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Riccio

[11] **3,785,530**

[45] **Jan. 15, 1974**

[54] **COMPRESSED AIR OPERATED DISPENSER WITH AIR COMPRESSION PISTON MEANS MOVABLE LATERALLY OF THE DISPENSER**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 240,025, March 31, 1972, abandoned.

[52] **U.S. Cl.** **222/193,** 222/378, 239/321, 239/357

[51] **Int. Cl.** **B67d 5/54**

[58] **Field of Search** 222/193, 373, 378, 222/380, 381, 383, 385, 400.5, 401, 402; 239/321, 333, 355, 357, 359

[56] **References Cited**

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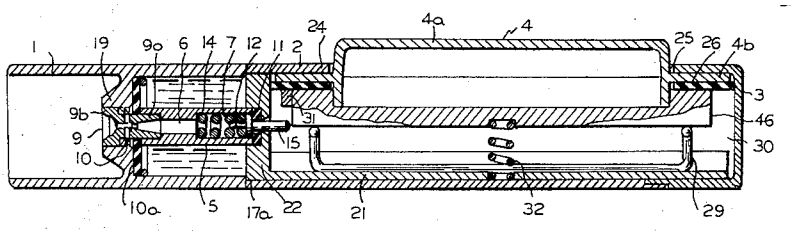
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Assistant Examiner—Larry Martin
Attorney—E. F. Wenderoth et al.

[57] **ABSTRACT**

A compressed air actuated dispensing device has a valve assembly having a valve body with a compressed air flow path therethrough and a valve member movable in the valve body and obturating the compressed air flow path. Aspirating means is provided at one end of the compressed air flow path, and a product containing means in the device feeds product through a product flow path to the aspirating means. A hollow elongated compression chamber portion has one end around the other end of the compressed air flow path, and a piston means is movable into and out of the compression chamber portion transversely of the direction of elongation thereof for compressing air therein. Extension means on the valve member is engageable by the piston means when the piston means is at the extreme inward end of its movement for moving the valve member for opening the compressed air flow path only after air in the compression chamber portion has been compressed.

5 Claims, 7 Drawing Figures



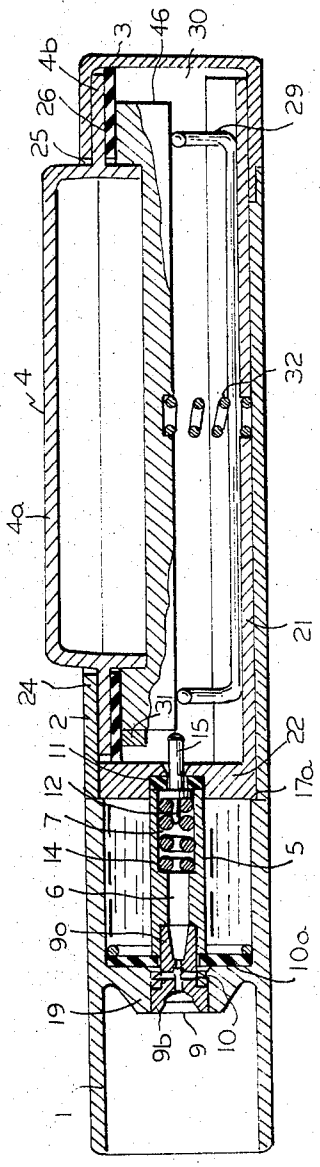

3
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4b
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FIG.1

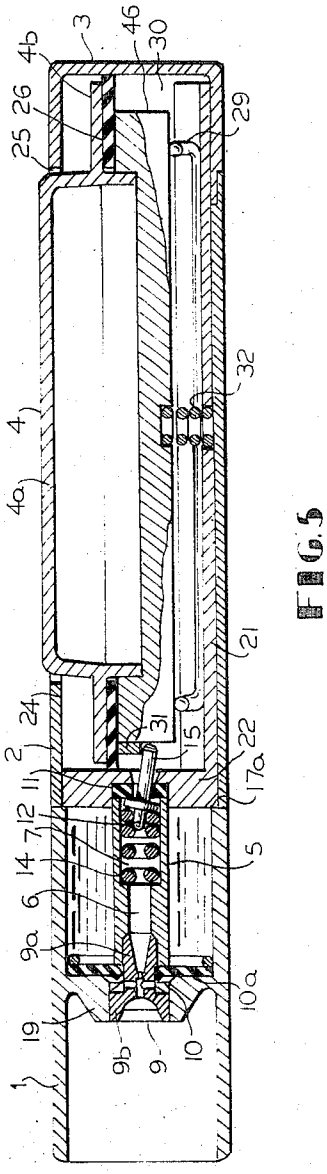

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FIG.5

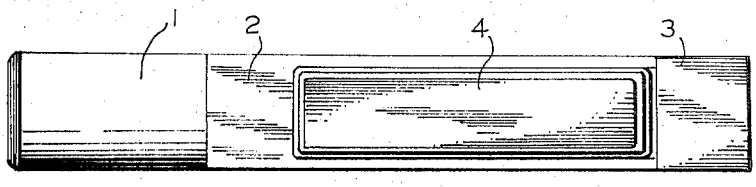


FIG. 6

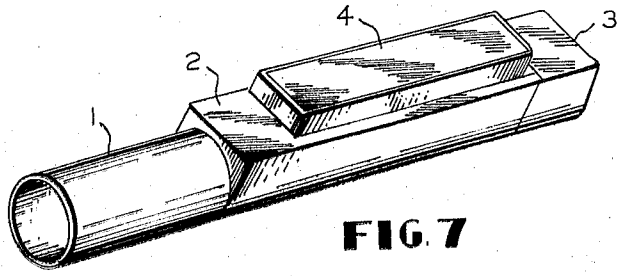


FIG. 7

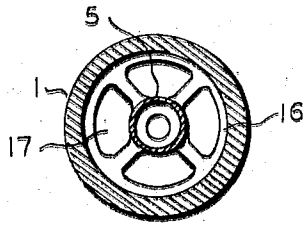


FIG. 3

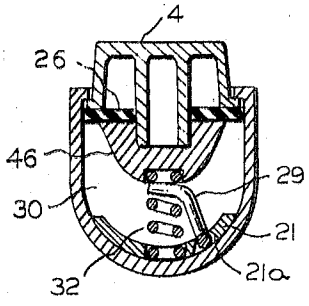


FIG. 2

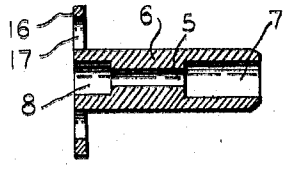


FIG. 4

COMPRESSED AIR OPERATED DISPENSER WITH AIR COMPRESSION PISTON MEANS MOVABLE LATERALLY OF THE DISPENSER

This application is a continuation-in-part of application Ser. No. 240,025, Filed Mar. 31, 1972 now abandoned.

This invention relates to dispensers for fluids, and more particularly to a compact hand held device for building up the pressure of compressed air until it reaches a predetermined value, at which point it is suddenly released to aspirate a fluid and dispense it as a spray. The device of the invention has an easily actuated means for compressing air.

PRIOR ART

There has recently been developed a type of dispenser for fluids which utilized compressed air for dispensing fluids in the form of a spray. This dispenser gradually builds up the pressure of air, and when a predetermined pressure has been reached, the compressed air is released suddenly for aspirating the fluid product as a spray.

There are many advantages to such a dispenser, among which are the fact that a conventional aerosol type propellant such as Freon, is necessary, whereby possible harm to users of the dispenser due to inhalation of the Freon propellant after it has been used to dispense the fluid is avoided. A further advantage is that such dispensers have a shelf-life limitation only by the shelf-life of the fluid product to be dispensed, since the air used to dispense the product is compressed by the user of the dispenser for each dispensing action. Such dispensers are disclosed in copending applications Ser. No. 44,694, now U.S. Pat. No. 3,672,345, and Ser. No. 90,897, Nov. 11, 1970; 139,027, now U.S. Pat. No. 3,733,010, and others.

In all of the various forms of the device as disclosed in the previously filed applications, the piston means for compressing the air moves axially of the elongated body of the device, or alternatively the elongated body moves axially of the piston means. While this is satisfactory for many uses, it often occurs that the particular product to be dispensed by the device requires the device to be held in such a position that it is awkward for the user to exert pressure on the parts of the device. For example, when the dispensing nozzle for dispensing the spray opens out of the end of the device, that end cannot have a finger or thumb placed thereover to exert axial pressure on the device. Technical progress would be achieved if a form of this type of dispenser could be developed in which the piston means was movable in the device in a direction in which the user could move his fingers more naturally and easily, and particularly if the finger movement were a squeezing movement.

OBJECTS AND BRIEF SUMMARY OF THE INVENTION

It is an object of the present invention to provide an inproved fluid product dispenser of the type described above which has the air compression means movable in a direction transverse to the axis of the elongated body of the device.

It is a further object of the invention to provide an improved fluid product dispenser of the type described above in which the air compression means can be actuated by either a single finger of a plurality of fingers of the user by a squeezing action of the finger or fingers.

These objects are achieved by the provision of a fluid product dispenser comprising a valve assembly having an elongated valve body which has a compressed air flow path therethrough, a valve member movable in the valve body and obturating the compressed air flow path, aspirating means at one end of the compressed air flow path, the other end of the compressed air flow path opening out of the valve body remote from said aspirating means, a product containing means in the device and a product flow path through the device from the product containing means to the aspirating means. A hollow enclosure is attached to the end of the valve body over the said other end of the compressed air flow path, and an elongated piston means is movable into the hollow enclosure in a direction transverse to the axis of the valve body and the hollow enclosure, and a flexible sealing diaphragm is provided around the piston means for sealing off the opening through which the piston means moves into and out of the enclosure for urging the piston means out of the enclosure. The piston means engages the valve means after it has moved into the enclosure sufficiently far to build up the pressure of the air within the enclosure in order to open the valve means to allow the compressed air to flow along the compressed air flow path.

BRIEF DESCRIPTION OF THE FIGURES

The invention will now be described in greater detail with reference to the accompanying drawing in which:

FIG. 1 is a longitudinal sectional view of the device according to the invention with the parts in the rest or non-dispensing positions;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a sectional elevation view of a part of the device;

FIG. 5 is a view similar to FIG. 1 with the parts in the dispensing positions;

FIG. 6 is a top plan view of the device; and

FIG. 7 is a perspective view of the device.

DETAILED DESCRIPTION OF THE FIGURES

The device as shown in the figures comprises a body portion 1, a conpression chamber portion 2, and a rear portion 3, all generally axially aligned. In the disclosed embodiment, body portion 1 is generally cylindrical and is either one piece of integrally joined, for example by plastic welding to compression chamber portion 2. Projecting out of the compression chamber portion 2 is an actuating bar 4 which forms part of a piston means which is movable into and out of the compression chamber portion 2 in a manner to be described hereinafter.

Within the body portion 1 is one arrangement of valve means, aspirating means and product container means with which the compression chamber 2 and actuating bar 4 can be used. The arrangement comprises a valve body 5, shown in detail in FIG. 4, having a longitudinally extending passage 6 therein which opens out of the bottom of the valve body in an enlarged recess 7. The other end of the valve body 5 has a further recess 8 therein.

Aspirating means in the form of a Venturi nozzle insert **9** has a smaller diameter portion **9***a* positioned in the recess **8** and extending forwardly of the end of valve body **5**. Boss **19** integrally formed on the inside of body portion **1** has a central aperture therein into which the larger portion **9***b* of the Venturi nozzle is tightly fitted. The space around the extending portions of the smaller diameter portion **9***a* defined between the boss **19** and the extending portion constitutes a product supply chamber **10** around the nozzle insert. The passage **6** forms a compressed air path through the body portion **1** from the recess **7** to the recess **8**.

The bottom of the valve body **5** fits ihto a recess in an apertured front wall **22** against an apertured valve seat member **11**, in the bottom of the recess and within the recess **7** over the valve seat member is a poppet valve member **12** which is urged toward the valve seat member **11** by a return spring **14** positioned in the recess **7**. Depending from the poppet valve member **12** through the aperture in the valve seat member **11** and the front wall **22** is a poppet valve actuating pin **15**.

The front end of the valve body **5** has a plate **16** thereon having fluid product flow apertures **17** therein, the portions of the disc between the apertures **17** forming spokes which support the rim of plate **16**. The rim fits tightly against the inside of the wall of body portion **1**. The wall of body portion **1** and the valve body **5** define between them a product containing space **18** from which fluid product flows through apertures **17** to the product supply chamber **10**. The fluid product flow apertures **17** are obturated by a flat annular gasket **10***a* which has the outer periphery held tightly between plate **16** and boss **19** and in its normal condition fits tightly against the front face of plate **16** and seals apertures **17**. The inner edge of the gasket **10***a* is free to flex forwardly into the product supply chamber **10**.

A mouthpiece extension **20** forming part of the body **1** extends from the boss **19** in a direction away from the nozzle insert **9**, and is adapted to be received in the mouth of the user of the device.

The other end of the product containing space **18** is closed by the front wall **22** which seats tightly against the inner periphery **17***a* of the end of body portion **1** and within the compression chamber **2**. In this device, the front wall **22** is integral with an anti-twist bar **21**, which has the same cross-sectional configuration as the bottom interior configuration of the compression chamber portion **2**. In the embodiment shown in the figures, the compression chamber portion is elongated in the direction of the length of the body portion and has a generally U-shaped cross-section hollow interior, the open top of the U being towards the actuating bar **4**. The actuating pin **15** extends through the front wall into the interior of the compression chamber portion.

A flat top wall **24** covers the top or open end of the U-shaped compression chamber portion and an aperture **25** is provided therein. The actuating bar **4** is positioned in the aperture, and is comprised of two parts, a finger pressure receiving part **4***a* which is toward the outside of the device, and a flange **4***b* extending laterally of the part **4***a* in the interior of the compression chamber portion. The actuating bar **4** has a piston body **46** on the inner end thereof. An rectangular piston diaphragm **26** is positioned between the piston body **46** and the under surface of the flange **4***b*, the peripheral edge being in sliding sealing engagement with the inner surfaces of the wall of the compression chamber portion and the front wall and the wall of the rear portion **3**. Flange **4***b* extends to a point close to the walls of the compression chamber, so that diaphragm **26** cannot flex upwardly. However, the sides of piston body **46** are spaced from the walls of the compression chamber to allow the diaphragm **26** to flex downwardly to permit air return on the outward stroke of the piston means. Resting against the under side of the piston body **46** is an anti-twist bar **29**, which is a U-shaped bar having the ends of the U resting against the piston body **46**, and having a relatively long straight portion forming the bottom of the U extending along a retaining slot **21***a* in the retainer **21**. A return piston spring **32** is provided between the bottom of piston body **46** and the bottom of the compression chamber portion **2**. It will be seen that the actuating bar **4**, the piston body **46** and the diaphragm **26**, together form a piston means and the piston means, the retainer **21** bar and the bar **29** can be assembled and compressed into an assembly which can be inserted into the compression chamber portion **2** before the rear portion **3** is added. The finger pressure receiving part **4a** is then released and projects through the aperture **25**.

The end of the compression chamber portion **2** opposite the end from which the valve body portion **1** extends is closed by the rear portion **3**, which is simply a cap having the same cross-sectional shape as the compression chamber portion **2**. The compression chamber portion **2** is attached to the valve body portion **1** and the rear portion **3** is attached to the compression chamber **2** by welding, a snap fit, or other means common in the art.

On the end of the piston body **46** toward the valve body portion is a poppet valve actuator **31**, which engages the poppet valve actuating pin **15** when the piston means has been pushed into the interior of the compression chamber portion **2** sufficiently far to compress air therein to the desired pressure.

In operation, the parts of the device are normally as shown in FIGS. **1** and **2**. When pressure is exerted on the actuating bar **4**, the piston means is forced into the space **30** within the compression chamber portion **2** against the resistance of the spring **32**, while the anti-twist bar **29** prevents the piston means from twisting, i.e. one end moving down faster than the other. When the piston means reaches the innermost position in which air within the compression chamber portion **2** is compressed sufficiently to aspirate the desired amount of product, the actuator **31** strikes the actuating pin **15**, thus opening the poppet valve, as shown in FIG. **3**. The compressed air then flows through the passage **6** and through the nozzle insert **9**. As it flows through the Venturi in the nozzle insert, it aspirates product from the product containing space **18** through the fluid product flow appertures **17**. When reduced pressure is created in product supply chamber **10**, the product, which is at atmospheric pressure acts against the inner edge of the annular gasket **10***a* flexing it inwardly. The product thus passes the inner periphery of the gasket **10***a* and flows into the product supply chamber from where it is aspirated. It is preferred to tilt the device so that the rear portion is elevated. This insures that product will always press against and escape past gasket **10***a*.

When aspiration is completed, sufficient air will flow back into the product containing space **18** to releive the vacuum therein. This is accomplished by the inertia of the inner periphery of gasket **10***a*. Alternatively, vac-

uum relief means can be provided separately. When the pressure on the actuating bar is released, and the return spring **32** urges the piston means out of the space **30** within the compression chamber portion **2.**

When the actuating bar **4** is being pressed inwardly, the edge of the flange **4***b* presses against the diaphragm **26,** and the diaphragm presses against the walls of the compression chamber portion **2** with its natural resilience, thus preventing air within the space **3** in the compression chamber portion from escaping past the diaphragm **26.** However, when the pressure on the actuating bar is released, the atmospheric pressure forces the diaphragm **26** downwardly away from the flange **4***b*, allowing air to enter the space **30** to relieve the vacuum.

It will be seen that the position of the actuating bar is such that it is easy for the user of the device to simply wrap his hand around the compression chamber portion **2** and bring the fingers to bear on the actuating bar. Simply squeezing the device will press the actuating bar. The actuating bar acts as a large piston, movable transversely of the direction of elongation of the compression chamber portion. It is easy and convenient for the user to place the mouthpiece extension **20** in his mouth with the hand wrapped around the device. This eliminates the awkward manipulation which would be necessary if pressure had to be exerted by the thumb against the end of the device while one end of it is in the mouth.

It should be understood that while a specific form of the valve body **5,** nozzle insert **9,** product supply space **18,** etc. have been described, this form can be altered to any of the forms shown in the copending applications described hereinbefore, or to any other convenient form, without departing from the scope of the invention. The actuating bar arrangement can be used with any of the other arrangements of valve body, nozzle insert etc.

What is claimed is:

1. A dispensing device comprising: a valve assembly having a valve body, said body having a compressed air flow path therethrough; a valve member movable in said valve body and obturating said compressed air flow path; aspirating means at one end of the said compressed air flow path, the other end of the compressed air flow path opening out of the valve body remote from said aspirating means; a product containing means in said device and said device having a product flow path therethrough from said product containing means to said aspirating means; a hollow elongated compression chamber portion with one end around the other end of the compressed air flow path, and a piston means movable into and out of said compression chamber portion transversely of the direction of elongation thereof and in sealing relationship with said compression chamber portion for compressing air therein, said piston means extending out of the compression chamber portion; and extension means on said valve member and engageable by said piston means when the piston means is at the extreme inward end of its movement for moving said valve member relative to said valve body for opening said compressed air flow path only after air in said compression chamber portion has been compressed.

2. A dispensing device as claimed in claim **1** in which said valve member extension means extends into said compression chamber, and said piston means comprises a piston body having a valve actuator thereon which, when the piston means is at the inner-most extent of its inward movement engages said extension means for tilitng said valve member for opening said compressed air flow path.

3. A dispensing device as claimed in claim **1** in which said piston means comprises a piston body and said device further comprises an anti-twist bar between said piston body and the interior of the hollow compression chamber portion, said bar preventing said piston body from being twisted as said piston body is moved inwardly and outwardly of the compression chamber portion.

4. A dispensing device as claimed in claim **1** in which said compression chamber portion has an aperture therein through which said piston means moves, and said device further comprising a diaphragm attached around said piston means for sealing engagement with the interior of said compression chamber portion when said piston means is being moved inwardly of said compression chamber portion.

5. A dispensing device as claimed in claim **1** further comprising valving means in said product flow path, said device having an annular chamber around said aspirating means through which said product flow path flows, and said valving means being an annular gasket, said product containing means having an apertured plate defining one end thereof and the apertures in said plate opening into said annular chamber, said annular gasket being against said plate and normally covering said apertures and having the outer periphery fixed and the inner periphery free to distort into the annular chamber and pass product when subjected to a pressure differential thereacross.

* * * * *