June 4, 1929. C. KOCH 1,716,276

DEVICE FOR PREVENTING FORMATION OF ICE ON AEROPLANES

Filed May 9, 1928

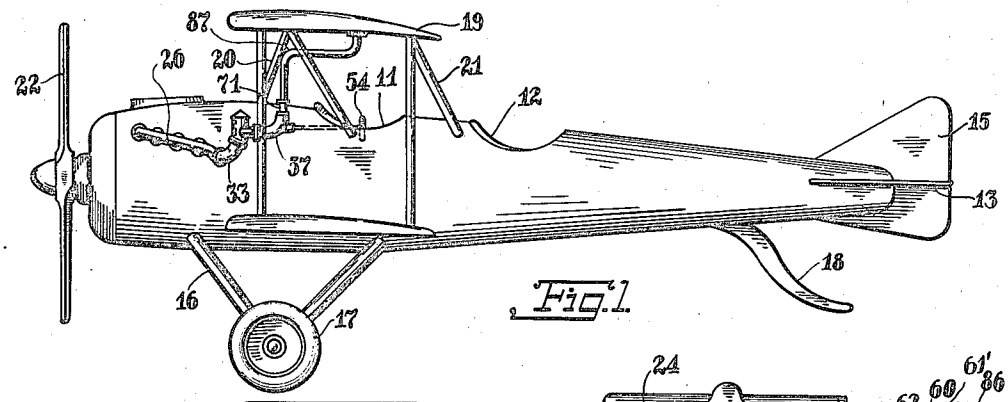


Fig. 1.

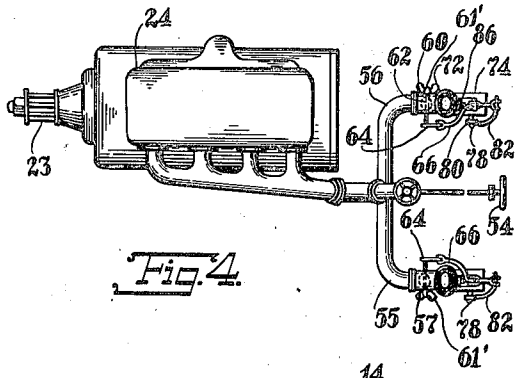


Fig. 4.

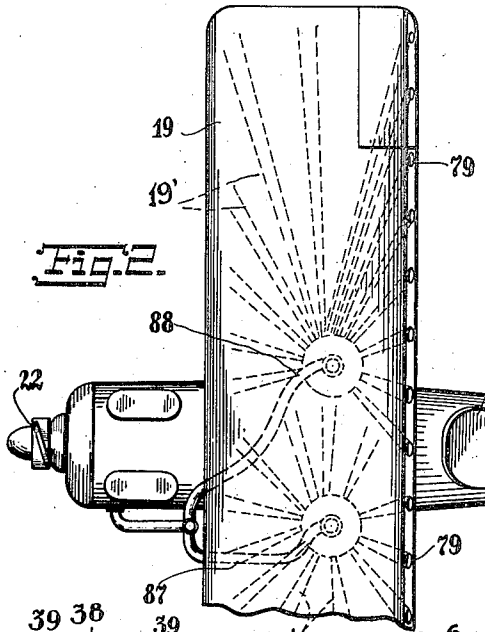
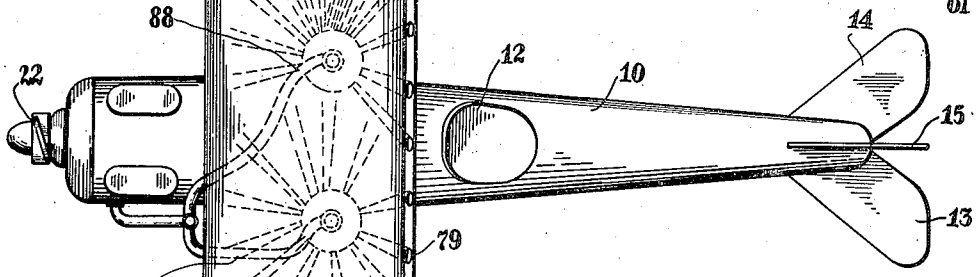


Fig. 2.



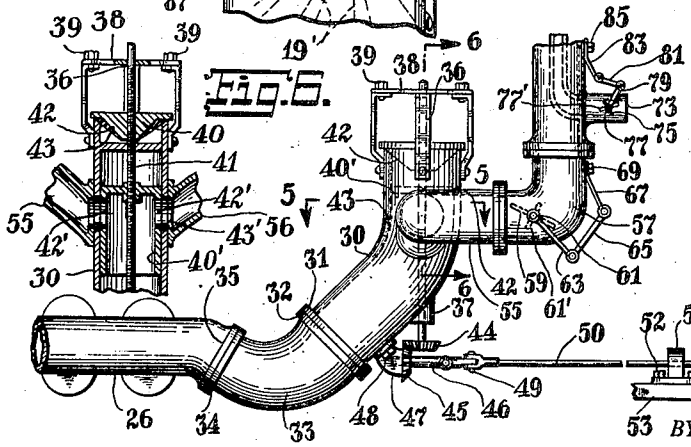


Fig. 6.

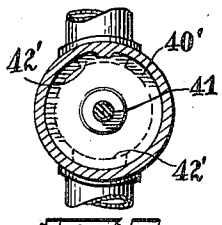


Fig. 5.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR PREVENTING FORMATION OF ICE ON AEROPLANES.

Application filed May 9, 1928. Serial No. 276,216.

This invention relates to improvements in aeroplanes, seaplanes, and the like, especially adapted to prevent the formation of ice, or sleet, frozen rain or the like, due to inclement weather when flying at varying temperatures, for the purpose of eliminating a forced landing which would be fatal when flying over a body of water.

The object of the invention is to provide an ice preventing device which employs the hot exhaust gases from the motor used to propel the aeroplane and which by means of suitable valves and connected piping transfers the said gases into the hollow wings of the aeroplane, thereby heating the wing surface preventing the formation of the above mentioned detriments on the wing surface.

A further object of the invention is to provide a device of the class described embodying certain new and novel features hereinafter more fully described, claimed and illustrated in the accompanying drawings.

Fig. 1 is a side elevational view of an aeroplane equipped with my improved device.

Fig. 2 is a top plan view thereof.

Fig. 3 is an enlarged detail fragmentary view of a portion of the device as shown in Fig. 1.

Fig. 4 is an enlarged top plan view of the motor employed to propel the aeroplane showing in particular my improved device attached thereto.

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is a fragmentary vertical sectional view taken on the line 6—6 of Fig. 3.

In Figs. 1 and 2 of the accompanying drawing, I have shown an aeroplane of the usual biplane type comprising briefly a body 10, provided with cockpits 11 and 12, adapted to accommodate the operators, navigators and passengers of the aeroplane. The said aeroplane is also provided with the usual steering members 13, 14 and 15, operatively connected to the control mechanism. A landing gear 16 provided with suitable tired wheels 17, and a tail skid 18, for the purpose of taking to the air from the ground and for landing on the ground. The usual wing 19 is secured to suitable struts 20 and 21, suitably braced and extended upwardly from the body 10, for the purpose of providing the required lifting effort for flying in the air. The usual propeller 22 is positioned in front of the body 10, and is rigidly secured to the forward extended portion of the crank shaft 23 of the motor 24 employed to propel the above described aeroplane.

The above described construction does not necessarily constitute a material part of my invention but is here merely illustrated and described for the purpose of more clearly defining my improved device. It is understood that my invention is not necessarily limited to use in connection with flying machines of the particular type here described but to all classes and types of heavier than air flying machines employing an internal combustion motor as a propelling agent.

It is to be understood that the hollow wing 19 is sub-divided by a plurality of partitions 19′ to guide the warm air entering into the wings so as to equally distribute the warm air.

The above mentioned motor 24 is of the usual internal combustion type and is provided with the usual exhaust manifold 26, into which the exhaust gases of the motor are discharged, which exit through the exhaust valve ports when the exhaust valves of the motor are opened in the usual valve operating mechanism, the latter mentioned elements not being shown in the accompanying drawing.

As here embodied, my improved device comprises a valve body 30, substantially of tubular construction, provided with a flanged lower extremity 31 as a means of securing the valve body 30 to the flanged extremity 32 of the tubular member 33 or exhaust pipe similarly connected by means of the flanged extremity 34 of the exhaust pipe 33 to the flanged extremity 35 of the above mentioned exhaust manifold 26.

A valve rod 36 is rotatively mounted in the lug element 37 of the valve body 30, and in the support 38 secured as at 39 to the upper open end of the valve body 30. The valve rod 36 is provided with a threaded intermediate portion 41, coaxially disposed in the valve body 30. A valve proper 40 is of disc like construction, has formed therein an axial aperture suitably threaded to receive the threaded portion 41 of the valve rod 36.

The valve proper 40 is provided with a frusto conical shape extension 42 adapted to engage a corresponding valve seat 43 formed in the inwardly extended element of the valve body 30.

A slide valve 40′ is also provided with an axial aperture suitably threaded to engage

the threaded portion 41 of the valve rod 36. The slide valve 40′ is provided with a pair of apertures 42′ which are aligned with port holes 43′ in the valve body 30. The rotation of the valve rod 36 regulates the amount of warm air entering the extended side elements 55 and 56, and the excess air is allowed to exhaust through valve 40.

The valve rod 36 is extended somewhat below the lug element 37 of the valve body and has secured thereto a bevel pinion 44 adapted to mesh with a similar bevel pinion 45 secured to the stub shaft 46 rotatively mounted in the bracket 47, secured as at 48 to the valve body 30 and extended therefrom.

A suitably flexible joint 49 such as commonly used for control rods so as to provide angularly relative to the said control rod and the mechanism to which same is connected, is secured to the extended extremity of the stub shaft 46 and to the control rod 50. The control rod 50 is somewhat angularly disposed from the flexible coupling 49, and is rotatively mounted in a bracket 51 secured as at 52 to any suitable convenient portion of the body 10 of the aeroplane, so as to permit the hand wheel 54 secured to the extended extremity of the control rod 50 to be located or positioned within convenient reach of the operator or navigator of the aeroplane.

The valve body 30 is provided with opposite extended side elements 55 and 56, of tubular construction having suitably connected thereto, at their extended extremities valve bodies 57 of hollow elbow construction. Valves 59 and 60, of the damper type, of disc shape construction, are secured to the valve rods 61 and 62, rotatively mounted in the valve bodies 57 and transversely disposed therein. Levers 63 and 64 are secured to the outer extended extremities of the valve rods 61 and 62, respectively, and are extended therefrom, and have pivotally attached thereto, at their extended extremities links 65 and 66, similarly attached to the free extremities of the heat control elements 67 secured as at 69 at their opposite extremities to the valve bodies 57.

Valve bodies 71 and 72 of tubular construction are secured to the above mentioned and described valve bodies 57, and are provided with intermediate extended elements 73 and 74 of tubular construction. Valves 75 of the damper type are secured to valve rods 77 and 78 rotatively mounted transversely in the elements 73 and 74, respectively. Levers 79 and 80 are secured to the valve rods 77 and 78, respectively, and have pivotally secured thereto at their extended extremities links 81 and 82, similarly secured to the free extended extremities of the heat control elements 83, respectively, secured as at 85 and 86 at their opposite extremities to the valve bodies 71 and 72.

Tubular members 77 and 78 are connected to the above mentioned valve bodies 71 and 72 and are connected to the under portion of the above mentioned wing 19 of the aeroplane. It is understood that the wing 19 is of the usual hollow construction, and has formed therein at the extreme rear edge thereof a plurality of apertures 79.

It is obvious from the foregoing description that by manual manipulation of the valve proper 40 that any desired portion of the exhaust gases from the motor 24 may be diverted through or into the elements 55 and 56 of the valve body 30. The heat control elements 67 and 68 closing the valves 59 and 60, when the said valve bodies are heated to any extremely hot temperature by the said exhaust gases, as a means of preventing excessive hot gases from passing through the valve bodies 57.

Wing nuts 61′ and 77′ are provided to secure the dampers 59, 60 and 75, respectively in any desired position when thermostatic control is eliminated.

The said exhaust gases then pass into the valve bodies 71 and 72, and in event the said valve bodies become extremely hot due to the heat from the said exhaust gases, the heat control elements 83 will automatically open the valves 75 due to the heat of the said valve bodies 71 and 72 and will permit air, at atmospheric temperature, to enter the valve bodies 71 and 72, as a means of cooling the said exhaust gases therein, which pass therefrom through the said tubular members 87, and enter the cavity in the wing 19, and issue therefrom through the apertures 89. It is understood that the automatically operated valves 59, 60, 75 are provided to prevent excessively hot exhaust gases from entering the cavity of the wing 19 which would cause a fire, or might warp or otherwise injure the wing material.

While I have shown and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to the use of any heat supply or source of warm air and to all other changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:—

1. In a device of the class described a means for preventing the formation of ice on the wing of an aeroplane, said device constructed so as to employ some source of heat supply, conducted to partitioned compartments within the wings of the aeroplane, a valve body provided with a manually operated valve, said valve body having extended elements, means for controlling the amount of warm air passing thru the extended elements, said means comprising a slide valve and a frusto conical valve, said slide valve adapted

to regulate the warm air passing thru the extended elements and said frusto conical valve adapted to allow the excessive warm air to exhaust in the atmosphere, dampers attached to said extended members for controlling a predetermined amount of cool air to mix with the warm air.

2. In a device of the class described a means for preventing the formation of ice on the wing of an aeroplane, said device constructed so as to employ some source of heat supply, conducted to partitioned compartments within the wings of the aeroplane, a valve body provided with a manually operated valve, said valve body having extended elements, means for controlling the amount of warm air passing thru the extended elements, said means comprising a pair of valves, one arranged to regulate the warm air passing thru the extended elements and the other arranged to allow the excessive warm air to exhaust in the atmosphere, dampers attached to said extended members for controlling a predetermined amount of cool air to mix with the warm air.

In testimony whereof I have affixed my signature.

CHARLES KOCH.