Mapping from Photographs :

The WILD *Autograph,* an apparatus of precision for the automatic plotting of maps from stereoscopic pairs of photographs taken on the ground or from the air. Bridging of tracts without fixed points by the plumb-point method. The WILD *Rectifier,* for the projectional rectification of air-photographs, with simultaneous enlargement up to 4 times or reduction down to one-third size.

Viewing-stereoscope.

H. B.

THE HUSUN FILAMENT CARD DEAD-BEAT COMPASS WITH NON-RESONANT SUSPENSION (*)

This new type of compass manufactured by Messrs Henry HUGHES & SON, Ltd, London, constitutes a great advance on the ordinary liquid compasses. The internal diameter of the current "Fleet" type compass bowl is 10 ins., that of the Card, 6 1/2 ins. The space thus provided between bowl and Card screens the latter against the entrainment influences of the liquid. Adequate expansion chambers are arranged which counteract the effect of temperature change on the liquid, thus avoiding any difficulty with bubbles.

The magnet system is constituted by short cobalt steel needles of high magnetic moment. This arrangement makes the compass highly sensitive. The qualificative "Dead-Beat" which the makers associate with this compass means that its oscillations are completely damped out. This damping out is obtained by means of fine radial filaments suspended on the underside of the Card; the friction of these filaments in the liquid warrants a perfect damping out under all conditions and precludes any oscillations arising under fortuitous causes.

The compass Card itself is manufactured by a patent photographic process which entirely eliminates any question of Card discolouration due to chemical action or discolouration of the liquid. The attached figure shows the general arrangement of the Card.

An idea of the damping out attained will be gained by indicating that the Card when deflected 45° returns to zero in 11 seconds, swings 5° beyond and returns to rest in 35 seconds.

Owing to the reduced dimensions of the needles which constitute the magnet system, any changes in the quadrantal deviation due to the length of magnets come very little into account, while a higher directive force of the system is attained.

The filaments which realize the damping out, due to the resistance of the liquid, are very light and produce only a small increase of inertia of the Card. The result thereof is that the Card thus damped does not, so to say, attain a complete period of oscillation.

Although the unique design of the "Dead-Beat" filament Card compass in itself is, in most cases, sufficient to absorb external disturbances before reaching the sensitive element, a special suspension has been provided the bowl to damp out all kinds of vibrations. Such vibrations are always produced in motor ships and the bridges are peculiarly sensitive to vibrations of certain definite frequencies.

The Husun non-resonant suspension consists of an outer band resting on four thick shock absorbing pads of a specially prepared sorbo substance (Dunlopillo); these in turn are fitted to a base flange mounted on the inside of the binnacle cylinder. To maintain a fore and aft direction for the lubber line two vertical pillars also reinforced with rubber tubes project from the base flange and pass through holes in the suspension ring. It will be noticed that, at this stage, there is a complete absence of metal-to-metal contact between the binnacle and the suspension ring. To eliminate entirely any possibility of disturbance from vibrations passing this point the compass in its gimbal is mounted in roller bearings slung from the outer ring by means of four spring-controlled plungers. The vibrationary

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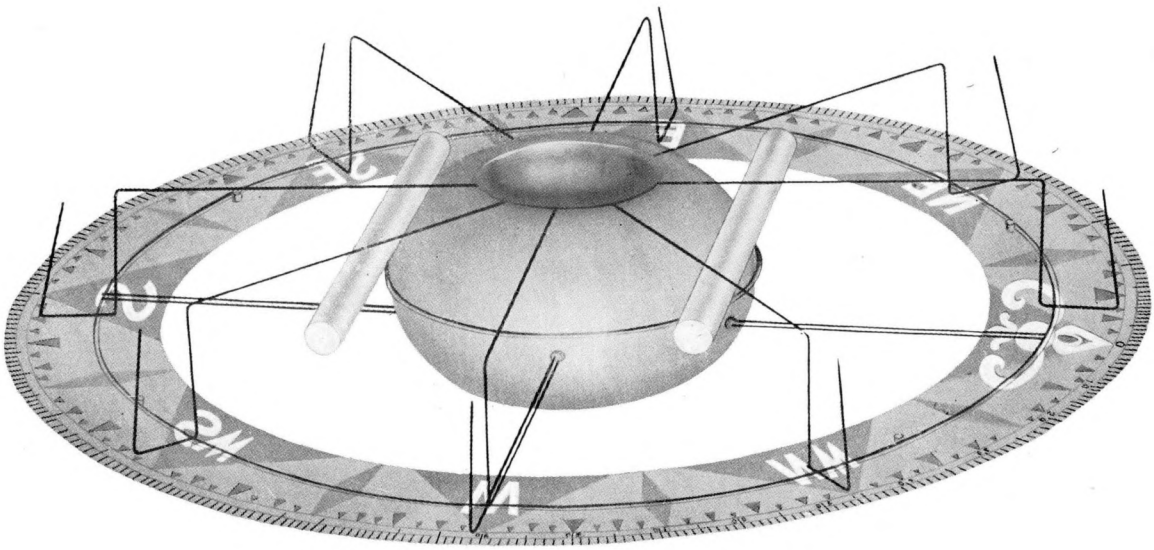
(*) *From pamphlets circulated by the firm* Henry Hughes & Son, *during the IVth International Hydrographic Conference, Monaco.*

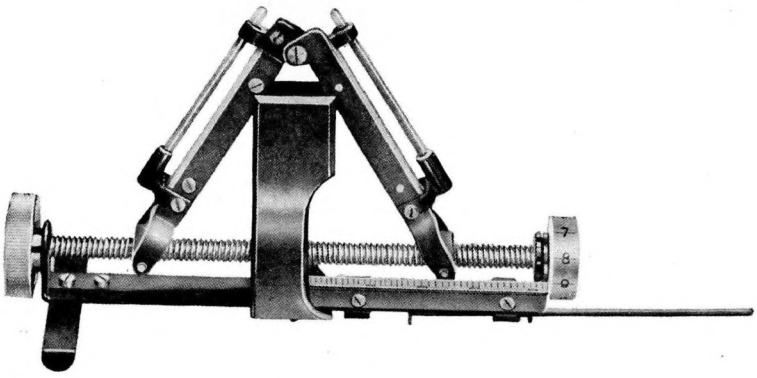


HUSUN DEAT-BEAT COMPASS.

Compass-Rose. — *Rose du Compas.*

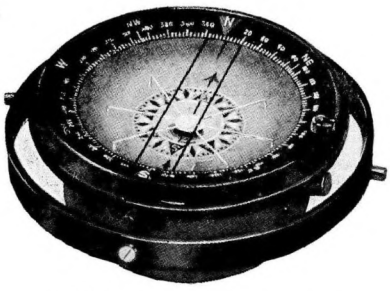
HUSUN non-resonant suspension.

Suspension non-résonnante HUSUN.

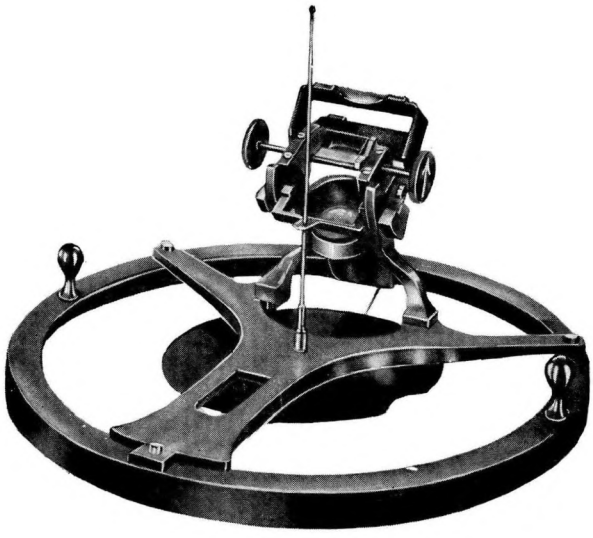


HUSUN Deflector.

Déflecteur HUSUN.

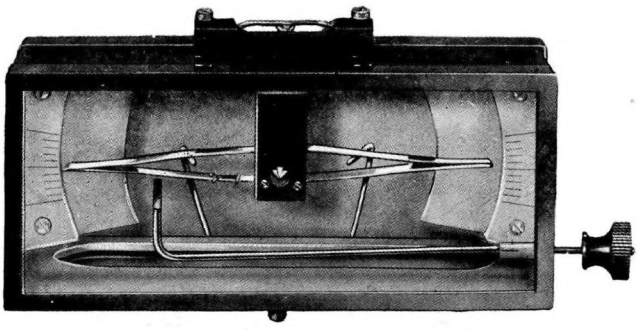


"Grid-Steering" HUSUN.



HUSUN Azimuth Mirror.

Miroir azimutal HUSUN.



HUSUN Balance.

Balance HUSUN.

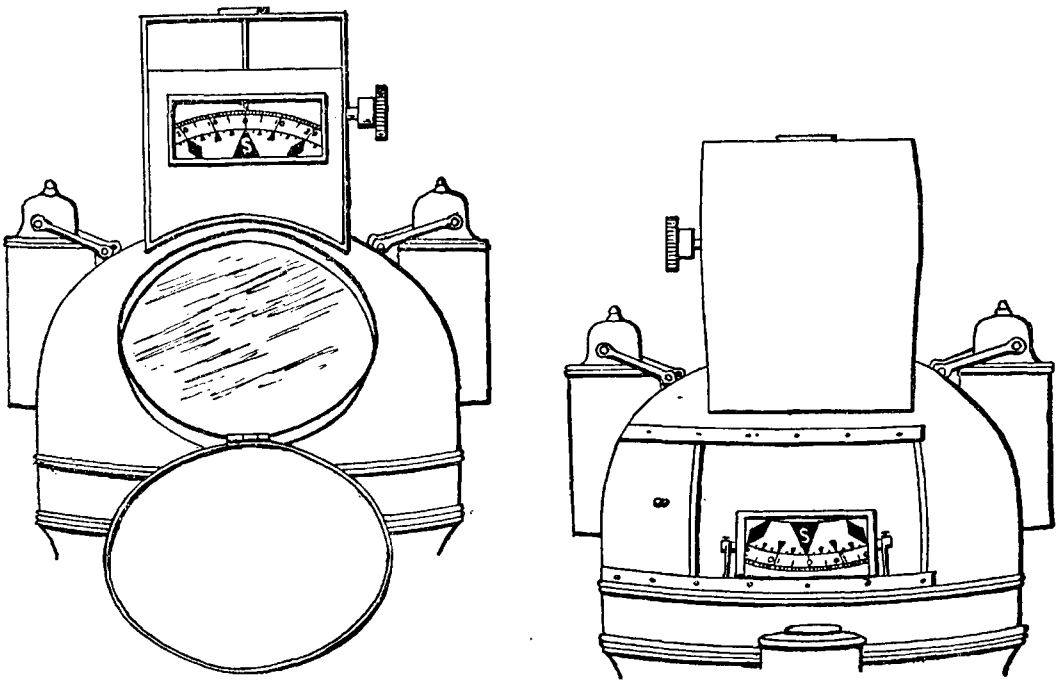
period of these plungers is of such a nature as to act in opposition to that of the outer ring; thus one suspension effectively damps out the residual resonance of the other.

The four springs are fitted into their sockets by friction, and are not screwed in. They may be turned forcibly by hand about their axis. Their tension is adjusted and equalized by means of the double milled head screws on the top side.

This suspension used in conjunction with the "Dead-Beat" compass has proved to be a perfect solution of the compass troubles initially encountered in motor ships.

The compass mounted in its binnacle may be fitted with an optical attachment for vertical reading of the Card. There is a total absence of parallax as the image of the compass Card and lubber line are projected on the same plane thus enabling the reading of the Card from a distance of 2 metres.

The top of the binnacle is also fitted with an auxiliary optical attachment enabling the compass Card and lubber line to be viewed by the officer from outside the wheelhouse. There is a sliding door to close in the top when the optical attachment is not in use.



The new models of motor-craft compass include on the top side of the bowl a so-called "Grid-Steering" device which enables a good course to be set under the worst possible conditions. The system is in general use for Air Navigation. It consists of a revolving ring, the size of the compass bowl, graduated in degrees and carrying two parallel wires. There is also a fixed wire on the glass, which represents the usual lubber line. The course is set by turning the ring until the desired course coincides with the lubber line. The ship's head is then set so that the N. and S. line of the Card, which is clearly marked, is parallel to the two parallel wires in the ring. One special advantage of Grid-Steering is that it enables the course to be steered equally well when the steersman observes the compass at an angle.

Messrs Henry HUGHES & SON have also perfected certain accessories of the compass, namely the azimuth alidade with mirror called "Husun Ring Azimuth Mirror". They also manufacture a special deflector, the "Husun Compass Deflector", based on the principle of that of Thompson, which is specially adapted to the compensation operations of the "Dead-Beat" Card compass. Under the name of "Husun Heeling Error Instrument" Messrs Henry HUGHES & SON present also a perfected model of balance by Lord Kelvin permitting the correction of the heeling error.

H. B.