ASTRONOMY

Telescope With New Features Will Take Best Star Pictures

40-Inch Instrument Planned by Prof. Ritchey Expected To be Superior to 100-Inch Reflector for Many Purposes

THE NEW 40-inch reflecting telescope, which is to be built at the U. S. Naval Observatory, Washington, D. C., though smaller than some existing instruments, will be the most perfect means in the world for photographing the stars. So says Prof. George W. Ritchey, noted telescope designer, who is to be in charge of the design and construction of the instrument.

Revolutionary methods of design and operation are expected to make the new telescope of even greater scientific importance than the huge hundred-inch reflector of the Mount Wilson Observatory in California, the optical parts of which were also designed and constructed by Prof. Ritchey.

New mathematical principles will permit this reflecting telescope to give a large field of sharp images, and at the same time to be only half as long as the present type reflector. The telescope is the invention of Prof. Ritchey and Prof. Henri Chrétien, professor of theoretical optics at the Sorbonne and at the Institute of Optics in Paris.

The contract price of the instrument is $76,000. This is not as great as the cost would be were the telescope designed like instruments now in use.

Newton's telescope, on which present reflecting instruments are based, consisted of a large concave mirror at the end of a long tube. This reflected the light back towards the stars, and the converging rays were deflected out to the side of the tube by a flat mirror placed near the top. Prof. Ritchey uses a convex curved mirror in place of this flat one. The curves of both of his reflectors are new to mathematicians.

Mere size, Prof. Ritchey says, does not give the most accurate means of photographing the stars. Actually the large domes necessary to house these giants are troublesome and expensive; and when pointed far off the zenith the long telescope tubes tend to sag.

The main object of the design of the optical parts of the 40-inch Naval Observatory telescope, according to Prof. Ritchey, is to secure by means of two reflections a large field which is sharply covered all over. Telescopes in use now give sharp images of the stars at and near the center of the field at which they are pointed, but neighboring stars are more or less blurred. The planned telescope will cover an angle of 90 minutes diameter with sharp definition, as compared with ten minutes given by the Mount Wilson instrument.

Special Photographic Plates

The photographic plates used will be round, seven and one-half inches in diameter, and slightly concave in form. They are to be ground and polished by Prof. Ritchey himself, true to one fifty-thousandth of an inch. The plates ordinarily used for photographing the sky are comparatively uneven in surface and have a thick emulsion on them. A special feature of Prof. Ritchey's technique is that the photographic emulsion used is ten times thinner than usual and has a granulation of the silver bromide particles twelve times finer. By these means rays can be brought to an accurate focus over the whole plate.

Present methods of astronomical photography, Prof. Ritchey says, do not make use of the full optical power of existing instruments. Only 10 per cent. efficiency is obtained with even the best instruments. Ninety per cent. is the efficiency expected of the new-type instrument. To give one illustration, the new telescope will focus to one ten-thousandth of an inch, whereas present methods permit accurate focusing to one hundreth of an inch.

The total length of the Washington instrument will be only ten feet, four inches. All the moving parts will float in mercury and the friction will thus be reduced nearly to zero.

In an interview with Science Service, Prof. Ritchey disclosed some of his hopes for the telescopes of the future. The reflectors of these will not be solid masses of glass like those of the present telescopes. They will be built up in cells from comparatively thin, selected plates of glass, cemented together to form the required surface.

A light, rigid, ribbed structure is formed and special plates cemented to it front and back. This honeycomb is hollow and can thus be ventilated. Discs of five to ten meters, or about fifteen to thirty feet in diameter, can be made successfully by this method, it has been shown already by the construction of large models.

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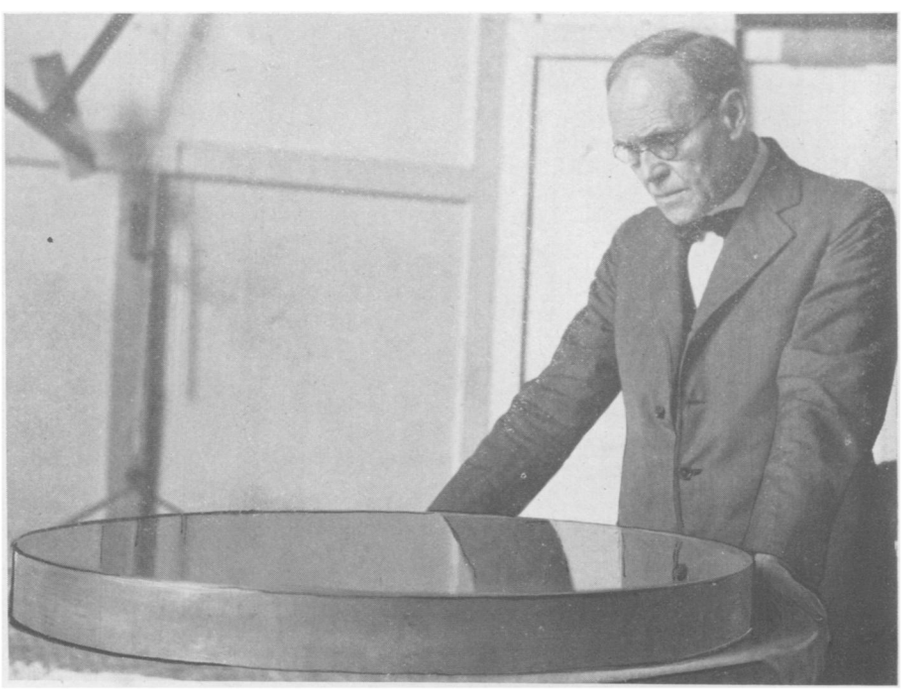

TELESCOPE BUILDER EXAMINING A SOLID MIRROR

This is the mirror used in the instruments that scan the heavens today. To make solid mirrors for the larger telescopes is a very difficult undertaking, and to overcome this disadvantage Prof. Ritchey has designed the cellular mirror pictured on page 404.

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