

THE PHOTOCRONOGRAPH.

The photochronograph, and its application to star transits.

By J. G. HAGEN, S. J., and G. A. FARGIS, S. J., Georgetown College Observatory. Georgetown, D. C., 1891. 4to, pp. 36.

THE authors of the above publication are the first to lay before the astronomical world a solution, or at least a partial solution, of the very important problem of meridian transit photography. The instrument they have employed consists essentially of an electromagnetic shutter or "occulting bar," which can be attached to the eye-end of a transit instrument or meridian circle. The apparatus is so arranged that the current from a break-circuit clock moves the occulting bar every second in such a way that the image of a star in transit is impressed for a moment upon a photographic plate mounted behind the bar. A line of "star-dots" can afterwards be developed upon the plate. In order to refer the dots to the collimation axis of the instrument, a glass reticle plate, ruled with one vertical reference line, is permanently fixed in the tube, directly in front of the sensitized surface, and in contact with it. After the star transit is over, it is easy to impress the line upon the sensitized plate, by allowing the light of a lantern to fall for a moment upon the object-glass of the telescope. While this is being done, the line of star dots is shielded from the light by the occulting bar, now permanently interposed between the dots and the light. This method of impressing the reference line upon the plate is excellent, and is further improved by ruling the line with a break in the middle, so that *none* of the dots can possibly be "occulted" by the line itself. The plates are measured with a micrometric apparatus, by means of which it is easy to determine the instant of the passage of the star across the reference line.

The process thus very briefly outlined is given by the authors with all possible detail; even the preliminary apparatus, subsequently discarded as imperfect, being carefully described. Other experimenters in the same field should therefore be greatly aided by the present work. In this connection it is proper to refer to the earlier observations of L. M. Rutherford, of New York, who successfully employed an arrangement essentially similar to the photochronograph many years ago.* In the collection deposited by Mr. Ruther-

* B. A. GOULD, *Memoirs of the National Academy of Sciences*, vol. iv., p. 175.

L. M. RUTHERFURD, *American Journal of Science and Arts*, vol. iv., Dec., 1872.