

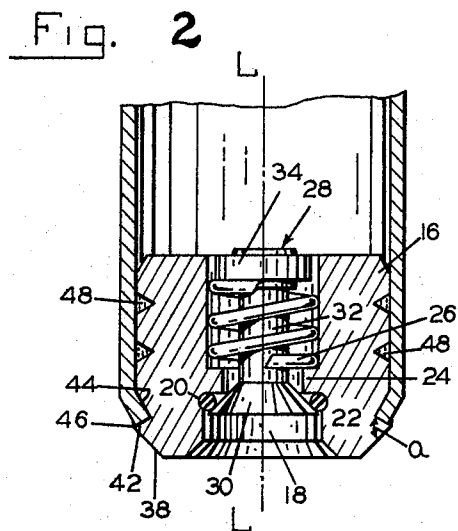
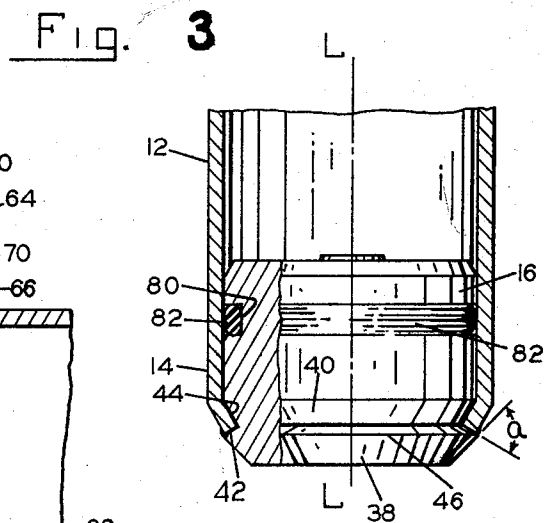
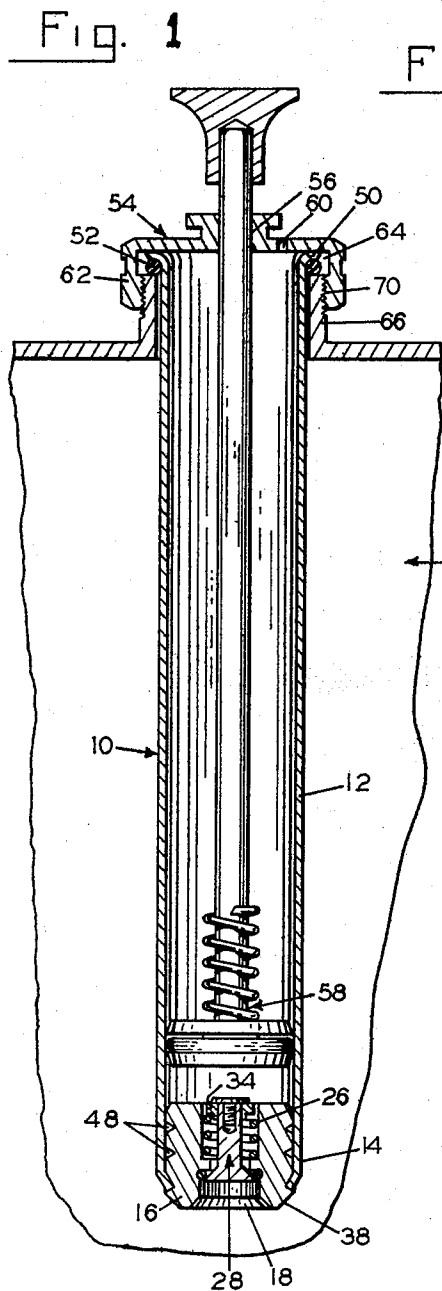
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AIR PUMP FOR PRESSURE VESSELS AND METHOD FOR MAKING SAME

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AIR PUMP FOR PRESSURE VESSELS AND METHOD FOR MAKING SAME

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This invention relates generally to air pumps and more particularly to manually operated cylinder pumps adapted for use in connection with pressure vessels which serve as fuel reservoirs for burners and the like.

Fuel reservoirs for furnaces which include pumps, usually manually operated, for introducing therein an atmosphere under pressure for propelling the fluid to the burners are difficult to construct and assemble economically so as to provide an air tight combination.

Accordingly, the present invention has as an important object the provision of a cylinder pump, the parts of which are of such construction and arrangement that fluid such as air may be pumped in a vessel under high pressure and no leakage to the exterior of the vessel will occur through the pump when the pump is not in use or at the connection between the pump and the vessel.

Another object of this invention is to provide a pump which is simple and economical to manufacture.

Still another object of this invention is to provide an air pump which may be easily removably connected to the reservoir with an effective seal therebetween.

Other objects and advantages of this invention will become apparent from a careful study of the following detailed description and drawings in which a preferred embodiment is described and illustrated; wherein,

FIGURE 1 is a longitudinal sectional view of the pump of my invention showing a fragment of the vessel and the connection of the pump to the vessel,

FIGURE 2 is an enlarged sectional view of the end of the pump showing the detail structure of the valve closure, and

FIGURE 3 is an enlarged sectional view of the end of the pump cylinder showing a modified seal means on the valve closure which is shown partly broken away.

Referring now to the drawings, the numeral 10 designates generally the pump of my invention. The pump 10 comprises a cylinder 12 having one end 14 provided therein with a nozzle or cylindrical closure 16. Said cylindrical closure 16 comprises a cylindrical block having a central passage 18 therethrough. In said passage 18, I provide a recess 20 for retaining therein an elastic O-ring seal 22. I also provide in said passage 18 an internal collar or inwardly projecting ledge 24 on which is seated coil spring 26. Axially movable in said passage 18 is valve 28. Valve 28 comprises a disk 30 which is shaped to make seal contact with O-ring seal 22, a stem 32 formed integral with disk 30 and a bushing 34 removably secured to the end of stem 32. Bushing 34 serves to retain spring 26 in compression against ledge 24 thereby maintaining said spring 26 in a state of bias against bushing 34 to close passage 18 by seating disk 30 against O-ring seal 22.

The exterior end of cylindrical closure 16, as inserted in cylinder end 14, is chamfered as at 38. Adjacent said end, I provide a V-shaped groove 40 circumferentially of said valve closure 16. Side wall 42 of said V groove 40 meets the chamfered surface 38 at an acute angle "a," the vertex thereof being the circumferential edge 46. Side wall 44 of said V groove 40 forms a right angle with side 42.

The chamfered side or surface 38 of closure 16 is formed at an angle of approximately 45 degrees with respect to the longitudinal axis L—L, and the side wall 44 of V groove 40 is formed at an angle of approximately 30

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degrees with respect to said longitudinal axis L—L. Cylindrical closure 16 is further provided with circumferential grooves 48 which serve as capillary reservoirs for a fluid seal material.

The method of assembling the component parts of the present pump 10 to accomplish the objects of this invention, include applying a fluid seal material circumferentially of said cylindrical closure 16. Inserting the cylindrical closure 16 in cylinder end 14 preferably by means of a forming die (not shown). The forming die will also circumferentially bend or crimp the cylinder end 14 in V groove 40 to lap over and abut against side walls 44 and 42, respectively, of said groove 40 and deform or collapse the circumferential edge 46 causing said edge 46 to lap over the said abutting cylinder end 14 at the exterior corner thereof and mechanically unite therewith, with approximately the force of a weld, thereby providing an exceedingly effective seal therebetween. I have found that bending or crimping the cylinder end 14 30 degrees to contiguously lap in groove 44 and deforming an edge of approximately 75 degrees, such as circumferential edge 46, to lap over cylinder end 14 provides a most effective seal with the least destructive deformation.

As shown in FIGURE 1, the other end of cylinder 12 is flared outwardly to form a circumferential rim 50 providing on one side thereof an annular recess against which may be seated a seal ring 52; and providing on the other side thereof a bearing surface for engaging cylinder cap 54.

Cylinder cap 54 is provided with opening 56 for guiding piston rod and piston 58 for reciprocal movement in cylinder 12 and a vent hole 60. Cylinder cap 54 includes a skirt portion 62 which is internally recessed as at 64 to allow seal ring 52 to be laterally adjusted for alignment with connecting nipple 66 of pressure vessel 68. Skirt portion 62 is internally threaded as at 70 by which means cap 54 is threaded to nipple 66 thereby securing pump 10 to pressure vessel 68 with a seal connection therebetween.

FIGURE 3 shows cylinder closure 16 modified in that I provide therein a single circumferential groove 80 in which is fitted a flexible ring seal 82. Ring seal 82 has an outside diameter greater than the outside diameter of cylinder closure 16. Upon assembling cylinder closure 16 to cylinder 12, the ring seal 82 is deformed to fit tightly in groove 80 with a seal contact against the sides of said groove 80 and cylinder 12.

It is apparent from the foregoing that the pump of my invention includes novel structure which provide joints which are leak-proof under high-pressure service and which is simple and economical to manufacture.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of my invention.

I claim:

1. A valve closure for a cylinder pump comprising a cylindrical body having a passageway axially therethrough, a circumferential recess in said passageway, an elastic O-ring seal in said circumferential recess, an inwardly projecting ledge circumferentially in said passageway, a valve axially movable in said passageway, said valve including a stem having a removable bushing and a disk closure for seating against said elastic O-ring seal, a coil spring on said stem of said valve, one end of said coil spring seated on said ledge, the other end of said coil spring being biased against said bushing, the terminal end of said cylindrical body being circumferentially chamfered at an approximate angle of 45 degrees with said body, a right angle V groove circumferentially of said cylindrical body, one side of said V groove being sloped approximately 30 degrees into said cylindrical body, the other side of said V groove forming an edge with said chamfered end and

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forming an included angle of approximately 75 degrees with said chamfered end, and at least one other groove circumferentially of said cylindrical body.

2. A manually operated piston pump for use in connection with a pressure vessel wherein said pressure vessel is provided with a necked opening comprising, a cylinder, a valved closure for one end of said cylinder, said valved closure comprising a cylindrical body having a passageway axially therethrough, a circumferential recess in said passageway, an elastic O-ring seal in said circumferential recess, an inwardly projecting ledge circumferentially in said passageway, a valve axially movable in said passageway, said valve including a stem having a removable bushing and a disk closure for seating against said elastic O-ring seal, a coil spring on said stem of said valve, one end of said coil spring seated on said ledge, the other end of said coil spring being biased against said bushing, the terminal end of said cylindrical body being circumferentially chamfered at an approximate angle of 45 degrees with said body, a right angle V groove circumferentially of said cylindrical body, one side of said V groove being sloped approximately 30 degrees into said cylindrical body, the other side of said V groove forming an edge with said chamfered end and forming an included angle of approximately 75 degrees with said chamfered end, at least one other groove circumferentially of said cylindrical body containing a viscous compound, the end of said cylinder being circumferentially crimped approximately 30 degrees inwardly to contiguously lap on said one side of said right

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angle V groove and abut against said other side thereof, said edge being deformed to lap over said cylinder end, the other end of said cylinder dished outwardly forming a seal retaining rim, an apertured cap bearing against said rim, and said cap having an internally threaded skirt portion spaced concentrically from said cylinder for connecting said necked opening of said vessel.

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