

This is followed by a chapter entitled *Photocarta* (Photographic Charts) which contains descriptions of the camera and other instruments employed in making such charts.

The next two articles are reports on the *Surveys of the Ganchos Inlets* and of *Sepetiba Bay*. The latter report contains a list of the charts (with their limits) which are to be published as a result of the survey.

Thereafter are chapters which deal with :

Notes on the Tides on the Brazilian Coast, containing the harmonic constants for 23 ports, mostly based on one year's observations.

Shipping Disasters in Brazil ; including even those of the XVI century, with an examination of their causes. The author, Rear-Admiral D. Paes LEME DE CASTRO, sums up with the words :-

"The above cases show that most disasters are due to the blind stubbornness of fatal and irresistible causes, but many others result from an incorrect interpretation of prevailing meteorological conditions and from imperfect knowledge of local lighting and buoyage or, again, are the result of lamentable errors only possible to those seamen who are grossly ignorant of the hydrography of the place in which they are manœuvring."

Erection of the Itapagé Lighthouse. The new light, which was inaugurated on 1st January 1933, takes the place of the old one extinguished during the night of 30th-31st July 1929 and lies some 1733 metres to the N.W. thereof.

Notes on Aids to Air and Surface Navigation. A short history of the evolution of these aids in Brazilian waters with brief notes on the programme of improvement and development.

It is to be regretted that neither this nor the previous volume contains an index or, even, a list of contents.

G. S. S.

MAPPING THE OCEAN FLOOR

by

CAPTAIN GILBERT T. RUDE, U. S. Coast and Geodetic Survey.

(Extract from the *United States Naval Institute Proceedings*, Annapolis, April, 1934.)

In this article, Captain Gilbert T. RUDE, Chief of Division of Hydrography and Topography, U. S. Coast and Geodetic Survey, gives a summary of modern hydrographic methods. After having recalled in a brief historical account the earlier conceptions which led to the drawing-up of hydrographic charts, since the epoch of the great discoveries, he outlines the general development of the methods of precise cartography, based on systematic surveys, a procedure which has gradually evolved from the less precise practices of the art of navigation, until it has reached its present precision, based on the developments and the principles of modern science. The recent years, and principally those which followed the World War, have seen a revolutionary advance in the technique employed in hydrographic surveying, with a corresponding increase in the volume and accuracy of this work.

In our time hydrography resorts to laboratory science, in order to bring into play new physical methods. Piano wire, after half a century's use for the measurement of the greatest depths, gives place, to-day, to a series of instruments borrowed from the arsenal of the radio engineer. The hydrographic surveyor, therefore, is actually a combination of navigator and engineer, with a clear understanding of the requirements of the mariner and with engineering ability to carry on, not only hydrographic work of a high order, but also all the related field operations necessary to the construction of the chart. It is necessary not only to determine the exact depth of the sea, but, above all, to ascertain the accurate location of these depths; it is actually in this dual operation that modern echo-sounding and sound-ranging methods complement the one the other now-a-days. At present, still more is demanded from the marine chart than was

the case heretofore. The progress of coastal surveys permits one to envisage representations of the ocean floor by means of depth contours which depict the deepest feature of the abysmal depths. Deep-seated valleys, which cut out large indentations on the edges of the continental shelf, give the coastal configuration a particularly characteristic appearance, impossible to represent by means of mere depth-figures. The necessity of gigantic enterprises, the elaboration of which has become possible thanks to modern methods, is recognised; the examination of ancient charts alone was unable to show this necessity.

ON THE GRADUATION ERRORS OF CIRCLES USED IN GEODETIC OPERATIONS

and on Methods which make it possible to reduce their influence.

by

J. BAILLAUD.

Bulletin Géodésique No. 42, Apr.-May-June 1934, pages 37 to 68.

The Author, who is an Astronomer of the Paris Observatory, shows that the errors of graduation in azimuth circles are of great importance and are the cause of imperfections which are much less negligible than are other errors which geodesists take the greatest care to avoid. Astronomers study the divisions of their circles very closely and geodesists should do so also; however they do not require the same extreme accuracy. For this purpose the errors of some of the fundamental divisions (every 10th degree for example) should be determined by the MARTH method; this method has the advantage of avoiding the accumulation of errors but requires somewhat lengthy calculations. The intermediate divisions may be merely compared to a standard distance.

Provided that these errors of graduation be taken into account, the Author advocates, for observing angles, a return to the *repetition* method using two opposed microscopes only. With the present well constructed instruments this method no longer has the defects attributed to it; the principal advantage of the *reiteration* method was that by using a larger number of graduations it compensated the graduation errors to a certain extent.

After giving a diagram of a *repeating* azimuth circle based on the above principles, the author expresses the hope that geodesists will re-examine the question of using the repetition method.

P. V.

J. F. CAMPBELL, 1822-85, AND HIS REFRACTING QUADRANT.

(Extract from an article by R. T. GUNTHER published in *Nature* - London,

18th August, 1934, p. 251).

Last year I purchased at auction a well-made piece of optical apparatus which intrigued me because I could not divine its purpose. It looked like a sphere of glass with circles etched upon it, set in a block of wood. After cleaning, some writing and the initials J. F. C. appeared on the box which I finally recognised as those of J. F. CAMPBELL. But although his name as applied to the CAMPBELL-STOKES Sunshine Recorder is a household word, none of the physicists or meteorologists to whom I applied for information knew anything about the man. Nor have I been able to find that any obituary notice of him appeared in *Nature* or in the usual journals.