March 13, 1945. A. S. PATTERSON 2,371,259

DEVICE FOR DETECTING FORMATION OF ICE ON AIRPLANE WINGS

Filed June 13, 1942

Fig. 1.

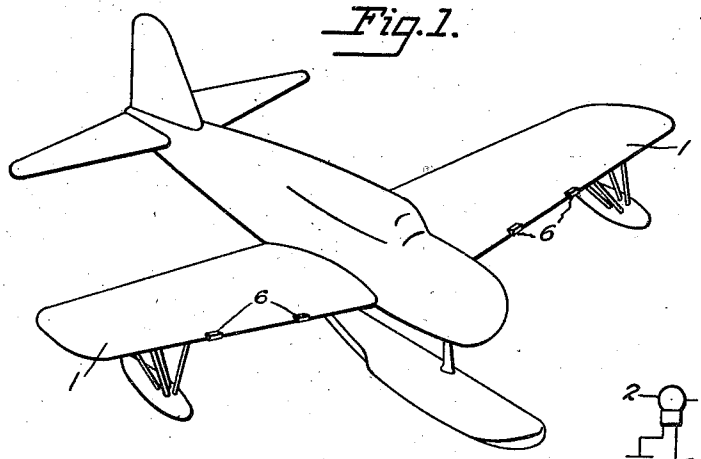


Fig. 5.

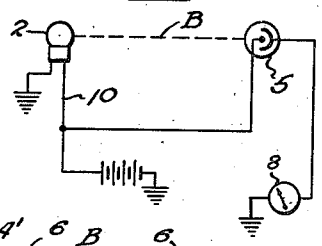
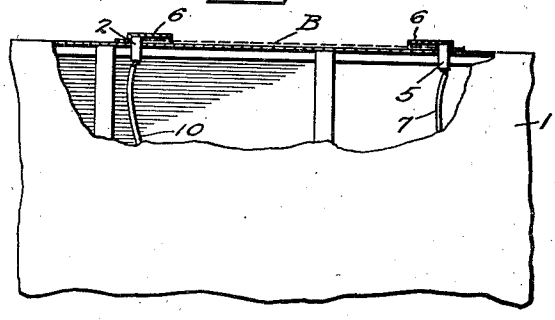


Fig. 2.



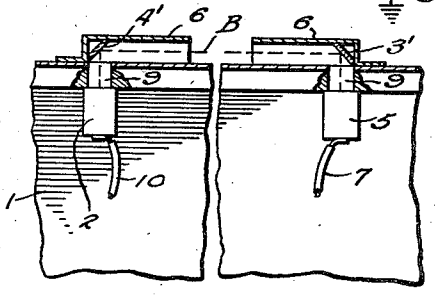


Fig. 3.

Fig. 4.

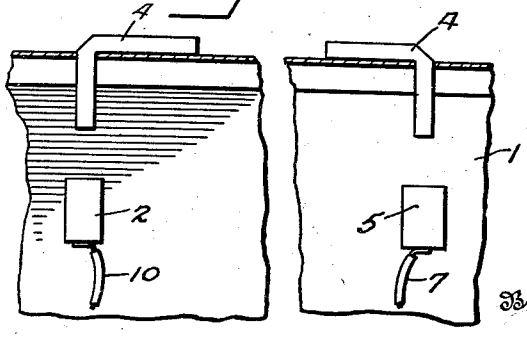
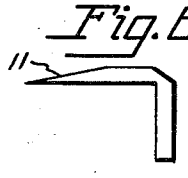


Fig. 6.



Inventor

A. S. Patterson

By Mason Fenwick & Lawrence

Attorneys

Patented Mar. 13, 1945

2,371,259

UNITED STATES PATENT OFFICE

2,371,259

DEVICE FOR DETECTING FORMATION OF ICE ON AIRPLANE WINGS

Albert S. Patterson, Nashville, Tenn.

Application June 13, 1942, Serial No. 446,958

2 Claims. (Cl. 177—311)

This invention relates to airplanes and more particularly to means to assist in controlling the formation of ice on the wings or other airfoils.

Various devices are known for controlling the formation of such ice by the application of heat and such known devices may be manually or automatically controlled.

The present invention is directed to a device sensitive to the formation of ice which can be arranged either to operate a signal device so that the pilot can be warned of the formation of ice and manually start the de-icers or it can be connected directly to the automatic starting device to start the mechanism when ice is forming.

The object of the invention is to provide a device of the character indicated having no movable parts subject to being clogged or injured, but at the same time one which will respond with certainty and precision to the formation of ice on the airfoil and transmit either the signal or the operative impulse to the automatic mechanism controlling the de-icer.

In connection with the following description the de-icing mechanism proper is neither illustrated nor described, but only the ice-sensitive device operating to transmit electrical energy modified by the formation of ice on the airfoil.

The invention consists in the novel construction, arrangement and combinations of parts hereinafter more particularly described and claimed.

One sheet of drawings accompanies this specification in which like reference characters indicate like parts throughout.

Figure 1 is a perspective view of an airplane showing the invention applied to the wings;

Figure 2 is a fragmentary portion of a wing or airfoil showing the invention applied to the leading edge thereof;

Figure 3 is a view similar to Figure 2 showing a modified form of the invention;

Figure 4 is a view similar to Figure 2 showing still a further modified form of the invention;

Figure 5 is a diagrammatic view of an electrical circuit showing the arrangement of one form of the invention; and

Figure 6 is a plan view of a modified form of lucite rod light conductor.

In accordance with the present invention it is proposed to utilize rays such as light rays or those commonly known as black light rays with suitable means for producing such rays, further means for directing a beam of such rays parallel with and closely adjacent to the leading edge of a wing or airfoil with further means provided on such leading edge and spaced from the transmitting means adapted to receive and direct such rays to an electrical resistance element susceptible to and capable of being influenced by the impact of such rays. It is proposed that such electrical resistance element be in an electrical circuit which may be arranged to actuate an indicator or any other subsidiary mechanism controlling the de-icing device.

In the drawing the wings are indicated at 1 and mounted on the forward edges of the wings and spaced laterally with respect to each other are suitable housings 6 which may contain light-directing mirrors 3' and 4' or lucite rods 4 which will transmit the rays longitudinally from a source of rays 2 to an electrical resistance or photo-cell 5 connected by electrical conductors 7 to an indicator or other electrical device 8. Current for the source of light 2 will be conveyed thereto as through conductors 10. If desired, the source of light 2 can itself be projected through the leading edge as indicated in Figure 2 and the photo-cell 5 can be similarly extended in which event the shields 6 will protect the ends of these devices and direct the rays in the beam B.

As illustrated in the modification shown in Figure 3, the shields 6 are fitted with inclined mirrors 3'—4' and the rays pass directly from the source 2 mounted in the wing through an opening 9 in the wing and then through a similar opening 9 to the photo-cell 5.

It is desirable that the transmitting and directing devices be so mounted with respect to the airfoil edge that the beam of rays B extend parallel with and closely adjacent to the leading edge of the airfoil, but also that it be spaced slightly forward thereof so that the film of water normally formed by rain will not affect the current transmitted through the photo-cell 5 and the latter will only be affected when such film of water freezes and is gradually built up to bridge that space and the gap between the directional devices.

In Figure 6 is illustrated a modified form of lucite light conducting rod in which the outer end has its forward face 11 bevelled so that moisture freezing on same will operate to reduce or eliminate the transmission of light rays.

Various modifications in the precise construction and arrangement of parts will readily suggest themselves to those skilled in the art, but in the scope of the present invention as claimed.

What I claim is:

1. Ice detector for airplanes comprising in combination with an airfoil means for projecting a

ray beam parallel with the leading edge of an airfoil, forward of its leading edge at least the thickness of the layer of water normally produced by rain on the leading edge means for intercepting said ray beam electrically influenced thereby and an electrical circuit controlled by said intercepting device operative of any desired subsidiary device.

2. Ice detector for airplanes comprising in combination with an airfoil a source of rays mounted within and near the leading edge of an airfoil, a light sensitive resistance element in an electric circuit associated with suitable control mechanism similarly mounted but spaced laterally with respect to said source of light, and means for directing light rays from the source of light in a path exterior to, parallel with and spaced slightly forwardly of the leading edge of the airfoil including a lucite rod having a portion positioned on the leading edge and bevelled toward said edge, said bevel constituting the entering or exit face of the rod for light rays.

ALBERT S. PATTERSON.