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L. H. GUSTAFSON

2,335,245

PUMP VALVE

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Fig. 1.

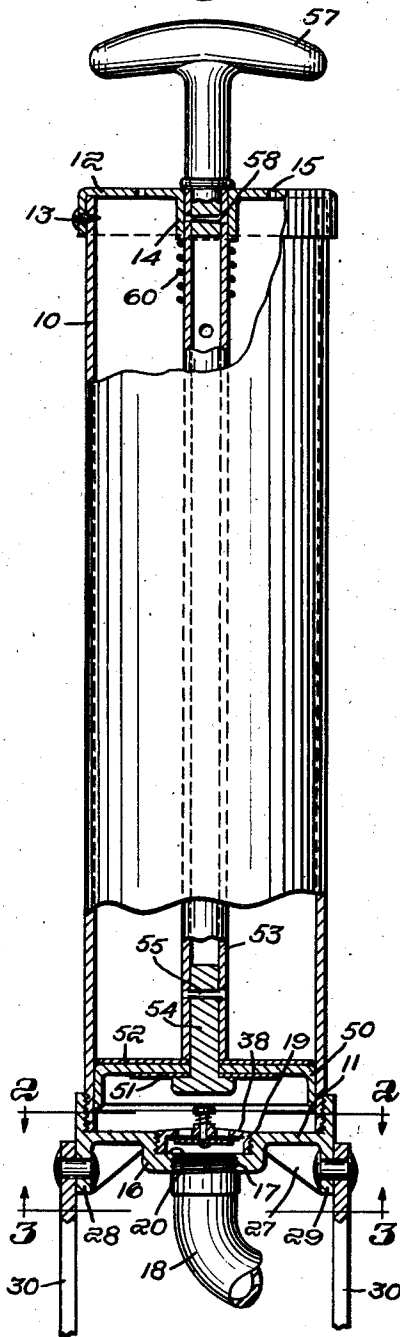


Fig. 2.

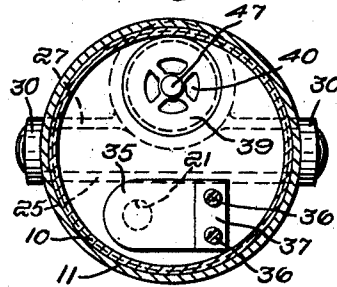


Fig. 3.

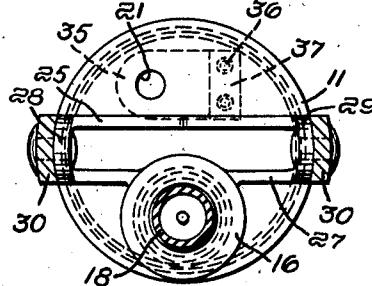


Fig. 4.

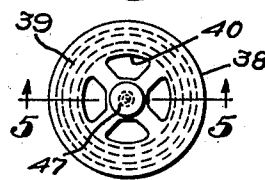
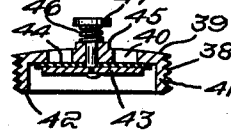


Fig. 5.



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UNITED STATES PATENT OFFICE

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PUMP VALVE

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4 Claims. (Cl. 277—61)

My invention relates to pump valves for inflatable life rafts carried by military aircraft.

Such pumps comprise a compression chamber formed by a tubular body closed at its base and top and having a piston which is reciprocable by a manually operable rod extending through the top. Valve means is provided for controlling the flow of air into and out of the compression chamber. Although the pump must meet exacting specifications, its weight is important and must be as little as possible. For these reasons it has been established practice to form its body of aluminum. Because of the present great demand for aluminum in the manufacture of war materials, it is important to replace aluminum by some other material wherever possible. It has been proposed to construct a pump of this character by making its body of a plastic material instead of aluminum but in such constructions considerable difficulty has been experienced with the base connection and valve structure.

My present invention provides a pump valve structure of the general character described above in which the body is formed of a plastic material, such as polystyrene. The fitting for the valve which controls the flow of air from the compression chamber also is formed of a plastic material, such as polystyrene. These and other features of the invention are so constructed and arranged as to provide a pump which meets required specifications and is lighter in weight than a pump of the same capacity of aluminum construction.

The invention will be more clearly understood from the following description in conjunction with the accompanying drawing, in which

Fig. 1 is an elevational view, partly in section, of a pump embodying the invention;

Figs. 2 and 3 are sectional views taken respectively on the lines 2—2 and 3—3 of Fig. 1;

Fig. 4 is a plan view of one of the pump parts; and

Fig. 5 is a sectional view taken upon the line 5—5 of Fig. 4.

A pump embodying the invention as illustrated in the accompanying drawing comprises a tubular body 10 of plastic material, such as polystyrene. One end of the tube 10 is threaded to receive an internally threaded substantially cup-shaped base closure 11 of plastic material, the end of the tube 10 abutting the inner surface of the base closure to provide an air-tight seal therebetween. The other end of the tube 10 is closed by a cap 12 of plastic material which

is secured thereto by screws 13. The cap 12 is provided with a central opening aligned with an integral tubular bearing sleeve 14. The cap 12 also is provided with suitable vent openings 15.

The base closure 11 is provided with an axially offset boss 16 projecting from its outer surface. The boss 16 is provided with a threaded passage 17 to receive a flexible tube 18 adapted to be connected to an inflatable life raft. The inner surface of the base closure 11 is provided with a threaded recess 19 opposite the boss 16 and providing a shoulder 20 adjacent the inner end of the passage 17. The closure 11 also is provided with an axially offset vent opening 21 substantially diametrically opposed with respect to the recess 19 and passage 17. The outer surface of the closure 11 is provided with a reinforcing rib 25 disposed between the boss 16 and the vent opening 21. Aligned ribs 27 disposed in parallel spaced relation to the rib 25 intersect the boss 16. Ears 28 and 29 connect the outer ends of the rib 25 with the outer ends of the ribs 27, respectively. A suitable fixture 30 holding the pump during operation extends between and is secured to the ears 28 and 29.

The vent opening 21 is controlled by a flap valve 35 of suitable flexible material, such as rubber, which is secured to the inner surface of the closure 11 by screws 36, a plate 37 being interposed between the heads of the screws 36 and the valve 35. The flow of air through the passage 17 is controlled by a valve carried by a valve fitting 38 of substantially inverted cup-shape formed of injection molded plastic material, such as polystyrene. The fitting 38 comprises a spoked disc-like portion 39 providing air passages 40 and an integral externally threaded cylindrical portion 41 adapted to be received in the threaded recess 19 with its lip 42 abutting the shoulder 20 to provide an air-tight connection therebetween. The air passages 40 are controlled by a disc valve 43 having a rubber surface or layer 44 adapted to engage the disc 39. The disc valve 43 is carried by a valve stem 45 extending through and slidably engaging a central passage in the disc 39. The disc valve 43 normally is held in its closed position by a spring 46 surrounding the valve stem 45 with one end engaging the disc 39 and its other end engaging a shoulder 47 formed on the outer end of the stem 45.

A cup-shaped piston 50 of leather or other suitable material is interposed between discs 51 and 52 and is secured to the end of a piston rod, such as a tube 53, by a headed rod 54 which pro-

jects into the tube 53 and is secured thereto by a pin 55. The other end of the tube 53 projects into and slidably engages the guide sleeve 14. A T-shaped operating handle 57 projects into the upper end of the tube 53 and is secured therein by a pin 58. A spring 60 surrounds the tube 53 to cushion the piston at the upper end of its stroke.

To operate the pump, the operator grips the fixture 30 either with his hand or by inserting his foot therein and the piston is reciprocated manually by pulling and pushing upon the handle 57. As the piston is moved upwardly away from the base closure 11, suction is created which opens the flap valve 35 and permits air to enter through the vent opening 21 to relieve suction. During the upward stroke of the piston the disc valve 43 is maintained closed by the spring 46. As the piston is moved downwardly toward the base closure 11, the air within the tubular body forming the compression chamber is compressed to close the flap valve 35 and open the disc valve 43 thereby permitting the compressed air to be forced through the passage 17 and tube 18 into the inflatable life raft.

I claim:

1. In a pump having a tubular body forming a compression chamber, a base closure of plastic material for one end of said body having an axially offset vent opening therethrough, an axially offset boss projecting from the outer surface of said closure and having a threaded passage communicating with a threaded recess in the inner surface of said boss and providing a shoulder adjacent the inner end of said passage, an inverted cup shaped valve fitting of plastic material threaded in said recess with its lip engaging said shoulder, said fitting having a valve controlled air passage, and a valve of flexible sheet material secured at one end upon the inner surface of said closure and adapted to extend over said vent opening to open and close the same.

2. In a pump having a tubular body forming a compression chamber, a base closure of plastic material for one end of said body having an axially offset vent opening therethrough, an axially offset boss projecting from the outer surface

of said closure and having a threaded passage communicating with a threaded recess in the inner surface of said boss and providing a shoulder adjacent the inner end of said passage, an inverted cup shaped valve fitting of plastic material threaded in said recess with its lip engaging said shoulder, said fitting having a valve controlled air passage, and a valve of flexible sheet material secured at one end upon the inner surface of said closure and adapted to extend over said vent opening to open and close the same, said base closure having spaced reinforcing ribs on its outer surface one of which intersects said boss and the other extends between said boss and said vent opening.

3. In a pump having a tubular body of plastic material forming a compression chamber, a base closure of plastic material for said body having a vent opening therethrough, said base having a threaded passage communicating with a threaded recess in the inner face of the base providing a shoulder adjacent the inner end of said passage, an inverted cup shaped valve fitting of plastic material threaded in said recess with its lip engaging said shoulder, said fitting having an air passage, a spring pressed disc valve within said fitting adapted to close said air passage, and a valve of flexible sheet material secured at one end upon the inner surface of said base closure and adapted to extend over said vent opening to open and close the same.

4. In a pump having a tubular body forming a compression chamber, a base closure of plastic material for one end of said body having an axially offset vent opening therethrough, said base closure having an axially offset threaded passage communicating with a threaded recess in the inner face of the closure and providing a shoulder adjacent the inner end of said passage, an inverted cup-shaped valve fitting of plastic material threaded in said recess with its lip engaging said shoulder, said fitting having a valve controlled air passage, and a valve of flexible sheet material secured at one end upon the inner surface of said closure and adapted to extend over said vent opening to open and close the same.

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