March 21, 1933. A. C. PILCHER ET AL 1,902,261

SIRUP PUMP

Filed July 7, 1930

Fig. 1.

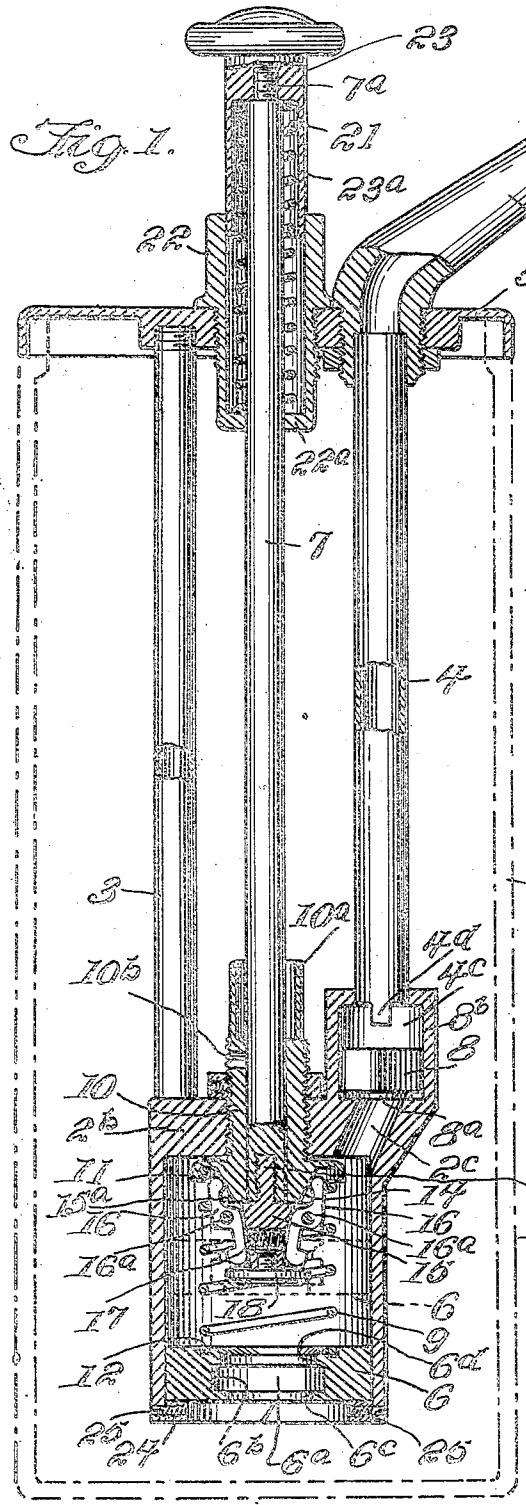


Fig. 2.

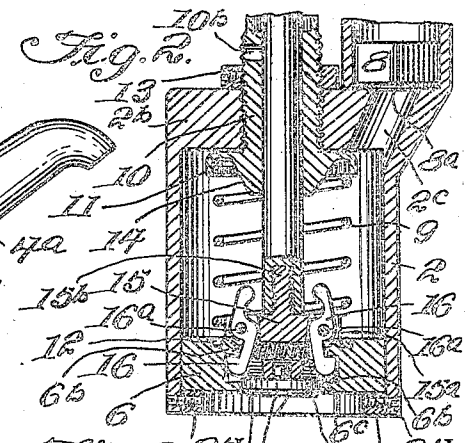


Fig. 3.

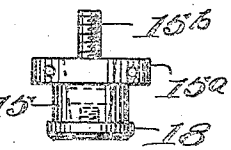


Fig. 5.

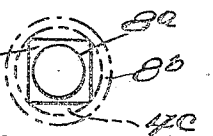


Fig. 4.

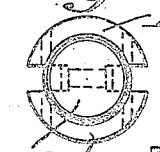


Fig. 6.

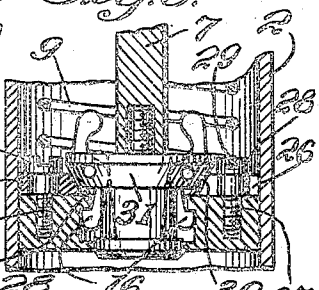
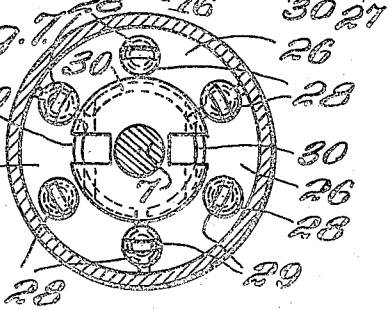


Fig. 7.



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UNITED STATES PATENT OFFICE

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SIRUP PUMP

Application filed July 7, 1930. Serial No. 466,236.

Our present invention relates to improvements in liquid dispensing pumps designed to deliver measured or predetermined quantities of liquid.

An object of the invention is the provision of a very simple and inexpensive pump which will be accurate and reliable in use.

The invention also aims to provide a novel means which will be inoperative to deliver the liquid until the actuating member has been moved for a full stroke, thereby preventing delivery of less than the full measured amount.

The invention further aims to provide a novel form of liquid inlet valve through the piston, in which the valve port is closed by a valve member on the end of the actuating member or piston rod.

Another object of the invention is to provide a liquid dispensing pump in which the piston actuating member consists of a piston rod detachable from the piston.

The invention also aims to provide effective means whereby the pump may be adjusted to deliver a greater or less amount of liquid.

Other objects will appear hereinafter.

The invention consists in the features, combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

Referring to the drawing:

Figure 1 is an elevation partly in vertical section of a pump embodying the features of the invention, with the sirup container indicated in dotted lines.

Fig. 2 is a vertical section of the cylinder showing the actuating member at the extremity of its inward stroke and connected to the piston.

Fig. 3 is a view of the enlargement or body for the end of the actuating member.

Fig. 4 is a bottom plan of the end of the piston rod enlargement.

Fig. 5 is a plan view of the check valve.

Fig. 6 is a sectional view of a form of piston locking means to prevent downward movement when the piston and rod are connected.

Fig. 7 is a top plan view of Fig. 6.

In the drawing, 1 represents the container, shown conventionally in dotted lines, for holding the sirup or other liquid to be delivered. The pump showing one embodiment of the present invention, is inserted in the container. The pump comprises a cylinder 2 which is carried at the lower end of vertical columns 3 and 4 which are connected at their upper ends to a cover member 5 for the container, by which cover member, the various parts of the delivery mechanism are supported.

The pump cylinder contains a piston 6. The piston 6 has no permanently connected piston rod but has a port 6*a* for removably receiving the end of an actuating member or piston rod 7 passing through an opening in the cylinder head 2*b*.

The column 4 is made hollow for delivery purposes and terminates at its upper end in a delivery spout 4*a* while at its lower end where it joins the cylinder head, it is enlarged to form a valve chamber 4*c* within which is located an upwardly opening check valve 8. The check valve 8 cooperates with a valve seat formed at the upper end of the port 2*c* in the cylinder head which places the valve chamber in communication with the piston chamber or cylinder 2.

Normally the piston is held in lower or inward position as shown in Fig. 1 by a compression spring 9.

Mounted in the opening in the cylinder head 2*b* is a threaded adjusting or regulating member 10 having an annular flange 11 at its lower end providing an upper bearing for compression spring 9. The lower end of the spring 9 bears in a groove 12 in the piston.

The regulating member 10 is in the form of a cylinder having a bore in which the piston actuating member or piston rod 7 is slidable. A lock nut 13 is provided at the upper end of the adjusting member 10 to lock it in adjusted position with respect to the cylinder head.

The regulating member may be adjusted from the outside by means of a pin wrench inserted in hole 10*b*.

The regulating member at its upper end is provided with an upstanding flange 10*a*

forming a reservoir for the sirup or other liquid which prevents air leakage into the cylinder past the piston rod when the liquid level in the container is below the top of the flange 10*a*.

The lower end of the adjusting member below the flange 11 is provided with an inclined tapered cam or lock releasing portion 14.

The lower end of the actuating member or piston rod 7 is provided with an enlargement 15 in which latches or pawls 16 are pivotally mounted at 16*a*. The latches 16 are spring-pressed outwardly by means of spring means 17. The enlargement 15 is preferably formed separate from the rod 7 and is attached thereto by stud 15*b* being fixed in a corresponding bore in the piston rod.

On the very end of the body 15 of the piston actuating member or rod 7, is provided a solid valve disc 18 adapted to fully close the hole or port 6*a*.

The piston at port 6*a* is provided with a groove 6*b* providing lower and upper flanges, 6*c* and 6*d*. The lower flange 6*c* is adapted to be snugly engaged by the edge of disc 18 and forms an effective valve closure for the port in the piston. With the port thus closed by disc 18 engaging flange 6*c*, the latches 16 are engaged beneath the flange 6*d*. The flange 6*d* is shorter than flange 6*c* and provides a larger opening than that provided by flange 6*c*.

The rod or actuating member is urged upwardly by spring 21 having a bearing at its lower end on inturned flange 22*a* at the lower end of tubular member or sleeve 22 mounted in the cover member. The actuating member or rod 7 has a reduced threaded extension 7*a* at its upper end which engages a correspondingly threaded recess in a handle member 23 designed to receive the pressure of the hand of the operator, which member 23 has a depending sleeve or skirt 23*a* which telescopically fits the guide tube 22 and which also encloses the upper end of the spring 21.

Pressure on the handle member 23 forces it downwardly and the disc valve 18 on the end of the actuating rod 7 enters and closes the hole at the bottom of the piston 6. The actuating member 7 and the piston are at the same time locked together by means of the latches 16 located above the disc valve 18, the latches engaging beneath the flange 6*d* on the piston, as shown in Fig. 2.

This, of course, only takes place when the actuating rod 7 is depressed for a full stroke, since the piston is disposed at the very bottom of the cylinder and rests against the flange provided by split ring 24 secured by pins or the like 25, to the cylinder wall.

When downward pressure is removed from the handle member, spring 21 raises the handle member and actuating rod with the piston locked to it, thus accomplishing the discharge.

During the latter part of the upward stroke of the actuating or piston rod 7, the release of the piston is accomplished by the upper ends of the latches 16 riding up the taper 14 of the regulating or adjusting member 10.

Upon release of the latches from the piston, the actuating member 7 continues upwardly a short distance, carrying the disc valve 18 out of contact with the piston flange 6*c* and thus opening the piston valve port 6*a*. The hole formed by flange 6*d* being larger than that formed by flange 6*c*, the free release and separation of the piston and actuating member is accomplished upon disengagement of the latches from flange 6*d*, since the liquid may flow freely through and above the piston and around the actuating member as soon as disc 18 is lifted from sealing contact with valve flange 6*c*. The piston is then free to descend under its own weight and under the influence of the coil spring 9, until the piston rests upon the flange provided by split ring 24 at the bottom of the cylinder. The releasing position of the piston is shown in dotted lines in Fig. 1.

The actuating member continuing upwardly a short distance after the piston is released, prevents a vacuum which would occur by endeavoring to lower the piston until a passage is open through the piston. The actuating member moving upwardly after release of the piston opens the piston port and allows a flow of sirup or other liquid to occupy the increasing space above the piston caused by the downward movement of the piston.

The spring 21 is of sufficient power to move the piston upwardly against the action of the spring 9, when the actuating member is locked to the piston.

Adjustment of the regulating member 10 will move the taper 14 down or up to release the piston sooner or later which will make the discharge smaller or larger.

Shoulder 15*a* on enlargement 15 on piston actuating rod 7 will limit upward movement of the rod 7 and handle member 23 by engagement with the lower end of tapered portion 14.

The check valve 8 is preferably made from square stock as shown in Fig. 5 and is provided with a small circular seating surface 8*a*.

Projections 4*d* depend from the tubular column 4 to limit upward movement of the check valve when it is lifted to open position.

In Figs. 6 and 7 is shown an arrangement whereby the piston may be locked if it is attempted to press it down before it has completed its upward discharge stroke and while it is secured to the piston rod. This device may be readily applied to the pump shown in Fig. 1. It comprises an expanding sectional disc 26 mounted on the top of the piston by screws 27 the heads 28 of which hold the sectional disc to the piston. As shown in Fig. 7 the disc 26 may comprise three segments. In this arrangement the piston ten-

sion spring 9 rests upon the screw heads in kerfs or slots 29 therein.

The inner edges of the disc segments are inclined as shown at 30 in Fig. 6 to correspond with an incline 31 formed on the actuating member enlargement body 15 adjacent the latch pivots 16*a*. The latches 16 are not shown in Fig. 6.

The sectional disc will expand in case the actuating member is pushed down while it is connected to the piston by the latches. This is caused by the incline 31 pushing down against the incline 30 which forces the segments of the disc outwardly. The expansion of the segments against the walls of the cylinder locks the piston against downward movement.

The expansible sectional disc piston effectively locks the piston against downward strokes and prevents interference with the full amount of discharge on the upward discharge stroke.

The pump may be made as shown in Fig. 1 or with the locking devices of Figs. 6 and 7 included. With the locking device included in the pump of Fig. 1 it will be apparent that, with the piston occupying the position shown in Fig. 1, the actuating member will latch into connection with the piston just before it reaches the end of its downstroke. Further downward movement simply causes the segmental lock to operate. The end of the downstroke of the actuating member is determined by the shoulder 32 of the body enlargement 15 engaging the top of the piston at upper flange 6*d*. This engagement may never occur due to the fact that the segments will first lock against the cylinder walls.

The screw holes 27*a* in the segments of the sectional disc 26 are larger than the shanks of the screws and permit movement of the segments during the locking and unlocking movements.

The fact that the coil spring 9 rests upon the screw heads eliminates frictional contact between the coil spring and the expanding segments.

The square construction of the check valve body 8 simplifies and facilitates manufacturing. The square valve body has a free working fit in the circular or round cylinder 8*b*. The corners of the square movable body 8 are slightly rounded and serve as guides for the body in the cylinder. The segmental spaces between the round cylinder and square valve body serve as passageways permitting the upflow of sirup, thus eliminating the making of slots in the valve body for this purpose.

We claim:

1. In a liquid dispensing pump, a piston having a port, an actuating member having means to operatively connect with said piston for unitary movement therewith, means moving with the actuating member for closing said port, and means rendered operative during such unitary movement to disconnect said actuating member from the piston for relative endwise movement and to open said port.

2. In a liquid dispensing pump, a cylinder, a piston having a port, a piston actuating member movable inwardly through said cylinder into connection with said piston for unitary outward movement therewith and closing said port, latches connecting said actuating member and piston, and means releasing said connection during the outward movement of said actuating member to open said port and to separate said actuating member and piston, said means including a tapered member depending from the cylinder head to be engaged by said latches.

3. A liquid dispensing pump according to claim 2 in which said tapered member is carried by a discharge regulating member adjustably mounted in the cylinder head to move said tapered member inward or outward.

4. In a liquid dispensing pump, a cylinder, a piston having a port, a piston actuating member movable inwardly through said cylinder into connection with said piston for unitary outward movement therewith and closing said port, an enlargement on the inner end of said piston actuating member, said piston receiving said enlargement to close said port, a locking flange on the piston at said port, latches pivotally mounted on said enlargement and spring-pressed outwardly to engage beneath said flange, and means releasing said latches during the outward movement of said actuating member for opening said port and to separate said actuating member and piston, said means including a tapered member depending from the cylinder head to be contacted by said latches.

5. A liquid dispensing pump according to claim 4 in which said tapered member is carried by a discharge regulating member adjustably mounted in the cylinder head to move said tapered member inward or outward, said regulating member having an upstanding flange at its upper end providing a liquid reservoir to seal the passage of the piston through the cylinder head against sucking in air when the level of the liquid is below the reservoir.

6. A liquid dispensing pump according to claim 4 in which said enlargement is provided with a terminal valve disc, and slots above said disc to receive said latches, said latches each having a hooked head below its pivot and an arm extending above its pivot, said piston at said port being provided with a groove beneath said locking flange to receive the heads of the latches, the port below said groove being adapted to be closed by said valve disc, the latch arms being adapted to ride upon said tapered member.

7. A liquid dispensing pump according to claim 4 in which said tapered member is carried by a discharge regulating member adjustably mounted in the cylinder head to move said tapered member inward or outward, said regulating member having a spring bearing flange adjacent said tapered member, a groove in the upper face of the piston, a spring bearing at its upper end against said spring bearing flange and at its lower end against the bottom of said groove to urge the piston inwardly, and a flange in said cylinder forming a rest for the piston limiting its inward movement, said enlargement providing a shoulder adapted to engage the lower end of the tapered member to limit upward movement of the actuating member.

8. A liquid dispensing pump according to claim 2 in which said piston actuating member connects with the piston and closes the port in the piston before the actuating member has reached the end of its inward stroke.

9. A liquid dispensing pump according to claim 2 in which said piston at said port is provided with an upper locking flange for cooperating with said latches and a lower valve flange for cooperating with the valve disc on the end of the actuating member to seal the port, said upper flange being shorter than the lower flange and providing a larger opening whereby upon disengagement of the latches the free release and separation of the piston from the actuating member is effected by the free passage of the liquid through and above the piston and around the actuating member.

10. A liquid dispensing pump according to claim 2 including radially movable locking means on said piston and means on said actuating member to move said locking means into engagement with the cylinder walls upon downward movement of said actuating member while connected to said piston.

11. In a liquid dispensing pump, a cylinder having an inlet at one end and an outlet at the other end, a piston normally biased to occupy a piston at the inlet end of said cylinder, said piston having a port, an actuating member for the piston reciprocable within the cylinder with means for giving it reciprocating movement, said actuating means including latch means for engaging the piston and moving it towards the outlet end of the cylinder, said actuating member having thereon a closure for the opening in the piston, radially movable locking means on said piston, said locking means comprising a segmental ring movably secured on the top of said piston, the inner edges of said segments being inclined, said actuating member having an inclined portion to engage the incline on the segments and to move them into engagement with the cylinder walls upon movement of the actuating member contrary to the direction of said unitary movement while connected to said piston.

12. A liquid dispensing pump according to claim 2 including radially movable locking segments mounted upon the top of said piston, said segments being inclined at their inner edges, said actuating member having an inclined portion to engage the inclined edges of the segments to move the segments against the cylinder wall upon movement of the actuating member contrary to the direction of said unitary movement while connected to said piston, said latches connecting said piston and actuating member and said port being closed by said actuating member prior to the end of the initial connecting stroke of the actuating member.

13. A liquid dispensing pump according to claim 4 in which said tapered member is carried by a discharge regulating member adjustably mounted in the cylinder head to move said tapered member inward or outward, said regulating member having a hole for receiving a pin wrench for adjustment from the outside.

14. In combination, a cylinder, a piston having a port for the passage of fluid from one side to the other of said piston, a reciprocal member having means for closing the port on one stroke, pawl means carried by said member for automatically engaging the piston on said stroke and for moving the piston on the return stroke of the said member and with the said port closed, means for releasing the pawl means from the piston on the said return stroke, the said piston then moving back to its initial position with its port open, substantially as described.

15. In combination, a cylinder, a piston therein having a port, a member to be reciprocated within the cylinder, means for effecting said reciprocation, said member having means for closing the port on one stroke of said member, said member also having means to connect with said piston to move it on the return stroke and with its port closed, for the discharge of the fluid from the cylinder, and means to release the piston from the connecting means during the return stroke to allow the piston to resume its initial position.

16. Apparatus according to claim 15, a spring urging said piston when released from the said connection to its initial position and a spring for urging in the opposite direction the said member which carries the connecting means, the last mentioned spring being of sufficient strength to move the piston from its initial position with its port closed for discharging the fluid from said cylinder.

17. In combination in a dispensing pump, a cylinder, a piston having a port therethrough, a reciprocable member having means for closing the port and having also means for engaging and disengaging the piston, means for operating the reciprocable

member, means for operating the said disengaging means for the release of the piston on one stroke of the reciprocable member for the return of said piston to initial position and means for locking the piston against movement towards its initial position while connected to said reciprocable means, substantially as described.

In testimony whereof, we affix our signatures.

ALLEN C. PILCHER.
LAWRENCE C. PILCHER.