

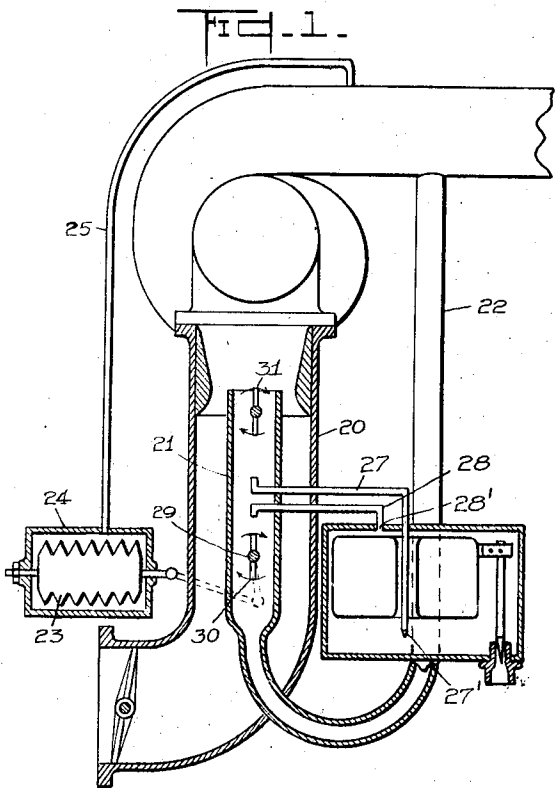
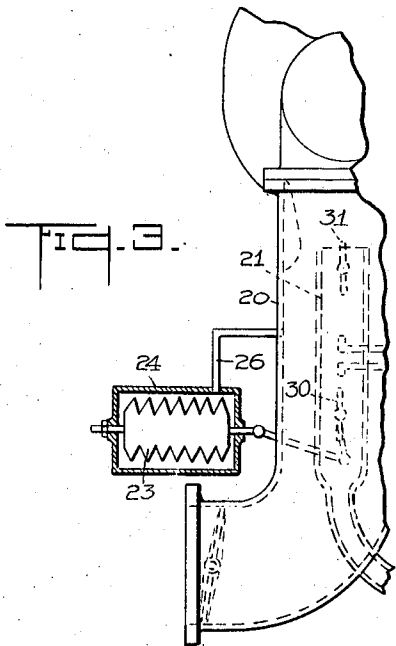
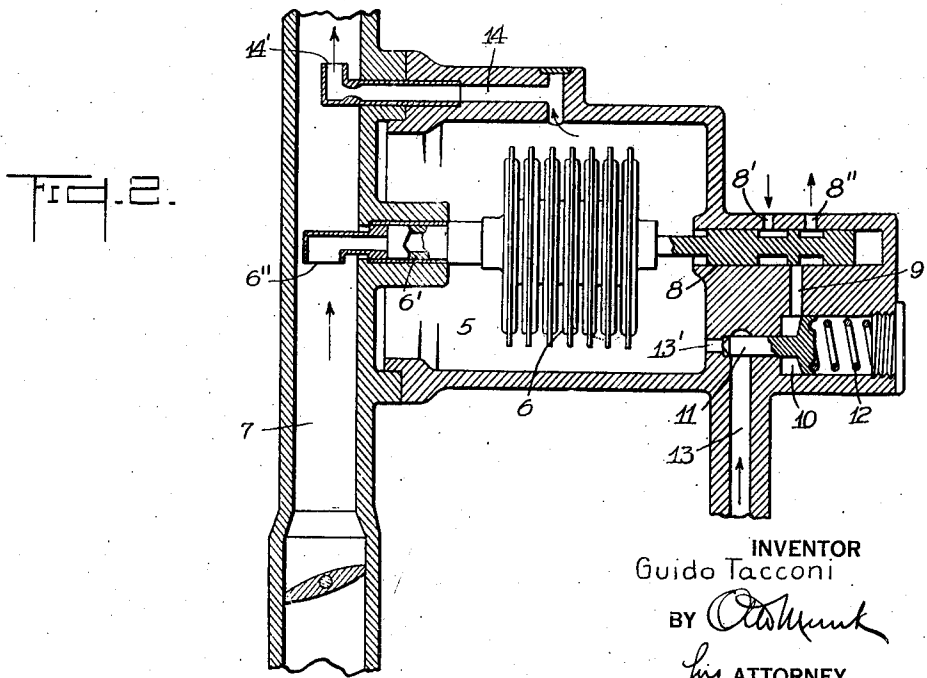
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G. TACCONI

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CARBURETOR

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CARBURETOR

Guido Tacconi, Firenze, Italy

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7 Claims. (Cl. 261—30)

This invention relates to a carburetion system for an internal combustion engine. My invention is particularly adapted for use in airplanes.

An object of my invention is to provide an automatic correction of the ratio of the fuel oil to the air as the speed control means and altitude of the airplane are varied.

A further object of my invention is to impede freezing of the carburetor even though the air has not been preheated.

My invention and its purposes are illustratively exemplified in the accompanying drawing in which:

Fig. 1 is a longitudinal sectional view of the carburetor.

Fig. 2 is a longitudinal sectional view of a modified form of the carburetor.

Fig. 3 is a longitudinal sectional view of a modified form of the aneroid connection.

In Fig. 1 there is shown the main conduit 20, and following the axis of this conduit 20 is a secondary conduit 21 which is open at its end facing the compressor and at its other end communicates directly through the pipe 22 with the compressor thrust pressure.

There is located at 30 or at 31 a throttle valve 29, or the like, directly controlled by an aneroid capsule 23; the said capsule is contained within a chamber 24, put into communication through the conduit 25 with the compressor thrust pressure. In consequence of this, therefore, the angular position of the throttle in the secondary conduit 21 will be a function of the compressor thrust (or feed pressure).

The throttle control 29 may be effected by any other subservient means.

Into the conduit 21 there opens the static inlet 27, which dips at its extremity 27' into the constant level chamber.

The dynamic inlet 28 also opens into the secondary conduit 21, and the opposite extremity thereof 28' penetrates into the constant level chamber at its upper part.

The static inlet 27 carries the fuel into tube 21 and the throttle valve 29 serves the purpose of causing the variation in the said conduit 21 of the velocity of the air traversing same, independently—or almost—of the velocity of the air flow through the main conduit 20, it being thus possible to regulate the fuel flow in function of the feed pressure, viz. as desired.

The flow velocity of the fluid through the secondary conduit 21 will not only be varied as a function of the feed pressure, but also as a function of the fall of pressure between the points

situated upstreamwardly and down-streamwardly in respect of the said compressor and, also as a function of the compression ratio of the said compressor, as well as a function of all the elements that tend to modify the said fall. Consequently, the fuel flow will be self-regulated in respect of all these elements.

Another advantage is that of eliminating (within certain limits) any freezing of the carburetor, as the fluid traversing the said conduit 21 is heated through the mechanical effect of the said compressor.

The conduit 25, after starting from the casing 24 of the aneroid capsule 23 extends to the compressor, may, if desired, be truncated or suppressed. In such case the aneroid capsule casing 24 may communicate directly with the main conduit 20 as shown by the conduit 26 in Fig. 3.

The conduit 21 carries the throttle valve 29 controlled by means of the aneroid capsule 23 as in Fig. 1.

In Fig. 2 the device is a modification adapted to be applied to the carburetor according to Fig. 1. In this example, the fuel tank 5 is provided with an aneroid capsule 6.

One extremity of this capsule is fixed at 6' to the chamber 5 and runs into the suction-pipe 7, terminating in a dynamic pressure inlet 6''. Here, too, this inlet is turned in a direction contrary to that of the fluid stream.

The lower extremity of the capsule carries a slide-valve 8 in which two holes are bored: 8' for the oil admission and 8'' for the issue of the oil. This slide-valve communicates through a passage 9 with a chamber 10 wherein plays a valve piston 11. The said valve is kept adherent to its seat by a spring 12; a passage 13 is provided for the fuel inlet into the tank chamber 5. There starts from the tank chamber 5 a conduit 14 which runs, with the jet 14' into the engine suction-pipe 7. The said jet is turned in the direction of the fluid stream, so as to be effected by the dynamic depression created at the mouth thereof. For which reason, the final efficient load on the fuel outflow is given by the sum of the dynamic pressures at 6'' and 14'. The pressure of the fuel within the chamber is an inverse function of any variable motor element, and is directly proportional to the pressure prevailing within the elastic element such as an aneroid capsule, membrane, or the like.

The operation of the modification as shown in Fig. 2 is as follows: When the pressure of the fuel contained in the tank has reached that existing within the aneroid capsule 6, the position

of the slide-valve 8 intercepts the communication between 8' and 9 and brings about the exhaust of the cylinder 10, as it causes 9 to communicate with 8''; so that due to the effect of the pressure of the spring 12 the valve 11 closes the admission of the fuel into the tank chamber 5. If the pressure within the fuel chamber is lowered, the position of the slide-valve 8 permits the oil under pressure to enter the cylinder 10 and the fuel from the pump flows through the passage 13—13' into the chamber 5, so as to reestablish the equilibrium between the internal pressure of the capsule and the external fuel pressure; on which account, in conclusion, the pressure of the latter, viz. of the fuel, always proves equal to, or a function of the pressure existing within the aneroid capsule.

Thus, the fuel pressure is not constant, but depends on the dynamic pressure collected in the conduit derived from a point situated downstreamwardly in respect of the compressor, and it is, therefore, a function of the engine feed pressure, of the compression ratio of the compressor, that is, of the angular velocity of the specific weight and hence of the temperature of the fluid traversing the said conduit.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In combination with an internal combustion engine, including a compressor, an air conduit connected to the input side of said compressor, and an output pipe connected to the output side of said compressor, and valve means controlling the air supply to said conduit, a carburetor comprising tubular means disposed in said conduit between said valve means and said compressor, a connecting pipe connected to the output side of said compressor, said tubular means having one end opening towards the input side of said compressor, the other end of said tubular means being connected to said connecting pipe, whereby a part of the fluid discharged by said compressor is fed through said connecting pipe and said tubular means, a fuel tank, means producing a constant fuel level in said tank, a first tube connected at one end to said tank, the other end thereof extending into said tubular means and facing in a direction away from the input side of said compressor to form a Pitot tube, and a second tube, one end thereof extending into the fuel in said tank and the other end thereof extending into said tubular means in a direction towards the input side of said compressor; flow control means disposed in said tubular means, pressure responsive means connected to the output side of said compressor, and means interconnecting said pressure responsive means with said flow control means, whereby control of the fuel-air mixture is rendered independent of variations in atmospheric pressure.

2. The device claimed in claim 1, in which said pressure responsive means comprises a chamber, an aneroid element disposed therein, a conduit connecting said chamber with said output pipe, whereby the pressure prevailing at the output side of the compressor is transmitted to said chamber and said aneroid element.

3. The device claimed in claim 1, in which said flow control means comprises a valve interposed between said first tube and the point of connection between said tubular means and said connecting pipe.

4. The device claimed in claim 1, in which

said flow control means comprises two valves disposed in said tubular means, one of said valves being interposed between said first pipe and the point of connection between said tubular means and said connecting pipe, and the second valve being disposed between said second tube and the open end of said tubular means.

5. In combination with an internal combustion engine, including a compressor, an air conduit connected to the input side of said compressor, and an output pipe connected to the output side of said compressor, and valve means controlling the air supply to said conduit, a carburetor comprising tubular means disposed in said conduit between said valve means and said compressor, a connecting pipe connected to the output side of said compressor, said tubular means having one end opening towards the input side of said compressor, the other end of said tubular means being connected to said connecting pipe, whereby a part of the fluid discharged by said compressor is fed through said connecting pipe and said tubular means, a fuel tank, means producing a constant fuel level in said tank, a first tube connected at one end to said tank, the other end thereof extending into said tubular means and facing in a direction away from the input side of said compressor to form a Pitot tube, and a second tube, one end thereof extending into the fuel in said tank and the other end thereof extending into said tubular means in a direction towards the input side of said compressor; flow control means disposed in said tubular means, pressure responsive means connected to the said air conduit at the input side of said compressor, and means interconnecting said pressure responsive means with said flow control means, whereby control of the fuel-air mixture is rendered independent of variations in atmospheric pressure.

6. In combination with an internal combustion engine, including a compressor, an air conduit connected to the input side of said compressor, and an output pipe connected to the output side of said compressor, and valve means controlling the air supply to said conduit, a carburetor comprising tubular means disposed in said conduit between said valve means and said compressor, a connecting pipe connected to the output side of said compressor, said tubular means having one end opening towards the input side of said compressor, the other end of said tubular means being connected to said connecting pipe, whereby a part of the fluid discharged by said compressor is fed through said connecting pipe and said tubular means, a fuel tank, means for supplying fuel to said tank, a first tube connected at one end to said tank, the other end thereof extending into said tubular means and facing in a direction away from the input side of said compressor to form a Pitot tube, and a second tube, one end thereof extending into the fuel in said tank and the other end thereof extending into said tubular means in a direction towards the input side of said compressor, and valve means disposed in said tubular means, for controlling the flow of fluid there-through, whereby control of the fuel-air mixture is rendered independent of variations in atmospheric pressure.

7. The device claimed in claim 6, in which said means for supplying fuel to said tank comprises a collapsible element, the latter being connected to said first tube, whereby said collapsible element is subjected to the current of air entering said first tube; said tank comprising

a fuel inlet port, a valve controlling the latter, a chamber for said valve, resilient means in said chamber to urge said valve to closed position; a second chamber provided with inlet and outlet openings and means for supplying a liquid under pressure thereto, said first and second chambers communicating with each other, a second valve disposed in said second chamber and adapted to control said openings, and actu-

5 ating means secured to said collapsible element and said second valve, whereby upon expansion or contraction of said collapsible element said second valve is moved and liquid under pressure admitted to or withdrawn from said first valve and the chamber, whereby said first valve is operated to admit or prevent fuel supply to said tank.

GUIDO TACCONI