Sept. 21, 1943. R. S. GRIER 2,329,715

SIGNAL OPERATING ALTIMETER

Filed Aug. 21, 1941

Fig. 1.

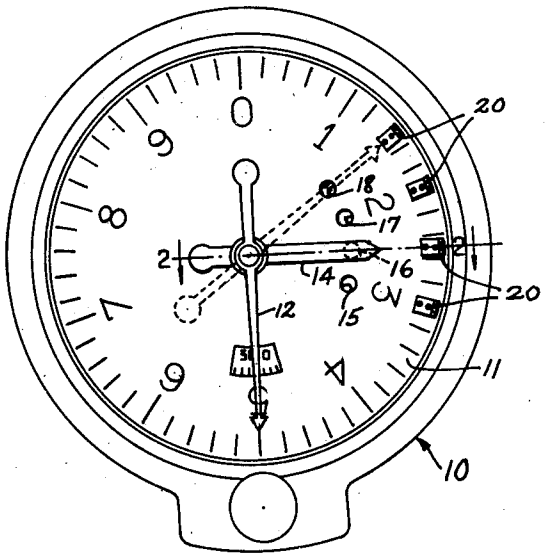


Fig. 2.

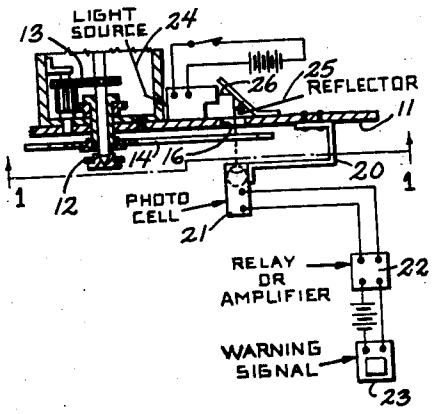


Fig. 3.

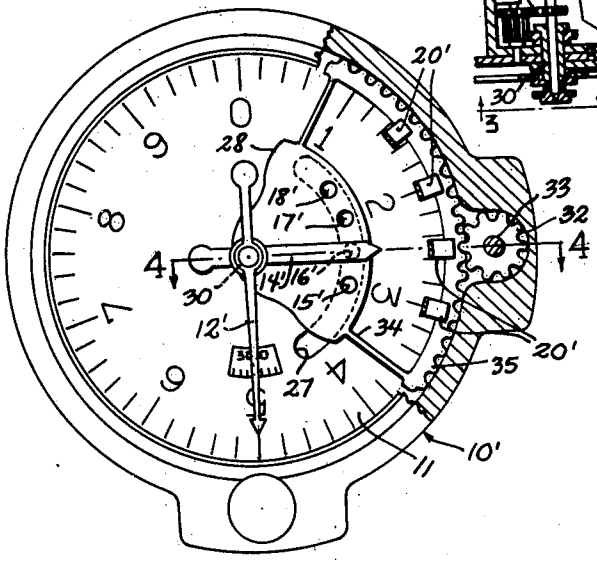
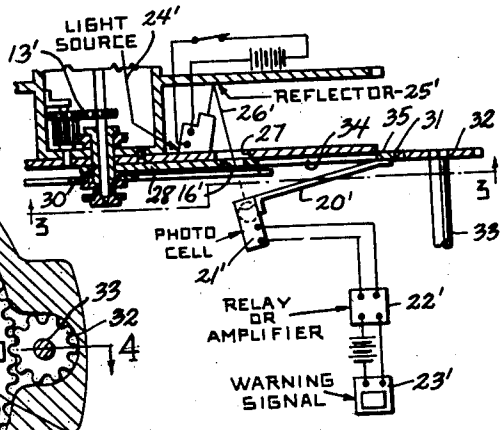


Fig. 4.



INVENTOR
Robert S. Grier
BY
ATTORNEY

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SIGNAL OPERATING ALTIMETER

Robert S. Grier, United States Navy

Application August 21, 1941, Serial No. 407,773

2 Claims. (Cl. 250—41.5)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to a signal operating altimeter, and has for an object to provide an altimeter especially intended for use in a dive bombing airplane, which altimeter is provided with a warning signal for informing the pilot that he has passed a particular altitude.

A further object of this invention is to provide an altimeter which will warn the pilot, either visually or audibly, or both, that he has reached a particular altitude so that he may know when he should come out of his dive in order to avoid crashing.

Many fatilities have occurred in dive bombing because of the fact that the pilot is so concentrated on his target that he fails to pull out safely while he still has sufficient altitude to do so. On the other hand, when the pilot has concentrated on pulling out at the proper time he may fail to properly concentrate on his target. With the present invention, however, he may concentrate on his target, knowing that he will receive ample preliminary warning, as well as final warning, as to the proper time for releasing his bomb on the target and pulling out to safety.

With the foregoing and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter described and illustrated in the drawing, in which:

Fig. 1 is an elevational view of one form of altimeter to which this invention has been applied, being on line 1—1 of Fig. 2.

Fig. 2 is a partly schematic, partly sectional view of the altimeter of this invention being on line 2—2 of Fig. 1.

Fig. 3 is a view of an altimeter to which an adjustable form of this invention is applied, being on line 3—3 of Fig. 4; and

Fig. 4 is a partly schematic, partly sectional view on line 4—4 of Fig. 3.

There is shown at 10 an altimeter having the usual altimeter face 11 over which is operated the altimeter indicating needles such as the 100 ft. needle 12, suitably geared as at 13 to the 1000 ft. altimeter needle 14, such construction being any suitable construction as, for instance, that shown in Reissue Pat. 19,079 to Kollsman.

In the form of the invention shown in Figs. 1 and 2, the altimeter is set to operate a preliminary warning signal at 3000 feet altitude, a couple of intermediate warning signals at 2500 and 2000 feet, and a final warning signal at 1500 feet. The holes 15, 16, 17 and 18 are formed through the altimeter face 11 adjacent the indication marks for these respective altitudes. At each of these altitude marks there may be secured a bracket 20 on which is supported a photocell 21 in proper alignment with its hole, 15, 16, 17 or 18. Each photocell 21 is connected through a suitable relay or amplifier 22 to a warning signal 23. This warning signal may be a buzzer or a bell, or a light so located that it is visible to the free eye of the pilot or may be both an audible and a visual signal. Also, the warning signal 23 of the respective altitudes may be of different intensities, the one at 3000 feet, for instance, being just a mild, buzzing sound, while the one at the final altitude of 1500 feet may be a loud, shrieking klaxon or siron, to remind the pilot to pull out without further delay.

A suitable light source 24 directs a beam of light against a reflector 25 so as to reflect the beam 26 through each of the holes 15 to 18 to the photocell 21. The 1000 ft. needle 14 is of a width at least equal to the diameter of each of the holes 15 to 18, so that as it passes over the holes it will intercept the beam 26, thus causing the respective photocell 21 to operate its respective warning signal.

To prevent accidental operation by the 100 ft. needle 12, such needle 12 should be suitable narrowed to less than one-half the diameter of the holes 15 to 18, or it may be of transparent material, or both, so that the passage of the 100 ft. needle 12 over the holes 15 to 18 inclusive, will not sufficiently interrupt the light beam 26 to actuate the photocell.

In the form shown in Figs. 3 and 4, instead of placing the holes 15 to 18 in the altimeter face 11, the altimeter face 11 is provided with a curved slot 27 extending from possibly the 4000 ft. indication to about the 1000 ft. indication. Over this there is placed a segment 28 pivoted about the needle sleeve 30 and provided at its peripheral edge with rack teeth 31 meshing with a gear 32 provided with a control shaft 33. This segment 28 is provided with a plurality of holes 15' to 18' inclusive, so that by rotating the control shaft 33 the holes 15' to 18' inclusive may be placed at the desired altitude indication mark within the limits of the slot 27. The segment 28 is also provided with an annular slot 34 through which the altitude marks are visible, while the photocell brackets 20' are mounted on the outer rim 35 of segment 28, the rim 35 having the rack teeth 31 formed in the edge thereof.

The other details and the operation of this form are identical with that of the forms of Figs.

1 and 2, the corresponding elements having been indicated by corresponding reference numerals and primes.

In operation, in using the form of Figs. 3 and 4, the shaft 33 is operated to place the holes 15' to 18' at the desired altitude marks. Therefore the operation of both forms is the same. When the 1000 mark needle 14 or 14' passes over the preliminary warning hole 15 or 15' it interrupts the light beam to actuate the preliminary warning signal. Then as the 1000 ft. needle moves further it successively operates the intermediate warning signals and then the final warning signal, if the pilot is still in his dive, to give him final warning that he must pull out with no further delay.

Other modifications and changes in the proportions and arrangement of the parts may be made by those skilled in the art without departing from the nature of the invention, within the scope of what is hereinafter claimed.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. An altitude pressure responsive control device comprising a sensitive altimeter having a clock face, a pair of indicating needles rotatable over said clock face, one of said needles being rotatable through a greater angular displacement than the other of said needles for a given change in altitude pressure and the relative displacement of said needles being in a predetermined ratio, said clock face having indications thereon indicating different altitudes, said clock face having at least one aperture therethrough at at least one indication thereon corresponding to a predetermined altitude, a light source on one side of said clock face, a photoelectric cell on the opposite side of said clock face arranged to receive light from said source through the aperture in the clock face, one of said needles being of a size and material to interrupt the light passing from said light source through said aperture to the photoelectric cell, the other of said needles being of a size or material as not to interrupt the light passing from the light source through the aperture to the photoelectric cell, and an electric circuit including a control relay operatively connected to said cell and energized when light from said source through said aperture to said photoelectric cell is interrupted by the presence of the needle over the clock face aperture capable of interrupting the light source.

2. An altitude pressure responsive control device comprising a sensitive altimeter having a clock face, a pair of indicating needles rotatable over said clock face, one of said needles being rotatable through a greater angular displacement than the other of said needles for a given change in altitude pressure and the relative displacement of said needles being in a predetermined ratio, said clock face having indications thereon indicating different altitudes, said clock face having at least one aperture therethrough at at least one indication thereon corresponding to a predetermined altitude, a light source on one side of said clock face, a photoelectric cell on the opposite side of said clock face arranged to receive light from said source through the aperture in the clock face, one of said needles being of a size and material to interrupt the light passing from said light source through said aperture to the photoelectric cell, the other of said needles being of a size or material as not to interrupt the light passing from the light source through the aperture to the photoelectric cell, an electric circuit including a control relay operatively connected to said cell and energized when light from said source through said aperture to said photoelectric cell is interrupted by the presence of the needle over the clock face aperture capable of interrupting the light source, said clock face aperture being in the form of an arcuate slot extending about a plurality of clock face altitude indications, a shutter rotatable over said clock face, said shutter having a plurality of angularly displaced apertures extending over said clock face slot, there being one photoelectric cell for each shutter aperture, and means for adjusting said shutter to bring its apertures into registration with a predetermined selection of altitude indications, there being a separate electric circuit for each photoelectric cell to be actuated by the interrupting needle as it extends over the aperture of a particular altitude indication.

ROBERT S. GRIER.