

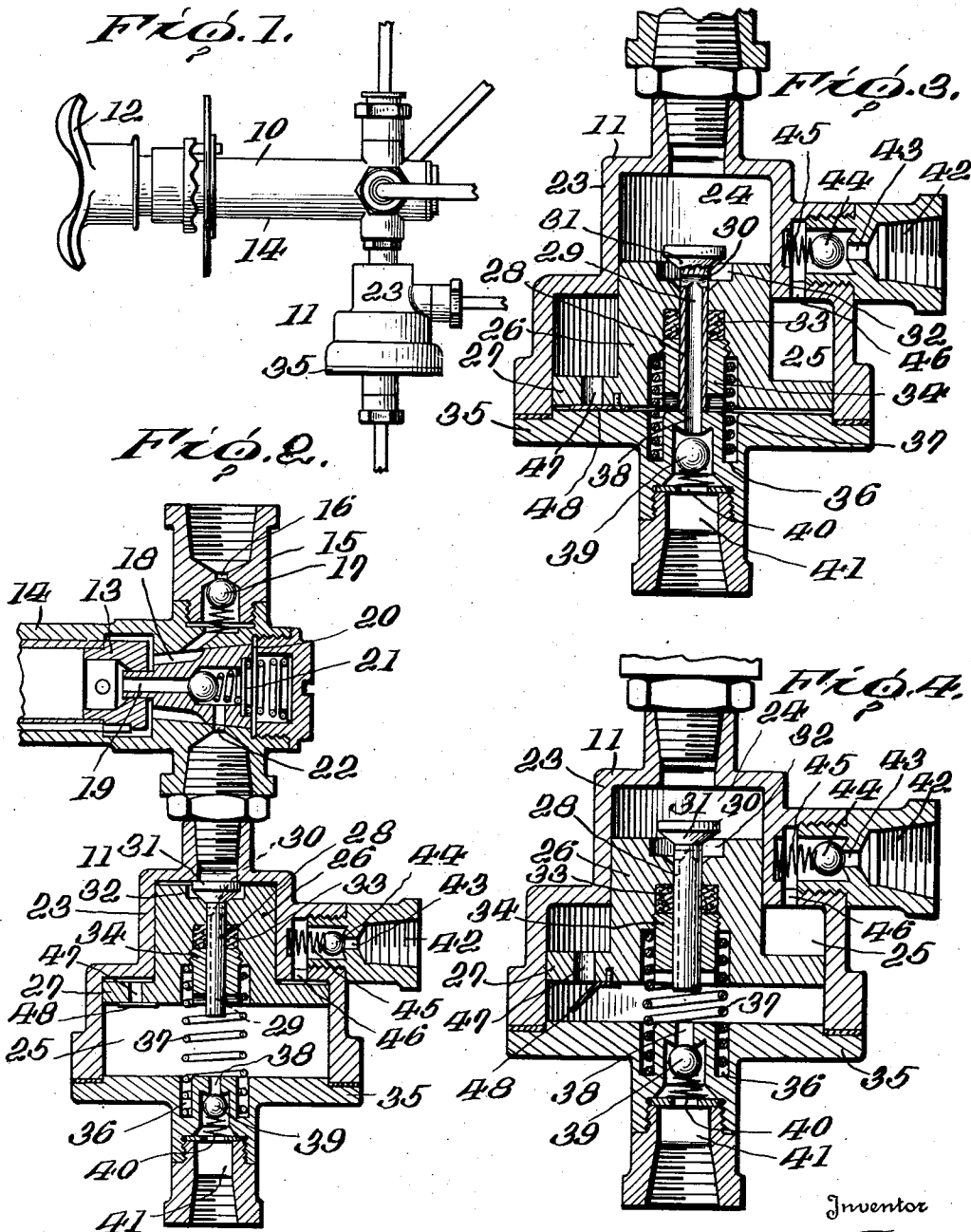
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BOOSTER FOR ENGINE PRIMERS

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BOOSTER FOR ENGINE PRIMERS

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The present invention relates to new and useful improvements in primers for gas engines and more particularly to a booster device for use in conjunction with an engine primer.

An object of the invention is to provide a booster device adapted to be used with an engine primer for increasing the volume of fuel transmitted to the gas engine.

A further object of the invention is to provide a booster device of the above type which is automatically operated incident to the operation of the primer.

The above and other objects of the invention will in part be obvious and will be hereinafter more fully set forth.

In the drawing:

Fig. 1 is a diagrammatic view showing the primer connected to the booster of the present invention.

Fig. 2 is a sectional view of the booster and connected portion of the primer.

Fig. 3 is a sectional view of the booster showing the piston at the end of its downward stroke.

Fig. 4 is a sectional view of the booster showing the piston on its upward stroke.

For purposes of illustration, the booster which forms the subject-matter of the present invention, is illustrated for use in connection with a primer of the type shown in my prior Patent No. 1,934,878 of November 14, 1933. The invention contemplates generally the provision of an engine prime booster which is automatically operated incident to the operation of the primer and which is adapted to increase the volume of fuel transmitted to the engine cylinders.

Referring more in detail to the accompanying drawing, there is shown, in Fig. 1, a primer 10, of the type shown in my aforementioned patent, connected to the booster 11 which forms the subject-matter of the present invention. The primer includes a handle 12 connected to a piston 13 operating within a casing 14. The casing 14 is connected to a conduit 15 which is adapted to be connected to a fuel supply. The conduit 15 is provided with a port 16 therethrough controlled by a ball check valve 17 normally held closed by a spring. The ball check valve 17 controls the passage of fuel from the fuel supply through a channel 18 into the casing 14. Leading from the casing 14 is a port 19 which is controlled by a ball check valve 20 normally held closed by a spring 21. Communicating with the channel 19, when the ball check valve 20 is open, is a port 22 which leads to the booster unit 11.

The booster 11 includes a casing 23 which is

provided with a relatively small chamber 24 and a relatively large chamber 25. Within these chambers a piston 26 operates. This piston 26 is provided with a relatively small portion closely fitting the walls of the chamber 24 and with an annular portion 27 closely fitting the walls of the chamber 25. The piston is provided with a central opening therethrough in which is mounted a valve 28 having a central passage 29 leading from the bottom thereof upwardly and terminating in a lateral passage 30. The valve 28 has a tapered head portion 31 which, when in closed position, fits within a recess 32 in the piston 26. A gland packing 33 is held in position around the valve 28 by means of a threaded member 34, and affords frictional engagement with the valve so that the valve will remain in open or closed position until forcibly shifted.

The bottom 35 of the casing 23 is provided with an annular recess 36 within which is disposed one end of a coil spring 37, the other end of which is seated against the piston 26 around the threaded member 34. Within the annular recess 36 and the bottom 35 of the casing 23 is a port 38 controlled by a ball check valve 39 which is normally held closed by a spring 40. When the ball check valve 39 is opened, the port 40 communicates with the discharge port 41 which leads to the discharge line extending to the gas engine. Threadedly connected to the relatively small portion of the casing 23 is a conduit 42 which leads from the fuel supply. This conduit 42 is provided with a port 43 therein which is controlled by a ball check valve 44 normally held closed by a spring 45. The port 43 communicates with a port 46, when the ball check valve 44 is open. The port 46 communicates with the relatively large chamber 25 above the annular portion 27 of the piston 26. The annular portion 27 of the piston has a port 47 therethrough which is controlled by a flap valve 48 on the under side thereof.

When the handle 12 on the primer is moved outwardly, the piston 13 within the casing 14 will be similarly moved so as to create a suction pull through the channel 18, thus opening the ball check valve 17 and admitting fuel from the supply through the port 16 and channel 18 to the interior of the casing 14. During this movement of the piston 13, the ball check valve 20 will remain closed and the spring 37 will operate to hold the piston 26 in the position shown in Fig. 2 with the slide valve 28 closed. On the return stroke of the handle 12 of the primer, that is, when the handle 12 and piston 13 are moved inwardly, the ball

check valve 17 will be closed and the ball check valve 20 will be opened due to the fluid pressure exerted by the inward movement of the piston 13. The fuel will then be forced by the piston 13 out of the casing 14 through the port 19 and port 22 into the booster 11. This passage of fuel will operate against the relatively small end of the piston 26 and force it against the action of the spring 37. Downward movement of the piston 26 will create a suction pull so as to open the ball check valve 44 and admit fuel from the supply through the ports 43 and 46 to the space within the chamber 25 above the annular portion 27 as the piston moves downwardly. During the entire downward movement of the piston 26, the flap valve 48 will remain closed. When the piston reaches its lowermost position, as shown in Fig. 3, the space within the chamber 25 above the upper surface of the annular portion 27 of the piston will be filled with fuel from the supply line 42. This downward movement of the piston 26 will force any fluid in the chamber 25 below the annular portion 27 of the piston out through the port 38 to the engine and the valve 28 will be forcibly opened by engagement with the bottom wall 35 of the casing 23 at the lowermost position of the piston. Upon upward movement of the piston 26 within the casing 23, the valve 28 will remain open, and fuel in the chamber 24 which has come from the primer will be bypassed through the lateral port 30 in the valve and down through the port 29 into the chamber 25 beneath the lower face of the annular portion 27 of the piston. During the upward movement of the piston, the flap valve 48 will be forced open and fuel which has come from the supply line 42 will be admitted to that portion of the chamber 24 below the annular portion 27 in the piston and the ball check valve 44 will be closed. When the piston 26 has reached its uppermost limit due to the action of the spring 37, the valve 28 will be forcibly closed again by engagement with the top wall of the valve 28.

It will be noted that the chamber 25 in the casing 23 has a greater capacity than the chamber 24 therein. Thus, when the piston 26 has been returned by the action of spring 37 to the position shown in Fig. 2, the chamber 25, that is, the space below the annular portion 27 of the piston 23, is of sufficient size to receive the fuel which has been previously drawn in through the port 46 and also the fuel from the primer which is bypassed through the valve 28. The device thus serves as a booster to increase the volume of the fuel which is transmitted through the discharge port 41 to the engine.

While the invention has been described for purposes of illustration with a hand operated primer of the type shown in my aforesaid patent, it is to be clearly understood that the booster of the present invention may be used with other forms of pumps, such as a mechanically operated one.

It is to be clearly understood that minor changes in the details of construction and arrangement of parts may be made without departing from the scope of the invention as set forth in the appended claims.

I claim:

1. The combination of a pump including means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the pump and the discharge line and including a casing and a piston operating therein, said booster piston being operated by the fluid pressure exerted thereon by the pump to deliver

fuel to the discharge line, means associated with the booster piston for transferring to the delivery side thereof the fuel delivered to the booster by the pump, and means including an independent connection of said casing to the fuel supply for adding fuel to the delivery side of said booster piston for transmission to the discharge line.

2. The combination of an engine primer including means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the primer and the engine and including a casing and a piston operating therein, said booster piston operating to deliver fuel to the engine by the fluid pressure exerted thereon by the primer, valve means on said casing for providing an independent connection to the fuel supply, and means associated with the booster piston for transferring to the delivery side thereof fuel drawn thereby from the supply and the fuel delivered to the booster by the primer.

3. The combination of an engine primer including means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the primer and the engine and including a casing and a piston operating therein, said booster piston being operated by the fluid pressure exerted thereon by the primer to deliver fuel to the engine, valve means on said casing for providing an independent connection to the fuel supply and operating to admit additional fuel on the delivery stroke of said booster piston in rear thereof, means for effecting the return stroke of said booster piston, and means associated with the booster piston for transferring the fuel drawn thereby from the supply and the fuel delivered to the booster by the primer to the delivery side of said booster piston on the return stroke thereof.

4. The combination of an engine primer including means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the primer and the engine and including a casing and a piston operating therein, said booster piston being operated by the fluid pressure exerted thereon by the primer to deliver fuel to the engine, valve means on said casing for providing an independent connection to the fuel supply and operating to admit additional fuel on the delivery stroke of said booster piston in rear thereof, spring means for effecting the return stroke of said booster piston, and means associated with the booster piston for transferring the fuel drawn thereby from the supply and the fuel delivered to the booster by the primer to the delivery side of said booster piston on the return stroke thereof.

5. The combination of an engine primer including means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the primer and the engine and including a casing and a piston operating therein, said booster piston being operated by the fluid pressure exerted thereon by the primer to deliver fuel to the engine, valve means on said casing for providing an independent connection to the fuel supply and operating to admit additional fuel on the delivery stroke of said booster piston in rear thereof, means for effecting the return stroke of said booster piston, a valve associated with the booster piston for transferring the fuel drawn thereby from the supply to the delivery side thereof on the return stroke of said piston, and a bypass valve associated with the booster piston for transferring the fuel delivered to the booster by the primer to

the delivery side of said piston, said bypass valve being opened upon the completion of the delivery stroke of said booster piston.

6. The combination of an engine primer including means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the primer and the engine and including a casing and a piston operating therein, said booster piston being operated by the fluid pressure exerted thereon by the primer to deliver fuel to the engine, valve means on said casing for providing an independent connection to the fuel supply and operating to admit additional fuel on the delivery stroke of said booster piston in rear thereof, means for effecting the return stroke of said booster piston, a valve associated with the booster piston for transferring the fuel drawn thereby from the supply to the delivery side thereof on the return stroke of said piston, and a bypass valve associated with the booster piston for transferring the fuel delivered to the booster by the primer to the delivery side of said piston, said bypass valve being opened at the completion of the delivery stroke of said booster piston and frictionally held open until the completion of the return stroke thereof.

7. The combination of an engine primer in-

cluding means for drawing fuel from a supply and forcibly ejecting the fuel therefrom, a booster interposed between the primer and the engine and including a casing having a relatively large chamber and a relatively small chamber, a piston operating in said casing and having portions corresponding in size to said chambers, said booster piston being adapted to deliver fuel to the engine and being operated by the fluid pressure exerted on the smaller portion thereof by the primer, means including an independent connection of the casing to the fuel supply for admitting additional fuel to the larger chamber in rear of the larger portion of said piston on the delivery stroke thereof, spring means for effecting the return stroke of said piston, valve means associated with said piston and operating on the return stroke thereof for transferring to the delivery side thereof the fuel drawn thereby from the supply, and valve means extending through said piston for affording communication between the two chambers in said casing on the return stroke of said booster piston whereby to transfer to the delivery side of said piston the fuel delivered to the piston by the primer.

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