Nov. 15, 1938. H. R. EKEBERG 2,136,970

FLUID COMPASS

Filed March 29, 1937

Fig. 1.

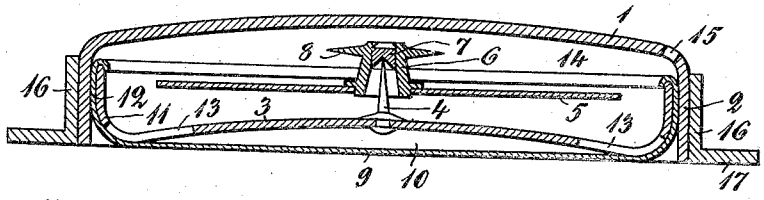


Fig. 3.

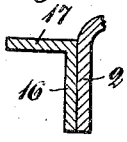


Fig. 2.

Fig. 4.

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FLUID COMPASS

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1 Claim. (Cl. 33—223)

The present invention refers to an improvement in compass casings filled with a damping liquid, and the invention has for its object to ensure changes of volume of the liquid at varying temperatures, without incurring the risk of the formation of vesicles or leakage. Furthermore, the invention refers to an arrangement for the suspension of the compass needle, in a manner such that the distance of the needle from the upper side of the casing remains substantially constant.

According to the invention, the first-mentioned object is realized by the liquid being enclosed within a chamber formed of a cover portion of transparent material and a thin resilient bottom portion secured thereto, this bottom portion being adapted to adjust itself to the changes of volume of the enclosed liquid caused by variations in temperature.

The latter object is fulfilled, according to the invention, by the compass needle being arranged on a pin which is carried by an intermediate partition or bridge, a frame or the like arranged between the transparent cover and the resilient bottom, the said partition or the like being provided with openings and being so arranged that the distance of the needle from the cover remains substantially constant in spite of the movements on the resilient bottom.

Other features characteristic of the invention will be explained more fully in the following with reference to the forms of embodiment illustrated in the accompanying drawing.

Fig. 1 shows an embodiment in longitudinal vertical section. Fig. 2 is a plan view of Fig. 1. Figs. 3 and 4 represent details.

In Fig. 1, *1* designates the cover portion formed of cellon, celluloid, glass or other suitable transparent material, said cover being provided with a downwardly directed annular flange *2*. Pasted to the inside of the flange *2* is the upwardly directed annular flange *12* of a resilient bottom *9* of thin cellon or sheet metal, such as aluminium-plate or the like. The flange *12* tightly surrounds the upwardly directed annular flange *11* of an intermediate partition *3* of comparatively thick sheet-metal, such as aluminium-plate, which is bulged upwardly. The intermediate partition *3* divides the space between the cover *1* and the bottom *9* into two chambers *10* and *14*. Secured to the centre of the partition *3* is the pin *4* carrying the holder *6* of the compass needle *5*, said holder forming a fitting for the jewel *7*, for instance agate, which rests on the point of the pin *4*. The holder *6* is provided with a disk-like projection *8* adapted to limit the movements of the compass needle by abutting against the cover *1*, so that the compass needle cannot fall off the pin *4*.

The liquid, such as petroleum, which serves to damp the swinging movements of the compass needle is filled in through a little aperture *15* in the cover portion *15*. To facilitate the filling, and in order with certainty to remove all air out of the casing as well as from the damping liquid, the filling is preferably effected under vacuum.

Secured to the outside of the annular flange *2* of the cover portion is a ring *16*, for instance of aluminium, rhodoid, cellon or the like, said ring serving as a fitting or attachment for the compass casing.

The annular flanges *11* and *12* of the partition *3* and the bottom *9* respectively pass over into the partition and the bottom respectively through correspondingly curved portions, so that the flange *12* will enclose the outside of the flange *11* as tightly as possible. The flange *12* may be curved inwardly and downwardly at the top, as shown in the drawing, so as to grasp about the upper edge of the flange *11*.

Provided in the intermediate partition *3* are two openings *13* adapted to connect the space *10* with the space *14*. In the embodiment shown, the openings are radially arranged and extend outwardly so far as to pass into the curved portion connecting the partition *3* proper with its flange *11*. Any air bubbles occurring in the space *10* may thus be caused readily to escape through the openings *13* by tilting the compass casing. After the filling of the casing has been completed, the aperture *15* is closed.

If desired, a ring *16*, for instance of aluminium, rhodoid, cellon or the like, may be secured on the outside of the annular flange *2* of the cover, said ring *16* serving as a fitting or attachment for the compass casing. To this end, it may be provided with an annular plane flange *17* intended to serve as a support for the compass casing. Figs. 1, 3 and 4 illustrate three different constructions of the ring *16*. In place of the flange *17* the ring *16* may be provided with projections, for instance in the form of lugs, by means of which the compass casing may be attached to a bracelet, for example. If desired, the ring *16* may be formed with a bottom to protect the thin resilient bottom *9*.

In the latter case, the ring forms a box.

In the construction according to Fig. 1, the intermediate partition *3* is primarily conceived as being made from sheet-metal, such as alu-

minium-plate. This, however, does not form any particularly characteristic feature of the invention, since the said bottom may be advantageously made from celluloid, cellon or other transparent material, for example. If the intermediate partition is made from opaque material, while the bottom portion 9 is made from some transparent material, it may be preferable to make the intermediate partition 3 in the form of a narrow bridge with parallel edge portions 19, so that large openings are formed, through which the bottom portion 9 and any chart or map or the like placed therebeneath will be easily visible. Such an alternative construction is shown in Fig. 2 with chain dotted lines, the openings in the intermediate partition being denoted by 18 therein.

If the bottom portion 9 consists of transparent material, and if the intermediate partition 3, should such partition be brought into use, is transparent or provided with large openings, it may be of advantage to provide the first-mentioned bottom portion with parallel lines for the purpose of orientation of the compass on a map. If desired, the intermediate partition may be provided with such lines.

Obviously, the shape of the cover portion 1 may be varied within wide limits. For example, it may be bulged in an accentuated manner so as to form a portion of a spherical surface, which under certain circumstances may be of advantage to facilitate reading of the compass.

Furthermore, it is not necessary that the flange 2 surround the flange 12 of the resilient bottom portion 9, the flange 2 being instead formed in a manner such as to be surrounded by the flange 11 of the intermediate partition 3.

Having now particularly described the nature of my invention and the manner of its operation what I claim is:—

Fluid compass comprising a cover of transparent material, a resilient bottom secured to said cover, a closed chamber between said cover and said bottom, said chamber being wholly filled with a damping fluid, an intermediate partition secured between the bottom and the cover and dividing the chamber into an upper and a lower space, means of communication between said spaces provided in said partition, a compass needle in said upper space, means secured to said partition for journalling the compass needle, an upwardly directed annular flange provided on said partition, an upwardly directed annular flange provided on said resilient bottom, the last named flange being concentric with and tightly surrounding the first named flange, the upper edge of said flange of the resilient bottom being curved inwardly and then downwardly about the upper edge of said flange of the intermediate partition, a downwardly directed annular flange provided on said transparent cover and concentric with and tightly surrounding said flange of said resilient bottom, and pasting means between said flanges of the bottom and the cover.

HENNING RUDOLF EKEBERG.