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H. F. JOHNSTON

2,125,572

DISPENSER

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Fig. 2

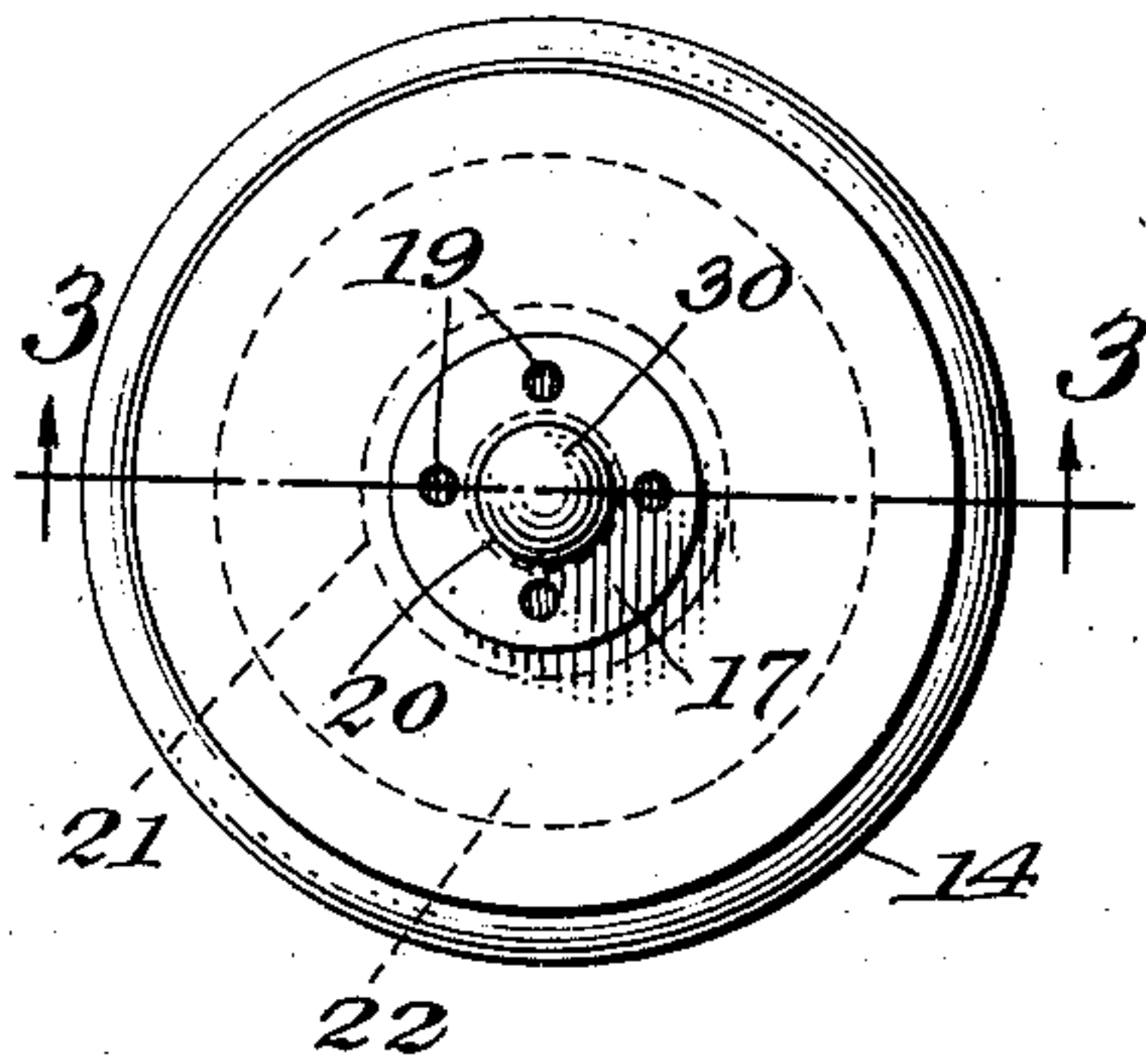


Fig. 1

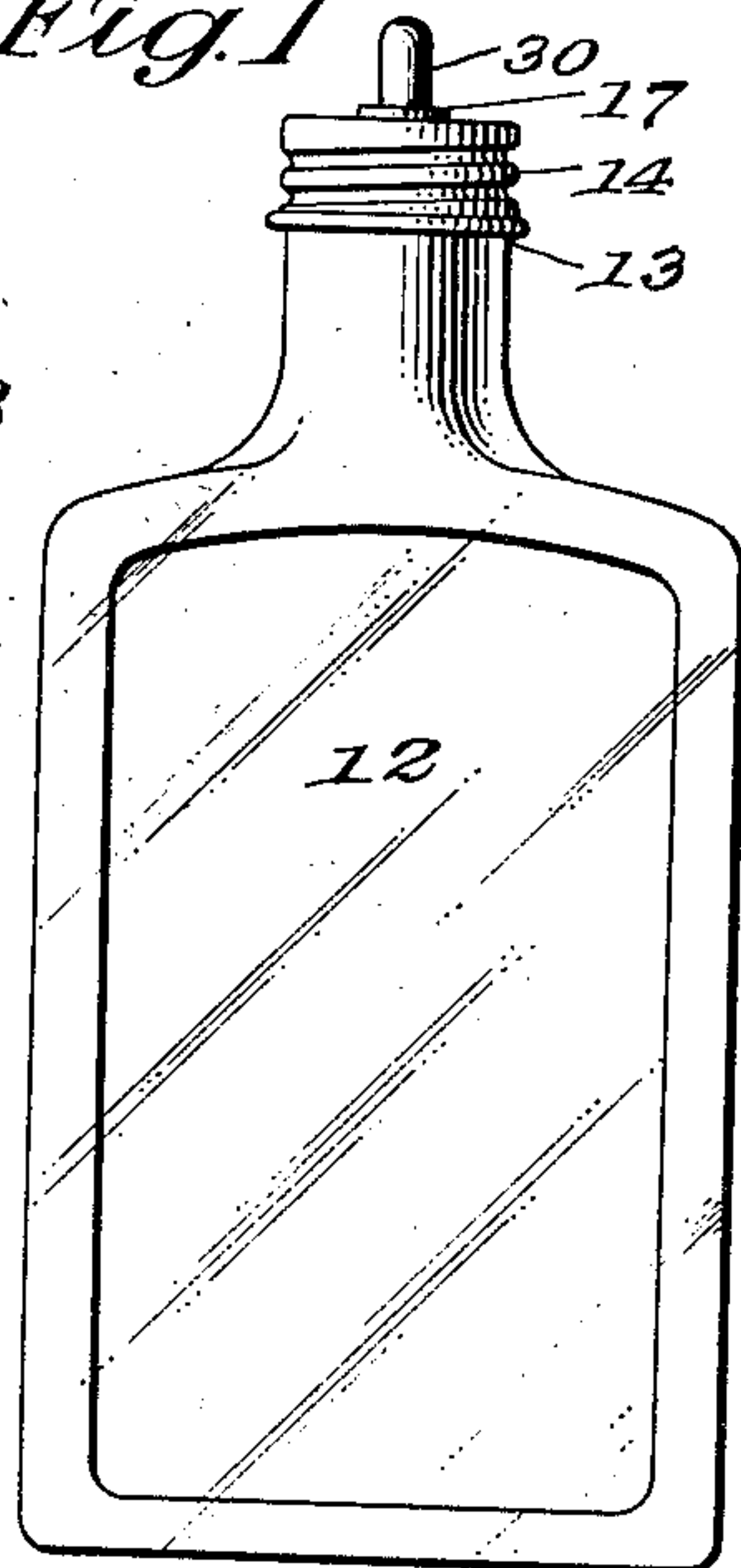


Fig. 5

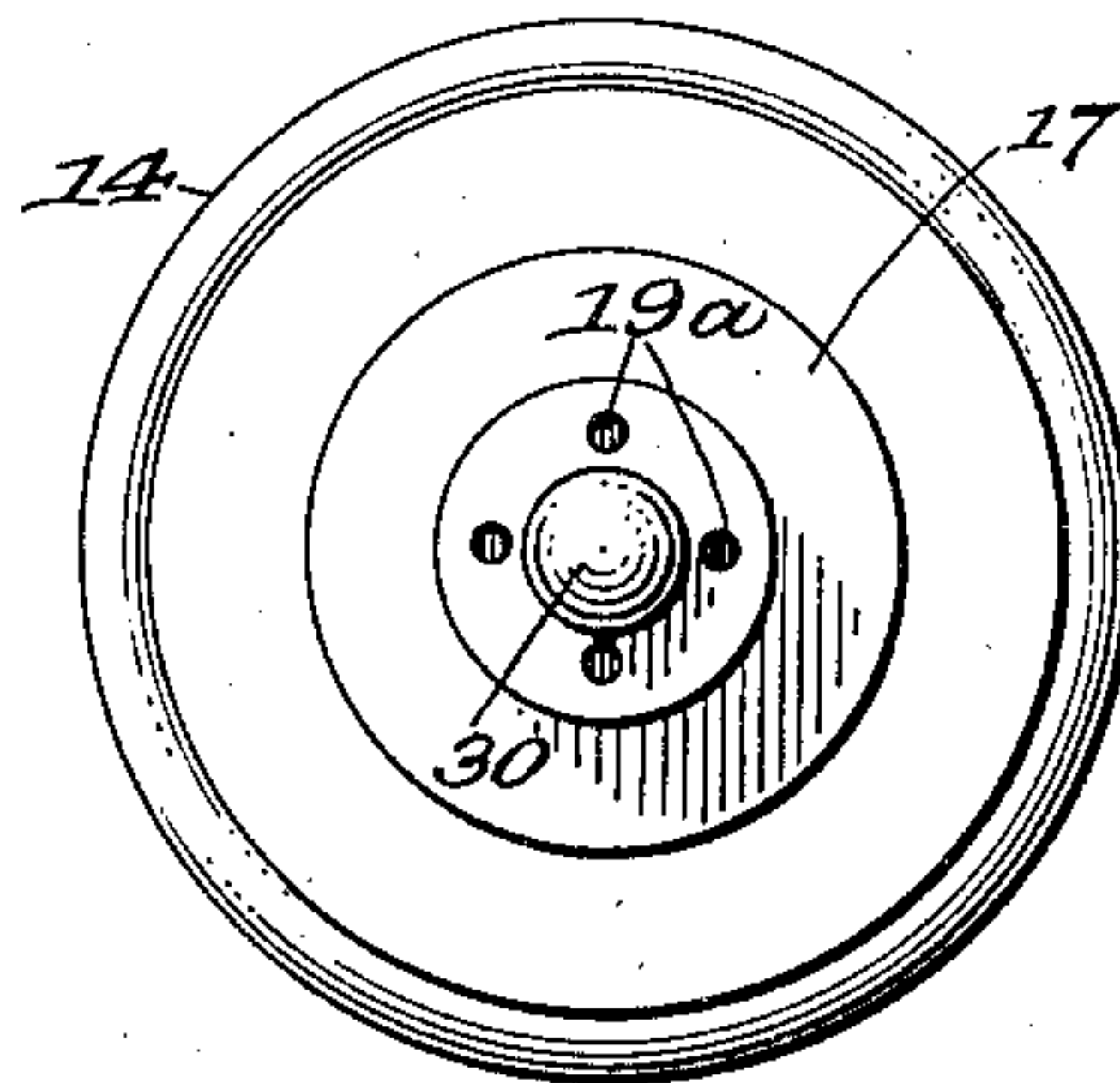


Fig. 3

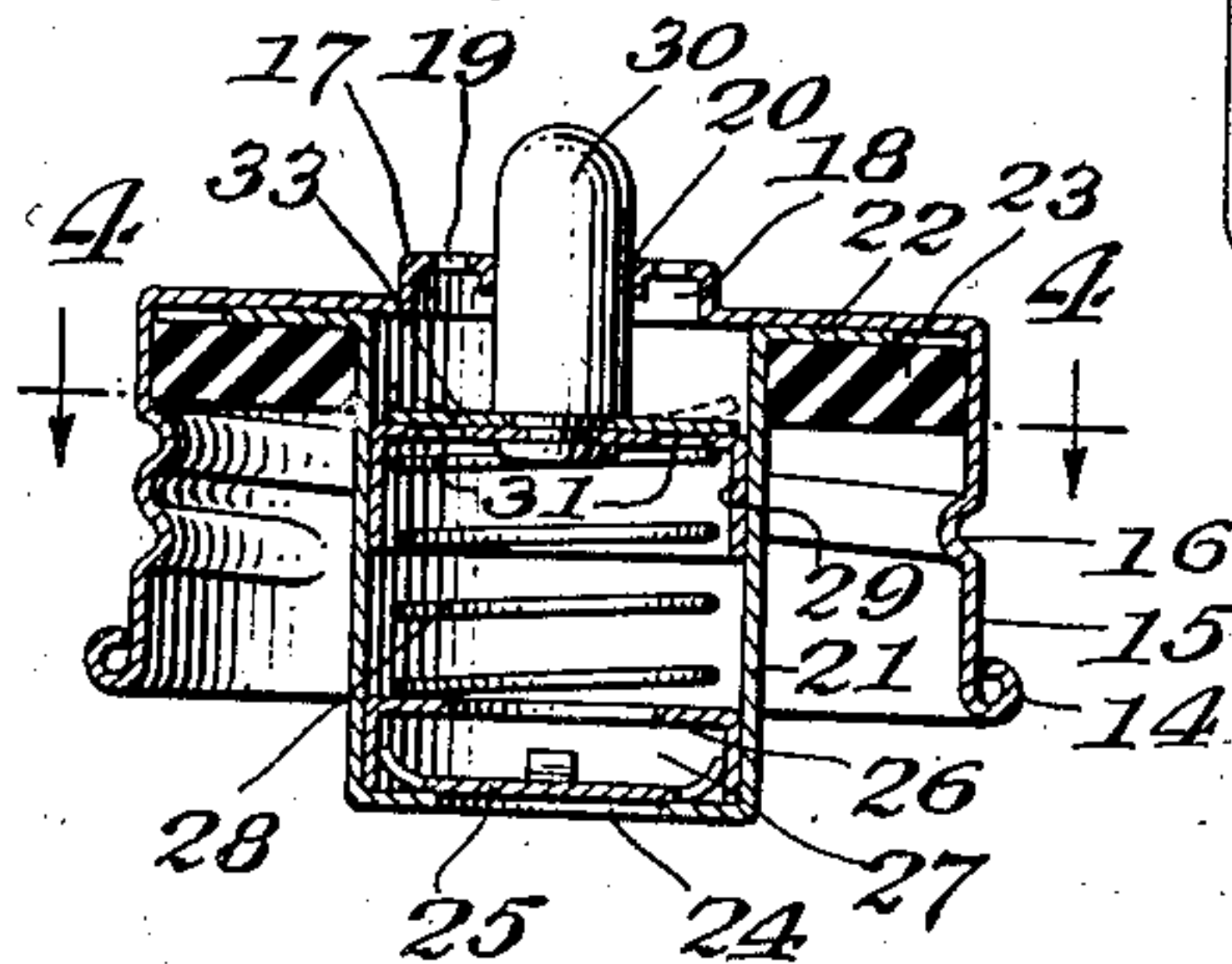


Fig. 6

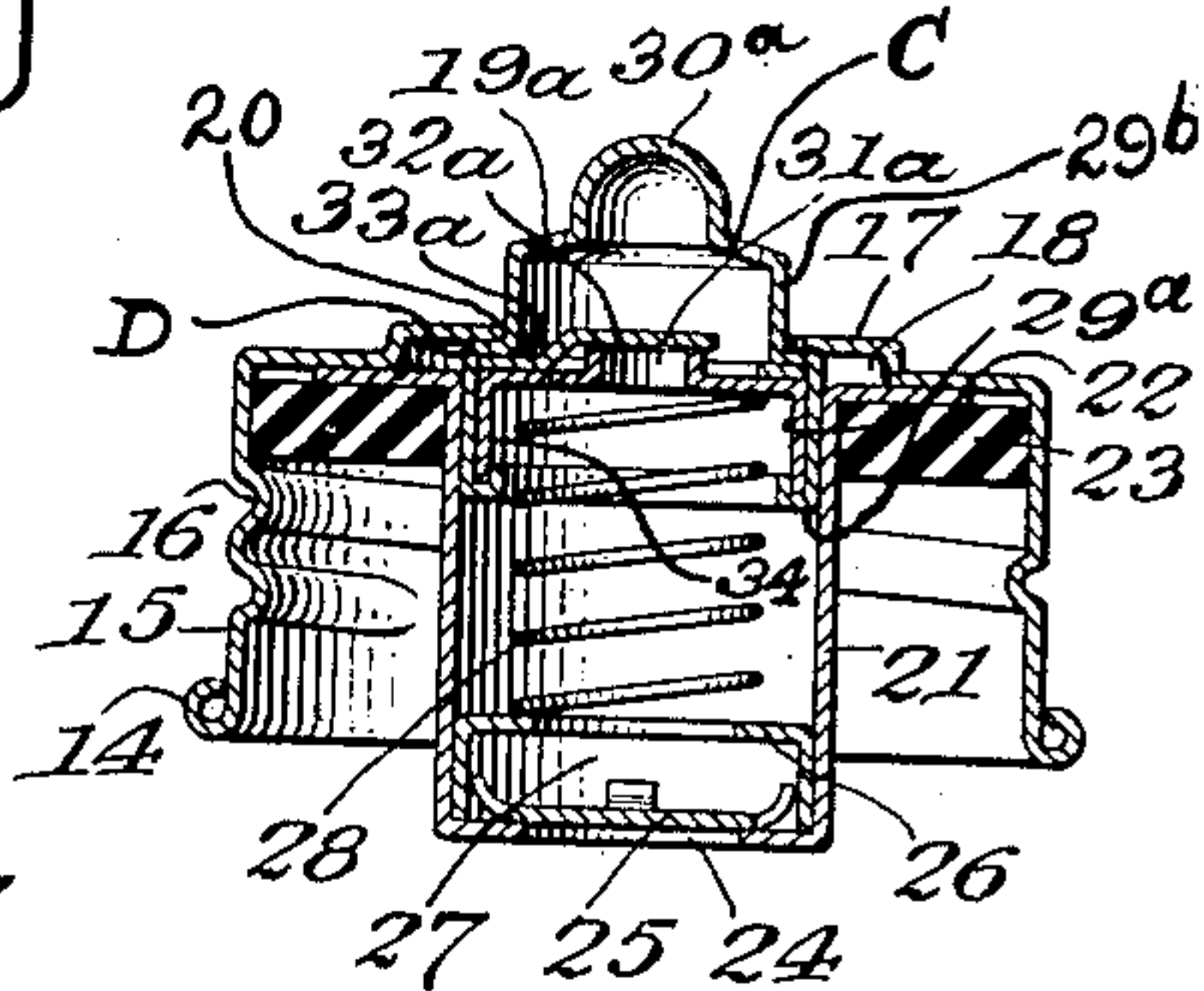


Fig. 8

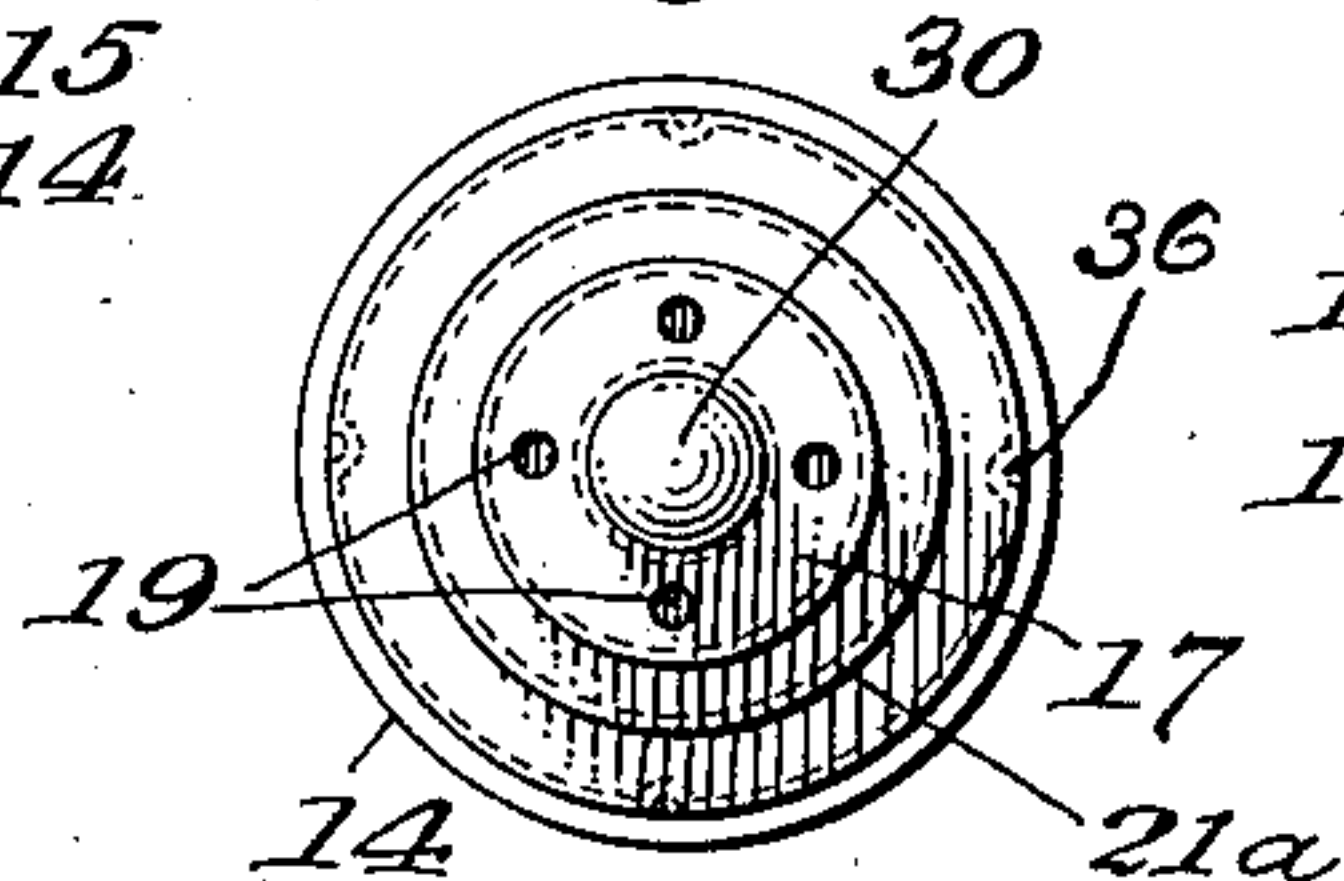


Fig. 4

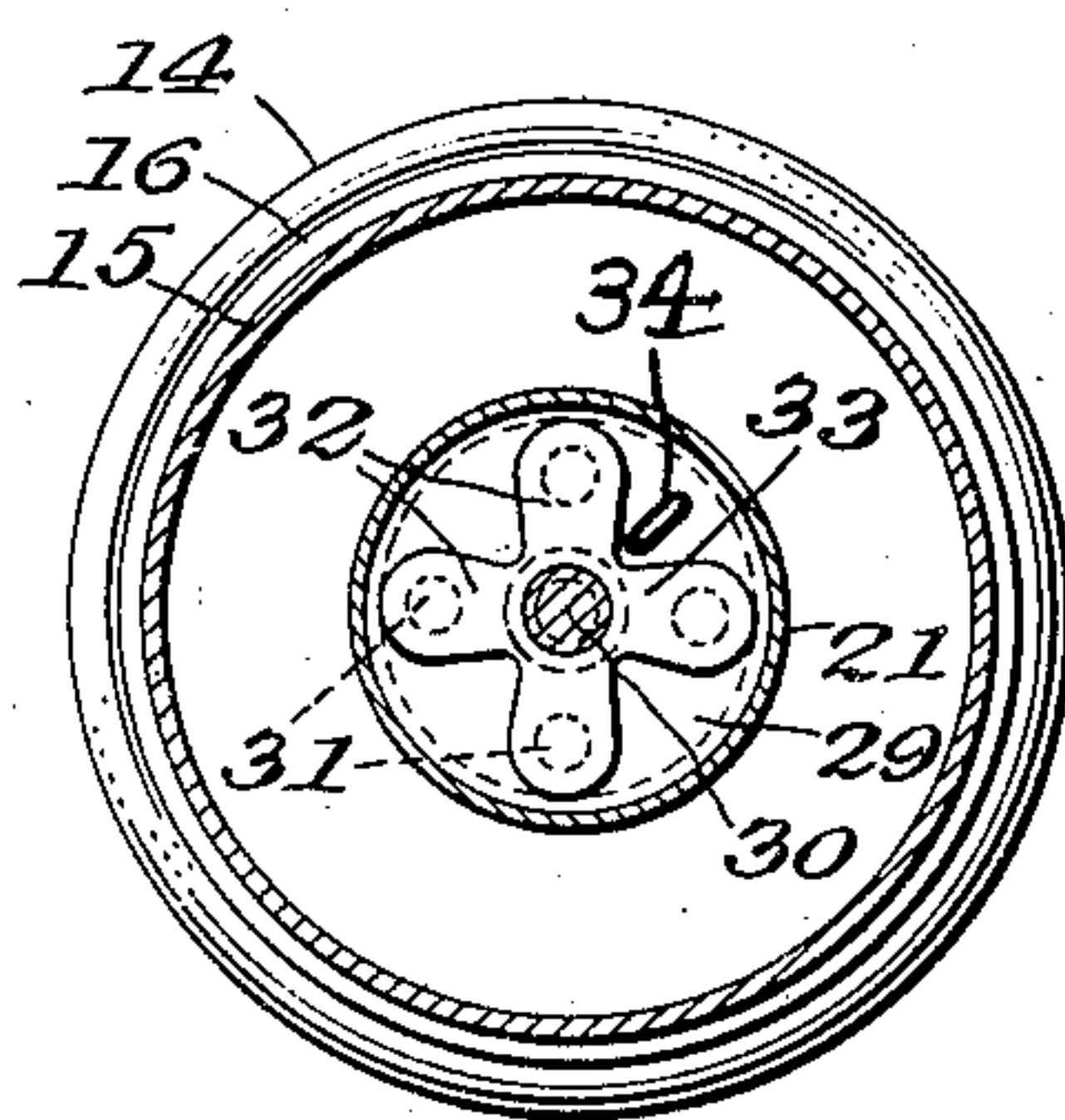


Fig. 7

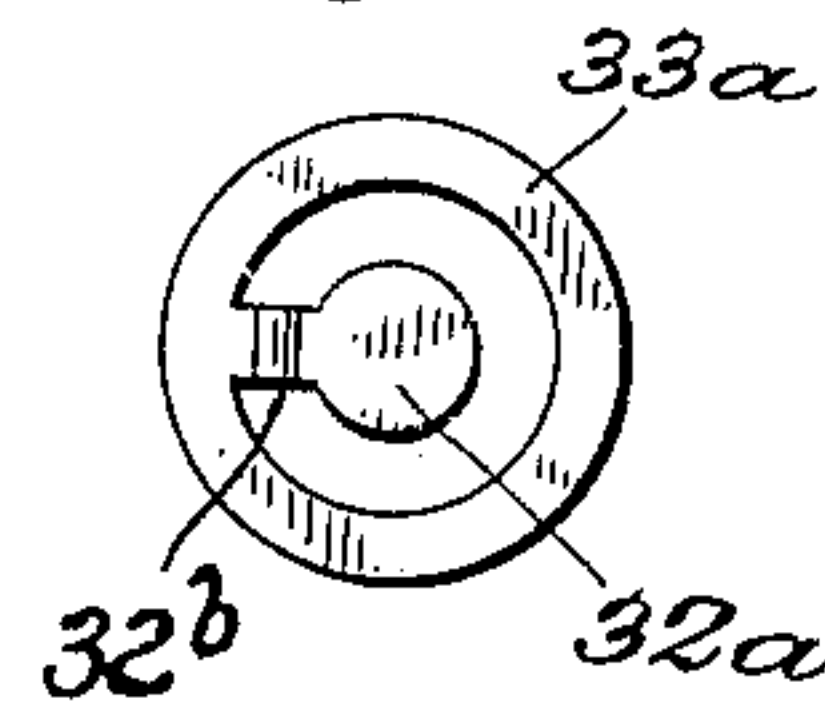


Fig. 9

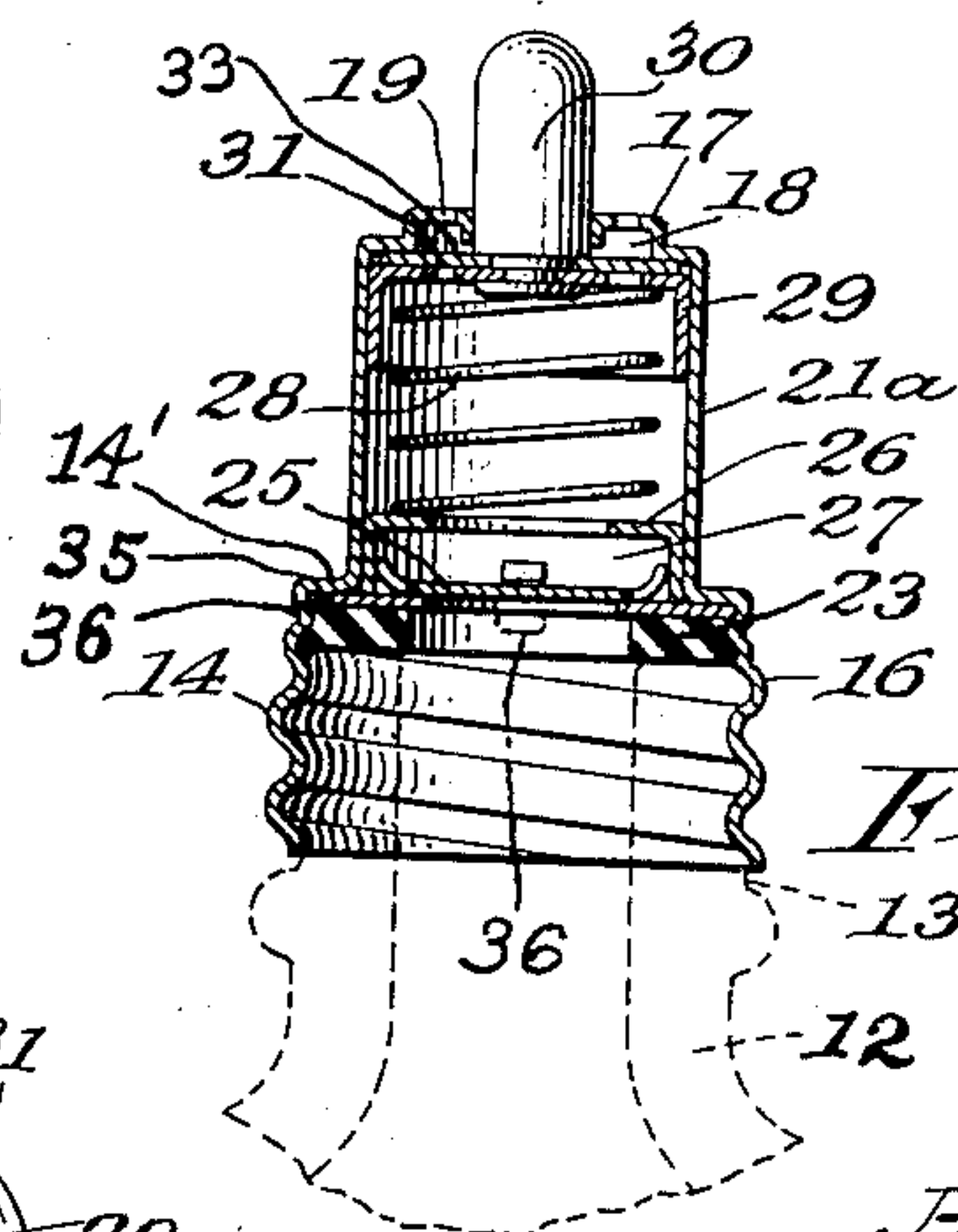
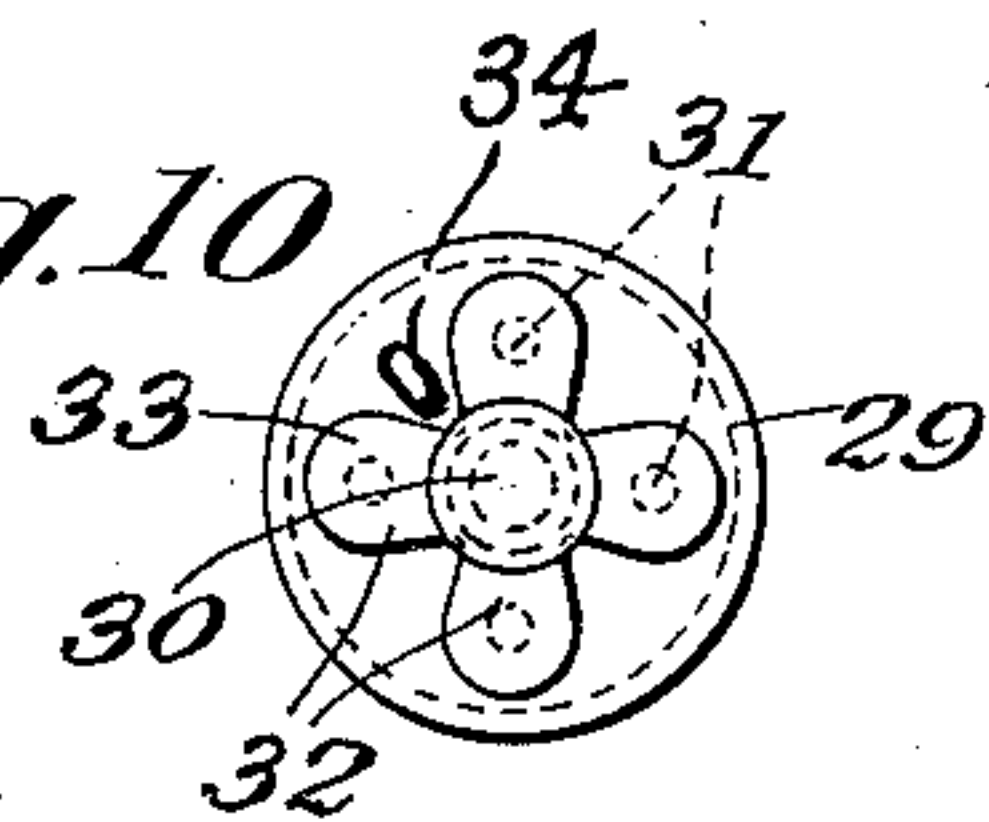


Fig. 10



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2,125,572

DISPENSER

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Application July 2, 1936, Serial No. 88,521

16 Claims. (Cl. 221—102)

My present invention relates to liquid dispensers, adapted to be applied to the mouth of bottles or containers, so that when applied forms a closure for the bottle and more particularly serves as a means whereby limited quantities of liquid may be discharged, by inverting the bottle and depressing a plunger.

The invention herein disclosed may be regarded as a pressure type of dispenser which is normally retained in a closed position but which may be operated, when the bottle is inverted, by pressing inwardly upon the plunger of the dispenser. The invention is illustrated in a preferred and two modified forms of structures, all of which employ a novel form of flat relatively thin sheet metal leaf type of valve normally retained in the outlet end of the dispenser, which are operated to open one or more ports by the action of the piston that carries the leaf valve.

The several forms of dispensers illustrated are designed to be made of light sheet metal stampings including a cylindrical spring housing adapted to be extended either into or above the neck of a bottle, and which together with the other elements of the dispenser is retained assembled within the cap by a washer which may be made of cork or other compressible material, and adapted to form a seal for the bottle as between the cap and bottle when the former is applied, thereby producing an assembled dispenser which as such may be packed, transported and sold along with a bottle of lotion, that is normally sealed with any preferred form of a stopper, and which when desired for use, the stopper may be withdrawn and the assembled dispenser screwed on for use.

An object of the invention as incorporated in the preferred structure is that the ejection of the liquid from the dispenser is effected with the return stroke of the plunger rather than with the initial inward stroke of the plunger. This feature naturally tends to keep the discharged liquid in a localized area to the better satisfaction of the operator rather than to be forced out over a larger uncontrolled area as when the discharge is produced with the inward stroke.

A further object is the fact that in the preferred structure a relatively thin leaf spring is held tightly closed over its respective ports in its normal inactive position, to assure that the valve will provide a relatively tight liquid seal in case the bottle should become accidentally tipped over or inverted.

My invention further consists in the novel construction and assembly of parts hereinafter fully

described, illustrated in the accompanying drawing, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions and minor details of the structure may be made without departing from the spirit or sacrificing any part of the invention.

In the drawing:

Fig. 1 shows a side elevation of a bottle provided with my preferred form of liquid dispenser,

Fig. 2 shows, on an enlarged scale, a detached top plan view of the liquid dispenser shown in Fig. 1,

Fig. 3 shows a central vertical cross sectional view of the dispenser, taken on line 3—3 of Fig. 2, the piston and its stem being shown as partly pressed in against the action of the spring,

Fig. 4 shows a sectional plan view taken on line 4—4 of Fig. 3,

Fig. 5 shows a plan view of a modified form of my invention,

Fig. 6 shows a central vertical cross section of the form of dispenser shown in Fig. 5,

Fig. 7 shows a detached plan view of a flat sheet metal spring valve shown in Fig. 6,

Fig. 8 shows a detached plan view of a further modified form of dispenser also shown in Fig. 9, and

Fig. 9 shows a central vertical cross-section through the dispenser shown in Fig. 8 and which is very similar to the preferred form, shown in Figs. 1, 2 and 3, but in this construction the valve casing and mechanism is disposed above the open end of the bottle instead of within the neck of said bottle, and

Fig. 10 shows a detached plan view of the plunger, its spring valve and its attached piston shown in Fig. 9.

The expression "pressure" type hereinbefore used, implies that when the bottle is inverted the discharge of liquid from the dispenser will occur only by the exercise of pressure on an element of the dispenser which causes the liquid within the valve to be compressed to forcibly close one valve and open another valve and to be ejected either with the inward stroke of the plunger or with the outward stroke of the plunger, the latter being preferred.

Referring in detail to the reference characters marked upon the drawing 12 represents a bottle shown in Fig. 1, 13 its threaded neck portion, see Fig. 9, and 14 a closure cap having a depending flange portion 15 that is provided with threads 16 to engage the threads on the outer surface of the neck of the bottle and whereby the cap is secured

to the neck of the bottle. This cap includes a raised extended portion 17 forming a relatively small interior chamber 18; and said portion 17 thus forms a sort of abbreviated nozzle structure to better dispense the liquid. This raised portion 17 is provided with a series of small liquid outlet ports 19 through which the liquid is dispensed and is further provided with a central inwardly flanged guide hole 20 to accommodate an outwardly extended operating stem 30, see Figs. 3 and 9.

The dispenser also includes a cylindrical housing 21 which is formed separate as shown in Figs. 3 and 6 whereas in Fig. 9 it is formed integral with the cap and designated as 21a. This housing, see Figs. 3 and 6, is provided with an outwardly extended annular flange 22 that lies against the underside of the top of the cap and is held in position by a washer 23 which may be formed of cork or other pliable material. The lower end of this support is provided with an inlet 24 that is normally covered by a sheet metal valve 25 adapted to be raised and lowered, to open and close the opening by the action of the piston. A separately formed sheet metal bridge 26 having a depending annular flange that fits against the lower inner wall and bottom of the housing serves to form a valve chamber 27 within the lower end of the housing, having an opening therethrough and also serves to form a support for the spring 28. A piston 29 is mounted upon the said spring 28, within the upper end portion of this housing which is preferably cylindrical in form and is normally retained in the upper portion of the housing by the before mentioned spring.

In Figs. 3 and 9 this piston is shown to be provided with a guide stem 30 that extends out through the central hole 20 of the cap and serves as a means for operating the dispenser. The piston 29 is provided with an annular series of holes 31 which are arranged in spaced relation and through which the liquid is ejected but only when uncovered by the several spring leaves 32 of the attached valve member 33 as shown in Figs. 3, 4, 9 and 10. In this connection it will be noted, see Figs. 4 and 10, I provide a raised nub 34 formed on the top of the piston as between the leaves 32 to prevent relative movement of the leaf valve 33 and insure the proper registration of the leaves with the holes 31 in the piston.

The discharge of liquid takes place in the form shown in Figs. 3 and 9 after the stem has been pressed in and when it is released, as during the return stroke. In this connection, it will also be seen that when the piston returns to its uppermost position the valve 25 is raised within its chamber by suction and the liquid drawn in so long as the piston continues to raise, whereupon the said valve settles, covering the inlet 20, trapping a quantity of liquid in the now closed support preparatory to a further operation of the piston. When the piston is at its normal uppermost position the leaves of its valve member 33 contact with the underside of the cap and positively close the ports in the piston, thereby sealing the bottle.

It should be borne in mind that these valve members 33 and 33a with their projected leaves 32 and 32a are made of very light metal, lighter in fact proportionately than that shown in the drawing where the thickness has been exaggerated for clearness and a better understanding. In Figs. 5, 6 and 7 is shown a modified form of dispenser, wherein a different form of sheet metal

valve is employed. In this case, the operating stem 30a and the piston 29a are formed from a single shell having an intermediate connecting section 29b, thus providing a pair of stepped shoulders C and D, as shown in Fig. 6. The section 29b slidably engages in the opening 20 in the cap 14 and the ports 19a are pierced through the upper shoulder C and travel with the piston member. The lower shoulder D of the piston abuts the underside of the raised portion 17 of the cap as a stop. This sheet metal stem 30a is provided with perforations 19a through which the liquid is dispensed and is also obviously adapted to be pressed inward to operate the piston, the same as in Figs. 3 and 9.

The sheet metal spring valve in this form comprises an annular ring 33a having an interior concentric flapper 32a connected thereto, preferably in a plane above the plane of the ring 33a as by means of a lateral offset connecting neck 32b. The annular ring 33a of the valve member is held in place in the piston by being embraced between the lower shoulder D of the piston member and an auxiliary capped shell 34 confined in the lower part of said piston member. The crown of the cupped shell has a single upstanding flanged port 31a which is normally closed by the flapper 32a of the leaf valve. In the operation of this dispenser, the bottle or container first being inverted, the liquid in the container will readily flow past the valve 25 which opens by gravity and fills the chamber within the housing 21. Upon depressing the stem 30a, the valve 25 will automatically close and the liquid in the chamber under pressure will be forced past the descending flapper to fill the chamber above said valve and discharge outwardly through the ports 19a. After the completion of the manual stroke of the piston, the spring 28 will return the ports to normal inactive position.

A further modified form as disclosed in Figs. 8, 9 and 10 is identical in most respects to the form shown in Fig. 1, except in this case the cylinder 21a is preferably made as an integral part of the screw cap 14 and of smaller diameter and extends above the bottle neck 13 as previously mentioned. This construction necessitates the use of a metal washer 35 which is positioned against the interior of the shoulder 14' provided at the junction of said cylinder 21a and cap 14 and may be held in rigid assembly as by means of several ribs 36 struck inwardly from the body of said cap. The washer 35 as shown in Fig. 9, serves not only as a backing for the sealing washer 23, but also provides the proper support for the bridge member 26.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A liquid dispenser of the class described including a closure cap adapted for attachment to a container and having a raised top portion with perforations therethrough, a depending cylindrical member secured to the cap having an inlet in its lower end, a valve covering the inlet, a piston within the cylinder having means for engagement and operation, a spring to normally hold the piston in an extended normal position, the said piston being provided with perforations therethrough, a relatively flat valve member secured on the piston and having extended leaves registering with and covering the perforations and adapted to yield and uncover the perforations with movement of the piston.

2. A liquid dispenser of the class described including a closure cap adapted for attachment to

a container and provided with an opening to permit the passage of liquid therethrough, a depending cylindrical member having an opening in its bottom end, a piston within the cylinder, a check valve carried by said piston, means extending through the end of said cap for operating said piston, a sheet metal bridge member having an opening therethrough and spanning the inlet to the cylinder and including a depending annular flange portion that engages the inner wall of the cylinder to support it in spaced relation to the bottom end of the cylinder, a valve member covering the inlet and engaging the inner wall of the flange portion of the bridge adapted for movement therein to open and close the inlet by the action of the piston.

3. A liquid dispenser of the class described including a closure cap adapted for attachment to a container and provided with an opening to permit the passage of liquid therethrough, a depending cylindrical member having an opening in its bottom end, a piston having perforations within the cylinder, means projecting through the end of said cap for operating said piston, a spring within the cylinder adapted to normally force the piston against the underside of the closure cap, spring means carried by the piston adapted to normally close the perforations in the piston yet adapted to yield against inward pressure upon the piston in a manner to allow fluid to flow from below to the upper portion of the cylinder and thence out through the opening in the cap with the return spring actuated movement of the piston.

4. In a dispenser of the class described the combination with a closure cap having a perforated raised portion in its crowned end, a cylindrical chamber attached to the crowned end of said cap of a diameter slightly greater than the diameter of the raised portion, a piston within the cylinder having perforations therein mounted for reciprocary action, spring means for closing the perforations in said piston and adapted to engage the under edge portion of the cap surrounding its raised perforated portion to assure a sealed closure for the perforations in the piston while in its normal position, an intake check valve in the lower end portion of the cylinder, a spring within the cylinder to actuate the piston, means for operating the piston to actuate the check valve and to open and close the perforations in the piston.

5. In a dispenser of the class described the combination with a closure cap having a perforated raised portion in its crowned end, a cylindrical chamber attached to the crowned end of said cap of a diameter slightly greater than the diameter of the raised portion, a perforated piston within the cylinder having means projecting through the perforated raised portion of said cap and mounted for reciprocary movement, an intake check valve in the lower portion of the cylinder, a spring within the cylinder to retain the piston in its normal raised position, a leafed spring positioned upon the piston adapted to engage the edge portion of the cap surrounding the raised portion and thereby hold the leafed spring down upon the perforations of the piston and thus close the dispenser.

6. A liquid dispenser of the class described, including a closure cap adapted for attachment to the mouth of a bottle, said cap including a reduced cylinder extending upwardly therefrom and having its upper crown end perforated, an intake check valve retained in the lower end

of said cylinder, a reciprocating piston having ports therethrough within said cylinder, means extending through said cap for operating said piston, spring means for actuating said piston in said cylinder, a leaf spring means forming a valve carried by the piston adapted to normally cover the ports of the piston, and said piston and associated valve means adapted to close off the perforations in the crown end of said cylinder when the piston is at the end of its upper stroke, said leaf spring being adapted to function with the operation of the piston to allow liquid to intermittently pass through said ports.

7. A dispenser of the class described including a closure cap having outlet perforations therein, a cylinder through which the liquid passes to said outlets carried by said cap, a check valve in the lower end of the cylinder, a piston having an operating means extending through said cap and mounted for reciprocary movement in the cylinder and having a port there-through and a spring leaf valve secured to and carried by the piston and adapted to open and close the ports with the operation of the piston.

8. A liquid dispenser of the class described including a closure cap adapted for attachment to the mouth of a container and provided with an opening to permit the passage of liquid therethrough, a depending cylinder having an opening therein, a piston having a flat side with one or more perforations therethrough and an extended operating stem, a flat valve of sheet material secured to the flat side of the piston and having one or more resilient leaves to cover said perforations, a valve member covering the opening and adapted to be actuated by the movement of the piston.

9. A liquid dispenser of the class described including a closure cap having a central opening, a depending cylinder associated therewith and having an opening therein, a piston mounted in the cylinder and including an integral stem portion extending through the opening of the cap and including perforations, spring means for operating said piston the said piston having a port therethrough leading to the stem, a flat valve member associated with the stem and covering the port in the piston to insure the ejection of liquid from the dispenser with the spring actuated movement of the piston.

10. A liquid dispenser of the class described comprising a closure cap for attachment to the mouth of a container and a smaller cylindrical shell carried by said cap and defining an interior chamber, the inner end of said shell having a relatively large opening leading into said container and the opposite end provided with a closure wall having a central opening with one or more surrounding discharge ports, valve means for controlling said large opening, a spring actuated plunger member operating in said chamber having an escape passage and an operating stem projecting through said central opening of said closure wall, and a flat resilient leaf spring carried on the upper transverse wall of said plunger and normally adapted to be compressed between said latter wall and the closure wall of said shell for sealing said passage, said leaf spring adapted to be flexed to open said passage when the plunger is operated in one direction and to be closed upon said passage when said plunger is operated in the opposite direction due to the compression forces set up in said chamber.

11. A liquid dispenser in combination with a fluid container, including a closure cap adapted

for attachment to a container and having a concentric slightly raised portion with perforations in its upper face, a cylindrical member having an inlet in its lower end attached to said cap and adapted to project within the open end of said container, said cylindrical member being of larger diameter than said cap raised portion, thus providing a stop shoulder at its upper end, a valve covering the inlet, a spring operated piston in said cylindrical member having fluid passages, means projecting through said cap for operating said piston, a flat leaf spring means covering said passages and adapted to be bent to open said passages when said piston is moved in one direction and to close said passages when said piston is moved in the opposite direction to force the liquid through the said cap perforations.

12. A liquid dispenser in combination with a fluid container, including a closure cap adapted for attachment to a container and having a concentric slightly raised portion with perforations in its upper face, a cylindrical member having an inlet in its lower end attached to said cap and adapted to project within the open end of said container, said cylindrical member being of larger diameter than said cap raised portion, thus providing a stop shoulder at its upper end, a valve covering the inlet, a spring operated piston in said cylindrical member having fluid passages, means projecting through said cap for operating said piston, a flat leaf resilient means attached to said piston by said operating means and having a plural number of tongues for individually covering each passage in said piston, said resilient means adapted to be opened to permit fluid confined in said chamber to pass through said passages when said piston is depressed and to close said passages when said piston is retracted and consequently eject the displaced fluid through the perforations in said cap raised portion.

13. A liquid dispenser in combination with a fluid container, including a closure cap comprising an enlarged lower portion adapted for detachable connection with said container and a reduced cylindrical portion extending upwardly therefrom, providing an intermediate shoulder, said latter portion having exit perforations in its upper end, an intake valve member positioned adjacent the lower end of said cylindrical portion, means attached to said enlarged portion for supporting said valve in said cylindrical portion, a plunger having fluid passages operating within said reduced portion, a helical spring engaging between said plunger and said intake valve, operating means carried by said plunger projecting through the upper end of said reduced portion, and a flat leaf spring means anchored to said plunger and adapted to open and close said passages coincident with the inward and outward stroke respectively of said plunger, said dispenser being of a character whereby the fluid is ejected through

said perforations with the outward stroke of said plunger.

14. A liquid dispenser in combination with a fluid container, including a closure cap comprising an enlarged lower portion adapted for detachable connection with said container and a reduced cylindrical portion extending upwardly therefrom providing an intermediate shoulder, the upper end of said reduced portion having a further reduced slightly projecting nozzle portion having a concentric inwardly flanged opening with one or more fluid passages at one side thereof, an intake valve member positioned at the opposite end of said reduced portion, a spring operated plunger slidable in said reduced section and adapted to abutt the stop shoulder at the junction of said reduced portion and said nozzle portion, said plunger having fluid openings there-through, an operating pin means attached to said plunger and projecting through said flanged opening, and a resilient leaf means anchored to said plunger by said pin and adapted to normally close said openings in said plunger and to intermittently open and close said opening upon the operation of said piston and eject fluid through said one or more nozzle passages.

15. A liquid dispenser of the class described including a closure cap having a central opening, a depending cylinder carried within said cap and having an intake opening, a spring operated stepped piston mounted in said cylinder and adapted to abutt that portion of the cap surrounding said central opening as a stop, said piston including an integral hollow operating stem extending through said central opening and having discharge passages, said piston having an interior port therethrough leading to the stem, and a flat leaf annular spring member anchored within said piston and having a radial tongue normally closing said port and adapted to be flexed to intermittently opened and closed position coincident with the operation of said piston.

16. A liquid dispenser of the class described including a closure cap comprising a threaded attaching portion and a smooth cylindrical section inclosing a chamber having one end closed with one or more discharge ports therein, a check valve located at the opposite end of said chamber, a piston mounted for reciprocatory movement in said chamber and having one or more fluid passages therethrough, means extending through said closed end for operating said piston, a flat leaf spring carried by said piston on the side thereof adjacent the closed end of said chamber for normally covering said one or more passages, and a tension spring interposed between said piston and said check valve for normally urging said piston against said closed end and causing said leaf spring to firmly seat upon said passages and assure a leak proof dispenser when not in use.

HAROLD F. JOHNSTON.