April 1, 1958 H. A. MART 2,828,895

COMBINED SPOUT AND COCK FOR A DISPENSING TYPE RECEPTACLE

Filed Sept. 28, 1953

Fig. 1

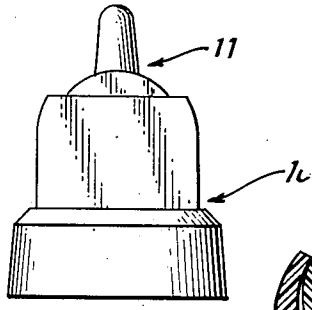


Fig. 2

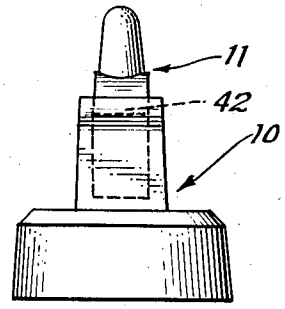


Fig. 6

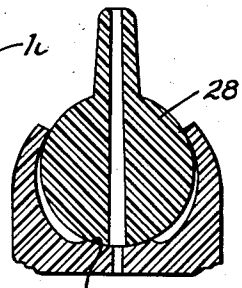


Fig. 3

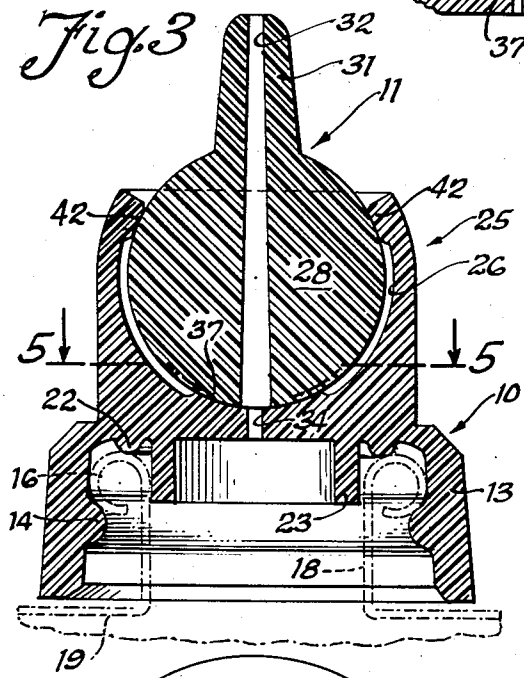


Fig. 4

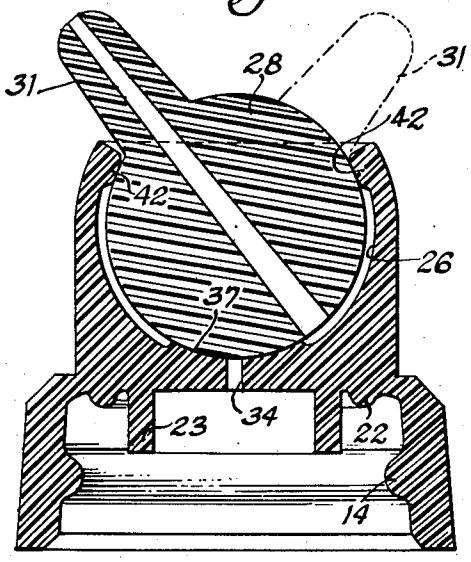
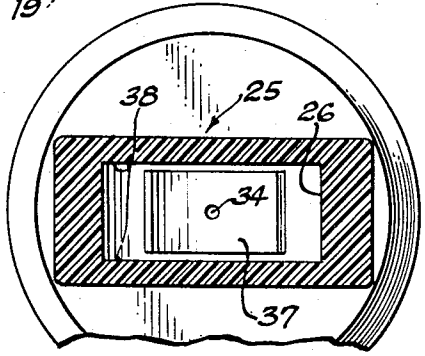


Fig. 5



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COMBINED SPOUT AND COCK FOR A DISPENSING TYPE RECEPTACLE

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Application September 28, 1953, Serial No. 382,625

9 Claims. (Cl. 222—536)

This invention relates to a combined spout and shut-off valve for a receptacle for dispensing a liquid.

In my United States Letters Patent Numbers 2,717,726 and 2,727,658 I have disclosed two forms of a similar invention, and upon which the present application constitutes improvements.

Basically the invention is intended for manufacture as a unit for attachment to a necked receptacle although it will become apparent that the same may be an integral part of the receptacle, e. g. squeeze-type bottles made of polyethylene. In either case all the novel features of the invention remain unchanged.

I have found that, due to the characteristics of those resilient, waxy-surfaced plastic compositions, which have been found to lend themselves best to manufacture of the device here comprehended, particularly polyethylene, the accomplishment of a fluid-tight joint between two relatively movable parts made of such material depends largely on the novel expedients disclosed herein. For example, in my Patent Number 2,727,658 I disclosed a device designed to possess the same principal object as the instant invention, but I found that, when the device was reproduced in quantity the idiosyncrasies of polyethylene and the practical exigencies of the commercial molding operations rendered it impossible to achieve a fluid-tight joint when a simple, male surface of revolution is made to move in a congruent, female surface of revolution. The difficulty of molding the necessarily perfectly fitting surfaces in the only commercially available material having the necessary resiliency and comparative rigidity forced the discard of that embodiment. In my Patent Number 2,717,726, I attempted to overcome this problem of leakage by providing a protuberance in the socket adapted, upon rotation of the spout part to one of its "off" positions, to press into a localized zone of the spout knuckle to provide around the margin of the orifice from the receptacle, high contact pressure per square unit of area, and by allowing such protuberance to frictionally nest in an enlargement of the bore of the spout nozzle in its "on" position. However, manufacturing difficulties proved this model also inadequate from a commercial standpoint.

Inasmuch as the invention device presently finds its widest field of use in connection with receptacles for refilling cigarette lighters every precaution must be taken to avoid leakage, principally during transportation as the fuel is highly inflammable.

The primary object of this invention lies in providing a combined dispensing spout and valve which is proof against leakage while shut off, and against dripping through its joints when in fluid-delivering position.

Another object lies in achieving the foregoing object while preserving these basic forms which enable the article to be readily molded from a resilient plactic composition, and to be readily assembled by automatic machinery.

Other objects will appear from the following description which, taken with the accompanying drawing, discloses a preferred mode of carrying the invention into practice.

In this drawing:

Fig. 1 shows a front elevation of a device embodying the invention;

Fig. 2 shows a side elevation of the same;

Fig. 3 is a somewhat enlarged cross section transversely of the axis of rotation of the spout, and showing the latter in its "on" position;

Fig. 4 is a like view showing the spout in one of its two "off" positions;

Fig. 5 shows a cross section taken on the line 5—5 of Fig. 3, and

Fig. 6 shows a cross section similar to that of Fig. 3 but of a modified form of the invention.

Broadly the invention contemplates the provision of a device of the same general type as is disclosed in my Patent No. 2,727,658 but further characterized by a localized pressure zone bounding the fluid exit from the receptacle, and by means of which the downward component of force exerted by the resilient curved walls of the socket upon the knuckle is concentrated upon this zone to provide high unit pressure. Moreover each of the curved socket walls is preferably provided near its upper margin with a pressure pad which develops the normal cantilever action of the walls into localized downward components of force upon the knuckle to utilize, most efficaciously, the available leverage of the walls. However, acceptable structures may be made in which the pressure pads per se are omitted and the resiliency of the curved walls of the socket alone relied upon to provide the necessary component of downward pressure.

Turning to the drawing there is shown a fixed body part **10** and a movable spout part **11**. The body part incorporates some portion by means of which the invention device may be secured to or become a part of the receptacle. In the example this is shown as a collar or mounting part **13** having a boss **14** adapted to "snap" under a flange **16** forming the margin of the usual neck **18** of a receptacle **19** of a common type, e. g. as used for fuel for pyrophoric lighters. Due to the resilient character of the material preferred for the body part the collar may be readily forced into engagement with the neck and will retain such engagement by constriction. If desired the sealing action of the boss **14** may be complemented by a second annular boss **22** and a flange **23** respectively snugly fitting upon and within the neck **18**. However the features just described are not to be regarded as part of this invention per se. Obviously the collar **13** may be simply the neck of a receptacle comprising the desired material.

Surmounting the mounting part **13** of the body **10** is a walled portion **25** defining a socket having a cavity **26**, in this case shown as a longitudinal segment of a substantially cylindrical surface although capable of taking the form of other surfaces of revolution. It is to be noted that the plane of truncation is necessarily selected so that the resulting cavity has an extent greater than 180°, and that the plane of truncation essentially defines a rectangular opening for the cavity through which the knuckle may be forcibly thrust for assembly with the socket and whereby the knuckle may be thereafter frictionally and rotatably retained. Adapted to be received in the socket **26** is the congruent knuckle **28** of the spout part **11**, in this case also cylindrical in form and having substantially the same radius and axial length as the cavity **26**. The axial length of each of the socket and knuckle are so selected as to provide frictional abutment to the maximum degree consistent with easy manipulation of the spout part, for example, a knuckle dimension of 0.200 inch and a socket dimension of 0.218 inch.

The spout part **11** includes a nozzle **31** having a bore

32 which continues through the knuckle to provide, when the spout part is in its "on" position, fluid communication with a passage 34 from the interior of the receptacle 19.

As heretofore alluded to, the problem of sealing the passage 34 against egress of fluid when the spout part is in the "off" position of Fig. 4 or its alternate (not illustrated) has presented considerable difficulty. The present invention meets this contingency by providing a curved pad 37 formed on the wall of the cavity 26, and having the same radius as the knuckle 23. Preferably the pad, regarded in its widthwise aspect (Fig. 5) is narrower than the spacing between the flat walls 38—38 of the cavity 26, in this case 0.125 inch, in order to avoid the adverse effects of fillets at the corners, as might otherwise occur. The height and area of the pad has not been found to be critical as long as it provides a zone surrounding the passage 34 sufficient to seal the same under ordinary conditions of handling and transportation. However, too extended an area may defeat the purpose, since then manufacturing considerations may render it practically impossible to assure that the respective radii of the knuckle and pad will correspond, and the unit pressure will be reduced in proportion. On the other hand if, in order to increase the unit pressure, such area is too limited minor irregularities in the adjoining surfaces may be conducive to leakage.

In one form of the invention for dispensing naphtha the radius of the knuckle and pad are 0.252 inch, and the length and width of the pad are respectively 0.250 inch and 0.125 inch. The height thereof may be approximately 0.010 inch or just sufficient to insure that the knuckle will seat fully on the pad and not on the curved walls of the socket flanking the sides thereof.

In my co-pending applications aforesaid I disclosed that relation between the curved walls of the socket and the knuckle whereby the generally radially-exerted tension of these walls is effective to provide a downward component to bias the knuckle into fluid-tight relation in the region of the fluid passage. In the instant application I disclose improved means for insuring that such downward component is availed of at a point where it is a maximum, and is substantially unaffected by oppositely acting forces exerted by other portions of the wall. It will be understood that a truly cylindrical knuckle fitted snugly in a truly cylindrical socket is exposed to equal forces in all directions, and that in the present case wherein a cylinder is longitudinally truncated by removal of a slice of thickness substantially less than the radius, these forces remain practically the same. However, in order to derive the maximum sealing benefit of the constrictive socket walls it is essential to avoid counterbalancing forces acting with components at right angles to the surfaces to be sealed. Accordingly, I provide pals 42—42 extending parallel to the axis of rotation and having a height substantially equal to the pad 37. The inner or bearing face of the pads may take any suitable form consistent with friction loss and ease of molding, e. g. of radius 0.242 inch, the principal desideratum being the assurance that the resiliency or constrictive force of the socket walls be applied to the knuckle with a predominant downward component. Obviously the pad is positioned at the upper margin of the walls in order to take advantage of its maximum effect. Stated otherwise, the knuckle is free of pressure components in the two clearance regions intermediate the pads 42—42 and pad 37.

Alternatively the pads as distinct entities, may be omitted and each of the socket walls so curved as to assure that the upper margin thereof bears on the knuckle to provide the same end result namely, concentration of the lever action of the walls in positions where a maximum downward pressure component is derived. Specifically such result may be achieved by providing a cylindrical knuckle and a substantially cylindrical cavity which has its curved wall relieved in the manner shown in Fig. 6. Such relief begins at the margin or periphery of the main entrance to the cavity and is continued downwardly in a gradually widening manner to define a localized sealing zone 37 about the exit end of the passage 34 (Fig. 5) which, in terms of pressure per unit area, provides an effective fluid seal thereabout and which is especially advantageous when a highly volatile liquid such as naphtha is to be dispensed.

It will be understood that at least the socket part be molded of resilient composition whereas the spout part may or may not be. Polyethylene has been found properly suited and is possessed of a waxy surface which lends itself ideally to the type of manipulation employed with the invention device.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

1. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a substantially segmentally-cylindrical cavity therein greater than 180°, the plane of truncation defining a principal entrance to the cavity, and said socket part having a first passage providing fluid communication between the receptacle and said cavity, a movable part including a cylindrical knuckle rotatably received in said cavity for movement between "on" and "off" positions, said knuckle having a passage providing fluid communication between the exit of said first passage and a surface portion of the knuckle which is exposed in said entrance when the movable part is shifted to "on" position, the curved wall of the cavity, at each of its margins adjacent said entrance, being provided with a pad in pressure contact with the knuckle, at least one of said knuckle and socket parts comprising resilient, comparatively hard material, the relative dimensions of said knuckle and cavity being such that the resiliency of the curved wall of the socket forces the knuckle into frictional contact with the surface of the cavity opposite said entrance, the exit of said passage being in the zone of said frictional contact, said knuckle having means for shifting the same between its said positions.

2. A device in accordance with claim 1 further characterized by the provision of a pad on said cavity surface circumjacent said exit, said pad having a curvature conforming to the curvature of the juxtaposed knuckle to bear frictionally thereon and to form a fluid seal about said exit.

3. A device in accordance with claim 2 wherein the margins of said pad are detached from the flat side walls of said cavity whereby said pad constitutes an island circumjacent said exit.

4. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a substantially segmentally-cylindrical cavity therein greater than 180°, and a first passage in said socket part providing fluid communication between the receptacle and said cavity, a movable part including a cylindrical knuckle rotatable received in said cavity for movement between "on" and "off" positions, the plane of truncation defining an entrance to the cavity for forcible initial assembly of said movable part into said socket, said knuckle having a nozzle protruding therefrom through said entrance and a passage providing fluid communication between the exit of said first passage and the bore of said nozzle, the curved wall of the cavity, at each of its margins adjacent the said entrance

being provided with a pad in pressure contact with said knuckle, at least one of said knuckle and socket parts comprising resilient, comparatively hard material, the relative dimensions of said knuckle and cavity being such that restricted areas of the knuckle and curved cavity wall respectively are congruent circumjacent said exit to provide a fluid-sealing zone about said exit and the resiliency of the curved wall of the socket forces said areas into frictional contact, said nozzle being adapted to serve as a handle for shifting said movable part.

5. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a substantially segmentally-cylindrical cavity therein greater than 180° and a first passage providing fluid communication between the receptacle and the curved wall of said cavity, a movable part including a cylindrical knuckle rotatably received in said cavity for movement between "on" and "off" positions, the plane of truncation defining the entrance to the cavity, said knuckle having a passage providing fluid communication between the exit of said first passage and a surface of the knuckle which is exposed in said entrance when the movable part is shifted to "on" position, the curved wall of the cavity being gradually relieved away from the knuckle beginning at the periphery of said entrance and terminating adjacent said exit to define an elevated region about said exit having a surface conforming to the curvature of the juxtaposed knuckle and bearing thereupon to form a fluid seal about said exit, at least one of the socket and knuckle comprising resilient, comparatively hard material, and means for shifting said knuckle between its positions.

6. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a substantially segmentally-cylindrical cavity therein greater than 180° and a first passage providing fluid communication between the receptacle and the curved wall of said cavity, a movable part including a cylindrical knuckle rotatable received in said cavity for movement between "on" and "off" positions, the plane of truncation of the cavity defining an entrance therefor for forcible initial assembly of said movable part with said socket, said knuckle having a passage providing fluid communication between the exit of said first passage and a surface of the knuckle which is exposed in said entrance when the movable part is shifted to "on" position, the curved wall of the cavity being gradually relieved away from the knuckle beginning at the periphery of said entrance and terminating circumjacent said exit to define an elevated region having a surface conforming to the curvature of the juxtaposed knuckle and bearing thereupon to form a fluid seal about said exit, at least one of the socket and knuckle comprising resilient, comparatively hard material, and means for shifting said knuckle between its positions.

7. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a cavity therein conforming substantially to a longitudinally truncated figure of revolution greater than 180° and a first fluid passage providing fluid communication between the receptacle and said cavity, the plane of truncation defining an entrance to the cavity, a movable part including a knuckle received in said cavity for rotational movement between "on" and "off" positions, said knuckle having a passage providing fluid communication between the exit of said first passage and a surface of the knuckle which is exposed in said entrance when the movable part is shifted to "on" position, the curved wall of the cavity, at each of its margins adjacent said entrance, being provided with a pad in pressure contact with the knuckle, at least one of said knuckle and socket parts comprising resilient, comparatively hard material, the curvature of the knuckle and cavity in a region circumjacent said exit being congruent and constituting one bearing zone for said knuckle and the said pads providing a pair of bearing zones for said knuckle opposite said one bearing zone, the resiliency of the curved wall of the socket forcing the knuckle into frictional contact with said region, and means for shifting said knuckle.

8. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a cavity therein conforming substantially to a longitudinally truncated figure of revolution greater than 180° and a first passage providing fluid communication between the receptacle and said cavity, the plane of truncation defining an entrance to the cavity, a movable part including a knuckle received in said cavity for rotational movement between "on" and "off" positions, said knuckle having a passage providing fluid communication between the exit of said first passage and a surface of the knuckle which is exposed in said entrance when the movable part is shifted to "on" position, the curved wall of the cavity being gradually relieved away from the knuckle beginning at the periphery of said entrance and terminating adjacent said exit to define an elevated region about said exit in pressure contact with said knuckle and having a surface conforming to the curvature of the juxtaposed knuckle to form a seal about said exit, at least one of the socket and knuckle comprising resilient, comparatively hard material, and means for shifting said knuckle between its position.

9. A combined spout and valve for use with a receptacle for dispensing fluent material therefrom and of that class which includes means forming an attachment with the receptacle comprising: a socket part united with said means having a cavity therein conforming substantially to a longitudinally truncated figure of revolution greater than 180° and a first passage providing fluid communication between the receptacle and the curved wall of said cavity, a movable part including a knuckle portion rotatably received in said cavity for movement between "on" and "off" positions, the plane of truncation defining an entrance for forcible assembly of said knuckle portion through said entrance, said knuckle having a passage providing fluid communication between the exit of said first passage and a surface of the knuckle which is exposed in said entrance when the movable part is shifted to "on" position, the curved wall of the cavity being gradually relieved beginning at the periphery of the cavity entrance and terminating adjacent said exit to define an elevated region about said exit and the flat side walls of the cavity being separated from said region whereby a localized pressure area is defined circumjacent said exit, said area being in pressure contact with said knuckle and having a surface conforming to the curvature of the juxtaposed knuckle to form a fluid seal about said exit, at least one of the socket and knuckle comprising resilient, comparatively hard material, and means for shifting said knuckle between its positions.

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