such book the Librarian shall insert opposite to the entry the date on which the book has been returned, and give in writing an acknowledgment of its return. And if on the return of such book the Librarian shall perceive that it has sustained any damage during its loan, he shall make a note of the particulars and report the same to the Library Committee.

17. In place of every book removed from the shelves, a card or board shall be substituted, on which shall be written the name of the borrower and date of issue.

Modifications of Existing Bye-laws.

Bye-law No. 57.—For the present Bye-law substitute :—

> "The common Seal of the Society shall be a representation of the constellation Scorpio above observatory set among palm trees, the whole surrounded by a border of lotus flowers with the words and figures 'Astronomical Society of India, 1910.'"

Bye-law No. 4.—From the first line of this Bye-law strike out the word "Treasurer," and after the word "Sections" in line four add the words "the Treasurer."

Grinding a 16-inch Speculum by hand.

BY W. E. BUCHANAN.

Having recently completed a 16″ speculum, a few notes may be of interest to members who make or contemplate making their own mirrors—for Newtonian telescopes.

The disc of glass was procured from Chance Brothers, Birmingham ; it was 2½″ thick and weighed some 45 lb.

The tool was of cast zinc and of the same thickness as the speculum.

Zinc was selected as being easy to cast and turn, but iron I consider better.

The focal length having been decided on (in this case 96 inches, or 6 diameters) two templates were made from sheet glass, by fixing an ordinary diamond glass cutter at the end of a long rod suspended to a beam.

The distance between the diamond and the point of suspension was 192 inches, and this is the radius of curvature or twice the focal length.

The speculum was then hollowed out to the required curvature by grinding it (face up) with a lead tool about 8″ diameter, 40 hole carborundum and water being used as the abrasion.

When the hollow corresponded with the template which took some 6 or 8 hours work, the zinc tool was taken in hand and faced up in a lathe, and then turned and scraped convex to its template.

The tool was then fixed face up on the top of a circular iron drum about 2′ 6″ high, and the speculum ground against it in the following manner.

The tool had carborundum smeared evenly on its face, and the speculum was placed gently face down on it. The speculum was then ground backwards and forwards with strokes of varying lengths, it being slowly revolved in the hands at the same time.

But the tool being a fixture, it was also necessary to walk round it about once in 100 strokes, so that the grinding would be uniform.

After the rough grinding was done and speculum and tool touched each other all over, the grinding was continued in grades ending up with 120-minute emery, *i.e.*, extremely fine particles of emery which are contained in the water syphoned off from a glass jar of emery and water which has stood for 2 hours after being stirred up.

At the completion of the fine grinding it was possible to read the smallest print through the mirror.

The polishing was done in a somewhat unusual way; with a facetted pitch tool and jeweller's rouge, but with the polisher of only 6½″ diameter.

It was found that with a full size polisher there was a tendency to stick and the work was very hard, so as an experiment the writer started polishing with mirror face up and the small polisher mentioned.

Probably most speculum workers would be horrified at this unconventional method, but, as a matter of fact, the curve was in some ways under better control than when using a full-sized polisher.

The first test (on the Foucault method) showed the mirror to be slightly hyperbolic, and this curve varied very slightly right through the polishing process, and there was no tendency to the "rings" which are sometimes such a source of trouble.

The final curve still showed a slight tendency to the hyperbola, but I considered it advisable to do no more till star tests were made, and these I hope to carry out soon. In the space of a brief paper like this, it is of course impossible to do more than touch on the subject of speculum grinding.

But those who wish to learn more should refer to the *English Mechanic*, which has much useful information on this fascinating and exasperating pursuit.

In fact it was from articles in that Journal by our President, Mr. Tomkins, that the writer made his first speculum some 10 or 12 years ago.

Crater Gassendi as viewed by an observer on the Moon.

BY U. L. BANERJEE, M.A.

This evening we shall see what view our imaginary observer on the Moon will have of the Crater Gassendi, its surrounding walls and mountain peaks, standing at different places on its surface.

This crater is situated between $+14°$-$15'$ and $+18°$-$13'$ Lat. and $-38°$ and $-41°$-$10'$ Long. It is a fine walled plane nearly circular in shape, having a diameter of 553 miles and an area of about 2,000 square miles. It is surrounded by a mountainous wall varying in height from about 9,600 to 500 feet over its interior. Beyond these walls is Mare Humorum, enclosing the plane on its south, the bed of which is 2,000 feet below the interior of the walled plane.

On its east wall is a long elliptical depression, on the south and north ends of which are situated two lofty mountain peaks γ and λ respectively about 9,600 and 9,000 feet high. Running northward, the wall is crossed by two deep passes on the north-eastern border. It then slopes down to the north to open out into the interior of a large ring plane, which forms a sort of spoon-shaped loop, surrounded by walls reaching to a height varying from 10,000 to 13,000 feet. Beyond this, on the north-west, the walls seem to have fallen outwards on to the surface to form a great mass of débris. At κ on the north-western corner the walls assume a height of 6,300 feet, and then terminate into a lofty peak Δ 9,270 feet high on the east. It then again slopes down southward to a height of 3,700 feet at μ attaining again a height of 9,000 feet at υ on the south. Here the walls suddenly part to form a deep pass scarcely 500 feet high,