

July 14, 1953

S. KAHN

2,645,387

FLEXIBLE TUBE DISCHARGE VALVE CONSTRUCTION

Filed June 16, 1950

FIG. 1

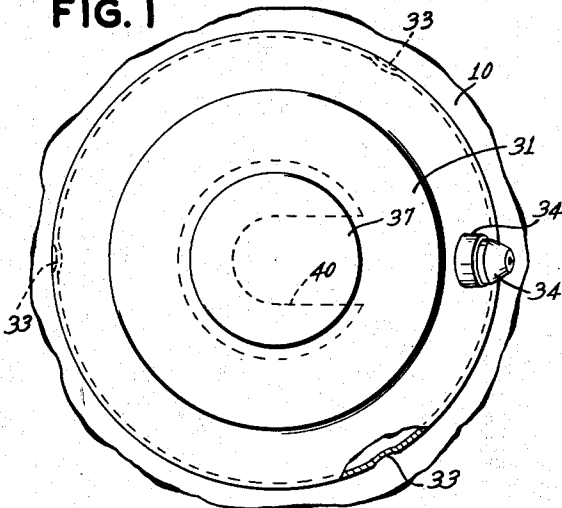


FIG. 3

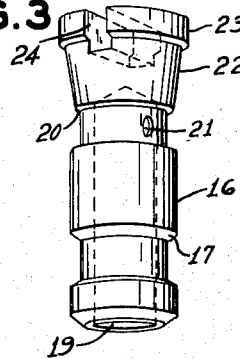


FIG. 2

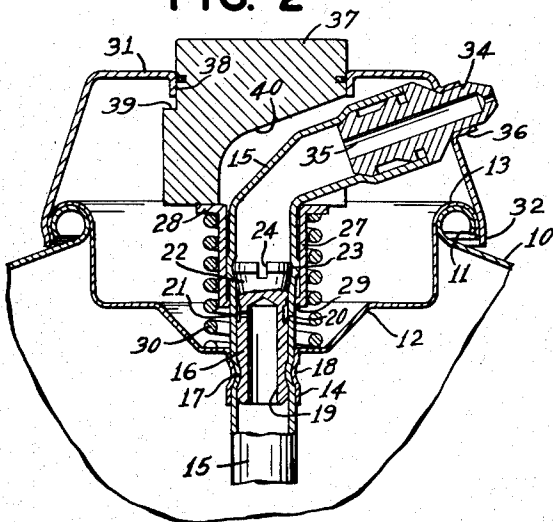


FIG. 4

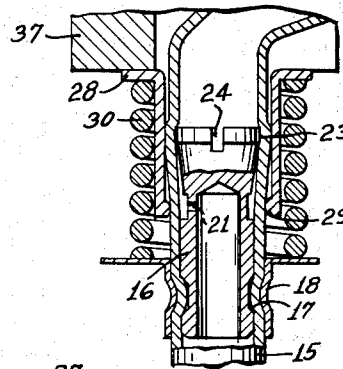


FIG. 5

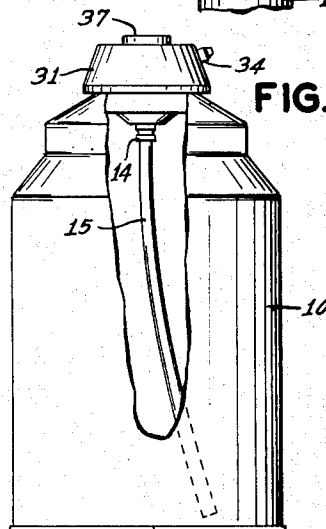
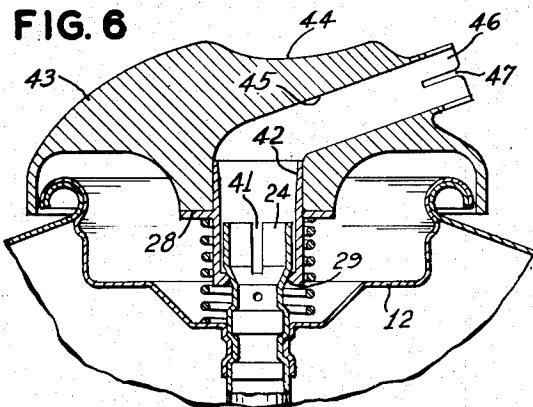


FIG. 6



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2,645,387

FLEXIBLE TUBE DISCHARGE VALVE
CONSTRUCTION

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Application June 16, 1950, Serial No. 168,477

15 Claims. (Cl. 222—394)

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This invention relates to discharge valves and discharge valve assemblies for self-dispensing pressure-tight containers. More particularly, it is concerned with a novel discharge valve the operating principles of which are believed to be entirely new to discharge valves for self-dispensing pressure-tight containers and in which the discharge siphon tube common to most self-dispensing pressure-tight containers is an integral part of the valve.

The heretofore most common and widely accepted type of discharge valve for pressure-tight containers comprises a valve assembly adapted to be secured in an opening in the upper end of a pressure-tight container and including a poppet valve spring urged into engagement with a valve seat and adapted to be unseated therefrom by a button extending upwardly from the valve and engageable by a user's finger. A flexible diaphragm is normally secured to the valve assembly across the upper end of the button whereby the user's finger actually engages the diaphragm in order to operate the valve. Such a valve assembly is normally very small in size relative to a user's finger and is fairly fatiguing in use. Additionally, considerable difficulty has been encountered in obtaining a pressure-tight seal between the valve assembly and the container end wall, though one such valve which substantially eliminates this latter characteristic is disclosed in the copending application Serial No. 161,835 of Abe O. Samuels, filed May 13, 1950.

Among the objects of this invention is the provision of a novel discharge valve which presents a relatively large finger engaging surface for operation thereof and which may be secured in a pressure-tight container, so that leakage around it will not result.

My invention broadly contemplates a discharge valve for a pressure-tight container comprising a valve core having a hole formed in it which extends longitudinally a substantial distance into its lower end. A flexible discharge or siphon tube surrounds the valve core and is permanently maintained pressed tightly against the lower portion of the valve core in pressure-tight relation therewith. A passageway is formed in the side wall of the valve core above that portion of the core against which the flexible tube is tightly pressed and intersects the upper end of the longitudinally-extending hole in the valve core. An annular collar surrounds the upper end of the valve core and the flexible discharge tube and is adapted to be moved axially into

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and out of a position in which it presses the flexible tube tightly against a portion of the valve core above the passageway through the valve core. This annular collar is normally maintained in the position in which it so presses the flexible tube against the valve core by a spring, but may be moved axially against the force of the spring to a position in which it no longer presses the tube against the valve core, at which time material under pressure in the container may flow through the hole and passageway formed in the valve core and around the upper end of the valve core between it and the flexible tube.

In one form of the invention a cover member is provided which overlies the discharge valve above described and supports a nozzle around one end of which is secured the upper end of the flexible discharge tube. The cover is also provided with an opening in its top through which a valve actuating button extends. The lower end of the button engages the top, or upper end, of the annular collar and by depression thereof the valve may be opened. This form of my invention is contemplated for use with pressure-tight containers containing gaseous fluids or liquids of low viscosity.

In another form of my invention which is contemplated for use with more viscous materials such as whipped cream, shaving cream, etc., the cover is provided with a rather large passageway therethrough the lower end of which surrounds or receives the upper end of the annular collar and the other end of which terminates in a notched flange. The number and size of the notches in the notched flange may be varied in accordance with the nature of the material to be dispensed.

For a better understanding of my invention reference may be made to the following more detailed description thereof in connection with the accompanying drawings in which:

Fig. 1 is a plan view of one form of discharge valve or discharge valve assembly of my invention secured to a pressure-tight container,

Fig. 2 is a sectional view, in elevation, of the form of valve shown in Fig. 1, and shows the valve in closed position,

Fig. 3 is a perspective view of a valve core,

Fig. 4 is an enlarged fragmentary view of the valve in open position,

Fig. 5 is an elevation of a container supporting the valve assembly of Figs. 1 through 4, and

Fig. 6 is a sectional view in elevation of a

modified form of valve assembly adapted for use with materials of relatively high viscosity.

By reference to Figs. 1 through 5, the form of discharge valve or discharge valve assembly, particularly adapted for use with pressure-tight containers which contain, under pressure, gaseous fluids or liquids of relatively low viscosity, will be described. One typical form of pressure-tight container 10 has an opening in its upper end surrounded by a rolled-out flange 11. A valve-supporting container cover member 12 provided with a turned-down peripheral flange 13 is adapted to be received by the opening in the container and to have its peripheral flange interlocked with flange 11 of the container in a seal-tight joint. Usually a sealing compound is used between flanges 11 and 13 to assure that the interlocking joint formed thereby will be pressure-tight. Container cover member 12 has a central opening which is surrounded by an integral depending flange 14. A flexible discharge or siphon tube extends through this opening. This tube may be made of any material so long as it is flexible, the only limitation upon the material chosen for this purpose being that it should not be one that might react with the contents of the container. Various plastics, or even rubber, may be used for this purpose.

A valve core 16 is contained within the flexible tube and has its lower end, which is provided with an annular groove 17, received in the opening in container cover member 12 and surrounded by flange 14. The flange 14 is crimped in at 18 to press the flexible tube tightly into annular groove 17 of the valve core to form a pressure-tight seal between the tube and the valve core. A hole or bore 19 extends longitudinally into the valve core from the lower end thereof terminating a substantial distance above the lower end. An annular channel 20 is formed in the valve core opposite the upper end of hole 19 and a passageway 21 places the upper end of the hole 19 in communication with channel 20. A tapered valve seat 22 is formed on the outer surface of the valve core above channel 20. The upper end 23 of the valve core is of a slightly greater diameter than the remainder thereof or than is the interior of the flexible tube and therefore it engages the inner wall of the tube rather tightly. A notch or groove 24 is formed in the upper end of the valve core and is of a depth such that its bottom is below the level of the upper part of the tapered valve seat 22. It will subsequently be understood that instead of having a groove or notch formed in the upper face thereof a longitudinally extending groove may be formed in the lateral face of portion 23 of the valve core and have its lower end terminating somewhere below the upper edge of the tapered valve seat.

An annular collar 27 surrounds the upper end of the valve core and the flexible tube and is provided with an outwardly extending flange 28 at its upper end. An inwardly extending circumferential projection 29 is formed on the lower edge of the collar. This collar, when in its uppermost position, is adapted to press the flexible tube tightly against the tapered valve seat 22 of the valve core to form a pressure-tight seal. This position of the annular collar is shown in Fig. 2. However, when the collar is moved downwardly to a position such as shown in Fig. 4, the flexible tube is permitted to disengage, or become unseated from, the valve seat and fluid under pressure is permitted to pass through hole 19, passageway 21, and notch 24 of the valve core

to the upper portion of the discharge valve tube. A compression spring 30 is provided to surround the annular collar and at its upper end engages the underface of flange 28 and at its lower end container cover member 12. Thus, the spring normally maintains the collar in its uppermost position thereby preventing the flow of material, under pressure, through the discharge tube.

A discharge valve cover member 31 overlies the above described structure and is provided with a flange 32 around its lower edge by which it is secured to the container cover member 12 as by being crimped inwardly thereagainst at several points 33. A conventional nozzle 34 having an axial discharge passage 35 is supported by the cover member in a flanged opening 36 at one side thereof. The larger portion of the nozzle is contained within the cover 31 and the upper end of the flexible discharge tube 15 is secured thereover. Thus, material passing through the discharge tube is discharged through nozzle 34.

A valve-actuating button 37 is contained for the most part within the cover and has its upper end extending through an opening 38 in the cover member. It is provided with an annular shoulder 39 by which its removal through opening 38 is prevented. Button 37 is supported by flange 28 of annular collar 27 and when depressed, as by the application of a user's finger to its upper end, serves to move the collar downwardly to open the valve. A part 40 of the otherwise substantially cylindrical button 37 is cut out as indicated in Figs. 1 and 2 to non-engagably receive the upper end of discharge tube 15 and the inner end of nozzle 34.

It should be noted that the above described discharge valve may be provided to users as a complete assembly ready to be secured to a container. This assembly comprises container cover member 12, discharge valve cover member 31, siphon tube 15 and all of the parts contained between the cover members.

Referring now to Fig. 6, a modified form of valve assembly is shown, which, as stated, is particularly adapted to use with containers holding a relatively viscous material under pressure. The details of the valve itself of this form are substantially the same as those of the above-described form, with minor exceptions. One of these exceptions is that valve core 24 instead of being provided with a groove or slot across its upper face is here provided with one or more grooves 41 formed in the outer lateral face thereof and extending from the upper face of the core downwardly to terminate in the tapered valve seat. In this form, the valve collar is also somewhat different. Whereas in the previous form the outwardly extending flange 28 is formed at the upper extremity of the annular collar, in this form it is not, and the collar has a portion 42 extending above flange 28. A cover member or cap 43, provided with a finger engaging depressed portion 44, is supported on flange 28 of the annular collar and has a passage 45 through it, the lower end of which receives upper portion 42 of the collar. The outer end of passage 45 terminates in a relatively thin flange 46 in which there is formed a plurality of notches 47. These notches are for the purpose of changing the shape of the relatively viscous material as it is expelled through passage 45 when the discharge valve is open so that the material will not be discharged therefrom as a plain tubular stream. It will be noted that in this form of valve assembly that the valve cover or cap 43 is not secured

to container cover member 12 as was the discharge valve cover 31 of the previous form of valve assembly.

In the appended claims the words "upper," "lower" and "above" are used for simplicity to concisely set forth the invention and it should be understood that their use is not intended to limit the scope of the claims other than for the purpose of relatively locating particular parts. It will also be apparent that various modifications of the forms of my invention disclosed may be made without departing from the scope of my invention and my invention is therefore to be limited to the extent set forth in the appended claims.

I claim:

1. A discharge valve for a pressure-tight container comprising a valve core having a hole formed therein which extends longitudinally into the lower end thereof but terminates therein below the upper end thereof, a flexible discharge tube surrounding said valve core, means for permanently maintaining the tube pressed tightly against the lower side wall of the valve core in pressure-tight relation thereto, a passageway extending laterally through the side wall of the valve core and intersecting said hole in the valve core above that portion of the valve core tightly engaged by the flexible tube, an annular collar surrounding said tube and said valve core and having a portion of smaller inner diameter than the diameter of the upper end of the valve core, said collar being movable axially into and out of a position in which said portion thereof presses said tube against the upper end of said valve core in pressure-tight relation above said passageway, and a spring normally urging the collar toward the position in which it presses the tube against the valve core.

2. A discharge valve according to claim 1 in which the annular collar presses the tube against the valve core when in its uppermost position and in which the annular collar has an outwardly extending peripheral flange at its upper end the underface of which is engaged by the upper end of the spring.

3. A discharge valve according to claim 1 in which the valve core has a valve seat formed adjacent the upper end thereof above said passageway, the annular collar being movable axially so that said portion thereof presses said tube against said valve seat.

4. A discharge valve according to claim 3 in which the wall of the valve core above the valve seat portion thereof permanently engages the tube and has formed in it a slot extending from the upper face of the valve core downwardly to the valve seat portion of the valve core.

5. A discharge valve according to claim 3 in which the upper end of the valve core above the valve seat portion thereof has a peripheral edge which permanently engages the tube and in which the upper end of the valve core has a slot formed across it having a depth such that the bottom of the slot is below said tube-engaging peripheral edge.

6. A discharge valve according to claim 3 in which an annular channel is formed in the valve core below said valve seat portion thereof, said passageway through the wall of the valve core having its outer end in said annular channel.

7. A discharge valve according to claim 3 in which the valve seat is tapered and in which the smaller diameter portion of the collar is an

annular inwardly projecting shoulder at the lower end of the collar.

8. A discharge valve according to claim 7 in which the upper peripheral edge of the tapered valve seat portion of the valve core permanently engages the tube and in which the upper end of the valve core has a slot formed across it having a depth such that the bottom of the slot is below said peripheral edge of the tapered valve seat.

9. A discharge valve assembly for a pressure-tight container comprising a valve-supporting container cover member adapted to be secured in the upper end wall of the container, said container cover member having an opening therethrough, a flexible discharge tube extending through said opening, a valve core the lower end of which extends through said opening inside said flexible tube, a flange integral with the edge of said container cover member around the opening therein, said flange being crimped against the lower portion of the valve core to press the flexible tube thereagainst in seal-tight relation, a passageway extending through the valve core from the bottom face thereof to a point on the face of the side wall of the core above said crimped flange, the upper end of said valve core being of larger diameter than the portion thereof adjacent said point on the face of the side wall, an annular collar surrounding said valve core and said flexible tube and having a portion of smaller inner diameter than the diameter of the upper end of the valve core, said annular collar being movable axially so that said portion thereof presses said tube against said valve core above said point on the face of the side wall of the core, and a spring normally urging the collar to the position in which it presses the tube against the valve core.

10. A discharge valve assembly for a pressure-tight container comprising a valve-supporting container cover member adapted to be secured in the upper end wall of the container, said container cover member having an opening therethrough, a flexible discharge tube extending through said opening, a valve core the lower end of which extends through said opening inside said flexible tube, a flange integral with the edge of said container cover member around the opening therein, said flange being crimped against the lower portion of the valve core to press the flexible tube thereagainst in seal-tight relation, an annular channel in the side wall of the valve core above said crimped flange, a passageway extending through the valve core from the bottom face thereof to the bottom of said annular channel, an annular collar surrounding said valve core and said flexible tube and having a portion of smaller diameter than the diameter of the portion of the valve core above said annular channel, said annular collar being movable axially so that said portion thereof presses said tube against said valve core above said annular channel, and a spring normally urging the collar toward the position in which it presses the tube against the valve core.

11. A discharge valve assembly for a pressure-tight container comprising a valve-supporting container cover member adapted to be secured in the upper end wall of the container, said container cover member having an opening therethrough, a flexible discharge tube extending through said opening, a valve core the lower end of which extends through said opening inside said flexible tube, a flange integral with the edge of said container cover member around the opening

therein, said flange being crimped against the lower portion of the valve core to press the flexible tube thereagainst in seal-tight relation, a passageway extending through the valve core from the bottom face thereof to a point on the face of the side wall of the core above said crimped flange, the upper end of said valve core being of larger diameter than the portion thereof adjacent said point on the face of the side wall, an annular collar surrounding said valve core and said flexible tube and having a portion of smaller inner diameter than the diameter of the upper end of the valve core, said annular collar being movable axially upwardly so that said portion thereof presses said tube against said valve core above said point on the face of the side wall of the core, an outwardly extending circumferential flange on the collar, and a spring compressed between said flange and said container cover member to normally urge the collar toward its upper position in which it presses the tube against the valve core.

12. A discharge valve assembly for a pressure-tight container comprising a valve-supporting container cover member adapted to be secured in the upper end wall of the container, said container cover member having an opening therethrough, a flexible discharge tube extending through said opening, a valve core the lower end of which extends through said opening inside said flexible tube, a flange integral with the edge of said container cover member around the opening therein, said flange being crimped against the lower portion of the valve core to press the flexible tube thereagainst in seal-tight relation, a passageway extending through the valve core from the bottom face thereof to a point on the face of the side wall of the core above said crimped flange, the upper end of said valve core being of larger diameter than the portion thereof adjacent said point on the face of the side wall, an annular collar surrounding said valve core and said flexible tube and having a portion of smaller inner diameter than the diameter of the upper end of the valve core, said annular collar being movable axially upwardly so that said portion thereof presses said tube against said valve core above said point on the face of the side wall of the core, a spring normally urging the collar upwardly to the position in which it presses the tube against the valve core, a discharge cover member overlying said valve, spring, and valve core and secured to the peripheral edge of said container cover member, a nozzle supported in an opening through the discharge valve cover member and having the upper end of the flexible discharge tube secured about its inner end, and a valve actuating button extending through an opening in the top of the discharge valve cover member and resting upon the annular collar whereby depression of the button effects depression of the collar to permit flow through the valve core, the discharge tube and the nozzle.

13. A discharge valve assembly for a pressure-tight container comprising a valve-supporting container cover member adapted to be secured in the upper end wall of the container, said container member having an opening therethrough, a flexible discharge tube extending through said opening, a valve core the lower end of which extends through said opening inside said flexible

tube, a flange integral with the edge of said container cover member around the opening therein, said flange being crimped against the lower portion of the valve core to press the flexible tube thereagainst in seal-tight relation, a passageway extending through the valve core from the bottom face thereof to a point on the face of the side wall of the core above said crimped flange, the upper end of said valve core being of larger diameter than the portion thereof adjacent said point on the face of the side wall, an annular collar surrounding said valve core and said flexible tube and having a portion of smaller inner diameter than the diameter of the upper end of the valve core, said annular collar being movable axially so that said portion thereof presses said tube against said valve core above said point on the face of the side wall of the core, a spring normally urging the collar to the position in which it presses the tube against the valve core, and a discharge valve cover member having a passage therethrough one end of which receives the upper end of the annular collar and the other end of which terminates in a flange in which there is formed a plurality of notches.

14. A discharge valve for a pressure-tight container comprising a valve core having a hole formed therein which extends longitudinally a substantial distance into the lower end thereof and terminates therein, a flexible discharge tube surrounding said valve core, means for permanently maintaining the tube pressed tightly against the lower side wall of the valve core in pressure-tight relation thereto, a passageway extending laterally through the side wall of the valve core and intersecting said hole in the valve core above that portion thereof tightly engaged by the flexible tube, an annular collar surrounding said tube and said valve core and having a portion of smaller inner diameter than the diameter of a portion of the valve core above said passageway, said collar being movable axially upwardly so that the smaller diameter portion thereof presses said tube against said portion of the valve core in pressure-tight relation above said passageway, an outwardly extending peripheral flange on said collar intermediate the length of the collar, and a spring engaging the underface of said flange to normally urge the collar upwardly toward the position in which it presses the tube against the valve core, and a discharge valve cover member having a passage therethrough one end of which receives the upper end of the annular collar and the other end of which terminates in a flange in which there is formed a plurality of notches, the discharge cover member being supported solely by said annular collar.

15. A discharge valve according to claim 14, which includes an inwardly extending projection at the lower edge of the annular collar adapted to engage said tube to press it tightly against said valve core.

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