PHOTOGRAPHY OF THE 1929 ECLIPSE WITH A NEW TYPE REFLECTOR

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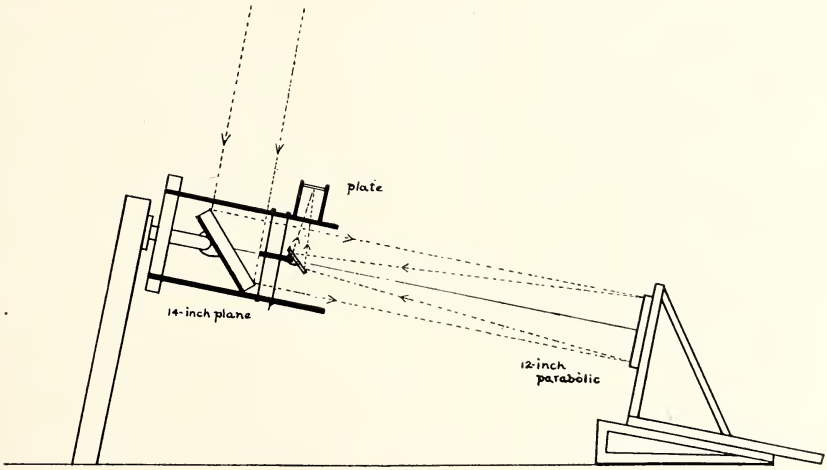
It was my good fortune to assist in observing the Total Eclipse of the sun last May 9th, as a member of the United States Naval Observatory party. The instruments used on the regular program were a 65 feet focus camera of 7½ inches aperture, pointed directly at the sun, two cameras of about 11 foot focus and 3½ inches aperture fed by beams from a coelostat, and a large polar axis carrying several short focus cameras.

With the cooperation of the Naval Observatory, I was able to try out a type of instrument which, as far as I know, has never been used. The instrument is a reflector in a coudé form, the polar axis becoming the tube of the telescope or camera. This was especially easy in this case because of the low latitude of the point of observation, 10° 41′.



As indicated in the diagram, the sun light falls on a large plane which turns the beam down the polar axis. At a point about 13 feet distant in this direction, a parabolic mirror of 12 inches aperture and 14 feet focus was placed which converged the light to an image. Near the focus this beam was turned out at right angles and fell on the photographic plate. In order to keep the image on the plate it is of course necessary to rotate the polar axis once in 24 hours, but as indicated in the diagram, there is no necessity for rotating the parabolic mirror, nor really for having any tube except a very short one to carry the two planes. In this case the tube, or polar axis, consisted of a front wheel of an old automobile which had an excellent set of roller bearings. To the rim of the wheel, at equal intervals, three pieces of angle iron, three feet long, were bolted. Small steel rods from these supported the mounting for the small flat in the middle of the beam.

The large plane, 14 inches in diameter, was supported on an adjustable mounting which screwed on in place of the regular hubcap.

The wheel was bolted to the south side of a heavy post, set in the ground at an angle of 10° 40′, and rotated by a long arm which was actuated by a driving clock of the usual form.

The whole thing is extremely simple, inexpensive except for the optical parts, easy to pack, quickly set up and very rapid in its action.

The mirrors were freshly silvered a few days before the eclipse, the final adjustments made in the axis and mirrors and then a few yards of cheap black cotton cloth wrapped around the angle iron tube. An opening was left for the sun light to strike the large plane of course. The plate holder was carried in a square draw tube made of thin wood which was in turn fastened to the angle irons of the tube.

During the eclipse the instrument was operated by Mrs. Cogshall and Mr. J. E. Barker, chief engineer for the Philippine Railway, Mr. Barker changing the plate holders and Mrs. Cogshall starting and stopping the exposures with a circular screen held in the beam in front of the parabolic mirror. A large part of the credit for the success of this part of the program is due Mr. Barker who from the first took great interest in the instrument and during the eclipse while I was busy in the 65 foot camera, took entire charge of its operation.

The instrument worked very beautifully, the images being clear and sharp and entirely free from any astigmatism so commonly feared in the use of plane mirrors.

At a low latitude a much greater focal length could be used with no additional trouble or expense. All that is required is more open air between the rotating part and the parabolic mirror. Even at higher latitudes I am inclined to think it would be worth while to use this form. It may be noticed that for a greater focal length it would work just as well to turn the parts end for end, keeping the moving parts down near the ground and placing the concave mirror at the upper end of the "polar axis." It would be no greater trouble to put the concave mirror on top of a low tower than to put a lens on a high one, and all necessity for a long light tight tube is obviated.