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LIQUID OXYGEN POWER BOOSTER FOR INTERNAL COMBUSTION ENGINES

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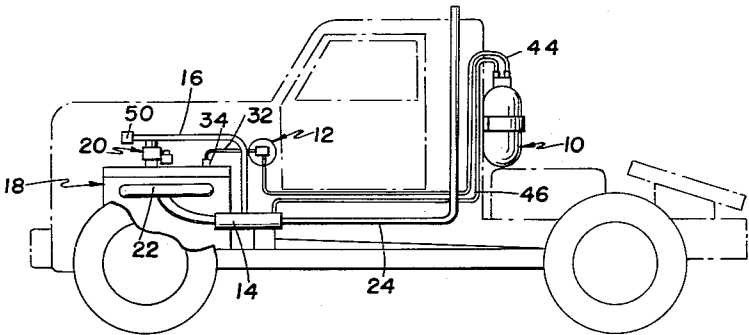


Fig. 1

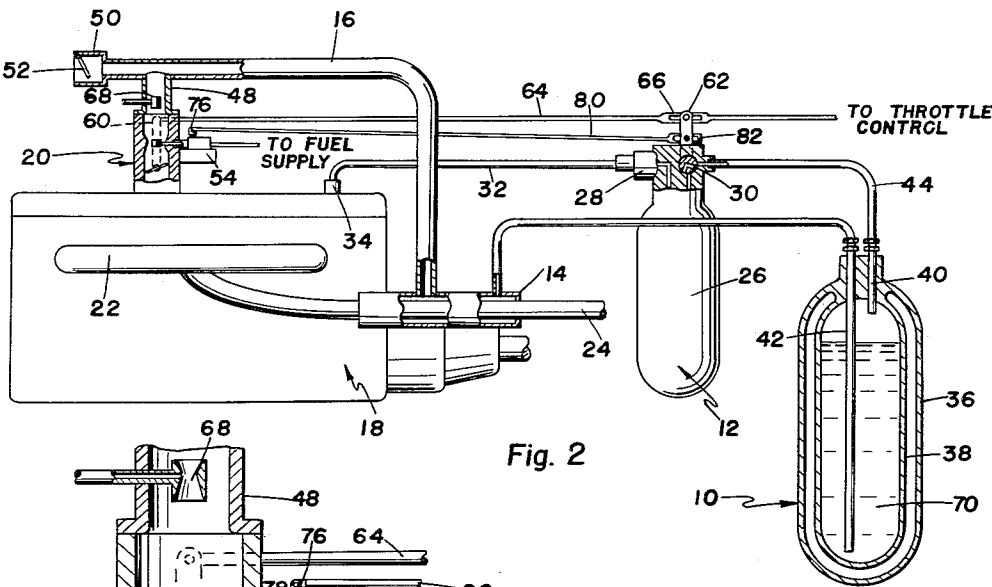


Fig. 2

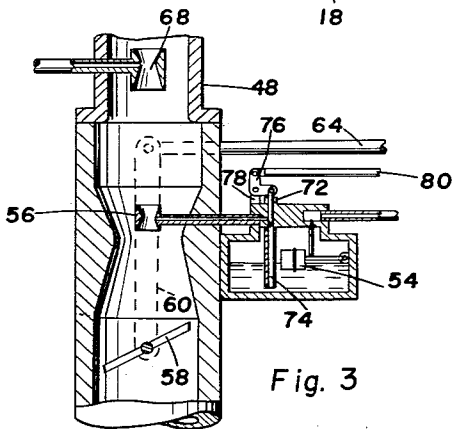


Fig. 3

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LIQUID OXYGEN POWER BOOSTER FOR INTERNAL COMBUSTION ENGINES

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10 Claims. (Cl. 123—119)

The present invention relates generally to internal combustion engines and more particularly to a liquid oxygen power booster for internal combustion engines.

The primary object of this invention is to provide a power booster in which oxygen is added to the air and fuel mixture to increase the power output of an engine, the oxygen being stored in liquid form.

Another object of this invention is to provide a power booster in which the flow of oxygen is controlled in relation to the engine throttle opening so that the oxygen supply meets the demands of the engine.

Another object of this invention is to provide a power booster in which liquid oxygen is vaporized by engine heat before mixing with the fuel.

Another object of this invention is to provide a power booster in which the vaporized oxygen is fed directly to the engine carburetor so that the mixing of oxygen and fuel is a normal function of the carburetor.

Another object of this invention is to provide a power booster which may be applied to conventional internal combustion engines with a minimum of alteration.

Another object of this invention is to provide a liquid oxygen power booster which is adapted for fabrication from many different materials, so that the choice of material can be according to the dictates of availability and price considerations, the exact sizes and proportions being matters easily determined to suit particular conditions and needs.

Another object of this invention is to provide a liquid oxygen power booster which is inexpensive and practicable to manufacture.

Finally, it is an object to provide a liquid oxygen power booster of the aforementioned character which is simple, safe and convenient to operate, and which will give generally efficient and durable service.

With these and other objects definitely in view, this invention consists in the novel construction, combination and arrangement of elements and portions, as will be hereinafter fully described in the specification, particularly pointed out in the claims, and illustrated in the drawing which forms a material part of this disclosure and wherein similar characters of reference indicate similar or identical elements and portions throughout the specification and throughout the views of the drawing, and in which:

Fig. 1 is a side elevation view of the installation fitted to a truck chassis.

Fig. 2 is a diagrammatic view of the installation, partially sectioned.

Fig. 3 is an enlarged fragmentary sectional view of the carburetor.

Referring now to the drawing the installation includes an oxygen storage bottle 10, which is secured in a convenient position adjacent the engine, a pressure accumulator 12, a vaporizer 14 and a delivery manifold 16.

The engine 18 is of a conventional type having a carburetor 20 and an exhaust manifold 22 from which is extended an exhaust pipe 24. The vaporizer 14 com-

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prises a closed cylinder which is fitted around the exhaust pipe 24 adjacent the engine, thus forming an annular jacket as shown in Fig. 2.

The pressure accumulator 12 comprises a cylinder 26 having a non-return inlet valve 28 and a controllable outlet valve 30 which is, in effect, a metering valve. A pipe 32 connects the inlet valve 28 to a pressure take-off plug 34 in the engine, said plug being installed in communication with one of the cylinders so that the pressure produced therein may be utilized. In this way, pressurized gases are stored in the accumulator 12. The oxygen bottle 10 comprises an outer container 36 and a thermally insulated inner container 38 so that the oxygen may be retained in liquid form for prolonged periods. The oxygen bottle has an inlet pipe 40 and an outlet pipe 42, said inlet pipe being connected by means of a pipe 44 to the outlet valve 30 of the pressure accumulator. The outlet pipe 42 extends to the lower end of the inner container 38 and is connected to the vaporizer 14 by a pipe 46.

The delivery manifold 16 is a relatively large pipe which extends from the vaporizer 14 and is connected to the carburetor 20 by means of an intake barrel 48. The delivery manifold extends beyond the carburetor and is provided with an enlarged mouth 50 in which is mounted a hinged flap valve 52.

It will be seen that atmospheric air drawn into the carburetor as the engine is running must pass the flap valve 52 and enter the intake barrel 48. It is in this intake barrel that the initial mixing of air and pure oxygen takes place, the mixture then passing through the carburetor and being mixed with fuel.

The carburetor shown in simple form in Fig. 3 is of conventional design having a float chamber 54, a fuel inlet venturi 56 and a throttle valve 58, said throttle valve having an actuating arm 60.

The outlet valve 30 of the pressure accumulator is provided with an arm 62 which is operatively connected to the throttle control rod 64 extending from the actuating arm 60 to the engine throttle control. It will be seen that the control rod 64 has a slotted portion 66, the arm 62 being engaged in the slot so that the outlet valve 30 is not actuated until the throttle valve has reached a predetermined open position.

In order to prevent overheating of the engine due to increased combustion, a coolant injector 68 is fitted in the intake barrel 48 so that atomized water is drawn into the carburetor together with the air and oxygen mixture. A coolant lowers the temperature of the combustion chamber and also improves the operation of the engine, as is generally recognized.

In order to ensure that the supply of fuel to the engine is increased in proportion to the supply of oxygen, the carburetor 54 is provided with a metering needle 72 which is positioned in the fuel outlet 74. This metering needle 72 is connected to a bell crank 76 which is pivoted on a bracket 78 on the carburetor. The bell crank 76 is connected by means of a rod 80 to the arm 62, said rod having a slotted portion 82 at the end thereof so that the movement of the metering needle is delayed until the outlet valve 30 has started to open. Thus the flow of fuel is controlled proportionally with the pressure in the oxygen cylinder. Direct fuel and oxygen injection may replace carburetion.

The outlet valve 30 may be considered to be a pressure regulating valve by which the outgoing pressure from the pressure accumulator 12 may be accurately controlled, various types of valves being suitable for this purpose. The pressure accumulator 12 may be replaced by a suitable pump connected for supplying the oxygen at the required pressure.

The operation of the power booster will now be explained.

As the engine is operating, a pressure is built up in the pressure accumulator 12. When the throttle valve 58 is opened to a predetermined position to speed up the engine, the outlet valve 30 is brought into operation, so releasing some of the pressured air into the oxygen bottle through the inlet pipe 40. The liquid oxygen 70 is forced out through the outlet pipe 42 and flows into the vaporizer 14. The heat of the exhaust pipe 24 quickly vaporizes the oxygen which then flows through the delivery manifold 16 in gaseous form. Air is drawn into the carburetor in the normal manner and mixes with the oxygen in the intake barrel 48, the oxygen enriched air then mixing with fuel and passing into the engine.

As the throttle valve 58 is opened further, the outlet valve 30 will also be opened a corresponding amount. The resultant increased pressure in the oxygen bottle will thus increase the flow of oxygen to the vaporizer. In this way, the oxygen supply is controlled together with the throttle so that the flow of oxygen meets the demands of the engine at all times.

The use of the slotted portion 66 at the connection of the arm 62 retards the flow of oxygen until the throttle valve 58 is substantially opened. As a power boost is not usually required at low engine speeds, or during the initial opening of the throttle, the oxygen is thus retained until required.

The installation may be adjusted so that when the throttle valve 58 is fully opened and the engine is running at maximum speed, the flow of oxygen will be increased until the pressure in the delivery manifold reaches or exceeds atmospheric pressure. Should this occur, the internal pressure will be sufficient to close the flap valve 52 against the atmosphere. At this point the engine will be operating on pure oxygen, water and fuel at its maximum speed.

The power booster is applicable to many uses such as in a race car or the like. One particular consideration contemplates its installation in a truck which is required to haul heavy loads through mountainous country. The extra power developed by using the oxygen boost enables the truck to negotiate steep grades at greater speeds, without an increase in the size of engine required.

The increased efficiency of combustion with the use of oxygen provides for greater economy of fuel in proportion to the power output.

The operation of this invention will be clearly comprehended from a consideration of the foregoing description of the mechanical details thereof, taken in connection with the drawing and the above recited objects. It will be obvious that all said objects are amply achieved by this invention.

Further description would appear to be unnecessary.

It is understood that minor variation from the form of the invention disclosed herein may be made without departure from the spirit and scope of the invention, and that the specification and drawing are to be considered as merely illustrative rather than limiting.

I claim:

1. In a power booster for an internal combustion engine having a fuel intake, a container wherein liquid oxygen is stored, said container being in communication with the fuel intake of the engine, engine heated means for vaporizing the liquid oxygen, and means for controlling the flow of oxygen from said container.

2. In a power booster for an internal combustion en-

gine, a liquid oxygen storage container in communication with the fuel intake of the engine, means for forcibly expelling oxygen from said container, means for vaporizing the liquid oxygen, and means for controlling the flow of oxygen.

3. In a power booster for an internal combustion engine, a thermally insulated, liquid oxygen storage container, a heated vaporizer communicating with said container and communicating with the fuel intake of the engine, means for pressurizing said container to force oxygen from said container into said vaporizer, and means for controlling the flow of oxygen.

4. In a power booster for an internal combustion engine, a thermally insulated, liquid oxygen storage container, a heated vaporizer communicating with said container and communicating with the fuel intake of the engine, pressure means for forcing oxygen from said container into said vaporizer and valve means controlling said pressure means.

5. In a power booster for an internal combustion engine, a thermally insulated liquid oxygen storage container, a vaporizer jacket surrounding a portion of the engine exhaust pipe and communicating with said container, a manifold connecting said vaporizer to the fuel intake of the engine, pressure means for forcing oxygen from said container into said vaporizer, and valve means controlling said pressure means.

6. In combination with an internal combustion engine having a carburetor and a throttle, a power booster comprising a thermally insulated, liquid oxygen storage container, a vaporizer jacket surrounding a portion of the engine exhaust and communicating with said container, a manifold connecting said vaporizer to the carburetor, pressure means for forcing oxygen from said container into said vaporizer, and valve means controlling said pressure means.

7. In combination with an internal combustion engine having a carburetor and a throttle, a power booster comprising a thermally insulated, liquid oxygen storage container, a vaporizer jacket surrounding a portion of the engine exhaust and communicating with said container, a manifold connecting said vaporizer to the carburetor, pressure means for forcing oxygen from said container into said vaporizer, and valve means controlling said pressure means, said valve means being operatively connected to the throttle, whereby said pressure is increased as the throttle is opened.

8. A power booster according to claim 6, wherein said manifold is provided with a flap valve, said valve being mounted to close when the pressure in said manifold exceeds the external pressure.

9. A power booster according to claim 6, wherein said manifold is provided with coolant injection means adjacent the carburetor.

10. A power booster according to claim 7, and including means for delaying operation of said valve means until the throttle reaches a predetermined open position.

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