

board a vessel of 12 tons the accuracy is still less. In all cases the errors due to rolling are greater than those produced by short period perturbations. In these circumstances, the author remarks that, in the middle of the oscillation of the roll, the acceleration  $f$ , and consequently  $d$ , are nil. At this moment, the bubble gives the true horizontal plane. Thus if a pendulum, whose proper period is fairly short, be made to follow the oscillations of rolling and to close an electric circuit exactly at the middle of the oscillation, thus actuating a sound signal, sextant observations could be taken in the best circumstances. In this case the mean error for 5 consecutive observations falls to about 15'.

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### THE NEW SPHERICAL COMPASS.

(Extract from *Zapiski po Hidrographii*, Leningrad, 1934, No. 3, p. 148).

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In the March 1934 number of *Marine Engineering* there is a note on the new KELVIN-WHITE spherical compass, invented and improved by Wilfred O. WHITE, of Boston.

Four years ago, Mr. WHITE, after various attempts to obtain a more stable compass, became convinced that if the compass bowl were spherical, instead of flat as in the ordinary type, it would give greater stability to the compass card at sea.

The principle of the instrument is based on the fact that the movement of the ship when rolling and/or pitching always gives rise to a force acting vertically; in the flat-topped compass, at each vertical movement the liquid strikes the glass and causes turbulence round the bowl in a horizontal direction, drawing the card with it and causing instability in the latter. In the spherical bowl, the liquid, taking up the same spherical form, with the card at its centre, remains quiet even when the bowl oscillates in all directions.

Further, in the spherical compass the "magnetic element" is established in such a way that the inertia and the magnetic moment are in harmony, giving excellent results.

The combination of the spherical glass of the bowl and of the liquid which completely fills it forms a kind of meniscus which magnifies the card considerably on the side opposite that from which one is looking.

Thanks to its great stability and better visibility, the spherical compass is now widely used in the American Mercantile Marine. For instance, after trying out these compasses on board various ships, the American Hawaiian Line has ordered twenty-five spherical compasses for its fleet.

G. B.

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### THE CHIEF RULES FOR THE TREATMENT OF MAGNETIC COMPASSES ON BOARD SHIP.

by

W. ULLRICH, of the DEUTSCHE SEEWARTE.

(Extract from *Der Seewart*, Altona-Elbe, Heft 1, 1935, page 2). (\*)

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In many industrial or commercial establishments it is the custom to extract the essentials from the innumerable instructions, rules and precautions to be observed, to group them in a clear, synoptic form, and to exhibit them as near as possible to the places where work is going on so that they may be continually exposed to the view of the employees. The favourable results obtained from this practice would seem to encourage its application to the principal points to be observed in the treatment of magnetic compasses on board ship, i. e. to group these points in rules easy to understand, without inconvenient extra work. It is reasonable to hope that their observation

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(\*) *Original text in German.*