Jan. 6, 1942. B. G. CARLSON 2,268,695

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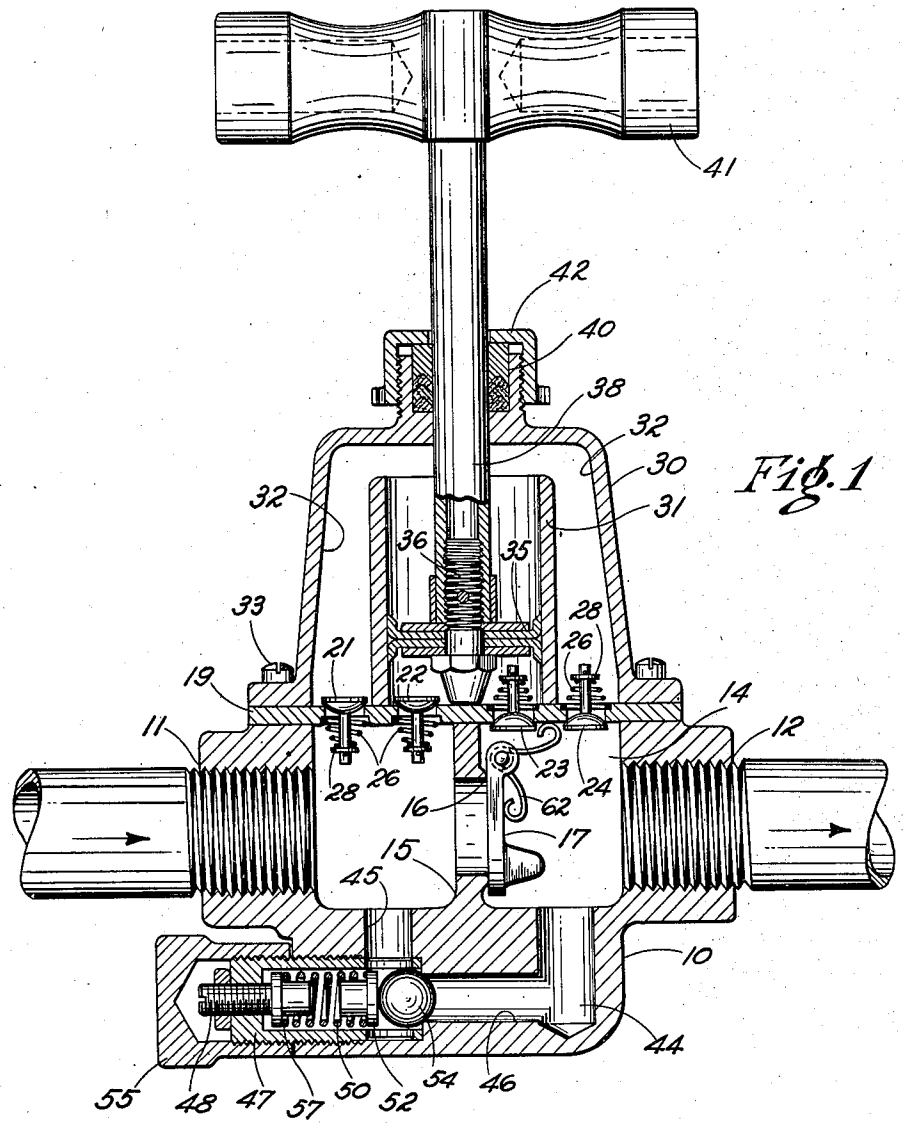


Fig. 1

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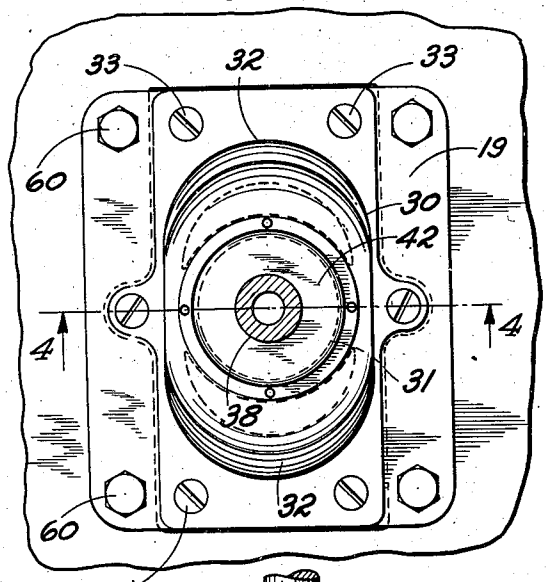
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ATTORNEYS

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Fig. 3



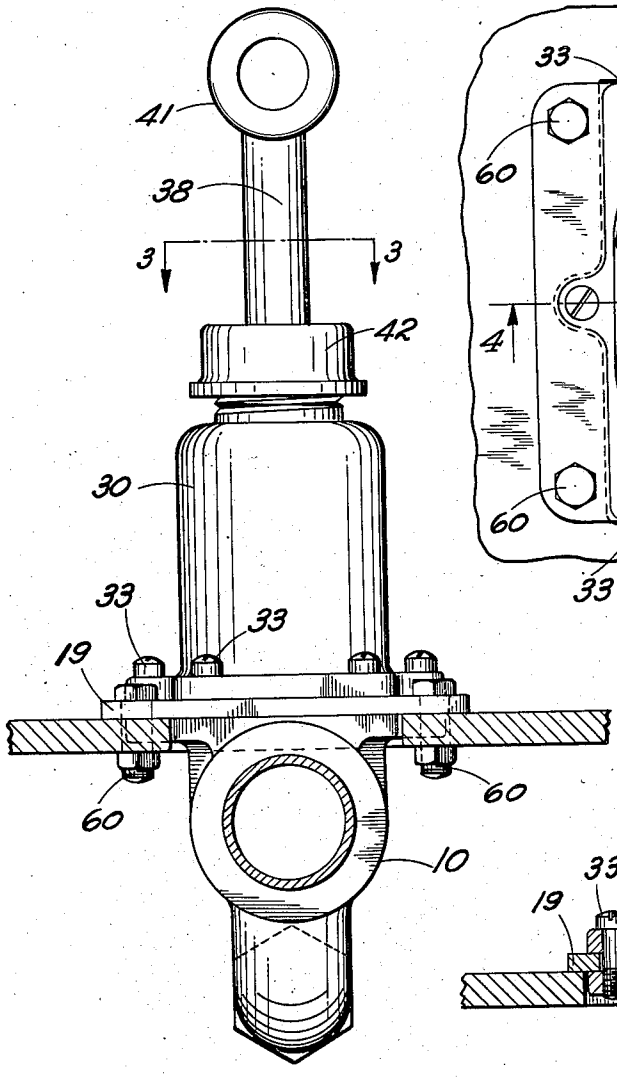


Fig. 2

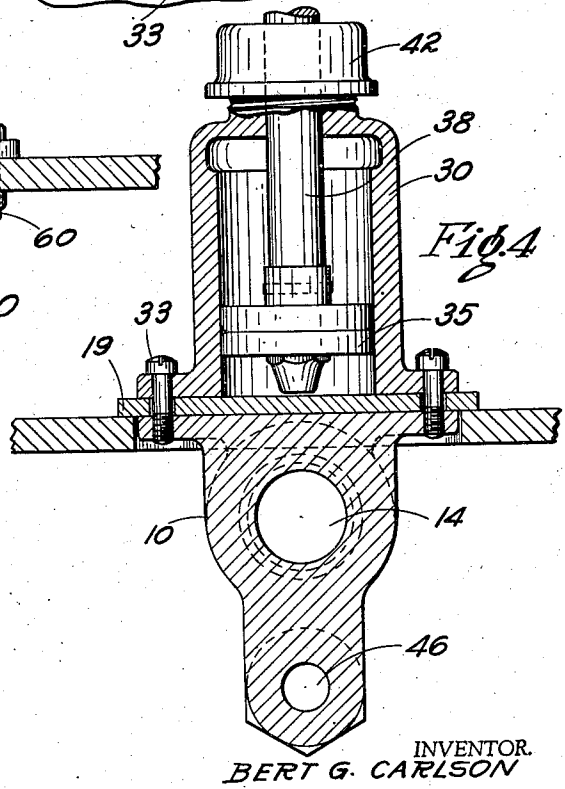


Fig. 4

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Patented Jan. 6, 1942 2,268,695

UNITED STATES PATENT OFFICE

2,268,695

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Application November 22, 1940, Serial No. 366,678

2 Claims. (Cl. 103—42)

This invention relates broadly to pumps and more specifically to improvements in hand operated pumps of the type particularly adapted for use as airplane fuel pumps.

The hand operated pumps used heretofore in connection with airplane fuel lines have ordinarily embodied oscillating vanes which are inefficient and which ordinarily required a manual adjustment prior to the use of the hand pump and when changing over from the use of the hand pump to the power operated fuel pump.

One of the objects of the present invention is the provision of a hand operated pump having a spring actuated check valve disposed within a main fluid line and arranged so that upon failure of fluid pressure in the line the hand operated pump may be used, without requiring any preliminary adjustments or manipulation of valves, and so that the presence of the pump in the line will not affect the flow of fluid in the line.

Another object is to provide such a pump in which, upon the reciprocation of the pump piston, alternature inlet and outlet valves function to by-pass a fluid around the closed check valve. Another object is to provide a simple and compact hand pump embodying a spring actuated check valve and a plurality of inlet and outlet by-pass valves. Further objects are to provide such a pump which is light in weight, reliable and efficient in service, economical of manufacture, and which is capable of being serviced without its removal from the fluid line.

Other objects and advantages more or less ancillary to the foregoing and the manner in which all the various objects are realized will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

I preferably accomplish the above and other objects of the present invention by providing a pump casing having a fluid passageway therethrough with a spring actuated check valve therein, and with a plate embodying a plurality of inlet and outlet valves therein supported upon the casing and having a cylinder and piston mounted thereon for pumping a fluid from one side of the check valve to the other. Preferably the cylinder is formed within a housing which is secured to the casing and plate, the housing forming inlet and outlet passages outside of the cylinder, and the valves being disposed in the plate.

Referring to the drawings wherein the preferred embodiment of the invention is illustrated, Fig. 1 is a vertical sectional view of a hand operated pump made according to the present invention; Fig. 2 is an end view of the pump illustrating the manner in which the pump is secured to a support; Fig. 3 is a plan view of the pump showing the elongated upper housing with the cylinder disposed therein, the view being taken on a plane indicated by line 3—3 of Fig. 2; Fig. 4 is a vertical sectional view of the pump showing the upper housing secured to the valve casing with the piston disposed within the cylinder, the view being taken on a plane indicated by line 4—4 of Fig. 3.

Referring to Fig. 1, the pump casing 10 comprises an integrally formed body having axially aligned inlet and outlet ports 11 and 12 communicating with a chamber 14 within the casing. A partition wall 15 is formed integrally with the casing and divides the chamber 14 into inlet and outlet compartments. A valve seat 16 is provided in the partition 15 and engageable by a check valve 17 which is pivotally mounted within the outlet portion of the chamber 14.

The pump casing 10 is open at its top and supports a plate 19, which has a plurality of valve seats formed therein with an equal number thereof disposed on the opposite sides of the partition wall. A plurality of valves 21, 22, 23 and 24 are seated on the valve seats with the stems thereof projecting through said plate. The valves 21 and 22 communicate with the inlet compartment of chamber 14 while valves 23 and 24 communicate with the outlet compartment of the chamber. Coil springs 26 encircling the stems of the valves are seated within recesses formed in the opposite side of the plate 19 from that upon which the valves are seated. Collars 28 secured on the ends of the valve stems by pins are adapted to retain the springs 26 in compression for urging the valves against their respective valve seats.

As shown in Figs. 1 and 3, an elongated housing 30, having a cylinder 31 formed integrally therewith and spaced from the ends 32 thereof to provide passageways therebetween, is secured to the plate 19 and casing 10 by threaded bolts 33. The cylinder 31 is supported on the plate 19 within the central portion thereof so that inlet valve 21 and outlet valve 24 are in direct communication with the passageways between the cylinder and housing 30 while the remaining valves in the plate 19 are enclosed by the cylinder 31. The fluid is pumped by a piston 35 which is slidably mounted within the cylinder 31 and has a screw 36 extending therethrough upon which is threaded a stem 38. The stem projects through a stuffing box 40 formed on the top of

the elongated housing 30 and has a handle 41 affixed to the free end thereof. A packing nut 42 threaded upon the periphery of the stuffing box 40 retains and compresses the packing.

Formed in the base of the pump casing 10 and communicating with the chamber 14 on opposite sides of the partition 15 there are conduits 44 and 45, which are connected together by a conduit 46. A bushing 47 is threaded within the base of the pump casing 10 in axial alignment with the conduit 46 and has an adjusting screw 48 threaded in the end thereof. A coil spring 50 has one end thereof seated on a collar 51 formed on the end of the adjusting screw 48 while the opposite end engages a button 52 for seating a ball valve 54 upon a seat formed in one end of conduit 46. A closure cap 55 is threaded on the periphery of the bushing 47.

The plate 19 may be secured to any suitable support, such as the floor of an airplane cockpit, by bolts 60 for retaining the pump in a rigid and upright position. Thus in the replacement of parts or in the servicing of the pump the removal of the bolts 60 and 33 will permit the housing 30, cylinder 31 and plate 19 to be lifted from the pump casing 10 without necessitating the removal of the casing from the fluid line. A leaf spring 62 disposed on the support for the valve 17 has one end thereof bearing against the plate 19 and the opposite end engaging the valve 17 for urging it towards its seat 16.

The hand pump is particularly adapted for use in airplane fuel lines or in any service where a drop in fluid pressure may be either costly or dangerous. For example, should the automatic fuel pump on an airplane fail to function, resulting in a drop in pressure in the fuel line, the spring 62 will seat the valve 17 upon its seat 16, thus permitting the use of the hand operated pump. Upon the use of the hand operated pump fuel may be drawn from the inlet port 11 through the valves in the plate 19 and delivered to the outlet port 12 from whence it will be forced, under pressure, to the engine carburetor. The upward movement of the piston 35 within the cylinder 31 will cause the inlet valve 22 to be opened due to the suction created by the piston within the cylinder. The opening of the valve 22 will cause fuel to be drawn into the cylinder 31 so that upon the downstroke of the piston the fluid will be forced outwardly through the valve 23 while at the same time valve 21 will be opened, due to the suction created within the housing, thus allowing fuel to be drawn into the passageway between the housing 30 and cylinder 31. Thus upon the succeeding suction stroke of the piston fuel will be drawn into the cylinder from the inlet port 11 through valve 22 while at the same time the fuel contained between the housing and cylinder will be forced out through the valve 24 which communicates with the passageway disposed between the cylinder 31 and housing 30.

If the delivery of the fuel from the housing 30 and cylinder 31 through the valves 23 and 24 to the outlet port 12 is of such a magnitude as to develop a pressure higher than can be accommodated by the carburetor the pressure relief ball valve 54 will then be unseated allowing the fluid to flow through the conduits 44, 45 and 46 and into the inlet side of the chamber 14, thus tending to equalize the pressure on opposite sides of the valve 17.

The hand operated pump is susceptible of operation only when the valve 17 is seated, thus upon a drop in pressure within the fuel line the valve will engage its seat 16 so that the operation of the pump may be effected. The pump is capable of immediate use without the necessity of any valve adjustment, and cannot interfere with the flow of fluid through the casing 10.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a fuel pump comprising a chambered casing having inlet and outlet passages, a plate thereon, a housing on the plate, a cylinder on the plate within the housing and a piston in the cylinder, the combination of a wall dividing said chamber into inlet and outlet compartments communicating respectively with said inlet and outlet passages and axially aligned with said passages, said wall having a valve controlled opening therethrough in axial alignment with said passages, the plate having valve controlled openings for permitting flow of fluid from said inlet compartment to the interior of said housing and cylinder and also having other valve controlled openings for permitting flow of fluid from said housing and cylinder to said outlet compartment.

2. In a fuel pump comprising a chambered casing having inlet and outlet passages, a plate thereon, a housing on the plate, a cylinder on the plate within the housing and a piston in the cylinder, the combination of a wall dividing said chamber into inlet and outlet compartments communicating respectively with said inlet and outlet passages and axially aligned with said passages, said wall having an opening therethrough coaxial with said passages, a check valve pivotally mounted in the outlet compartment for closing said opening upon a decrease in pressure in the inlet compartment, the plate having valve controlled openings for permitting flow of fluid from said inlet compartment to the interior of said housing and cylinder and also having other valve controlled openings for permitting flow of fluid from said housing and cylinder to said outlet compartment and a pressure regulating valve disposed in the base of the casing for equalizing the pressure in said outlet and inlet compartments.

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