Oct. 10, 1967 W. W. WEESE 3,346,148

DISPENSING SHOWER HEAD

Original Filed Jan. 4, 1965 2 Sheets-Sheet 1

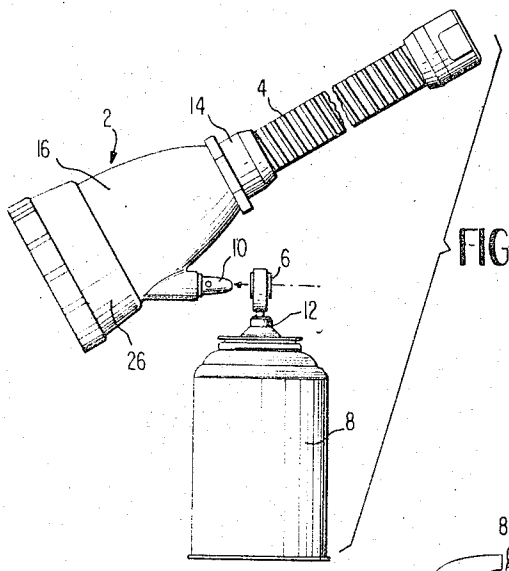


FIG. 1

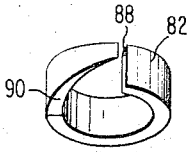


FIG. 5

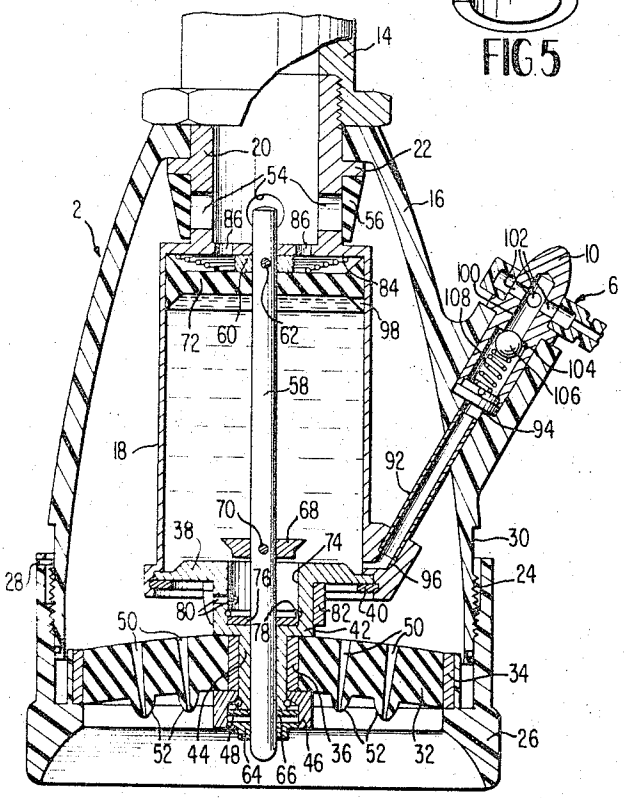


FIG. 2

FIG. 3

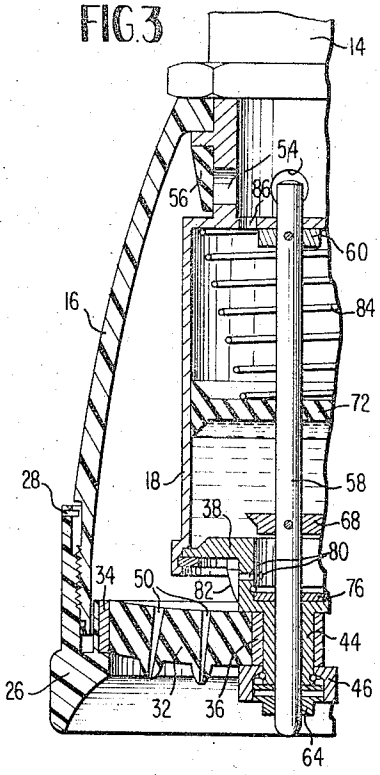
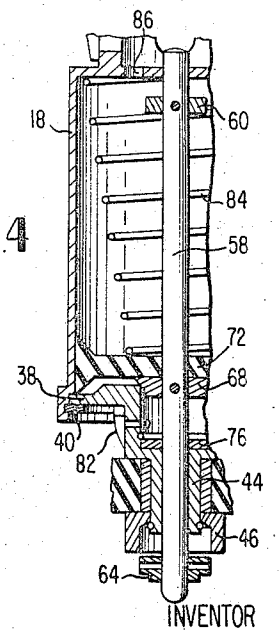


FIG. 4



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DISPENSING SHOWER HEAD

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FIG.6

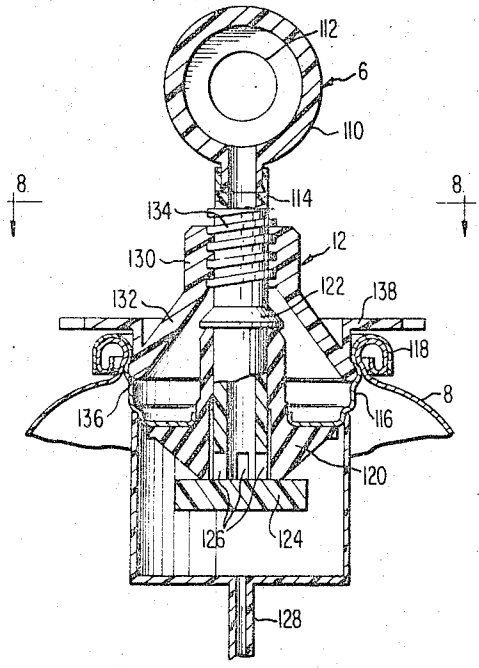


FIG.7

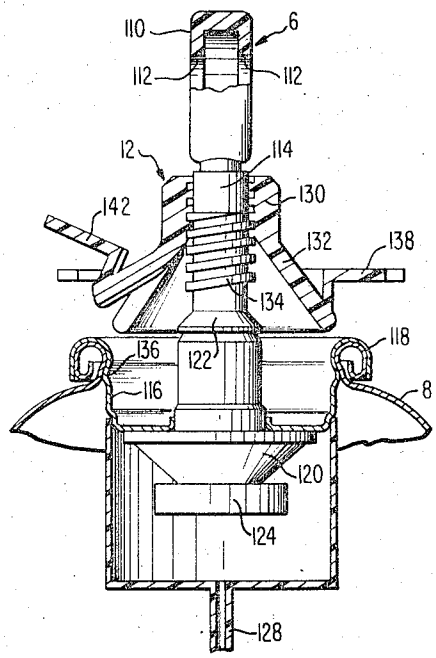
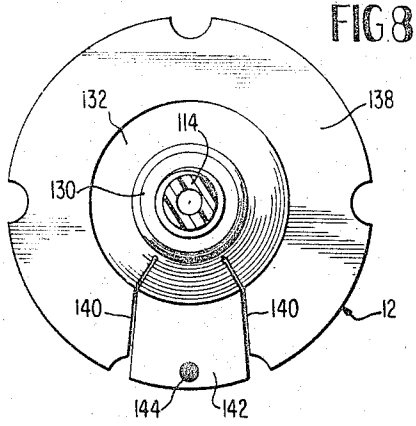


FIG.8



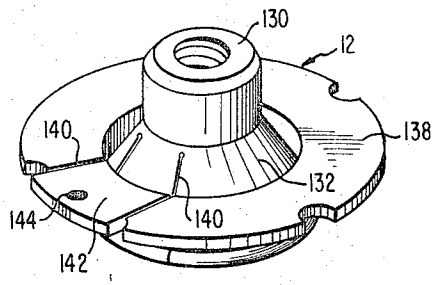


FIG.9

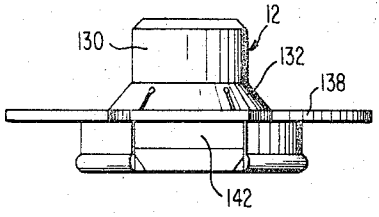


FIG.10

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DISPENSING SHOWER HEAD

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Original application Jan. 4, 1965, Ser. No. 422,946. Divided and this application Feb. 24, 1967, Ser. No. 618,426

11 Claims. (Cl. 222—402.11)

This is a division of application Ser. No. 422,946, filed Jan. 4, 1965.

This invention relates to a shower head and, more particularly, to apparatus for dispensing a treatment solution from a shower head.

Various attempts have been made to provide means for introducing treatment materials, such as shampoo, cosmetic and medicinal preparations into the spray from a shower head. Devices previously proposed have been awkward to use and do not provide for adequate mixing of the treatment material with the water spray.

Accordingly, it is an object of this invention to provide an improved shower head.

It is another object of this invention to provide safe and efficient means for introducing treatment fluid into the shower spray.

It is a further object of this invention to provide an improved shower head dispensing device.

It is a still further object of this invention to provide means for conveniently transferring a treatment fluid from a container to a shower head.

These objects are accomplished in accordance with a preferred embodiment of the invention by a shower head having a chamber for receiving treatment fluid. A piston is mounted for reciprocation in the chamber, and a supply conduit communicates between the exterior of the shower head and the interior of the chamber. A fitting on the outside of the shower head is adapted to receive from a container pressurized fluid under sufficient pressure to displace the piston. An outlet conduit communicates between the interior of the chamber and the interior of the shower head and a spring urges the piston toward the outlet conduit, thereby dispensing the treatment fluid into the water stream which flows through the shower head. The rate of flow of treatment fluid through the outlet conduit may be adjusted by a valve, and the spray from the shower head may be changed to provide a converging or diverging spray pattern. The fitting on the exterior of the shower head is adapted to receive a hollow coupling on the valve stem of a conventional pressurized container. When the valve stem of the pressurized container is displaced, fluid flows from the container into the chamber. A cap on the valve stem rigidly engages the container to prevent accidental displacement of the valve stem, but the cap is readily released to allow operation of the valve stem.

This preferred embodiment of the invention is illustrated in the accompanying drawings in which:

FIG. 1 is a side elevational view of the shower head and a container having the coupling and cap of this invention;

FIG. 2 is a cross sectional view of the shower head, adjusted for a converging spray pattern;

FIG. 3 is a cross sectional view of the shower head showing the piston partially displaced from its position in FIG. 2 and adjusted for a diverging spray pattern;

FIG. 4 is a detail sectional view of the treatment fluid chamber with the piston at the end of its travel;

FIG. 5 is a detail perspective view of the metering ring for adjusting the rate of flow of treatment fluid;

FIG. 6 is a cross sectional view of the valve of a pressurized container and showing the locking cap and coupling of this invention;

FIG. 7 is a detail view of the valve of the pressurized container as in FIG. 6, but with the locking cap in the released position;

FIG. 8 is a cross sectional view of the valve and locking cap along the line 8—8 in FIG. 6;

FIG. 9 is a perspective view of the locking cap of this invention; and

FIG. 10 is a side elevational view of the locking cap.

Referring to FIG. 1, the apparatus of this invention includes a shower head 2 which may be mounted on the end of a flexible pipe 4. A coupling 6 on a valve stem of a conventional pressurized container 8 cooperates with a fitting 10 on the shower head for transferring treatment fluid from the container 8 into the shower head 2. A locking cap 12 engages the valve stem and prevents accidental discharge of the contents from the container 8.

The shower head 2 is secured to the flexible pipe 4 by a coupling 14, as shown in FIG. 2. The shower head 2 includes a hollow body 16 in which a cylinder 18 is mounted. The cylinder 18 has a tubular extension 20 which is threadedly secured in the coupling 14. The tubular extension 20 has a radial flange 22, and the end portion of the body 16 is clamped between the flange 22 and the coupling 14.

At the opposite end of the body 16, external screw threads 24 are provided and a ring 26 is threadedly secured on the body 16. A plurality of pins 28 are secured in the ring 26 and extend into an annular groove 30 in the body 16. By rotating the ring 26, it may be displaced axially relative to the body 16 until the pins 28 engage the shoulder at one end of the groove 30, or the threads 24 at the opposite end of the groove 30. A flexible spray element 32 of substantial thickness has a band 34 secured along its periphery. The band 34 is also secured to the ring 26. A sleeve 36 is bonded in a central opening in the spray element 32. The spray element 32 may be formed of rubber of other flexible material.

A cylinder cover 38 is mounted in the end of the cylinder 18 and held in place by a snap ring 40. The cover 38 includes a cylindrical boss 42 and a tubular portion 44 extending outwardly from the boss 42. The sleeve 36 is mounted on the tubular portion 44 with one end abutting against the boss 42 and the opposite end abutting against an annular ring 46. The ring 46 is secured on the tubular portion 44 by a snap ring 48. There is a sufficiently close fit between the sleeve 36 and the tubular portion 44 to prevent leakage therebetween, but the sleeve 36 is free to turn relative to the tubular portion 44. If desired, an O-ring or other sealing means may be inserted between the sleeve 36 and the tubular portion 44.

The spray element 32 is of substantial thickness and has a plurality of nozzle openings 50. The length of the nozzle openings may be extended by providing projections 52 on the outer surface of the spray element 32. Since the nozzle openings 50 are relatively long, the stream issuing from the nozzle remains in a relatively narrow stream for a substantial distance away from the spray element 32. The direction of the stream issuing from each nozzle 50 may be adjusted by turning the ring 26 relative to the body 16. When the ring 26 is adjusted to the position shown in FIG. 2, the streams issuing from the nozzles 50 form a converging pattern, and when the ring 26 is adjusted to the position shown in FIG. 3, a divergent spray pattern is obtained. While the ring 26 is being rotated with respect to the body 16, the spray element 32 and the band 34 rotate with the ring 26, and the sleeve 36 rotates relative to the tubular portion 44.

Water flows into the interior of the body **16** from the tubular extension **20** through ports **54**. A check valve **56** prevents the reverse flow of water from the body **16**, back through the ports **54**. The check valve **56** is in the form of a flexible, resilient band, preferably formed of rubber. Water pressure in the tubular extension **20** urges the valve **56** away from the ports **54** and the water flows into the body **16**. The band has a substantially greater thickness at one end that at the other, so that the thin end of the band deflects to a greater extent under the pressure of the water flowing through the ports **54**, thereby deflecting the stream downwardly into the body **16**.

The cylinder **18** has a rod **58** mounted for reciprocating movement in one end of the cylinder **18** and the opposite end of the rod **58** is mounted in the tubular portion **44** of the cover **38**. A collar **60** is secured on the rod **58** by a pin **62** adjacent one end of the cylinder **18** and a collar **64** is secured on the opposite end of the rod **58** by a pin **66**. A valve element **68** is secured on the intermediate portion of the rod **58** by a pin **70**. A piston **72** in the cylinder **18** is guided by the rod **58**, but it is a floating piston and moves longitudinally relative to the rod **58**, between the collar **60** and the valve element **68**. A counterbore **74** in the cover **38** forms a valve seat for the valve member **68**. At the bottom of the counterbore **74**, a washer **76** frictionally grips the rod **58** to provide resistance to longitudinal displacement of the rod. The washer is held in place by a snap ring **78**. A plurality of ports **80** are provided in the boss **42** and a valve in the form of a metering ring **82** is slidably mounted on the boss **42**. A spring **84** in the cylinder urges the piston **72** toward the outlet ports **80** and a plurality of vent openings **86** in the cylinder **18** allow water to flow into and out of the space behind the piston.

As shown in FIG. 5, the metering ring **82** has a slot **88** to permit radial expansion of the ring. The free internal diameter of the ring **82** is slightly less than the external diameter of the boss **42**, and the friction between them resists displacement of the ring relative to the boss. The metering ring **82** has a sloping portion **90** and the length of the ring **82** at the end of the sloping portion adjacent the slot **88** is less than the distance between the end wall **38** and the ports **80**, so that one or more of the ports **80** may be uncovered. By turning the ring **82** relative to the boss **42**, the rate of flow through the ports **80** may be adjusted.

Treatment fluid is supplied to the cylinder **18** from the fitting **10** through a tube **92** having one end mounted in the cylinder **18** and the opposite end mounted in a bore **94** extending through the body **16**. The cylinder **18** has a passage **96** communicating between the tube **92** and the interior of the cylinder **18**. In order to allow the fluid from the passage **96** to flow into the cylinder **18** between the piston and the end wall **38** a notch **98** is provided in the peripheral edge of the piston **72**, as shown in FIG. 2. The fitting **10** is secured in the bore **94** and has a longitudinal passage **100** and a plurality of radial passages **102**. The exterior of the fitting **10** is substantially cylindrical adjacent the radial passages **102**. A shoulder in the bore **100** forms a seat **104** for a ball **106**. The ball **106** is urged toward the seat **104** by a spring **108**, thereby forming a check valve preventing the escape of fluid from the cylinder **18** through the fitting **10**.

The fitting **10** cooperates with the coupling **6**, as shown in FIG. 1, for supplying treatment fluid from a pressurized container **8** to the interior of the cylinder **18**. As shown in FIGS. 6 and 7, the coupling **6** is in the form of a hollow torus **110** having aligned circular openings **112** on opposite sides. The torus **110** is preferably formed of a resilient material, and the openings **112** have a slightly smaller diameter than that of the fitting **10** adjacent the radial passages **102**, so that the openings **112** dilate and form a tight sealing relation with the fitting when the coupling **6** is applied over the fitting, as shown in FIG. 2. The radial passages **102** are substantially aligned with the hollow interior portion of the torus **110**.

The coupling **6** is mounted on the end of a valve stem **114** of a conventional pressurized container **8**. The conventional valve assembly includes a valve cup **116** which is rolled and welded to the wall of the container to form a rim **118**. A resilient valve seat **120** is mounted in the valve cup **116** for supporting the valve stem **114**. The valve stem **114** has a radial flange **122** which engages the end of the valve seat **120** and has a valve head **124** enclosing the end of the stem **114**. A plurality of ports **126** are provided in the valve stem **114** adjacent the valve head **124**. The valve is operated by swinging the upper end of the stem **114**, thereby causing the stem to pivot on its flange **122**. Since the valve seat **120** is formed of a resilient material, the swinging movement of the stem causes the valve head **124** to become separated from the valve seat **120** at one side of the stem **114**. Fluid under pressure flows from the interior of the container **8** through a tube **128** and into the valve stem **114**. Therefore, when the valve stem **114** is displaced from its upright position, the valve opens and pressurized fluid flows through the stem and into the coupling **110**. The resiliency of the valve seat **120** causes the stem to return to its upright position when the deflecting force is removed.

In order to prevent accidental discharge of the contents of the container **8**, a locking cap is provided. The cap **12** includes a hub portion **130** and a web portion **132**, as shown in FIGS. 6 to 10. The stem **114** has screw threads **134** formed thereon and the hub **130** is internally threaded to cooperate with the threads **134**. By turning the hub **130**, the cap **12** is displaced longitudinally relative to the stem **114**.

The valve cup **116** has an annular groove **136** formed in its interior surface and, as shown in FIG. 6, the web **132** extends outwardly from the hub **130** sufficiently for its peripheral edge to engage in the groove **136**, when the hub is at the lower end of the threaded portion **134**. The web **132** is sufficiently resilient to pass over the rim **118** and to spring outwardly into the groove **136**. A flange **138** projects outwardly from the web portion **132** adjacent the peripheral edge of the web. The shape of the flange **138** makes the edge of the web **132** more rigid and prevents the web **132** from being displaced too deeply into the cup **116**.

The cap **12** has a lock for preventing rotation of the cap relative to the stem. A pair of slots **140** extend through the flange **138** and the web **132** and terminate adjacent the hub **130**, as shown in FIG. 8. The slots **140** separate a wedge portion **142** from the remainder of the cap **12**. The wedge portion **142** is hinged on the web **132** between the ends of the slots **140**. To facilitate swinging of the wedge portion **142** into the grooves **136**, after the cap **12** has been displaced to the position shown in FIG. 6, the peripheral edge of the web **132** is chamfered, as shown in FIG. 7. A colored spot **144** or other indicator may be provided on the wedge portion **142**.

The web **132** is inserted in the valve cup **116** by turning the cap **12** relative to the stem **114**, while the wedge portion **142** is swung upwardly relative to the web **132**, as shown in FIG. 7. The diameter of the web **132** at its peripheral edge is slightly larger than the internal diameter of the groove **136**. Since the portion of the web included in the wedge portion **142** is temporarily displaced, the peripheral edge of the web **132** may contract sufficiently as it passes over the rim **118** for the web to enter the groove **136**. As the web **132** contracts and becomes lodged in the groove **136**, the outer portions of the web and flange **138** along the edge of each slot **140** move closer together. Therefore, when the wedge portion **142** is swung downwardly into the valve cap **116**, as shown in FIG. 6, it urges apart the web and flange along the slots **140** and imposes a tangential force on the web **132**, tending to expand it radially. The opposite edges of the wedge portion **142** may be chamfered, as shown in FIG. 10, to facilitate spreading apart the flange **138** when the wedge portion **142** is inserted in the valve cup **116**. In

this manner, the wedge portion **142** causes the web **132** to grip the valve cup **116** more tightly and the increased frictional force resists turning of the cap **12** relative to the valve cup **116**. The cup **116** may be roughened to increase the frictional resistance.

The container **8** is stored with the cap **12** in the position shown in FIG. 6. The hub **130** and the web **132** prevent lateral displacement of the stem **114**. In order to operate the valve, it is necessary to lift the wedge portion **142** until it is raised out of the valve cup **116**. The hub **130** may then be rotated relative to the stem **114**, until the peripheral edge of the web **132** is displaced out of the valve cup **116**. The cap **12** then occupies the position shown in FIG. 7, and the valve stem **114** is free to swing on its flange **122** for opening the valve and discharging the contents of the container **8** into the coupling **6**. The cap may be reapplied for holding the valve stem **114** in an upright position by turning the hub **130** while swinging the wedge portion **142** out of engagement with the valve cup **116**. After the peripheral edge of the web **132** is seated in the groove **136**, the wedge portion **142** is swung down into the valve cup and into engagement with the groove **136**. The wedge portion is chamfered as shown in FIGS. 7 and 10 to allow the wedge portion to be inserted into the rim **118** and to pass between the edges of the flange **138**.

In operation, the cylinder **18** may be filled with pressurized treatment fluid from the container **8** by applying the coupling **6** over the fitting **10**, as shown in FIG. 2. While the cap **12** in the position shown in FIG. 7, the valve stem **114** may be displaced to uncover the valve ports **126**. The pressure in the container **8** propels the fluid through the valve stem **114**, through the torus **110** and into the passages **102**. The fluid pressure is sufficiently great to displace the ball **106** off of its seat **104**. The fluid flows through the tube **92** and into the cylinder **18** between the cylinder cover **38** and the piston **72**. The spring **84** urges the piston **72** against the valve member **68**, and when the piston is in the position shown in FIG. 4, the valve member **68** prevents fluid from flowing into the counterbore **74**. As the treatment fluid flows into the cylinder **18** from the container **8**, the fluid pressure is sufficiently great to overcome the force of the spring **84** and to cause the piston **72** to be displaced toward the opposite end of the cylinder, until it reaches the position shown in FIG. 2. While the piston **72** is moving through the cylinder the valve member **68** remains in the position shown in FIG. 4, since the washer **76** resists longitudinal displacement of the rod **68**.

While the cylinder is being filled, the collar **64** is positioned below the ring **46**, as shown in FIG. 4, and when the piston **72** engages the collar **60**, the rod **58** is displaced upwardly to the position shown in FIG. 2. Displacement of the rod **58** lifts the valve member **68** from the seat in the counterbore **74** and lifts the collar **64** into the ring **46**. This change in position of the collar **64** indicates that the cylinder is full. The coupling **6** is then removed from the fitting **10**. The ball **106** prevents the treatment fluid from flowing out of the cylinder **18** through the tube **92**.

Water is turned on and flows through the coupling **14** and into the interior of the body **16**, through the ports **54**. The valve **56** prevents the water from flowing back into the tubular portion **20**. The ring **26** is adjusted to provide selectively a converging spray, shown in FIG. 2, or a diverging water spray, shown in FIG. 3. When the valve member **68** is raised from the seat by the piston **72**, the treatment fluid in the cylinder **18** flows through the counterbore **74**, through the ports **80**, at a selected flow rate according to the position of the metering ring **82**, and into the body **16** where the treatment fluid mixes with the water.

The treatment fluid continues to flow through the ports **80**, as the piston moves toward the cylinder cover **38** under the force of the spring **84** (FIG. 3). The valve

member **68** remains in the position shown in FIG. 3, since the washer **76** resists longitudinal displacement of the rod **58**, but when the piston **72** reaches the cover **38**, it engages the valve member **68** and moves the valve member **68** into the counterbore **74**, as shown in FIG. 4. Movement of the valve member **68** causes a corresponding movement of the collar **64** on the lower end of the rod **58**, and the collar **64** is displaced out of the retaining ring **46**. The collar **64** may be brightly colored, or otherwise marked, to indicate that the treatment fluid has been exhausted.

The dispensing shower head of this invention is designed to use treatment fluids which are packaged in conventional pressurized containers. The treatment fluids may include shampoos and medicinal preparations. The apparatus is simple to operate and to adjust. The spray element formed by the spray element **32** is resistant to corrosion and self-cleaning due to the flexing action of the wall. Any sediment or solids on the interior surface of the wall will be washed away through the nozzles **50**. The cap **12** for the pressurized container **8** assures that the contents of the container will not be discharged accidentally.

While this invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein, without departing from the invention as set forth in the claims.

I claim:

1. In a coupling comprising a first portion having first surface means extending at least in part about an axis, with said first surface means defining a recess disposed interiorly thereof and having an open end, the improvement comprising:

a second portion, said second portion comprising:

second surface means extending in part about said axis, received within the recess of said first portion, and facing outwardly toward said first surface means, and

a pair of lips connected with said second surface means, said lips being spaced circumferentially with reference to said axis; and

abutment means disposed between said spaced lips;

said abutment means engaging said lips so as to impede circumferential contraction of said second surface means and hold said second surface means in compressed engagement with said first surface means.

2. A coupling comprising:

a first portion, said first portion including:

first surface means extending at least in part about an axis,

said first surface means defining a recess disposed interiorly thereof and having an open end; and

a second portion, said second portion comprising:

second surface means extending in part about said axis, received within the recess of said first portion, and facing outwardly toward said first surface means, and

a pair of lips connected with said second surface means, said lips being spaced circumferentially with reference to said axis; and

abutment means disposed between said spaced lips;

said abutment means engaging said lips so as to impede circumferential contraction of said second surface means and hold said second surface means in compressed engagement with said first surface means.

3. A coupling as described in claim **2** wherein:

said first portion includes:

a valve operating stem projecting axially from said recess and spaced radially inwardly of said first surface,

said stem having at least a portion thereof externally threaded;

wherein said second portion includes:

a hub, and

generally frustoconical means connecting said hub with said second surface means, and diverging away from said hub generally toward said first surface means, said hub having an internally threaded portion threadedly engaged with the externally threaded portion of said stem;

wherein said first surface means includes:

a generally cylindrical portion coaxial with but spaced from said axis, and

a rim portion facing generally axially of said axis; and

wherein said second surface means includes a generally cylindrical portion in compressed engagement with said generally cylindrical portion of said first surface means;

said second portion additionally including abutment means extending generally transversely of said axis and engaged with said rim portion of said first surface means whereby said cylindrical portion of said second surface means is prevented from moving axially through the entire axial length of said recess.

4. A coupling as described in claim **2**

wherein said abutment means comprises:

a wedge; and

hinge means pivotally mounting said wedge on said second portion;

wherein said first surface means has a recessed portion opening toward and extending circumferentially of said axis; and

wherein said second surface means has a beaded portion extending radially outwardly of said axis and into said recessed portion of said first surface.

5. A coupling comprising a hub, a web portion extending outwardly from said hub, said web portion being substantially circular and having a peripheral edge, a flange projecting outwardly from said web portion adjacent said edge, means forming a wedge in said flange and web portion, said wedge means being hingedly attached to said web portion for swinging radially of said web portion, said hub having screw threads thereon, whereby

said wedge means grips a cylindrical recess to resist turning of said coupling relative thereto.

6. A coupling according to claim **5** wherein said hub has a central axis and said peripheral edge is concentric with said axis, said web portion being substantially frustoconical.

7. A coupling according to claim **6** wherein said wedge means includes a pair of continuous slots extending generally radially through said flange and said web portion, said slots separating a wedge from said flange and web portion, said wedge being hingedly joined to said wedge portion adjacent said hub.

8. A coupling according to claim **6** wherein said wedge means is integral with said web portion and said hub.

9. A coupling according to claim **6** wherein said hub has a central bore therethrough, said hub screw threads being in said central bore.

10. A coupling according to claim **7** wherein said flange extends substantially radially about said central axis and lies in a plane, the plane of said flange being spaced axially between said web portion peripheral edge and the intersection of said hub and said web portion.

11. A locking cap for pressurized container of the type having a cylindrical valve cup with a hollow valve stem extending substantially axially outward from the center of said cup wherein the contents are expelled from the container through the stem by displacing the stem, said cap comprising a hub, a web extending outwardly from the hub, and a flange extending outwardly from an intermediate portion of said web, said web having a segment including a portion of said flange hingedly secured to the remainder of the web adjacent the center thereof, whereby the hinged segment resists turning of the cap when engaged in said valve cup.

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