

THE "MINNESOTA," THE LARGEST STEAMSHIP EVER BUILT IN AMERICA.

Quite a flutter of excitement was caused in maritime circles in this city and among those laymen who take an interest in shipping, by the arrival at the port of New York of the great steamship "Minnesota," the largest freighter ever built in America and the fourth largest steamship in the world. She came to this port direct from New London, where she was built, and during her brief stay she was thrown open to inspection by the public. After leaving New York she sailed for Newport News, where she will be dry-docked and cleaned; then she will return to Philadelphia for a cargo of 10,000 tons of coal, from which port she will start on her long journey around the Horn to San Francisco and Seattle. The latter city is to be her home port. The "Minnesota" is one of two twin ships that have been built for the Pacific trade, to run in connection with the Great Northern Railroad, which has its Pacific terminus at Seattle. A curious feature in connection with these ships is that an entirely new company was formed expressly for the purpose of constructing them. A site was selected at New London, a plant for their construction was erected, and the two ships have been pushed through steadily to completion.

The "Minnesota's" principal dimensions are: Length, 630 feet; breadth, 73 feet; molded depth, 56 feet. On a draft of 36½ feet her displacement would be 37,000 tons. The only vessels that are larger than the "Minnesota" are the "Celtic" and "Cedric," which are 700 feet in length by 75 feet in breadth, and of about 1,000 tons greater displacement, and the "Baltic," recently illustrated in this journal, which is 725 feet in length, and has a total displacement of about 40,000 tons. That the "Minnesota," with her smaller dimensions should so nearly approach the big White Star boats in displacement is accounted for by the fact that her lines are very much fuller, the vessel more completely "filling the block" than the finer-lined and somewhat more speedy White Star vessels.

The most remarkable feature of the new ship, and the one that made the deepest impression on the visitors, was her great depth, the effect, when looking down through the upper deck hatchway to the ship's inner bottom below, being most impressive. From the outer bottom to the navigating bridge there

and the boat deck, the boat deck being 25½ feet above the promenade deck or 81½ feet above the keel; while another 8 feet above this, or 90 feet above the keel, is the navigating bridge. Now, since the vessel at her full draft will draw 33 feet, it follows that the navigating bridge will at that draft be 57 feet above the water-line. In the light condition in which she entered New York harbor, she drew something less than 20 feet, consequently the navigating bridge was about



View from Astern, Showing the Great Beam.

70 feet above the water, and the passengers on the upper promenade deck were about 62 feet above the water-line. When we remember that the heaviest waves seldom exceed 30 feet in height, it follows that in the stormiest weather the passengers on the Pacific will be able to look down upon the Pacific rollers from a point of observation 30 feet above their crests. Accommodations are provided for fifty first-class passengers, a hundred second-class passengers, one hundred third-class passengers, and a thousand steerage. There are also quarters for the accommodation of twelve hundred troops, while the total cargo capacity is 20,000 tons.

The new vessel embodies several new principles of construction, and is considerably stiffer and stronger than any vessel heretofore built for the American merchant marine. The outer plating of the ship's bottom

reaching from the keel to the upper deck. This is the first case that we know of a vessel being constructed with a complete, central bulkhead of steel from upper deck to keel and from stem to stern. The ship also acquires great longitudinal strength from the new system on which the stanchions and girders are built in. Instead of using a large number of ordinary pipe or tube stanchions, placed at frequent intervals, there are three lines of heavy box section stanchions, measuring 13 x 12 inches in section. These stanchions are placed 20 feet apart longitudinally, and the deck loads of the deck above each series are carried to them by means of continuous lines of 13 x 24-inch box girders. This is not only an economical distribution of material, but it adds greatly to the longitudinal stiffness of the vessel. The longitudinal bulkheads necessitate double hatches, and there are in the ship no less than fourteen cargo hatches. There are four or more derricks at each mast, and there are four independent derricks in addition, so that the facilities for loading and unloading the ship are exceptionally good.

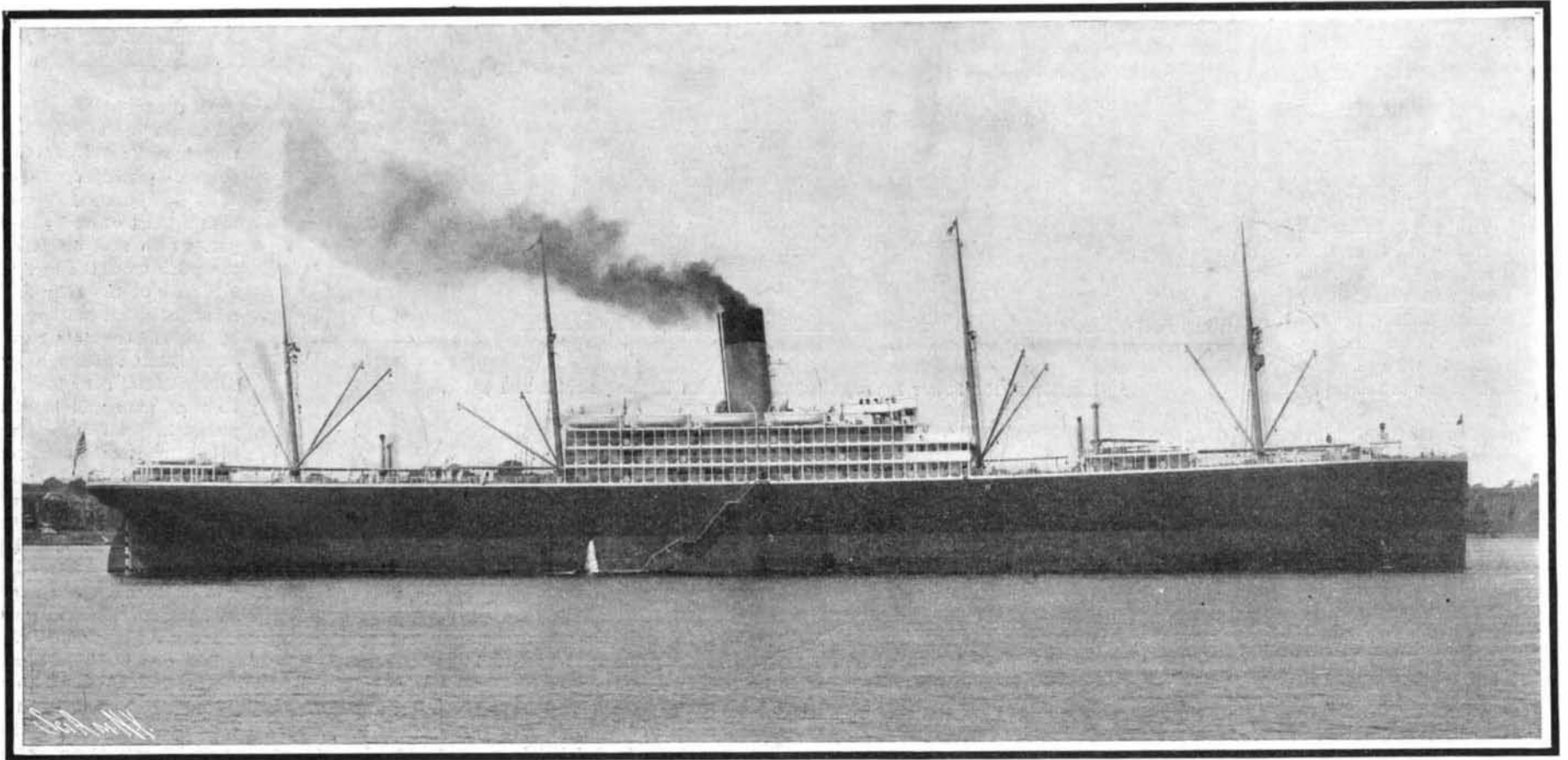
The vessel, as we have stated, was designed to meet the special requirements of the Oriental trade, and one of the hatches is made sufficiently long to enable a locomotive to be loaded complete into the hold. The sea speed of this fine vessel is about 15 knots an hour.

The latest measures of the aurora spectrum, made from photographs obtained by Sykora at Spitzbergen in 1899, are compared by E. C. Baly with lines of similar wave-length in the spectrum of krypton, produced by an induction spark on the gas in an exhausted tube. The krypton lines are given with much greater accuracy than those of the aurora, owing to the difficulty of observing the latter. From the apparent coincidences of the constituent wave-lengths it is considered as probable that a close connection exists between the two spectra.

EXPRESS ENGINE AND TURNTABLE IN THE TRANSPORTATION BUILDING.

BY THE ST. LOUIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

A striking novelty in the Transportation Building is a powerful express locomotive built for the "Big Four" road, which is shown mounted upon a plate-girder turntable, both the engine and the turntable



Length, 630 feet. Beam, 73 feet. Displacement, 37,000 tons on a draft of 36½ feet. Speed, 15 knots.

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are eleven distinct decks or platforms. First there is the outer bottom of the ship; 6 feet above this is the inner bottom or floor; then follow the orlop, the lower, the between, the main, and the upper decks, all of these decks being contained within the plated structure of the vessel, and every one of them being built of steel plating. The whole inclosed structure is 56 feet in height. Above the upper deck are the promenade deck, the upper promenade deck,

is of 1½-inch steel, and the shell plating is strengthened by an additional strake of 1-inch plating at the main and upper decks, while continuous 1-inch stringer plates are worked from stem to stern along these two decks, as a stiffening to the regular deck plating, which, on the main deck, is 16-20 of an inch in thickness, and on the upper deck is 18-20 of an inch. The ship is strengthened against hogging and sagging strains by a continuous central longitudinal bulkhead,

being in constant operation. The driving wheels moving at a rate equivalent to a speed of about 20 miles an hour, and the turntable with its heavy load of 163 tons moving majestically around upon its axis combine to make a decidedly striking effect. The engine is a splendid example of the modern Atlantic type turned out by the American Locomotive Company. The cylinders are 20½ x 26 inches, driving wheels 79 inches, and its total weight in working order is 184,000

pounds. The diameter of the boiler is 68 $\frac{3}{4}$ inches, the total heating surface is 3,196 square feet, grate area 44.8 square feet, and the boiler pressure 200 pounds to the square inch. The maximum tractive power is 26,000 pounds. The tender weighs 140,000 pounds and has a capacity of 7,500 gallons of water and ten tons of coal.

The turntable, which is an excellent job of riveted plate steel work, consists of two plate-steel girders, one under each rail, 5 feet in maximum depth and 70 feet in length, which are heavily braced

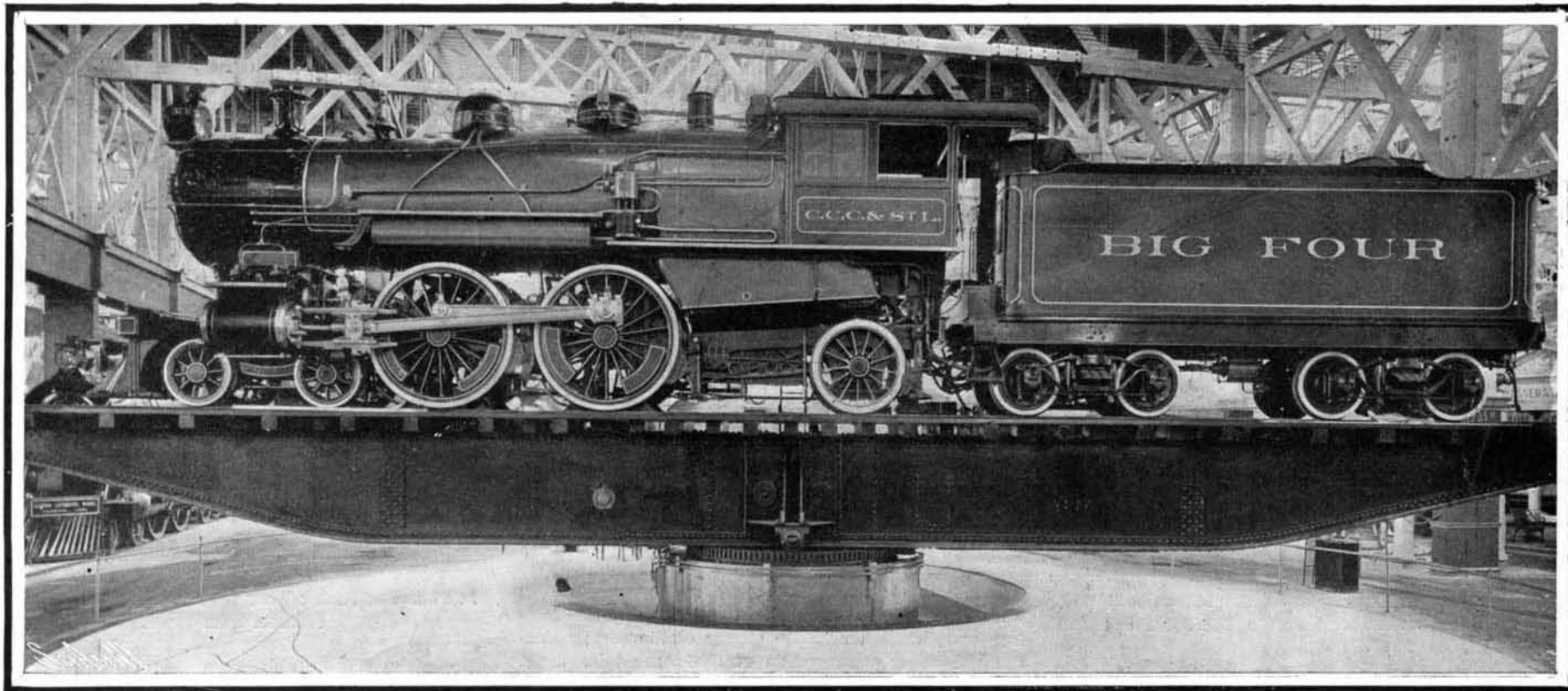
the other side the various lines with which the "Big Four" route has connections. Altogether this is one of the most imposing exhibits in the Transportation Building.

**FESTIVAL HALL AND THE COLONNADE OF STATES
—THE ARCHITECTURAL MASTERPIECE OF THE
LOUISIANA PURCHASE EXPOSITION.**

BY THE ST. LOUIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.
It is not often that the photographer is presented with such a fine opportunity to show what the camera can do in the reproduction of architectural and land-

Visitors to the fair who have seen the famous architectural panoramas of the Old World do not hesitate in pronouncing this scene the most beautiful and imposing of them all. It is an artist's dream, and like a dream it must soon vanish; for the wrecker and the junk man are already estimating what it will be worth to them as rubbish and old lumber.

To enable our readers to preserve a memento of this scene, we present the accompanying double-page insert of what is certainly the finest scenic effect in the whole of the St. Louis Exposition.



Engine and Tender weigh 163 tons. The turntable is 70 feet long by 5 feet deep.

EXPRESS ENGINE AND TURNTABLE IN OPERATION IN THE TRANSPORTATION BUILDING, ST. LOUIS WORLD'S FAIR.

together vertically and laterally. It runs upon a base which is 12 feet in diameter, and it stands 4 feet above a hemispherical mound, erected upon the floor of the building. The engine is raised sufficiently for the driving wheels to clear the track by 3-16 of an inch, the supports consisting of four heavy castings, which reach from the rail to the engine frames, to which they are bolted. The driving wheels of the engine are run by an 18-horse-power electric motor, the wheels being carried in Babbitt cellars in the driving boxes. The turntable is also rotated by an 18-horse-power motor, the current being taken by two bus-bars which extend around the base near its top. The mound upon which the turntable stands is painted to represent on one side the "Big Four" route, and on

scape effects as is provided by the prodigal wealth of architecture, statuary, cascades, and floral landscape that renders Festival Hill the chief glory of the Exposition at St. Louis. Festival Hall and the Cascades are beautiful at any hour of the day; but they are seen at their best when the sun has passed the meridian and the afternoon is well spent; for then it is that exquisite contrasts of light and shade serve to accentuate the rich profusion of detail in the buildings, and cause the statuary to stand out in all its pure white beauty against the rich green of the sloping lawns, and the brilliant coloring of the flower beds; while the shafts of sunlight that steal through the many-columned stretch of the Colonnade give a touch of rainbow beauty to the fountains and cascades.

Equally beautiful in its way is the night effect produced by the electric illumination of the Cascades and surrounding buildings; and that the crowds at the fair appreciate the illumination is proved by the fact that at the appointed hour for the display, which is set to take place in the last glow of twilight, vast throngs may be seen pouring through the many plazas to the great Court of Honor, from which the illumination may be seen to the best effect. The thousands of incandescent lamps are brought up gradually to their full brilliance, brightening from a dull red to an almost dazzling white. At intervals the lights on Festival Hall and the Colonnade are changed from white to pale green, and then to a ruby red. It is a picture that once seen will never be forgotten.

