

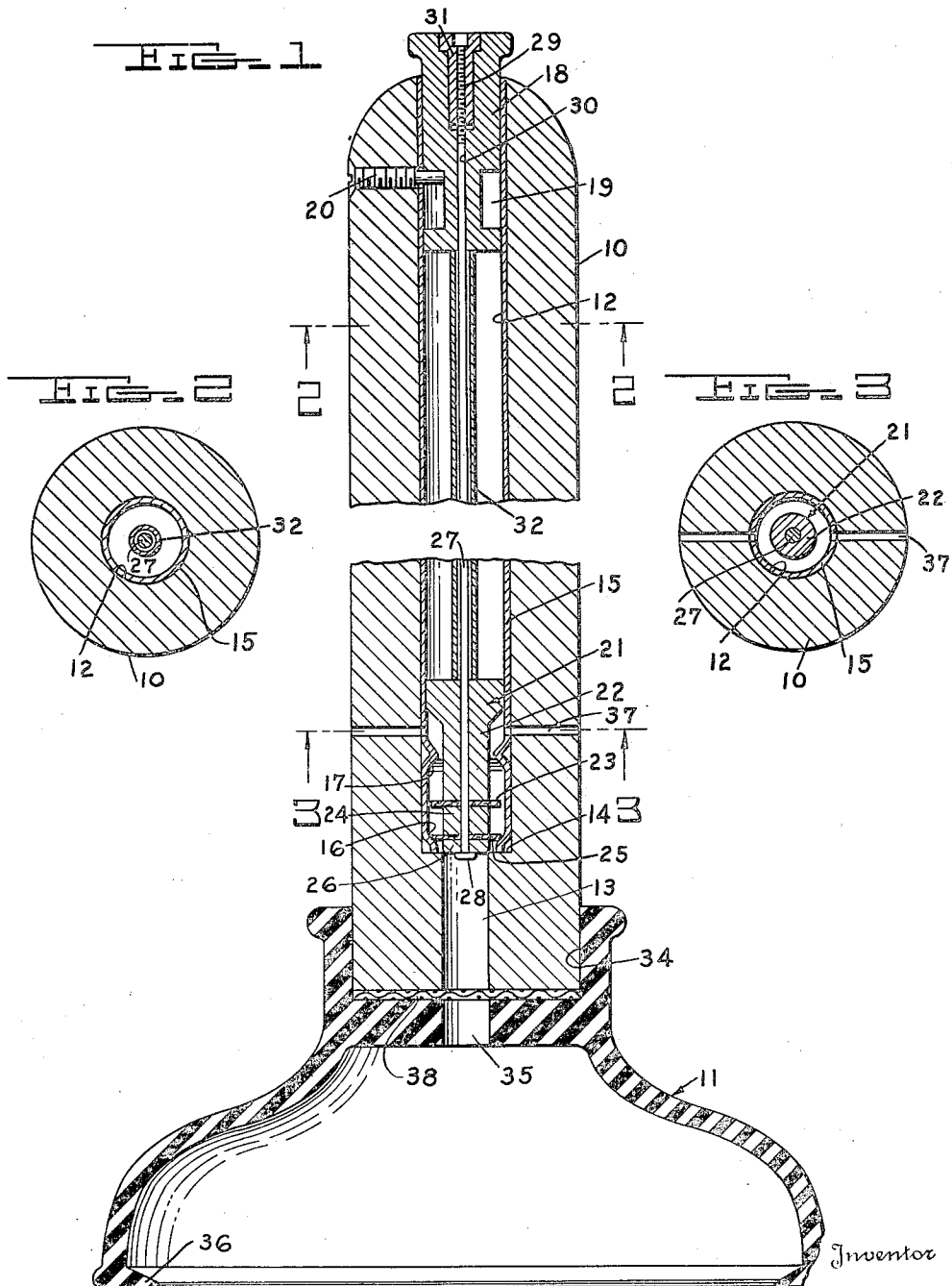
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PLUNGER PUMP

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PLUNGER PUMP

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This invention relates generally to pump plungers and refers more particularly to improvements in the type of hand operated plungers employed in clearing drains.

Plungers of the above general type usually comprise an elongated handle having an inverted cup-shaped member secured to one end thereof and formed of rubber or some equivalent resilient material. The open side of the cup-shaped member is of sufficient dimension to fit over a drain and the walls of the member are sufficiently resilient to collapse in response to a downward thrust on the handle. Once the lip of the cup-shaped member is firmly engaged with the surface surrounding the drain, the interior of the member is sealed, with the result that air is displaced under pressure into the drain in response to collapsing the member, and is withdrawn from the drain upon restoring the member to its normal shape. The resulting agitation has a tendency to dislodge particles clogging the drain and some success has been obtained in cases where the condition is not severe.

It is the object of this invention to improve the effectiveness of the above general types of plungers by incorporating means enabling selective operation of the plunger as a suction pump or pressure pump depending upon which method is the most suitable for the particular application of the pump.

Another feature of this invention is to connect the interior of the inverted cup to the atmosphere with a passage having annular seats spaced from each other in the direction of air flow through the passage and having valve means comprising discs secured at their central portions to a reciprocable element and having flexible peripheral portions alternatively engageable with the valve seats upon movement of the element in opposite directions. The specific arrangement is such that when the valve means is moved to engage one of the valve discs with the adjacent seat, the air displaced by collapsing the inverted cup-shaped member is permitted to escape through the passage to the atmosphere instead of being forced into the drain as is the case with orthodox plungers. However, in the above position of the valve means, reverse flow of air into the cup is prevented when the cup is restored to its normal shape, so that a suction is created in the drain. On the other hand, when the valve means is moved to engage the other valve disc with its adjacent seat, the air trapped in the cup is prevented from escaping from the cup to the atmosphere, as the cup is collapsed, so that air is forced

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into the drain. This latter valve disc, however, permits air to flow from the atmosphere into the cup when the latter is restored to its normal shape, so that no suction is created, and the plunger acts solely as a pressure pump.

The foregoing as well as other objects will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawing, wherein:

10 Figure 1 is a vertical sectional view through a plunger type pump constructed in accordance with this invention;

15 Figures 2 and 3 are respectively cross sectional views taken on the planes indicated by the lines 2—2 and 3—3 of Figure 1.

The hand operated plunger pump illustrated in the drawing comprises an elongated handle 10 and an inverted cup-shaped member 11 secured to the lower end of the handle. The handle 10 may be formed of any suitable material, such for example, as wood, plastic or metal, and the inverted cup-shaped member 11 is preferably formed of rubber, synthetic rubber, or some material having equivalent characteristics.

25 The handle 10 is formed with an axially extending bore 12 therethrough having a reduced portion 13 at the lower end providing an annular shoulder 14. A tube 15 of wear-resisting material is secured in the bore 12 with the lower end seated against the shoulder 14. The lower end portion of the tube 15 is fashioned to form axially spaced annular valve seats 16 and 17. The upper end portion of the tube 15 is open for receiving an operating plunger 18 having an annular groove 19 in the periphery thereof for receiving a stop 20. The stop 20 is in the form of a screw threaded into the upper end of a handle 10 and projecting into the groove 19 through an opening formed in the tube 15. The groove 19 is elongated in the direction of the length of the tube 15 to enable sliding movement of the operating plunger 18 in opposite directions relative to the handle.

45 A valve carrying body 21 is slidably supported by the tube 15 at the lower end thereof and is formed with a reduced portion 22 having an outside diameter substantially less than the diameter of the valve seats 16 and 17. As shown in Figure 1 of the drawing, the reduced portion 22 extends axially through the valve seat 17 and a valve disc 23 is clamped to the lower end of the reduced portion by a spacer 24. A second valve disc 25 is clamped against the lower end of the spacer by a washer 26.

55 It will be noted from the drawing that the two valve discs are located in the tube 15 between

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the valve seats 16 and 17. In the present instance the valve discs are clamped to the body 21 by a rod 27 adapted to project through aligned openings formed in the washer 26, valve disc 25, spacer 24, valve disc 23 and the body 22. The lower end of the rod is formed with a head 28 engageable with the bottom surface of the washer 26, and the upper end of the rod is provided with a threaded portion 29. The rod is of sufficient length to enable extending the threaded portion 29 into a bore 30 formed in the operating plunger 18. The upper end of the bore 30 is enlarged to receive a tubular nut 31 internally threaded for threadably engaging the portion 29 of the rod. The plunger 18 is spaced from the valve carrying body 21 by a tube 32. The rod extends axially through the tube 32 and the tube is of sufficient length to enable respectively engaging opposite ends with the operating plunger 18 and valve carrying body 21.

It follows from the above that movement of the operating plunger 18 in opposite directions throughout the extent allowed by the annular groove 19 effects a corresponding movement of the valve carrying body 21. This movement is transmitted to the valve discs by the valve carrying body 21, and is sufficient to alternatively engage the peripheral portions of the discs with the valve seats 16 and 17 upon movement of the plunger 18 in opposite directions. The valve discs are formed of a flexible material, so that the peripheral portions of the discs may flex away from the valve seats to permit passage of fluid under certain conditions.

The cup-shaped member 11 is formed with a recess 34 at the upper end for receiving the lower end of the handle 10, and a port 35 is formed in the base of the cup-shaped member in registration with the reduced portion 13 of the bore 12. The side wall of the cup-shaped member flares outwardly and terminates in a lip 36 for engagement with the surface surrounding a drain, for example.

The port 35 cooperates with the bore 12 to form a passage for air, and the upper end of the passage communicates with the atmosphere through bores 37 formed in the handle 10 above the top valve seat 17. A filtering screen 38 is preferably supported in the recess 34 in the cup-shaped member between the base of the recess and the adjacent bottom surface of the handle to prevent foreign matter from escaping into the passage or bore 12.

Referring now to the operation of the pump plunger and assuming that the operating plunger 18 is held in its lowermost position wherein the bottom disc valve 25 engages the adjacent seat 16, and that the inverted cup-shaped member is collapsed by exerting a downward thrust on the handle 10, it will be noted that the air trapped in the cup-shaped member flows upwardly against the peripheral portion of the valve disc 25. As a result the peripheral portion of the valve disc 25 is flexed away from the seat 16 and the air is permitted to flow to the atmosphere throughout ports 37. However, reverse flow from the atmosphere to the interior of the cup-shaped member 11 is prevented by the valve disc 25, so that a suction is created within the cup-shaped member as the latter is restored to its normal shape. Thus the plunger acts entirely as a suction pump, and very little or no air is forced into the drain as is the case with conventional types of plunger pumps.

When it is desired to employ the plunger as a

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pressure pump, the operating plunger 18 is moved upwardly to engage the valve disc 23 with the seat 17. Thus air trapped in the inverted cup-shaped member 11 is prevented from escaping to the atmosphere, and is directed into the drain under pressure when the cup-shaped member is collapsed. Restoration of the cup-shaped member 11 to its normal shape is permitted without creating a suction by reason of the fact that air is permitted to flow from the atmosphere around the valve disc 23 to the cup-shaped member 11 as the latter is returned to its normal position.

What I claim as my invention is:

1. A plunger comprising a handle and an inverted cup-shaped portion at one end of the handle collapsible to effect an increase in pressure therein, means for venting the interior of the cup-shaped portion to the atmosphere including a passage having annular valve seats spaced from each other in the direction of flow through the passage, and valve means slidably supported in the passage between said seats and relatively engageable with the seats upon movement in opposite directions.

2. A plunger type pump comprising a handle, an inverted collapsible cup-shaped member of resilient material secured to one end of the handle, means for venting the interior of the cup-shaped member including a passage having annular valve seats spaced from each other in the direction of flow through the passage, a plunger movable in opposite directions in the passage, and valve discs secured at their centers to the plunger and having flexible peripheral portions alternatively engageable with the valve seats upon movement of the plunger in opposite directions.

3. A plunger type pump comprising a handle having a bore therethrough, an inverted collapsible cup-shaped member of resilient material having the base secured to one end of the handle and having an opening through the base registering with the bore in the handle to provide a passage, a port through one side of the handle connecting the passage to the atmosphere, a pair of annular valve seats located in the passage between the port and opening in the base of the cup-shaped member and spaced from each other lengthwise of the passage, a plunger supported in the passage for movement in opposite directions lengthwise of the passage, and valve discs secured at the central portions to the plunger between the valve seats and having flexible peripheral portions alternatively engageable with the valve seats upon movement of the plunger in opposite direction.

4. A plunger type pump comprising a handle, an inverted collapsible cup-shaped member of resilient material secured to one end of the handle, means for venting the interior of the cup-shaped member to the atmosphere including a passage having annular valve seats spaced from each other in the direction of air flow through the passage, a plunger slidably supported in the passage and having a portion extending through the annular valve seats, valve discs secured at their central portions to the plunger in spaced relation to each other between the valve seats and having flexible peripheral portions alternatively engageable with the valve seats upon movement of the plunger in opposite directions, and means accessible for manipulation on said handle and connected to said plunger for sliding the same.

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