

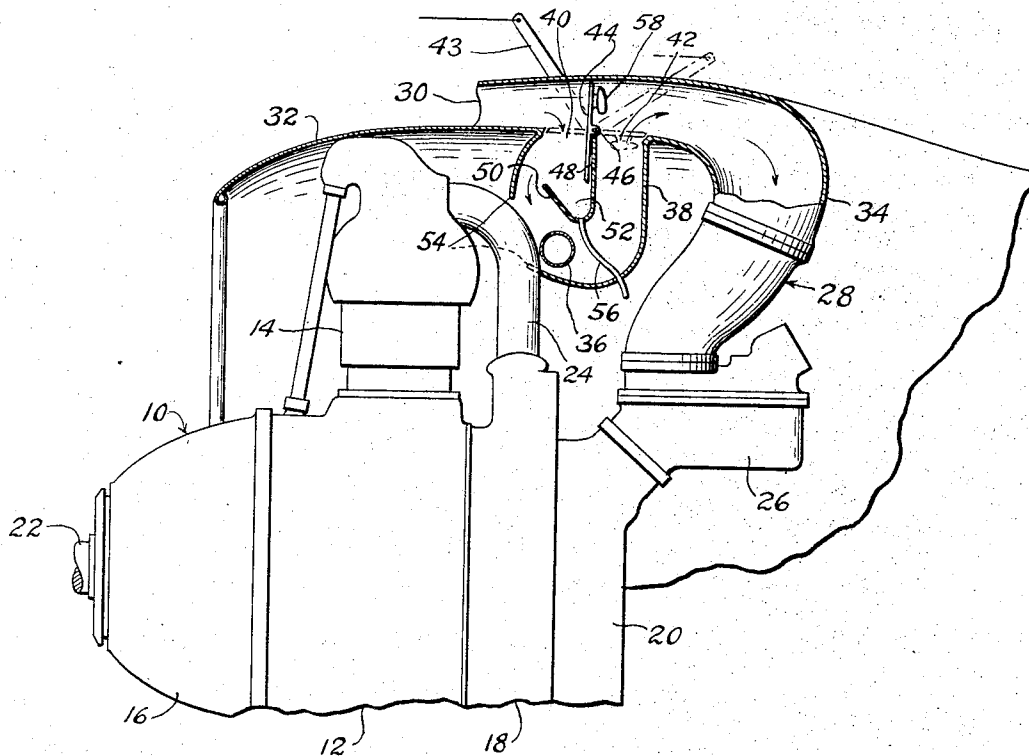
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AIR DUCT

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AIR DUCT

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8 Claims. (Cl. 123—122)

This invention pertains to improvements in the air intake systems of aircraft engines.

An object of the invention is to provide for overcoming difficulties arising from atmospheric icing conditions, especially when the atmospheric moisture is already in the form of snow or ice particles when entering the carburetor intake duct.

Another object is to provide a by-pass channel leading from, and returning to, the intake duct, and a valve for detouring incoming air through the by-pass.

Another object is to provide heat in the by-pass channel.

Another object is to provide an ice-catching pocket-like receptacle in the by-pass, the opening to the pocket being in the path of the air entering the by-pass.

Another object is to arrange the detouring valve to open or close both ends of the by-pass simultaneously.

Another object is to provide a valve which, in normal position, forms a part of the surface of the intake duct.

Further and other objects and advantages will be apparent from the specification and claims, and from the accompanying drawing, which illustrates what is now considered to be a preferred embodiment of the invention.

The single figure of drawing shows in schematic form an aircraft engine provided with an intake air de-icer constructed according to the teaching of this invention.

The engine, generally indicated at 10, has a crankcase 12 on which are mounted a number of radial cylinders such as 14, a nose section 16, and a supercharger section 18 having an inlet 20. A propeller shaft 22 projects from the nose.

Inlet pipes, such as 24, lead from the supercharger to the inlet valves of the cylinders. A carburetor 26 is connected at one side with the intake 28 of the supercharger and at its other side with the air intake system indicated generally at 28, and extending from the carburetor through curved section 34 and the air entrance 30 provided on cowl 32. A section of the exhaust collector ring is indicated at 36.

A U-shaped by-pass channel 38 leaves the air duct 30—34—28 at 40 and returns to it at 42. A valve 44 is pivoted at 46 on the top of wall 48 which forms a partition in the by-pass channel. Valve 44 in its normal position, as indicated by dotted lines, closes both inlet 40 and exit 42 of the by-pass. The valve may be moved from its normal dotted horizontal position to a vertical

full-line position in which the main air duct is fully closed and the by-pass fully open by a cable and lever mechanism 43 attached to the valve pivot 46. The valve may be held in an intermediate position, and although usually operated by the pilot it may be operated automatically by a thermo-responsive device.

The lower part of partition 48 is bent upwardly, as at 50, to form a pocket 52 having its upper, open, end in the patch of at least a portion of the air entering at 40. The pocket has a drain 56.

The by-pass is heated by exhaust ring 36, either directly or through a preheater muff, and a portion of the channel wall is removed, as indicated at 54, to permit air from the cowl to enter the by-pass after the air has been heated by the cooling fins of the engine.

The pilot is aided in opening the by-pass by a vane 58 on the underside of the valve 44 and so located as to be acted upon by the stream of air flowing from exit 42.

In operation, when icing conditions are encountered, valve 44 is moved to close the main air duct wholly or partly, simultaneously opening both ends 40 and 42 of the by-pass, thus compelling the air, in any desired proportion, to pass through the by-pass channel.

Removal of ice from the air is greatly aided by pocket 52. The impact of incoming air against the walls of the pocket and the one hundred and eighty degree angle through which the air turns, serves to separate the ice particles from the air. The pocket will also catch any ice formations that collect on the upper portion of the valve and eventually melt loose. The ice remains in the pocket, to be melted and drained away through drain pipe 56.

It will be observed that valve hinge 46 is at all times protected from direct contact with ice-laden air, and while valve 44 is in normal horizontal position, the valve and hinge are always heated from below and are therefore not frost-bound when the valve is to be operated. Ribs should be provided on the heater side of the valve.

When the valve is open, separation of ice from the air is aided by the impact of air and ice against the valve.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. Means for removing ice from charging air

entering an aircraft engine through an intake air duct, comprising in combination, a by-pass channel leaving and re-entering said duct, a valve operable for compelling ice-laden air to pass through said by-pass, and a pocket in said by-pass, said pocket being so located as to receive the impact of the entering air, said impact being effective for removing ice particles from the air.

2. The invention set forth in claim 1 in which means is provided for heating said by-pass.

3. In combination with an internal combustion aircraft engine, an intake air duct, means for removing ice from air entering said engine through said duct, comprising in combination, a by-pass channel leaving and re-entering said duct, a valve operable for opening the inlet end of said by-pass and for simultaneously closing said duct, said valve when in said open position having a portion thereof in the path of the ice-laden air entering said by-pass, the impact of the air on said valve being effective for removing ice particles from the air.

4. In combination with an aircraft engine and an intake duct for supplying charging air to said engine, means for eliminating the presence of ice in said engine charging air comprising, a by-pass duct connected at both ends to said intake duct, a valve for by-passing engine charging air through said by-pass duct, an ice collecting pocket in said by-pass, and means for heating said by-pass duct and said pocket including an exhaust pipe for said engine in heat exchanging relationship with said by-pass duct and said pocket.

5. In combination with an aircraft engine having a cowl, means for passing engine cooling air through said cowl and over said engine, and an intake duct open to the outside of said cowl for supplying charging air to said engine; means for eliminating the presence of ice in said engine charging air comprising, a by-pass duct connected at both ends to said intake duct and having a portion thereof disposed within said cowl on the inner side of said engine, an opening in said by-pass duct for admitting heated engine cooling air thereto, a valve for by-passing engine charging air through said by-pass

duct, and an ice collecting pocket in said by-pass duct disposed in the path of said by-passed charging air and exposed to the heating effect of the engine cooling air admitted through said opening.

6. In combination with an aircraft engine having a cowl, means for passing cooling air through said cowl and over said engine, and an intake duct open to the outside of said cowl for supplying charging air to said engine; means for eliminating the presence of ice in said engine charging air comprising, a by-pass duct connected at both ends to said intake duct and having a portion thereof disposed within said cowl on the inner side of said engine, an ice collecting pocket in said by-pass, an opening in said by-pass duct for admitting heated engine cooling air thereto, an exhaust pipe for said engine in heat exchanging relationship with said by-pass duct, and a valve for by-passing charging air from said intake duct through said by-pass duct.

7. In combination with an aircraft engine intake duct, de-icing means for engine intake air passing through said duct comprising a by-pass duct connected at both ends with said intake duct, a pivoted valve for deflecting either all or a portion of said intake air through said by-pass duct, and a vane carried by said valve positioned in the flow path of the air passing from said by-pass duct into said intake duct.

8. In combination with an aircraft engine intake duct, a by-pass duct having its ends opening into a side wall of said intake duct, a pivoted plate forming in one position thereof a wall portion of said intake duct closing the entrance and exit openings of said by-pass duct, and forming in another position thereof a means for passing intake air through said by-pass duct, and a hinge carried on one side of said plate for pivotally mounting said plate between said intake and said by-pass ducts, said hinge being so disposed relative to said plate as to be protected thereby from direct impingement of the airstream passing through said intake duct in all positions of said plate.

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