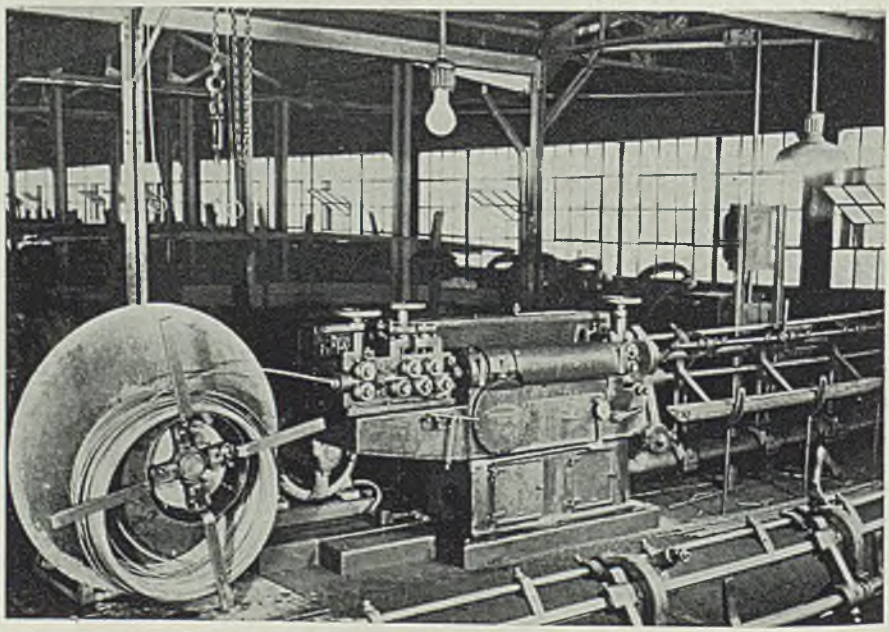
Example 3

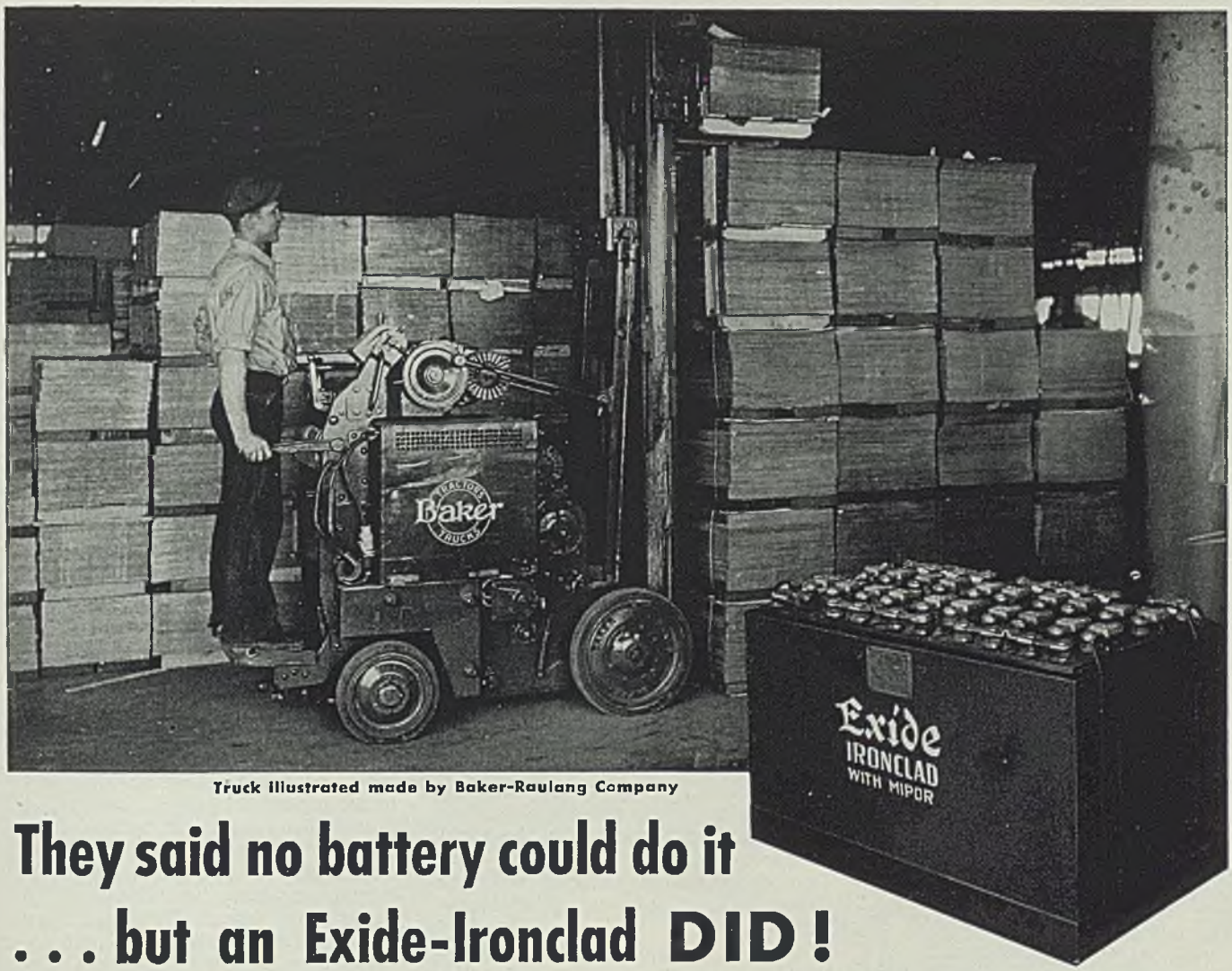
Cost Summary of Comparison of Skid Load vs. Bulk Load of Zinc Anodes

Origin Handling Costs

	Skid Load	Bulk Load
Unit weight, lbs.	3,000	67
Labor and material cost to place each unit in car	$0.55	$0.015
Number of units per car	26	1260
Total cost of car labor.	$14.30	$18.90
Cost of unit load or bulkheading labor and material		$1.27
Cost of freight on dunnage	$0.42	$0.065
Total cost of car	$14.72	$20.23

Saving at origin $20.23 — $14.72 = $5.51





Truck illustrated made by Baker-Raulang Company

They said no battery could do it . . . but an Exide-Ironclad DID!

THE officials of a large steel mill recently were skeptical that batteries could handle a tough haulage job in the mill. "It's too hard for batteries," they said. But we told them, "Not at all — and we'll prove it." They were from Missouri but willing to be shown.

An 18-cell TLM19 Exide-Ironclad Battery was installed, and here is the record: —

Time of operation, 8.5 hrs.
Truck in actual motion, 6.7 hrs.
Tons hauled, 322
Number of trips, 290
Average distance, 170 ft. each way
Average speed loaded, 480 f.p.m. or 5.6 m.p.h. not including acceleration

At the end of the period the battery was still going strong and could have done about 20% more work. The loaded speed from morning to night had varied but 5.76%.

Those who had been skeptical at the start changed to enthusiastic Exide boosters. The operator said the truck handled better and for once he did not have a headache at quitting time.

This is only one job, but we *proved* batteries could handle it. There are many others, and we stand ready to prove that Exide-Ironclad Batteries can handle them if given the opportunity. It is simply a job of engineering analysis and of the right size battery for the work to be done.

Let Exide analyze your handling jobs . . . there is no obligation.

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WITH EXIDE MIPOR SEPARATORS

"MIPOR," Reg. U. S. Pat. Off.

Destination Handling Costs

Skid Load	
0.5 man-hour @ 50c per hour unloading	$0.25
0.5 man-hour @ 50c per hour weighing	0.25
0.5 man-hour @ 50c per hour warehousing	0.25
0.5 man-hour @ 50c per hour hauling to machines	0.25
Total	$1.00
Bulk Load	
10 man-hours @ 50c per hour unloading	$5.00
1 man-hour @ 50c per hour weighing	0.50
10 man-hours @ 50c per hour wareh'sing, stacking or tiering	5.00
10 man-hours @ 50c per hour hauling to machines	5.00
Total	$15.50
Saving at destination $15.50—$1=$14.50	
Grand total cost origin and destination, skid load	$15.72
Grand total cost origin and destination, bulk load	$35.73
Net saving per 80,000-lb. car	$20.01

During the early days of the depression, the United States department of commerce made an extensive study of skid shipments. In the course of this, many experimental shipments were made. In one instance, it was claimed, 14 loaded skids with a total of 43,000 pounds were transported from a loading platform at an electric manufacturing plant, stowed and blocked in a freight car in 36 minutes, utilizing one lift truck, one truck operator and one helper.

One of the conclusions from this study was that if goods are properly packed on substantial skids, and the skids properly stowed and blocked, the danger of damage in transit is far less than when the same commodities are stowed in the ordinary manner in separate containers. The study also showed that changes in packing and other economies incidental to skid shipments would more than offset the dunnage weight of the skids themselves.

Special Tools and Fixtures Raise Production Levels

(*Concluded from Page* 51)

over by manual effort so a two-horsepower motor working through reduction gearing is provided. In this jig 15 holes are drilled and bored through the side and bottom of the jig, which is located directly under a 6-foot Cincinnati-Bickford radial drill. In the illustration the machinist is shown standing on the jig in a convenient position. It is necessary to stand on the jig to change tools and to operate the feed mechanism. As climbing up on the jig many times a day would prove tedious, an hydraulically operated elevator or lift has been provided at one end for the machinist's convenience.

Small Turntable Jig

This simple installation saves considerable time. As the work in this jig is located from the milled surface shown in Fig. 1, all holes will be in proper relation with the column. This is especially true of the holes for the spindle bearings, for the spindle in the finished machine must stand exactly square with the column face. Otherwise the finished machine would not pass the rigid inspection required of all the company's products before they are released for shipping to the customer.

A good example of a smaller turntable jig is shown in Fig. 5. The part in this jig is a spindle carrier for a 3-24 Hydromatic milling machine. The part is worked upon from four sides on this jig, while an end plate is provided for further drilling. In all 62 holes are drilled, bored or end reamed on five sides of the work. As this jig is well balanced on its turn trunnions, it can be turned over readily by hand. Its dimensions are 33 x 33 x 24 inches. Work is done under a 5-foot Cincinnati-Bickford radial drill. While the two turntable jigs described are very expensive to construct, they save endless hours of time that otherwise would be consumed. Without such jigs it would be necessary to drill and bore the numerous holes on a boring mill wherein several settings of the work would be necessary. There always is chance for error when work is laid out and bored in this manner and these errors are absolutely eliminated through the use of jigs as they will finish all parts exactly alike.

Bases Planed in Groups

Planers are used for a few operations, a typical one being shown in Fig. 6. This machine is a Cincinnati 48 x 48 inch planer with a 30 foot table. The work is a milling machine base 6 x 3 x 9 feet and it is possible to plane several bases at one setting. In handling work of this kind no work holding fixtures are necessary since the parts are strapped directly to the planer table. As the illustration shows, one cross rail head and one side head are in use. A substantial planer of this type is capable of taking heavy cuts and in this instance the tool in the crossrail head is taking a cut ⅝-inch deep with a 1/16-inch feed. The cut taken by the side head in this case is not quite so deep as it is not necessary to remove much metal from this surface. On work of this kind, one roughing cut followed by a finishing cut with a wide nose tool and a ⅜ to ½-inch feed is necessary. In some instances, however, a straightening up cut is taken before the final finishing cut, depending on the work.

Heavy Work on Planer

The planing job shown in Fig. 7 is of more than usual interest as the work consists of finishing an all steel grinding machine base of welded construction. This unit is 84 x 60 x 54 inches. In Fig. 7 the view is from the back showing a reach tool in use for reaching a surface in a depression at the base. The machine used is a 60 x 84 inch Gray planer with a 30 foot table. This is another example where heavy work pieces can be handled to advantage on the planer.

It is shown that special equipment plays an important part in the accurate machining of machine tool components for without the use of special appliances the necessary accuracy could be attained only at considerable expense. The fact American machine tool builders do use special tools accounts in a measure for the high quality of American made machine tools which is known and appreciated throughout the world.

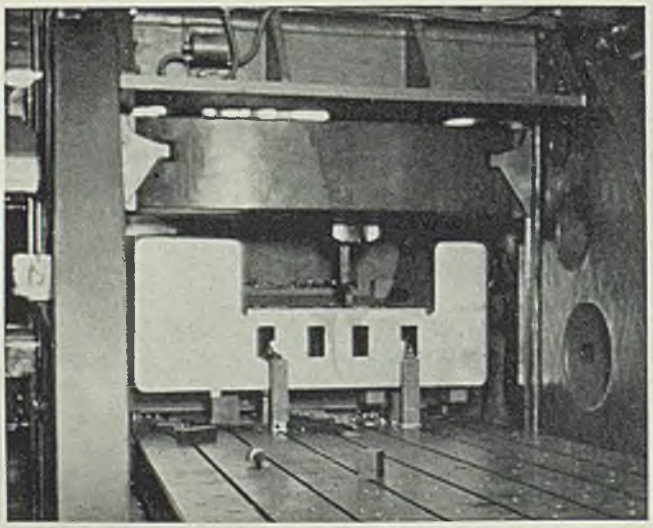
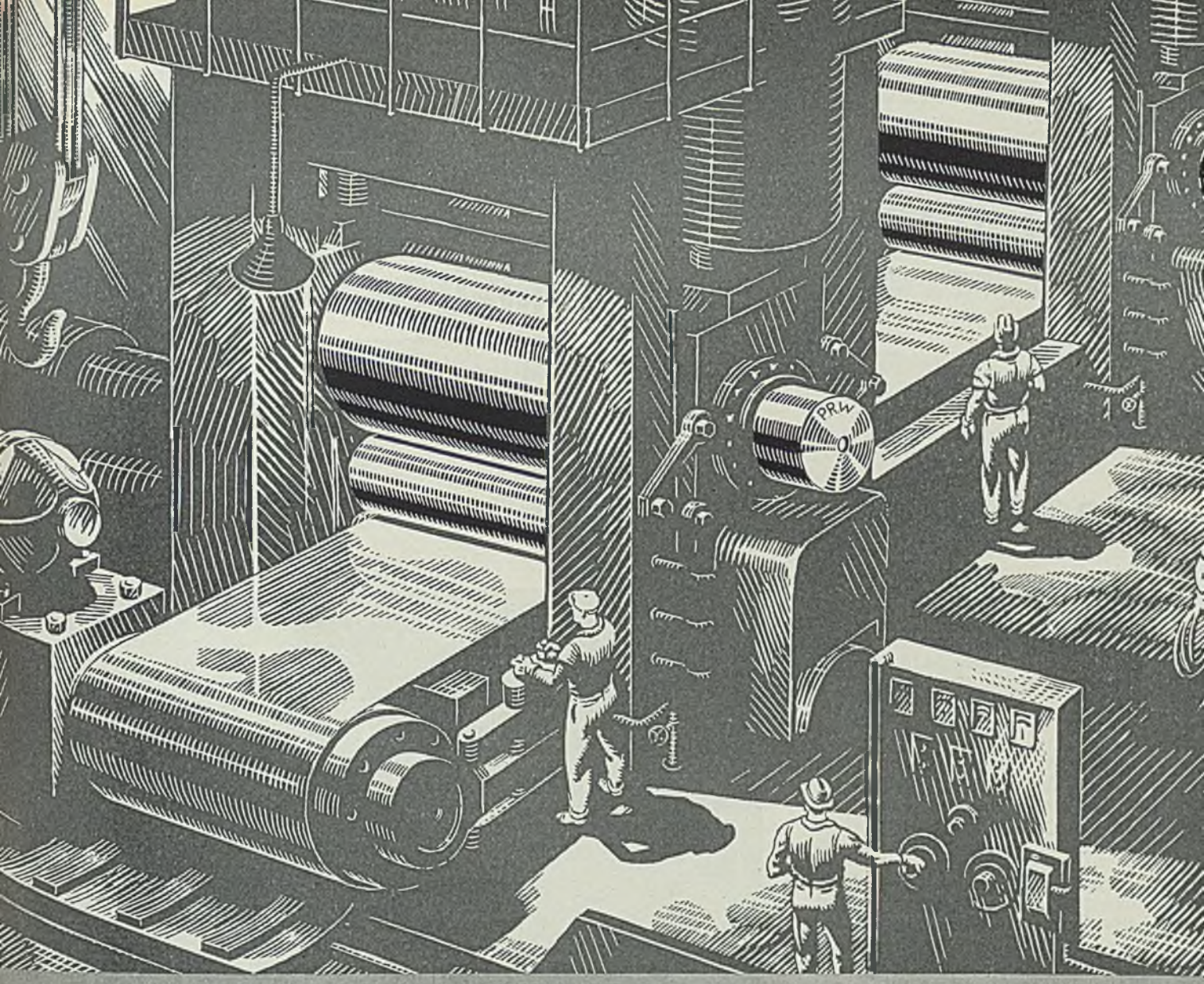


Fig. 7—Planer finishing on all steel grinding machine base of welded construction



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PITTSBURGH ROLLS CORPORATION

PITTSBURGH, PA.

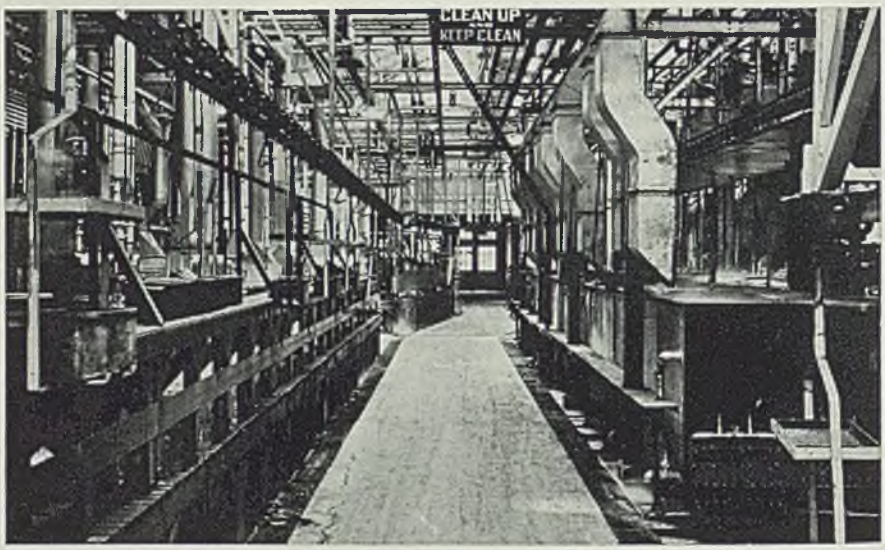
SURFACE TREATMENT AND FINISHING OF METALS

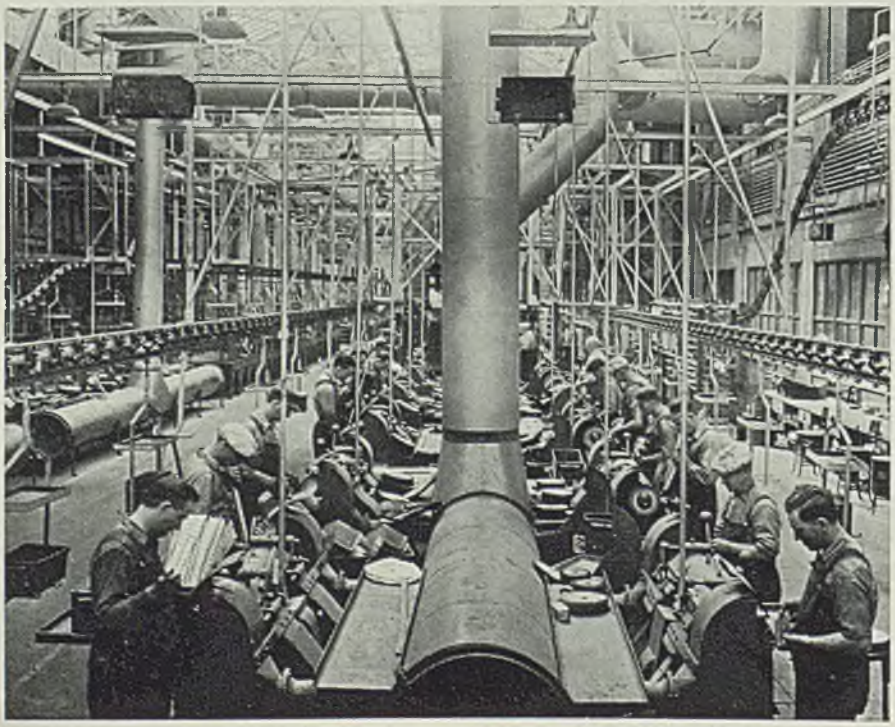
Conveyors Speed Production Plating Work

AN EXAMPLE of good housekeeping and efficient materials handling in electroplating plants is illustrated in these two views of the plating department of Packard Motor Car Co., Detroit.

Above, at right, is a general view through the middle of the plating section. To the right are the continuous plating baths where the copper and nickel plating is done. At the left, in the foreground, is the chromium plating department, and to the left of the center in the background is an installation of chromium plating die castings and other zinc parts.

The metal grating on each side of the aisle covers a trough in which water is running continuously. This carries off any plating solution





which may leak from the tanks or is splashed on the floor. The conveyor at the left carries the work along the unloading bench where it is readily reached and transferred to the plating baths. Important features of this plating department are the ample lighting and ventilation facilities.

Below, at left is shown a part of the buffing section. A conveyor system carries the work throughout the department on a continuous chain. After a part is copper plated it is carried on the conveyor down the line of buffing machines and is readily reached by one of the operators. It is buffed and returned to the conveyor which carries it to the nickel plating baths. After nickel plating, the part is returned to the buffers, is buffed and then goes back on the conveyor to be carried to the chromium plating department. When it has been chromium plated it goes back on the same conveyor and is again carried to the buffers. When the buffing operator

has finished polishing the part, he hangs it on the conveyor and it travels through the department until taken off by the inspectors in a special inspection booth not shown in the illustration. One section of the conveyor carries unplated parts from the metal finishing rooms on upper floors of an adjoining building.

The ventilating ducts in this room carry away 200,000 cubic feet of air per minute. Note the shields which protect the mid-sections of operators.

Highly Finished Tools Command Respect of Shop Mechanics

WHETHER it is instinctive or not, it is a fact that the majority of individuals show more regard for an article with a high finish than for one without. Even that part of the human family which is supposed to be lagging farthest behind possesses this trait. Civilized man and savage alike strive to beautify the things which surround their daily lives.

In civilized lands this love of the bright and glossy dominates the entire industrial scene. An automobile would run as efficiently with much less polish—a radio would give forth music as sweet in a painted cabinet as in a highly polished one. Nevertheless, given the opportunity to possess one of these modern luxuries, nearly everyone selects the one with the high polish.

Unnecessary Expense Traced

The same holds when the tools used in machine shops are considered. When tools and gages are made to sell in the open market a good finish is essential for competitive reasons, but what about those that are made for use in the maker's own toolroom. Few employers have grasped the importance of finishing their own tools, for strange to say, the man in the shop is not credited with possessing that high regard for finish that the fellow outside is known to have. Experience has proved this is a mistake which results in poor work and unnecessary expense, the latter not easily traceable unless the facts stated are borne in mind. A few illustrations of actual cases will perhaps be useful.

Half a dozen identical snap gages were to be made for shop use only. Hardening, tempering and finish grinding of the work faces had been completed and the toolmaker was busy polishing the gages to bring out a high finish. He had finished two when the head of the department in which they were to be used made a hurry call for the lot. Informed that he could have the two finished ones, he decided not to wait until the apparently unnecessary work of polishing the other four was completed and taking up the half dozen gages, he hurried off with them. Nothing more was thought about the matter until the man who had made the gages had occasion to go into the department where they were in use.

Polished Gages Protected

He was not much surprised to find that the two gages which had been polished were treated as "master gages" and the other four used more as a check before the actual size was reached. Nobody trusted these although they were identical in every way with the polished ones. The unfinished gages were found thrown down on any part of the machine, but both men who had been given a finished gage had procured a small box to hold it. It may be easily imagined which of the gages would have the longer life and which was the most economical in practical use.

Another company uses jigs and fixtures built up of steel plates welded together. No finish of any sort is allowed beyond the actual squaring up and locating points. This makes it difficult for the toolmaker who has to supply, as finished, work which has the appearance of salvage materials. What happens to this toolroom's products after they reach the shop? Nobody can see any particular reason for being careful with unsightly tools. Hammers and wrenches are used freely to ease in pieces that may fit a little snugly, and if a jig must be turned over it is thrown over in no uncertain way. Besides this, a rough looking jig or fixture will never inspire a man to do good work. It is easy to imagine him thinking that the job cannot be very important if he is expected to do it with a rough jig.

In strong contrast to this is the shop that really believes a good job is worthy of a good tool. This does not mean that unnecessary time is spent in finishing a jig and polishing it. In one shop all jig feet are frosted and bosses and all locating points are ground. In fact any part which requires finishing is well done. The result is a jig of pleasing appearance and one that inspires respect. The difference in the way these jigs are handled as compared to the first shop is really amazing. The men take a personal interest in seeing that they are not damaged, and there seems to be a feeling that a good job is expected merely because the appearance of the jig creates that impression.

Rough Tools Used Roughly

A cutting tool often suffers also in shop use because it looks too cheap for lack of finish. An incident is cited to show exactly what is meant. The cost of some special box cutters used in the manufacture of valves was found to exceed the estimates greatly. Investigation revealed this was caused by a high percentage of broken cutters. Further research brought to light the fact this unusual breakage was due entirely to rough usage on the machines. Instead of giving the cutter time to start the cut and center itself the men were jamming them up against the castings with too much force. The result was that an

(*Please turn to Page* 67)

CAREFULLY made jigs and tools prompt the skilled mechanic to exert his best efforts

POWER DRIVES

Automatically Controlled Drive Speeds Operation of Slushing Units

EASE and advantage of automatic control and operation of equipment at the adjusted speed most suitable for the work is an advantage of the unit shown in the accompanying illustration of the drive of an electric slushing unit. This particular unit is used to slush bearings parts in a plant in the Detroit district.

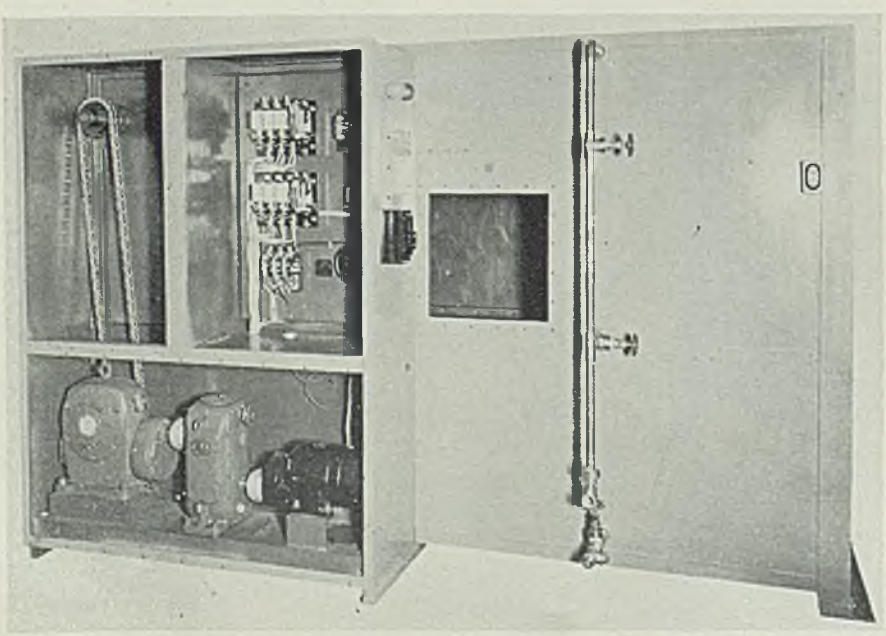
The drive is built on the side of a tray type conveyor slushing unit about 10 feet long; the conveyor is driven from the top shaft connected to a roller chain. The thick slushing compound is heated electrically to a thin liquid and the baskets of bearing parts conveyed down through the hot circulated compound around to drip and back to the inlet, which is at the end of the unit and not shown.

Two unusual features of this unit are the low variable speed drive of the conveyor and the automatic operation. Each time a tray comes in position opposite the door of the tank the conveyor is stopped automatically long enough to permit the operator to remove the basket of parts and insert another. The conveyor then automatically starts through electrical devices and continues the process. The operator can stop and start by independent pushbutton control.

The positive speed control drive which permits this timing consists of a combination of eight power drive units. The 1-horsepower geared-head motor drives an all-metal P.I.V. positive variable-speed, 4 to 1 ratio gear which in turn connects to a double reduction unit employing a helical gear as first reduction and a cut-tooth worm gear unit on the second reduction. Both input and output shafts of the variable-speed gear are connected by flexible couplings using silent chain, encased and lubricated. as the flexible unit.

Drive from the worm reducer to the conveyor is by roller chain on sprockets. To guard against damage, if a basket or part slips and catches in the totally enclosed slushing chamber, the upper chain sprocket has a shear pin which breaks with the heavy load and permits the gear to revolve loose on the shaft. The pin is easily and cheaply replaced.

Entire drive unit, except geared-head motor, electrical control and conveyor were supplied by Link-Belt Co., Philadelphia. The slushing unit is manufactured by Hynes Electric Heating Co., Philadelphia.



Combination of power drive equipment to give positive low-speed automatic control of operations on slushing conveyor for small parts

♦ ♦ ♦

Roller chains for unprotected transmission and for use in conveyors, where subject to corrosive liquids or excessive moisture, are available in 18-8 stainless steel and in bronze, including pins and rollers. Side bars and attachments for conveyors are also manufactured of the same materials. Thus the chains may be exposed to most of the dilute acids including pickling liquids.

♦ ♦ ♦

One engineer has estimated that on one type of drive the life of the unit varies inversely as the fourth power of the load. Accordingly, a drive overloaded 100 per cent will last only 1/16 as long as a drive designed for the 100 per cent overload. Any type of drive has a shorter life and increased maintenance with excessive overloads.

See Our Exhibit at the Twelfth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York. November 30 to December 5, 1936. Booths 326-331.

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WELDING, etc.

by Robert E. Kinkead

Language of Welding

LEON C. BIBBER, chairman of the Symbols committee of the American Welding society and welding engineer for the Carnegie-Illinois Steel Corp., announced the symbols and nomenclature to be suggested to the American Welding society at a meeting of the local welding society chapter in Cleveland, November 11th. This work is important, in view of the fact that no two shops which use welding have a common language with which to describe the welds they make.

In erecting standards and providing symbols, the welding society is providing a universal language with which welds may be described and understood in Germany, France and Russia as well as they are in this country. The matter is of particular significance where purchaser and vendor enter into a contract by which welded steel construction is to be furnished. Unless the type and kind of welds are accurately specified, the vendor can furnish any kind of a weld he wishes and claim such was his understanding of what was to be furnished. Since the element of safety is involved in many cases, the desirability of a common language of welding has been evident for several years.

These symbols will be ready to issue within a few weeks and manufacturers will find it advantageous to adopt them as standards.

Surface Hardening

SIMILAR to welding in many respects, and manifestly an out growth of welding experience, surface hardening of parts by heating and quenching has reached a high state of perfection. Three processes are known in this classification.

Torch hardening is accomplished by applying the heat and water quench at the same time. Pressure of the gases keeps the water away from the metal being heated. Progressive movement of the torch or the work brings the quenching bath of water to the heated metal. Depth of hardening may be from 1/16-inch to ⅛-inch.

The Teleweld process, which is used to harden rail ends for steam railroads, employs a direct-current carbon arc which is oscillated by an alternating-current magnetic field as the heating element in place of the oxy-acetylene torch in the process described above.

The Tocco induction hardening process shown at the National Metal exposition uses high frequency alternating current to induce heating currents in the surface to be hardened with subsequent quenching by water.

In certain cases it now appears likely that welding experience will make possible another solution to the problem of having a soft core and a hard surface. In these circumstances the part is made of two types of metal fused together. By suitable selection of analysis, the same heat treatment which makes the core soft will make the surface hard. This represents one of the possibilities in the field of composite metal structures.

New Bodies Go All-Steel

WELDING the steel door pillar to the rocker panel which reinforces the metal floor at either side in the new "unisteel" Fisher bodies. Flash, spot, arc and gas welding are employed in fusing the various parts into one homogeneous steel unit. The new bodies are being introduced with the 1937 General Motors cars (STEEL, *Nov. 9, p. 74*)

Painting of finished cores for ingot molds. After painting they are allowed to set for one to three days

Adopts Randupson Process For Making Ingot Molds

BY E. A. FRANCE JR.
Associate Editor, Pittsburgh

MANUFACTURE of ingot molds with the use of cement-bonded molding sand, now proceeding commercially, marks the first time that this method, which is popularly known as the Randupson process, has been used for this type of gray iron casting in the United States.

Operating under an exclusive license from the Birdsboro Foundry & Machine Co., Birdsboro, Pa., which in turn is American agent for the Society d'Electro-Chemie d'Electro-Metallurgie et des Acieries Electriques d'Usine, the French patent holders of the Randupson process, the Vulcan Mold & Iron Co., Latrobe, Pa., in the Pittsburgh district, has recently changed its process completely in the manufacture of ingot molds.

Affords Many Advantages

The essentials of the Randupson method in ingot mold production at Latrobe find important advantages over ordinary sand molding on a number of points. From the standpoint of the finished mold, Vulcan has found that within the last few months since it has adopted the process, since there has been a virtual elimination of both human and material variables causing surface defects, chipping and grinding to remove usual casting imperfections are practically eliminated.

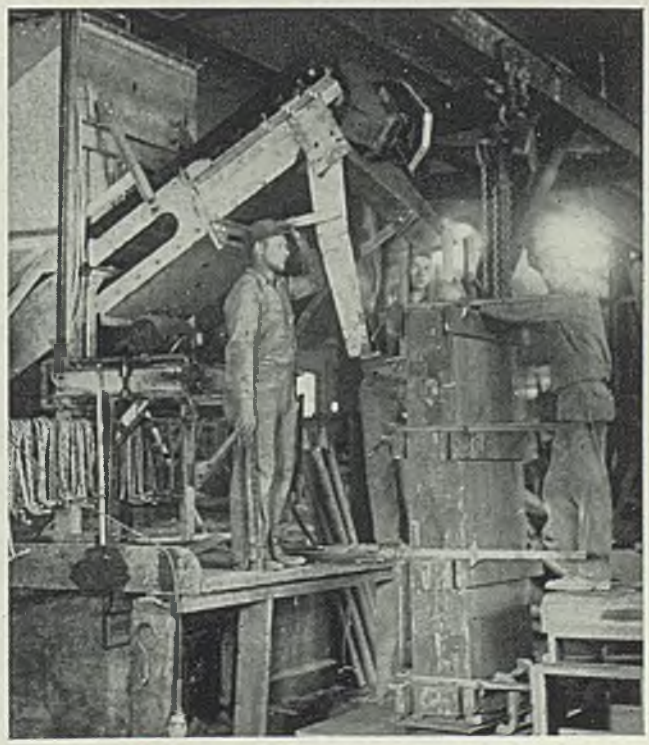
Thus, the original "skin" on the ingot surface of the mold is left. This retention of the "skin" makes the mold more resistant to fire cracking, it is claimed, than a ground surface since the pores of the metal are not opened and oxidation is retarded. Furthermore, the size of the mold is not changed.

Secondly, the elimination of stresses within the ingot mold casting is claimed from the greater inherent refractory value of the cement-bonded sand mold. Consequently, the insulating properties of this method of casting tend to provide an annealing effect on the metal, reducing stresses which may have been set up, and thus result in an important bearing for longer mold life. Some idea of the refractory action may be gained from the fact that small molds of around 2000 pounds retain their heat even 24 hours after pouring.

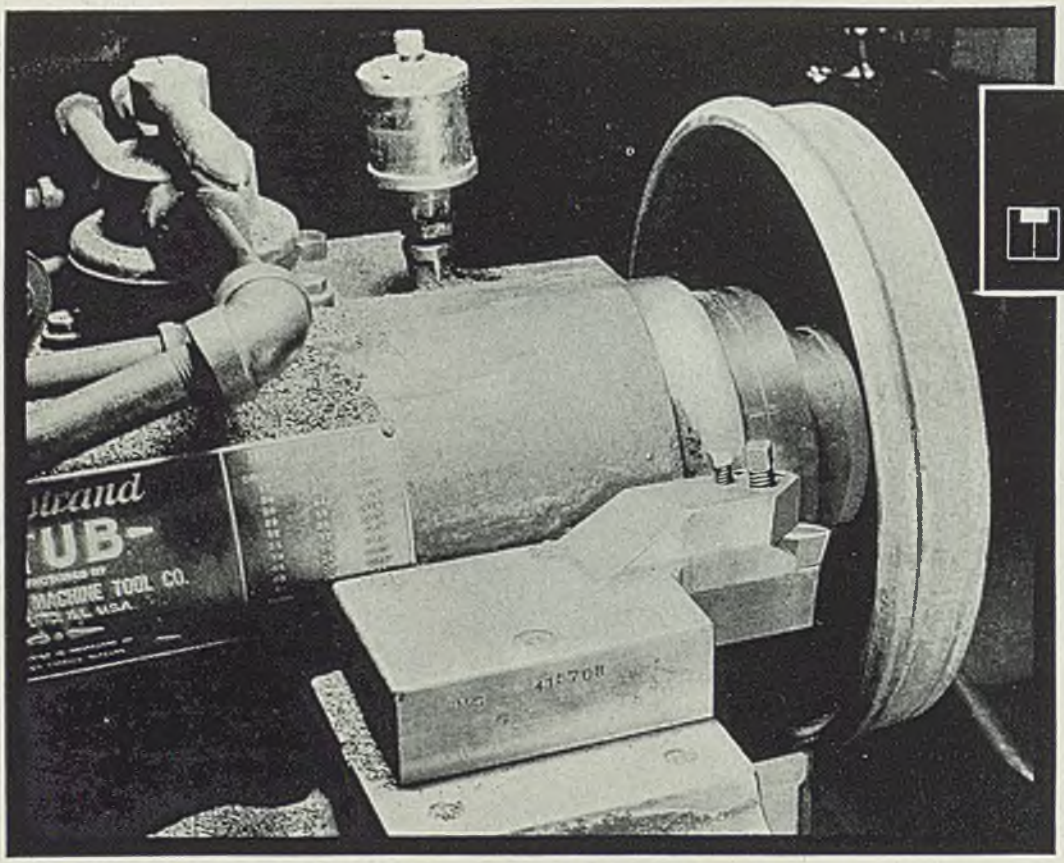
Assures True Reproduction

In addition, due to the strength and trueness of the cement-bonded sand mold, it has been found that mold castings are faithfully reproduced and the method seems apparently well adapted to irregular contours of ingot surfaces.

Vulcan Mold & Iron Co. has made extensive changes in its plant to accommodate the new method of casting, since it began to change over about July 15 of this year. A modernization program, including the installation of new conveying equipment, storage bins, pulverizer, dust collector, batch mixers and jolting



Mixture of sand and concrete is run into boxes which are set on jolt machines to replace hand ramming



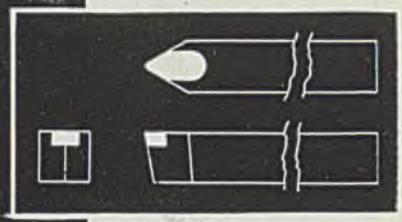


Diagram of tool used in the operation illustrated—Vascoloy-Ramet grade AT for use on hard cast iron in mass production jobs requiring increased pieces per grind.

Finish boring centrifuse brake-drum. Material: the brake surface of the drum is cast iron centrifugally cast into a steel shell. Performance of Vascoloy-Ramet tool:

Speed	Feed	Tool Life
118 R. P. M. 370 Feet Per Minute	.007 Per Revolution	146 Pieces Per Grind

Faster work—done better—at lowered costs! Yet this is only one of thousands of tough jobs in which Vascoloy-Ramet, the new tantalum carbide hard alloy, is daily proving its superiority.

And the grade here used is only one of fifteen grades that cover the complete range of machining needs!

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On cast iron, semi-steel and nonferrous materials, its performance is exceptional.

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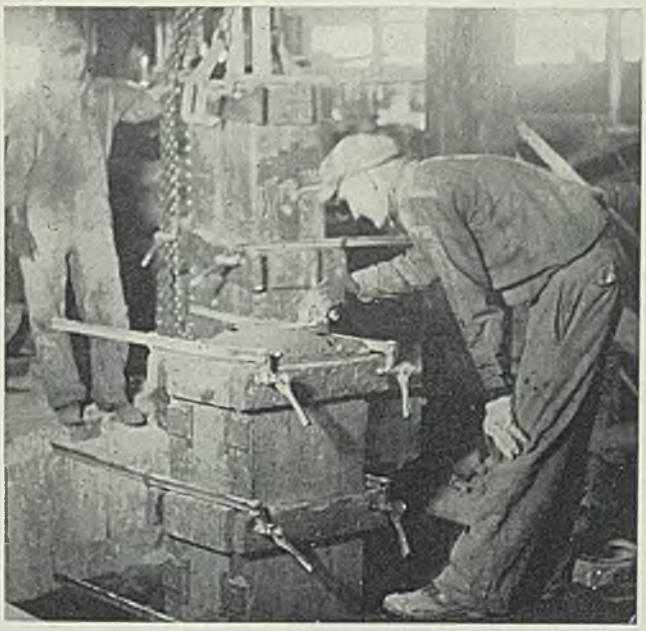


Workman putting finishing touches on a core before the box is removed

machines have all been installed and now are in operation.

The various steps in the Randupson process begin with the use of ordinary wooden core boxes and patterns which take a molding sand mixture composed of 98 per cent pure silica sand, to which is added "high early strength" Portland cement and water. The patented feature lies in the percentage of water used, the quantity being sufficiently small so that all the water is chemically absorbed and there is no resultant excess. Therefore, during casting no gas is formed as is the case with ordinary molding sand and the only reaction is a small amount of steam which does not arise until after the casting is set.

Special Sand Is Used

The highly-pure silica sand used is especially specified for uniformity of grain size and dryness. This process precludes the use of many different kinds of molding sand and the necessity of the foundry carrying them in stock. Elimination of the variables found in the old process of loam sand bonded with clay and varying in grain size, bond and moisture content reflects in the absence of problems over possible defects such as scabs, buckles and blowholes in the mold when cast. Likewise the problem of maintaining size and shape accurately to pattern is also solved.

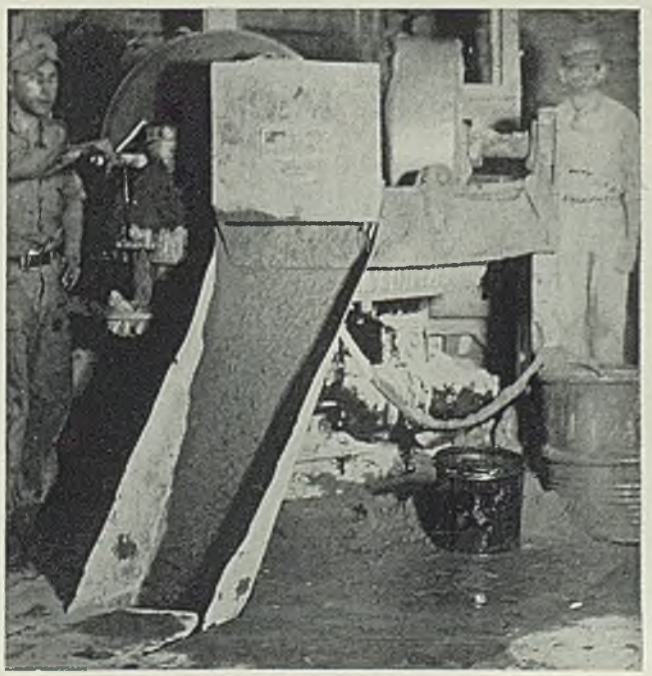
Instead of ramming the mold by the old method of pneumatic rammer, it is possible to use jolt machines, which have not been successfully used with loam molding sands. The jolt machine produces a more uniform ram than the pneumatic method. After ramming, the mold is then naturally air dried for a period of time varying from one to three days, prior to casting. It has been found that this natural air drying has advantages over forced oven drying, which often dries the skin of the mold only and not uniformly.

Since the sand mold is then set up hard and strong enough in itself, the need for flasks, core bars and other metal equipment is largely eliminated.

Casting of the metal is considerably quieter due to the absence of formation of gases from the mold itself. The Vulcan company has found in actual practice that the metal "lays" better in the mold and that the porosity of the cement-sand mold "vents" better than ordinary sand.

The entire process as now operating at Latrobe is claimed to be the nearest approach to complete mechanization yet obtained in the manufacture of ingot molds. The company's new equipment, set up with the prime purpose to mold for both accuracy and control, begins with a Jeffrey Mfg. Co. conveyor for handling sand, a Clearfield mixer for batch mixing of the silica sand, water and cement, a Herman jolt machine for replacing hand or pneumatic ramming and a Jeffrey pulverizer and Pangborn dust collector for reconditioning old sand.

With the new molding process, the company is continuing its patented process of making de-sulphurized, cupola-controlled analysis ingot molds, first adopted ten years ago.



Mixer showing composition of sand, cement and water. Runway in the foreground transports material to the conveyor system

New Sizes Offered in Low Temperature Brazing Alloy

New sizes and forms of brazing alloys have been placed on the market by Handy & Harman, New York. To the Sil-Fos line, for joining copper, brass and bronze, has been added a new strip thickness, 0.005-inch, in widths of ¼-inch or more. To the Easy-Flo line, used with both ferrous and non-ferrous metals and especially for joining steel, stainless steel, monel metal and other copper-nickel and chromium-nickel alloys, as well as dissimilar metals such as copper and steel, have been added a new wire size, 3/64-inch, and four new strip gages, 0.020, 0.010, 0.005 and 0.003-inch, in widths of ¼-inch or more.

For special applications, additional forms such as washers, circles, rings and filled or powdered forms still are available.

PROGRESS IN STEELMAKING

New Grinding Machine Handles Rolls For Continuous Broad Strip Mills

NINE separate electric motors totaling 113¾ horsepower and ranging in size from ¼ to 60 horsepower are employed for operating a large roll grinder recently completed for servicing the rolls used on modern broad stripsheet mills. The new unit, which has a swing of 60 inches and a spread of 312 inches between centers, weighs in excess of 90 net tons.

An idea of the massiveness of the machine may be gained from the headstock and footstock spindles which measure 12 inches diameter. The grinding wheel spindle bearings also are much above the average size, being 6 inches diameter and 14 inches long. The grinding wheel head alone weighs nearly 8 tons. The machine is designed to handle rolls weighing up to 75 tons.

This type machine is built with 36, 48, 52 and 60-inch swings and in lengths ranging from 120 to 312 inches between centers depending upon the swing. All machine movements may be controlled from an operating platform located on the traveling wheel carriage. The point of contact between the grinding wheel and work being surfaced always is in plain view.

The headstock is driven by multiple V-belts, the drive being located in a pit at the end of the machine. By this arrangement vibration is kept away from the bed. The grinding wheel head is equipped with large babbitt-lined steel wheel spindle bearings. These are flood lubricated with filtered oil by means of a special lubricating system which will not permit the wheel spindle driving motor to start until the pump drive motor has raised the pressure in the oil line to a certain amount previously determined.

A crowning and concave mechanism of the adjustable crank pin type causes the wheel to grind symmetrically and mathematically accurate contours, the setting being made quickly at the rear of the wheel base end. Flood lubrication is provided to the wheel carriage ways, the traversing mechanism and the work and grinding wheel spindle.

The new grinding unit, shown in the accompanying illustration, is of the same general design as many others which have been supplied to numerous steel manufacturers in this country by the Landis Tool Co., Waynesboro, Pa.

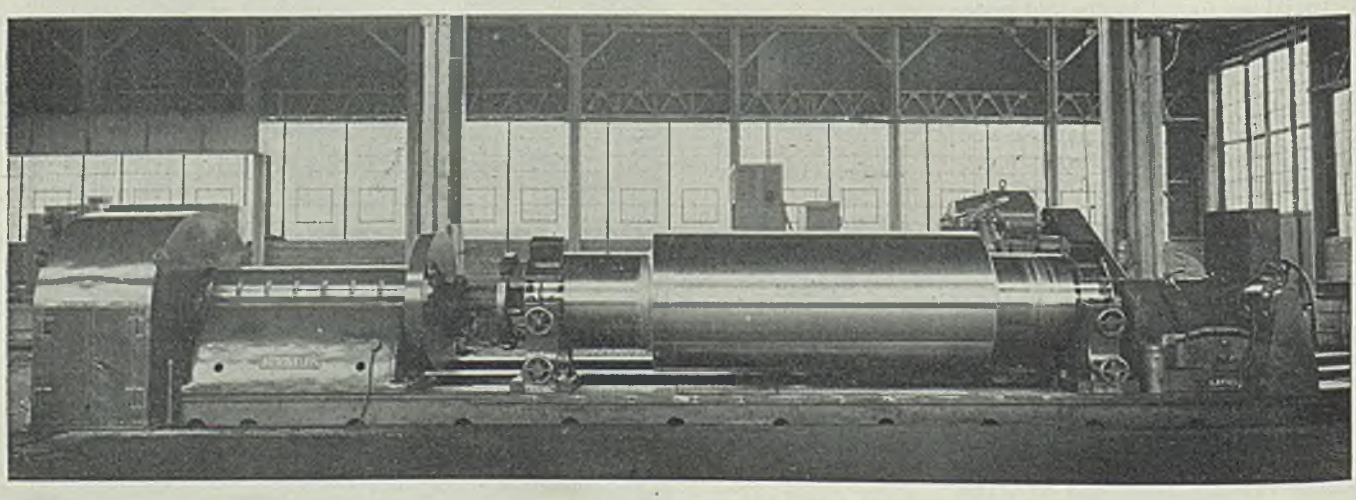
Charts Now Are Available

All temperature, heat flow and emission problems encountered in high-temperature heating furnaces as well as in the open hearth now may be solved quickly by a set of six charts, each 11½ x 16 inches, devised by W. C. Buell, Jr., author of "The Open-Hearth Furnace." The diagrams suitable for calculation to close limits and amply bound, may be secured from STEEL at a cost of $5.00 per set, postpaid

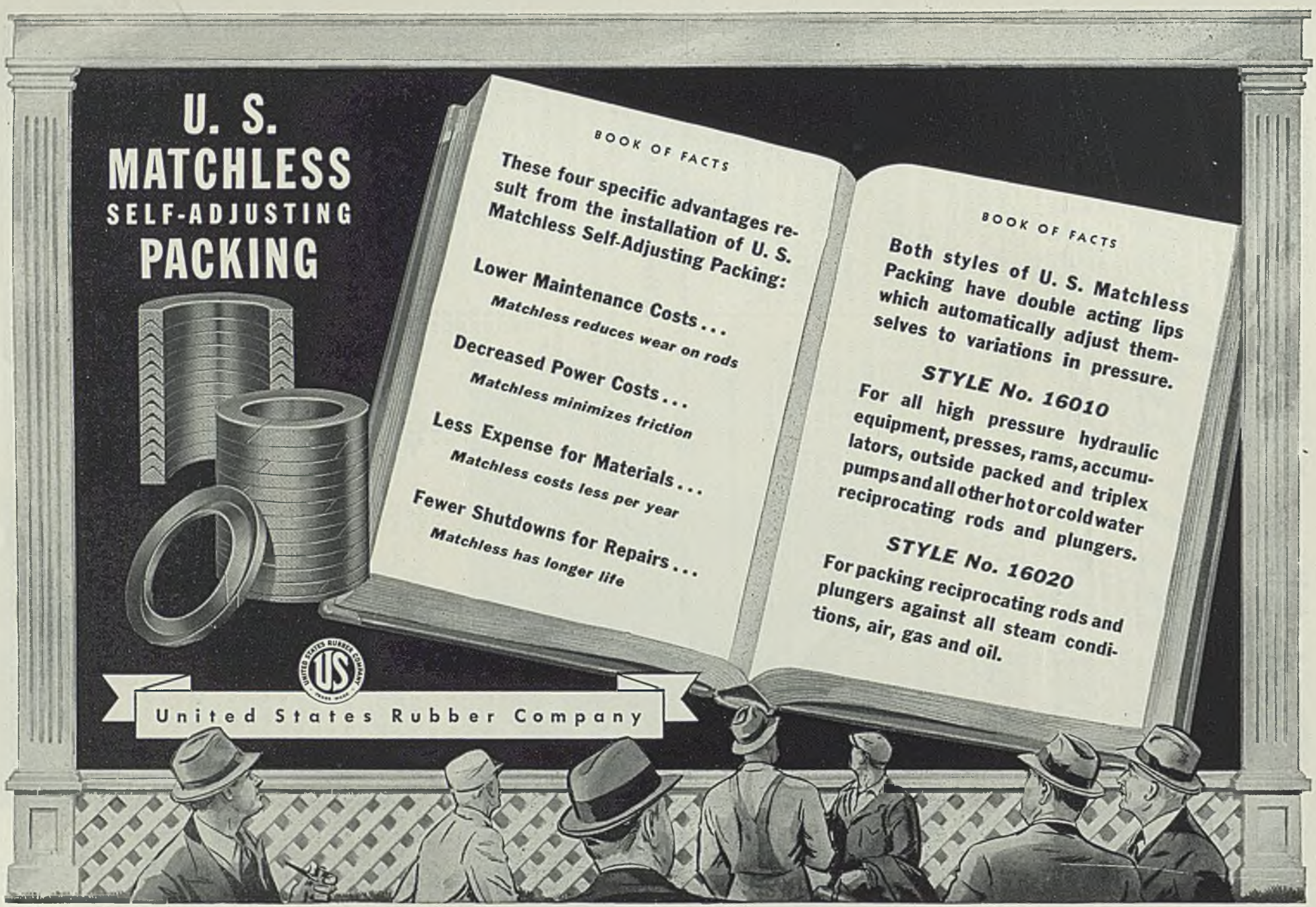
• • •

Facilitates Joint Breakage

Joints on many pieces of equipment used at iron and steel plants, which have become rusted or corroded, may be broken almost instantly by the application of a newly developed fluid that penetrates into the threads or between the faces of the joint to be broken. The liquid is claimed to form a gas that quickly dissolves the rust or corrosion into a fine powder and permits easy separation. The material has no lubricating value and cannot be used as an additive for lubrication purposes. Noninjurious to metal and nonexplosive, it will only burn under intense heat. Where threads are only rusty the rust is dissolved and the metal surface is as good as new.



Large roll grinder recently completed to surface finish wide rolls of the modern stripsheet mill



United States Rubber Products, Inc., New York, N. Y.

Stainless Steel Alloys Must Be Selected Intelligently

IMPORTANCE of intelligent selection of stainless steel alloys was emphasized in a paper by V. N. Krivobok, professor of metallurgy, Carnegie Institute of Technology, Pittsburgh, and associate director of research, Allegheny Steel Co., Brackenridge, Pa., presented before the American Society for Metals in Cleveland, Oct. 20. The work comprised an extensive research project carried out by Dr. Krivobok and R. A. Lincoln and R. Patterson Jr. of the Allegheny research laboratories.

In this study eighteen 30-pound ingots from the same heat were made with carbon contents of approximately 0.05 and 0.15 per cent and with chromium ranging from 17 to 19 per cent and nickel from 7 to 9 per cent for each series of carbon content. These ingots were reduced by hot and cold rolling to strip 0.038-inch thick which was annealed to dissolve any carbides. The effect of composition on the mechanical properties was determined on both annealed strip and the material after different degrees of cold rolling.

The ultimate strength and elongation in both cold rolled and annealed samples changed sharply with composition. Correlation of ultimate strength with the hardness of different alloys showed a variation in the annealed condition which became less pronounced with increasing amounts of cold work.

High Carbon for Forming

Bend tests on the annealed and on cold rolled samples indicated the superiority of the high carbon alloys for use in forming operations after cold rolling to high tensile strengths.

The proof stress of these alloys in the annealed condition is low but upon cold rolling increases more rapidly than the ultimate strength. With 30 per cent cold reduction a proof stress greater than half the ultimate stress resulted in all the alloys studied. The accompanying tabulation of properties attainable in stainless alloys of various compositions should provide some interesting data for the engineer and designer.

In discussing Dr. Krivobok's work, Paul Ffield, materials engineer, Bethlehem Shipbuilding Co., cited results of an investigation which he made in 1929 covering the use of stainless steels in airship construction at Goodyear Zeppelin Corp. His experience in fabricating experimental structures of high tensile 18-8 stainless indicated that variations in properties occurred from sheet to sheet of the material which would point to the belief that some factor outside the analysis in either the heat treatment or rolling of the material produced variations in tensile properties.

Concerning proof stress, Mr. Ffield stated there is a method of raising this value other than by cold rolling. This involves preloading the material above the yield point, thereby raising its strength to a new level. Duralumin girders and steel tie rods in the airship HINDENBURG have in some cases been so treated. This is accomplished either by stretching the sheet after rolling or, as in the case of the HINDENBURG, by stretching the girder booms after fabrication. The latter method has the advantage of re-orienting the locked-up shop fabrication stresses, Mr. Ffield pointed out.

Joseph Winlock, chief metallurgist, Edward G. Budd Mfg. Co., Philadelphia, observed that Dr. Krivobok's experiments checked results of the Budd company's experiments in using these alloys for light weight structures namely, that the low-nickel high-carbon austenitic stainless steels yield a more ductile material after cold rolling than when the relative amounts of those alloys in the metal are reversed.

Importance of stability and the extent to which this is varied to obtain high strength was mentioned by Russell Franks, research metallurgist, Union Carbide & Carbon Research Labortories Inc., Niagara Falls, N. Y. In other words, Mr. Franks stated, how far can the increase in strength be carried by cold rolling without seriously affecting other desirable properties.

Strength by Cold Rolling

To illustrate the point he cited the following results: Cold rolled steel containing 18.95 chromium, 7.70 nickel and 0.07 per cent carbon exhibited in a standard tensile test using a 0.505-inch section, a maximum strength of 146,000 pounds per square inch, a yield point of 135,900 pounds per square inch and elongation of 20 per cent in 2 inches and a

(*Please turn to Page* 73)

Effect of Varying Composition on Properties of Stainless Steels

Per Cent			Elongation in 2 inches, per cent	Gage, inch	Smallest radius over which bend was satisfactory, inch
C	Cr.	Ni			
Cold rolled to a tensile strength of 150,000 pounds per square inch Starting with same gage (0.038-inch) annealed					
0.10	15.66	7.46	32.0	0.036	0.032
0.13	15.66	7.62	40.0	0.034	0.032
0.05	17.25	7.07	15.0	0.034	0.050
0.10	17.05	7.01	45.0	0.034	0.032
0.14	17.20	7.18	53.0	0.036	0.032
0.14	17.98	7.04	51.0	0.034	0.032
0.13	17.65	8.60	19.0	0.025	0.032
0.05	18.63	8.17	19.0	0.027	0.050
0.05	16.83	9.79	7.0	0.021	0.070
0.05	17.66	9.80	10.0	0.024	0.050
0.05	18.22	9.14	5.0	0.020	0.050
Cold rolled to a tensile strength of 175,000 pounds per square inch					
0.13	16.47	6.60	34.0	0.034	0.050
0.10	15.66	7.46	23.0	0.032	0.050
0.13	15.66	7.62	27.0	0.030	0.032
0.05	17.25	7.07	9.0	0.027	0.090
0.14	17.20	7.18	35.0	0.032	0.032
0.05	16.83	9.79	2.0	0.017	0.070
0.14	17.98	7.04	34.0	0.029	0.032
0.05	18.63	8.17	7.0	0.023	0.050
0.05	18.22	9.14	3.0	0.019	0.090
Cold rolled to a tensile strength of 200,000 pounds per square inch					
0.13	16.47	6.60	27.0	0.030	0.050
0.10	15.66	7.46	15.0	0.030	0.090
0.13	15.66	7.62	19.0	0.024	0.032
0.14	17.98	7.04	22.0	0.027	0.032
0.06	18.68	7.33	4.0	0.021	0.090
0.16	19.70	6.75	7.5	0.021	0.050
Cold rolled to a tensile strength of 225,000 pounds per square inch					
0.13	16.47	6.60	20.0	0.025	0.050
0.14	17.20	7.18	12.0	0.023	0.090
0.14	17.98	7.04	12.0	0.022	0.070
0.06	18.68	7.33	2.5	0.016	0.050

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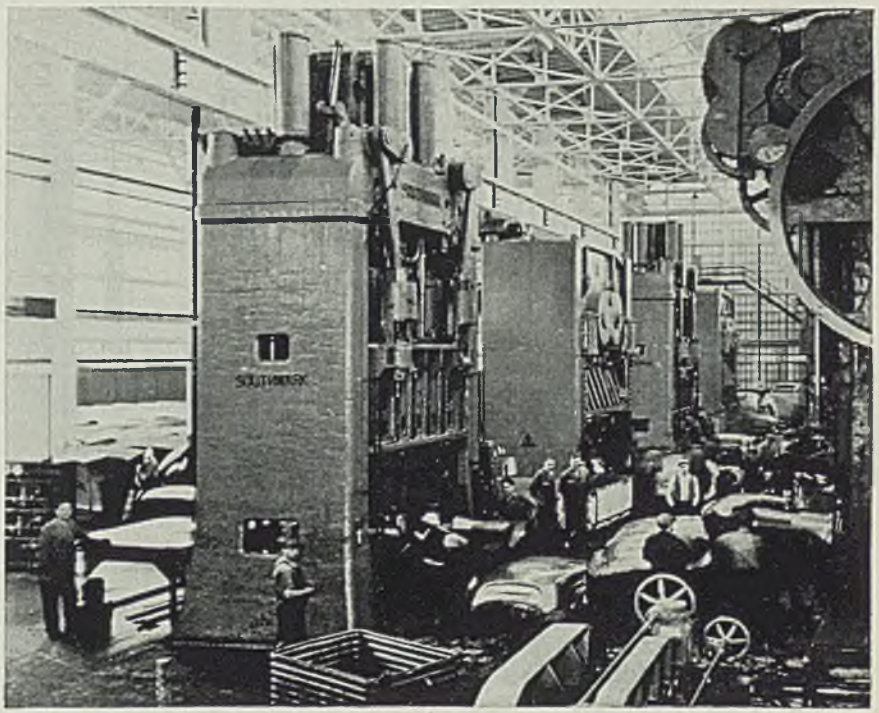

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5. Uniform pressure on every piece —fewer rejects—fewer returns for repressing
6. Less tearing of metal in sharp changes of contour
7. No possibility of machine breakdown due to incorrect setting
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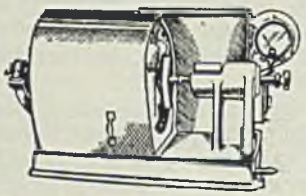
Solving many perplexing problems of failure of machine parts in service. Fatigue tests are extremely sensitive indicators of the factors which shorten the life of materials in service—factors that are not disclosed by tension, hardness, impact, ductility and other ordinary routine tests. Southwark offers the R. R. Moore Fatigue Testing Machine, of special design based on the rotating beam principle—providing a means of testing full sized specimens taken from machine or structural members, under conditions closely approaching those of actual service.



Determining the effect of drawing temperature on toughness of tool steels and other hard materials—as well as supplying much other valuable information—The Carpenter Torsion Impact Testing Machine has been welcomed by leading metallurgical laboratories. The growing list of users includes Bethlehem, Allegheny, American Steel and Wire, Vanadium, Halcomb, Carpenter, Republic and others.

Investigate Effects of Vanadium and Aluminum on Grain Size in Steel

GRAIN size in steel, particularly the effects of vanadium and aluminum, provided the topic for consideration at one session of the American Society for Metals during its annual convention in Cleveland, Oct. 19-23. Participating in the presentation of three papers and in the discussion were well-known metallurgists who in the past have contributed much to this increasingly important subject.

Some of the effects of small additions of vanadium through a comparison of steels of approximately eutectoid composition, with and without this element, were described in a paper by J. G. Zimmerman, R. H. Aborn and E. C. Bain, who at the time the experimental work was done were staff members of the research laboratory, United States Steel Corp., Kearny, N. J. Their observations of the effect of small vanadium additions to eutectoid steel, chiefly as to the rate of transformation, were summarized briefly.

Effects of Vanadium

1. Vanadium, like molybdenum, tungsten, titanium, and even chromium, is preferentially carbide forming, although definitely ferrite-soluble when present in amounts in excess of that combined with the carbon present. The carbides of vanadium are relatively insoluble, and therefore highly stable, at ordinary heat treating temperatures, and at temperatures high enough to effect solution, dissolve slowly. Their influence depends therefore upon the temperature and duration of heating prior to transformation.

2. At heating temperatures at which vanadium-rich carbide particles remain substantially undissolved, they inhibit austenitic grain growth and subsequently act as transformation nuclei; consequently the steel remains fine grained, transforms rapidly and is therefore shallow hardening and relatively tough at any hardness.

3. At heating temperatures high enough to dissolve an appreciable amount of these carbides, the vanadium entering into solution retards the transformation and to that extent promotes deep hardening, though the steel remains fine grained.

4. At heating temperatures at which the carbide particles are substantially all dissolved, the steel is coarse grained and deep hardening.

5. A vanadium steel softens during temperature less rapidly than a plain carbon steel, because of the precipitation of vanadium-rich carbide particles, which are widely dispersed and coalesce only slowly.

Discussing this paper, Jerome Strauss, vice president, in charge of research and development, Vanadium Corp. of America, Bridgeville, Pa., said the authors rightfully stressed the influence of the vanadium-rich carbides in restraining grain growth upon heating and in serving to form small and numerous grains upon cooling a steel in which all of these carbides have not been dissolved. They seemed, however, to have dismissed rather summarily any possible contribution by compounds other than carbides without ample demonstration of the reason for this view.

Superiority Is Questioned

W. H. Wills, metallurgist, Ludlum Steel Co., Dunkirk, N. Y., pointed out that the vanadium steel investigated is a shock-resisting tool steel of a type made by several mills in carbon ranges above and below eutectoid composition. Common applications include chisels, rivet sets and other pneumatic tools, shear blades, punches, and cold header dies. There has been a difference of opinion, he said, as to whether carbon-vanadium steel is superior for some of these applications. Points brought out in the paper should be valuable as a basis for further investigation of physical properties and for working out heat treatments to get best results from vanadium steels.

The same reason that explains the fact that carbon vanadium steel softens less rapidly than plain carbon during tempering would doubtless apply to a similar phenomenon noticed in the case of tungsten hot work steels, Mr. Wills concluded. These usually contain vanadium as a minor alloy, but other elements being the same, the steel with the higher vanadium content appears to soften less rapidly in tempering.

Also discussing the paper, O. W. McMullan, research laboratory, International Nickel Co. Inc., Bayonne, N. J., stated it would seem necessary that the finely distributed material acting as nuclei for crystal formation be stable and remain finely dispersed at the temperature or recrystallization and should it become coalesced or distributed in any massive form it would cease to inhibit grain growth. He attempted to show that all carbides at least are not such materials, and grain size cannot be explained satisfactory by their action.

Chromium and Normality

Influence of aluminum on the normality of steel was discussed in paper by G. R. Brophy and E. R. Parker, research laboratory, General Electric Co., Schenectady, N. Y. Pure iron-carbon-aluminum alloys were made, containing 0.001, 0.01, 0.10 and 1.0 per cent aluminum; and they were carburized in commercial carburizer and in an oxygen-free hydrocarbon atmosphere.

The cases obtained in hydrocarbons were all normal regardless of aluminum content, and those in commercial compound all abnormal. Depth of the abnormal layers decreased as aluminum content increased. According to the authors, the suggestion made by McQuaid that small amounts of aluminum, as such, in solution in steel are responsible for the production of abnormal structures, is, therefore untenable.

Contributing discussion, Mr. McMullan pointed out that the authors had shown that it is oxygen rather than aluminum that promotes abnormality. In fact, the effect of aluminum is exactly the contrary, it promotes normality in steel and any apparent effect shown toward abnormality is secondary rather than primary.

Continuing, he said that primarily, aluminum promotes normality and a coarse grain, but when both aluminum and oxygen are present in the right amounts a fine-grained structure results, which in turn, in steels

of low alloy content and high critical cooling rates, may result in abnormality in the McQuaid-Ehn test. This puts considerable restriction on the authors' statement that aluminum in extremely small amounts is sufficient to cause abnormality if oxygen is available.

A study of the effect of aluminum addition on the structure of a quenched carbon steel was reported in a paper by H. W. McQuaid, metallurgist, Republic Steel Corp., Massillon, O. In this, an attempt was made to indicate the effect of aluminum on the tendency to form heavier carbide particles. It was reasoned that the difference in hardenability of heats of steel of the same analysis is due to variation in the amount of carbide in solution in the austenite as well as the distribution of the carbon in the individual austenite grain.

Mr. McQuaid suggested that maximum hardenability in a steel of a given analysis is not primarily a function of grain size but of carbon content. Thus it is possible that a coarse-grained steel will harden more deeply than a fine-grained steel, not because of any variation in the size of the grain but because of the distribution of the carbides in solution in the steel at the quenching temperature.

Whether the effect of the aluminum on the carbide size and solubility is due to the formation of carbides containing aluminum or whether it is entirely due to the presence of aluminum in solution in the ferrite was not indicated, said Mr. McQuaid, although it is believed that the effect on the carbide is due to the presence of the aluminum in the ferrite rather than the formation of a special carbide.

Heat Treatment Is Affected

Considering the paper of Mr. McQuaid and also the paper of Messrs. Brophy and Parker, R. H. Harrington, research metallurgist, General Electric Co., Schenectady, N. Y., said he was led to the following conclusions: (1) Aluminum in solution in carbon steels affects the boundary structure of pearlitic areas; and (2) presence of alumina affects the internal structure of pearlitic areas, both factors combining in causing differences in behavior toward various heat treatments.

Judging from experiences in commercial manufacture of steels to controlled grain size, there appears to be a critical addition of aluminum that will produce a fine-grained steel, commented R. L. Wilson, metallurgical engineer, Timken Steel & Tube Co., Canton, O. Either larger or smaller additions in the same circumstances leave the steel coarse-grained. If other steels of still higher residual aluminum content had been examined in this series of tests, and had shown a further decrease in the proportion of pearlite to ferrite, the preference would be stronger for the conclusion that the structural changes were caused by the aluminum in the steel.

E. E. Thum, editor, *Metal Progress*, Cleveland, pointed out that Mr. McQuaid in his 1935 Campbell lecture and in his present paper held to the belief that it is metallic aluminum in solution rather than submicroscopic particles of aluminum oxide that is of most importance in controlling the grain size of heat treated steels. Further, Mr. McQuaid stated that this is due to its effect on the carbide solubility in austenite and the transformation temperature. Mr. Thum suggested that a little aluminum does not affect the equilibrium conditions so much as it does the rates of reaction and rates of solution and precipitation.

Stainless Alloys Must Be Wisely Selected

(*Continued from Page 70*)

reduction in area of 61 per cent. The steel showed an Izod impact value of 34 foot-pounds. In another

test a more stable steel containing 17.42 chromium, 8.24 nickel and 0.06 per cent carbon exhibited after cold rolling a maximum strength of 138,000 pounds per square inch, a yield point of 128,300 pounds per square inch, elongation of 29 per cent in 2 inches and reduction in area of 68 per cent. The Izod impact value for this steel was 67 foot-pounds. While these results were not entirely comparable to those attained in cold rolled strip, Mr. Franks pointed out that they do show that after cold working to approximately the same degree the higher strength steel is inferior in toughness to the more stable steel with a somewhat lower strength.

Report on the effect of overload on fatigue properties of three steels at temperatures of +70, +10, −20 and −40 degrees Fahr. was given by S. W. Lyon, research assistant, University of Illinois, Urbana, Ill., who collaborated with H. B. Wishart of the same organization in preparing the report. The low-temperature observations were carried out in one of the cold rooms at Wright field, Dayton, O.

To study the effect of overload on fatigue properties the "probable damage diagram" method developed by H. J. French was used. Of the three steels tested—S.A.E. 1020, 0.75 per cent carbon steel and a 3 per cent chromium steel—the first showed the greatest change of damage range with variation in temperature. The endurance limits of steels tested increased with decreasing temperatures. Results of the tests indicated that the present method of damage determination is inadequate to provide a sufficiently accurate method of evaluation.

Disagreement on Physical Tests

INTERPRETATION of physical testing data, a controversial subject at best, was the theme of a symposium on physical tests and their significance held by the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers at their meeting in Cleveland, Oct. 22. Considerable attention was given to the new theories of loading test specimens recently proposed by European scientists and it was readily apparent from the discussion that the theories are not generally accepted here, at least not by some of the industrial testing laboratories.

Discussion Is General

Most of the papers presented were general in character and each was the center of much discussion by those who agreed with or opposed the interpretations presented. Such generality was necessary because of the many factors which enter into physical testing. Industrial laboratories are primarily concerned with specific problems peculiar to their own plants and all have designed tests which they have found to be most suitable for their particular requirements. This is particularly true in the case of bending tests for metal to be formed in dies and bending tests to determine the quality of welds. Papers presented on these subjects were so closely correlated with practical problems that little or no discussion or disagreement was aroused.

The new high-speed impact testing machine developed at the Watertown arsenal, Watertown, Mass., was to have been described in a paper by H. C. Mann of that organization. However, because of his absence the paper could not be presented and a general discussion was carried on by other members of the arsenal. A request that all laboratories possible co-operate in evaluat- this new method of testing was made.

A.S.M.E. Gives Meeting Program

SEVERAL sessions scheduled for the annual meeting of the American Society of Mechanical Engineers to be held in the Engineering Societies building, New York, Nov. 30 Dec. 4, will prove of direct interest to the iron and steel industry. These include a three-session symposium on corrosion-resisting metals and single sessions devoted to strength of materials, cutting metals, machinery and springs, lubrication, management.

Coincident with the society's annual meeting, the twelfth national Exposition of Power and Mechanical Engineering will be held in Grand Central Palace.

Portions of the A. S. M. E. program are as follows:

Monday, Nov. 30

MORNING

Council meeting.

AFTERNOON

Business meeting.

EVENING

Management—Time and Motion Study—Research and Application

"An Investigation in Some Hand Motions," by Ralph W. Barnes.

"Introduction of a Time and Motion-Study Program," by W. R. Cooley.

"Motion Study as a Basis of Establishing Proper Employe Training and Personnel Relations," by A. Williams Jr.

"Social Aspects of Motion Study," by Allan H. Morgensen.

Tuesday, Dec. 1

MORNING

Strength of Materials

"The Creep Curve and Stability of Steels at Constant Stress and Temperature," by S. H. Weaver.

"Interpretation of Creep Tests for Machine Design," by C. R. Soderberg.

Discussion of research activities and progress report to sponsors, by special research committee on effect of temperature on metals.

NOON

Luncheon—Lubrication research and application.

AFTERNOON

Safety and Hygiene in Industry

"Practical Results from Safety Contests," by Harold Miner.

"Engineer's Part in Industrial Hygiene," by William Yant.

"Engineering Value of Adequate Operating Instructions," by Dan Royer.

Railroads

"Use of Alloy Steels for Side Frame and Bolsters of Freight-Car Tests," by D. S. Barrows.

Westinghouse Ninetieth Anniversary Commemoration

"Engineering Achievements of George Westinghouse," a discussion by his former associates.

EVENING

Honors Night

Towne lecture, by Dr. James R. Angell, president, Yale university, New Haven, Conn.

Wednesday, Dec. 2

MORNING

Cutting Metals

"A Study of Cutting Fluids Applied to the Turning of Monel Metal," by O. W. Boston and W. W. Gilbert.

"Comparative Torque and Horsepower Requirements of Standard Four-Flute and Spiral-Flue Taps," by H. L. Daasch.

"Cemented Carbide Tool Maintenance and Application," by L. J. St. Clair.

NOON

Luncheon—Distribution. "Discussion of Product and Sales Research," by Dr. L. Chalkley and W. M. Bristol.

AFTERNOON

Machinery and Springs

Discussions of spring problems to include rubber springs, helical springs, and spring materials.

"Bearing Oil-Ring Performance," by R. Baudry and L. M. Tichvinsky.

"Quieting Machinery," by E. J. Abbott.

Plant Layout Management

"Economics of Manufacturing Layout in a Varied Product Plant, to Include Influence of Type of Layout, Functions of Feeder Sections, Flexibility, Salvage Value, and Functions of Time Studies," by A. F. Murray.

"Time Studies and Their Relation with Factory Layout," by B. C. Koch.

EVENING

Annual dinner and Thurston lecture—Astor hotel.

Thursday, Dec. 3

MORNING

Management—Dealing with Workers

"Modern Principles and Practice of

Manufacturing Organizations in Employe-Employer Relationship," by W. G. Marshall, T. I. Phillip, J. H. Priest and R. M. Rumbel.

Power

"Physical Property Uniformity in Valve Body Steel Castings," by A. E. White, C. L. Clark and S. Crocker.

Corrosion-Resistant Metals Symposium

I

"Introduction to Corrosion-Resistant Metals," by F. H. Speller.

"Aluminum and Its Alloys," by E. H. Dix Jr. and R. B. Mears.

"Construction and Use of Lead Equipment," by G. O. Hiers.

AFTERNOON

Corrosion-Resistant Metals Symposium

II

"Cast Iron," by Dr. H. L. Maxwell.

"Zinc in the Chemical Industries," by E. A. Anderson.

"Copper and Copper-Base Alloys," by R. A. Wilkins.

Management—Training People To Be Skilled Workers

"Selection of Apprentices and Their Training To Operate Machines," by F. E. Searle, Ford Motor Co., Dearborn, Mich.

"Adult Education," by C. G. Simpson, Philadelphia Gas Works, Philadelphia.

EVENING

Corrosion-Resistant Metals Symposium

III

"Corrosion-Resistant Steel," by P. H. Critchett.

"Nickel and Nickel-Base Alloys," by F. L. LaQue.

Designing Quiet High-Speed Gears

(*Concluded from Page* 48)

a low frequency note which gradually builds up and then just as suddenly dies out. Because it is not particularly unpleasant and can be heard only in the immediate vicinity, it has not aroused much interest. The source of its disturbing force is unknown. Its frequency bears no relation to either of the revolving elements nor to the tooth contact rate. Because of its irregular and intermittent nature it cannot be a beat such as caused by alternate reinforcement and interference of primary sound waves. There is a suspicion that it is due to recurrent building up and collapse of pressures in the lubricant of either the teeth or bearings.

Particular care must be used to insure the lubricant being kept clean and pure, since many of the difficulties met with arise from the presence of abrasives and other foreign elements carried in the oil. Gears have been known to produce a high metallic note when the quantity of lubricant was insufficient, indicating that some cushioning action is derived from the oil.

Good Gears for Long Life

Gear manufacturers sometimes have difficulty in explaining the apparent high prices they charge for high speed equipment. Commercial gears cannot be operated at high speeds because they will destroy themselves by virtue of the loads resulting from their own errors. The problem in high speed gearing is not so much a matter of designing against the applied loads as the loads created within themselves.

There is a case on record of an operator who found it necessary to replace some poor gears which did not have a satisfactory life. He resorted to gears which were hardened after cutting with no subsequent attempt to correct for the fire distortions. Despite the higher physicals obtained, the relief was but slight and he continued to replace pinions every three or four months. Finally, he tried one set of very accurate gears. They were made from steel in its annealed condition. The transmitted load being quite small, the gears easily stood up.

In this discussion, much emphasis has been placed on the need for accuracy in what may appear to the uninitiated as irrelevant detail. Those engaged in this endeavor have learned long ago that quiet gears are possible only by complete exploration of all the circumstances encountered in their manufacture.

NEW EQUIPMENT

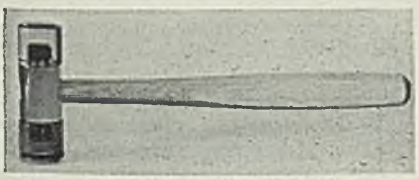
Angle Vise—

Chicago Tool & Engineering Co., 8389 South Chicago avenue, Chicago, is now manufacturing a new angle vise for use in drilling, milling, grinding, filing and the like. Parts are accurately machined, base body and sliding jaw being of semi-steel cast. Adjusting screw has fine pitch thread and long bearing in vise body. Jaws are 2½ inches wide and open to a length of 3 inches. Overall length of the vise is 8 inches and weight is 10 pounds. Swivel base is available for attachment to the base of the vise. Swivel is graduated in 360 degrees for horizontal angular adjustment. Vertical angles are measured on a scale marked on the stationary jaw.

• • •

Soft Face Hammers—

Bonney Forge & Tool Works, Allentown, Pa., has recently brought out a line of soft face hammers designed for working on fine finished surfaces. They will be found useful in fitting bushings, pins and similar work where the surface must not be marred in any way, it is claimed. Tips are of a tough amber



Bonney soft face hammer with tips of amber colored material for work on which surfaces must not be scratched

colored composition which will not chatter, chip or break, according to the makers. Should the tips become worn, new ones may be installed by turning the old tips loose from the center steel piece and pressing on the new tip. Hammers are balanced, with hickory handles fastened in the head. Three sizes are available, 1-pound, ½-pound and 1½-ounce.

• • •

Duplex Bearings—

Fafnir Bearing Co., New Britain, Conn., announces a new X-type duplex ball bearing for high speed grinding spindle applications which can be installed by the user in any one of three mounting arrangements, face to face, back to back, or tandem. New bearings are said to provide added convenience and less possibility for error in assembling than bearings which are matched for a single method of mounting, and must be specified on this basis in advance of purchase.

The new units consist of two matched single row bearings operating with the rings clamped tightly together. They are particularly applicable in providing extreme shaft rigidity for vibrationless operation of high speed spindles where precision and finish are important considerations. The new bearing is now available in nine sizes and capacities.

♦ ♦ ♦

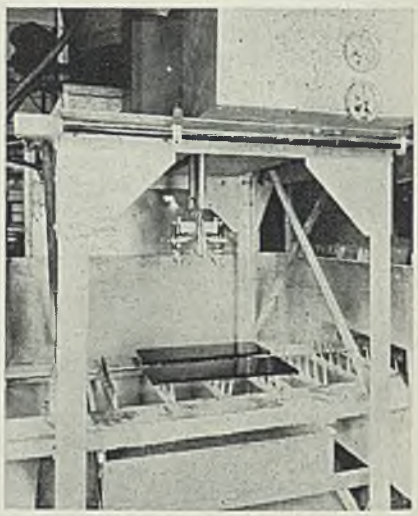
Core Drill—

Sullivan Machinery Co., Michigan City, Ind., has added a new core drill to the line now manufactured. Known as No. 12, the new drill has a 50 per cent increase in drilling speed. The machine is 4 feet 7 inches high and weighs slightly over 1000 pounds. Four compact parts, hoist, engine, swivelhead and frame, can be quickly dismantled for easy transportation. Reserve strength is built into every part, according to the company, to minimize chances of breakdown. Hydraulic or screw feed swivelhead which can be set for drilling at any desired angle is supplied. Variable speeds make efficient operation possible in either soft or hard formations. Machines are supplied with either gasoline or electric drive as desired.

♦ ♦ ♦

Spray Machine—

Binks Mfg. Co., 3114 Carroll avenue, Chicago, announces a new automatic reciprocating spray machine which carries two spray guns back and forth across flat pieces moving on a conveyor. Guns shut off and on automatically, only operating when they are directly over the ware to be sprayed. Shown in the illustration is an application of the machine in spraying parts for ranges, but many other applications are possible, including wall board,



Binks automatic reciprocating spray machine sprays flat materials automatically as they pass on a conveyor

linoleum, leather, refrigerator parts, paper, fabrics, tile, glass and others. This machine has overcome the difficulties of the ordinary swinging arm type spray machine, including the variable speed over the articles to be sprayed, according to the company. Machines are especially adapted by the Binks company to the uses for which the individual machine is to be operated.

♦ ♦ ♦

Drafting Stand—

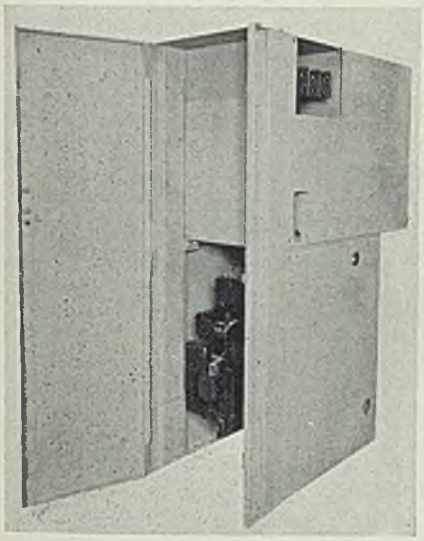
L. G. Wright Inc., 5713 Euclid avenue, Cleveland, announces a new drafting table designed for use with Wrigraph drafting machines made by this company. The stand is intended for use in making drawings under 20 x 26 inches, and is built and finished to harmonize with office surroundings. The table is oak stained walnut. Drawing board tilts 90 degrees and can be clamped at any angle by means of a device operating from the right side of the table. Height of the table is ad-

justable from 33 to 45 inches, and starwheels clamp the side posts to prevent slipping. The stand is so constructed that it can be shipped in a flat carton and the legs can be assembled to the post in a few minutes. Board is of white pine and is treated with shellac to prevent soiling.

• • •

Switchgear—

Delta-Star Electric Co., 2400 block, Fulton street, Chicago, announces a new industrial type metal clad switchgear, which is a 3-phase unit. It can be mounted in banks of two or more units in one location or in different parts of the plant. Unit is self-contained and is shipped ready for immediate installation. All live parts are steel enclosed and the various elements such as oil circuit breakers, buses, metering transformers, fuses and the like are in separate internal compartments with steel barriers between units. The 5-kilovolt, 600-ampere, 25,000 and 50,000-kilovolt-ampere oil-blast circuit breakers are interchangeable between units of the same rating. Breakers are easily inserted or removed by a small truck. A positive interlock prevents the breaker from being lowered or raised from operating position except when breaker is fully opened.



Delta-Star industrial type metal clad switchgear in which all live parts are steel enclosed

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Protective Mask—

Martindale Electric Co., Box 2669, Lakewood, Cleveland, is the maker of a new lightweight aluminum mask for protecting workers from industrial dusts. Made of soft rolled aluminum, the masks are pliable and fit the contour of the wearer's face. Cotton gauze is used both as a filter medium and protective pad for the face. The masks offer no protection against vapors or gases and are not recommended for protection against toxic dusts or against such dusts as silica unless the concentration is relatively low or the time of exposure relatively short. Efficiency of the mask is claimed to run from 85 per cent on fine silica to 97 per cent on coarser dusts. Since the mask is so light, workers will wear it with greater regularity than heavier, more efficient types, according to the company. Masks are offered at low cost because of their simple construction.

• • •

Finishing Wheel—

Manhattan Rubber Mfg. Division, Passaic, N. J., announces a new metal finishing wheel of fine grit with a slight cushioning action. The new wheel is designed for use on welds in stainless steel dairy equip-

ment, stainless steel forgings for aircraft, taps and twist drills of both carbon and high speed steels and similar uses. Although slightly flexible, this wheel is not soft enough to conform to irregular surfaces like a cloth polishing wheel. It is limited to work having a flat or relatively even curved surface. Operating speed should not exceed 6000 surface feet per minute.

♦ ♦ ♦

Demountable Rim Sheave—

Dodge Mfg. Corp., Mishawaka, Ind., has recently placed on the market a new demountable rim sheave which has been designed to include two new features. The sheave consists of a hub on which can be mounted rims of varying diameters and number of grooves. The rims can be mounted in four different positions so that the hub can be approximately central or have varying amounts of offset as desired. These features make the new product suitable for installations requiring occasional change in horsepower or speed. Hubs are mounted permanently on the motor or shaft and rims are changed as needed. The selected range of diameters and number of grooves for C and D belts will take care of most requirements, although in some cases it may be necessary to

Dodge demountable rim sheave for V-belt drives

make a slight change in the drive ratio so as to accommodate a regular sheave, which is preferable to take advantage of stock delivery, saving time and cost.

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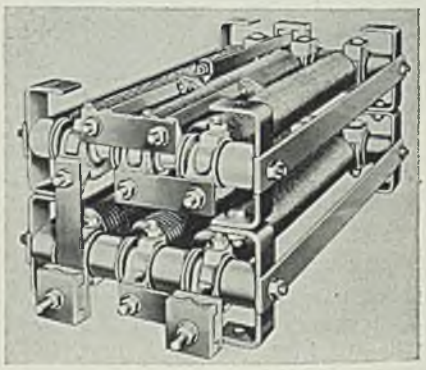
Resistor—

Monitor Controller Co., Baltimore, has developed a new resistor which has created considerable interest. This resistor includes all the essentials of their Edgewound type and in addition has malleable iron ter-



Monitor resistor built to operate at high temperatures and resist shock, vibration and heavy currents

minal clamps which are supported directly from the frame, relieving the resistor elements of cable strain and vibration. Heavy pressed steel terminals provide immediate tap connections. Location of these terminals can be easily and quickly changed. All wiring and inter-connections between banks are conveniently made at the end of the frame. These resistors operate at high temperatures without damage and are especially suitable in places subject to vibration and shocks, involving heavy currents and general rough usage.

RECENT PUBLICATIONS of MANUFACTURERS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing STEEL, in care of Readers' Service Department, 1213 West Third Street, Cleveland.

Molybdenum — Climax Molybdenum Co., 500 Fifth avenue, N. Y. Folder on properties and advantages of molybdenum in steel.

Piston Grinder—Landis Tool Co., Waynesboro, Pa. Catalog No. D-36, describing the 5-inch type C hydraulic piston grinder.

Structural Arc Welding—Lincoln Electric Co., Cleveland. Folder No. 13c2, covering various phases in structural arc welding.

Boiler Water Treatment—Elgin Softener Corp., Elgin, Ill. Bulletin on a nontechnical discussion of various methods of boiler water treatment.

Transmission—Graham Transmissions, Springfield, Vt. Bulletin No. 302, describing the company's variable speed transmission, including diagrams and dimension tables.

Indirect Lighting—Silvray Lighting Inc., 755 General Motors building, New York. Booklet traces the development of artificial light from Edison's first lamp.

Safety Tank—American Safety Tank Co., Kansas City, Mo. Catalog presenting the crash-resistant, spillproof and non-explosive American safety tank.

Batteries—Electric Storage Battery Co., Philadelphia. Booklet Vol. 10, No. 9, showing uses and advantages of batteries in delivery trucks, linotype machines and in operating loading trucks used in tunnel work.

Automatic Welding Head—Harnischfeger Corp., Milwaukee. Bulletin No. W-9, describing a new welding head, outlining the manner in which welding can now be put on a high-speed production basis.

Grinding Fixture — Luther Mfg. Co., 58 Knecht drive, Dayton, O. Circular introducing the grinding fixture and radius dresser as accessories for all cutter and surface grinders.

Steel Wheels — French & Hecht Inc., Springfield, O. Manual describing and illustrating various types and designs of tension-bilt steel wheels for agriculture and industry.

Spur Gears — Garrison Machine Works Inc., Dayton, O. Folder describing spur gear chucks designed especially to produce spur gears of such precise accuracy that they will sound like helical gears.

Converter and Furnaces — Ajax Electrothermic Corp., Ajax Park, Trenton, N. J. Bulletin No. 10, describing oscillator or spark gap type converter and furnaces; description of the new 60 pound tilting furnace, for melting non-ferrous and precious metals, is included.

Magnetic Separators — Stearns Magnetic Mfg. Co., 675 South Twenty-eighth street, Milwaukee. Bulletin No. 700, describing and illustrating its line of type K, high duty magnetic separators.

Cylinders — Hanna Engineering Works, 1765 Elston avenue, Chi-

cago. Catalog No. 224, containing dimensions, capacities and illustrations of cylinders to push, pull, raise, lower.

Industrial Floor Maintenance—Flexrock Co., 800 North Delaware avenue, Philadelphia. Folder describes Ruggedwear resurfacer and goes into details concerning floor conditions and repair material.

Die Castings—Chicago Die Casting Mfg. Co., 2515 West Monroe street, Chicago. Bulletin No. 36, illustrating and describing pulleys of various types; flexible couplings; self-aligning shaft supports; pillow blocks; collars; journal bearings; sleeve couplings; universal joints; die cast hubs; sanding disks; grinding mandrels; saw mandrels; motor attachments; grinding attachments; flanges; reducing gears; mitre gears; and a novel display table with a capacity of 100 pounds.

Boiler Scale Prevention—Bloomfield Chemical Co., 169 Bloomfield avenue, Bloomfield, N. J. Folder explaining how to keep boilers clean scientifically, by use of the company's "Scale-Kem" water and metal treatment.

Safety Equipment—American Allsafe Co., 210 Franklin street, Buffalo. Bulletin shows how the Allsafe life line grabs the life line used by construction workers, steeplejacks, public utility men, and millwrights, thereby eliminating serious hazards incidental to working at high levels and makes it easily possible to use an independent life line and safety belt.

Centrifugal Pumps—Worthington Pump & Machinery Corp., Harrison, N. J. Folder No. W-323-B1A, describing electrically operated centrifugal pumps arranged for automatic priming; Folder No. L-611-B2A, describing feather valve two-stage, direct-connected motor-driven compressors.

Thawing Frozen Water Pipes—Hobart Bros. Co., Box FW-116, Troy, O. Booklet covering actual cases of pipe thawing, nature of job, time required, length of pipe to be opened up, size and kind of pipe, costs, etc.

Screw Products—Bristol Co., mill supply division, Waterbury, Conn. Bullletin No. 823, covering the company's screw products; prices, sizes, etc., are included for socket set screws, socket head cap screws, stripper bolts and pipe plugs.

High Finish on Tools

(*Concluded from Page* 61)

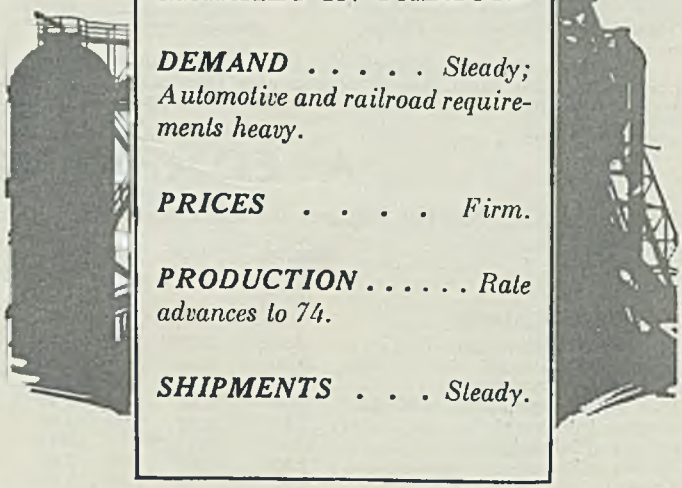
offset casting or one with a lump in it generally broke the cutter at once. The cutters were properly made, ground and tempered, but after this last operation they were not touched except to grind the cutting edges. A suggestion was made that they be polished after hardening. This was done and the percentage of broken cutters dropped off at once. Here is an instance of two identical tools, one made more efficient because a few minutes were spent improving its appearance.

Anyone with practical experience in machine shops could easily duplicate such incidents as have been described. One shop in particular has a proper understanding of this subject. Everything in this shop is beautiful to the eyes of a mechanic. Surface plates and angle irons are brightly ground and kept clean while jigs and fixtures bear the stamp of good finish by their generally pleasing appearance. It amounts to something like sacrilege for a good mechanic to mistreat a well finished tool. The same kind of a tool, just as accurate, but of rough appearance, will give rise to nothing but contempt.

It may again be urged that needless polishing is unnecessary, but the general appearance of the work destined to be used in the shop should be such that it gives the impression to the user that time and care have been spent in its production and that it is one link in the chain toward which he is expected to contribute his best.

Heavy Rail Awards Feature Active Market

Interest Centers On Prices; Auto Assemblies Increase



MARKET IN TABLOID

DEMAND . . . . . *Steady; Automotive and railroad requirements heavy.*

PRICES . . . . *Firm.*

PRODUCTION . . . . . *Rate advances to 74.*

SHIPMENTS . . . *Steady.*

WHILE interest in the anticipated price advances dominated the iron and steel market last week, automobile production rose above the 100,000-mark for the first time in five months, rail awards aggregated 118,560 tons, structural shape contracts increased by about 3000 tons, and the national steelworks operating rate advanced 1 point to 74 per cent of capacity.

Protective buying against the price advances appeared, even though the extent of the increases or the effective dates were unknown.

The week brought forth additional expansion programs and it is now apparent that the seven continuous hot strip and sheet mills being constructed or under authorization constitute one of the most remarkable expansions for any product in any two-year period in the history of the steel industry. Capacity will be increased by 4,020,000 tons. Prior to 1935 capacity of such mills in this country amounted to only 4,838,500 tons.

Automobile assemblies were up 19,943 units to 104,248, with Chevrolet accounting for one quarter of the industry's total and Ford speedily increasing production.

Sheet Mills Booked

HEAVY buying of billets and sheet bars by Ford has been a feature of the semifinished market recently. Highlights in some of the other lines include: The strong demand for sheets, including numerous protective orders, has resulted in some mills becoming completely booked for the remainder of the year. Adjustment of quantity extras and expected price advances have augmented demand for strip. Tin plate mills, with production of 1936 packers' cans virtually completed, are now operating at about 90 per cent of capacity. Bar specifications, which have been fairly steady, show prospects of further gains.

Platemakers are reported anticipating an early pickup in orders. Steel wire shipments are heavy and apparently many buyers are preparing for a price adjustment.

Pennsylvania railroad's order for 100,000 tons of rails, the largest in three years, is expected to be followed by a good sized inquiry from New York Central and orders from several western carriers. Seaboard Airline bought 10,060 tons last week and Atlantic Coast Line 6000 tons. Freight car awards, which aggregated 39,643 at the end of October compared to only 9158 in the same period last year, are likely to be boosted by purchases in the immediate future. Chesapeake & Ohio is in the market for 2000 cars.

Awards for structural shapes totaled 25,671, compared to 22,497 a week ago. Contracts placed included 6500 tons for the Sixth avenue subway, New York, and 4320 tons for an upper Mississippi river dam.

Numerous Small Inquiries

ACTIVITY among manufacturers of machine tools, whose business made a sharp upturn in October continues at a high rate. The absence of large lists has been made up by a relatively large number of smaller inquiries.

A number of diverse trends are apparent in the scrap market. Commitments are at a minimum in some districts. Fewer price changes were noted last week than usual, and STEEL's index remains unchanged at $16.04. Pig iron shipments are much heavier than a month ago, with the anticipated higher prices having some effect on foundry orders.

Pittsburgh Down 2 Points

OPERATIONS in the Cleveland district rose 1 point to 80½ per cent; Wheeling 3 to 92; Birmingham 7 to 74; Cincinnati 5 to 96 and St. Louis 3 to 68. Pittsburgh was down 2 points to 68; Youngstown 4 to 70 and New England 15 to 73.

Both the finished steel composite and the iron and steel price index are unchanged, at $53.90 and $34.60, respectively.

Great Britain in October, for the fourth time this year, established an all-time high mark for production of steel ingots and castings with 1,060,500 gross tons, compared with 1,027,000 tons in October, the previous high mark.

COMPOSITE MARKET AVERAGES

	Nov. 14	Nov. 7	Oct. 31	One Month Ago Oct., 1936	Three Months Ago Aug., 1936	One Year Ago Nov., 1935	Five Years Ago Nov., 1931
Iron and Steel	$34.60	$34.60	$34.62	$34.67	$33.88	$33.15	$30.16
Finished Steel	53.90	53.90	53.90	53.90	53.40	53.70	48.17
Steelworks Scrap..	16.04	16.04	16.25	16.44	14.66	12.92	8.22

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Nov. 14, 1936	Oct. 1936	Aug. 1936	Nov. 1935
Finished Material				
Steel bars, Pittsburgh	2.05c	2.05c	1.95c	1.85c
Steel bars, Chicago	2.10	2.10	2.00	1.90
Steel bars, Philadelphia	2.36	2.36	2.26	2.16
Iron bars, Terre Haute, Ind.	1.95	1.95	1.85	1.75
Shapes, Pittsburgh	1.90	1.90	1.90	1.80
Shapes, Philadelphia	2.11½	2.11½	2.11½	2.01½
Shapes, Chicago	1.95	1.95	1.95	1.85
Tank plates, Pittsburgh	1.90	1.90	1.90	1.80
Tank plates, Philadelphia	2.09	2.09	2.09	1.99
Tank plates, Chicago	1.95	1.95	1.95	1.85
Sheets, No. 10, hot rolled, Pitts.	1.95	1.95	1.95	1.85
Sheets, No. 24, hot ann., Pitts.	2.60	2.60	2.50	2.40
Sheets, No. 24, galv., Pitts.	3.20	3.20	3.20	3.10
Sheets, No. 10, hot rolled, Gary	2.05	2.05	2.05	1.95
Sheets, No. 24, hot anneal., Gary	2.70	2.70	2.60	2.50
Sheets, No. 24, galvan., Gary	3.30	3.30	3.30	3.20
Plain wire, Pittsburgh	2.50	2.50	2.40	2.30
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.05	2.05	2.10	2.40
Semifinished Material				
Sheet bars, open-hearth, Youngs.	$32.00	$32.00	$30.00	$29.50
Sheet bars, open-hearth, Pitts.	32.00	32.00	30.00	29.50
Billets, open-hearth, Pittsburgh	32.00	32.00	30.00	28.50
Wire rods, No. 5 to ⅜-inch, Pitts.	40.00	40.00	38.00	38.00

	Nov. 14, 1936	Oct. 1936	Aug. 1936	Nov. 1935
Pig Iron				
Bessemer, del. Pittsburgh	$20.8132	20.8132	20.8132	20.81
Basic, Valley	19.00	19.00	19.00	19.00
Basic, eastern del. East. Pa.	20.8132	20.8132	20.8132	20.81
No. 2 fdy., del. Pittsburgh	20.3132	20.3132	20.3132	20.31
No. 2 fry., Chicago	19.50	19.50	19.50	19.50
Southern No. 2, Birmingham	15.50	15.50	15.50	15.50
Southern No. 2, del. Cincinnati	19.44	19.44	19.44	20.2007
No. 2X eastern, del. Phila.	21.6882	21.6882	21.6882	21.68
Malleable, Valley	19.50	19.50	19.50	19.50
Malleable, Chicago	19.50	19.50	19.50	19.50
Lake Sup., charcoal, del. Chicago	25.7528	25.7528	25.2528	25.25
Ferromanganese, del. Pitts.	80.13	80.13	80.13	90.13
Gray forge, del. Pittsburgh	19.6741	19.6741	19.6741	19.67
Scrap				
Heavy melting steel, Pittsburgh	$17.25	$18.15	$16.00	$13.65
Heavy melt. steel, No. 2, east. Pa.	14.25	13.95	12.80	11.00
Heavy melting steel, Chicago	16.50	16.25	15.45	13.20
Rail for rolling, Chicago	17.25	16.95	16.40	14.30
Railroad steel specialties, Chicago	18.25	17.75	16.65	13.75
Coke				
Connellsville, furnace, ovens	$4.00	$4.00	$3.45	$3.55
Connellsville, foundry, ovens	4.25	4.25	4.25	4.35
Chicago, by-product foundry, del.	9.75	9.75	9.75	9.75

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week.

Sheet Steel

Prices Subject to Quantity Extras and Deductions (Except Galvanized)

Hot Rolled No. 10, 24-48 In.

Pittsburgh	1.95c
Gary	2.05c
Chicago, delivered	2.08c
Detroit, del.	2.15c
New York, del.	2.30c
Philadelphia, del.	2.26c
Birmingham	2.10c
St. Louis, del.	2.28c
Pacific ports, f.o.b. cars, dock	2.50c

Hot Rolled Annealed No. 24

Pittsburgh	2.60c
Gary	2.70c
Chicago, delivered	2.73c
Detroit, delivered	2.80c
New York, del.	2.95c
Philadelphia, del.	2.91c
Birmingham	2.75c
St. Louis, del.	2.935c
Pacific ports, f.o.b. cars, dock	3.25c

Galvanized No. 24

Pittsburgh	3.20c
Gary	3.30c
Chicago, delivered	3.33c
Philadelphia, del.	3.51c
New York, del.	3.55c
Birmingham	3.35c
St. Louis, del.	3.53½c
Pacific ports, f.o.b. cars, dock	3.80c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered	3.08c

Cold Rolled No. 10

Pittsburgh	2.60c
Gary	2.70c
Detroit, delivered	2.80c
Philadelphia, del.	2.91c
New York, del.	2.95c
Pacific ports, f.o.b. cars, dock	3.20c

Cold Rolled No. 20

Pittsburgh	3.05c
Gary	3.15c
Detroit, delivered	3.25c
Philadelphia, del.	3.36c
New York, del.	3.40c

Enameling Sheets

Pittsburgh, No. 10	2.45c
Pittsburgh, No. 20	3.05c
Gary, No. 10	2.55c
Gary, No. 20	3.15c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base (box) Pittsburgh	$5.25
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.50c
Do., Gary	3.60c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plate

Pittsburgh	1.90c
New York, del.	2.19c
Philadelphia, del.	2.09c
Boston, delivered	2.32c
Buffalo, delivered	2.15c
Chicago or Gary	1.95c
Cleveland, del.	2.09½c
Birmingham	2.05c
Coatesville, base	2.00c
Sparrows Pt., base	2.00c
Pacific ports, f.o.b. cars, dock	2.45c
St. Louis, delivered	2.18c

Structural Shapes

Pittsburgh	1.90c
Philadelphia, del.	2.11½c
New York, del.	2.16¼c
Boston, delivered	2.30½c
Bethlehem	2.00c
Chicago	1.95c
Cleveland, del.	2.10c
Buffalo	2.00c
Gulf Ports	2.30c
Birmingham	2.05c
Pacific ports, f.o.b. cars, dock	2.45c

Bars

Soft Steel
(Base, 3 to 25 tons)

Pittsburgh	2.05c
Chicago or Gary	2.10c
Duluth	2.20c
Birmingham	2.20c
Cleveland	2.10c
Buffalo	2.15c
Detroit, delivered	2.20c
Pacific ports, f.o.b. cars, dock	2.60c
Philadelphia, del.	2.36c
Boston, delivered	2.47c
New York, del.	2.40c
Pitts., forg. qual.	2.40c

Rail Steel
To Manufacturing Trade

Pittsburgh	1.90c
Chicago or Gary	1.95c
Moline, Ill.	1.95c
Cleveland	1.95c
Buffalo	2.00c

Iron

Terre Haute, Ind.	1.95c
Chicago	2.00c
Philadelphia	2.26c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young...	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. car docks	2.45c
Philadelphia, del.	2.26c-2.36c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight or mixed carloads; less carloads $4 higher; less carloads fencing $5 over base column.)

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.05
Cement coated nails	$2.05
Galv. nails, 15 gage and finer	$3.05
do. finer than 15 ga.	$4.55

(Per pound)

Polished staples	2.75c
Galv. fence staples	3.00c
Barbed wire, galv.	2.55c
Annealed fence wire	2.80c
Galv. fence wire	3.15c
Woven wire fencing (base column, c. l.)	$60.00

To Manufacturing Trade

Plain wire, 6-9 ga.	2.50c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pitts. or Cleveland	3.05c

Do., Chicago up $1, Worc. $2.

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.35c
20,000 to 59,999 lbs.	2.30c
60,000 to 99,999 lbs.	2.25c
100,000 to 299,999 lbs.	2.22½c
300,000 lbs. and over	2.20c

Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 15c; eastern Michigan, up 20c.

Alloy Steel Bars (Hot)

(*Base, 3 to 25 tons*)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.55c

Alloy	Diff.	Alloy	Diff.
S.A.E.		S.A.E.	
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.50

4600 0.20 to 0.30 Mo. 1.25-1.75 Ni 1.05

5100 0.80-1.10 Cr. 0.45

5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van.	1.50
Carbon Van.	0.95
9200 spring flats	base
9200 spring rounds, squares	0.25

Piling

Pittsburgh	2.25c
Chicago, Buffalo	2.35c

Strip and Hoops

(Base, hot rolled, 25-1 ton)
(Base, cold-rolled, 25-3 tons)

Hot strip to 23⅛-in. Pittsburgh	1.95c
Chicago or Gary	2.05c
Birmingham base	2.10c
Detroit, del.	2.15c
Philadelphia, del.	2.26c
New York, del.	2.30c
Cooperage hoop, Pittsburgh	2.05c
Chicago	2.15c
Cold strip, 0.25 carbon and under, Pitts., Cleveland	2.60c
Detroit, del.	2.81c
Worcester, Mass.	2.80c

Carbon	Cleve-Pitts.	Worcester, Mass.
0.26—0.50	2.60c	2.80c
0.51—0.75	3.70c	3.90c
0.76—1.00	5.45c	5.65c
Over 1.00	7.50c	7.70c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts. 20—100 lbs.	25.50-28.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll. qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
Spikes, R. R. base	2.75c
Track bolts, base	3.75c
Tie plates, base	2.00c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $2; 16 and 20 lbs., up $1; 12 lbs. up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists:

Carriage and Machine

½ x 6 and smaller	70-10 off
Do. larger	70-5 off
Tire bolts	50 off

Plow Bolts

All sizes 70-5 off

Stove Bolts

In packages with nuts attached 75 off; in packages with nuts separate 75-5 off; in bulk 82½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	65 off
Elevator bolts	65 off

Nuts

S. A. E. semifinished hex.: ½ to ⅞-inch	60-20-10 off
Do., ½ to 1-inch	60-20-10 off
Do., over 1-inch	60-20-10 off

Hexagon Cap Screws

Milled	50-10 off
Upset, 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	75 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	3.05c
Struc., c. l., Chicago	3.15c
⅞-in. and smaller, Pitts., Chi., Cleve.	70-5 off
Wrought washers, Pitts., Chi., Phila. to jobbers and large nut, bolt mfrs.	$6.00 off

Cut Nails

Cut nails, Pitts.; (10% discount of size extras) .. $2.90

Do., less carloads, 5 kegs or more, no discount on size extras ... $3.20

Do., under 5 kegs; no disc. on size extras ... $3.35

Pipe and Tubing

Base $200 net ton, except on less boiler tubes under 2 inches and cold drawn seamless.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ less. Wrought pipe, Pittsburgh.

Butt Weld

Steel

In.	Blk.	Galv.
⅛ and ¼	60	44½
⅜	64½	55
½	67½	59
¾	69½	61½
1—3	31½	15

Iron

⅛	36½	20½
¼	39½	25½
⅜	41½	26
½	62	53½
¾	65	56½
1—1¼	67	58½
1½—2	66	56½
2½—3	65½	56

Lap Weld

Steel

2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel

⅛, butt weld	56
¼ and ⅜, butt weld	59
½, butt weld	63½
¾, butt weld	66½
1 to 3, butt weld	68½
2, lap weld	61
2½ to 3, lap weld	64
3½ to 6, lap weld	66
7 and 8, lap weld	65

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 pts. under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices being on lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in., Chicago	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4-in.	46.00

Class A pipe $3 over Class B Stnd. fitgs., Birm. base .. $100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., Buffalo and Young	$32.00
Philadelphia	37.67
Duluth	34.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chicago, Buffalo	39.00
Forging, Duluth	41.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buffalo, Canton, Sparrows Point	32.00

Slabs

Pitts., Chicago, Cleveland, Youngstown	32.00

Wire Rods

Pitts., Cleve., No. 5 to ⅝-inch incl.	40.00
Do., over ⅝ to 41/64-inch incl.	42.00

Chicago up $1; Worcester up $2

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt.	1.80c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.75- 4.00
Connellsville, fdry.	4.25- 4.50
Connell. prem. fdry.	5.50
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	10.20-10.65
Chi., ov., outside del.	9.00
Chicago, del.	9.75
New England, del.	12.00
St. Louis, del.	10.00-10.50
Birmingham, ovens	6.50
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	10.30
Buffalo, del.	10.50
Detroit, del.	10.70
Philadelphia, del.	9.88

Coke By-Products

Spot gal. Producers' Plants

Pure and 90% benzol	16.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylol	30.00c

Per lb. f.o.b. Frankford

Phenol (200 lb. drums)	15.50c
Do., (450 lbs.)	14.50c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	8.25c

Per 100 lbs. Atlantic seaboard

Sulphate of ammonia	$1.275

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malle-able	Basic	Besse-mer
Bethlehem, Pa.	$20.50	$21.00	$20.00	$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	21.50	22.00	21.00	22.50
Hamilton, O.	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00
Delivered from Basing Points:				
Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	22.00	22.50	21.50	23.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm.	22.55	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	†19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	19.82	20.58	20.08	.....
Cincinnati from Birmingham	19.44	.....	18.44	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.17	21.77	21.27	.....
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.27	21.07
Muskegon, Mich., from Chicago, Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25
St. Louis, northern	20.00	20.00	19.50	.....
Delivered from Basing Points:	No. 2 Fdry.	Malle-able	Basic	Besse-mer
St. Louis from Birmingham	†19.68	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $24.00, Phila. base, standard and copper bearing, $25.13.

Gray Forge		Charcoal	
Valley furnace	19.00	Lake Superior fur.	$22.50
Pitts. dist. fur.	19.00	Do., del. Chicago	25.75
		Lylees, Tenn.	22.50

Silvery†

Jackson county, O., base; 6-6.50 per cent $22.75; 6.51-7—$23.25; 7-7.50—$23.75; 7.51-8—$24.25; 8-8.50—$24.75; 8.51-9—$25.25; 9-9.50—$25.75; Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$55.00

First Quality

Pa., Ill., Md., Mo., Ky.	$45.00
Alabama, Georgia	$38.00-45.00

Second Quality

Pa., Ill., Ky., Md., Mo.	40.00
Georgia, Alabama	35.00

Ohio

First quality	$40.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	48.00

Ladle Brick (Dry Press)

Pa., O., W. Va., Mo.	$24.00
do., wire cut	22.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	40.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	22.00

Base Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chem. bonded chrome	45.00
Magnesite brick	65.00
Chem. bonded magnesite	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$22.50
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$18.00
Do., for barge	$19.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	75.00
Do., Baltimore, base	75.00
Do., del. Pittsburgh	80.13
Spiegeleisen, 19-20% dom. Palmerston, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight allowed, c. l.	69.50
Do., less carload	77.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicoman., 2½ carbon	85.00
2% carbon, 90.00; 1%,	100.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.30-1.40
Ferrovanadium, 35 to 40% lb., cont.	2.70-2.90
Ferrotitanium, c. l., prod. plant, frt. all., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $3 unitage	58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $3 unitage	75.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead: New York N. Y.	Lead: East St. L.	Zinc: St. L.	Alumi-num 99%	Antimony: Chinese Spot, N. Y.	Nickel: Cath-odes
Nov. 7	10.50	10.62½	10.20	50.50	49.87½	5.00	4.85	4.85	*19.00	12.50	35.00
Nov. 9	10.50	10.62½	10.20	53.25	52.75	5.00	4.85	4.95	*19.00	12.50	35.00
Nov. 10	10.50	10.62½	10.20	53.62½	53.12½	5.10	4.95	4.95	*19.00	12.50	35.00
Nov. 11—Holiday											
Nov. 12	10.50	10.62½	10.20	52.62½	52.05	5.10	4.95	4.95	*19.00	12.50	35.00
Nov. 13	10.50	10.62½	10.20	53.25	52.62½	5.10	4.95	4.95	*19.00	12.50	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 10.50c Conn. copper

Sheets	
Yellow brass (high)	16.25
Copper, hot rolled	18.25
*Lead cut to jobbers	8.75
Zinc, 100-lb. base	9.50
Tubes	
High yellow brass	18.50
Seamless copper	18.75
Rods	
High yellow brass	14.25
Copper, hot rolled	15.00
Anodes	
Copper, untrimmed	15.75
Wire	
Yellow brass (high)	16.50

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	6.37½-6.62½
*Cleveland	7.00- 7.50
*Chicago	6.87½- 7.00
*St. Louis	6.50- 6.75
Heavy Copper and Wire	
*New York, No. 1	8.10-8.12½
*Chicago, No. 1	8.37½-8.62½
*Cleveland, No. 1	8.25- 8.50
*St. Louis, No. 1	8.00- 8.25
Composition Brass Borings	
New York	6.00-6.12½
Light Copper	
New York	6.50- 6.75
*Chicago	6.75- 7.00
*Cleveland	6.75- 7.00
*St. Louis	6.50- 6.75
Light Brass	
*Chicago	4.00- 4.25
*Cleveland	4.00- 4.25
*St. Louis	3.75- 4.25
Lead	
New York	4.00-4.12½
*Cleveland	4.00- 4.25
*Chicago	4.00- 4.25
St. Louis	3.75- 4.00
Zinc	
New York	2.50- 2.75
*St. Louis	2.37½-2.87½
Cleveland	2.50- 2.75
Aluminum	
Borings, Cleveland	9.00- 9.50
Mixed, cast, Cleve.	13.00-13.25
Mixed, cast, St. L.	13.00-13.25
*Clips, soft, Cleve.	15.00-15.25
SECONDARY METALS	
*Brass ingot, 85-5-5-5	10.75
Stand. No. 12 alum.	16.75-17.25

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

HEAVY MELTING STEEL

Birmingham†	11.00-13.00
Bos. dock, No. 1 exp.	†12.25
N. Eng. del. No. 1..	12.75
Buffalo, No. 1	16.00-16.50
Buffalo, No. 2	14.50-15.00
Chicago, No. 1	16.25-16.75
Cleveland, No. 1	15.50-16.00
Cleveland, No. 2	15.00-15.50
Detroit, No. 1	13.50-14.00
Eastern Pa., No. 1..	14.50-15.00
Eastern Pa., No. 2..	13.50-14.00
Federal, Ill.	13.00-13.50
Granite City, R. R.	14.50-15.00
Granite City, No. 2.	13.00-13.50
New York, No. 1	†11.50-12.00
N. Y. dock, No. 1 exp.	†11.00
Pitts., No. 1 (R. R.)	17.50-18.00
Pitts., No. 1 (dlr.)	17.00-17.50
Pittsburgh, No. 2	15.25-15.75
St. Louis, R. R.	14.50-15.00
St. Louis, No. 2	13.00-13.50
Toronto, dlrs. No. 1.	10.50-11.00
Toronto, No. 2	9.50-10.00
Valleys, No. 1	16.75-17.25

COMPRESSED SHEETS

Buffalo, dealers	14.50-15.00
Chicago, factory	15.00-15.50
Chicago, dealer	14.00-14.50
Cleveland	15.00-15.50
Detroit	14.00-14.50
E. Pa., new mat.	15.00-15.50
E. Pa., old mat.	12.00-12.50
Pittsburgh	17.00-17.50
St. Louis	10.50-11.00
Valleys	16.50-16.75

BUNDLED SHEETS

Buffalo	12.50-13.00
Cincinnati, del.	9.50-10.00
Cleveland	12.50-13.00
Pittsburgh	15.25-15.75
St. Louis	8.75- 9.25
Toronto, dealers	4.50

SHEET CLIPPINGS, LOOSE

Chicago	10.00-10.50
Cincinnati	8.50- 9.00
Detroit	10.50-11.00
St. Louis	8.00- 8.50

STEEL RAILS, SHORT

Birmingham	14.00-16.00
Buffalo	18.00-19.00
Chicago (3 ft.)	17.50-18.00
Chicago (2 ft.)	18.50-19.00
Cincinnati, del	16.50-17.00
Detroit	16.50-17.00
Pitts., open-hearth, 3 ft. and less	19.50-20.00
St. Louis, 2 ft. & less	16.00-16.50

STEEL RAILS, SCRAP

Boston district	†11.00
Buffalo	16.00-17.00
Chicago	16.25-16.75
Pittsburgh	17.50-18.00
St. Louis	15.25-15.75
Toronto, dealers	8.50

STOVE PLATE

Birmingham	8.00- 9.00
Boston, district	†7.00- 7.25
Buffalo	12.00-12.50
Chicago	9.00- 9.50
Cincinnati, dealers.	9.50-10.00
Detroit, net	9.00- 9.50
Eastern Pa.	12.00-12.50
New York, fdry.	†10.00
St. Louis	8.50- 9.00
Toronto, deal'rs, net	5.50- 6.00

COUPLERS, SPRINGS

Buffalo	17.50-18.00
Chicago, springs	18.25-18.75
Eastern Pa.	18.00-18.50
Pittsburgh	20.50-21.00
St. Louis	16.50-17.00

ANGLE BARS—STEEL

Chicago	18.00-18.50
St. Louis	15.50-16.00
Buffalo	14.50-15.00

RAILROAD SPECIALTIES

Chicago	18.00-18.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	18.50-19.00
Cleveland, billet, bloom crops	19.00-19.50
Eastern Pa., crops.	18.50-19.00
Pittsburgh, billet, bloom crops	20.50-21.00
Pittsburgh, sheet bar crops	19.50-20.00

FROGS, SWITCHES

Chicago	16.00-16.50
St. Louis, cut	15.25-15.75

SHOVELING STEEL

Chicago	16.25-16.75
Federal, Ill.	13.00-13.50
Granite City, Ill.	13.00-13.50
Toronto, dealers	6.50

RAILROAD WROUGHT

Birmingham	8.00- 9.00
Boston, district	†8.00- 8.25
Buffalo, No. 1	14.50-15.00
Buffalo, No. 2	16.00-16.50
Chicago, No. 1, net	14.00-14.50
Chicago, No. 2	16.25-16.75
Cincinnati, No. 2	14.00-14.50
Eastern Pa.	15.50-16.00
St. Louis, No. 1	13.00-13.50
St. Louis, No. 2	14.50-15.00
Toronto, No. 1 dlr.	7.00

SPECIFICATION PIPE

Eastern Pa.	14.00-14.50
New York	†10.00-10.50

BUSHELING

Buffalo, No. 1	14.50-15.00
Chicago, No. 1	14.75-15.25
Cincin., No. 1, deal.	11.00-11.50
Cincinnati, No. 2	6.50- 7.00
Cleveland, No. 2	10.50-11.00
Detroit, No. 1, new	13.00-13.50
Valleys, new, No. 1.	16.00-16.50
Toronto, dealers	6.00

MACHINE TURNINGS

Birmingham	6.00- 6.50
Buffalo	9.50-10.00
Chicago	8.50- 9.00
Cincinnati, dealers.	7.50- 8.00
Cleveland	10.00-10.50
Detroit	8.50- 9.00
Eastern Pa.	10.50
New York	†5.00- 5.50
Pittsburgh	11.50-12.00
St. Louis	6.00- 6.50
Toronto, dealers	4.00- 4.50
Valleys	10.75-11.25

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†5.00- 5.25
Buffalo	10.00-10.50
Cincinnati, dealers.	6.50- 7.00
Cleveland	10.50-11.00
Detroit	9.25- 9.75
Eastern Pa.	8.50- 9.00
New York	†4.25- 4.75
Pittsburgh	11.50-12.00
Toronto, dealers	4.00

CAST IRON BORINGS

Birmingham	6.00- 6.50
Boston dist. chem.	†6.25- 6.75
Boston dist. for mills	†6.00- 6.25
Buffalo	10.00-10.50
Chicago, dealers	9.25- 9.75
Cincinnati, dealers.	6.50- 7.00
Cleveland	10.50-11.00
Detroit	9.25- 9.75
E. Pa., chemical	10.00-13.00
New York	†6.00- 6.50
St. Louis	7.00- 7.50
Toronto, dealers	4.50- 5.00

PIPE AND FLUES

Cincinnati, dealers.	9.00- 9.50
Chicago, net	8.00- 8.50

RAILROAD GRATE BARS

Buffalo	11.00-11.50
Chicago, net	10.00-10.50
Cincinnati	9.00- 9.50
Eastern Pa.	12.00-12.50
New York	†8.00- 8.50
St. Louis	10.50-11.00

FORGE FLASHINGS

Buffalo district	9.65- 9.75
Buffalo	14.50-15.00
Cleveland	14.50-15.00
Detroit	12.50-13.00
Pittsburgh	15.25-15.75

FORGE SCRAP

Boston district	†6.50- 7.00
Chicago, heavy	18.00-18.50
Eastern Pa.	14.00

ARCH BARS, TRANSOMS

St. Louis	16.50-17.00

AXLE TURNINGS

Boston district	†7.25- 7.50
Buffalo	12.50-13.00
Chicago, elec. fur.	16.00-16.50
Eastern Pa.	13.00-14.00
St. Louis	10.50-11.00
Toronto	4.50

STEEL CAR AXLES

Birmingham	14.50-16.00
Boston district	†14.50-15.00
Buffalo	18.00-19.00
Chicago, net	18.00-18.50
Eastern Pa.	21.50
St. Louis	17.00-17.50
Toronto	8.50

SHAFTING

Boston district	†15.25-15.50
Eastern Pa.	20.50-21.50
New York	†16.00-16.50
St. Louis	15.00-15.50

CAR WHEELS

Birmingham	14.00-15.50
Boston dist. iron	†11.00-11.50
Buffalo, iron	16.00-17.00
Buffalo, steel	18.00-19.00
Chicago, iron	16.50-17.00
Chicago, rolled steel	18.00-18.50
Cincinnati, iron	13.00-13.50
Eastern Pa., iron	16.00-17.00
Eastern Pa., steel	18.00-18.50
Pittsburgh, iron	18.00-18.50
Pittsburgh, steel	20.50-21.00
St. Louis, iron	14.00-14.50
St. Louis, steel	16.50-17.00
Toronto, net	8.50

NO. 1 CAST SCRAP

Birmingham	11.50-12.50
Bos. dis. No. 1 mch.	†10.75-11.00
N. Eng., del. No. 2	†9.00- 9.25
N. Eng., del. textile.	12.00-12.50
Buffalo, cupola	14.50-15.00
Buffalo, mach.	15.50-16.00
Chicago, agri. net.	12.00-12.50
Chicago, auto	12.50-13.00
Chicago, mach. net	14.00-14.50
Chicago, railr'd net	13.00-13.50
Cincl., mach. cup.	13.50-14.00
Cleveland, mach.	16.25-16.75
Eastern Pa., cupola.	16.00-16.50
E. Pa., mixed yard.	14.00-14.50
Pittsburgh, cupola.	17.00-17.50
San Francisco, del.	13.50-14.00
Seattle	10.00-11.00
St. Louis, No. 1	12.50-13.00
St. L. No. 1, mach.	13.00-13.50
Toronto, No. 1, mach., net	9.50-10.00

HEAVY CAST

Boston, dist. break.	†9.75
New England del.	11.00-11.50
Buffalo, break.	13.25-13.75
Cleveland, break.	13.00-13.50
Detroit, No. 1 mach. net	13.50-14.00
Detroit, break.	11.50-12.00
Detroit, auto net	13.50-14.00
Eastern Pa.	15.00
New York break.	†11.00-11.50
Pittsburgh	14.00-14.50

MALLEABLE

Birmingham, R. R.	13.50-14.00
New England, del.	†16.25-17.50
Buffalo	17.00-17.50
Chicago, R. R.	18.00-18.50
Cincl., agri. del.	14.00-14.50
Cleveland, rail.	17.50-18.00
Detroit, auto, net.	14.50-15.00
Eastern Pa., R. R.	16.50-17.50
Pittsburgh, rail	17.50-18.00
St. Louis, R. R.	15.50-16.00
Toronto, net	7.00

RAILS FOR ROLLING

5 feet and over

Birmingham	14.00-15.00
Birmingham	†11.00-11.50
Buffalo	16.50-17.50
Chicago	17.00-17.50
Eastern Pa.	16.00
New York	†12.00-12.50
St. Louis	16.00-16.50

LOCOMOTIVE TIRES

Chicago (cut)	18.00-18.50
St. Louis, No. 1	13.50-14.00

LOW PHOS. PUNCHINGS

Buffalo	18.00-18.50
Chicago	18.50-19.00
Eastern Pa.	18.00-18.50
Pittsburgh (heavy)	19.50-20.00
Pittsburgh (light)	18.50-19.00

Iron Ore

Lake Superior Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.50- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	11.00
No. Afr. low phos.	13.00
Swedish basic, 65%	10.00
Swedish low phos.	11.50
Spanish No. Africa basic, 50 to 60%.	nom.
Tungsten, spot sh. ton unit, duty pd.	$15.85-16.00
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	19.50-19.75

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52%	27.00
So. African, 50-52%	27.00
Indian, 50-52%	27.00

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.10c
Chattanooga	3.56c
Chicago (j)	3.20c
Cincinnati	3.42c
Cleveland	3.10c
Detroit	3. 29c
Houston	3.10c
Los Angeles	3.80c
Milwaukee	3.31c-3.46c
New Orleans	3.55c
New York‡ (d)	3.51c
Pitts. (h)	3.15c-3.30c
Philadelphia*	3.25c
Portland	3.70c
San Francisco	3.60c
Seattle	3.90c
St. Louis	3.45c
St. Paul	3.45c-3.60c
Tulsa	3.35c

IRON BARS

Portland	3.50c
Chattanooga	3.56c
Baltimore*	3.10c
Cincinnati	3.42c
New York‡ (d)	3.15c
Philadelphia*	3.25c
St. Louis	3.45c
Tulsa	3.35c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.56c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Angl., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	3.50c
St. Louis	3.35c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore*	3.10c
Boston††	3.29c
Buffalo	3.35c
Chattanooga	3.66c
Chicago	3.30c
Cincinnati	3.52c
Cleveland	3.41c
Detroit	3.52c
Houston	3.10c
Los Angeles	3.80c
Milwaukee	3.41c
New Orleans	3.65c
New York‡ (d)	3.47c
Philadelphia*	3.10c
Pittsburgh (h)	3.25c
Portland (i)	3.75c
San Francisco	3.60c
Seattle (i)	3.75c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.60c

PLATES

Baltimore*	3.10c
Boston††	3.31c
Buffalo	3.47c
Chattanooga	3.66c
Chicago	3.30c
Cincinnati	3.52c
Cleveland, ¼-in. and over	3.41c
Detroit	3.52c
Detroit, ⅜-in.	3.85c
Houston	3.10c
Los Angeles	3.60c
Milwaukee	3.41c
New Orleans	3.65c
New York‡ (d)	3.50c
Philadelphia*	3.10c
Phila. floor	4.95c
Pittsburgh (h)	3.25c
Portland	3.75c
San Francisco	3.80c
Seattle	3.75c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.60c

NO. 10 BLUE

Baltimore*	3.20c
Boston (g)	3.40c
Buffalo	3.72c
Chattanooga	3.46c
Chicago	3.15c
Cincinnati	3.32c
Cleveland	3.21c
Det. 8-10 ga.	3.24c
Houston	3.45c
Los Angeles	3.90c
Milwaukee	3.26c
New Orleans	3.65c
New York‡ (d)	3.41c
Portland	3.85c
Philadelphia*	3.20c
Pittsburgh (h)	3.05c
San Francisco	3.60c
Seattle	3.85c
St. Louis	3.40c
St. Paul	3.40c
Tulsa	3.80c

NO. 24 BLACK

Baltimore*†	3.80c
Boston (g)	4.05c
Buffalo	3.35c
Chattanooga*	3.51c
Chicago	3.55c-4.55c
Cincinnati	3.97c
Cleveland	4.01c
Detroit	4.14c
Los Angeles	4.35c
Milwaukee	4.16c
New Orleans	4.50c
New York‡ (d)	4.10c
Philadelphia*†	3.85c
Pitts.** (h)	3.65c-4.95c
Portland	4.30c
Seattle	4.60c
San Francisco	4.20c
St. Louis	3.30c
St. Paul	4.10c
Tulsa	4.85c

NO. 24 GALV. SHEETS

Baltimore *†	3.90c
Buffalo	4.10c
Boston (g)	4.00c
Chattanooga*	3.96c
Chicago (h)	4.15c-5.15c
Cincinnati	4.82c
Cleveland	4.61c
Detroit	4.82c
Houston	4.50c
Los Angeles	4.60c
Milwaukee	4.76c
New Orleans	4.95c
New York‡ (d)	4.50c
Philadelphia*†	4.50c
Pitts.** (h)	4.30c-5.55c
Portland	4.60c
San Francisco	5.00c
Seattle	5.10c
St. Louis	4.90c
St. Paul	4.60c
Tulsa	5.20c

BANDS

Baltimore*	3.30c
Boston††	3.40c
Buffalo	3.52c
Chattanooga	3.71c
Chicago	3.40c
Cincinnati	3.57c
Cleveland	3.46c
Detroit, ⅜-in. and lighter	3.49c
Houston	3.35c
Los Angeles	4.30c
Milwaukee	3.51c
New Orleans	4.05c
New York‡ (d)	3.66c
Philadelphia*	3.30c
Pittsburgh (h)	3.30c
Portland	4.35c
San Francisco	4.20c
Seattle	4.35c
St. Louis	3.65c
St. Paul	3.65c
Tulsa	3.55c

HOOPS

Baltimore	3.55c
Boston ††	4.40c
Buffalo	3.52c
Chicago	3.40c
Cincinnati	3.57c
Det., No. 14 and lighter	3.49c
Los Angeles	6.05c
Milwaukee	3.51c
New York‡ (d)	3.66c
Philadelphia*	3.55c
Pittsburgh (h)	3.80c
Portland	5.85c
San Francisco	6.25c
Seattle	5.70c
St. Louis	3.65c
St. Paul	3.65c

COLD FIN. STEEL

Baltimore (c)	3.98c
Boston*	4.15c
Buffalo (h)	3.70c
Chattanooga*	4.38c
Chicago (h)	3.75c
Cincinnati	3.97c
Cleveland (h)	3.75c
Detroit	3.84c
Los Ang. (f) (d)	6.10c
Milwaukee	3.86c
New Orleans	4.55c
New York‡ (d)	3.96c
Philadelphia*	4.01c
Pittsburgh	3.60c
Portland (f) (d)	6.25c
San Fran. (f) (d)	6.05c
Seattle (f) (d)	6.25c
St. Louis	4.00c
St. Paul	4.27c
Tulsa	4.80c

COLD ROLLED STRIP

Boston	3.245c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.22c
Cleveland (b)	3.00c
Detroit	3.18c
New York‡ (d)	3.36c
St. Louis	3.41c

TOOL STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up).

	Base
High Speed	59½c
High carbon, high chrome	39c
Oil hardening	23c
Special tool	21c
Extra tool	17¾c
Regular tool	14½c

Uniform extras apply.

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	65
Cleveland	70
Detroit	70
Milwaukee	70
Pittsburgh	65-5

(a) Under 100 lbs., 60 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Quantity base; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) Shapes other than rounds, flats, fillet angles, 3.35c.

Prices on heavier lines are subject to new quantity differentials: 399 lbs. and less, up 50 cts.; 400 to 3999 lbs., base; 4000 to 7999 lbs., 15 cts., under; 8000 to 14,999 lbs., 25 cts. under; 15,000 to 39,999 lbs., 35 cts. under; 40,000 lbs. and over, 50 cts. under; (except Boston).

‡Domestic steel; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 40,000 lbs., extras on less.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Nov. 12

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
			Quoted in dollars at current value	**Quoted in gold pounds sterling
PIG IRON	£ s d			£ s d
Foundry, 2.50-3.00 Silicon	$15.31	3 2 6*	$14.23	1 15 0
Basic bessemer	15.31	3 2 6*	11.79	1 9 0
Hematite, Phos. .03-.05	18.38	3 15 0	.....	.....
SEMIFINISHED STEEL				
Billets	$28.79	5 17 6	$19.10	2 7 0
Wire rods, No. 5 gage	43.86	8 19 0	36.61	4 10 0
FINISHED STEEL				
Standard rails	$40.43	8 5 0	$44.74	5 10 0
Merchant bars	1.86c	8 10 0	1.20c	3 5 0
Structural shapes	1.81c	8 5 0	1.14c	3 1 6
Plates, †¼-in. or 5 mm.	1.89c	8 12 6	1.57c	4 5 0
Sheets, black, 24 gage or 0.5 mm	2.24c	10 5 0	2.30c	6 5 0††
Sheets, gal., 24 gage, corr.	2.73c	12 10 0	2.67c	7 5 0
Bands and strips	2.03c	9 5 0	1.48c	4 0 0
Plain wire, base	2.14c	9 15 0	1.94c	5 5 0
Galvanized wire, base	2.52c	11 10 0	2.15c	5 17 6
Wire nails, base	2.63c	12 0 0	1.75c	4 15 0
Tin plate, box 108 lbs.	$ 4.59	0 18 9	.....	.....

British ferromanganese $75 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$18.38	3 15 0(a)	$14.65	315	$15.46	460	$25.31 (b) 63
Basic bessemer pig iron	18.38	3 15 0(a)	8.87	190	14.03	415	27.93 (b) 69.50
Furnace coke	5.27	1 1 6	5.89	127	4.60	137	7.63 19
Billets	30.01	6 2 6	22.32	480	19.49	580	38.77 96.50
Standard rails							
Merchant bars	1.81c	8 5 0	1.41c	671	1.73c	1,150	2.38c 132
Structural shapes	2.04c	9 7 0	1.40c	665	1.05c	700	1.98c 110
Plates, †¼-in. or 5 mm.	2.05c	9 7 6	1.37c	650	1.05c	700	1.93c 107
Sheets, black	2.12c	9 13 9	1.74c	830	1.28c	850	2.29c 127
Sheets, galv., corr., 24 ga.	2.63c	12 0 0§	1.79c	850‡	1.39c	925‡	2.59c 144‡
or 0.5 mm	3.07c	14 0 0	2.84c	1,350	2.25c	1,500	6.66c 370
Plain wire	2.19c	10 0 0	2.31c	1,100	1,95c	1,3C0	3.11c 173
Bands and strips	2.21c	10 2 0	1.62c	770	1.28c	850	2.29c 127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed.
**Gold pound sterling carries a premium of 67.00 per cent over paper sterling.

Bars

Bar Prices, Page 84

Pittsburgh—Likelihood of a first-quarter advance in both carbon and alloy steel bars seemed to gain ground last week, but no announcement has been made. A continuing good rate of specifications for bars is noticeable and includes bookings of a leading producer here the past week on about 6000 tons of alloy material, its second best weekly showing for the year.

Cleveland — New bar buying, while not as heavy as before the opening of the fourth quarter, continues to hold deliveries well extended. Nut and bolt concerns, cold bar finishers and auto manufacturers are most active consumers. Considerable speculative buying is anticipated over the remainder of this quarter, in view of the general expectation that prices will be advanced the first of the year.

Chicago—Principal gains in steel bar specifications are coming from automotive plants, though the upturn in shipments still is below the volume which had been anticipated. Further gains are in prospect. Tractor manufacturers are maintaining steady schedules at a high level and operations of implement plants show further improvement. While backlogs of cold bar finishers are declining, shipments of hot-rolled bars to this group continue heavy.

New York—Consumers of commercial steel bars are specifying more freely in expectation of an advance for first quarter. Jobbers and bolt and nut manufacturers are specifying particularly well.

Philadelphia—Notwithstanding the fact that commercial steel bars were advanced $2 a ton the beginning of this quarter it is believed that a further increase will be announced for next quarter, in line with advances which will probably take place in all leading products as a result of higher wages and other producing costs. This probability is already being manifested in a somewhat more active market, although as deliveries are not quite so extended, there is not quite the pressure for protective coverage as in certain of the lighter, flat lines.

Youngstown, O.—Mills here are comfortably filled with steel bar business. Since mill wage advance announcements presage certainty of higher prices for first quarter more orders for larger tonnages are quietly flowing in for December delivery.

United Bronze Co., Pittsburgh, has purchased a portion of the Rieseck Iron Works plant, 1115 Metropolitan street, North Side, Pittsburgh, which was formerly occupied by the Alloy Metal & Mfg. Co.

Plates

Plate Prices, Page 84

Pittsburgh—Marietta Mfg. Co., Point Pleasant, W. Va., has received a contract from the Standard Oil Co. of New Jersey for a stern wheel towboat for service on the lower Mississippi river. The boat will be 190 x 42 x 7½ feet. Maryland Drydock Co., Baltimore, is building three railroad car floats for the Pennsylvania railroad to be delivered at New York.

Cleveland — Plate tonnage has been restricted to small lots. However, total sales remain on a par with those in the similar period in October. Prices are firm and unchanged, but many feel that an advance of $2 a ton will likely be announced the first of next month.

Chicago—Plates are slow in new bookings, but mill shipments are holding at a fair rate. Producers have only small backlogs of freight car material and need new orders to continue deliveries at their present rate. Orders for fabricated material include 1725 tons at Los Angeles, and Standard Oil Co. (Ind.) has ordered an oil tanker involving a substantial tonnage of plates and shapes.

Boston—Demand for plates by tank and boiler fabricators continues high. Mills generally are able to ship plain material within a week or 10 days, but on flanged plates and other shapes requiring special treatment shipping time becomes a matter of weeks. Considerable current business is in carload lots with sheared plates in heaviest demand. Persistent rumors of a price advance for first quarter are exerting a slightly bullish influence, with indications that as soon as some definite price move is made orders will become heavier.

New York—Plate consumers expect an advance of $2 per ton for first quarter and as a result are expected to buy more freely. Eastern producers offer deliveries in two to three weeks. Impending tonnage includes 30,000 tons of riveted pipe work. Considerable work is expected from railroad equipment buyers before the end of the year.

Philadelphia — Platemakers are anticipating an early pick-up in orders in view of impending higher prices for first quarter.

An increase of $2 a ton is expected, which would advance base prices from 2.00c, Coatesville, Pa., to 2.10c, that point, or to 2.19c, Philadelphia. So far the announcement of wage increases with implications of a price rise has had little effect on plates, due in all probability to the fact that deliveries are not far extended and buyers, therefore, figure they still have ample time to get under cover. Deliveries at eastern producing plants are available around two weeks on an average.

Maryland Dry Dock Co., Baltimore, has placed 1800 tons of steel, including 1000 tons of plates, for three car floats for the Pennsylvania railroad.

Birmingham, Ala.—Plate mills are maintaining active schedules and production is keeping consumers well supplied. Fabricating shops still report considerable business on hand.

San Francisco—Plate bookings are confined to lots of less than 100 tons. St. Maries, Idaho, rejected bids on 560 tons of 10 and 12-inch welded steel pipe and plans to call for new bids. MacDonald & Kahn, general contractors, San Francisco, were awarded the general contract for the University Mound reservoir, San Francisco, requiring 170 tons. Bureau of yards and docks, Washington, expects to call for bids soon for a floating drydock for the west coast, 446 feet in length and 68 feet beam. Several hundred tons of plates and shapes will be required.

Seattle—Plants and shops generally are busy, mostly with jobs involving small tonnages. However, they are running short of steel and may be forced to close unless water transportation is resumed.

Contracts Placed

1725 tons, department of water power, Los Angeles; 1025 tons to Emsco Derrick & Equipment Co., Los Angeles, 700 tons to Southwest Welding & Mfg. Co., Alhambra, Calif.

200 tons, welded barge, 195 x 35 x 11 feet, for Ohio River Co., Cincinnati, to own shops, Huntington, W. Va.

150 tons, tank barge, for Ashland Refining Co., Ashland, Ky., to St. Louis Structural Steel Co., St. Louis.

150 tons, tanks, American Cyanamid & Chemical Corp., Bridgeville, Pa., to Levinson Steel Co.; Rust Engineering Co., Pittsburgh, general contractors.

120 tons, for 37 small tanks at Bridgeville, Pa., to Buffalo Tank Corp., Lackawanna, N. Y.

110 tons, plates, for Cooling Tower Co., New York, to A. J. Fritschy Corp., New York.

Unstated tonnage, stern-wheel towboat, 190 x 42 x 7½ feet, for Standard Oil Co. of New Jersey service on the lower Mississippi river, to Marietta Mfg. Co., Point Pleasant, W. Va.

Contracts Pending

3000 tons, mostly plates, 465-foot electrically welded tanker for Standard Oil Co. (Ind.), Manitowoc Ship Building Corp., Manitowoc, Wis., builder.

250 tons, standpipe, Rockland, Mass.;

bids on 1,000,000-gallon tank rejected; new bids due Nov. 18, on 500,000 and 600,000-gallon tanks.

Transportation

Track Material Prices, Page 85

Placing of 100,000 tons of standard steel rails by the Pennsylvania, with Bethlehem Steel Co., Carnegie-Illinois Steel Corp. and Inland Steel Co., division of which is not announced, is the highlight of the week in the railroad market. This is the largest purchase since 1933 when an equal tonnage was placed by the same road.

New York Central will have a Clayton act opening on rails Nov. 25, the tonnage not announced, but estimated by observers at 60,000 to 80,000 tons.

Other rail tonnages placed include 10,000 tons by the Seaboard Air Line; 1000 tons each by the Western Railway of Alabama and Central of Georgia; 6000 tons by the Atlantic Coast Line and 500 tons by the Kentucky & Indiana. These total 118,560 tons for the week. It is reported two unidentified western roads have placed 35,000 tons and as high as 125,000 tons are expected to be placed by western lines in a short time. Prospect of an increase in the price of steel rails is expected to drive in an unusually large tonnage.

Chesapeake & Ohio is inquiring for 2000 freight cars, including 1000 hoppers, 500 all-steel box cars and 500 high-side gondolas, all of 50 tons capacity.

New York Central is still considering bids on 50 locomotives and may increase the order to 60 by the inclusion of ten switchers. Chicago, Burlington & Quincy has awarded 11 locomotives to its own shops. Utah Copper Co, Salt Lake City, Utah, has placed twelve 85-ton electric locomotives with General Electric Co. Indications are that as many as 200 locomotives may reach contract stage by the end of the year. Locomotive purchases so far this year total about 200, contrasted with only 96 bought in 1933-35. Meanwhile 5385 locomotives have been scrapped since Jan. 1, 1934.

Domestic freight car orders in October involved 2210 cars and brought the total for the first 10 months to 39,643, against 9158 in the corresponding period of 1935, 23,465 in the first 10 months of 1934 and 1545 in the same period in 1933. Further comparisons follow:

	1936	1935	1934	1933
Jan.	2,050	24	152	3
Feb.	6,900	806	19,725	0
March	632	0	30	5
April	4,427	350	800	50
May	8,900	2	717	8
June	5,220	5,151	1,835	500
July	7,229	500	19	306
Aug	225	200	105	202
Sept.	1,750	875	7	23
Oct.	2,210	1,250	75	514
10 mos. ...	39,643	9,158	23,465	1,545
Nov.	.....	100	254	533
Dec.	.....	10,050	110	316
Total ...		19,308	23,829	2,460

Rail Orders Placed

Pennsylvania railroad, 100,000 tons, made up of 64,000 tons of 131-pound rails and 36,000 tons of 152-pound rails, placed with Carnegie-Illinois Steel Corp., Bethlehem Steel Co. and Inland Steel Co.

Atlantic Coast Line, 6000 tons 112-pound rail, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Central of Georgia, 1000 tons, to unnamed producer.

Kentucky & Indiana, 500 tons, placed.

Seaboard Airline, 10,000 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and the Bethlehem Steel Co., Bethlehem, Pa.

Western Railway of Alabama, 1000 tons, to the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Locomotives Placed

Chicago, Burlington & Quincy, 11 locomotives, to own shops.

Utah Copper Co., Salt Lake City, Utah, twelve 85-ton electric locomotives to

General Electric Co., Schenectady, N. Y.

Car Orders Pending

Chesapeake & Ohio, 1000 hoppers, 500 all-steel box and 500 high-side gondolas, all of 50 tons capacity.

Chicago & Eastern Illinois, 500 box cars, permission given to buy; probably to General American Transportation Co., Chicago.

Western Maryland, 100 to 500 box cars and 100 gondolas, 50 tons capacity.

Woodward Iron Co., Woodward, Ala., five gondolas.

Rail Orders Pending

Capitol Traction Co., Washington, 600 tons, contemplated.

Sheets

Sheet Prices, Page 84

Pittsburgh—Mindful of an early price advance many sheet consumers last week showed a tendency to increase specifications. This has been complicated by the fact that mill backlogs are still heavy and deliveries cannot be promised in much less than three to four weeks. In company with automotive buying, specifications from refrigerator manufacturers, railroad car roof fabricators and stove makers have been most in evidence.

Cleveland—Stoves, refrigerators and radio cabinet manufacturers are active buyers, because of the approaching holidays. In view of the return to almost capacity operations among auto builders, considerable tonnage is being consumed there. Deliveries on cold-rolled sheets have shown little improvement. Some mills are booked throughout the remainder of the quarter. Consumers expecting a price advance for first quarter are now placing orders well in advance of current requirements.

Chicago—A large portion of sheet mill capacity here is booked for the remainder of the year and with higher prices regarded not unlikely for next quarter, producers face the necessity of declining additional business or of sacrificing their return on material shipped after the change in quotations. While shipments to the automotive industry have increased more slowly than was anticipated, consumption is rising and a peak in fourth quarter needs is expected to be reached within a few weeks. Little improvement is shown in deliveries. Prices are steady, with prospective advances a strengthening factor.

Boston—Strong demand prevails for galvanized sheets. Sales of other type sheets are being maintained at a relatively high rate. The revision in quantity differentials has been a factor in some otherwise nominal orders being increased considerably.

New York—Sheet consumers are further anticipating their requirements to cover against an expected price increase for first quarter. As mills have little capacity for the remainder of the year pressure is pronounced.

Philadelphia—Sheet demand is brisk, reflecting further protective buying by consumers against probable advances for first quarter. Increases of $2 and probably $3 a ton in some grades are expected. The fact that this anticipatory buying is already so brisk is attributed to extended mill deliveries. On some grades producers are already virtually out of the market for this year, and on others they in many cases are sold ahead three and four weeks. Alan Wood Steel Co., Conshohocken, Pa., has within the past week started production on its new mechanized mill, placing it in position to supply hot-rolled annealed sheets of all grades and finishes.

Radio manufacturers continue to specify substantial quantities of sheets, due mainly to expanding re-

quirements for automobile radios. Radio makers are specifying hot-rolled pickled and cold-rolled sheets; also some galvanized sheets and hot strip.

Youngstown, O.—Makers of steel sheets show lively concern over ability to ship next month as customers' needs develop. Already mills seem to have about as much tonnage booked as they can take care of over the remainder of this year.

Cincinnati—Buying of sheets continues active in this district, weekly commitments exceeding production, so that backlogs are being further extended. Books are becoming nearly filled for this quarter on some grades. To assure delivery, many consumers are anticipating requirements but examination of contracts fails to reveal much speculation against expected price increase.

Birmingham, Ala.—Sheet mills show no slowing down nor is there any accumulation by users. Shipments are as active as some weeks ago with prospects of continued good demand.

St. Louis—Shipments against orders are well maintained, but there is a tendency to taper. There has been no change in mill operations, and automotive releases are expanding. Demand for enameling stock and galvanized sheets is unabated. Pressure for delivery on all descriptions continues strong.

Behind the Scenes with STEEL

No Gong

THOSE stalwart radio amateurs, Charles M. Schwab and Walter P. Chrysler, did their stuff for Major Bowes the other night and practically stole the show. In case you missed it, we can tell you that Mr. Schwab rocked the audience with one of his memorable stories.

The incident happened years ago when Mr. Schwab was general manager of the Homestead Works and one day was showing his boss, Mr. Carnegie, through the plant.

As they walked about the mill, they came upon one of the casting pits, at the bottom of which a little Irishman was doing a magnificent job of loafing.

Realizing that this situation looked bad for the management, Mr. Schwab yelled down to Paddy, "Hey, you, what are you doing down there?"

Looking up, Paddy said, "And who might you be?"

"Why, I'm the general manager here," replied Mr. Schwab.

"Well, young man," retorted the Irishman, "you've got a damn nice job. Take care of it."

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On the Trail

SPEAKING of radio shows, Fred Allen's recent observation that New York authorities were becoming worried over the number of small children falling out of passing trailers calls to mind the article published in STEEL for Nov. 9 dealing with the outlook for trailer production and use of steel in same.

This survey indicated that some of the figures cited by trailer enthusiasts (production of 700,000 trailers in 1937) might be slightly screwy, but that nevertheless the industry has taken its place among the larger users of steel.

Babson, you know, has stated that in 20 years half the population of the country will be riding around in trailers (probably trying to find a place to park). Personally we prefer to stick to living quarters *sans* wheels where we can worry about why the watermelons don't grow, rather than about where we will find the next place to hook up our sewer pipes.

However, the trailer fad appears to be a fad no longer, but a definitely established mode of living. They've even started to write popular songs about them and their inhabitants. One of the first ditties, we believe, was, "Trailer Girl, I Love You."

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Africa Speaks

THE *Atlanta Journal*, as you may know, "covers Dixie like the dew." While we can't say the same for STEEL, we can report that STEEL "covers Africa like the ozone." "Well, maybe not all of Africa, but South Africa anyway. Well, maybe not the entire extent of South Africa, but at least the South African Iron & Steel Industrial Corp. Ltd. Well, possibly not the entire corporation, but at least Mr. G. Reyburn of the Iscor Works at Pretoria West, telephone 3241.

The Rt. Hon Mr. Reyburn saw the item in this column recently about the Automatic Decider developed by Ed Boots of U. S. Steel Corp.'s commercial office. Having some committee troubles of his own, Mr. R. was quick to see the value of the Decider and wrote to us for help. We've asked Mr. Boots to shoot one along to him.

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Dutch and Scotch

MR. REYBURN, incidentally is editor of the *Iscor News*, a copy of which he sends us. He must have quite a task in getting out this snappy little sheet, for most of it is printed in both English and Dutch. Keynote of the editorial page is the following: "Ons bou een van Suid-Afrika se grootste nywerhede op en dit op 'n wyse waarop ons met reg trots kan wees en in de woorde," which simply means, "We are building up one of Africa's great industries, building it up in a manner of which we can be proud."

From the joke page of the *Iscor News* we lift the following:

"A Scotsman from the remote Highlands paid his first visit to London. On arriving at Euston a voice immediately said, 'Taxi, Sir?'

"Donald shook his head.

"After exploring London our Scots friend went on to Bristol. On emerging from the station, he heard the familiar hail, 'Taxi, Sir?'

"The Scot became annoyed.

"'No, thank ye,' he bawled, 'I said No in London and I meant it. Now stop following me about.'"

—SHRDLU

Pipe

Pipe Prices, Page 85

Pittsburgh — Numerous factors point to an increase in the price of skelp and tube rounds, for first quarter. If these items are advanced, the logical result would be an advance in net prices on finished tubular products. Over the past week a 50-55 per cent rate found chief support from small and medium-sized orders for standard pipe, a fair participation from oil country goods and increasing business on mechanical tubing.

Cleveland—Jobbers report steady strong demand from miscellaneous sources, with the result that stocks are turning over at an active rate. Industrial requirements are by far the largest. Bids went in last week on 200 tons of cast pipe for the city of Garfield Heights, O., and bids are due Nov. 20 for the city of Cleveland for unstated tonnage of cast pipe. Prices remain firm and unchanged.

Chicago — Cast pipe deliveries, while holding at a fairly active rate, will commence to recede shortly. Inquiries and orders are in fair volume for this period. In most instances, contractors are seeking prompt shipment. Chicago is in the market for 203 tons of fittings.

Boston—Shipping time is from one to two weeks on cast pipe, depending upon size and quantities desired. Little business has developed lately from private sources, the greater volume being booked for federal aid projects. Prices are firm.

New York—The cast pipe market was comparatively quiet last week. The only project of size involves 500 tons for the United States treasury at Buffalo, on which bids will be taken Nov. 17. Foundries are now in a position to offer fairly prompt deliveries on various sizes. Despite the decline in business prices remain unchanged.

Seattle—Improvement in the cast pipe market is negligible, inquiries being for small lots and mostly out of stock. No large projects are pending.

Youngstown, O.—Fair sized order books are being worked on by makers of merchant pipe, but both line pipe and electric-weld business could be better. The new consignment rule on jobbers' requirements has changed completely the old-time pic-

ture of cash-payment days, and mills now are struggling to prevent jobbers' stocks becoming unwieldy, particularly ahead of year-end inventory days.

San Francisco—The largest cast pipe award went to Pacific States Cast Iron Pipe Co. and involved 300 tons of various size for Yellowstone county, Montana. New inquiries include 450 tons of 4 to 10-inch for Atwater, Calif.; 343 tons of 6 to 12-inch for Glendale, Calif., and 176 tons of 4 to 8-inch for Tucson, Ariz.

Cast Pipe Placed

300 tons, various sizes, Yellowstone county, Montana, to Pacific States Cast Iron Pipe Co., Provo, Utah.
100 tons, 4-inch, class 250, treasury department, Los Angeles, invitation 17,373, to unnamed interest.

Cast Pipe Pending

1300 tons, various sizes for Providence, R. I.; bids Nov. 16.
450 tons, 4 to 10-inch, Atwater, Calif.; bids opened.
343 tons, 6 to 12-inch, Glendale, Calif.; bids opened.
203 tons, 3 to 24-inch fittings, Chicago.
200 tons, various sizes, Lincoln Park commissioners, Chicago.
176 tons, 4 to 8-inch, Tucson, Ariz.; bids opened.
Unstated tonnage, 12-inch, for Wilmington, Mass., water department; bids opened Nov. 12 at Boston.

Strip

Strip Prices, Page 85

Pittsburgh—A larger volume of orders for strip steel came into the market last week in a variety of sizes and for well-diversified uses, apparently driven out by expected first-quarter price advance. In numerous cases consumers have been more liberal in anticipating requirements and have placed orders for release through the last half of November and December. Cold-rolled strip is quoted 2.60c, Pittsburgh, and 1.95c for hot-rolled strip.

Cleveland—Miscellaneous requirements held up well through last week and auto partsmakers increased their takings, as was expected. Electrical equipment and small farm tool manufacturers are reported to be taking greater tonnages. In view of some forward buying mills report deliveries well extended, this is more acute on cold-rolled narrow widths. Prices are firm.

Chicago—Strip steel shipments are steady and are increasing to the automotive industry. Backlogs of cold-rolled strip will support active operations through most of fourth quarter. Hot strip demand, while steady, has built up relatively moderate backlogs. Prices are steady, with higher quotations regarded as likely for first quarter.

Boston—Reclassification under the quantity extra method of pricing strip steel has resulted in orders otherwise nominally for carload lots being increased considerably, in some instances. The underlying demand continues strong. Possibility of higher prices for first quarter is expected to provide the impetus for a heavier volume of business.

Philadelphia—Narrow strip buyers here have taken no cognizance of the prospect for higher prices in next quarter insofar as being reflected in purchases. This is probably explainable by the fact that deliveries are not greatly extended on hot strip and are still available before the end of the year on such relatively little narrow cold strip as is being consumed in this district. Current prices are 2.26c, Philadelphia, on hot strip and 2.91c, on cold strip.

Youngstown, O.—Needs of customers for both wide and narrow strip are being filled to the best of mills' ability to ship. While regular customers are being taken care of new orders are being scanned

critically to determine if the tonnages sought can be delivered by the end of the present quarter. Unless buyers now have a place on mill books, or obtains such a position shortly, they are very likely to be disappointed later.

Wire

Wire Prices, Page 85

Pittsburgh—Present prices on merchant wire products at $2.05 per keg, Pittsburgh, the standard wire nail price and the jobbers' figure for resale at $1.90, are as firm as the market has been at any time in recent months. Apparently many nail and wire buyers are convinced that a price advance is immediately pending and have begun to anticipate needs at the present level rather than attempt to seek a lower price. Plain manufacturing wire quoted 2.50c, Pittsburgh, reflects a steady demand from makers of small automotive parts, bolts, nuts and rivets.

Cleveland — Requirements for wire products have been stimulated considerably because of increased activity among automotive manufacturers. Bolt and nut concerns are the heaviest consumers here. Agricultural dealers are gradually increasing specifications in preparing for spring trade, which from all accounts is expected to be heavy. Stocks of manufacturing consumers are reported to be normal, with little opportunity offered for stocking. Prices are firm.

Chicago—Steel wire shipments are heavy and although deliveries are at a better rate than new business, a continuation of active deliveries appears assured for the remainder of the quarter. Automotive consumption is increasing, while needs of most miscellaneous users of manufacturers' wire are steady or heavier. An incerase in stocks by dealers compared with a year ago is anticipated. Quotations recently have been steady.

Boston—Shipments of wire for retail sale for manufacturing purposes are mostly in carload lots. Manufacturers are using material bought before the beginning of the final quarter. Should prices be advanced further for first quarter considerable new business is expected. Mills may abandon the practice of announcing new quarterly wire prices a month before the date they become effective. In this event wire prices may be announced the latter part of this month, and then become effective some time before the first of January.

Youngstown, O.—All wire makers and their customers recognize that the current price situation is topsy-turvey. Nails and other wire products are declared far out of line with plain wire. When the new price schedule is announced before the end of the year, as is confidently expected, it is hoped that the entire wire and wire products price schedule will be revised and realigned.

Tin Plate

Tin Plate Prices, Page 84

Pittsburgh—As tin mills have worked down their backlogs to a more satisfactory point, a loss of about five percentage points in the average of the industry's operations was recorded last week, making production now at about 90 per cent of capacity. Canmakers have virtually concluded all of their production on 1936 packers' cans, but general line can demand is holding up the average. Movement of tin mill black sheets after a heavy autumn on toys has shown some downward tendency. Considerable interest hinges on the opening of 1937 books on tin plate, the price on which remains unchanged for the present at $5.25 per base box, Pittsburgh.

New York—Speculation prevails concerning future tin plate prices. While advancing steel wages and higher prices of pig tin present two reasons for an advance it is pointed out that numerous intangibles may lead to extension of current prices. These bear on the relation of tin plate to competitive lines and to other steel products. At present there is an excellent balance between these lines.

Cold Finished

Cold Finished Prices, Page 85

Pittsburgh—Buyers of cold-finished steel bars still find an acute delivery situation on turned and ground shafting, where five and six-week promises are common. The situation is improved, however, on cold-drawn bars and backlogs accumulated by producers around Oct. 1 are now reduced roughly half. In common with other finished steel products, an advance from 2.35c, Pittsburgh, market on cold-finished carbon bars is an early possibility.

Shapes

Structural Shape Prices, Page 84

New York—Lettings of structural shapes last week were few, with 6500 tons for a section of the Sixth avenue subway the largest item. Fabricators expect that should prices be increased for the first quarter, jobs actively contemplated will be out for bidding before the end of the year.

Pittsburgh—Bethlehem Steel Co. has taken an order for 2620 tons of fabricated structural steel for the Tifft street bridge at Buffalo. The present structural market at 1.90c, Pittsburgh, is subject to a likely advance for the first quarter.

Cleveland—Mills report slight improvement in deliveries because of the moderate decline in new tonnage. This condition has aided fabricators in making their delivery schedules. Bethlehem Steel Co., Bethlehem, Pa., was awarded the only job let last week, an addition to the laminated glass building of Libbey Owens Ford Glass Co., Toledo, O., involving 190 tons. Prices remain firm.

Chicago—Inquiries include over 3000 tons for several bridges, but new projects continue small. Awards are made up of only a few major items and fabricators are unable to add to backlogs.

Boston — Verified lettings of structural shapes last week totaled more than 3500 tons. An undetermined tonnage will be required for bridges in New Hampshire and Connecticut on which bids will be taken within two weeks.

St. Louis—No new awards of consequence were made during the past week or ten days. While fabricators are still operating at 50 per cent of capacity, this rate is at the expense of backlogs, which have noticeably receded since mid-October.

Philadelphia—Possibility of a $2 advance in shapes is expected to stimulate structural activity, notwithstanding the approach of winter. Fabricators report some quickening of activity, although this has not yet affected formal inquiry. Engineers are asking bidders to submit their qualifications for figuring on the toll bridge between Easton, Pa., and Phillipsburg, N. J., Nov. 15.

San Francisco—Shape lettings aggregated 2502 tons and brought the total for the year to 149,529 tons as compared with 105,869 tons for the corresponding period in 1935. The only new inquiry of importance calls for 322 tons, including 47 tons of sheet piling for the Parker bridge, Yuma county, Arizona, up for figures Nov. 17.

Seattle—Fabricating shops face a shortage of steel supplies due to cessation of water transportation. As a rule plants had their pending contracts well along before the maritime walkout and they are rapidly using all available stocks.

Shape Awards Compared

	Tons
Week ended Nov. 13	25,671
Week ended Nov. 6	*22,497
Week ended Oct. 30	13,004
This week, 1935	19,795
Weekly average, 1935	17,081
Weekly average, 1936	22,140
Weekly average, October	16,068
Total to date, 1935	*770,732
Total to date, 1936	*1,018,321

*Revised

Shape Contracts Placed

6500 tons, section 9, route 101, Sixth avenue subway, New York, to Bethlehem Steel Co., Bethlehem, Pa., through Park Contracting Co., New York.

4320 tons, roller dam No. 14, upper Mississippi river near Leclaire, Iowa, to Bethlehem Steel Co., Bethlehem, Pa.; Central Engineering Co., Davenport, Iowa, general contractor.

2620 tons, Tifft street bridge, Buffalo, to Bethlehem Steel Co., Bethlehem, Pa.

2500 tons, paper mill, Georgetown, S. C., to Stupp Bros. Bridge & Iron Co., St. Louis.

2000 tons, plant, Monsanto Chemical Co., Ashwood, Tenn., to Ingalls Iron Works Co., Birmingham, Ala., and Virginia Bridge Co., Roanoke, Va.

970 tons, sheet piling, for department of public works, Roughans point, Revere, Mass., to Carnegie-Illinois Steel Corp., Pittsburgh; through M. F. Gaddis, Boston.

920 tons, TVA requirement 108708, 150 transmission towers at Knoxville, Tenn., to American Bridge Co., Pittsburgh.

600 tons, addition No. 10 to state hospital building, Brooklyn, N. Y., to Ingalls Iron Works, Birmingham, Ala.

550 tons, annealing building, for Mesta Machine Co., Homestead, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

475 tons, bridge over Central Vermont tracks, Munson, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; through V. A. Gardetta, Ashley Falls, Mass.

450 tons, seven state highway bridges, Riverton, Wyo., to Minneapolis Moline Power Implement Co., Minneapolis.

390 tons, state bridge No. 5365, East Grand Forks, Minn., to American Bridge Co., Pittsburgh.

350 tons, stock shed, for Tonawanda Boxboard Co., Tonawanda, N. Y., to Lackawanna Steel Construction Co., Buffalo.

350 tons, tunnel ribs, metropolitan water district, Los Angeles, specification 181, to Western Pipe & Steel Co., Los Angeles.

300 tons, Pennsylvania state bridge,

route 403, Clearfield county, placed through C. G. Thompson, Clearfield, with the Bethlehem Steel Co., Bethlehem, Pa.

250 tons, new floor in forge shop, for Mesta Machine Co., Homestead, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

235 tons, plant addition, Hamilton Watch Co., Lancaster, Pa., to A. B. Rote, that city.

220 tons, addition to buildings No. 2, 3, and 17, Battle Creek, Mich., to R. C. Mahon Co., Detroit.

220 tons, hockey rink, for J. C. Cambria, Washington, to Dietrich Bros., Baltimore.

205 tons, Pennsylvania state highway bridge, on route 52, Cambria county, to Fort Pitt Bridge Works, Pittsburgh.

200 tons, plant extension, American Cyanamid & Chemical Corp., Bridgeville, Pa., to Levinson Steel Co., Pittsburgh, general contractors.

190 tons, additions to laminated glass building, for Libby-Owens Ford Glass Co., Toledo, O., to Bethlehem Steel Co., Bethlehem, Pa.

169 tons, two bridges, Malden-Revere, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; through C. J. Maney Co. Inc., Boston.

130 tons, bus station, Chicago, to Bethlehem Steel Co., Bethlehem, Pa.

125 tons, building, Stratford, Conn., for Tilo Roofing Co., New York, to New England Iron Works Inc., New Haven, Conn.

122 tons, post office, Auburn, N. Y., to Utica Structural Steel Co., Utica, N. Y.

110 tons, bridge, Westboro-Hopkington, Mass., to Truscon Steel Co., Youngstown, O.; through Middlesex Construction Co., Boston.

100 tons, state highway bridge, WPGH RC—3829 Chenango county, New York, to American Bridge Co., Pittsburgh.

100 tons, Fairgrounds bridge, Springfield, Vt., to American Bridge Co., Pittsburgh; through O. W. Miller, Springfield, Mass.

Shape Contracts Pending

2600 tons, bridge, Blountstown, Calhoun county, Fla.; Wisconsin Bridge & Iron Co., Milwaukee, low.

2500 tons, hangar, Newark, N. J.; expected out within a week.

1700 tons, bridge, Bonham, Tex.

1500 tons, field house, Purdue university, Lafayette, Ind., federal grant approved.

1220 tons, state viaduct, Wilkes-Barre, Pa., Dick Smith Engineering Co., Wilkes-Barre, Pa., low.

950 tons, alterations to building, for New York Historical society, New York.

900 tons, repairs to Manhattan bridge, New York.

900 tons, state bridge, Lafayette, Ind.; bids Nov. 17.

735 tons, track stringers for bridges in Manhattan, New York city; bids taken Nov. 12 by department of plants and structures, New York city.

700 tons, bridge, Little Deer Isle, Sargentville, Me.; John Roebling's Sons Co., Trenton, N. J., low on superstructure; substructure bids rejected.

650 tons, four span truss bridge, Armstrong-Westmoreland counties, Pennsylvania; Freeland Inc., Pittsburgh, low.

596 tons, through truss bridge, Johnstown, Pa.; Vang Construction Co., Pittsburgh, low.

500 tons, hangar and other buildings for coast guard station, Rockaway, N. Y.; bids taken Dec. 11 by treasury department, procurement division, Washington.

460 tons, through truss bridge, Union and Henderson townships, Huntingdon county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 20; included, 61 tons of plain steel bars.

450 tons, asphalt plant, New York city department of plant and structures; bids due Nov. 17.

420 tons, state bridge, Schererville, Ind.; bids Nov. 17.

420 tons, overhead bridge Eckman, W. Va.

375 tons, Big Shark river lift bridge, Avon-Belmar, N. J., for New York & Long Branch railroad.

350 tons, state highway bridge, Cedar Rapids, Iowa.

350 tons, building, for Wallace and Tiernan Inc., Belleville, N. J.

322 tons, including 47 tons of steel piling, Parker bridge, Yuma county, Arizona, bids Nov. 17.

310 tons, field office building, Weehawken, N. J., for New York Port authority.

300 tons, building for Fulton Savings bank, Brooklyn, N. Y.

300 tons, state highway bridges, Huntington and Culloden, W. Va.

300 tons, Isherwood hall extension, Annapolis, Md., for United States navy.

300 tons, storage warehouse, for Grand Trunk Western railroad, Detroit.

275 tons, Somesville bridge, Biddeford-Sacco, Me.; Cyr Bros., Waterville, Me., low.

275 tons, school, Garden City, Long Island, N. Y.; John H. Eisele Inc., New York, low.

250 tons, factory building, for Chrysler Corp., Detroit.

250 tons, health center building, Kips Bay-Yorkville, New York city; Wheeler Engineering Co. or Stock Construction Co., New York, depending upon acceptance of alternate bids.

200 tons, field office, Weehawken, N. J., for port authority of New York.

177 tons, bridge, Bartlett, N. H.; Hagan-Thibodeau Construction Co., Wolfsborough, N. H., low.

130 tons, Pennsylvania state bridge, route 11; bids Nov. 20.

128 tons, plate girder bridge, Eton township, Wyoming county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 20; included, 41 tons of plain steel bars.

123 tons, plate girder bridge, Elk county, Pennsylvania; Holt, McConnell & Osburn Inc., Canonsburg, Pa., low on Nov. 6 letting; included, 34 tons of plain steel bars.

100 tons, state bridges, Indiana; bids Nov. 17.

100 tons, bridge Sharon, Mass.; B. F. Construction Co., New Bedford, Mass., low.

Unstated tonnage, warehouse, Proctor & Gamble, Port Ivory, Staten Island, N. Y.; out for figuring.

Unstated tonnage, bridge, Alexander, N. H.; bids taken Nov. 12.

Unstated tonnage, bridge, North Haven, Conn.; bids Nov. 16.

Unstated tonnage, bridge, Fairfield, Conn.; bids Nov. 16.

Unstated tonnage, bridge, Thompson, Conn.; bids Nov. 16.

Unstated tonnage, bridge, Newport, N. H.; bids due Nov. 19.

Town Teaches Citizens Importance of Industries

"What Warren makes, makes Warren" is the slogan of the fall industrial festival at Warren, O., sponsored by retail merchants and manufacturers to call attention of citizens to the importance of the city's industries to the community. Downtown store windows presented 22 exhibits of products of the city's industries, some featuring finished products and others various stages of manufactures.

The purpose was to acquaint citizens with the importance of industry to the community. The exhibits were backed up by a publicity campaign in the press, including a series of short articles on how exports of products carry the name of Warren around the world.

Reinforcing

Reinforcing Bar Prices, Page 85

New York—The easy situation which has characterized the concrete reinforcing bar market, especially in New York and New Jersey, is being eliminated. This is believed to be a reflection of the possibility of an advance in mill prices for first quarter. Should prices be advanced, sellers expect that a number of jobs now actively contemplated will be out for figuring before the end of the year. State highway work in New Jersey and New York forms the bulk of tonnage pending.

Pittsburgh—The 2.05c market on new billet quality bars for reinforcing purposes, as a distributor's price for cut lengths in carloads, is quotably unchanged but subject to a possible advance for first quarter.

Cleveland — Estimated tonnage from private sources in Northern Ohio during October, is 759 tons; an increase of 600 tons over the preceding month. This contrast is attributed to the tonnage involved in the sewage treatment contract 93, this city. November is expected to show a marked decline from October, because of the lack of jobs involving heavy tonnages. Prices are firm, but no real test has been recently offered.

Chicago—Reinforcing bar shipments are declining, but deliveries still are at a relatively high rate. A further recession in bar consumption is in prospect, though activity is expected to be supported by private construction at a higher level than during previous years. Some business is pending for state road work, but few new inquiries are in prospect.

Boston—Weakness in reinforcing bars, which has been prevalent for several weeks, is being eliminated. This is attributed to the possibility of mill price advances for first quarter. New inquiries amount to approximately 600 tons. A number of concrete bridges involving less than 100 tons of reinforcing bars will be out for figuring within several weeks.

Philadelphia—Reinforcing bar demand continues slow. Orders are largely lots of 20 tons or less and there is not much outstanding new inquiry.

San Francisco—Demand for reinforcing bars continues well sustained and awards totaled 2522 tons. To date 218,556 tons have been booked, compared with 197,114 tons for the same period last year.

Seattle—Large tonnages are few but small awards are still outstanding, although in less number than 30 days ago. Few important projects are up for prompt action except the Ruby dam for Seattle's light plant, on which bids will be invited before the end of the year. Local mills are running close to capacity but operations will probably be reduced soon.

Concrete Awards Compared

	Tons
Week ended Nov. 13	2,702
Week ended Nov. 6	*5,678
Week ended Oct. 30	2,803
This week, 1935	3,640
Weekly average, 1935	6,862
Weekly average, 1936	6,333
Weekly average, October	3,728
Total to date, 1935	325,924
Total to date, 1936	*291,345

*Revised.

Reinforcing Steel Awards

500 tons, Eighth avenue crossing, Denver, Colo., to unnamed interest.

465 tons, bureau of reclamation, invitation, A-42,106-A, Knob, Calif., to Colorado Fuel & Iron Corp., Pueblo, Colo.

254 tons, paving and underpass, Rockaway beach boulevard, Jacob Reiss park, Queens, N. Y., for Marine parkway authority, to Igoe Bros. Inc., Newark, N. J., through Mill Basin Asphalt Corp., Brooklyn.

217 tons, bureau of reclamation, invitation A-42,131-A, Potholes, Calif., to Bethlehem Steel Co., Bethlehem, Pa.

195 tons, Treasury department, schedule 16,853, Los Angeles, to unnamed interest.

169 tons, two bridges, Malden-Revere, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; through C. J. Maney Co. Inc., Boston.

151 tons, bureau of reclamation, invitation A-42,099-A, Laguna, Colo., to Colorado Fuel & Iron Corp., Pueblo, Colo.

143 tons, bureau of reclamation, invitation 47,520-A, Burnt River, Oreg., to Colorado Fuel & Iron Corp., Pueblo, Colo.

129 tons, bureau of reclamation, invitation A-42,120-A, Laguna, Colo., to Colorado Fuel & Iron Corp., Pueblo, Colo.

129 tons, bridge, Delta county, Colorado, to unnamed interest.

125 tons, treasury department, schedule 17882, Los Angeles, to unnamed interest.

125 tons, Casper Tin Plate Co., Chicago, to Concrete Engineering Co., Chicago.

100 tons, crossing, Mountain House county, Idaho, to unnamed interest.

Reinforcing Steel Pending

1750 tons, University Mound reservoir, San Francisco; general contract to MacDonald & Kahn, San Francisco.

400 tons, Langston housing development, Washington; Coath & Goss Inc., Chicago, general contractor.

260 tons, hospital ward, naval operating base, San Diego, Calif.; bids opened.

244 tons, crossing, Deming, Luna county, New Mexico; bids opened.

225 tons, building addition, for American Woolen Co., Lawrence, Mass.; bids submitted Nov. 8.

204 tons, bureau of reclamation, invitation A-42,137-A, Potholes, Calif.; bids opened.

200 tons, senior high school, Wellsley, Mass.

200 tons, asphalt plant, for department of plants and structures, New York City; bids Nov. 17.

181 tons, paving work, Cumberland and Perry counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 20.

150 tons, Oregon state bridge projects; Dolan Construction Co., Portland, general contractor.

143 tons, bureau of reclamation, invitation 42,626-A, Mesa, Ariz.; bids opened.

138 tons, bureau of reclamation, invitation A-40,646-A, Ashton, Idaho; bids rejected.
118 tons, gymnasium, high school, Daley City, Calif.; bids opened.
114 tons, highway work near Dunsmuir, Calif.; bids Nov. 18.
110 tons, for negro public school at St. Louis, A. H. Heissler Building & Contracting Co., St. Louis, low.
100 tons, bureau of roads project, Bonner county, Idaho; F. R. Newton, Layton, Utah, low.
100 tons, Ruby dam project; bids to state water conservation board, Helena, Mont., Dec. 5.
100 tons, junior college, Palo Alto, Calif.; bids opened.
100 tons, dam, Madison county, Montana; bids Dec. 5.
100 tons, state fish pier, Gloucester, Mass.
100 tons, highway paving, Queens, N. Y., for New York highway department; bids Nov. 24.
Unstated tonnage, seven-story court house, on Sutphin boulevard, Jamaica, N. Y.; bids taken around Dec. 1; A. Eccles and W. Knowles, Long Island City, architects.
Unstated tonnage, federal housing project, Newark, N. J.

Pig Iron

Pig Iron Prices, Page 86

Chicago—Pig iron shipments are at a new high level for the year, 20 per cent ahead of the corresponding October period. Some new business still is being received. Increases in wages practically assure an advance in prices. Foundry operations show further gains, with production of automotive castings increasing steadily.

Pittsburgh—Iron and steel foundries and nonintegrated steel mills here are daily expecting the announcement of higher pig iron prices. For the present, and including delivery over fourth quarter, the local price is quoted $19 on basic, $19.50 on foundry and $20 on bessemer irons, but excepting where shipment can be made from existing stock, deliveries over the remainder of the year are not easily obtainable.

Cleveland—Sales this last week showed the expected increase due to the $1 a ton advance in New England iron. Requirements from auto, farm equipment and foundries in the railroad trade continue unchanged. Shipments so far this month are at a higher rate than in the corresponding period last month. No price change has been announced, but the general feeling is that an advance will be made soon.

Boston—Following a slight flurry of orders just before the recent $1 advance in Mystic pig iron Nov. 4, no new business has appeared. This is a reflection of the covered position of most foundries. Foundry melt has been increasing, and shipments of foundry coke are about 20 to 30 per cent higher than a year ago.

New York—Pig iron specifications continue brisk, and some sellers look for an early price increase.

Philadelphia—While specifications continue active, pig iron consumers are marking time as far as new orders are concerned. The trade expectation is that advancing prices for first quarter will soon stimulate orders, notwithstanding the fact that many consumers are covered on full fourth quarter needs. Close to 3000 tons of Russian iron arrived here recently, but it is believed that little if any will go into storage for future sale.

Buffalo — With all signs pointing to early announcement of price increases in pig iron, many consumers are seeking to purchase for fourth quarter in larger quantities than they had anticipated. Furnaces are well sold for the period, however, and can not take much more business in some grades. Shipments the past six weeks are believed to have exceeded those of any similar period this year.

Cincinnati—Pig iron sales are beginning to show more intent to cover future needs against a possible price advance. Melters who normally order in carload lots are in the market for 300 to 500 tons. Shipments must be stepped up next month to get out all material booked.

St. Louis — Pig iron market continues active. The movement so far this month indicates a larger total tonnage for the period than in October, which was the peak month of the year. The advance of $1 per ton in New England has served as an incentive to buying here, and many melters have taken on additional tonnages, though their full final quarter requirements are covered. There is no intimation that a price advance is in prospect, but with increased costs and heavy consumption, such a move is not unlikely.

Birmingham, Ala.—Steady movement of pig iron from blast furnaces bespeaks a firm market, and indications point to continued need for active shipment for some time.

Toronto, Ont. — Melters are maintaining steady demand for merchant pig iron, and sales are holding around the peak level for the year. Awards last week exceeded 1200 tons. Producers look for increased forward delivery contract placing for the first quarter of next year. Prices are firm.

Semifinished

Semifinished Prices, Page 85

Consumers' requisitions for rerolling billets and sheet bars increased considerably last week and were featured by heavy buying in the open market by Ford Motor Co. Many large producers of semifinished steel, in considering a tentative advance for first quarter, have found from recent experience that it is cheaper to buy semifinished than produce it at today's levels. An advance in semifinished would spread to all forms of finished steel, a turn of events which both steel producers and consumers alike are expecting. The mar-