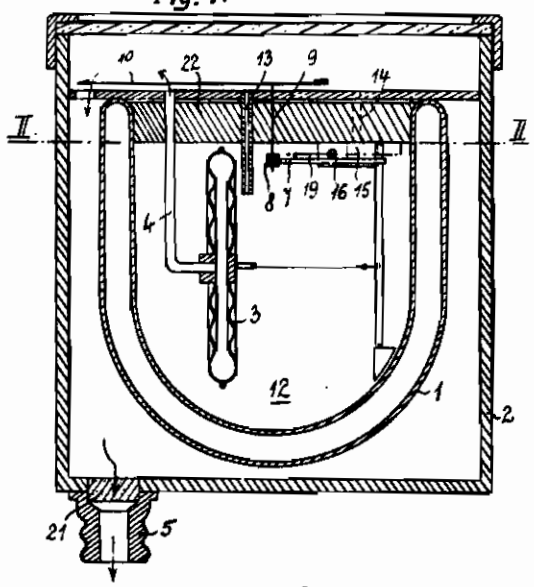
PUBLISHED
MAY 4, 1943.
BY A. P. C.

R. ROUDNICKY
RATE-OF-CLIMB INDICATOR OR THE LIKE FOR AIRCRAFT

Filed Aug. 17, 1940

Serial No.
353,148

Fig. 1.



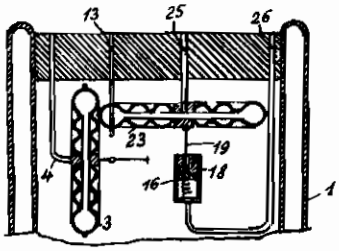


Fig. 4.

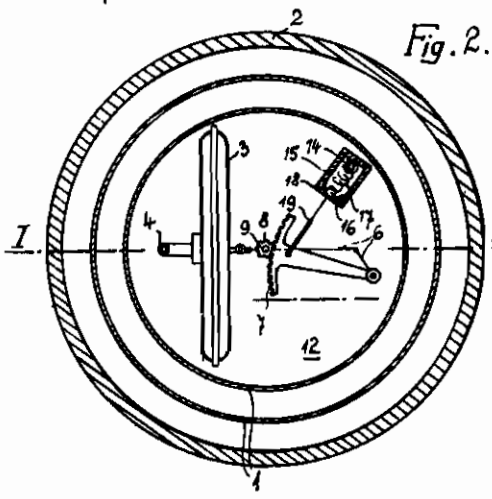


Fig. 2.

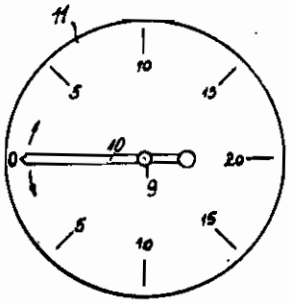


Fig. 3.

INVENTOR.
Rudolf Roudnicky
BY
Ben. J. Chromy
ATTORNEYS.

Published May 4, 1943 Serial No. 353,148

ALIEN PROPERTY CUSTODIAN

RATE-OF-CLIMB INDICATOR OR THE LIKE FOR AIRCRAFT

Rudolf Roudnický, Prague, Czechoslovakia;
vested in the Alien Property Custodian

Application filed August 17, 1940

This invention relates to rate-of-climb indicators and the like for aircraft, of the type in which the barometric pressure mechanism, such as an aneroid capsule or diaphragm, is contained in a heat-insulated casing and communicates with the outer atmosphere through a tube and in which the interior of the casing itself communicates with the outer atmosphere through a capillary tube. Altimeters of this type suffer from the disadvantage that, if the aircraft changes its altitude too rapidly the pressure within the heat-insulated casing cannot become equal to that of the outer atmosphere sufficiently quickly, so that as atmospheric pressure also prevails inside the barometric pressure mechanism, the latter, which in view of the sensitivity required, consists of extremely thin sheet metal becomes damaged.

The object of the present invention is to overcome this disadvantage, and this is achieved by providing the interior of the heat-insulated casing, in which the aneroid capsule or the like is arranged, with a valve which is automatically opened by a movable part of the transmission leverage of the altimeter, or directly by the wall of the aneroid capsule, or by an auxiliary aneroid capsule, as soon as, a certain maximum difference of pressure between the outer atmosphere and the interior of the casing, so that the pressure prevailing in the casing becomes, through such valve, at once equal to that of the outer atmosphere. This arrangement is advantageously supplemented by a filter plug by means of which the effect of the rapidly changing pressure of the outer atmosphere on the aneroid capsule or the like is also retarded.

In the drawings, in which an embodiment of the invention is illustrated, with the required details, by way of example,

Fig. 1 is a vertical section on the line I—I of Fig. 2,

Fig. 2 is a section on the line II—II of Fig. 1,

Fig. 3 is a plan view of the altimeter scale, and

Fig. 4 is a vertical section of a modified embodiment.

Referring to these drawings, the altimeter consists of a known, heat-insulated, double-walled, evacuated casing 1, which is arranged in the cylindrical protective casing 2 and contains a known form of barometric pressure mechanism such an aneroid capsule 3, which communicates with the outer atmosphere through a small tube 4 by way of the free space in the casing 2 and the tubular fitting 5. This aneroid capsule acts, through a suitable lever mechanism 6, a gear section 7 and gear wheel 6, upon the shaft 9 of a pointer or indicator 10, which moves over a scale 11 provided on the upper side of the enclosed altimeter.

According to the invention the space 12 within the casing 1 communicates with the outer atmosphere through a capillary tube 13 in known manner to enable a gradual equalisation of the difference of pressure, as well as through a tube 14 of relatively large bore which opens into a casing 15 having a non-return valve comprising a valve body 16 which is normally pressed down to its seat by a spring 17 and is positively connected with a movable part of the altimeter, for example with the gear sector 7 /Fig. 2/ by a control rod 19. The valve body may, however, also be connected with some other part, for example it may be connected direct with the wall of the aneroid capsule 3, or with the wall of an auxiliary aneroid capsule, the hollow interior of which communicates directly with the outer atmosphere as shown for example in Fig. 4. In the embodiment shown in Fig. 1 and Fig. 2 the control rod 19 is connected with the gear sector 7 and with the valve body 16, with the provision of a certain amount of play in such a manner, that the valve body only opens or moves, against the action of the spring 17, if the sector 7 has performed the maximum possible swing, for example from 0 to 20 on the scale 11, this swing also corresponding to the highest permissible pressure load of the aneroid capsule 3.

If the aircraft descends by a small amount the difference in pressure will not reach the danger value, and the pointer 10 will not reach the degree 20, but if the aircraft descends from a considerable height to a relatively low altitude within a very short period, the difference of pressure may exceed that limit, when the valve 16 will be opened as soon as the pointer reaches the degree 20 on the scale 11, and the pressure inside the casing 1 will at once become equal to that of the outer atmosphere, so that the pointer 10 will return to the position 0.

The correct adjustment of the control rod 16 is such that the pointer 10 points to the maximum degree 20 of the scale in the first instance, and the positive connection of the control rod with the valve body 16 effected in that position. As long as the pointer 10 does not reach the value 20 on the scalle 11, the valve 16 will not be opened.

According to a feature of the invention, a filter plug 21 of a suitable porous material, for example pumice stone or the like, is arranged in the tubu-

lar fitting 5 of the outer protective casing 2, which plug retains dust and, on the other hand, reduces the rate of flow of the air into or out of the aneroid capsule 3 in the case of any too sudden changes of altitude of the aircraft.

The upper end of the casing 1, which is open, is closed in the known manner by a sealing stopper 22, through which the sealed channels 4, 13, 14 already described, and the sealed shaft 9 of the pointer 10 are passed.

In Fig. 4 is illustrated the operation of the valve 16 with the aid of an auxiliary aneroid capsule 23, which is also arranged in the casing 1, with suitable alteration of the arrangement of the control rod 19'. This control rod may have, with this embodiment, also a certain amount of play, up to the widest expansion of the aneroid capsule 23, before it begins to act on the valve cone 16 on the seat 18. The aneroid capsule 23 communicates with the outer atmosphere by aid of the small tube 25.

RUDOLF ROUDNICKÝ.