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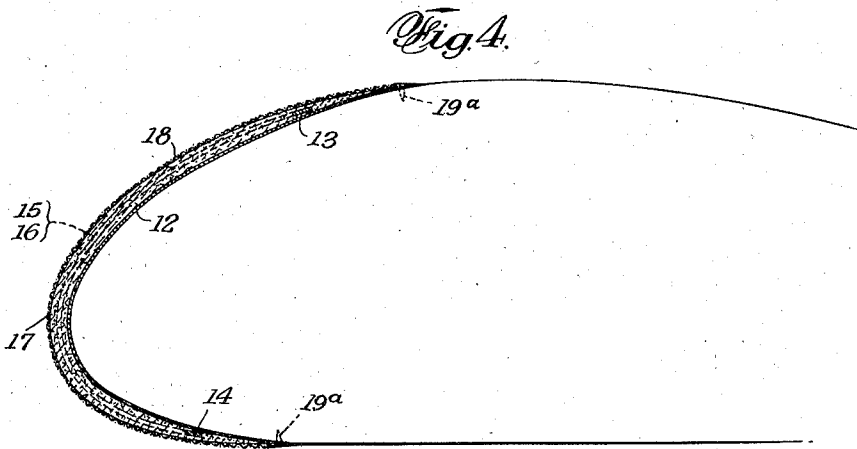
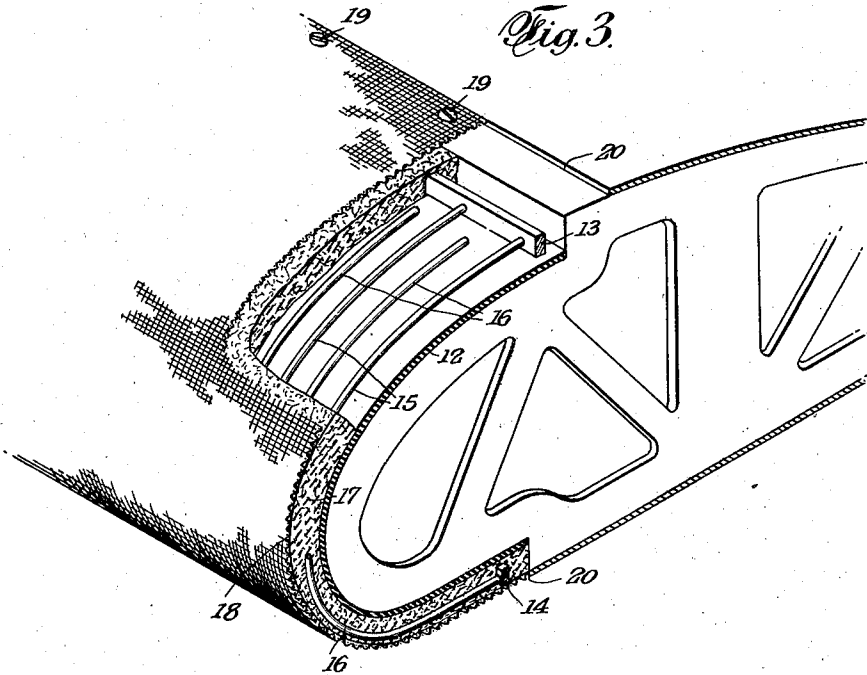
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PREVENTION OF ICE FORMATION

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PREVENTION OF ICE FORMATION

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2 Claims. (Cl. 244—134)

The invention herein disclosed relates to the prevention of ice formation on aircraft surfaces.

Special objects of the invention are to provide practical and efficient means for preventing ice formation on aircraft supporting and control surfaces, which will be readily applicable to existing equipment, which can be faired into or over the wing surfaces, control surfaces and the like, without materially altering or impairing the aerodynamic efficiency of the same, which will be reasonable in cost and sufficiently light in weight, durable and lasting in character and will require only a reasonable amount of available power.

Other objects of the invention are to provide ice prevention apparatus in a form which may be readily applied to and as readily removed, as it may be considered necessary or unnecessary.

Other objects and the novel features of construction, combinations and relations of parts by which such objects are attained will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate practical embodiments of the invention. These illustrations however are primarily by way of disclosure, since changes and modifications in structure may be made all within the true intent and broad scope of the invention as hereinafter defined and claimed.

The drawings accompanying and forming part of the specification illustrate practical embodiments of the invention. These illustrations however are primarily by way of disclosure, since changes and modifications in structure may be made all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 is a perspective view of an airplane equipped with the invention.

Fig. 2 is a broken cross-sectional view of one of the wings showing how ice formation preventers may be built into the leading edges of the wing and aileron structures.

Fig. 3 is an enlarged broken sectional and perspective view of the ice formation prevention equipment as built into the leading edge of the wing.

Fig. 4 is a broken sectional detail illustrating one method of manufacturing the equipment for ready attachment to and detachment from the wings or other surfaces to be protected.

The present invention utilizes the principle broadly covered in the Driscoll Patent 1,943,062 of separating conductors of opposite polarity by absorbent medium, which is an insulator when

dry and which when moist permits passage of current sufficient to prevent formation of ice. Special features relate to the structure and mounting of such equipment.

In Fig. 1, ice formation preventers are indicated at 5, applied to the leading edges and tips of the wings, at 6, on the leading edges of the ailerons and at 7, 8, 9, 10 11 on the leading edges of the propeller horizontal stabilizers, elevators, vertical stabilizer and rudder respectively.

Each of such ice formation preventers may be constructed substantially as indicated in Figs. 2 and 3 that is, with an underlying insulating support, such as a layer of rubber 12, separated bus bars 13, 14, spaced conductors 15, 16, connected respectively with opposite bus bars, absorbent normally non-conductive intervening medium 17, and a protective pervious covering 18. The latter may be a wire mesh screen, suitably secured at opposite edges as by screw fasteners 19, and suitably faired into or to the supporting or control surfaces as indicated generally at 20.

To avoid electrolytic action and corrosive effects, the spaced conductors 15, 16, of opposite polarity may be thin strips, wires or strands of lead or similar metal.

The absorbent control medium 17, may be asbestos and may be in fibrous, matted or woven condition. When dry, this material is an efficient insulator and as it becomes moist, it permits flow of current accordingly.

The covering screen 18 forms a guard and protection over the absorbent normal insulator, saving the asbestos from wear, reducing the air friction of such material and at the same time, admitting moisture, the mesh of the screen and size of the wire being selected to accomplish these several effects. Usually, these ice prevention devices are only needed about the leading edges of the supporting and control surfaces and hence it is sufficient to secure them as by rows of screw fastenings or equivalent along the opposite edges of the same.

In Figs. 2 and 3, the protectors are shown set into the leading edges of the aircraft structure, but it is contemplated that they may be simply applied over the leading edges as illustrated in Fig. 4 and be secured in a readily detachable fashion in such relation as by screw fastenings 19a.

As in dry weather the deicing or ice formation prevention equipment is inoperative, it is practical to connect the opposite bus bars of all the devices in a single circuit, such as indicated at 21, leaving such devices then to automatically become effective

tive each in accordance with the extent to which it may become moistened. A current limiting device or devices such as an incandescent lamp or lamps may be cut into the circuit as indicated at

5 22. Current may be furnished by an air driven generator, storage battery or the like. If ice preventers are used on the propeller, current may be conducted to the same through suitable slip rings. The insulating support 12 may be of rubber sufficiently flexible to conform to and take

10 the shape of the surface to which the device is applied and water-proof to prevent absorbed moisture soaking through to under portions before it can be dissipated by the heat resultant

15 from electrical conduction between opposed conductors. The ice preventers may be made up in the form of flexible pads of a size and shape to fit the particular surfaces for which they are intended and be connected direct with the two main

20 feed wires in the manner generally indicated on dotted lines, Fig. 1. If extreme lightness is required, aluminum or similar conductors may be used, but as these conductors can be made as fairly thin light strips, it is practical to use a

25 non-corrosive metal such as lead.

What is claimed is:

1. An ice preventer for aircraft, comprising a flexible pad conformable over the leading edge of an airfoil and composed of a flexible base layer

30 of water-proof material, an outside flexible layer pervious to atmospheric moisture, an intermediate layer of moisture absorbent material electrically insulative when dry and electrically conductive when wet, said intermediate layer being

35 flexible in nature and confined and supported between said outer moisture pervious flexible

layer and said inner flexible waterproof layer, electrically separated conductors in said intermediate normally insulating but electrically conductive when wet moisture absorbent layer, means for connecting said electrically separated conductors in opposite sides of an electrical circuit,

5 said flexible outer and inner layers of said pad being secured together in tapering relation at opposite edges of the pad to enable the conforming of the flexible pad in stream-lined engagement about the leading edge of an airfoil.

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2. In combination with an airfoil, a covering for preventing formation of ice thereon, comprising a base layer of non-absorbent water-proof material, a layer of moisture absorbent material

15 over said non-absorbent water-proof layer, said absorbent material being non-conductive to electricity when dry and conductive to electricity when wet, electrical conductors separated by said absorbent material and insulated from each other

20 by said material when dry and electrically connected by said material when wet, controllable means for supplying electric current to said conductors when formation of ice on said airfoil is imminent and a strong abrasion resistant covering

25 ing over said absorbent layer, said covering possessing the mechanical strength necessary to fully confine and support said absorbent layer and being pervious to atmospheric moisture to freely admit atmospheric moisture throughout

30 said absorbent layer, said absorbent material being of a flocculent nature to readily absorb atmospheric moisture and said pervious covering being secured to the airfoil under tension holding said absorbent material under compression.

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