Sept. 29, 1942. E. M. ARDELT 2,296,973

ANEMOMETER

Filed Jan. 13, 1941

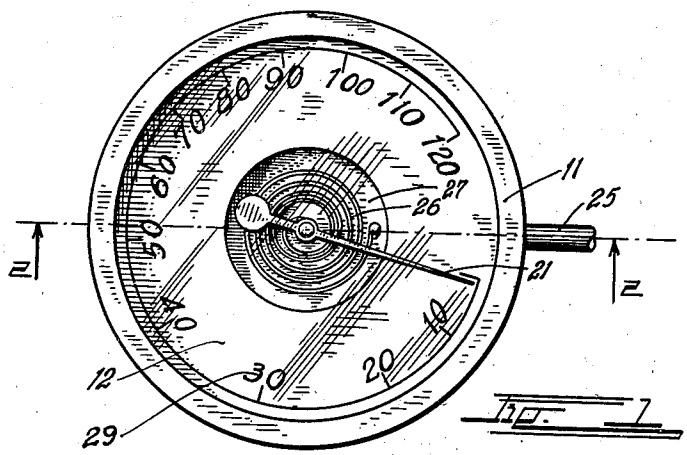


Fig. 1

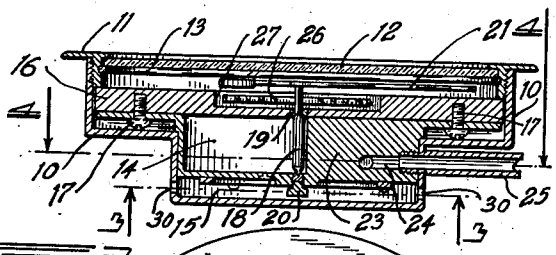


Fig. 2

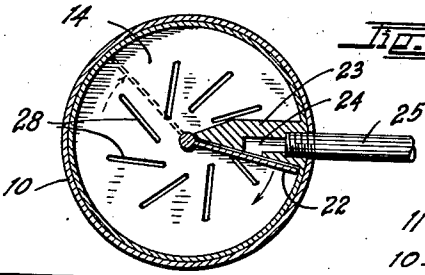


Fig. 4

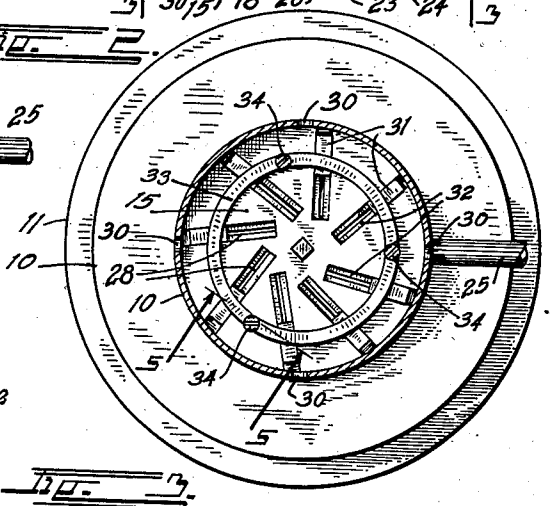


Fig. 3

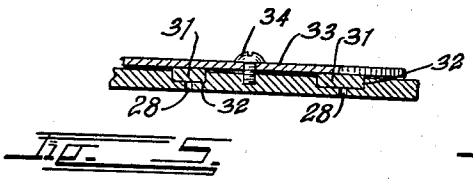


Fig. 5

INVENTOR.
EUGENE M. ARDELT.

BY R. H. Walbreath

ATTORNEY.

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ANEMOMETER

Eugene M. Ardelt, Denver, Colo.

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3 Claims. (Cl. 73—228)

This invention relates to an anemometer and has for its principal object the provision of a highly efficient and accurate device for determining the velocity of flow of a stream of air, gas, or fluid, or the velocity of movement of a body through air, gas, or fluid.

It is more particularly desired and will be described as an air speed indicator for use on airplanes and the like to determine the speed at which the craft is traveling through the surrounding air. An object of the invention is to provide an accurate airspeed indicator which will not be effected by moist or freezing air.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a face view of the improved anemometer;

Fig. 2 is a cross section therethrough, taken on the line 2—2, Fig. 1;

Fig. 3 is a sectional view, taken on the line 3—3, Fig. 2;

Fig. 4 is a sectional view, taken on the line 4—4, Fig. 2; and

Fig. 5 is a detail section, taken on the line 5—5, Fig. 3.

The invention is mounted in an outer housing 10 having an open face in which a circular frame 11 is threaded or otherwise secured. A glass face plate 12 is secured to the frame by means of a suitable slip ring 13.

A cylindrical air chamber 14 is fitted into a cupped depression 15 in the housing 10. A dial plate 16 is secured over the air chamber 14 in any desired manner, such as by means of suitable screws 17 to completely seal the chamber.

A hand shaft 18 extends axially through the chamber 14 and is journalled therein between a shoulder jewel 19 and an adjustable jeweled bearing screw 20. The outer extremity of the shaft 18 is reduced in diameter and projects through the jewel 19 beyond the face of the dial plate 16 where it supports an index hand 21.

A pressure vane 22 is secured to and projects radially from the shaft 18 within the air chamber 14. This vane is of a size to completely fill the chamber 14 and act as a rotary piston therein. A dividing partition block 23 extends into the chamber 14 into sealing contact with the shaft 18. An air port 24 is formed in the partition block and opens to one side thereof against the vane 22. Air is conducted to the port 24 through the medium of a suitable air conductor 25.

It can be readily seen that if air enters the port 24 it will act against the vane 22 to cause the latter to rotate the shaft 18 in one direction. The shaft is returned in the other direction, when the air pressure is relieved, by means of a spiral spring 26. The spring 26 is positioned in a recess 27 in the dial plate 16 and is secured at one extremity to the dial plate and at the other extremity to the projecting portion of the hand shaft 18.

The air is discharged from the chamber 14 through a plurality of exceedingly small orifices or slots 28 through the back wall of the chamber 14. These slots are preferably positioned at an angle to the radii of the chamber 14, so that, as the vane 22 swings across them, they will be individually and progressively opened throughout their lengths. It will be noted that the further the vane swings, the greater will be the length of the slot which will be exposed and, as the vane leaves one slot it will immediately begin to expose the next successive slot. Thus, we have the effect of a single continuous slot extending completely around the pressure chamber but by placing the slots at angles, as illustrated, a greater total length of slot is obtained.

Thus, it can be seen that the vane 22 will automatically open a sufficient length of aperture to maintain a constant, predetermined pressure in the chamber. Should the velocity of incoming air increase, the pressure against the vane will increase and the vane will move a proportional amount to increase the area of discharge until the pressure against the vane resumes its original pressure, plus a slight increase to accommodate a slight increased spring reaction. Thus, the vane will move in proportion to the amount of incoming air at all peripheral positions.

The face of the dial plate 16 is calibrated with suitable index numerals 29 to indicate the proper positions of the hand 21 at differing air speeds. The air discharging from the chamber 14 exits from the housing 10 through suitable discharge ports 30 and may, if desired, be conducted away through a suitable discharge conduit.

The device may be provided with adjusting means so that it can be pre-set and pre-adjusted to accommodate any desired conditions, and as illustrated, this is accomplished by placing valve

blocks **31** in suitable guide channels **32** along each of the orifice slots **28** on the outer face of the chamber **14**. These blocks can be moved along their channels to adjust the amount of effective slot area and when finally adjusted can all be locked in place by means of a clamp ring **33** which is secured to the outer face of the chamber **14** by means of suitable clamp screws **34**.

It is believed that the various uses of the device are readily apparent. In an aircraft, for instance, the air conductor **25** would be lead to a position where its intaking extremity would be directed forwardly into the air stream of the craft so that the air would flow directly therein to the chamber **14**.

One advantage that has been found with this device is that it is self-cleaning, moisture-proof and non-freezing. In a pressure actuated anemometer, of the diaphragm type, the air does not flow through the instrument therefore it is a quiescent or static condition which allows the moisture thereon to freeze onto the interior of the tube and instrument so as to affect the accuracy thereof. In this instrument, however, the air is constantly flowing freely through the instrument so that the moisture is carried entirely through and does not collect. It appears that any condensation or freezing occurs on the exterior of the instrument, whereas on the usual type it occurs on the interior.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. An anemometer comprising: a circular pressure chamber; an axially positioned shaft in said chamber; indicating means operable by said shaft; a vane projecting from said shaft and acting as a partition in said chamber; means for introducing a fluid under pressure on one side of said vane; a plurality of slots formed through the wall of said chamber, said slots being inclined away from the radii of said chamber so that their effective lengths will increase as said vane moves away from the introducing means; and individual valving means for individually adjusting the lengths of said slots.

2. An anemometer comprising: a circular pressure chamber; an axially positioned shaft in said chamber; indicating means operable by said shaft; a vane projecting from said shaft and acting as a partition in said chamber; means for introducing a fluid under pressure on one side of said vane; a plurality of slots formed through the wall of said chamber, said slots being inclined away from the radii of said chamber so that their effective lengths will increase as said vane moves away from the introducing means; an individual slide valve for each of said slots; means for guiding each slide valve along its respective slot to control the effective length thereof; and means for locking said slide valves in their adjusted positions.

3. An anemometer comprising: a circular pressure chamber; an axially positioned shaft in said chamber; indicating means operable by said shaft; a vane projecting from said shaft and acting as a partition in said chamber; means for introducing a fluid under pressure on one side of said vane; a plurality of slots formed through the wall of said chamber, said slots being inclined away from the radii of said chamber so that their effective lengths will increase as said vane moves away from the introducing means; an individual slide valve movable along each slot to control the effective length thereof; an annular clamping member overlying all of said slide valves; and means for clamping said clamping member against said slide valves to lock the latter in their adjusted positions.

EUGENE M. ARDELT.