W. B. STOUT.

AIRCRAFT.

APPLICATION FILED NOV. 28, 1917.

1,325,054. Patented Dec. 16, 1919.

Fig. 1.

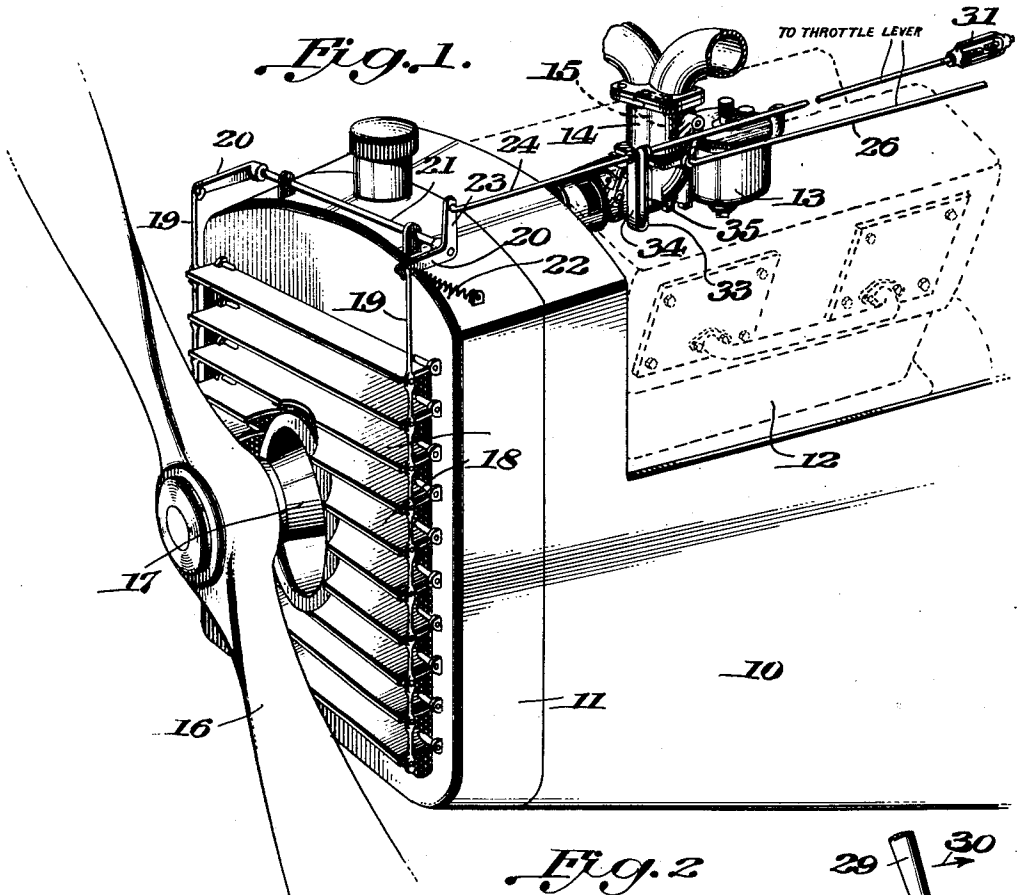
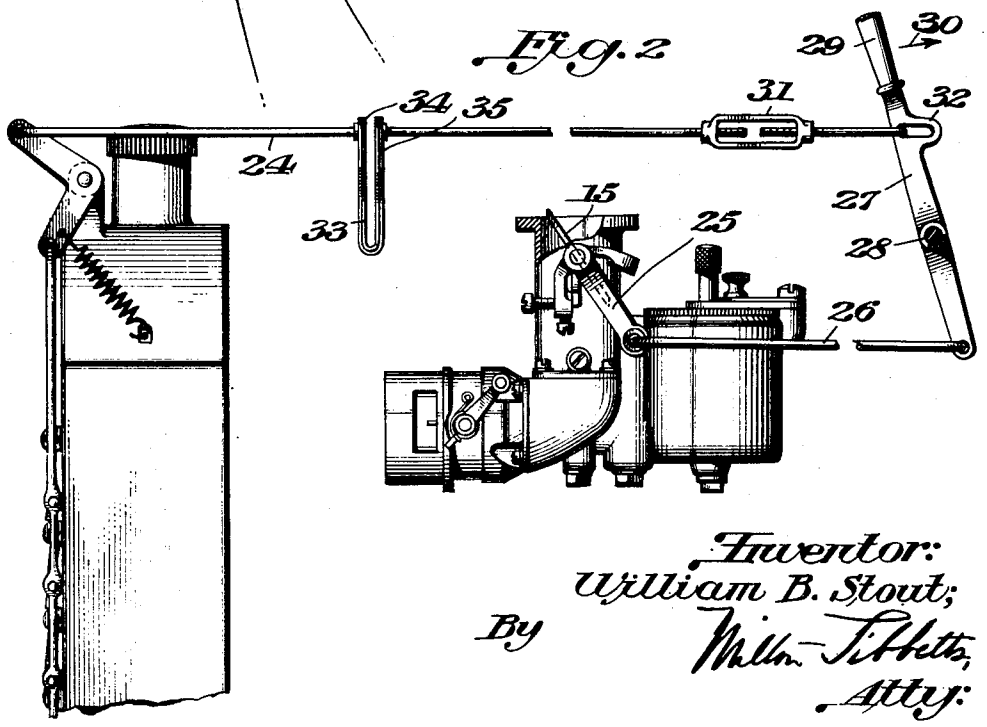


Fig. 2.



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UNITED STATES PATENT OFFICE.

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AIRCRAFT.

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To all whom it may concern:

Be it known that I, WILLIAM B. STOUT, a citizen of the United States, and resident of Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Aircraft, of which the following is a specification.

This invention relates to aircraft, and particularly to the motor and radiator control thereof.

Since airplanes and other similar craft are designed to ascend to great heights the matter of regulating the cooling of the motor has become important. It has been found, for example that in the extreme cold of the higher altitudes considerably less cooling area of the radiator is required to maintain the motor at its best working temperature and in case of vol-planing or nose-diving at those altitudes with the motor stopped or idling, if the radiator is left exposed, the motor is cooled down to such a degree that it is not quickly responsive when restarted. It is one of the objects of the present invention to provide an aircraft in which control of the motor temperature is partly or wholly automatic and thereby greatly facilitated under conditions such as hereinabove referred to.

Another object of the invention is to provide interconnecting means between the motor throttle and shutters on the radiator or similar means for varying the effectiveness of the radiator.

Other objects of the invention will appear from the following description taken in connection with the drawings which form a part of this specification, and in which:

Figure 1 is a perspective view showing the forward part of an aircraft embodying the invention; and

Fig. 2 is a side elevation of some of the parts shown in Fig. 1 and illustrating more in detail the interconnection between the throttle valve and the radiator shutters.

Referring to the drawings, 10 represents the forward part of the fuselage or body of an air plane and at the extreme front end a radiator 11 is mounted. Immediately at the rear of the radiator is a hydrocarbon motor 12 illustrated somewhat diagrammatically in dotted lines. The carbureter 13 of the motor is illustrated in full lines and the intake pipe 14 leading therefrom is provided with a throttle valve 15 which controls the quantity of explosive mixture passing to the motor. The motor is connected to operate a propeller 16 at the front of the airplane, the propeller shaft 17 extending through the center of the radiator.

The radiator 11 is provided with suitable means for varying its effectiveness and, as shown, these means comprise a series of shutters 18 pivoted as shown and connected together by rods 19 which operate to open and close the shutters. The rods 19 are operated by levers 20 on a rock shaft 21 and a spring 22 normally holds the shutters in closed position. A lever 23 on the shaft 21 connects with an operating rod 24 by the movement of which the position of the shutters may be controlled.

The motor throttle valve 15 above referred to may be operated by a lever 25 and an operating rod 26 to which the lever is connected.

For the purpose of permitting the operator to simultaneously control the motor throttle and radiator shutters, the operating rods 24 and 26 are connected to a single device, as a lever 27, shown in Fig. 2. This lever is pivoted at 28 and when the handle 29 is moved in the direction of the arrow 30 the throttle valve 15 is moved to its open position and the shutters 18 are raised to their wide open position. The reverse movement of the lever 27 closes the throttle and simultaneously closes the front of the radiator so that the radiator's effectiveness is greatly reduced.

With the above described construction it will be understood that when the airplane is at a very high altitude where it is cold, a nose-dive may be taken and the motor throttled down for the purpose and in so doing the operator automatically closes the radiator shutters so that the motor is kept warm during the dive. Then when the throttle is opened the radiator shutters are also opened to increase the effectiveness of the radiator to take care of the work of the motor.

Under some circumstances it is desirable to decrease the effectiveness of the radiator without throttling the motor and for the purpose of permitting the operator to do this the operating rod 24 is provided with a turn-buckle 31, preferably adjacent the connection of the rod 24 to the lever 27. By moving this turn-buckle the operator may

effect a relative adjustment of the throttle valve and the radiator varying means. Under these conditions the throttle may be kept wide open and the radiator shutters may be partly closed.

In order that the adjustment above referred to may not operate to prevent the full closing of the throttle when desired, the end of the operating rod 24 that is connected to the lever 27 is arranged in a slot 32 in said lever so that the lever may be given an additional closing movement after the shutters have been closed without further operating the rod 24.

Under some conditions it is desirable to effect an automatic adjustment of the connections between the radiator shutters and the throttle valve so that the shutters may be closed more or less depending upon the temperature in which the airplane is operating. For this purpose a thermostatic device 33 of any suitable construction may be connected to the operating rod 24 as shown particularly in Fig. 2. The device shown comprises a U-shaped bar formed of two strips of metal of different coefficiency of expansion and the two adjacent ends of the bar are rigidly connected respectively to the two parts of the rod 24, as at 34 and 35, the rod 24 having been cut at this point for the purpose. It will be understood that the device 33 is sufficiently rigid to permit of the operation of the rod 24 through the device and that because of the formation of the device by the two metals referred to a low temperature will cause the adjacent ends to separate and thereby effect a partial closing of the shutters 18, and vice versa.

It will be understood that my invention is not limited to the details of construction shown, and other forms may be used without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In an aircraft, in combination with the motor, a throttle valve, a radiator, and means for lessening the exposed area of the radiator as the throttle valve is closed.

2. In an aircraft, in combination with a motor including a throttle valve, a radiator, means for varying the area of the radiator exposed to the atmosphere, and connected operating means for the throttle valve and area varying means.

3. In an aircraft, the combination with the motor thereof having a throttle valve, and a radiator having shutters, of a single lever connected to both the throttle valve and shutters.

4. In an aircraft, the combination with the motor thereof having a throttle valve, and a radiator having shutters, of a single lever connected to simultaneously close the throttle valve and shutters.

5. In an aircraft, the combination with the motor thereof having a throttle valve, and a radiator having shutters, of a single device for operating both said valve and said shutters, and means for changing the relative adjustment of said valve and shutters.

6. In an aircraft, the combination with the motor thereof having a throttle valve, and a radiator having means for varying its exposed area, of a common device for operating said valve and radiator varying means, and means for changing the relative adjustment of said valve and radiator varying means.

In testimony whereof I affix my signature.

WILLIAM B. STOUT.