

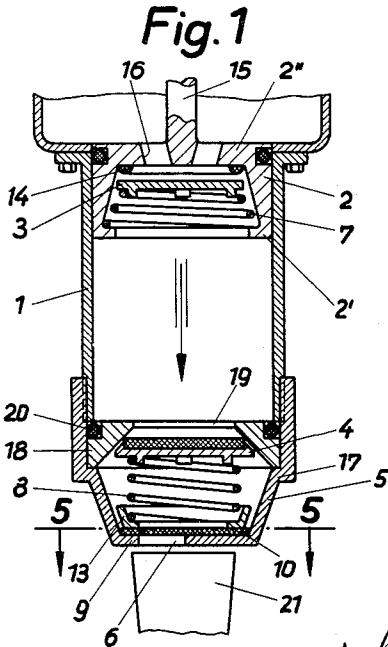
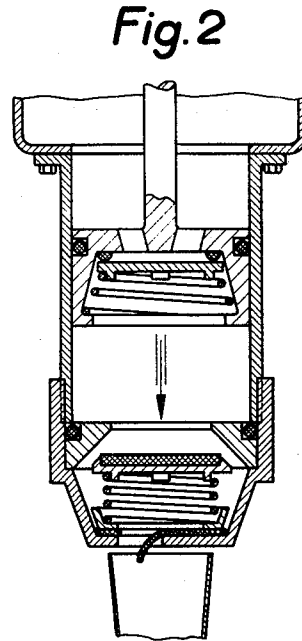
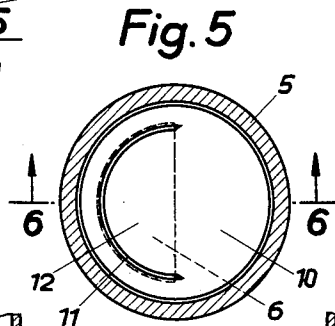
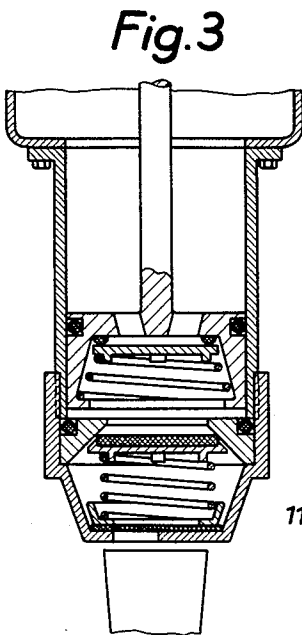
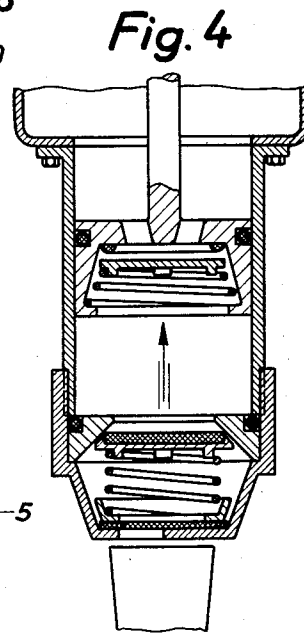
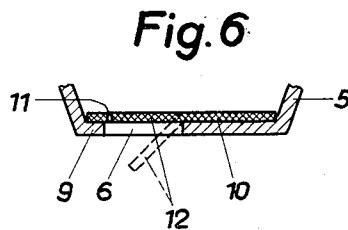
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MECHANISM FOR FILLING CONTAINERS WITH LIQUID

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MECHANISM FOR FILLING CONTAINERS WITH LIQUID

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9 Claims. (Cl. 141—117)

The present invention relates broadly to the art of dispensing.

More particularly, this invention relates to apparatus or mechanism which delivers or racks liquids such as milk or the like into containers.

This invention is still more particularly related to filling apparatus which utilizes a piston means that reciprocates in a calibrated cylinder for delivering the liquid.

In dispensing or racking devices of this character, there is usually provided a calibrated chamber that is provided with inlet and outlet ports. A piston reciprocates in a chamber and the stroke thereof determines the amount of liquid to be racked or delivered. The inlet port is connected with a storage tank while the outlet port communicates with a filling funnel or is designed as an outlet spout or mouthpiece. The arrangement is such that the interior of the calibrated chamber is alternatively placed in communication with the storage tank and with the outlet port by means of valves which are controlled in accordance with the rhythm of the working operation.

More particularly, this invention relates to mechanism of the aforescribed character incorporating means operable to prevent leaking or at least excess leakage at the close or termination of the filling stroke of the piston.

Filling mechanisms or apparatus of this type are known in which means have been incorporated to prevent trickling or leaking of liquid remaining in what can be termed the filling socket or nozzle associated with the discharge valve, such as a sieve or screen associated with the discharge aperture of the filling nozzle. Means of this character, however, are only effective in instances where the discharge aperture is of relatively small cross section and thus the mechanism has a limited filling capacity. Furthermore, the sieve or screen has a tendency to become obstructed, particularly when the liquid being dispensed to containers is milk or another dairy product. In such instances the obstruction of the sieve or screen is caused by deposition of lacteal fat rather than by the presence of foreign objects or substances. In other words, the screen or sieve becomes fouled.

The prior art has further proposed mechanically operated shut-off means which open and close during the cycle of operation of the reciprocable piston and thus control the discharge aperture of the filling nozzle. Such mechanically actuated shut-off means, obviously require additional constructional components and additional manipulations are required to maintain and clean the filling or dispensing mechanism. Thus, any components which require separate manipulation in connection with adequate cleaning and servicing of filling mechanisms for milk or dairy products curtail the productivity or output of a dairy plant.

Accordingly, the present invention has for an object to provide a filling mechanism for milk or dairy products of the type including a measuring or calibrated chamber having an inlet end associated with the supply container, a reciprocable piston within the chamber, inlet valve means operable to permit liquid to flow from the container to the

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chamber and outlet valve means controlling communication with a mouthpiece or filling nozzle and in which said mouthpiece includes a discharge aperture and means in addition to said outlet valve means for controlling the passage of liquid through said aperture and operable to open under the pressure exerted by the piston during the filling stroke and to close automatically at the termination of such stroke so as to efficaciously prevent leakage of liquid that may remain in the mouthpiece between the discharge aperture thereof and the outlet valve or port in the chamber.

More particularly, the invention has for an object to provide means for controlling the passage of fluid being dispensed that is operably associated with the discharge aperture of a nozzle or the like that is located downstream of a pressure operated discharge valve and which means close automatically when the discharge pressure falls below a predetermined level.

It is a specific object of the present invention to provide a filling apparatus for liquids or the like including a chamber, a piston reciprocable therein, a pressure controlled outlet valve at one end of the chamber operable to open in response to movement of the piston towards said end, a nozzle structure associated with the chamber downstream of the valve and supplementary valve means operable to open in response to passage of liquid through said discharge valve under pressure and to close automatically to prevent leakage through the nozzle upon the cessation of the pressure stroke of the piston.

It is a specific object of this invention to provide such supplementary valve means in the form of a flap of resilient material such as rubber or the like. Specifically, it is an object of the invention to provide a particular association of a rubber disc having a slit therein so associated with a discharge aperture as to close automatically upon cessation of fluid pressure.

It is a further object of the present invention to provide a fluid passage control arrangement for the discharge aperture of the filling mechanism that is operable to provide a dual function comprising the automatic closure to prevent undue leakage and further to provide a deflection or direction of the liquid being dispensed at an angle to the axis of the container being filled, such that the liquid will flow into the container in a stream directed against the side wall of the container. The guiding or deflection of liquid in this fashion, particularly in the case of relatively rapid filling of large quantities of liquid prevents undue spraying or foaming formation during dispensing. This latter result being particularly advantageous in connection with dispensing milk.

It is, therefore, a specific object of the present invention to incorporate a disc of rubber or the like resilient material with a discharge nozzle or outlet of a filling mechanism and to provide such disc with a slit extending parallel with the edge of the discharge opening a distance such as to comprehend or extend at least over half the peripheral extent of the opening. Such slit provides a movable flap operable as a valve to open in response to pressure and to close automatically upon cessation of pressure and which flap further constrains the liquid being dispensed to flow at an angle to the axis of a container being filled whereby the discharge into the container is effected without undue foam formation.

It is a further specific object of the invention to provide a filling mechanism of the type described including the combination of means defining a discharge aperture for a chamber, means downstream of said aperture defining a nozzle having a discharge orifice therein, a valve means between the aperture and the orifice, a resilient member mounted over the orifice and having a slit therein forming a flap movable under pressure to control the orifice in one direction and to automatically close said

orifice in the other direction, a pressure applying ring superposed on said resilient member and spring means biased between said discharge valve and said pressure applying ring and operative to normally hold said discharge valve closed and said ring and resilient member in place whereby compression of the spring means occasioned upon opening of the discharge valve increases the force maintaining said resilient member in place.

Further and more specific objects will be apparent from the accompanying drawings in which:

Figure 1 is a fragmentary view partly in longitudinal section and partly in elevation and illustrating an embodiment of the invention,

Figures 2-4 are fragmentary longitudinal sectional views illustrating various positions of the components during the course of the dispensing operation,

Figure 5 is a top plan view of the slitted resilient member controlling flow through the outlet orifice, and

Figure 6 is a transverse cross sectional view of the resilient member shown in Figure 2.

In the drawings the filling mechanism includes a calibrated cylinder or measuring chamber 1 which communicates at its upper end with a storage tank or container. This calibrated cylinder or measuring chamber can either be attached to the bottom of a tank or constitute a tubular extension thereof. Within the cylinder or chamber is a piston or plunger 2. This piston is reciprocated vertically within the chamber 1 by a cam drive mechanism including a connecting rod coupled to a holder that is in turn connected to the upper end of the piston rod or stem. The piston 2 has a peripheral groove containing a gasket ring or seal and it further has an aperture therethrough controlled by an inlet or admission valve 3. As shown in Figure 1 the piston 2 has an intumed annular flange or shoulder 2' at its lower end on which seats a compression spring 7 that biases the admission valve 3 and normally urges the same into contact with the sealing ring 14 secured to the undersurface of the flange 2' at the upper end of the piston. The piston rod or stem 15 is connected to the piston by a spider means including arm means 16 shown diagrammatically. The lower end of the cylinder or chamber 2 receives a nozzle or filling socket extension 5. This filling socket can be removably attached to the cylinder by thread means. The nozzle 5 includes an internal flange or shoulder 17 which bears against ring member 18 that is centrally apertured at 19. This aperture 19 constitutes an outlet from the chamber proper. A gasket ring 20 is disposed between a peripheral flange on the ring member 18 and the lower marginal edge of the chamber or cylinder 2. An exhaust valve 4 faced with suitable packing material such as rubber controls passage of fluid through the outlet aperture 19. The lower end of the nozzle or filling socket 5 has a discharge aperture 6 formed therein and a washer or disc 10 is seated on the interior of the bottom of the nozzle. Resting on the washer is a pressure ring member 13 and a spring 8 is biased between this ring member and the undersurface of valve body 4. The washer or disc 10 is made of rubber or the like and is provided with a slit 11. This slit corresponds essentially to the contour of the edge 9 which delimits the left hand side of the discharge opening 6. In other words, the opening in the bottom of the nozzle body 5 has an arcuate edge 9 following part of the periphery of the nozzle. The rubber washer or gasket 10 has its slit 11 extend at least over half the perimeter of the discharge opening 6 so as to form a flap 12.

This flap 12 is shown closed in Figure 5. In Figure 6 the flap 12 is shown in closed condition in full lines and in open condition in dotted lines and due to the inherent elasticity of the material of which the washer 10 is made the flap will automatically close when the pressure acting thereon diminishes.

In the operation of the filling mechanism aforescribed the downward motion of the piston 2 forces liquid from

chamber 1 because the pressure exerted on the liquid opens the valve 4 against the action of spring 8. This outgoing liquid forces the flap 12 to open and this flap directs the liquid against the side of a container being filled as shown at 21. At the end of the filling stroke, piston 2 is raised whereupon valve 3 opens in opposition to spring 7 whereas valve 4 closes under the force of spring 8. On the upstroke of the piston the chamber is refilled when the valve 4 closes and the flap 12 closes automatically due to its elasticity so that it will retain any liquid that remains within the filling nozzle 5, thus preventing leakage.

It is further pointed out that the spring 8 has a dual function in that it exerts pressure on the ring 13 to hold the washer or disc 10 in place and likewise normally urges discharge valve 4 into closed position. When the discharge valve opens in response to downward movement of piston 2 the spring 8 in being compressed exerts a greater holding force on ring 13 and thus on disc 10.

What is claimed is:

1. A mechanism for filling containers with liquid and which mechanism is of the type including a dispensing cylinder, a piston means reciprocable therein, inlet valve means operable in response to movement of the piston in one direction to control admission of liquid into the cylinder in one direction of movement of the piston and to remain closed upon movement of the piston in the opposite direction so that the piston expels liquid during a filling stroke, a discharge valve means for the cylinder, an extension of the cylinder projecting beyond the discharge valve means and having a discharge aperture therein downstream of the discharge valve means and resilient flap valve means below the discharge valve means and operably associated with said discharge aperture, and said resilient flap valve means comprising a disc of elastic material extending across said aperture, said disc having a slit therein that defines a resilient flap disposed in the plane of the disc and movable out of said plane to open in response to flow of liquid expelled through the discharge valve means by the piston during movement of the piston in said opposite direction and to close due to its inherent elasticity upon the cessation of movement of the piston in said opposite direction to prevent leakage from the filling mechanism at the conclusion of a filling stroke.

2. A mechanism for filling containers with liquid and which mechanism is of the type including a dispensing cylinder, a piston means reciprocable therein, inlet valve means operable in response to movement of the piston in one direction to control admission of liquid into the cylinder in one direction of movement of the piston and to remain closed upon movement of the piston in the opposite direction, so that the piston expels liquid during a filling stroke, a discharge valve means for the cylinder, an extension of the cylinder projecting beyond the discharge valve means and having a discharge aperture therein downstream of the discharge valve means, resilient flap valve means below the discharge valve means and operably associated with said discharge aperture to open in response to flow of liquid expelled through the discharge valve means by the piston during the movement of the piston in said opposite direction, and to close due to its inherent elasticity upon cessation of movement of the piston in said opposite direction to prevent leakage from the filling mechanism at the conclusion of a filling stroke, and said flap valve means extending transversely of the axis of the discharge aperture and including a movable portion which opens during a filling stroke with a container positioned below said aperture, said movable portion being offset laterally from the axis of said cylinder, said movable portion moving in response to pressure of the liquid to a position at an angle to the axis of the aperture whereby the liquid passing through the aperture is deflected at an angle to the axis of a

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container so as to flow in a stream directed against a side of the container.

3. A mechanism for filling containers with liquid and which mechanism is of the type including a dispensing cylinder, a piston means reciprocable therein, inlet valve means operable in response to movement of the piston in one direction to control admission of fluid into the cylinder in one direction of movement of the piston and to remain closed upon movement of the piston in the opposite direction, so that the piston expels liquid during a filling stroke, a discharge valve means for the cylinder, an extension of the cylinder projecting beyond the discharge valve means and having a discharge aperture therein downstream of the discharge valve means, resilient flap means extending transversely of the axis of the discharge aperture and including a movable portion which opens in response to flow of fluid expelled through the discharge valve by the piston during movement of the piston in said opposite direction, and to close due to its inherent elasticity upon cessation of movement of the piston in said opposite direction to prevent leakage from the filling mechanism at the conclusion of a filling stroke, said resilient flap means comprising a washer supported adjacent said aperture and said washer having a slit therein extending coextensive with at least half the perimetrical extent of the aperture, the slit defining the movable portion whereby during a filling stroke with a container positioned below said discharge aperture said movable portion moves in response to pressure of liquid to a position at an angle to the axis of the aperture so that liquid passing through the aperture is deflected at an angle to the axis of the container so as to flow in a stream directed against a side of the container.

4. A mechanism as claimed in claim 3 and further including a ring member bearing against said washer and spring means biased between said ring member and said discharge valve to normally hold the discharge valve closed, said valve opening during the filling stroke of the piston.

5. A mechanism for filling containers with liquid comprising in combination with a dispensing chamber a piston means reciprocable within the chamber, said piston means having an inlet port therein, valve means normally biased to close said port so that movement of the piston in one direction expels liquid from the chamber whereas movement of the piston in the opposite direction permits said valve means to open said inlet port in response to liquid pressure exerted from upstream of said piston, discharge valve means for said chamber operable to open in response to movement of the piston in said one direction and to close when said piston moves in the opposite direction, nozzle structure downstream of said discharge valve means and having an outlet aperture therein, supplementary valve means operably associated with said aperture and comprising an elastic member having a slit therein coextensive in length with at least half the peripheral extent of the aperture and parallel with the adjacent edge of the aperture so as to define a flap member which opens in response to pressure discharge of liquid through the discharge valve during movement of the piston in said one direction and which closes automatically due to its inherent elasticity upon cessation of movement of the piston in said one direction.

6. A mechanism for filling containers with liquid as claimed in claim 5 in which said elastic member is a flat washer and said slit is arcuate whereby the resultant flap when open diverts liquid being discharged to flow against the interior wall of a container being filled.

7. In a mechanism for filling containers with liquid and which mechanism is of the type including a measuring cylinder, a ported piston reciprocable in the cylinder and valve means operably associated with the piston

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to remain closed during a filling stroke and to open during a return stroke so as to refill the cylinder, the improvements comprising a ring member at the discharge end of the cylinder, a tubular member having an internal shoulder intermediate its length supporting said ring member relative to the cylinder, said tubular member further including a bottom spaced from the ring member and having a discharge aperture therein, a flat member of resilient material on the interior of the bottom, a valve means operably associated with the ring member and having a transverse dimension greater than the inner periphery of the ring member, spring means normally biasing said valve means against the ring member to prevent discharge of fluid except when said piston moves toward the ring member, another ring member resting on said elastic member and held thereagainst by said spring means, and said elastic member having a slit therein coextensive with at least half the periphery of the aperture in the bottom of said extension so as to define a flap means operable to open in response to discharge of fluid through said first ring member when the piston moves toward the same and to close automatically upon cessation of movement of the piston toward the ring member.

8. In a filling mechanism of the type described the combination of a chamber, means defining a discharge aperture for the chamber, means downstream of said aperture defining a nozzle having a discharge orifice therein, a valve means between the aperture and the orifice, a resilient member mounted over the orifice and having a slit therein defining a flap that is movable under pressure to open the orifice and to automatically close said orifice upon cessation of application of pressure, a pressure applying ring superposed on said resilient member and spring means biased between said discharge valve and said pressure applying ring and operative to normally hold said discharge valve closed and said ring and said resilient member in place, whereby compression of the spring means occasioned upon opening of the discharge valve increases the force maintaining said resilient member in place.

9. In a mechanism for filling containers of the type including a dispensing cylinder, a piston reciprocable therein, and inlet and discharge valve means operable to open and close alternately during reciprocation of the piston, means defining a discharge aperture below the discharge valve means and an additional valve means operably associated between the discharge valve means and said aperture, comprising a disc of elastic material extending across said aperture, said disc having a slit therein that defines a resilient flap normally disposed in the plane of the disc and movable out of said plane to open said aperture in response to pressure of liquid when said discharge valve means is open and to close into said plane due to the inherent resiliency of the flap when the discharge valve means is closed so as to prevent leakage from the filling mechanism at the conclusion of a filling stroke and said flap having a smooth surface and moving about a hinge point defined by a portion of the aperture so that in open position it is disposed at an angle to said axis.

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