THE GREAT TELESCOPE AT THE PARIS EXPOSITION OF 1900.

In a recent issue of the SCIENTIFIC AMERICAN (see SCIENTIFIC AMERICAN, March 11, 1899), Prof. Pickering, of Harvard University, advocated the establishment of a horizontal telescope of great focal length. He suggests a telescope with an aperture of 12 to 14 inches, having a focal length of 135 to 162 feet. The star would be reflected into the instrument by means of a mirror. It will be interesting to learn that a telescope of this general character is to be built for the Paris Exposition of 1900.

Our esteemed contemporary La Nature, in speaking of this announcement, says: The great telescope which is to figure at the Exposition of 1900, and which is due to the initiative of M. François Deloncle and the skill of M. P. Gautier, will surpass the most powerful instruments of the kind that have ever been constructed. The greatest telescope that exists at present is that of the Yerkes Observatory, the objective of which is 3·28 feet in diameter, and the focal distance about 65 feet. It moves around an axis fixed in the center and in a vast cupola 78 feet in diameter.

The telescope of 1900 has an objective of 4·1 feet in diameter and a focal distance of 65 feet, and its weight exceeds 44,000 pounds. It was therefore out of the question to think of placing the instrument under a cupola 209 feet in diameter, as this would have required foundations of exceptional solidity, the maneuvering would have been difficult, the flexions and distortions of the glasses and tubes would have been considerable, and the net cost would have been extremely high.

M. Gautier decided upon a very advantageous form, and one that, under the circumstances, was necessary —that of the Foucault siderostat (a heliostat regulated to sidereal time).

This instrument consists essentially of a movable plane mirror actuated by a clockwork that causes it to move in such a way that the luminous rays thrown upon it by a star are, after their reflection, sent in a fixed and absolutely invariable direction. If the axis of the telescope be placed in such direction, the observer, upon putting his eye to the eyepiece, will see the image constantly during the entire time in which the star remains above the horizon, and will be able to study it at his leisure, and to make drawings and photographs of it.

Fig. 1 shows the apparatus in its entirety. The siderostat is at the north, with the mirror placed upon the movable support. The declination circle is seen as well as the horary axis, resting upon a stone base. The ocular, with its movable part, is at the south.

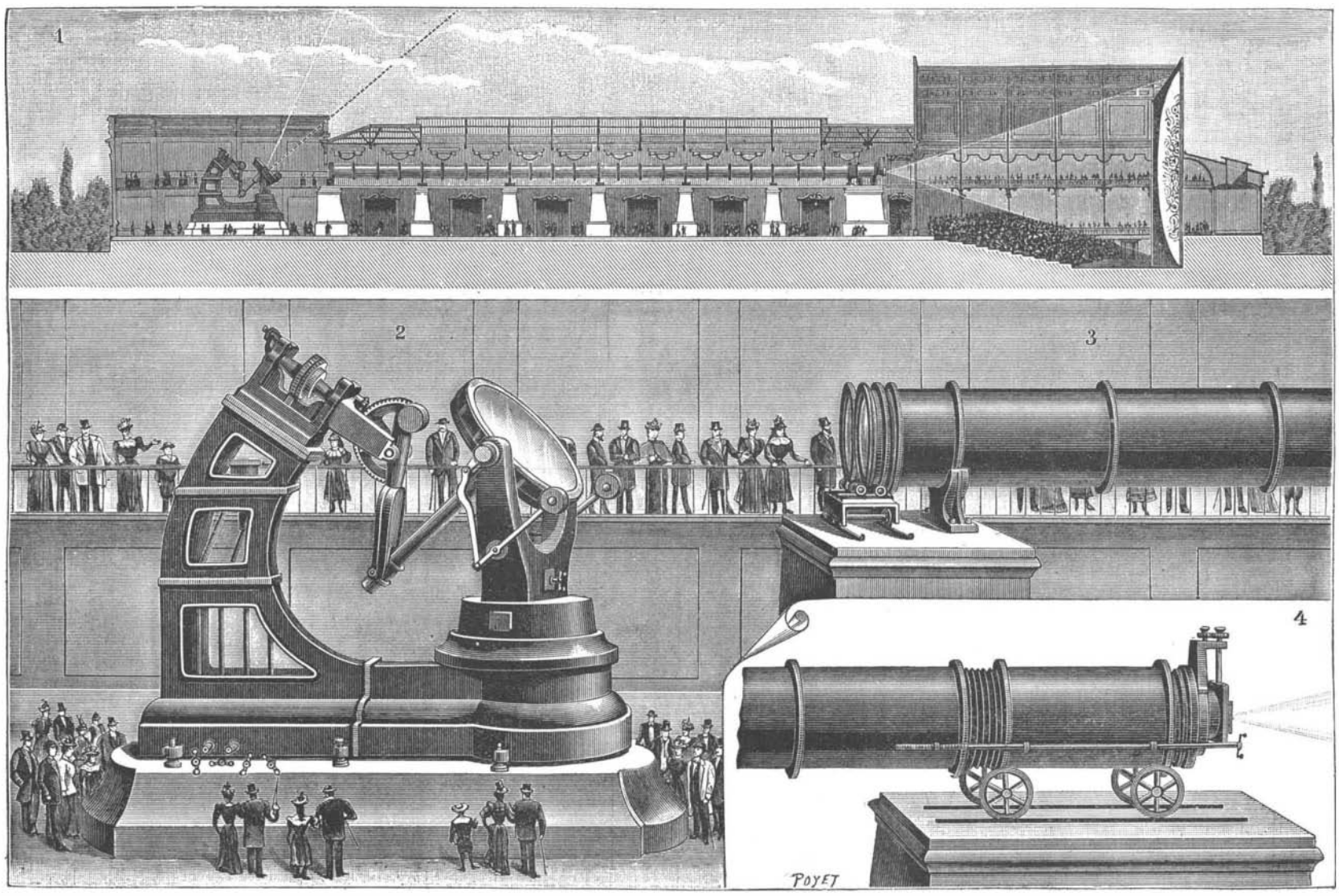
This magnificent instrument, when mounted, will be the optical and mechanical chef-d'œuvre of the nineteenth century.

The siderostat under consideration comprises a circular mirror 2 meters (6½ feet) in diameter, absolutely plane and giving excellent images, and of a 196 foot telescope placed horizontally in a line running north and south. The telescope forms the images to its focus, where they may be examined by means of an eyepiece, or be received upon a sensitized plate, or be projected upon a screen placed in a hall in which they will be exposed to the view of numerous spectators.

Let us now pass to the details. The mirror consists of a glass cylinder, 6½ feet in diameter and 10⅛ inches in thickness, and weighs 7,920 pounds. It is arranged in a 6,820 pound tube, and is kept in equilibrium through a system of levers and counterpoises.

All this part is fixed in a mounting of which the total weight is 33,000 pounds. The base of this mounting floats on mercury contained in a tank, and the thrust of which eases it of $\frac{9}{10}$ of its weight. Hence the clockwork that directs the apparatus has merely to displace a mass of 33,000 pounds, and its motive weight is but 220 pounds.

The siderostat (Fig. 2) comprises: (1) a cast iron base 34 feet in height, of which the southern part supports the horary axles, parallel with the line of the poles, and its toothed rings; (2) the declination circle; (3) the clockwork movement, connected with the circle and its weight; (4) the cranks which serve respectively for the tangent screw, for the displacements of the horary circle, for the declination circle, and for the winding up of the clockwork. The part situated at the south comprises: (1) the support of the mirror, mounted in the tube and resting upon the breech, with the screw that permits of displacing it; (2) the axis of direction of the mirror, which slides in a tube, fixed upon the diameter of the declination circle; (3) the counterpoise of the mirror; (4) the mercury reservoir; (5) the windlass, designed to raise the receptacle for the silvering mirror; (6) the rollers of the support; and finally (7) the regulating screws of the siderostat. Fig. 3 gives the arrangement of the objectives, 4·1 feet in diameter, one of which is designed for visual observations and the other for photographic work. They are mounted together upon the same carriage, the base of which rolls upon the rails by means of wheels, in such a manner that one or the other can be easily adapted to the extremity of the telescope which is in the vicinity of the siderostat. The tubes that carry the crown and flint glass lenses are mounted upon the rails. The flint and crown glasses may be separated from each other in order to permit of wiping off any dust that may settle upon them. Fig. 4 gives a lateral elevation of the ocular. Here it shows the external tube set in motion by the wheels, the internal tube sliding into it by the aid of the rollers, and the bellows that join the ocular with the body of the telescope. Clockwork movement carries along the tube through the transmission rod.



DETAILS OF THE GREAT TELESCOPE.

1. General view. 2. The siderostat. 3. The telescope. 4. The ocular.

The New York Academy of Sciences–1899 Reception.

The sixth annual reception and exhibition of the New York Academy of Sciences will be held on the 19th and 20th of April, in the American Museum of Natural History. There will be three sessions, as usual: That on Wednesday evening for members of Academy, exhibitors, and special guests; that on Thursday afternoon for teachers and students; and that on Thursday evening for the members of the Scientific Alliance and their friends. These annual receptions have come to be an important feature in the scientific life of the city, on its more popular side, and they are looked forward to with interest, because the exhibitions connected with them illustrate in the most graphic way the progress which has been made in the various departments during the year. The general committee of arrangements consists of Prof. H. F. Osborn, of Columbia University; Prof. C. A. Doremus, of the City College; Mr. C. F. Cox, of the New York Central Railroad; and Prof. C. L. Bristol, of the New York University. The chairman of the committee on exhibits is Prof. William Hallock, of Columbia.

The Current Supplement.

The current SUPPLEMENT, No. 1212, is of exceptional interest. The first article is on "Excavations in the Roman Forum," and deals largely with the recently discovered tomb of Romulus. "The Passy Underground Railroad" describes a great engineering work in Paris and supplements the work described last week. "Trade Suggestions from the United States Consuls" is continued and is the subject of thirteen notes. M. De Baye's "Mission to the Caucasus" describes an interesting exploration in a little known country. "Approved Lightning Protection" is an article by Nevil Monroe Hopkins and is a short treatise on the historic and modern lightning rod and its daily incorrect application; it is accompanied by seven illustrations. "The Nature and History of Patent Rights" is an important address by E. L. Thurston. The new "French Flashless and Soundless Gun" is also described.

Contents.

(Illustrated articles are marked with an asterisk.)