No. 722,738. PATENTED MAR. 17, 1903.

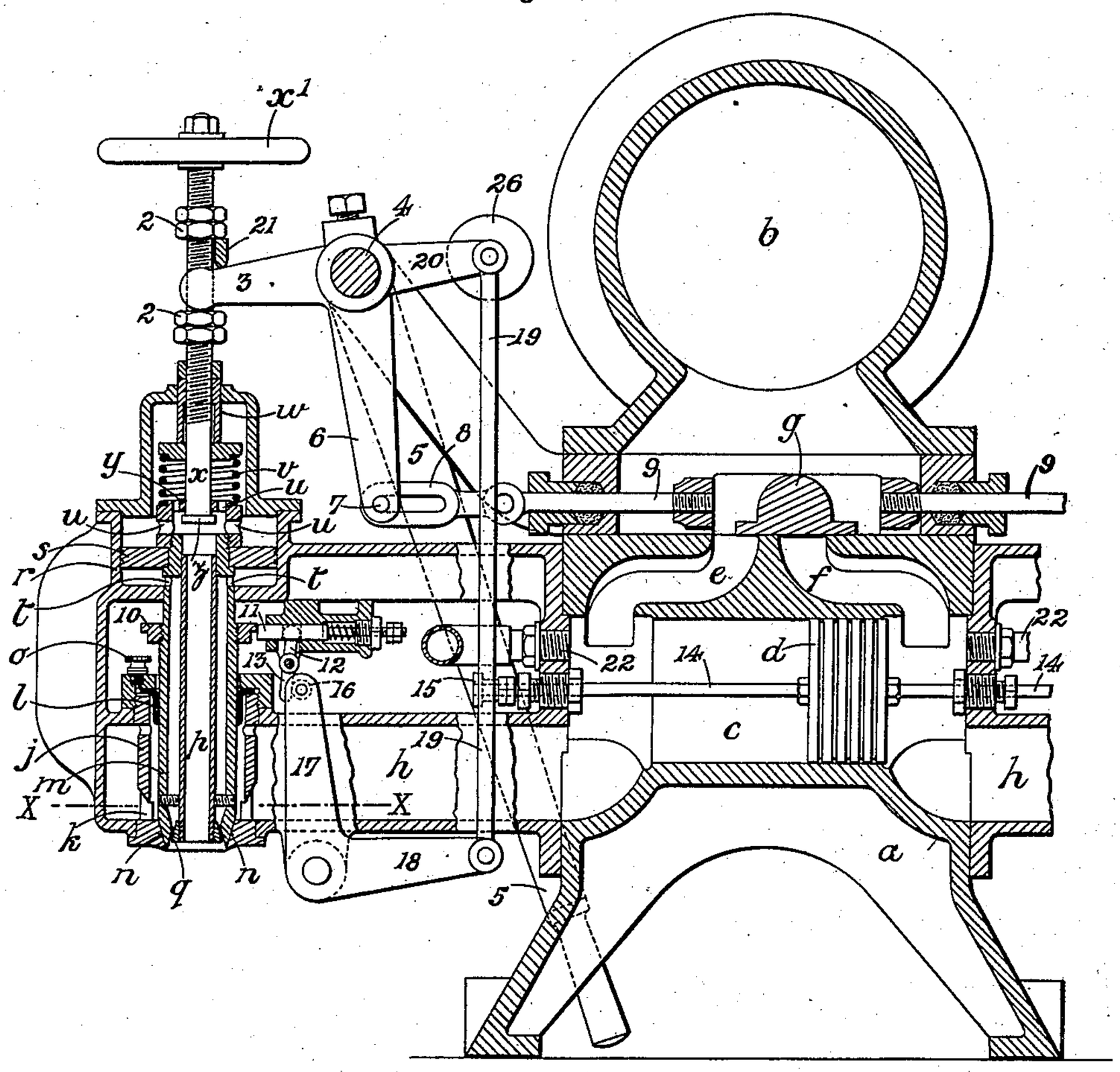
C. F. MENDHAM.

APPARATUS FOR CONTROLLING THE DELIVERY OF VISCOUS LIQUIDS, &c.

APPLICATION FILED JUNE 25, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

Wm. D. Bell.

Robert J. Pollitt

Inventor.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

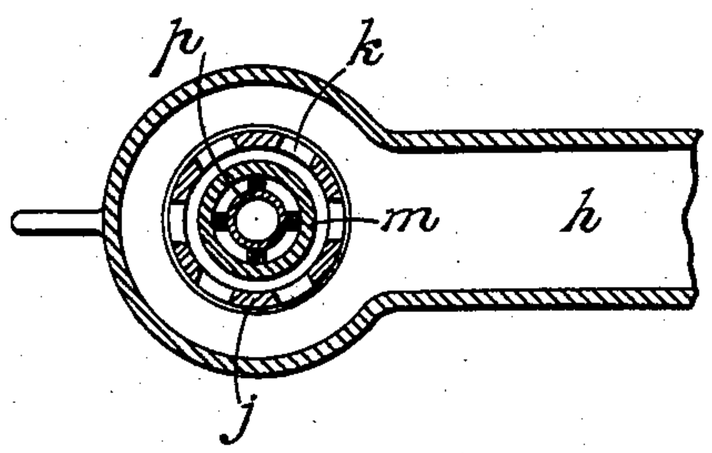


Fig. 3.

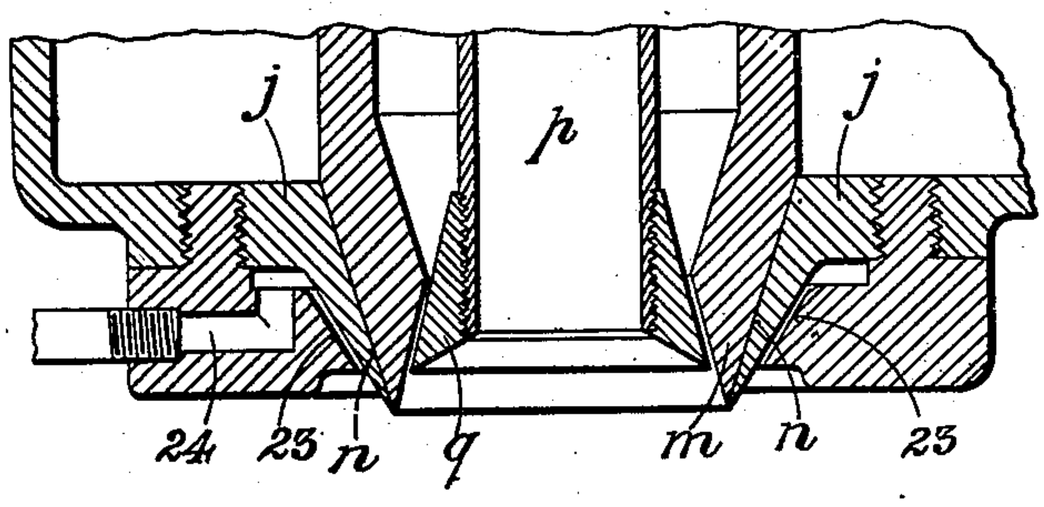
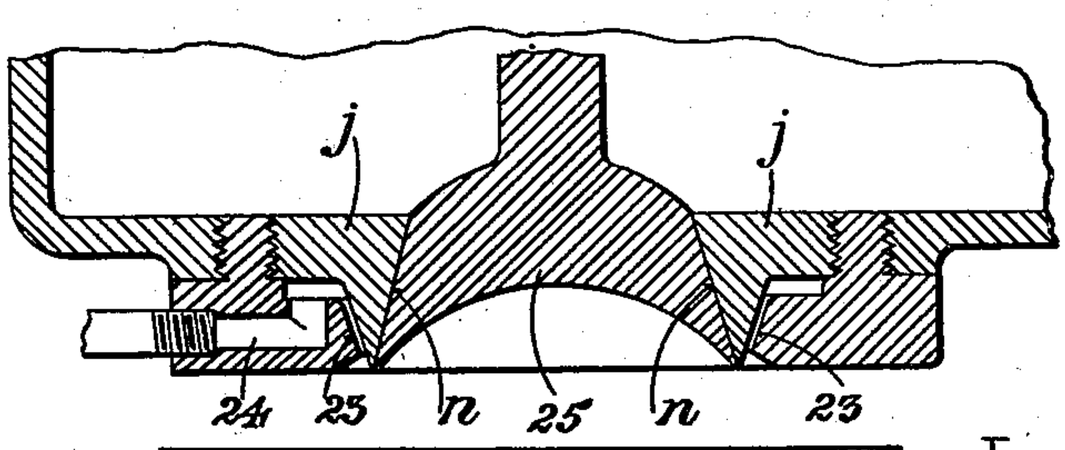


Fig. 4.



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UNITED STATES PATENT OFFICE.

CONRAD FIELD MENDHAM, OF LONDON, ENGLAND.

APPARATUS FOR CONTROLLING THE DELIVERY OF VISCOUS LIQUIDS, &c.

SPECIFICATION forming part of Letters Patent No. 722,738, dated March 17, 1903.

Application filed June 25, 1902. Serial No. 113,089. (No model.)

To all whom it may concern:

Be it known that I, CONRAD FIELD MENDHAM, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful improvements in apparatus for controlling the delivery of viscous liquids in measured or other quantities chiefly designed for use in filling jars, tins, and other receptacles with such liquids, of which the following is a specification.

My invention relates to apparatus for controlling the delivery of viscous liquids, and is chiefly designed for use in filling jars, tins, and other receptacles with such liquids.

In the devices heretofore employed to control the delivery of viscous liquids—for example, syrups—there has been an orifice in a flat surface formed on a flange having square edges, and over this surface a pivoted lever or valve, also having square edges, can be moved parallel thereto, so as to open and close the orifice. This arrangement possesses the disadvantage that the liquid during the flowing out thereof collects on the square lower edge of the flange and also during the closing of the orifice wets and adheres to the square lower edge of the lever or valve, so that after the orifice is closed some of the viscous liquid continues to drop or fall slowly for a considerable time from the said flange and lever or valve, thereby soiling the tops of the jars, tins, or other receptacles as the latter are removed from beneath the orifice.

Now according to my said invention in order to cut off the liquid cleanly—*i. e.*, without forming the strings of dropping liquid incident to the old methods of filling—I cause an extended jet of air to issue from an orifice arranged adjacent to and preferably moving with the valve, which can be flat, annular, or of any other suitable form, so as to impinge on the surface of the liquid issuing from the orifice and deflect it from the advancing edge of the valve. The said edge is thus not wetted by the liquid, the air-jet moving the liquid in front of the valve and acting as a continuation of the said valve. Moreover, the lower edges of the said flange and valve are beveled or inclined toward the engaging surfaces in order to reduce the surface on which the liquid can rest to a minimum and also in the case of the valve to allow the air-jet to act directly on and in front of the leading edge of the said valve at a small angle to the direction in which the liquid is flowing. By these means it is possible to cut off the liquid, so as entirely to prevent dripping or the formation of strings and the consequent soiling of the exterior of the jars, tins, or other receptacles to be filled.

My said invention also comprises means for automatically producing a jet of air by the motion of the valve itself, for which purpose the said valve is connected to a piston moving in an air-cylinder the interior of which is in communication with the nozzle on the valve.

My invention, moreover, comprises the combination of my improved apparatus with a measuring cylinder or chamber for enabling measured quantities of liquid to be filled into tins, jars, or like receptacles.

In the accompanying drawings I have shown how my said invention can be conveniently and advantageously carried into practice.

Figure 1 is a vertical central section of a filling-machine having my invention applied thereto. Fig. 2 is a horizontal section on the line X X, Fig. 1. Figs. 3 and 4 are vertical central sections drawn to an enlarged scale and illustrating two modified forms of my improved apparatus.

a is the frame of a filling-machine having my invention applied thereto.

b is a supply-pipe for the viscous liquid under suitable pressure.

c is a measuring-cylinder, and *d* a piston movable therein. *e f* are ports leading to the opposite ends of the said cylinder, and *g* a slide-valve for controlling the passage of the liquid from the pipe *b* into the cylinder *c*. From each end of the said cylinder the liquid passes through a bracket-shaped chamber *h* to the delivery-tube *j*, which extends through the said chamber and is provided in its sides with ports *k* for the passage of the liquid and at its upper end with a packing-ring *l*, through which a tubular valve *m* passes fluid-tight. The lower end of the delivery-tube *j* is provided with a valve-seat *n* to coact with the valve *m*, the lower edges of the valve-seat *n* and of the valve *m* being inclined toward the coacting surfaces, so as to meet at an angle, as shown. A set-screw *o*, having an air-pas-

sage extending from the lower to the upper end of its stem, is fitted into a hole formed in the upper part of the chamber *h* and communicating with the space between the interior of the delivery-tube and the tubular part of the valve *m* in order to permit the escape of any air that may collect in said space or to close the said hole fluid-tight by means of a suitable washer arranged beneath the head of the said set-screw.

The valve *m* is provided in its interior with a concentrically-arranged tube *p*, to the lower end of which is fitted a flange *q*. This flange is shaped so as to form, with the inclined part of the lower end of the valve *m*, an annular nozzle through which air can be projected from the annular space between the tubes *m p* onto the valve-seat *n* in front of the valve *m* while the said valve is being closed, as hereinafter described. The upper end of the tubular valve *m* extends into a cylinder *r*, where it is secured to a piston *s*, the space at the lower side of which is in communication, through ports *t* in the valve *m*, with the annular air-space on the exterior of the tube *p*, while the space at the upper side of the said piston is in communication, through ports *u*, with the interior of the tube *p*.

The valve *m* is acted upon at its upper side by a spring *v*, the other end of which abuts against a flange on a sleeve *w*. This sleeve is adjustably mounted on a spindle *x*, the square lower end of which slides freely in a correspondingly-shaped hole in a plate *y*, forming the top of the valve *m*, and is provided with a head *z* for engaging with the under side of the said plate. The spindle *x* is provided at its upper end with pairs of lock-nuts 2, forming adjustable abutments, between which acts the forked end of a lever 3, so as to enable the valve *m* to be lifted and also to be turned relatively to its seat *n* at suitable intervals by means of a hand-wheel *x'* at its upper end in order to insure even wear thereof. The lever 3 is mounted on a rock-shaft 4, which turns in suitable bearings in the frame of the machine and is provided with a hand-lever 5 for actuating the valve *m*, as hereinafter described. The rock-shaft 4 is provided with a second arm 6, which is connected by a pin 7 and slotted link 8 to the rod 9 of the slide-valve *g*, so as to reverse the position of the slide-valve as the valve *m* is opened.

On the exposed part of the tubular valve *m* is adjustably mounted a ring 10, the flange of which, when the said valve is opened, engages with a spring-pressed detent 11, so as to hold the said valve open. The detent 11 is formed with a recess into which extends one arm 12 of a tripping-lever 12 13. On the piston *d* of the measuring-cylinder *c* is mounted a rod 14, which extends out of the said cylinder through a gland and stuffing-box and has a head 15 adjustably secured on its end, so that the said head can act on the lever 12 13, and thereby trip the detent 11 at any desired point in the travel of the piston *d*.

Instead of allowing the head 15 to come directly into contact with the lever 12 13, it is arranged to act thereon through a pin 16 on one arm 17 of a bell-crank lever, of which the other arm 18 is connected by a link 19 to an arm 20 on the rock-shaft 4. This enables the detent 11 to be tripped by means of the hand-lever 5 and also during the outward movement of the piston-rod 14 the spring *v* to be compressed through the flanged sleeve *w*, the spindle *x*, and the linkwork connecting the said spindle with the pin 16.

21 is a bar lying on the forked lever 3 for opening the valve *m* independently of the rock-shaft 4 for cleaning purposes, the slide-valve *g* being meanwhile drawn along halfway, so as to close both ports.

22 is a connection for a steam-pipe whereby steam may be blown into the cylinder *c* for cleaning or warming purposes.

The arm 20 is provided with a counterweight 26 for balancing the valve *m* and its attachment.

On the right-hand side of the cylinder *c*, Fig. 1, is arranged a similar set of valve apparatus to that shown on the left-hand side, the valves *m* of the two sets being opened alternately.

The operation of my improved apparatus is as follows: Assuming the parts to be in the position shown in Fig. 1, with the part of the cylinder to the left hand of the piston *d* filled with liquid, on pulling the hand-lever 5 toward the left hand the slide-valve *g* is moved so as to close the port *e* and open the port *f*. At the same time the valve *m* is opened and held in its opened position by the detent 11. Liquid under pressure from the supply-pipe *b* then enters the cylinder *c* and acting through the piston *d* forces the liquid out through the chamber *h* and delivery-tube *j* until the head 15 reaches the pin 16, whereupon the spring *v* is compressed, and when such compression has reached a suitable degree the detent 11 is tripped. The valve *m* then descends under the action of the spring *v* and the piston *s* compresses the air in the lower part of the cylinder *r* and forces it out through the annular nozzle at the bottom of the valve *m* onto the valve-seat *n*, so as to cut the liquid column and prevent the formation of dropping strings of liquid. The air after impinging on the seat *n* is drawn up through the interior of the pipe *p* to the space on the upper side of the piston *s*, thus preventing excessive pressure in and possible bursting of the hollow upper part of the column of liquid before the same is cut.

In the modified form of apparatus shown in Fig. 3 an auxiliary annular nozzle 23 is arranged around the exterior of the orifice of the delivery-tube *j*, so as to assist in cutting the liquid column, which is thus acted upon from both sides simultaneously. This aux-

iliary nozzle is preferably supplied with compressed air by means of a passage or passages 24, communicating with the lower end of the cylinder *r*.

In the arrangement shown in Fig. 4 the valve 25 is made solid and opens downward, an external nozzle 23 only being employed.

If desired, a suitable check-valve can be arranged on the compression side of the air-cylinder *r*, through which air can be drawn during the opening of the liquid-valve. If desired, moreover, a vent controlled by a cock or valve is provided in the cylinder, so as to enable the amount of air discharged through the nozzle to be varied as required. Moreover, the cylinder *r* is preferably formed with a suitable amount of clearance, as shown, to provide a supply of compressed air for maintaining the jet after the motion of the piston *s* has been arrested for a sufficient time to remove the last portions of the liquid from the edge of the orifice. Other suitable means can, moreover, be employed for producing the air-jet above mentioned. For example, it can be supplied from a separate air compressor or reservoir of compressed air through a pipe having a cock controlled by the opening and closing of the viscous-liquid valve.

My improved apparatus can be used in filling receptacles with treacle, syrups, tar, paint, bird-lime, pitch in a heated condition, and other like viscous liquids.

What I claim is—

1. An apparatus for controlling the flow of viscous liquid from a delivery-orifice, comprising a valve for closing said orifice in combination with means for causing a jet of air to act at the front of said valve during the closing thereof, for the purpose specified.

2. An apparatus for controlling the flow of viscous liquids from a delivery-orifice, comprising a valve for closing said orifice, beveled edges on said orifice and said valve, and means for causing a jet of air to act at the front of said valve during the closing thereof, substantially as, and for the purpose, hereinbefore described.

3. The combination, with a discharge-tube, a valve-seat in said tube, and a valve coacting with said valve-seat, of a cylinder, a piston arranged in said cylinder and connected to said valve, a spring acting on said piston, a detent for said piston, means for tripping said detent, a nozzle for discharging a jet of air in front of said valve, and a passage communicating between the compression end of said cylinder and said nozzle, substantially as described.

4. The combination, with a discharge-tube and a valve-seat in said tube, of an annular valve coacting with said valve-seat, a cylinder, a piston arranged in said cylinder and connected to said valve, a spring acting on said piston, a detent for said piston, means for tripping said detent, a nozzle-tube in said valve, a passage communicating between the compression end of said cylinder and the exterior of said nozzle-tube, and a passage communicating between the suction end of said cylinder and the interior of said nozzle-tube, substantially as, and for the purpose, hereinbefore described.

5. The combination, with a discharge-tube and a valve-seat in said tube, of an annular valve coacting with said valve-seat, a cylinder, a piston arranged in said cylinder and connected to said valve, a spring acting on said piston, a detent for said piston, means for tripping said detent, a nozzle-tube in said valve, a passage communicating between the compression end of said cylinder and the exterior of said nozzle-tube, and a nozzle arranged around the delivery end of said discharge-tube and communicating with the compression end of said cylinder, substantially as described.

6. A machine for filling cans, jars or other receptacles with measured quantities of liquid, comprising a reservoir for the liquid, a measuring-cylinder, ports connecting said reservoir with said cylinder, a valve controlling said ports, a piston in said cylinder, a discharge-tube supplied from said cylinder, a valve-seat in said discharge-tube, a delivery-valve coacting with said valve-seat, an air-cylinder, a piston arranged in said air-cylinder and connected to said valve, a spring acting on said piston, a detent for said piston, a nozzle for discharging a jet of air in front of said valve, a passage communicating between the compression end of said air-cylinder and said nozzle, and a rod on the piston of said measuring-cylinder for tripping said detent, substantially as described.

7. A machine for filling cans, jars or other receptacles with measured quantities of liquid, comprising a reservoir for the liquid, a measuring-cylinder, ports connecting said reservoir with said cylinder, a valve controlling said ports, a piston in said cylinder, a discharge-tube supplied from said cylinder, a valve-seat in said discharge-tube, a delivery-valve coacting with said valve-seat, an air-cylinder, a piston arranged in said air-cylinder and connected to said valve, a spring acting on said piston, a detent for said piston, a nozzle for discharging a jet of air in front of said valve, a passage communicating between the compression end of said air-cylinder and said nozzle, a rod on the piston of said measuring-cylinder for tripping said detent, and linkwork comprising a hand-lever connecting said detent and said delivery-valve, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CONRAD FIELD MENDHAM.

Witnesses:
WM. O. BROWN,
FRED. C. SMITH.