

their flight after the exposure is completed. For such cases, M. Bull encloses them in a glass tube with a very light mica door, which is moved by the insect in its flight, and which, making a contact, sets the shutter mechanism in action.

In order to study the movements represented on the films, which in nature are far too rapid to be followed by the eye, it is merely necessary to pass them through an ordinary kinematograph, making some fifteen exposures a second instead of the 1500 or 2000 a second employed in taking the photograph, and then the movement, 100 or more times as slow, will be seen, and in many cases easily followed. Where a still greater slowing is required, M. Bull arranges to make the film appear stationary for a much larger proportion of the whole interval than is usual, and then only two or three views a second are sufficient to give an apparently continuous movement. C. V. Boys.

THE TOTAL SOLAR ECLIPSE, MAY 9, 1910.

THE following two communications from Port Davey, dated May 7 and 9 respectively, complete the account of Mr. McClean's expedition to Tasmania. In spite of the trying weather conditions, a very complete installation of instruments was successfully erected, but, as previously reported, clouds prevented their use during the eclipse.

The photographs accompanying the report were taken by Mr. H. Winkelmann, and the three here reproduced have been selected to illustrate the setting up of some of the instruments.

Port Davey, May 7, 1910.

"The weather since April 27 was execrable until May 4, and was not good until the following afternoon. Continuous gales, heavy rains, and floods made progress absolutely impossible, and no trustworthy tests were made before May 4. The ground became a quagmire, and the instruments were covered with rust, in spite of paraffin and oil. Rain got into the concave grating slide-holder, and the cloth began to peel off. The coelostat mirror was badly discoloured, in spite of coverings of Japara and Willesden canvas. The siderostat mirror was also permanently fogged and slightly spotted, and in the morning, on uncovering (when possible), was covered with moisture. In addition to this, the ground shook at every footstep, and everything vibrated. The barricades proved very useful in protecting the instruments from the wind, which was so strong that during the gusts it was impossible to walk against it. On several days no coverings could be taken off, and work was at a standstill. The *Wainui*, which came in on May 1, had to take refuge in Schooner Cove on the other side of the Bathurst Channel until the following day. Our boat, which had to go over to pick up Mr. Short, from Sydney, and his instruments, could not get back, and we had to cross behind Mundy Island and land a mile across country from our camp, leaving the boat in a cove until the next day.

"On May 4, however, there were a few intervals of sunshine during the afternoon, and on May 5 the afternoon was fairly bright after a drizzling morning, while May 5 was cloudless and with a gentle breeze from the east, and much progress was made. The

instruments fed by the siderostat were in accurate position, and some trial photographs were taken with the concave grating spectrograph which on development proved to be good in every way.

"Mr. Short, who arrived on May 1, has decided to feed his five-foot camera from an auxiliary mirror from the siderostat, as, with the wind that is likely to occur, it would not be steady on the equatorial mount, and on this mount have been placed his telephoto and Worthington's camera, as the latter could not be run correctly with his clock.

"Considerable difficulty had been found in driving the siderostat after about 3.15 in the afternoon, and a device had been put up to help the mirror cell arm round after that time. Owing to bad weather, no complete examination had been possible until May 7, when the mirror and cell were removed, and it was found that one of the balance-arm bearings had not sufficient play to allow the rollers to continue in contact with the cell. Filing down was tried, but there was not sufficient material to do this fully, and so the bearing was reversed. This gave considerable improvement, but before the time at which eclipse would occur it was found that the rollers reached



FIG. 1.—Beginning the erection of the instruments on Hixson Point. Figures from left to right—J. Brooks, F. K. McClean, A. Young, S. Dowsett.

the end of their slot, and greater power was required to drive them up the slope. Having no tools for continuing this groove, arrangements were made for a weight to be attached upwards to the cell arm, and this was found to answer; but considerable dangers of irregular drive are present in this method. An attempt was made to work the slow motions from the concave grating spectrograph, but, owing to the distance, no good results were obtained, and Mr. Dowsett was therefore placed in charge of the siderostat to follow instructions from the spectrograph, where the large image on the slit gives a quick idea of any movement either in right ascension or declination.

"Drills commenced on May 6 both separately and generally. The allocation of the instruments to the members of the party has been arranged as follows:—

Siderostat S. G. Dowsett

Instruments fed by siderostat.

Concave grating spectrograph ... F. K. McClean
De la Rue coronagraph ... A. Wilson
Short 5-ft. " ... J. Short

Instruments fed by cœlostat.

16-ft. coronagraph	...	...	J. Brooks
42-in. spectrograph	...	...	H. Winkelmann
Telephoto	...	...	H. Winkelmann
Steward (dismounted)	...	...	E. Jeffs

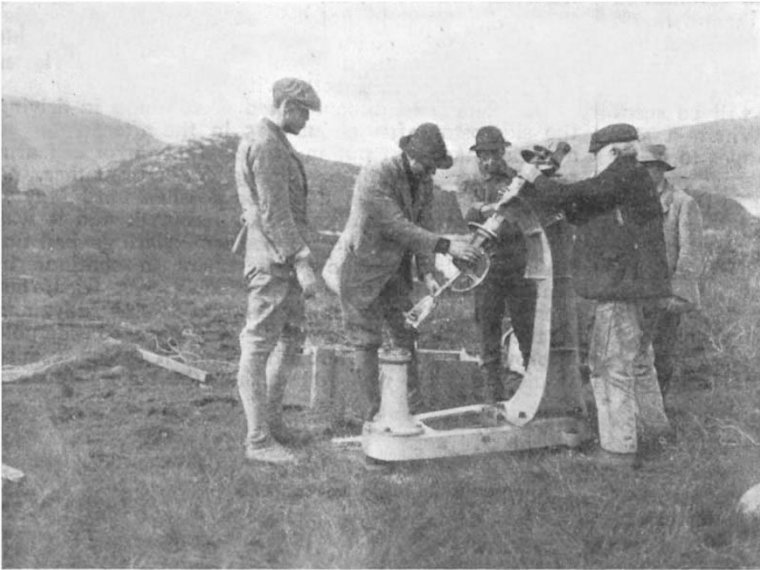


Fig. 2.—Setting up the 21-inch Siderostat.

Figures from left to right—A. Young, F. K. McClean, S. Dowsett, J. Brooks, J. Worthington.

Equatorial.

Short's equatorial mount carrying telephoto & Worthington camera	J. Worthington
and	
Time caller	A. Young

"Owing to the resilient nature of the ground, it was found advisable not to allow anyone to move about, and shutters were fitted to the 16-foot and De la Rue coronagraphs, which could be worked from the dark-slide ends. Winkelmann, who has two instruments in his charge, has only a step or two to make, and it is impossible to prevent him moving. In the following programme for the eclipse, the times mentioned are standard time (ten hours east), as given by Dr. A. M. W. Downing, F.R.S., and also local time at Pyramid Rock in the entrance to Port Davey, which is long. $145^{\circ} 55'$ E. and lat. $43^{\circ} 22'$ S. As the position of the observatory is long. 146° E. and lat. $43^{\circ} 20'$ S., the eclipse will start a little later, and finish a trifle earlier. The time was again checked on May 6 by Messrs. Brooks and Young, and the chronometer error found."

(Here follows a large table showing the exposures to be made in the various instruments. This is omitted here.)

"Port Davey, May 9, 1910.

"Rain commenced on the afternoon of May 8, and continued steadily all through May 9. No drills were possible. On the night of May 8 the dark slides were filled, and all were taken up to the ob-

servatory on the Monday afternoon, and, in spite of the rain, the instruments were made ready; but exposures were limited to one slide, which was opened at 5 seconds and closed at 200. There was a tremendous downpour during the eclipse, but it cleared a little afterwards. During totality there was a stretch of bright sky on the western horizon, and soon after sunset the clouds dispersed and a bright, starry night followed.

"Immediately after eclipse the barricades were pulled down and the ground prepared for the final packing."

Since the receipt of the above communications both Mr. McClean and Mr. Young have arrived home. They have both suffered from the effects of the hard work and inclement weather, and the former is still in the doctor's hands. While Mr. McClean has had considerable experience in roughing it, he describes his recent work in Tasmania as the most trying that he has yet had to contend with. Nevertheless, his keenness for eclipse work is by no means damped, for he is now looking forward to the eclipse of next year, which will be visible from islands in the Pacific Ocean, and is already commencing arrangements to observe it.

WILLIAM J. S. LOCKYER.

JOHN B. CARRUTHERS.

WE regret to have to record the death, at the early age of forty-one, of Mr. J. B. Carruthers, assistant director of agriculture in Trinidad. Mr.



Fig. 3.—Adjusting the Cœlostat.

J. Brooks on the left, F. K. McClean on the right.

Carruthers only took up his new appointment last autumn, and with characteristic enthusiasm entered at once very energetically upon the task of making himself familiar with his fresh surroundings. The possibilities of rubber cultivation was the principal subject to occupy his attention, and to this end he visited most of the chief estates in Trinidad. Thence