For aeroplane work great care has to be employed in the design to avoid eddies in the liquid, &c., and the weight of the card is a very imporant point. If the period of the card in any way agrees with the rate of vibration of the aeroplane, matters become hopeless, and, although a special type of suspension is practically always required, it will rarely remedy this defect, although on the ground it may appear to be satisfactory.

We now come to the actual method of marking a compass card. Card No. 1 is the ordinary type as usually employed by small vessels and sailing ships where great accuracy is not required. It is divided into 32 points, ½-points and ¼-points. Starting from N. to E. the points are as follows :—

N.	N.E. by N.	E.N.E.
N. by E.	N.E.	E. by N.
N.N.E.	N.E. by E.	E.

The ½-divisions and ¼-divisions between the points are referred to thus :—

N. ¼-E., E. ¾-N., N.E. ½-E., and so on.

As a ¼-point is about 2½° it is difficult to lay a course closer than that, which is not nearly accurate enough for large steamers. Card No. 2 is more generally employed sometimes with the degrees and compass points, sometimes with degrees only, which is quite sufficient. A course is then given as so many degrees E. or W. of N. or S. For instance :—

N.E. is referred to as N. 45° E.

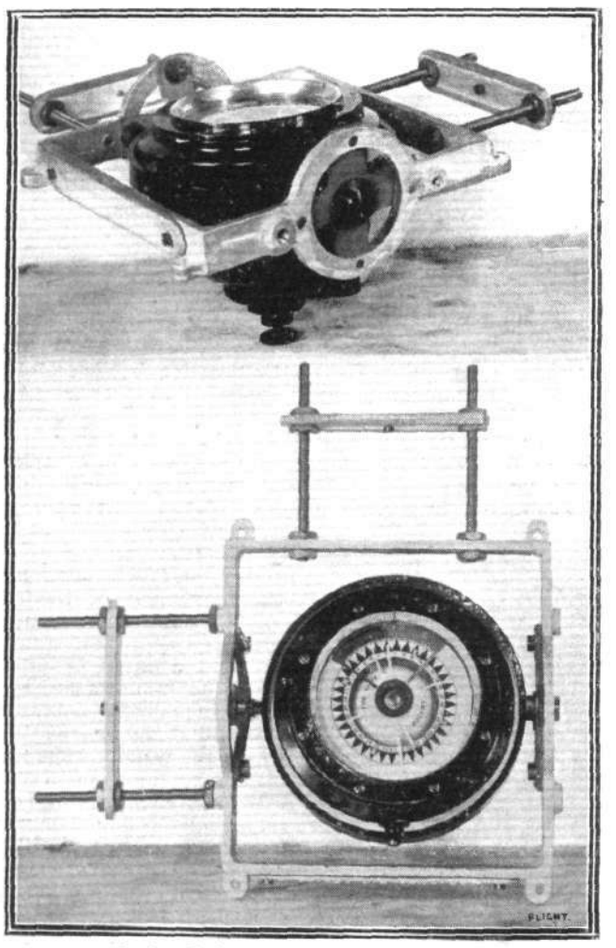
S.S.W. as S. 23° W.

N. ¼-E. as N. 3° E., and so on.

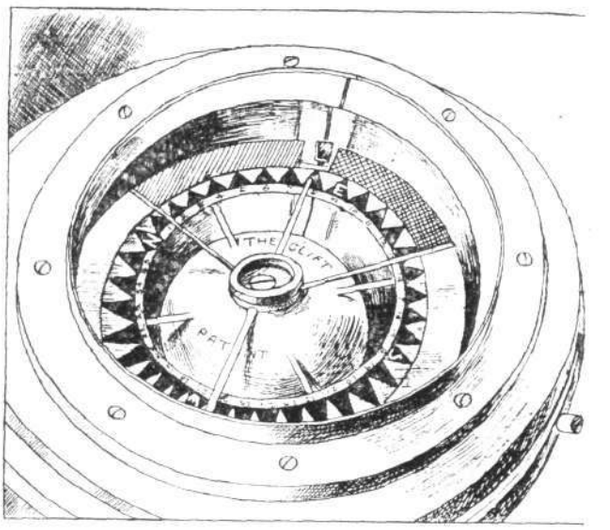
With this card courses can be laid to the nearest degree, and in addition there can be little confusion as to what course is meant, as there might be with the older method.

Card No. 3 gives the last and what seems to be the simplest method, especially for aviators, who probably are not accustomed to the use of the compass. The card is divided into 360° just as in Card No. 2, but instead of stoping at (90°) at E. and numbering downwards again to (O°) at S., the card is marked progressively round. S. becomes 180° and W., 270°—N. being 360°.

The advantage of this method is that it is extremely easy to remember; there is no question as to whether a certain course is say N.N.W. ¼-W., or N. by W. ¼-W., which, of course, is a huge error; neither can an error be made by mixing up E. and W., such as N. 25° W. or N. 25° E.; N.N.W. ¼-W. becomes simply 335°; it is not necessary to mention N. or W. or anything else, neither is it necessary to convert, as it is as easy, probably easier to read a course off a map in degrees as it is in compass points. Which ever method is used is purely a matter of choice. This is not put forward as a novel idea, as it is now frequently employed on big steamers, and no doubt in future years will be almost entirely used. The writer usually shows compass courses on his maps in both methods, so that they can be used with compasses having either type of card without converting. In the actual Card No. 3 the figures are shown from O to 36, the O behind each figure being left out for the sake of clearness.



Two views of the Clift aeronautical compass, showing the star-shaped rubber pieces by which it is suspended from the special frame. The screw below the compass is for lifting the compass card in order that the "lubber point" may be adjusted.



Sketch showing the adjustable "lubber point" on the Clift aviation compass. To guide the pilot there are coloured quadrants to either side of the pointer, which is set before starting, according to the bearings of the route to be taken. At night the north point on the compass is illuminated by a beam of light, and as long as this shows through the slit at the tip of the pointer, the pilot knows he is on his proper course.

Compasses for marine work are practically always gymballed to allow the card to remain horizontal whatever the angle of the ship through pitching and rolling, and as the same motions take place in aeroplanes it is advisable to have the compasses so fixed. These gymballs consist of two rings pivoted at right angles to one another, the compass being hung in the inner one.

Having a suitable compass for aeroplane work, properly suspended in anti-vibrating supports, the next point to consider is the actual fixing in the aeroplane. Theoretically it should be central in the ship, a considerable distance from any iron or steel, and no dynamo or magneto should be nearer than say 40 ft. This, of course, is in theory, and is quite impossible in practice, and if the usual rules had to be absolutely observed magnetic compasses would have to be discarded altogether. It is important that the compass should be central for various reasons, one being that it avoids parallax, which could easily introduce a fairly large error, and it is well known that an aviator who has constantly to put his head to one side to observe his compass never looks at it sufficiently to steer a correct course.

In fixing a compass, provided it is fitted with its own anti-vibratory suspension, care should be taken that it is held fairly rigidly, otherwise new vibrations may be introduced. Iron screws and bolts for this job must on no account be used.

Having fixed the compass, it will nearly always be found that the N. on the compass card is no longer pointing to the magnetic north, and if the machine's head is turned in different positions,