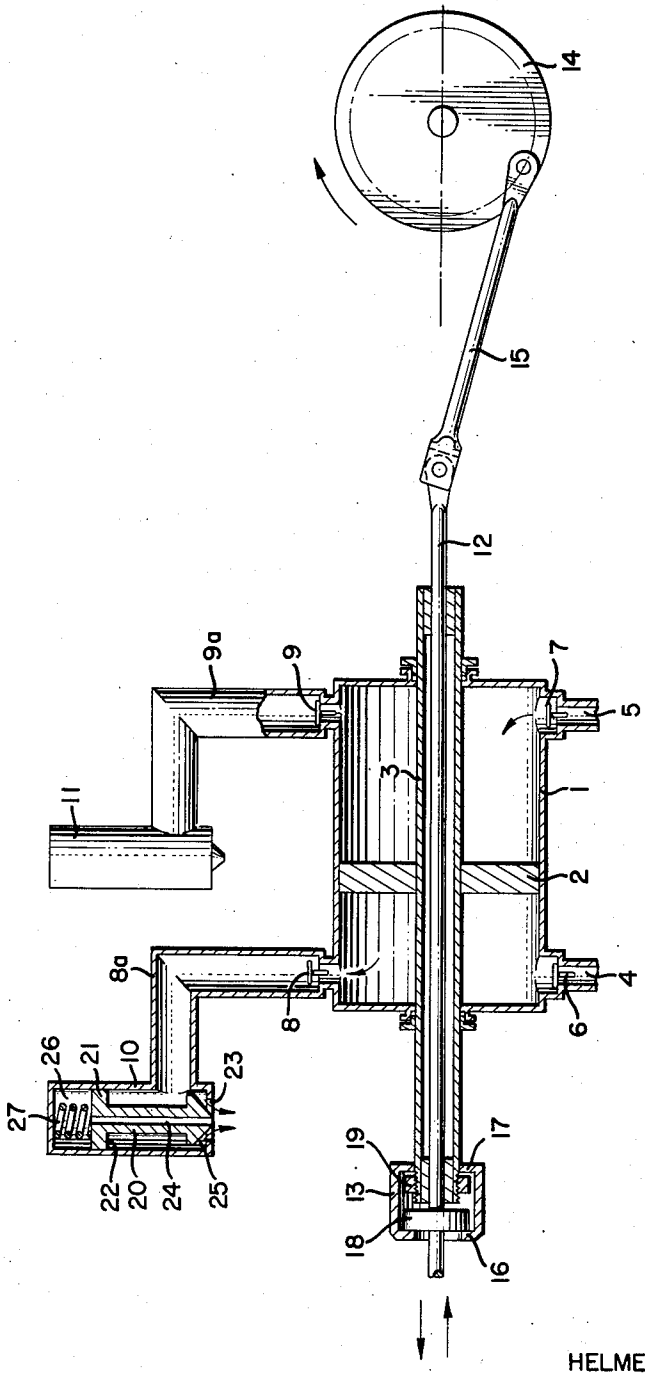
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LIQUID DISPENSING APPARATUS

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INVENTOR
HELMER LUNDH

Watson, Cole, Grindle & Watson
BY

ATTORNEYS

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LIQUID DISPENSING APPARATUS

Helmer Lundh, Sjursoya, Oslo, Norway

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The present invention relates to dispensing apparatus adapted to dispense definite quantities of liquids from a storage tank under the use of a piston pump which by each stroke delivers the desired liquid quantity, and the object of the invention is certain improvements in such apparatus permitting any number of the apparatus to be driven by one and the same driving means, the liquid quantity delivered by each stroke of the pump being at the same time very easily and accurately adjustable.

According to the invention, the piston rod of the pump comprises a tube extending through the pump cylinder, a reciprocating rod being carried within and coupled to the said tube so as to impart a reciprocating movement to the same. The accurate adjustment of the liquid quantity delivered by the pump may be effected by making the connection between the piston rod and the driving rod in such a manner as to impart an adjustable backlash to the reciprocating rod prior to its actuating the piston rod.

According to the invention the coupling means between the said tube and the reciprocating rod may comprise a sleeve or the like adapted to engage both a catch provided on the driving rod and a catch provided on the piston rod, one or both of said catches being axially adjustably secured to the respective rod for the purpose of adjusting the backlash. The pump may be single-acting, but is preferably made double-acting, the pump cylinder being on either side of the piston connected to an inlet and a discharge valve.

For conveying of cans or containers to be charged through the discharge valves of the apparatus according to the present invention any suitable conveyor means may be used which performs an intermittent movement synchronously with the driving rod, so that the cans are at rest during the charging. A conveyor means particularly adapted for the present purpose is disclosed in my co-pending application Serial No. 188,089, entitled "Improvement in Can Seaming Machines," filed October 3, 1950.

The invention also relates to an improvement in the discharge valve whereby any waste of liquid by dripping from the valve upon closing of the same is avoided. According to the invention this is achieved by forming the end of the valve body opposite to the end facing the discharge opening as a piston provided with a pressure surface of an area which is greater than that of the discharge opening, this piston being slideably mounted in a corresponding bore in the valve casing in such a manner that the valve body is raised relatively to

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the said discharge opening by the pressure exerted by the liquid coming from the pump, and by providing the valve body with a bore, one end of which opens into free air and the other end into a closed space on the side of the piston remote from the said pressure surface. Thus, when the piston is raised, the air contained in the space above the piston is compressed and some air is forced out through the bore. When the delivery of the liquid quantity is finished and the liquid pressure on the piston surface consequently decreases, the valve body will, by gravity and preferably assisted by spring action return to closing position against the discharge opening, thereby creating a reduced pressure in the said closed space above the piston, whereby air is caused to flow in through the said bore in the valve body, thereby carrying along any oil drops possibly accumulated at the lower end of the valve body. In order to secure a complete removal of all liquid drops, the lower, free end of the valve body is made conical and extending slightly beyond the valve seat of the discharge opening, when in closing position, the bore being at the same time so arranged as to open in the center line of the valve body.

In the accompanying drawing an embodiment of an apparatus according to the invention is illustrated in a vertical sectional view.

In the embodiment shown, a double-acting pump is serving the dispensing of the liquid, the pump cylinder to either side of the piston being connected to its individual discharge valve. Such valves are preferably positioned at different distances from the vertical plane through the center line of the pump, so as to make each of them adapted to serve the charging of cans fed by spaced parallelly running conveyor means, which have such intermittent movement that they are alternatively at rest during the charging of a can through the corresponding discharge valve.

In the drawing, 1 is the pump cylinder and 2 the piston which is mounted on a tubular piston rod 3 extending through the cylinder. The liquid is fed from a tank which is not shown and may be of any suitable form and position, but should preferably be placed at a higher level than the pump so as to feed the same by gravity through pipes the ends of which are shown at 4 and 5, respectively on either side of the piston. The pipes 4 and 5 are connected to the pump through suction valves 6 and 7, respectively, and the pump is also provided with pressure valves 8 and 9, through which the liquid is conveyed alternatively to the discharge valves 10 and 11 respectively.

The pump is operated by a reciprocating rod 12 which is carried within the tubular piston rod 3 and connected to the same by means of a coupling 13. The rod 12 is reciprocated in any suitable manner, such as by means of a crank disc 14 and connecting rod 15, the disc 14 being continuously rotated by any suitable energy source. The coupling 13 comprises a sleeve which at each end is provided with an inward bent flange 16 and 17, respectively. The sleeve, which preferably is made readily removable, embraces a catch 18 provided on the driving rod 12 and a catch 19 provided on the piston rod 3, the said catches 18 and 19 being adapted to engage the flanges 16 and 17 respectively of the sleeve. The distances between the catches 18 and 19 on one hand and between the flanges 16 and 17, on the other are so dimensioned that the driving rod 12 has a certain backlash prior to its actuation of the piston rod 2 in either direction, this backlash being adjustable by adjusting of the axial position of the catch 19, relatively to the rod 3, the catch 19 being for this purpose in screw thread engagement with the piston rod.

The pressure valves 8 and 9 of the pump are, through pipes 8a and 9a feeding into discharge valves 10 and 11, respectively, each provided with a valve body 20, the upper part of which is formed as a piston body 21 presenting a pressure surface 22 of an area which is greater than the area of the discharge opening 23 of the valve and which is slideably fitted in the valve casing. Further, the valve body 20 is provided with a central bore 24 opening into free air through a conical end portion 25 of the valve body and, at the opposite end, opening into the closed space 26 above the piston body 21. The valve body is loaded with a screw spring 27. This spring is in the example shown accommodated in the space 26 above the piston body, but it may also be arranged in any other convenient manner.

When liquid is forced from the pump through any of the valves 8 and 9 to the discharge valves 10 and 11, respectively the discharge valve in question is opened due to the liquid pressure against the surface 22 of the piston body 21, thereby leaving free discharge flow through the opening 23. By the raising of the valve body 20, the air contained in the space 26 above the piston is compressed to the effect that a certain quantity of air is forced out through the bore 24. When the pump piston 2 reaches its end position, the delivery of liquid to the discharge valve is discontinued whereby the pressure against the surface 22 decreases so that the valve body 20 is caused to move to closing position by gravity and by the action of the spring 27. Consequently, a reduced pressure is created in the space 26 above the piston body 21, whereby air is drawn up through the bore 24, thereby carrying with it any liquid drops which may be accumulated at the free end of the valve body 20.

What I claim is:

1. A liquid dispensing apparatus comprising a piston pump which by each stroke delivers the desired liquid quantity to be dispensed, said pump including a cylinder provided with inlet and exhaust valves, a piston reciprocable in said cylinder, and a piston rod, the piston rod of the pump being made in the form of a tubular member having an opening in each end and extending through the pump cylinder, a reciprocating rod extending through the said tubular member, and coupling means provided between the said tubular member and the said rod to transfer the reciprocating movement of the said rod to the said tubular member and thereby to the piston, said coupling means being external of the tubular member.

2. An apparatus as claimed in claim 1, wherein the coupling means between the said tubular piston rod and the said reciprocating driving rod includes adjustable lost-motion means comprising catch members on said piston rod and catch members on said driving rod, at least one of said catch members being adjustable axially for adjustment of the liquid quantity to be dispensed.

3. An apparatus as claimed in claim 1, wherein the coupling means between the said tubular piston rod and the said reciprocating rod comprises a sleeve member, a catch member on the reciprocating rod and a second catch member on the tubular piston rod, the said sleeve member being provided with means adapted to engage the said catch members, at least one of the said catch members being axially adjustably mounted for adjustment of the free motion of the said reciprocating rod.

HELMER LUNDH.

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