officer to buy such a brake. But there is one very apparent result from these tests which nobody could look upon as a mere refinement, and that is, the much greater efficiency of the Westinghouse air brake in the emergency stops. Here we find a very striking difference in favor of the Westinghouse brake. The average length of the four emergency stops is 365 ft. for the Westinghouse and 418.25 for the New York, being 16.2 per cent. longer for the New York trains. If, however, we correct the stops for errors arising in the record from the break-in-two cases and for difference in train-pipe pressures and reduce all to a uniform speed of 30 miles an hour, we shall find that the New York train traveled something over 18 per cent. further than the Westinghouse.

The great differences shown in these two trains in the matter of shock were pointed out and discussed in our former article on the subject, and we can add nothing to what was said then. It will be well enough to observe, however, that the shocks in the Westinghouse train were, minimum, ½ in., maximum, 6 in., average, 5½ in., New York, minimum, 26½ in., maximum, 31 in., average, 28½ in.

We have now given all of the important trials of the New York brake up to this time. The general results are as follows: The first trials on the Burlington road showed the brake to be without quick action and the shocks to be very great. The triple valve was then changed to get a quicker action. The triple used was No. 1. At the second trial on the Burlington, the brakes would not release, and it was claimed that the defect was due to imperfect workmanship. The triple used was the No. 2. In the trial on the Lehigh Valley Railroad, the triple valves were of better workmanship, but they still would not release. The triple used was the No. 2. In the West Albany brake trials, where the conditions were more comparable than in any of the preceding trials, and the brakes were made as well as they can be expected to be by any new firm, there was much leakage of the triple valves, and the shocks were nearly double the limit prescribed by the Master Car Builders' Association committee. The triple used was the No. 2. The No. 3 triple, which is now being sold, differs materially from the No. 2 triple, and has been devised to prevent leakage; but the change to gain tightness has been made by putting a slide valve on the graduating piston, which must increase the friction of movement of that piston, and possibly will interfere seriously with the graduation on long trains. Any tests that have been made of the No. 3 triple have not been made public, and it is not known how this triple will act under service conditions.

From all this and the preceding accounts of brake tests, railroad officers can see how important is the work of the committee appointed to devise standard tests for air-brake apparatus. For the safety of trains, railroad companies are more dependent on brake apparatus than upon any other device, not excluding wheels, axles, couplers, and signals; and as brake apparatus is, when compared to other train devices, a very complicated mechanism, it is desirable that the work of examination of new forms of brakes should be allotted to an expert committee of the Master Car Builders' Association, who would not only be keenly alive to the best interests of the railroads, but would put time and work into investigation. At the World's Fair there are several large and elaborate testing racks containing, except in one case, 50 sets of brakes, and in that case 100; and those who care to investigate for themselves the comparative merits of the air brakes now offered for sale will find opportunities in the Transportation Building for making the most exhaustive shop tests that can be made with present information. Taken altogether, the brake question, about which so much has been written, still remains one of the most interesting and important matters before railroad officers. Perhaps the increasing demand for long high-speed freight trains and the need for greater braking power for high-speed passenger trains are the two principal factors which now keep up the interest in this matter.

The Transportation Exhibit at the World's Fair.

The transportation exhibit at the World's Fair is still incomplete; but perhaps it is the most complete of any of the exhibits, and it is certainly so far advanced as to give a good notion of its scope and of the number and variety of objects to be displayed. Much the greater part of this exhibit was in place at the beginning of this week, but the means of getting information as to the articles displayed were still very imperfect, as few of the exhibitors were to be found, or they were busy in finishing the arrangement of their displays. Still, there are some advantages in going now, for there is plenty of room to go about and see things without being crowded.

A very important part of the transportation exhibit is outside of the grounds—that is the means of getting to the Fair. Of these we have had considerable to say in the past, and probably shall have something to say, incidentally, in the future. Last week we spoke especially of the Alley Elevated Railroad, which has been so remarkably well organized and equipped. We spoke also of the Illinois Central, but did not do justice to the admirable preparations that have been made by that company.

It is no longer a question with the Illinois Central of its ability to handle the World's Fair traffic, but rather whether the traffic offered will come up to the preparations made to handle it. In a speech made at the dinner given to Mr. James Dredge by the Western Society of Engineers last week, Mr. Wallace, Chief Engineer of the Illinois Central, gave some interesting particulars of the work that has been done in permanent improvements of the Illinois Central's Chicago terminus and in the preparations for the temporary traffic of the World's Fair. At the old station, the business in and out had to be handled on six stub tracks for all service. There are now eight main tracks which run through the main depot at the foot of Twelfth street which is now approaching completion. The suburban and World's Fair stations are further up the lake, the suburban terminus being at the old station at the foot of Lake street and the World's Fair terminus at the foot of Van Buren street; at the latter place 12 ticket booths are provided. The World's Fair service is complete in itself. The trains are run through from the foot of Van Buren street to the station near Jackson Park without stop, making the run nominally in 15 minutes, but frequently in 13. The cars have cross seats and side entrances, and a 10-car train holding 960 persons can be emptied in 30 seconds. In fact, by actual time, on the opening day, only 30 seconds was occupied from the stop to the start of one of these trains at the southern terminus. For this service 300 cars and 40 locomotives have been provided. The cars have freight trucks with improved springs and freight car bodies with M. C. B. couplers and Westinghouse air brakes. When the need for them at Chicago is passed they will be slightly remodeled and put into the express fruit business from New Orleans. How important this trade has become with the Illinois Central may be judged from the fact that in one day that road has brought into Chicago 130 carloads of bananas.

In remodeling the terminus and before building the new station the yard at Twelfth street had to be entirely changed and the locomotive repair shops removed. These were taken out to Burnside, on the line of the road where new shops are being built, to cost from $400,000 to $500,000. Then the tracks were raised for a distance of 2½ miles at a cost of $1,260,000. In this 2½ miles 13 streets were passed under the tracks, and, instead of closing any streets, five or six streets were opened up to the lake front. The company has also provided for country excursion business to the Fair, having established a through-track station at the Midway Plaisance, and it has waiting-room under the tracks at that point for over 1,800 persons. Altogether, this has been one of the most important city terminal improvements made in any city in recent years, and it is probable that when the World's Fair business is over and forgotten the Illinois Central people will be very glad that they were forced to do this work now.

The Hall track-circuit block signals on this line are another important exhibit. Indeed this is the only exhibit made by the Hall company at the Fair.

Within the grounds and still not in the Transportation Building, are several things of special interest to railroad men. One of these is the Intramural elevated railroad. This is an electric railroad, run from a central station, with motor trucks under the first car of each train. It is the purpose to run trains of four cars at considerable speeds, with frequent stations. The structure is worth looking at, for if the road is successful mechanically this will be an example of a cheap and possibly adequate structure for similar purposes. The central power station is a good example, and will be described at considerable length in a later issue. A general description of the whole plant appeared in our issue of March 31.

The Multiple Speed Railroad, of which we have said more or less in times past, and the latest form of which is shown in this issue, is also an interesting transportation exhibit It embodies principles and methods which may be practically applied hereafter in many places if they are successful here. This enterprise is an illustration of the burdensome terms of concessions, of which we have spoken in another place. The proprietors had to pay to the World's Fair authorities a cash bonus of $25,600, and must pay in addition one-third of their gross receipts, leaving a pretty narrow margin from which to pay operating expenses and the actual cost of construction and installation, to say nothing of a profit on the enterprise.

The Grand Terminal Station and its tracks are also worth looking at, and here the visitor will see a novel interlocking arrangement, the Wuerpel. This terminus will be described at length in a later article.

Outside of the Transportation Building will be found also the special exhibits of the Pennsylvania Railroad, the New York Central Railroad and the Krupp Works, all of which will be of great interest, but none of which are yet completely installed.

The main Transportation Building is 250 ft. × 960 ft., and has an annex covering over nine acres. The annex is one story high, but the main building has two stories, the second floor being open through the centre, giving galleries and offices on the sides. The scheme has been to collect in this building a comprehensive display of all human means of transportation adapted to the heaven above, the earth beneath and the water under the earth, and representing all historical ages. It is probable that the collection of objects has fallen short of the aim of the projectors in one way at least, and it is fortunate that such is the fact; that is, few novelties are shown which are merely novelties. The collection exhibits mostly standard practice in various ages and countries, and is pretty closely confined to the surface of the earth. Indeed, it is somewhat astonishing to see how crudities and mere speculations have got weeded out. A few reminders of old times may be seen in revolutionary car couplers, and one pathetic individual is on the ground with his couplers mounted on trucks which he slowly pumps back and forth on a little track to show how beautifully they will couple. It is sad to think how tired he will get in the next six months as the stream of general managers, master car builders and master mechanics flows past him, hardly stopping to see him pump, and not a single man of them pausing long enough to order 10,000 couplers. "The only rational rail joint," too, is very sparingly represented, and we saw but one epoch-making locomotive.

The locomotive exhibit, as a class, is the best thing in the Transportation Building. Most of the large firms of builders in the United States are represented as well as several railroad companies, and the engines shown range from a four-cylinder compound decapod weighing 96½ tons down to a "midget" designed for a mill yard. The locomotive exhibit is almost entirely domestic. There are, we believe, but nine foreign engines shown, and two, at least, of these are not now standard types. This is rather unfortunate, for many Americans who will never go abroad would have liked to have a chance to see something of foreign locomotive practice.

The exhibit of the Baltimore & Ohio Railroad, as we have repeatedly said, is intended to be a comprehensive display of the development of the locomotive engine from the earliest times. This is made up partly of models and partly of actual engines, and will be one of the most popular and one of the most instructive collections to be seen at the Fair. It has involved a great amount of work, and the record of it should be made permanent in a handsome illustrated volume.

In cars there is a fair domestic exhibit, but quite a meagre foreign one; but the domestic exhibit of cars is not so good as that of locomotives, and there is not a very good opportunity to get a complete view of American practice, in freight cars especially, as none of the great builders exhibit them. The showing of special cars, such as stock, horse and refrigerator cars, is quite large. There are some very beautiful displays of passenger cars both of home and foreign makes, and there are one or two German cars for freight service that are worth looking at; in fact, the American designer can get some valuable lessons in the foreign exhibits, even if the types shown are not applicable to American uses. Many of the details of the foreign cars and locomotives show an elegance of line and proportion which our designers might imitate without any sacrifice of economy or practicality, and with very decided gain in appearance.

Why the Bethlehem exhibit is placed in the Transportation Building is not exactly clear, although it is probably because of the convenience in handling the very heavy pieces which that company shows. This exhibit includes a model of the great hammer at Bethlehem, a big gun and some very heavy forging.

Some remarkably interesting drawings are shown in this building, including plans of German yards and stations, the display of the Associated German Engineering Societies and the bridge plans prepared by Mr. Theodore Cooper for the Baltimore & Ohio, a list of which appears elsewhere. The plans illustrating the St. Gothard railroad which hang on the wall at the north end of the main building are also interesting.

The marine exhibit is very fine. There are many beautiful models of vessels and a large display of special machinery such as steam capstans, steam steering gear, etc., and the display of bicycles and carriages is large and very handsome.

The Lake Shore & Michigan Southern and the Chicago, Rock Island & Pacific roads, which have been considering the subject of block signals for some time, have finally taken action, both having given contracts to the Hall Signal Company this week. The Rock Island will put in automatic block signals, operated by wire circuits, between Mokena, Ill., and Joliet, 10 miles. Plans have been prepared for blocking a good deal more than this, but this is all that will be done just now. The Lake Shore will put in about 31 miles of automatic block signals, to be operated by track circuits, the signals to stand normally at danger, as in the installation at Kansas City, illustrated in the *Railroad Gazette* of Jan. 13 last. These signals are to be put in on three different sections of the road; on the Western Division from Durham to Burdick, 8 miles, and from Rolling Prairie to Terre Coupee, 8 miles; on the Air Line

Division from Goshen to Ligonier, 15 miles. The Hall Company will also put in some of its automatic highway crossing bells for the Rock Island road, and has taken a contract for crossing bells to be erected on the Louisville & Nashville.

The May returns of the Department of Agriculture on the condition of winter wheat show a reduction of 2.1 points from the April average, being 75.3 points against 77.4 last month and 84.0 in May, 1892. Winter rye has also suffered a decline in condition since last month, its average for May 1 being 82.7 against 85.7 for same date in April. The average condition of barley is 88.6 against 92.8 last year.

TRADE CATALOGUES.

Randolph & Clowes, Waterbury, Conn. Price List of Seamless Brass and Copper Tubing, Sheet Brass, etc. Price lists, as they are understood by many, are comparatively uninteresting literary products, except in so far as they appeal to the pockets of buyers and sellers. This "Standard Price List," however, recently issued by Randolph & Clowes, the well known manufacturers of sheet brass and copper, seamless drawn brass and copper tubing and allied products, is something more than its name implies, giving not only prices, but also a mass of other valuable information, which engineers and the trade generally will appreciate. On the vexed gauge question, for instance, the catalogue gives tables showing the differences between the several wire gauges in use, the equivalents in common fractions of an inch of different gauge numbers, and decimal equivalents of 8ths, 16ths, 32ds and 64ths of an inch, for use in connection with the micrometer gauge, thus tending to make clear to prospective buyers a subject concerning which there always is more or less annoying confusion. Then comes a series of comprehensive tables of seamless drawn brass and copper tubing, of different gauge thicknesses and from $\frac{3}{16}$ in. to 16 in. in diameter, giving not only the prices per pound of each variety, but also the approximate weights per running foot. Some of the tubes—those ranging from $\frac{3}{16}$ in. to 8 in. in diameter—are turned out in exceptionally long lengths, an accompanying photograph showing a lot of tubes 38 ft. long. A table of brass and copper tubes of iron pipe sizes gives also the actual outside and inside diameters in decimal equivalents. Still another table furnishes data for finding the weights when the inside diameters are known. Similarly comprehensive tables are given for sheet copper and brass, round bolt copper, spun brass kettles, etc. The catalogue was evidently compiled after long and careful work, and the figures for weights and gauges are exceptionably thorough and reliable and have already elicited much favorable comment. An index is appended for convenient reference. Mr. Theo M. Baker, the Philadelphia agent of this house (333 Walnut street), informs us that it secured the contract for supplying the sheet copper for the Pennsylvania Railroad company's new train shed at Philadelphia. The roof alone required 125,000 lbs. of cold-rolled, patent-leveled sheet copper.

The Brown & Sharpe Manufacturing Company, of Providence, R. I., issues what it calls a contribution to the literature of the World's Columbian Exposition. It is a 64-page pamphlet containing an account of the works of the company, a brief description of Providence, Newport, Boston and Chicago; some interesting statistics, a number of suggestions in regard to living and traveling in America, a cable code, views of Exposition buildings, etc. This book will be mailed without charge upon application. The pamphlet is a very pretty one and so intelligently compiled as to be really useful to a foreigner traveling in America.

The exhibit of the company at the World's Fair was ready at the opening, being in place before the exhibit of any other maker of machinery for working iron and steel. This exhibit comprises 40 machines and more than 1,500 tools, and is placed in the Machinery Hall annex.

The Buffalo Forge Company, of Buffalo, N. Y., has issued a large new general catalogue, which is very full and complete. There are nearly 300 pages and a great many illustrations. The fans, stationary engines, blowers, blacksmiths' drills and forges, etc., are perfectly illustrated by drawings and perspective cuts, and the book is also embellished with direct process cuts of handsome buildings ventilated by this company's apparatus. This book, like former editions, contains much valuable data concerning the movement of air by fans and the resistance of air in pipes. There is a good index.

World's Fair Exhibits of Special Interest to Engineers.

In the Transportation Building at the World's Fair appears a remarkably interesting collection of drawings of American bridges which was prepared by Mr. Theodore Cooper, of New York, for the Baltimore & Ohio Railroad Company. The drawings are quite fully dimensioned, and illustrate the history of American bridge building from 1804 to 1892. The collection has involved a considerable expenditure both of money and of time, and has been a labor of love on Mr. Cooper's part; and it constitutes a most valuable contribution to the World's Fair. A list of the plans shown follows.

Trenton arch bridge, 1804, 1843, 1869.
Harper's Ferry Bridge, timber, by Latrobe, 1836.
Harper's Ferry Bridge, iron, by Bollman, 1852.
Colonel Long's Truss, 1st form, 1833.
Colonel Long's Truss, 2d form, 1837.
Town's Wooden Lattice, 1820, 1851.
Burr arch bridges, 1832 and 1849.
Cascade arch, Erie Railroad, 1848.
Standard arch bridge, adopted during construction of Erie Railroad, 1849.
Howe's Springfield bridge—first Howe railroad bridge, 1838.
Howe's, Salisbury, Conn. 2d form of Howe's truss, 1870.
Pratt's truss bridge, Newburyport, Mass., 1877.
MacCallum truss bridge, Erie Railroad, 1851.
Portage Viaduct, timber, Erie Railroad, 1852.
Portage Viaduct, iron, Erie Railroad, 1875.
Millholland's plate girder, 1846-7.
Fink's Monongahela, 1851-2.
Fink's Louisville, 1868-70.
Fink's combination bridges.
Fink's Tray Run viaduct, 1853.
Whipple's truss bridge, Erie Railroad, 1847-8.
Whipple's truss bridge, Rensselaer & Saratoga Railroad, 1852-3.
Whipple-Murphy bridge, 1859.
Lowthorp's truss bridge, 1860.
Early Howe truss in iron, Boston & Providence Railroad, 1849.
Post's first bridge, Washingtonville, Erie Railroad, 1865.
Smith, Latrobe & Co.'s iron trestles, 1867-8.
Lowthorp's cast iron trestle, Jordan River, Pa., 1856.
Linville's arsenal bridge, 1859-60.
Linville's, Steubenville, 1863-4.
Juniata No. 8, cast iron arch bridge, Pennsylvania Railroad, 1864.
Rockville wooden arch bridge, Pennsylvania Railroad, 1848-9
Victoria tubular bridge, 1859.
Roebling's Niagara, 1852-3.
Kentucky River bridge, 1876-7.
David Lyman viaduct, 1869.
Kinzua viaduct, 1882.
Pecos River viaduct, 1891.
New Jordan River viaduct, 1889.
Fishing River bridge, Chicago, Milwaukee & St. Paul Railway, 1886.
Memphis bridge, 1892.
300 ft. Combination bridge, Northern Pacific Railroad, 1886.
Cairo bridge, 1888-9.
Bellefontaine bridge, under construction.
Modern Type arched Howe Truss, 1890.
Bridge 73 Susquehanna Division, Erie Railway, 1891.
Trenton Falls bridge, 1891.
Canastota bridge, 1865.
Photograph of Red Rock bridge, 1890.
Photograph of Memphis bridge, 1892.
Photograph of Ohio River bridge, Chesapeake & Ohio Railway, 1888.
Photograph of Devil's Gate viaduct, 1883.
Photograph of Pecos Viaduct, 1891.

This collection is displayed in the gallery of the Transportation Building. At the north end of the main floor hangs a series of plans and views showing certain features of the St. Gothard railroad. These include three relief maps which show the development of the line at three different points, including five spirals in tunnels and two great loops. These are all contoured and colored, showing the elevations and geological formation. In the same collection are 15 water colors by Weber, of Zurich. These show characteristic landscapes on the line of the railroad.

Statistics of the American and Foreign Iron Trades for 1892—Annual Statistical Report of the American Iron and Steel Association.

Mr. Swank has added to his usual full annual report the paper "Twenty Years of Progress in the Manufacture of Iron and Steel in the United States," which he contributed to the report of the United States Geological Survey on the Mineral Resources of this country. Although many of the figures have appeared from time to time in the *Railroad Gazette*, some of them are tabulated below.

In these tables gross tons are used for the United States and the United Kingdom, and metric tons for other countries.

The production of coal for the years named has been as below:

	1889.	1890.	1891.	1892.
U. S.	126,097,779	140,882,729	150,565,954	.....
U. K.	176,916,724	181,614,288	185,476,126	181,786,871
Germany	84,973,230	89,290,834	94,252,278	.....
France	.....	26,083,118	26,024,893	26,548,860
Belgium	.....	20,365,960	19,675,614	19,591,908

PRODUCTION OF PIG IRON.

	1890.	1891.	1892.
U. S.	9,202,703	8,279,870	9,157,000
U. K.	7,904,214	7,406,064	6 616,890
Germany	4,658 451	4,641,217	4,793,003
France	1,962,196	1,897,387	2,022,989
Belgium	787,836	684 126	768,321

PRODUCTION OF STEEL OF ALL KINDS.

	1890.	1891.	1892.
U. S.	4,277,071	3,904,240	4,927,581
U. K.	3,679,043	3,256,543	.....
Germany	2,161,821	2,352 074	.....
France.	717,975	840,221	814,977

PRODUCTION OF BESSEMER STEEL INGOTS.

	1890.	1891.	1892.
U. S.	3,688,871	3,237,417	4,168,435
U. K.	2,014,843	1,642,005	1,500,810

PRODUCTION OF BESSEMER RAILS.

	1890.	1891.	1892.
U. S.	1,867.837	1,293.053	1,537.588
U. K	1,019,606	662,676	535,836

PRODUCTION OF OPEN HEARTH STEEL.

	1880	1891.	1892.
U. S	513,231	579,753	669,889
U. K.	1,564,200	1,514,538	1,418,830

Open hearth steel is about the only weak spot in our production, and we shall be behind the United Kingdom in this until we build more ships, but while in 1890 our production was only 24.7 per cent. of the total make of the two countries, last year it was nearly 34 per cent. of the joint production. In 1886, when the building of our new navy began, the production of open hearth steel was only 218,973 tons, and the increased production has amounted to nearly 205 per cent. The English government, however, gave out large contracts for war vessels and the trade has been further stimulated by an unprecedented commercial demand for ships, so that the United Kingdom increased its production from 694,150 tons to 1,418,830 tons, or nearly 105 per cent.; and the two countries have increased their production in the seven years by 1,175,593 gross tons. As Secretary of the Navy Herbert has pointed out, the price of the materials entering into the construction of ships, mostly open hearth steel, has fallen during this period to about one-half of its former cost, and it may be noted the cost of steel bridge and elevated railroad work has fallen from about eight cents to less than four cents per pound! The price of ship plates, etc., in England has fallen nearly as much as here.

The stocks of pig iron on hand and the approximate consumption are given as below:

	1889.	1890.	1891.	1892.
Domestic production	7,603,612	9,202,703	8,279,870	9,157,000
Imported	148,759	134,555	67,179	70,125
Stock on hand July 1	300,144	283,879	661,858	627,233
Total supply	8,052,515	9,621,537	9,008,907	9,854,358
Less stock, December 31	283,879	661,858	627,233	535,616
Approximate consumption	7,768,666	8,959,679	8,381,674	9,318,742

Of the pig iron produced last year 48.5 per cent. was classed as Bessemer pig. In 1890 44.4 per cent. was Bessemer, and in 1887, the first year in which Bessemer pig was separated, 44.8 per cent. of the total was so classed.

The production of iron and steel structural shapes is given for 1892, for the first time, as 453,957 tons; and iron and steel plates and sheets are credited with 751,460 tons, an increase of 72,533 tons. The production of wire rods, mostly steel, was for last year 627,829 tons, an increase of 91,222 tons as compared with 1891. Attention is called to the fact that our production of wire rods for last year was greater than our make of Bessemer steel rails in 1879, and almost two-thirds as many tons as of Bessemer steel rails made in either 1884 or 1885. It is probable that rather more than one-third of these wire rods went into wire nails, the production of which, 4,719,524 kegs, for the first time exceeded the output of cut nails, which was 4,507,819 kegs, all of 100 lbs. each. The production of cut nails is given year by year in the appendix for 1872, when it was 4,065,322 kegs, reaching its maximum production, 8,160,973 kegs, in 1886. Wire nails, which did not come into prominence until 1883 or 1884, have gained continuously and rapidly since 1886, when only about 600,000 kegs were made by 27 works. The product of 1892 was turned out by 39 works.

The production of iron blooms and billets from the ore has declined to 2,182 tons for 1892, and for pig and scrap the product offered for sale was only 6,922 tons.

Our iron and steel shipbuilding for the fiscal year amounted to 51,374.27 tons, gross measurement, not counting vessels built for government; of this 28,458.8 tons, or over 55 per cent., were built on the great lakes.

TECHNICAL.

Manufacturing and Business.

The large contract for sheet copper for roofing and cornices on the Pennsylvania Railroad's new trainsheds at the Broad Street Station, Philadelphia, has been awarded to Randolph & Clowes, of Waterbury, Conn. The roof alone takes 125,000 lbs. of cold-rolled sheet copper.

The Browne & Sharpe Manufacturing Co., of Providence, R. I., has contracted with Norcross Bros., of Worcester, Mass., for a new addition, to consist of a four-story brick building of fireproof construction, 163 × 51 ft., with two wings 57 × 84 ft. The boiler stack is 125 ft. high. The building has a total floor space of about 50,000 sq. ft. and will be used for the manufacture of machine tools.

The Colorado Fuel & Iron Company is adding buildings to its Bessemer steel works to extend the foundry and machine shops so as to include the making of structural iron and steel work for bridges and buildings. The iron pipe foundry is running at full capacity.

The Cleveland Bridge Co., Cleveland, O., has been granted a charter in Ohio, with a nominal capital stock. The new concern will engage in the construction of bridges and other structures, and will do a general constructing business.

The Toledo Bridge Co., of Toledo, O, is putting up an additional building 90 × 250 ft., which will be equipped for turning out all kinds of heavy iron building material. Heretofore the company have confined themselves to bridgework alone.

John A. Potter, formerly Superintendent of the Homestead Steel Works, Homestead, Pa., has recently been appointed Mechanical Engineer of the Pennsylvania Steel Co.

The New York office of the Union Switch & Signal Co. has been removed from the Times Building to the Havemeyer Building, 26 Cortlandt street.

The Drexel Railway Supply Co. has removed from its location on the ground floor of the Rookery Building, Chicago, taking more commodious quarters on the seventh floor of the Rookery.

The Greenleaf Co. is erecting a turntable for the Vandalia line at Terre Haute, Ind., which is the largest yet made by that company. It has a capacity of 150 tons, and had to be adapted to an old pit with a depth of only 4 ft. 5 in. from the top of the centre stone to the base of rail. The centre foundation was strengthened to three times its original capacity without changing the dimensions or disturbing the drainage or buildings.

At a meeting of the directors of the Jones Vestibule Sleeping Car Co., at Denver, Col., recently, the following were elected officers for the ensuing year: H. A. W.