THE IMPROVEMENT OF WASHINGTON.

BY OUR WASHINGTON CORRESPONDENT.

After months of study and investigation on the part of architects and sculptors of the highest professional standing, there has lately been formulated a most pretentious plan for what might virtually be termed a new Washington, so elaborate is the scheme for remodeling and reconstructing the capital city along the lines planned when the city on the Potomac was originally laid out—a project which, as at present contemplated, constitutes the most magnificent advance in civic government ever undertaken in the United States. To define briefly the scope of the improvements outlined, it may be said that the object of the enterprise is to bring into harmonious relation with one another the Washington Monument, the proposed Memorial to Abraham Lincoln, the White House and all public buildings including the Capitol; in short, to make the American seat of government still more beautiful by treating artistically and scientifically the entire territory of the District of Columbia.

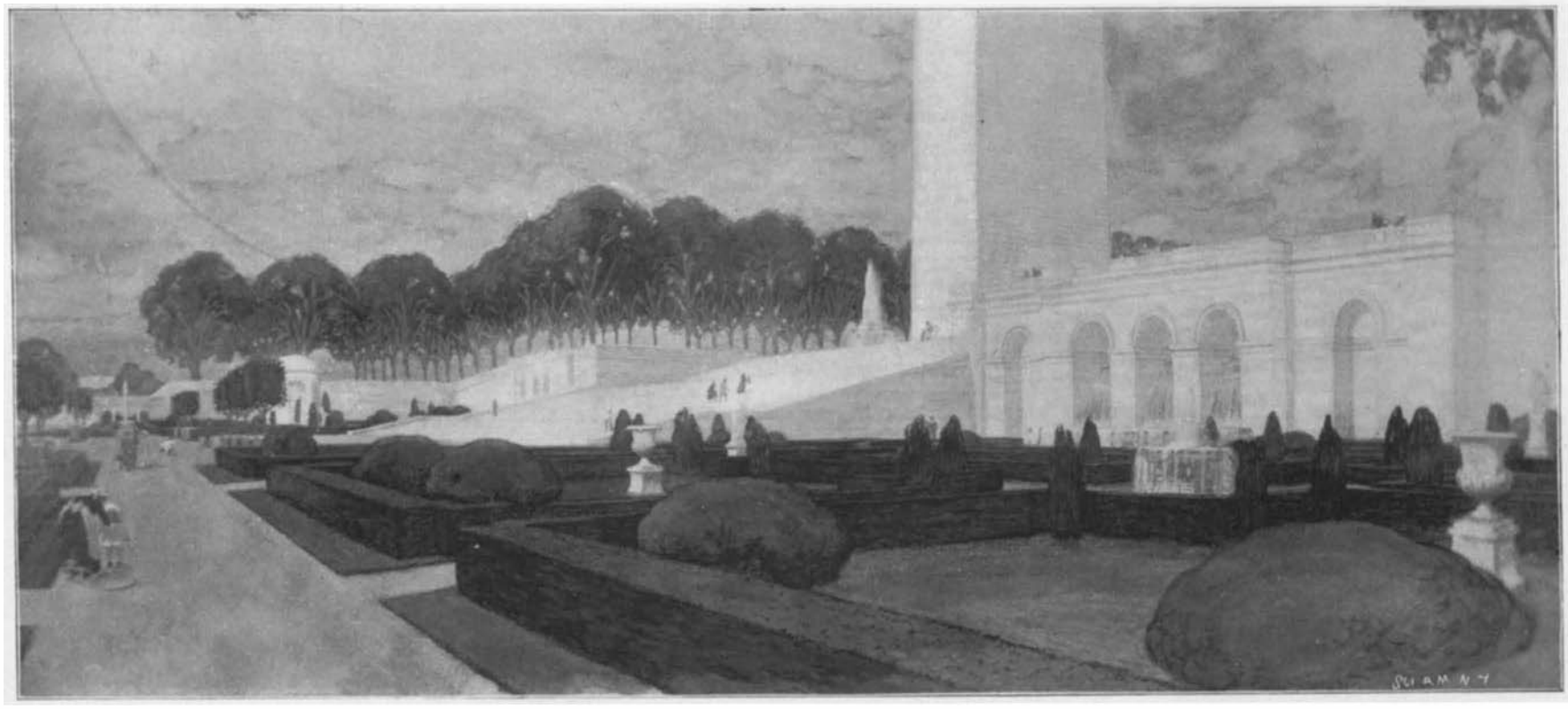
The city of Washington differs from all other American cities in the fact that in its original plan parks were laid out as settings for public buildings. Even the broad avenues of the capital were arranged so as to enhance the effect of the great edifices of the nation, and the squares at the intersection of the wide thoroughfares were planned as sites for memorials. Parks in the modern sense of large public recreation grounds were unprovided for, but instead there were embodied numerous small areas designed to beautify the connections between the various departments of the government.

During the nineteenth century, however, Congress, seeing no prospect that the government buildings would ever require so large and grand a setting, diverted from the original purpose. The great space known as the Mall, which was intended to form a unified connection between the Capitol and the White House and to furnish sites for a certain class of public buildings, was cut into fragments, each portion receiving a separate and individual informal treatment, thus substituting diversity for harmony; many reservations passed from public into private ownership, with the result that public buildings have lost their appropriate surroundings, and new structures have been built without that landscape setting which the founders of the city relied upon to give them beauty and dignity.

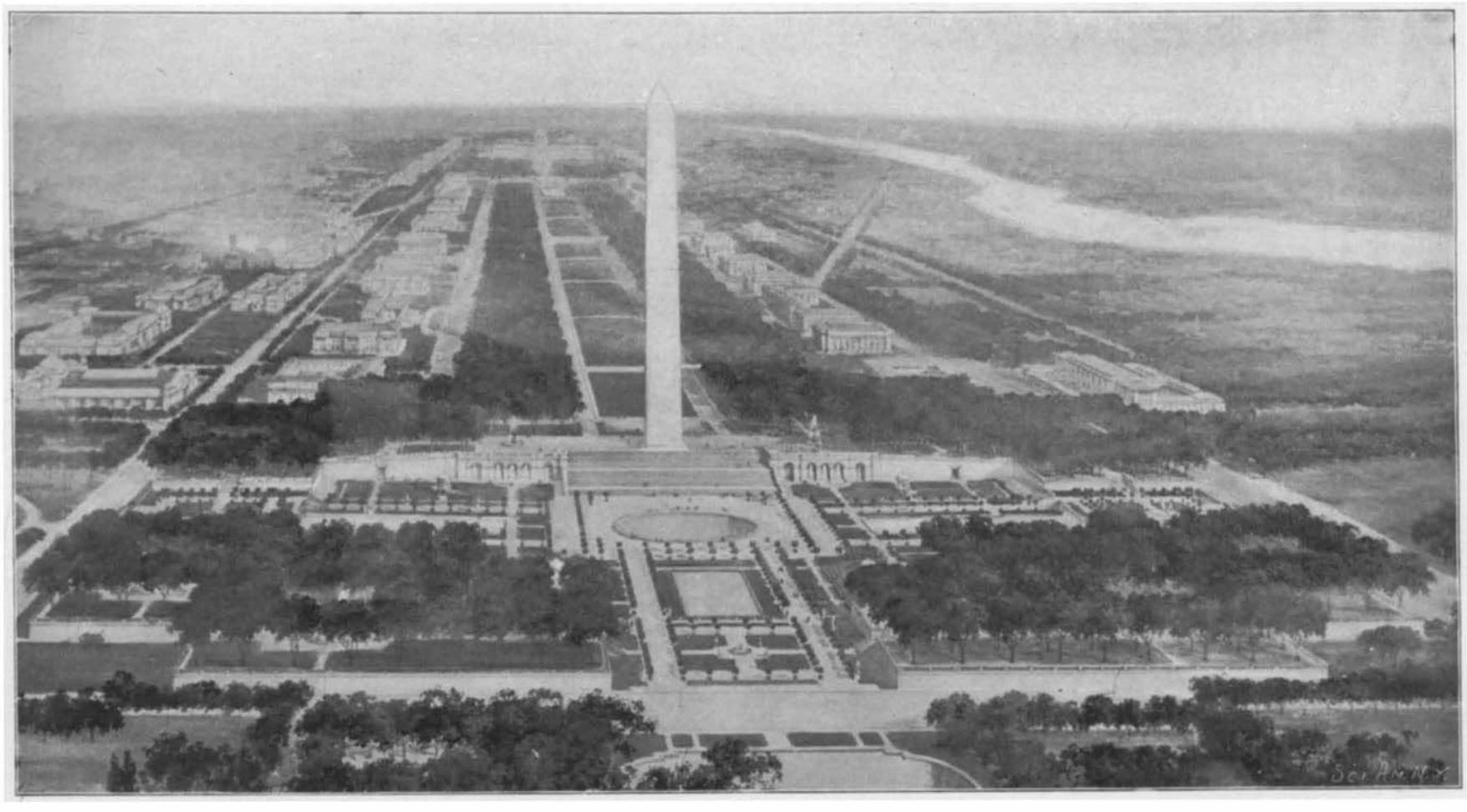
Of late years the demand for new public buildings and memorials has reached an acute stage; and impelled by the embarrassment in locating these because of the difficulty in securing appropriate sites, the United States Senate in the spring of 1901 ordered the preparation and submission of a general plan for the improvement of the District of Columbia. The Senate committee having the matter in charge met the representatives of the Institute of American Architects, and agreed to the proposition of the latter that Mr. Daniel H. Burnham, of Chicago, and Mr. Frederick Law Olmsted, Jr., of Brookline, Mass., be employed as experts with power to add to their number. These gentlemen subsequently invited Mr. Charles F. McKim and Mr. Augustus St. Gaudens, of New York, to act with them in the preparation of plans.

The work of this special commission has been to devise a plan which will tend to restore that unity of design which was the fundamental conception of those who first laid out the city as a national capital, and to formulate definite principles for the placing of those future structures which in order to become effective demand both a landscape setting and a visible orderly relation one to another for their mutual support and enhancement. The chief aim of the commission in all branches of the gigantic project, however, has been to carry to a legitimate conclusion the comprehensive, intelligent, yet simple and straightforward scheme devised by L'Enfant under the direction of George Washington and Thomas Jefferson.

The proposed improvement of the Mall is very extensive. It is proposed to secure for it a uniform width of 1,600 feet throughout its entire extent. The axis of the Capitol and the Washington Monument is to be clearly defined by an avenue a mile and a half in length and 300 feet broad, walled on either side by elms planted in formal processions, four abreast. The cross axis of the Mall, forming a thoroughfare between the body of the city and the river front, will be laid



Garden and Terrace at the Washington Monument.



View Toward the Capitol, Showing Boulevard and New Department Buildings.

THE PROPOSED EMBELLISHMENT OF THE NATIONAL CAPITAL.

out as a garden. Areas adjacent to the Mall and averaging more than 400 feet in width from the Capitol to the Washington Monument are set aside as sites for the great museums and buildings devoted to scientific purposes. Perhaps the feature of this portion of the plans which serves as the greatest cause for congratulation is found in the arrangement whereby the unsightly railway terminal which is now set down in the Mall will be removed to another portion of the city.

Not only will the monument be brought into the Capitol vista, but the Mall will be restored to its original use as a grand setting for the two great buildings of the nation, the Capitol and White House. To the distance of one and a half miles from the Capitol to the monument the reclamation of the Potomac flats adds another mile, giving opportunity for an extension of the treatment accorded the Mall and also a new and great memorial to Abraham Lincoln, to stand on the axis of the Capitol and monument, near the bank of the Potomac. The proposed Lincoln Memorial consists of a portico of Doric columns 250 feet in length by 220 feet broad. The Lincoln Memorial will be the gate of approach to the park system of the District of Columbia. A broad paved quay or landing space will skirt the Potomac; the proposed Memorial Bridge, to be erected at a cost of $15,000,000, will lead directly across the Potomac to the mansion house at Arlington, the national cemetery; and drives up the valley of Rock Creek will afford natural connection to the National Zoological Park.

Connecting the Washington Monument and the Lincoln Memorial will be a canal 200 feet in width and 2,300 feet in length and similar to those at Versailles and Fontainebleau. West of the monument it is planned to place a garden, which will not only add to the impressiveness of the structure, but create an axial relation with the White House, this latter being accomplished by a sunken garden framed in by tree-bearing terraces in the shape of a Greek cross. The center is marked by a great pool, and rectangular basins support this. From the garden a flight of steps 300 feet in width lead to the base of the monument, giving that structure forty additional feet of height. The space south or in the rear of the White House will be left practically undisturbed. Between the monument and the Potomac will be a great place of recreation to be known as Washington Common, and the plan for which contemplates a great stadium bordered by smaller playgrounds.

The south side of Pennsylvania Avenue, now a blot upon the city, is designated as a site for the District Building (which corresponds to a City Hall), the Armory for the District Militia, a Hall of Records and other similar structures. The connection between the Mall system and the Capitol is formed by a rectangle 1,000 feet long and 450 feet wide, relieved by plots of green and flanked by two public buildings which will stand as sentinels to the Capitol. The chief decoration of this area, to be known as "Union Square," will be the Grant Memorial, associated with which will be the figures of his great lieutenants, Sherman and Sheridan, standing independently yet forming a single composition. The grounds at the Capitol will be elaborated by terraces relieved and enriched by basins and fountains, in which the water falling from one level to another is poured finally into a great central basin at the street level. Indeed, the Commission, impelled by the fact that Washington experiences during four months of the year extended periods of intense heat, has provided for a wonderful array of fountains and for an increase in the water supply which will make possible the copious and even lavish use of water in these fountains. In addition to these main features, the plan for the improvement of Washington embraces many minor projects, such as the creation of a magnificent "Cliff Drive" on the Palisades of the Potomac, and the creation of a great boulevard system connecting the various parks.

The most recent application of the electric current is that of taking the place of the old-time bed warmer. The modern implement consists of a coil of wire covered with asbestos, and the electric current passing through the wires heats up the material.

THE YERKES OBSERVATORY TWO-FOOT REFLECTOR.

BY MARY PROCTOR.

Among the many important pieces of work which have been accomplished in the instrument shop of the Yerkes Observatory, has been the mounting of the two-foot reflecting telescope, with which the faint nebula surrounding Nova Persei (referred to in the SCIENTIFIC AMERICAN for December 7, 1901) was photographed.

The telescope is mounted in the southeast dome of the observatory, which was originally intended for a 16-inch refractor. A substantial observing platform or floor, 20 feet in diameter and 12 feet higher than the original floor of the tower, was also built, so that the eyepiece or plate-holder of the telescope is never more than 11 feet above the floor, and is therefore easily accessible with the aid of a suitable observing chair.

While the instrument is generally called the two-foot reflector, the clear aperture of the large mirror is 23½ inches, the focal length being 93 inches. The disk of glass for this mirror was made at the St. Gobain glass works near Paris, for Prof. G. W. Ritchey, who finished the work of grinding, polishing, and figuring it in 1896, at his own laboratory in Chicago.

In the case of a reflecting telescope of large angular aperture, such as the present instrument, great rigidity of the tube and extreme stability of support of the optical parts are absolutely essential, in order that the optical parts shall remain in perfect adjustment. And no less important are the perfection of the driving mechanism (by which the telescope is made to follow the apparent motion of the heavenly bodies from east to west across the sky) and of the guiding mechanism, by which the observer corrects any minute irregularities of movement. The parts of the mounting concerned in the four important requirements just mentioned were designed with great care by Prof. Ritchey and constructed under his supervision. The arrangement of the polar and declination axes is similar to that used in the German type of equatorial mounting; but the end of the tube below the declination axis is so short that it will pass the column without obstruction for all declinations, so that reversal of the instrument when passing the meridian is unnecessary. Long-exposure photographs can therefore be started four or five hours east of the meridian, and continued for eight or ten hours when required.

The driving clock, part of which can be seen inside the column in the illustration, is similar in general plan to that of the 40-inch refractor, and is one-fourth the size of the latter, the governor making two revolutions per second instead of one, as in the larger instrument. The governor balls weigh about seven pounds each, and all parts of the clock are proportionately heavy and strong. The winding drum is provided with a maintaining device, the winding at present being done by hand and requiring attention every two hours.

The driving worm and worm-gear, which directly rotate the polar axis, were ground together for 200 hours with fine grades of emery (such as are used in optical work) and oil, and the smoothing was finished with optical rouge and oil. To this grinding the extraordinary smoothness of driving of the instrument is largely due.

The plan of support adopted for the large mirror is as follows: "The mirror rests upon three very rigid cast-iron plates, 10 inches in diameter, the upper surfaces of which are ground to fit the back of the mirror. One thickness of writing paper is placed between each iron plate and the glass. Each plate is supported at its center on a strong ball-and-socket joint. The three balls form the upper ends of the three large adjusting screws which extend through the heavy back casting, and by which the mirror is adjusted for collimation. The edge support adopted consists of four strong steel bands, each of which is in contact with nearly one-half the circumference of the mirror; two opposite bands are just above the middle of the edge of the mirror; the other two, 90 deg. from the first, are just below this plane. In addition, four long rigid arcs of cast-iron are used to give greater stability of position laterally; two of these are bolted down to the large casting behind the mirror; the other two are held against the edge of the mirror by weak springs."

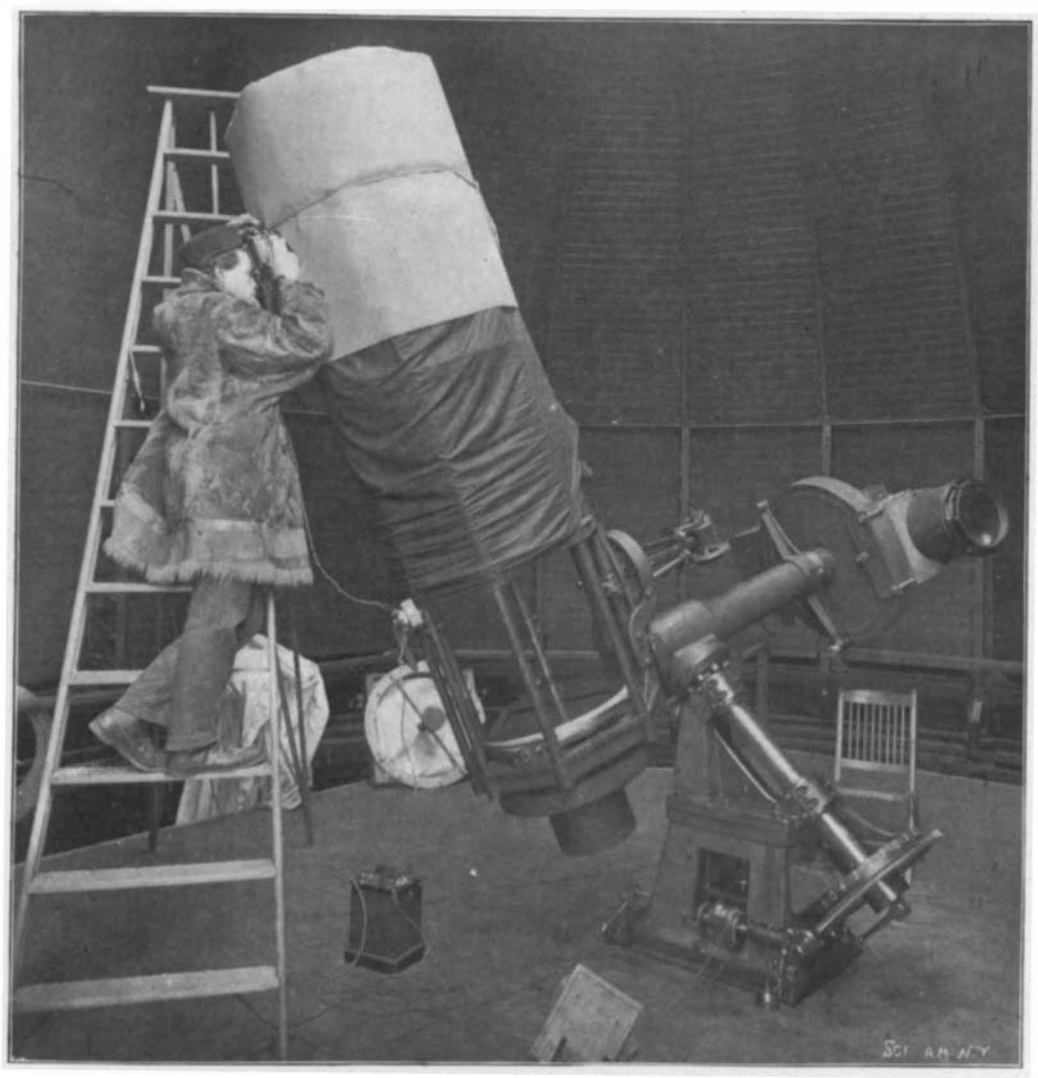
The skeleton tube is about seven feet long, and is constructed of eight two-inch steel tubes, which are connected by three strong light rings of cast aluminium. The rings are driven on the tubes, and each junction is tightly clamped with two strong screws. When the telescope is used with the double-slide plate-holder for direct photography at the first focus, an attachment is used consisting of a strong cast-aluminium ring which carries, by means of four thin wide bands of steel, the diagonal plane mirror and its supports.

The double-slide plate carrier used with the two-foot reflector is the same which was used in Prof. Ritchey's first experiments in photographing with the 40-inch telescope with a color screen. In the latter work a large sliding plate-carrier taking 8 x 10 inch plates is now used. The smaller one takes 3¼ x 4¼ inch plates, and the field photographed is three inches square, which corresponds, in the two-foot reflector, to a portion of the sky about two degrees square.

In regard to the exposures, the telescope is of course always moved by the driving mechanism (the clockwork in the column) during an exposure, but in addition to this the observer watches and "guides" throughout the entire exposure. This is not done in the old-fashioned and clumsy way of moving the entire telescope to make the necessary corrections (by means of "hand slow motions") but by means of what is called the double-slide plate carrier, in which the photographic plate, in its plate-holder, is carried on two very finely made slides, at right angles to each other, which can be moved by two screws held in the observer's fingers. By this means the necessary small corrections can be made with extreme delicacy and quickness.

At the edge of the field a "guiding star" is selected and is brought to the intersection of the spider lines in the "guiding eyepiece," which is carried on the same frame which also carries the photographic plate, so that the two move together. If the observer keeps the "guiding star" exactly bisected on the spider lines, he also keeps all of the stars of the field being photographed immovable on the photographic plate, despite any small errors which may occur in the clock driving.

This guiding is done throughout all exposures, long or short, which accounts for the excellent results obtained. In Prof. Ritchey's best photographic work with the reflector, double stars only 2½ seconds of arc apart are sharply separated. In the illustration showing the two-foot reflector, with which the Nova Persei nebula photographs were taken, Mr. F. G. Pease, Prof. Ritchey's assistant, is represented at the sliding plate carrier, with his fingers on the screws and his eye at the guiding eyepiece. The clockwork is seen in the column, and the two-foot silvered glass speculum is



TWO-FOOT REFLECTOR WITH WHICH PROF. RITCHEY PHOTOGRAPHED THE NEBULA SURROUNDING NOVA PERSEI. HIS ASSISTANT, MR. PEASE, WORKING THE DOUBLE-SLIDE PLATE-HOLDER.