Nov. 24, 1925. 1,562,663

W. J. H. STRONG

FLYING MACHINE

Filed July 22, 1918 3 Sheets-Sheet 1

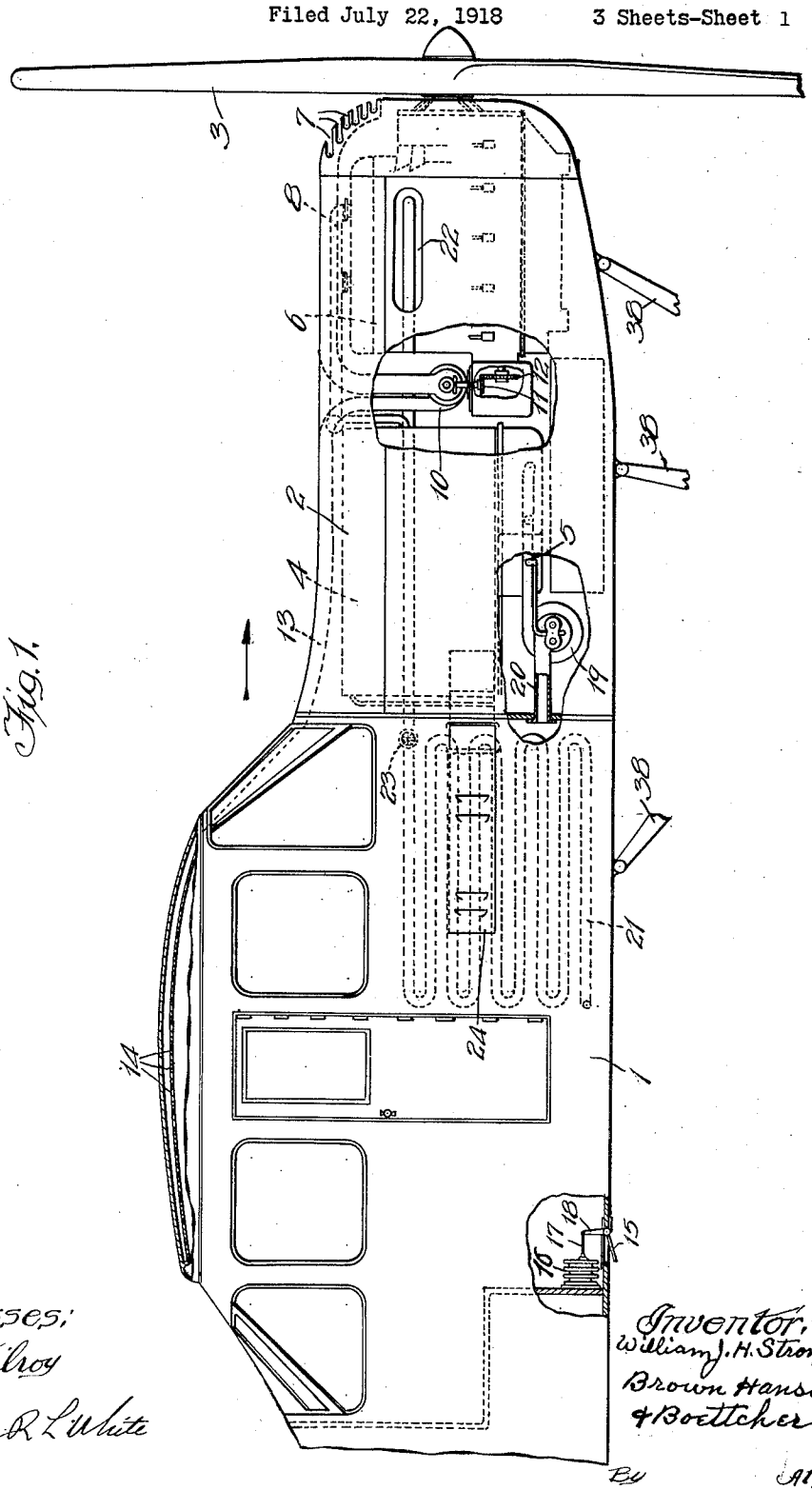

Fig. 1.

Witnesses:
W. F. Kilroy
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Inventor:
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By Attys

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FLYING MACHINE

Filed July 22, 1918 3 Sheets-Sheet 2

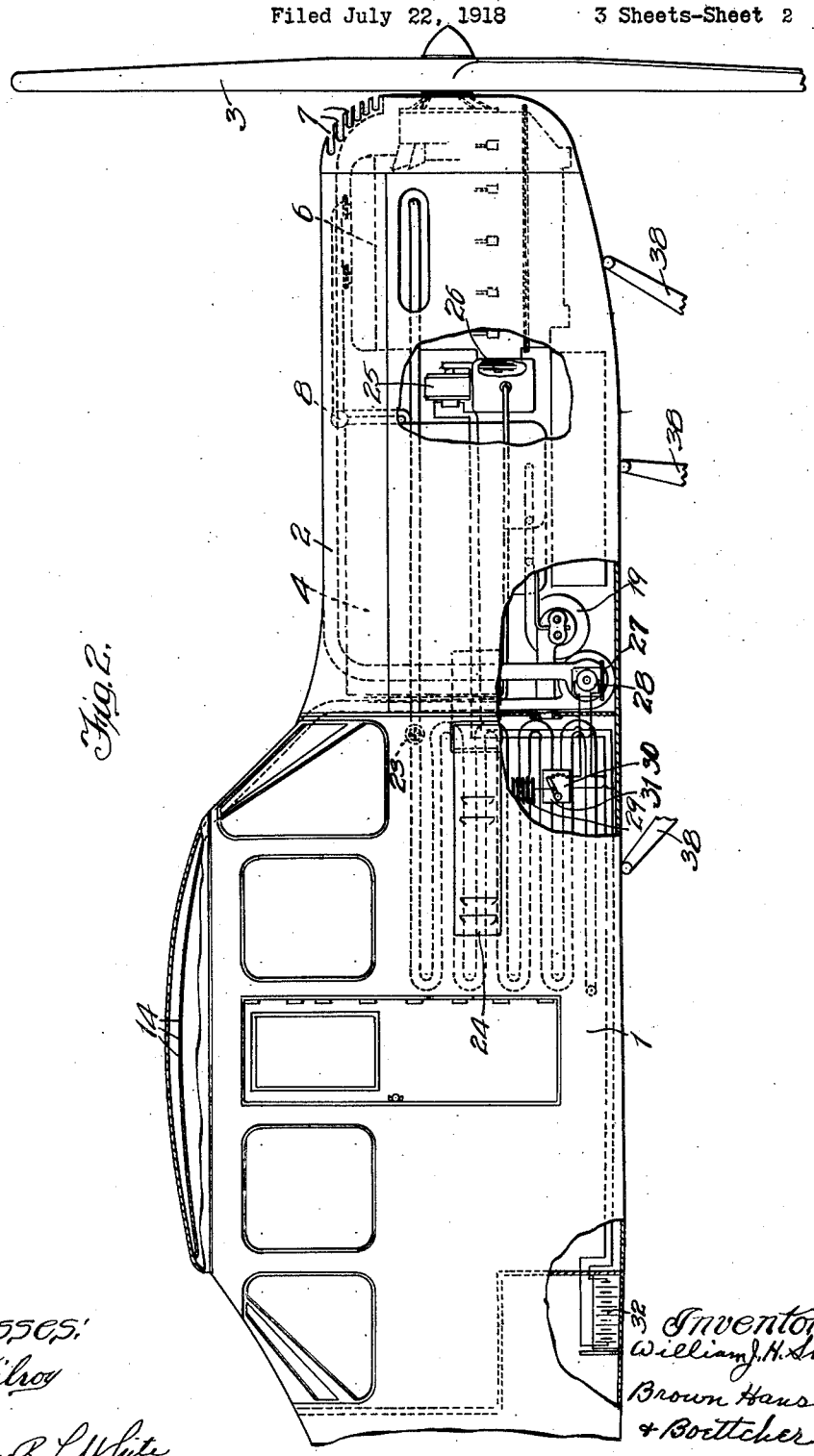

Fig. 2.

Witnesses:
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FLYING MACHINE

Filed July 22, 1918 3 Sheets-Sheet 3

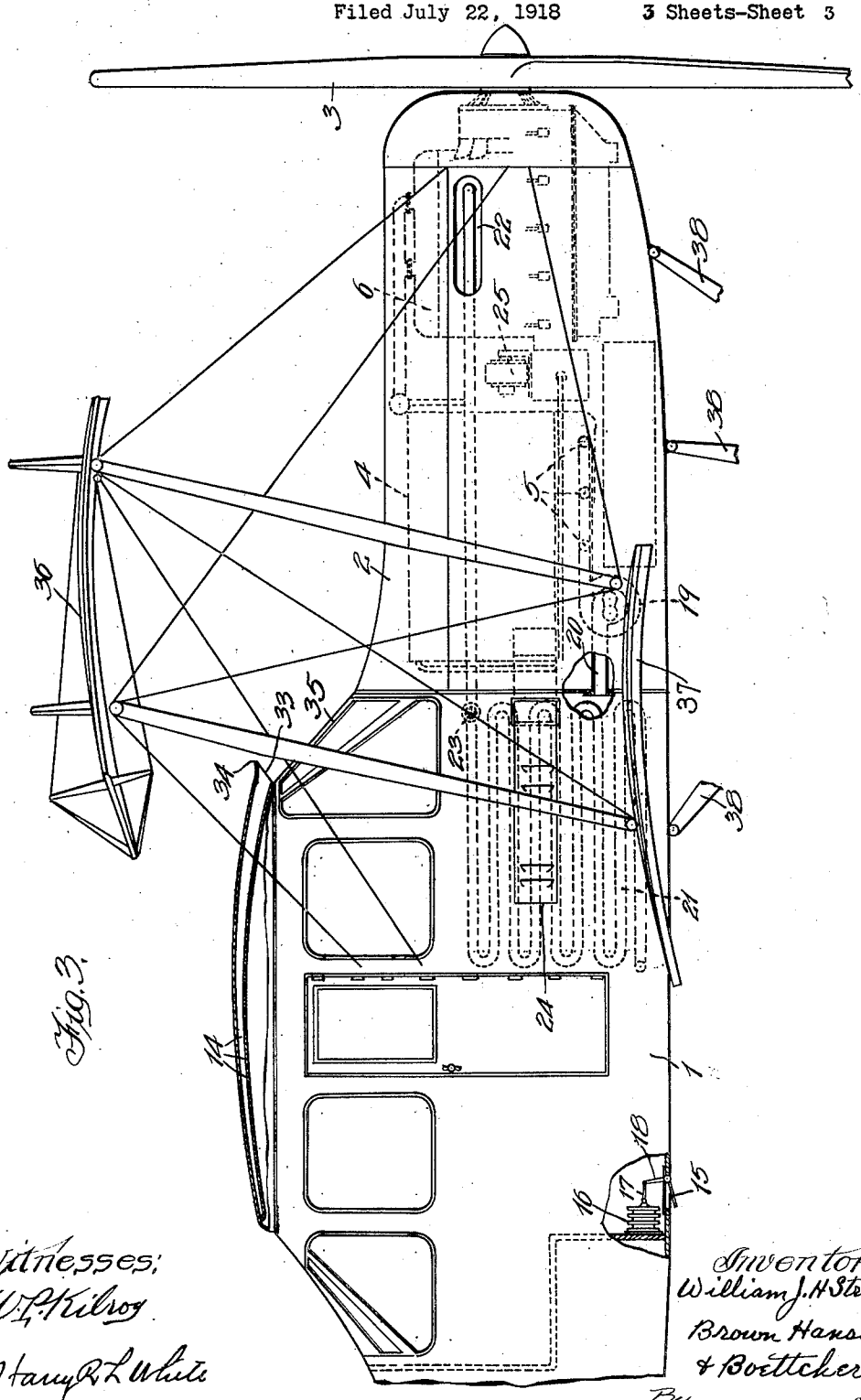

Fig. 3.

Witnesses:
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Patented Nov. 24, 1925. 1,562,663

UNITED STATES PATENT OFFICE.

WILLIAM J. H. STRONG, OF CHICAGO, ILLINOIS.

FLYING MACHINE.

Application filed July 22, 1918. Serial No. 245,979.

To all whom it may concern:

Be it known that I, WILLIAM J. H. STRONG, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Flying Machines, of which the following is a specification.

My invention relates to improvements in machines such as airplanes and the like, which are adapted to be used in a medium of varying density such as air at various altitudes.

Such machines as airplanes, dirigible balloons and the like are usually propelled by some motive power, such as an internal combustion engine or a steam engine which derives its power from the combustion of suitable fuel oil as gasoline or kerosene. The combustion of the oil or other suitable fuel requires oxygen and the usual source of the oxygen is the atmosphere in which the device is situated.

It is well known that the pressure and hence the density of the air reduces as the altitude increases until at substantially 15000 ft. above the sea level the air pressure is about 7 lbs. per sq. inch instead of nearly 15 lbs. per sq. inch at the sea level and in consequence the oxygen content per cubic foot of such rarefied air is about one-half that at sea level. In consequence of this reduction in the oxygen content, the combustion devices, viz: carburetors or oil burners, etc., are not worked to their maximum efficiency, for this maximum efficiency is usually arranged for normal sea level pressure, the result being that the power plant of the flying machine falls very much below its possible maximum capacity and furthermore various adjustments have to be provided for, to compensate as to the fuel feed for this reduction in oxygen.

A further difficulty arises in regard to the operator of the machine, if he is subject to this great reduction in the oxygen in the atmosphere, his breathing becomes difficult and labored and many ill effects result therefrom. Furthermore, at the high altitudes to which such machines are driven, at times, the cold is so intense that not only is the operator subjected to great inconveniences but when such extremely cold air is made use of in the development of power a great loss of efficiency occurs.

By means of my invention, all of the above difficulties and many others are eliminated, the power plant is run at highest efficiency at all altitudes, the operator is given a fixed sea level pressure of atmosphere to breathe, and he is protected from the extremely low temperatures experienced at high altitudes.

I produce all of these beneficial results by providing a substantially air-tight compartment for the operator, maintaining the air pressure in this compartment substantially constant at sea-level pressure, either by the movement of the machine through the air at high speed or by the use of an air pump driven by the engine which drives the machine, or by a combination of both of these sources of pressure. I draw the air for the power plant from this constant pressure compartment, and I maintain the compartment heated to a desired temperature, say 60° F., by the exhaust from the engine or other suitable source of heat.

Another feature of my invention resides in the automatic control of the air pressure in the compartment by means of pressure controlled valves whereby any excess of pressure is reduced by permitting the escape from the compartment of some of the contained air, or by an automatic pressure control of the pump by which the pressure is maintained thus in one case preventing a rise of pressure above a predetermined point by allowing some of the air to escape, and in the other positively controlling the production of the pressure.

The beneficial results of my invention not only relate to the convenience of the operator of the machine, but also to the power production of the power plant of the machine, and I am enabled to cause a production of maximum power at maximum efficiency at practically all altitudes.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which I have illustrated several ways in which the beneficial results described can be practically attained.

In said drawings:

Figure 1 is a fragmentary side elevation of an airplane illustrating one embodiment of my invention;

Figure 2 is a similar view illustrating another embodiment of my invention; and

Figure 3 is a similar view illustrating still another form in which my invention may be embodied.

In said drawings 1 represents a cabin or fuselage of a machine which is adapted to be driven through the air at high speed and at various altitudes. In this instance the machine shown is an airplane or a heavier-than-air machine.

The cabin is an air-tight compartment except as to such conduits and openings as I provide for the purpose of controlling the air pressure therein. The cabin is adapted to house the operator and the passengers, if any, and the various control devices for properly operating the machine. The forward part 2 of the fuselage houses the power plant for rotating the propeller 3 when driving the machine.

In the form illustrated the power plant comprises a steam generator 4 having oil burners 5 and a steam engine 6 for generating the power from the steam. It should be understood that the power plant is merely typical and might consist of the usual internal combustion engine with its carburetor for use of fuel oil.

The machine is adapted to be propelled through the air in a forward direction, as indicated by the arrow in Figure 1, and I provide the forward end of the fuselage with air inlet openings 7 adapted to deliver air into a conduit 8 within the fuselage. In the form shown in Figure 1 I deliver the incoming air, which enters at more or less pressure, depending on the speed of the machine, to an air compressor 10 adapted to be suitably driven by the engine 6 by gears 11 and 12. The compressed air delivered by the pump or compressor 10 is directed through a conduit 13 into the cabin which it enters at the ceiling through the distributing opening 14. By means of this delivery of air in the cabin, I am enabled to maintain the air pressure in the cabin at or about the ordinary sea-level pressure.

I provide means to prevent an excess of pressure which, as shown in Figure 1, consists of an outlet valve 15 arranged, in this instance, in the floor of the cabin. When the machine is at any appreciable elevation above the sea-level the contained air will escape when the valve 15 opens due to the higher pressure within the cabin than that of the surrounding atmosphere. I control the valve 15 by means of a pressure controlled device 16 consisting of a sealed bellows of flexible material, such as thin sheet metal, adapted to be collapsed by an increase of pressure in the surrounding air and to be expanded by the pressure within the bellows upon a decrease of the surrounding pressure. The device 16 is connected to the valve 15 by a link 17 which is connected to the free end of an arm 18 rigid with the valve, and so arranged that upon a decrease of the surrounding pressure below a certain point the device will close the valve and upon an increase of surrounding pressure above a fixed point the device will open the valve.

I provide a blower 19 which may be run by power derived from the power plant in any suitable manner and is adapted to deliver air to the burners 5 for generating the power for running the machine. The inlet 20 of the blower 19 opens directly into the cabin 1 and the blower draws its supply of air from the air in the cabin, which I maintain at a constant pressure, preferably sea-level pressure.

I arrange one or more coils of pipe 21 in the cabin connected with the exhaust 22 of the engine and through which the exhaust can circulate and heat the cabin. I also provide a valve 23 controlling the heating coils so that the operator can prevent the cabin becoming too hot. The control of the temperature of the cabin can also be regulated by any of the well known thermostatic control devices.

At 24 I have illustrated the escape pipe for the gases of combustion from the steam generator, and it should be understood that I can readily arrange to heat the cabin by the heat contained in these escaping gases, if it is necessary. As arranged upon the sides of the cabin these escape pipes add somewhat to the heat of the cabin.

In Figure 2 I have illustrated a slightly different method of control of the pressure of the air in the cabin. In this instance I provide an electric generator 25 driven by the engine 6 by suitable gearing 26, and I provide an air compressor 27 driven by a suitable electric motor 28 deriving its power from the generator 25. The compressor receives air from the inlet conduit 8 as in the former instance and delivers it at a higher pressure to the cabin 1 through the inlet openings 14 in the ceiling thereof.

I provide a pressure-operated or controlled device 29 similar to the device 16 in Figure 1, but in this instance adapted to control the motor 28 by means of a rheostat 30 in an obvious manner. The device 29 is linked to the movable arm 31 of the rheostat and either increases or decreases the resistance of the circuit in which the motor is arranged in accordance with the pressure in the cabin. As a measure of safety I provide a storage battery 32 in circuit with the motor and generator in accordance with the common use of a storage battery in the electrical circuits on automobiles.

In Figure 3 I have illustrated another slight modification of my invention. In this instance I eliminate the pump for forcing the air into the cabin and depend entirely upon the force with which the air is driven

into the cabin by the rapid movement of the machine through the air. In this form I provide a relatively large inlet 33, immediately at the forward edge of the roof of the cabin. The opening 33 has an overhanging roof 34 and is situated immediately above the upward sloping forward wall 35 of the cabin by which the air is driven with great force into the opening 33. As in the former instance I prefer to distribute the air over the upper part of the cabin through a plurality of relatively small holes 14 in the ceiling of the cabin provided for this purpose. In this instance I have indicated a generator 25 by which the blower for the steam generator can be suitably driven. As in the former instance, the blower 19 draws its air from the constant pressure cabin and delivers it to the burners 5. In this case I have shown means for controlling the pressure in the cabin consisting of a valve 15 and controlling device 16 similar to that described in relation to Figure 1.

In Figure 3 I have shown the cabin as part of a biplane having an upper plane 36 and a lower plane 37. The fragmentary arms or links 38 in the several drawings represent suitable framework connections for the supporting wheels, upon which such machines are mounted for starting and landing.

I claim:

1. In a machine of the kind described, a substantially closed cabin, a conduit having an open end into which air is adapted to be forced by the movement of the machine through the air, a pump adapted to receive said air and force it into the cabin at a higher pressure and means controlling the pressure in the cabin.

2. In a machine of the kind described, a substantially closed cabin, a conduit having an open end into which air is adapted to be forced by movement of the machine through the air, a pump adapted to receive said air and force it into the cabin at a higher pressure, means for controlling the pressure of the atmosphere in the cabin and a pump for drawing the air from the cabin and forcing it to the power plant for combustion purposes.

3. In a flying machine a substantially closed cabin, means for forcing air into the cabin to maintain the pressure therein at a suitable point for respiration, a power plant including a combustion chamber for the machine, and means for drawing the air from the cabin and forcing it to the power plant for combustion purposes.

4. In a flying machine, a substantially closed cabin, a pump for forcing air into the cabin to maintain the pressure therein at a suitable point for respiration, a power plant, including an internal combustion engine for the machine, and a pump for drawing air from the cabin and forcing it to the power plant for combustion purposes.

5. In an air craft, a source of power, a fluid compressor actuated by the source of power, a fluid chamber capable of sustaining life, a combustion chamber, the combustion chamber adapted to receive the fluid compressed by the compressor through the fluid chamber, and a pressure increasing means between the two chambers.

6. In an air craft, a power unit, a fluid compressor, a fluid reservoir adapted to be occupied by humans, a combustion chamber for the power unit, the combustion chamber adapted to receive fluid from the fluid compressor through the fluid reservoir and means for forcing the fluid from the reservoir to the combustion chamber.

7. In an air craft, a source of power therefor, a combustion chamber for the source of power, a closed atmospheric chamber on the craft, means for maintaining the pressure in said closed chamber at a desired point, means for automatically controlling the pressure in said chamber, a combustion chamber for the source of power, a conduit connecting the two chambers and a supercharger interposed between the two chambers.

8. In an air craft, a source of power requiring oxygen, a closed chamber on the air craft capable of sustaining human life, a pump for compressing the gases in which the craft is operating into said chamber to a desired pressure, a combustion chamber for the source of power and means for forcing fluid from the closed chamber to the combustion chamber.

9. The combination with a living compartment of an air craft capable of being made air tight, of mechanism for compressing external air and introducing it into said compartment including a part exposed within the latter effected by changes of air pressure therein to automatically control the operation of such mechanism, and an escape valve in the wall of such compartment.

10. In an air craft, a steam power unit having a combustion chamber, a closed chamber for the operator, means for maintaining a suitable air pressure in the chamber, a conduit connecting the two chambers and a supercharger interposed in said conduit.

In witness whereof, I hereunto subscribe my name this 19th day of July, A. D. 1918.

WILLIAM J. H. STRONG.