Professor G. FORNI's work published last year by the HYDROGRAPHIC INSTITUTE OF THE ROYAL ITALIAN NAVY takes the form of a precise handbook of observations by means of the astrolabe. It gives the description and method of use of the JOBIN instrument and of the instrument constructed by the S. O. M. (SOCIÉTÉ D'OPTIQUE ET DE MÉCANIQUE DE HAUTE PRÉCISION, Paris).

For the computation of observations by prismatic astrolabe the Italian Hydrographic Institute has adopted the JORDAN formula by means of which the computations of distance from the estimated position to the position line given by the astrolabe observation, may be easily estimated. An example of computation is given in the work.

For the preparation of the programme of observations the Italian Hydrographic Institute has adopted a graphic procedure worked out by Admiral TONTA; this procedure, which makes use of stellar plans of the northern and southern hemispheres in stereographic-polar projection and of a graph representing the almucantar of 30° zenithal distance corresponding to the station position, is described on pp. 40-45 of Professor FORNI's publication; by its means the list of sidereal times and azimuths of the different stars observable passing at the zenithal distance of 30° is very readily established.

THE ASTROLABES OF THE WORLD

by

Dr. ROBERT T. GUNTHER

Vol. 1: *The Eastern Astrolabes.* Pp. *xvii* + 304, 68 plates
Vol. 2: *The Western Astrolabes.* Pp. *viii* + 305-609, plates 69-153
(Oxford: Printed at the University Press, 1932, £10.10s. net)

Dr. Robert T. GUNTHER, Curator of the Lewis Evans Collection in the Old Ashmolean Museum at Oxford, has published a general Catalogue of the astrolabes of the world based upon the series of instruments in the LEWIS EVANS Collection in the old Ashmolean Museum at Oxford, with notes on astrolabes in the collections of the BRITISH MUSEUM, the SCIENCE MUSEUM, Sir J. FINDLAY, Mr. S. V. HOFFMAN, the MENSING collection, and in other public and private collections.

He begins with the astrolabes of Greece, Byzantium, Persia, India, Arabia, and Morocco in Volume I, which is devoted to the astrolabes of the East, and continues with those of Spain, Italy, France, the Low Countries, Germany and England in Volume II (The Western Astrolabes). Under each of these heads, dated instruments are arranged in order of antiquity, but there are also numerous interesting examples to which no exact date can be assigned.

This interesting publication constitues a valuable contribution to the history of the astrolabe.

A NEW READING MICROSCOPE.

In the *Zeitschrift für Instrumentenkunde* 53.4, page 159, is a description by Engineer H. WEDEMEYER of Göttingen of a reading microscope suitable for the reading of the divided circles on theodolites, universal transits, and particularly suitable also for the reading of the graduations of the stadia in levelling instruments.

This new reading microscope is distinguished from the known appliances in that no micrometer screws are employed and that, hence, no kind of error can ensue through wear. It consists essentially of a reading microscope of standard design in the focussing plane of which there are two small graduated plates, one of which may be rotated from outside by means of a milled ring at the eye-end of the telescope. The fixed graduated

plate contains, besides three short parallel lines in its centre, a circular graduation near its edge which presents special characteristics according to the use for which it is intended. The rotatable graduated plate presents a single line, which will be referred to as the pointer-line. Fig. 1 shows the appearance of the field of view of such a reading microscope when it is mounted on a 5-inch theodolite. In the field of the telescope the graduation of a circle divided in sixths of degrees may be seen. Thus each interval represents 10 minutes. The corresponding auxiliary circular scale in the upper portion is divided into 10 main parts and 3 secondary parts. This auxiliary scale is read by means of the pointer-line, the zero position of which is indicated by a pecked line. In this position the reading microscope can be used as a simple reticule-microscope. In this case the reading in the example considered would be 112° 26'. Should a more accurate reading be required, the pointer is then rotated until the lower end covers the preceding dividing-line at its intersection with the middle line of the three parallels; the accurate value can be then read at the upper end by means of the auxiliary graduation. In the example given the whole minutes on the auxiliary graduation are divided into 3 parts = 20 seconds. As the tenths can be easily estimated, the reading yields an accuracy of 2 seconds. In the present case the reading should be 112° 26' 06".

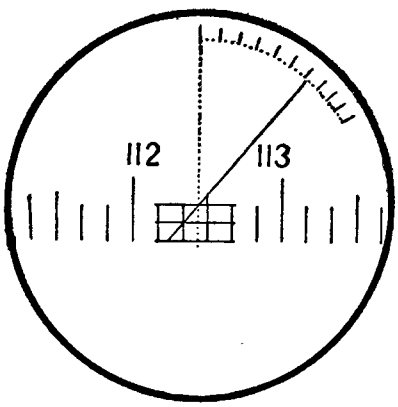

Fig. 1

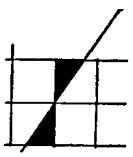

Fig. 2

The focussings and readings are very speedily effected and out of doors in good lighting conditions yield an average error of the individual reading of 2 seconds in round numbers.

The setting of the pointer is obtained very accurately by the method shown in Fig. 2 by making the two triangles marked in black equal.

This new reading device is by no means limited to the reading of graduated circles. The SARTORIUS-WERKE A. G., Göttingen, makes use of this device for the fine reading of graduations on levelling staves as shown in Fig. 3. In such a case the three short central lines of the fixed graduated plate are useless. Its division scheme has been transferred to the stave itself and thus the scale appears in the form shown along the central diameter of the field in Fig. 3.

As the graduations of the stadia run vertically through the focussing plane, the auxiliary graduation is situated in this case in the right-hand half of the field of the telescope. The characteristic, in contrast to Fig. 1, will no longer be a sexagesimal graduation, but will be centesimally subdivided as shown in Fig. 3. The accurate reading for the case illustrated would be 2.6727 m., or for a well-trained eye 2.67268 m.

The rotation of the pointer covers only 45° of the circumference of the circle, the initial and terminal positions of the pointer being limited by stops.

This fine reading by means of the pointer and circular arc saves time since all the readings are conveniently effected in the eyepiece.

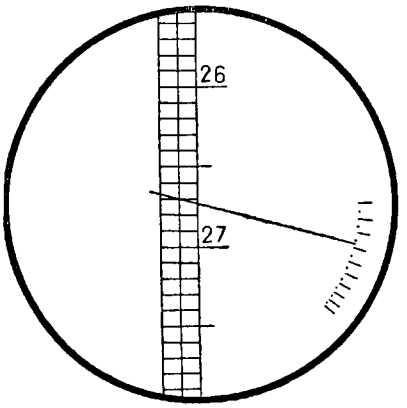

Fig.3

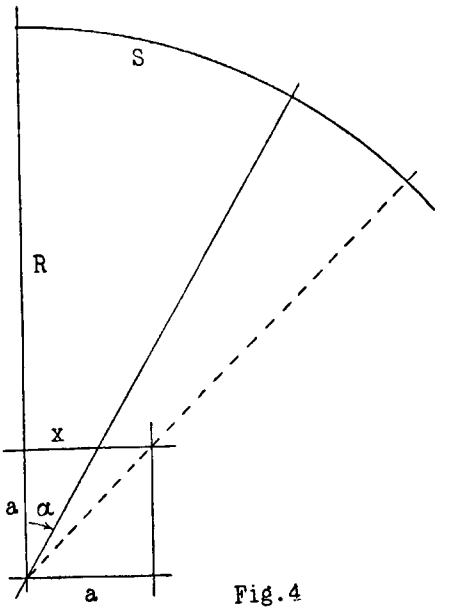

Fig.4

The division is governed by the formula:

$$s = R \tan^{-1} \frac{x}{a}$$

in which x is the part of a central division to be measured,
a being the length of a central division, and
R the radius of the circular arc.
s is the corresponding length of the circular arc (see Fig. 4).

THE DISCOVERERS OF THE FIJI ISLANDS

by

G. C. HENDERSON, M. A. (Oxon), EMERITUS PROFESSOR OF HISTORY, ADELAIDE UNIVERSITY.

To all those interested in the history of Polynesia, Professor HENDERSON's scientific study of the original discoverers of the numerous islands embraced in the Fiji Group will come as a valuable addition to their libraries. The author having spent eight years sailing in those waters has been able to follow the actual tracks of the early navigators TASMAN, COOK, BLIGH, WILSON and BELLINGSHAUSEN, and having studied their original journals and maps and compared them with the more recent charts of the British Admiralty, has been able to produce a really authoritative account of the islands, reefs, etc. discovered by each of them; the general plan of the book being to recount the story of each discoverer from the time of approaching the islands of Fiji to the time they were lost to view.

The book is divided into 15 chapters: Chapter I describes the difficulties with which these early Navigators had to contend owing to lack of charts and the means of accurately determining their position at sea. Chapters II to VI are devoted to TASMAN's voyage in 1642-3 when in command of two ships, the yacht *Heemskercq* and the flute *Zeehaen*. Chapter IV also describes the *Great Chart of the South Seas* compiled by Hessel GERRITSZ in 1634 which is in the possession of the Dépôt de la Marine, Paris, and is frequently referred to in TASMAN's journal. The author deplores the fact that