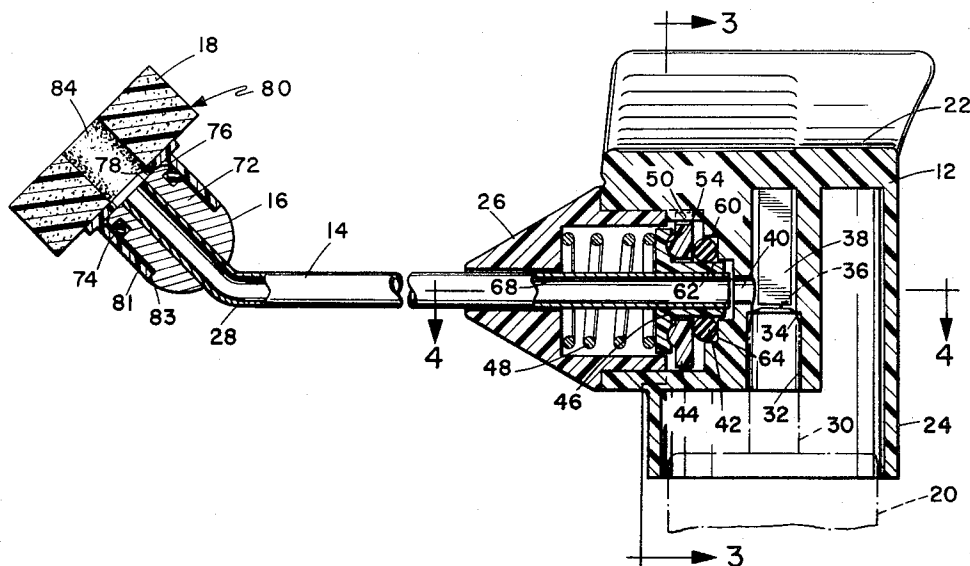


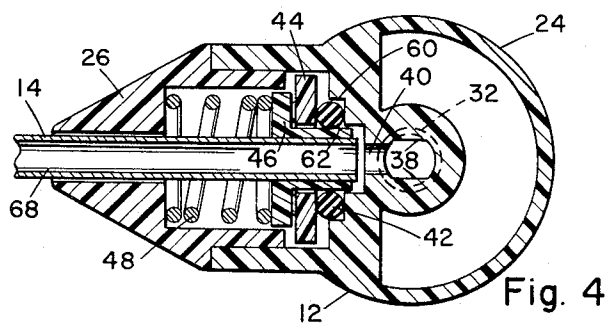
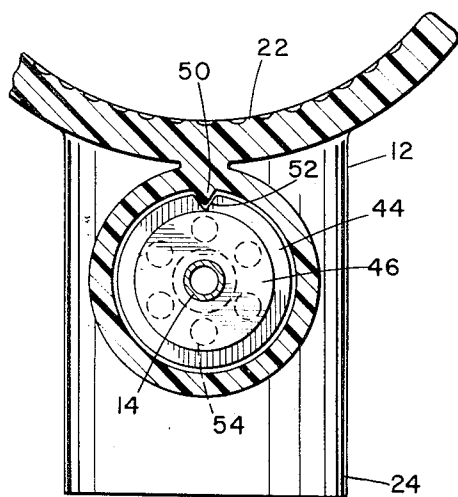
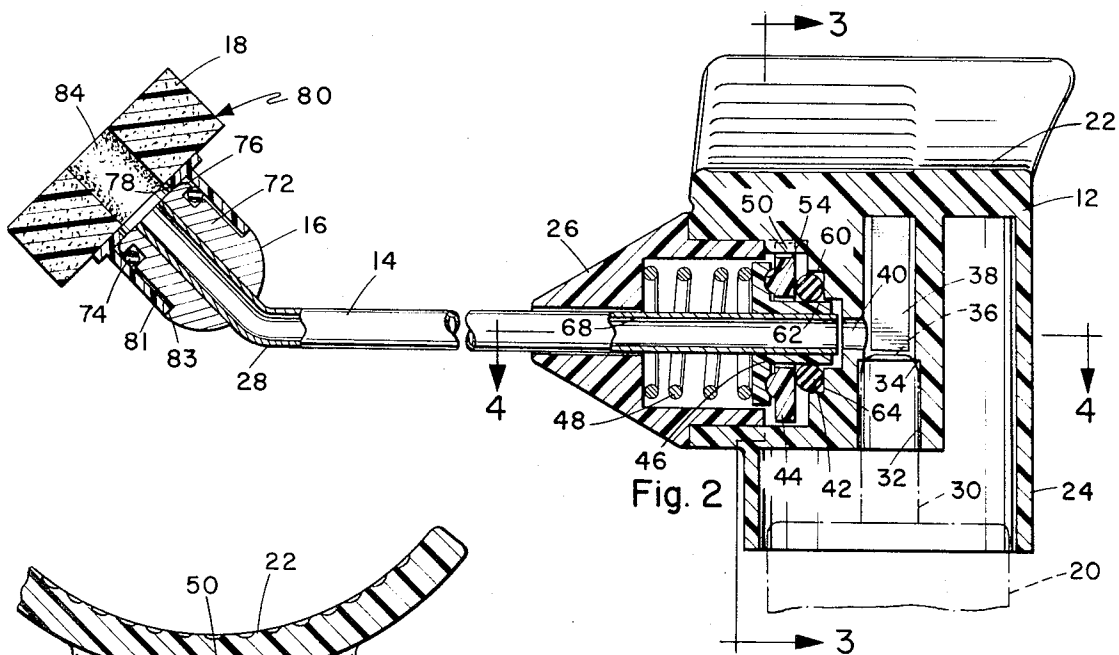
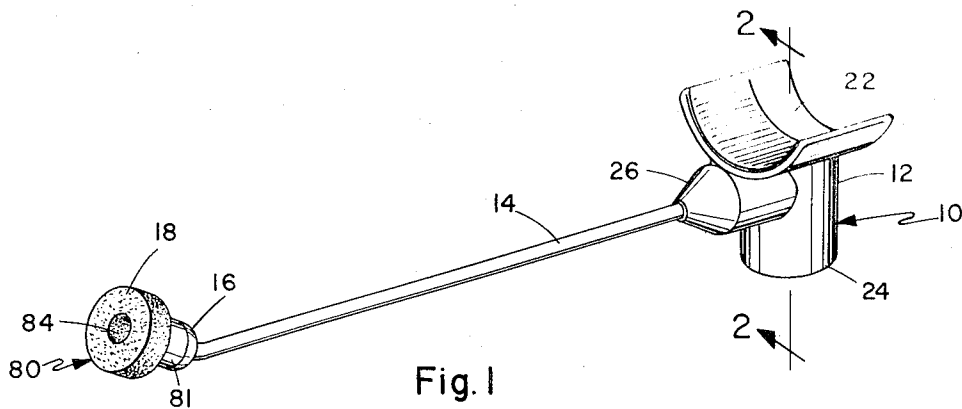
[54] APPARATUS FOR FACILITATING
APPLICATION OF FLUIDS1,278,225 9/1918 Schamberg 401/265 X
1,442,363 1/1923 Saxe 15/172[76] Inventors: **George A. Otis**, 715 E. Los Angeles
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Attorney—Carl R. Brown et al.[22] Filed: **July 7, 1971**[21] Appl. No.: **160,400**[52] U.S. Cl. **222/394**, 128/173, 401/190,
401/265[51] Int. Cl. **B65d 83/14**[58] Field of Search 222/394, 516, 548,
222/566; 128/173 X, 184, 260; 401/190 X,
265 X; 239/526, 579, 587; 239/390, 394,
397; 15/172[56] **References Cited****UNITED STATES PATENTS**

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[57] **ABSTRACT**

An apparatus for facilitating the application of fluids from a source of fluid such as an aerosol container. The apparatus comprises an actuator body which includes a bore for fitting over the dispensing tube of the aerosol bottle. Also mounted on the actuator body is a coupling means which provides for mounting of a dispensing tube in a sealed and rotatable configuration. The dispensing tube has a bend near its free end and may be rotated so as to position the dispensing end against any surface. A seal within the housing comprises a spring loaded seal that compensates for wear and compression of the O-ring seal. The spring also forces a detent sleeve into association with a detent washer creating a plurality of detent positions for the rotatable dispensing tube.

12 Claims, 4 Drawing Figures



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APPARATUS FOR FACILITATING APPLICATION OF FLUIDS

BACKGROUND OF THE INVENTION

Aerosol containers are normally supplied with a plastic actuator which does little more than provide means for depressing the discharge tube of the aerosol bottle and re-directing the resulting spray through a nozzle. The spray is useful for many purposes, but is inappropriate and inconvenient for use in confined spaces or where a limitation of the area to which the aerosol spray is to be supplied, is desired. In some applications, an extension known as a snorkle tube has been added by insertion into the conventional plastic actuator. This extension does provide improved access to confined areas but does not solve the problem of limiting the area of coverage. A further deficiency in prior art devices results from the requirement that an aerosol container be operated in an upright position. This limitation results in difficulty in reaching certain inaccessible surfaces, particularly when those surfaces are not oriented vertically.

Thus it would be desirable if a dispensing apparatus for use in conjunction with an aerosol container could be developed which would permit the selective application of a fluid to a limited and relatively inaccessible area independently of the planar orientation of that area.

SUMMARY OF THE INVENTION

An exemplary embodiment of the invention provides an apparatus for facilitating the application of fluids, that is particularly adapted to the application of fluids to limited inaccessible areas. The invention has particular use in the application of local anesthetics, such as are frequently employed in the dental field.

The invention comprises an actuator body, which is configured for mounting on a conventional aerosol bottle, and a dispensing tube, having a bend along its length, configured for mounting an applicator tip. The dispensing tube is rotatable within the actuator and is releasably held in a plurality of detent positions, so that the surface of the applicator tip can be configured in substantially any planar orientation while the orientation of the dispensing bottle is maintained upright.

The actuator body is supported by, and seals against, the discharge tube of the aerosol bottle and utilizes a cylindrical bore sized to frictionally engage the discharge tube. The cylindrical bore has a stepped down portion spaced from its open end to provide sealing engagement with the curved end of the discharge tube. A second necking down of the bore, which may take the form of two flats, reducing the cross sectional area of the bore, is located adjacent the first necked down section, and further within the bore. This necked down portion acts as a limit stop so that, despite the pressure with which the actuator body is depressed, the travel of the discharge tube within the bore is limited.

The invention provides a resilient seal, comprising a neoprene or other non-reactive resilient O-ring. The O-ring is confined within a chamber and is forced into contact with all opposing surfaces by the action of a resiliently biased washer. The travel of and pressure against the washer are sufficient to compensate for wear and compression of the O-ring after a period of use. In the exemplary embodiment the O-ring is compressed in a chamber which comprises, on two sides,

portions of the body of the actuator, on a third side, the wall of the washer, and on the fourth side a detent sleeve.

The detent sleeve, in addition to serving the functions of confining the O-ring provides a plurality of detent depressions around its circumference that mate with corresponding detent protrusions on the washer. The detent sleeve is secured to the dispensing tube and therefore is rotatable therewith, whereas the detent washer is keyed against rotation with respect to the actuator body. Therefore, when an operator rotates the dispensing tube, the detent sleeve is forced over succeeding detent protrusions on the detent washer and is frictionally held in a detent position by the force of a spring. The opposite end of the spring engages a seat on the conical nose cone, which nose cone is secured in a bore within the actuator body.

The free end of the dispensing tube includes an adaptor for receiving an applicator tip. The adaptor has a cylindrical protrusion which amounts an O-ring seal and is sized to be substantially the same length as the depth of bore in the adaptor tip. The adaptor tip is forced over the cylindrical protrusion, and O-ring, and seals by contact with the O-ring and also by contact with the rounded tip of the protrusion and a necked down portion in the bore of the applicator tip. The applicator tip is cushioned by a layer of cushioning material which may take the configuration of annular ring providing a hole in the center, for the flow of the fluid.

The advantages of the apparatus of the invention will be apparent from a description of its use in applying a local dental anesthetic. The apparatus is brought into use by the actuator body being placed over a discharge tube of a conventional aerosol container that holds a quantity of anesthetic liquid. When the actuator body is forced down over the discharge tube the sizing of the bore diameter creates a sealing contact between the tube and the actuator body. The necked down portion creates further sealing effect by contact with the curved end portion of the discharge tube. A limit to the discharge tube's travel into bore of the actuator body is provided by a plurality of flats. These flats ensure that when the actuator body is depressed, the discharge tube will be forced down into the aerosol container causing fluid to flow from the container into the actuator body.

After installation of the actuator body on the aerosol container, the dentist applies a cushion applicator tip to the adaptor on the end of the dispensing tube by pressing the tip over the cylindrical protrusion and O-ring seal. Adequate sealing in this portion of the apparatus is ensured by contact between the curved cylindrical tip portion and a necked down portion of the bore in the cushioned applicator tip. The dentist then selects the orientation for the cushion tip by rotating the dispensing tube about its mounting within the applicator body. The orientation of the tip being selected to achieve a substantially coplanar relationship between the surface of the applicator tip and the skin area, such as a patient's gum. The dentist then places the tip against the area to be treated. The cushioning provides a means against which the operation may be braced without damage to the tissue or discomfort to the patient. Also, it allows air or other gasses trapped in the passages through the actuator and tube to escape while simultaneously trapping all excess liquid and holding same. The remaining step is to depress the actuator

body and cause flow of the fluid onto the area to be treated.

It is therefore an object of the invention to provide a new and improved apparatus for facilitating application of fluid.

It is another object of the invention to provide a new and improved apparatus for facilitating the application of dental anesthetics.

It is another object of the invention to provide a new and improved apparatus for application of fluids which is low in cost.

It is another object of the invention to provide a new and improved apparatus for the application of fluids which provides an effective seal for limiting leakage of the fluid to be dispensed.

It is another object of the invention to provide a new and improved apparatus for facilitating application of fluid, with provision for use with a cushioned applicator tip.

It is another object of the invention to provide a new and improved apparatus with provision for use with an absorbent cushioned applicator tip, eliminating difficulties experienced with uncontrolled flow of excess liquid, while at the same time allowing for retention of contact between moist tip and treated surface, for any desired period of time.

It is another object of the invention to provide a new and improved apparatus for facilitating application of fluids which may be easily mounted on an aerosol container.

It is another object of the invention to provide a new and improved apparatus for facilitating the application of fluids which has a long service life.

It is another object of the invention to provide a new and improved apparatus for the application of fluid in which the dispensing tube may be rotated to a plurality of detent positions.

Other objects and many attendant advantages of this invention will be apparent from a reading of the following detailed description, together with the drawing in which like reference numerals refer to like parts throughout and in which:

FIG. 1 is a perspective view of the complete unit.

FIG. 2 is an enlarged sectional view taken on line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken on line 3—3 of FIG. 2.

FIG. 4 is a sectional view taken on line 4—4 of FIG. 2.

Referring now to the drawings there is illustrated generally an apparatus for application of fluids 10 comprising an actuator body 12, dispensing tube 14, adaptor portion 16, and applicator tip 18. The apparatus is mounted on a conventional aerosol container 20 and conceals the upper portion of the container by virtue of a depending skirt 24. The dispensing tube 14 is mounted within a conical nose cone 26 received within the actuator body. The dispensing tube is shown to have a 45 degree bend at the numeral 28.

Referring now to the cross sectional view of FIG. 2, the actuator body 12 is illustrated as being received on a dispensing tube 30 through its bore 32 which contacts the dispensing discharge tube 30 along its length and also at the reduced diameter portion of the bore at numeral 34 through its curved terminal portion 36. A limit stop in the form of two flats which have the effect

of further reducing the cross sectional area of the bore is provided at 38.

The depression of the actuator body, through pressure on the surface 22, causes the depression of the discharge tube 30 and flow of fluid out of the tube and through a right angle bore 40 to continue through the bore 68 of the dispensing tube. Flow of this fluid to the exterior of the device is prevented by an O-ring seal 42. The O-ring is maintained in contact with the sealing surfaces by a resilient bias provided by washer 44, which transmits the resilient force through sleeve 46 from spring 48. Compression of the O-ring seal causes it to contact the body portion of the actuator at wall 64 as well as the body portion surface 60. The inner diameter portion of the O-ring seal contacts the sleeve portion of the detent sleeve along surface 62.

The operation of the detent mechanism of the invention can be visualized by reference to FIGS. 2 and 3 and 4 which illustrate the protrusions 54 being received within detent cavities in the detent sleeve 46. Rotation of the discharge tube 14 causes rotation of the detent sleeve 46 which is fixed to the tube by adhesives, such as epoxy or other means. The detent sleeve is forced to ride up over the protrusions 54 as it rotates since the washer is keyed to the actuator body by a key 50 on the actuator body received in a key slot 52 in the washer.

Initial assembly of the device is facilitated by the fact that the nose cone spring and detent sleeve may be assembled exteriorly of the apparatus and the detent sleeve secured to the tube, whereupon the nose cone is forced within a corresponding bore in the actuator body and secured also by adhesive or other means.

Referring now to FIG. 2, there is illustrated the other end of the discharge tube 14, which shows the adaptor section 16 comprising a cylindrical protrusion 72 mounting an O-ring seal 74 and a rounded terminal end 76. A tip 80 is received on this protrusion by its sleeve extension 81 which contacts the O-ring seal and abuts against the shoulder 83 on the protrusion. Security of the seal is ensured by a necked down portion 78 which coacts with the curved end of the tip 76 to create a frictional sealing contact.

Fluid delivered from the aerosol valve arrives at the tip, through bore 68, in tube 14 and flows out into a cylindrical cavity 84 in the cushioned applicator portion 18.

In use, the actuator body is applied to the aerosol container in the manner previously described. The apparatus is so constructed so that it may be used numerous times, surviving a plurality of aerosol containers. The cushion tip, however, would normally be used only for a single use or application and is made of an inexpensive molded material, so that it may be disposed of after use. The tip is applied to the adaptor section of the discharge tube by forcing it over the protrusion and O-ring and into contact with the shoulder which acts as a limit stop and spaces the cushion tip so that the rounded portion of the adaptor protrusion coacts with the necked down portion within the applicator tip. The spongy plastic material which provides the cushioning action of the tip also acts as a dam to prevent the flow of fluids beyond the area of intended application, localizing the medication or other fluid being applied. The orientation of the tip is adjustable to a plurality of positions. Detents are provided, at for example six such positions, to hold the actuator tip in position during the application operation.

The resilient seal ensures that excess fluid will not be emitted from the actuator body over the entire life of the apparatus by providing sufficient adjustment for compression of the O-ring seal with age. The resilient nature of this seal cooperates with the resiliency requirements for the detent operation and so makes dual utilization of the spring.

Having described our invention, we now claim.

1. Apparatus for facilitating the application of fluids from a source of fluid under pressure comprising:
 - actuator means including mounting means for mounting said actuator means on a source of fluid under pressure,
 - said actuator means including coupling means for receiving a first end of a dispensing tube means,
 - a conduit providing a passage for fluid from said source of fluid to said tube means,
 - means for preventing leakage of said fluid between said dispensing means and said coupling means,
 - said coupling means for permitting relative rotation between said dispensing tube means and said actuator,
 - said source of fluid being an aerosol container,
 - said mounting means comprising a cylindrical bore to surround and frictionally engage the discharge tube of said container,
 - and said seal means comprising an O-ring contacting said actuator body along at least one line and contacting a resiliently biased washer along another line.
2. The apparatus of claim 1 wherein: said washer cooperates with a detent sleeve to provide a plurality of detent positions.
3. The apparatus of claim 2 wherein: said detent sleeve is fixed to said tube; and said washer is keyed to said actuator body to prevent rotation.
4. The apparatus of claim 3 wherein: said O-ring contacts said actuator body in two quadrants and contacts said washer and said detent sleeve in the other quadrants.
5. The apparatus of claim 1 wherein: said washer is biased toward said O-ring by one end of a coiled spring;

the other end of said spring is seated against a nose cone member; and said nose cone member is secured to said actuator body.

6. The apparatus of claim 1 wherein: said bore has a reduced diameter portion to engage the curved end of said discharge tube.
7. The apparatus of claim 6 wherein: said bore includes a stop means for engaging the end of said discharge tube and limiting the travel into said bore.
8. The apparatus of claim 1 wherein: a second end of the dispensing tube mounts a seal adaptor means for receiving an applicator tip.
9. The apparatus of claim 8 wherein: said adaptor means includes a protrusion to extend within a sleeve on said tip.
10. The apparatus of claim 9 wherein: said protrusion is substantially cylindrical and has a shoulder spaced from its end to limit the travel of the tip on said protrusion; and said protrusion carries an O-ring for engaging the tip sleeve.
11. The apparatus of claim 10 wherein: said tip has a necked down portion for engaging the rounded end of said protrusion.
12. Apparatus for facilitating the application of fluids from a source of fluid under pressure comprising:
 - actuator means including mounting means for mounting said actuator means on a source of fluid under pressure,
 - said actuator means including coupling means for receiving a first end of a dispensing tube means,
 - means for preventing leakage of said fluid between said dispensing tube means and said coupling means,
 - said seal means comprising a resiliently biased washer forcing an O-ring into contact with a sealing surface,
 - and said washer allowing sufficient travel toward said O-ring to exert said force on said O-ring even after compression from long use.

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