

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Pouring Spout for Containers

We, SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V., 30 Carel van Bylandtlaan, The Hague, The Netherlands, a Company organised under the laws of The Netherlands, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a pouring spout which can either form part of a capsule adaptable to a container made of any convenient material such as glass, metal, or synthetic plastics, or which can be formed integrally at one extremity of the container when the same is made of a relatively soft synthetic plastics material or a metal such as lead, tin and the like.

The invention has for its main object to ensure faultless sealing of the container for the sale of the product contained therein to provide the consumer with a simple and rapid means for opening the same and to combine these means with an obturating cap for use when utilizing the product, the whole being designed in such manner as to ensure a low cost price.

The pouring spout according to this invention comprises a first element attached or adapted for attachment to a container and formed with a pierceable obturating wall inclined to the axis of the spout and having upper and lower sides, and a cover element fitting or adapted to fit over the first element for rotation thereon and having an internal off-centre knife adapted to lie adjacent the lower side of said wall when the cover element is fitted on or to pierce and cut said wall when the elements are relatively rotated.

In accordance with one embodiment of the invention, said pouring spout is obtained by moulding a relatively soft synthetic plastics

material, or a metal of the aforementioned type, and consists of a fixed truncated cylindrical tube which on delivery is sealed by a flat or curved oblique cover which is preferably thinned down adjacent the tube wall whereby to form a flexible diaphragm round the periphery of the cover, said tube being integral with a transverse annular wall and with the oblique cover projecting upwardly therefrom, said wall including a circular guiding means over which fits elastically a cap bearing a knife of which the edge parallel with the geometrical axis of said tube is positioned in the delivery configuration facing the lowermost point along the thinned-down periphery of the cover, in such manner that rotation of the cap about its axis causes a peripheral slicing through of said cover, which cover can then be pulled off by hand. Obturation is then ensured only by the removable cap.

The knife and the cap bearing the same are preferably a one-piece casting made of some rigid material.

It is a further object of this invention, in a pouring spout of the type hereinbefore described, to ensure inviolability prior to use, together with permanent fitting of the pouring spout on can-like containers and positive retention of the cap on the pouring spout.

It is still another object of the invention to provide a pouring spout of the type described hereinabove, wherein, in order to ensure cleanliness of the container by recovering the drops, the fixed cylindrical tube terminates in a funnel and is obturated by a cylindrical end-piece lodged therein and joined obliquely through a thinned-down peripheral portion to the external wall of said tube, the opening of which, subsequent to cutting, communicates with a bowl providing direct spilling into the receptacle embodied on the transverse annular wall.

[Price 4s. 6d.]

In order to permit of pouring the contents of the container drop by drop or in continuous fashion, as desired, while at the same time isolating said contents from the surrounding atmosphere when the container is not in use, this invention lastly has for its object to provide a pouring spout of the type hereinbefore described wherein the cylindrical tube is movable, rigidly connected to the knife and pivotally mounted therewith on an element which is adaptable to the container and is obturated by a transverse wall having a lower flat portion against which said tube bears and is locked by a peg when the container is not in use, said lower flat portion being joined to an upper flat portion via a ramp having a thinned external edge which is cut by the knife to form a lip folded downwardly into the container to enable the liquid contained therein to flow out.

The description which follows with reference to the accompanying drawings, which are filed by way of non-limitative examples, will give a clear understanding of how the invention can be carried into practice and will disclose yet further particularities thereof.

In the drawings:

Fig. 1 shows in perspective the pouring spout and its cap separated from each other, as executed in accordance with a first embodiment of the invention;

Fig. 2 shows in vertical section through II—II of Fig. 3, the pouring spout of Fig. 1 and its associated cap, in the configuration used for delivering the container;

Fig. 3 is a horizontal section taken through III—III of Fig. 2;

Fig. 4 shows in similar sectional manner to Fig. 2 the obturating cap as it rotates to slit the pouring spout cover.

Fig. 5 is a section taken through V—V of Fig. 4;

Fig. 6 is a vertical section through the pouring spout, showing how the cover is pulled off;

Fig. 7 illustrates a pouring spout and its cap executed according to an alternative embodiment providing for drop recovery and an inviolability peg, showing in diametrical section through said peg the configuration of said spout and peg when the container is delivered.

Fig. 8 is a horizontal section through the line VIII—VIII of Fig. 7;

Fig. 9 shows in similar sectional form to Fig. 7 the pouring spout alone after it has been opened by cutting;

Fig. 10 shows in enlarged perspective form a portion of the pouring spout and the cap of Fig. 7, near the position of the inviolability peg;

Fig. 11 is a similar view to that of Fig. 2, relating to a pouring spout equipped with its associated cap according to a further alternative embodiment, mounted on a container;

Fig. 12 is a diametrical section similar to

that of Fig. 2 taken through a pouring spout with detachable sealing element and the associated cap, the whole being fitted to a container and being shown in the configuration ready for delivery;

Fig. 13 is an enlarged perspective view of the pouring spout and cap of Fig. 12, in the area wherein the sealing element is disposed;

Fig. 14 shows in diametrical section through the inviolability peg a drop-by-drop or continuous-type pouring spout with its movable tube in their container delivery configuration;

Fig. 15 is a horizontal section taken through the line XV—XV of Fig. 14;

Figs. 16 and 17 are similar views to those of Figs. 14 and 15, showing the open configuration ready for use subsequent to the slitting operation, Fig. 16 being a section taken through the line XVI—XVI of Fig. 17;

Fig. 18 illustrates in perspective the elements of the pouring spout of Figs. 14 to 17 separated from one another in their configuration prior to delivery;

Fig. 19 shows in fragmental perspective view from underneath the lower element of the pouring spout of Fig. 14, in the position for pouring the liquid;

Fig. 20 shows in plan view on a reduced scale the element of Fig. 14 carrying the tube and the knife;

Fig. 21 is a fragmental section taken through the line XXI—XXI of Fig. 15;

Fig. 22 is a diametrical section taken through a cap carrying a metal blade; and

Fig. 23 is a similar section to that of Fig. 6, the cap being integral with the container made of plastic.

In the specific embodiment shown in Figs. 1 to 6, the pouring spout is supported by a capsule 1 made of relatively flexible material such as polyethylene adapted to fit elastically over the edge of a bottle neck in the manner well known per se. Said spout takes the form of a cylindrical tube 2 which is obturated in an oblique plane by a cover 3 having along its periphery a score line 4 and on its top a small tongue 5.

Concentrically with cylinder 2, capsule 1 is obturated by a transverse annular wall integral with tube 2 and by the cover 3 which projects upwardly and obliquely therefrom. Said transverse wall embodies a circular rib 6 serving as a circular guideway, over which fits elastically a cap 7 having ribs 8 on the outer face thereof.

Internally, said cap 7 supports an eccentric blade 9 the free extremity of which engages, in the inoperative position, into a small cavity 10 embodied in capsule 1, at the base of cover 3. Cap 7 and blade 9 form a one-piece moulding of some relatively rigid material such as shock-resisting polystyrene.

In the position shown in Fig. 2, the container equipped with the unit designated by numerals 1—7 is hermetically sealed by cover

3. To open the container, all that is necessary is to rotate cap 7 about its axis (see Figs. 4 and 5), whereupon the rigid blade 9, acting as a knife, cuts through the peripheral thinned-down portion 4 of cover 3, except at its lowermost point which cannot be reached by the lower extremity of blade 9. Thus, after the cutting operation has been performed, cover 3 will remain attached to cylinder 2 only over a small portion of its base (see Fig. 6), from which it must be detached by hand, thereby being prevented from accidentally dropping into the container. Thereafter pouring spout 2 will be devoid of a cover and the container will thenceforward be closed only by the cap 7 when not in use.

Like parts to those of the pouring spout of Figs. 1 to 6 bear like reference numerals followed by the letter *a* for Figs. 7 to 10, by the letter *b* for Fig. 11, by the letter *c* for Figs. 12 and 13 and by the letter *d* for Figs. 14 to 21.

In the specific embodiment shown in Figs. 7 to 10, the pouring spout is supported by a capsule 1*a* made of polyethylene for instance, adapted to fit elastically over the edge of a bottle neck in the manner well known per se. Said spout takes the form of a cylindrical tube 2*a* open over a longitudinal area 11 and terminating at the top in a funnel portion 12. At its base said tube is joined to the truncated transverse annular wall 13 forming a bowl and obturating the capsule. Said tube is obturated by a substantially cylindrical end-piece 14 which joins onto the inner wall of said tube 2*a* along an oblique plane 15, which joint comprises along its periphery a score line 4*a*.

Concentrically with cylindrical tube 2*a*, capsule 1*a* embodies a circular ridge 6*a* over which the cap 7*a* embodying external ribs 8*a* fits elastically. Said cap is moulded in one piece out of some rigid synthetic plastics material such as a shock resisting polystyrene, and incorporates an eccentric blade 9*a* which in the inoperative position obturates the opening 11 of cylindrical tube 2*a*.

Said cap is further provided with a base 16 engaging into a groove formed on the capsule by an upper lip 17 thereon. Said upper lip is interrupted, as is clearly shown in Fig. 10, and in this interrupted area said capsule is integral with a peg 18. The base 16 is in turn interrupted in the same area, being terminated in two bevels 19 and 20.

In the configuration of Fig. 7, the container equipped with the unit designated by numerals 1*a* to 7*a* is hermetically sealed by the end-piece 14 and can be opened merely by rotating cap 7*a* about its axis. Rigid blade 9*c* acts as a knife and cuts through the thinned-down portion 4*a* of said end-piece at the same time as either of bevels 19 or 20, likewise acting after the fashion of a knife, cuts off the peg 18 which ensured inviolability of

the bottle seal. At the end of the cutting operation, the cap is removed and the sliced end-piece 14 pulled off, following which the pouring spout assumes the configuration of Fig. 9.

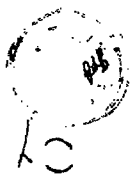
When the liquid is poured, the same is channelled by the funnel portion 12, and should any drops tend to drip therefrom when the bottle is placed upright again, they are collected by the bowl 13 which communicates directly with the interior of the bottle and spills said drops thereinto immediately. This is particularly advantageous in the case of a bottle containing a greasy liquid such as oil, in which case the pouring spout ensures that the bottle is kept clean.

Reference is now had to Fig. 11, wherein the pouring spout is similar to that of Figs. 7 to 10, differing therefrom only in that capsule 1*b* is provided with an external circular ridge 21. Said capsule can be fitted to a can 22 made of any convenient material such as metal, cardboard, or rigid synthetic plastics material, said can be initially provided with an opening having an inwardly and downwardly directed conical edge 23. Thus the ridge 21 passes through said opening by reason of the elasticity of its material and cannot be extracted therefrom because it abuts against the inner periphery of the downwardly directed edge 23. In this particular embodiment, the cap 7*b* is of generally cylindrical shape.

Reference is next had to the embodiment shown in Figs. 12 and 13, wherein the pouring spout and the cap are of the type shown in Fig. 11. The tube 2*c*, however, consists of a cylinder against the inner wall of which is applied the external face of knife 9*c*, said tube terminating in a complete funnel 12*c*. In addition, the edge 24 of capsule 1*c* bearing against can 22*c* comprises a radial portion 25 projecting therefrom and having a relatively large annular development whereby to permit a warranty inscription to be affixed thereon. Said projection is joined by a heel 26 to said edge 24. The cap base 16*c* is indented as shown in Fig. 13 to allow it to mate with the internal portion of projection 25. Said indent 27 comprises a central portion which surrounds heel 26 and is provided with an oblique wall 28.

In this particular design the circular ridge 6*c* of capsule 1*c* is provided externally with a screw thread 29 adapted to engage with a matching thread embodied on the inside of cap 7*c*. The cap is fitted onto the capsule by forcing it in the direction of arrow F, the capsule made of flexible material giving way to the screw thread on the cap made of rigid material, whereby to dispose the indents 27 and 28 as shown in Fig. 13.

To again access to the contents of the can, the cap is unscrewed, thus ensuring simultaneous cutting of the end-piece 14*c* by the rigid blade 9*c* and breaking of the heel 26 of the warranty element along the line 30.



Reference is now had to the embodiment shown in Figs. 14 to 21, in which the capsule 1d no longer supports the cylindrical tube, which tube 2d is integral with the cap-like rotating part 7d and is embodied in the knife 9d. Beyond the tube 2d, said knife embodies a sealing heel 29. Part 7d is made of relatively hard material and fits elastically into a circular ridge 30 embodied on the capsule 1d which is made of a relatively soft material.

Said capsule 1d is obturated by a transverse wall comprising an upper annular flat portion 31 serving for its application against the container neck 32 and bearing a sealing peg 18d which penetrates into a slot in part 7d having cutting edges 19d and 20d. Said capsule 1d further includes a lower flat portion 33 which penetrates into the container and upon which bears the lower edge of tube 2d. Said flat portion 33 is joined to flat portion 31 by a further portion 34 forming an upwardly directed ramp having a thinned-down edge 35. In the inoperative configuration the heel 29 of the tube-embodiment knife is applied against the end closure of a lodging 36 provided on the capsule between its horizontal walls 31 and 33. Where the ramp 34 joins horizontal wall 31, the capsule is reinforced at 37 over the area reached by the knife edge. Between said area and lodging 36, upper flat wall 31 is of circular arcuate shape and terminates in a cylindrical portion 38 centered upon the axis common to the capsule and part 7d, whereby to serve as a pivot when said part 7d is rotated.

In order to use this pouring spout, part 7d is rotated in the direction of arrow O (Fig. 20) by means of the ribs 39, 40, and 41 embodied on its upper surface. The knife edge 9d guided by cylindrical wall 42 cuts through ramp 34 along its thinned-down line 35 and at the same time turns the lip cut out thus downwardly and inwardly, as shown in Fig. 16, whereby to enable the liquid to flow from the container in the direction of arrow f in Fig. 16. The cutting operation can be pursued until the edge abuts against reinforcement 37.

When part 7d rotates in the direction of arrow F in Fig. 20, the pouring spout releases the lip formed by the peripherally slit ramp 34 and comes to bear against the lower flat wall 33, against which it is restrained by a peg 43 projecting therefrom, when the container is not in use. The knife is of cylindrical external shape to match that of the cylindrical portion 42 and bears against cylindrical portion 38 in such manner that no liquid can leak out in spite of the slit ramp 34.

Such a pouring spout is more particularly usable with vessels containing liquids liable to be adversely affected by contact with the air, an example being vinegar. In addition, depending upon the position occupied by tube 2d relative to the peripherally slit ramp 34,

the liquid can be poured either drop by drop or in a continuous stream.

It will of course be understood that many modifications can be made to the specific embodiments hereinbefore described, without departing from the scope of the invention. In particular, as is illustrated in Fig. 22, the knife, instead of being rigidly connected to the cap 44, could consist of a metal blade 45 inserted, by its heeled retaining extremity 46, in the synthetic plastic material at the time the cap is moulded. Similarly, the capsule 47 could be integral with the very wall 48 of a container made of some synthetic plastics material such as polyethylene or the like (see Fig. 23). Lastly, in the specific case where the unit includes an inviolability peg, the cap base and the capsule retaining ridge could be unbroken, whereby to ensure positive overall retention of said cap and said capsule.

WHAT WE CLAIM IS:—

1. A pouring spout for containers comprising a first element attached or adapted for attachment to a container and formed with a pierceable obturating wall inclined to the axis of the spout and having upper and lower sides, and a cover element fitting or adapted to fit over the first element for rotation thereon and having an internal off-centre knife adapted to lie adjacent the lower side of said wall when the cover element is fitted on or to pierce and cut said wall when the elements are relatively rotated.

2. A pouring spout as claimed in claim 1, wherein the wall is integral with a fixed tube shaped as a truncated cylinder which projects from the first element.

3. A pouring spout as claimed in claim 2, wherein the wall is adapted to remain connected to the first element after cutting by means of a strip of material at the lower end of the wall.

4. A pouring spout as claimed in claim 1, wherein the cover element has a base portion which penetrates into a circular ridge formed by a lip portion round the border of the first element.

5. A pouring spout as claimed in claim 4, wherein the first element has an inviolability peg on its border, an external knife carried by said cover element being provided for slicing off said peg when the oblique wall portion is slit.

6. A pouring spout as claimed in claim 5, wherein a base portion of the cover element and the upper lip of the border of the first element are interrupted to permit passage of said peg, the interrupted end faces of said base portion being bevelled whereby to act as a knife for slicing off said peg.

7. A pouring spout as claimed in claim 1, wherein the border of the first element is integral with a radial projection of relatively large annular development joined by a radial



Reference is now had to the embodiment shown in Figs. 14 to 21, in which the capsule 1d no longer supports the cylindrical tube, which tube 2d is integral with the cap-like rotating part 7d and is embodied in the knife 9d. Beyond the tube 2d, said knife embodies a sealing heel 29. Part 7d is made of relatively hard material and fits elastically into a circular ridge 30 embodied on the capsule 1d which is made of a relatively soft material.

Said capsule 1d is obturated by a transverse wall comprising an upper annular flat portion 31 serving for its application against the container neck 32 and bearing a sealing peg 18d which penetrates into a slot in part 7d having cutting edges 19d and 20d. Said capsule 1d further includes a lower flat portion 33 which penetrates into the container and upon which bears the lower edge of tube 2d. Said flat portion 33 is joined to flat portion 31 by a further portion 34 forming an upwardly directed ramp having a thinned-down edge 35. In the inoperative configuration the heel 29 of the tube-embodiment knife is applied against the end closure of a lodging 36 provided on the capsule between its horizontal walls 31 and 33. Where the ramp 34 joins horizontal wall 31, the capsule is reinforced at 37 over the area reached by the knife edge. Between said area and lodging 36, upper flat wall 31 is of circular arcuate shape and terminates in a cylindrical portion 38 centered upon the axis common to the capsule and part 7d, whereby to serve as a pivot when said part 7d is rotated.

In order to use this pouring spout, part 7d is rotated in the direction of arrow O (Fig. 20) by means of the ribs 39, 40, and 41 embodied on its upper surface. The knife edge 9d guided by cylindrical wall 42 cuts through ramp 34 along its thinned-down line 35 and at the same time turns the lip cut out thus downwardly and inwardly, as shown in Fig. 16, whereby to enable the liquid to flow from the container in the direction of arrow f in Fig. 16. The cutting operation can be pursued until the edge abuts against reinforcement 37.

When part 7d rotates in the direction of arrow F in Fig. 20, the pouring spout releases the lip formed by the peripherally slit ramp 34 and comes to bear against the lower flat wall 33, against which it is restrained by a peg 43 projecting therefrom, when the container is not in use. The knife is of cylindrical external shape to match that of the cylindrical portion 42 and bears against cylindrical portion 38 in such manner that no liquid can leak out in spite of the slit ramp 34.

Such a pouring spout is more particularly usable with vessels containing liquids liable to be adversely affected by contact with the air, an example being vinegar. In addition, depending upon the position occupied by tube 2d relative to the peripherally slit ramp 34,

the liquid can be poured either drop by drop or in a continuous stream.

It will of course be understood that many modifications can be made to the specific embodiments hereinbefore described, without departing from the scope of the invention. In particular, as is illustrated in Fig. 22, the knife, instead of being rigidly connected to the cap 44, could consist of a metal blade 45 inserted, by its heeled retaining extremity 46, in the synthetic plastic material at the time the cap is moulded. Similarly, the capsule 47 could be integral with the very wall 48 of a container made of some synthetic plastics material such as polyethylene or the like (see Fig. 23). Lastly, in the specific case where the unit includes an inviolability peg, the cap base and the capsule retaining ridge could be unbroken, whereby to ensure positive overall retention of said cap and said capsule.

WHAT WE CLAIM IS:—

1. A pouring spout for containers comprising a first element attached or adapted for attachment to a container and formed with a pierceable obturating wall inclined to the axis of the spout and having upper and lower sides, and a cover element fitting or adapted to fit over the first element for rotation thereon and having an internal off-centre knife adapted to lie adjacent the lower side of said wall when the cover element is fitted on or to pierce and cut said wall when the elements are relatively rotated.

2. A pouring spout as claimed in claim 1, wherein the wall is integral with a fixed tube shaped as a truncated cylinder which projects from the first element.

3. A pouring spout as claimed in claim 2, wherein the wall is adapted to remain connected to the first element after cutting by means of a strip of material at the lower end of the wall.

4. A pouring spout as claimed in claim 1, wherein the cover element has a base portion which penetrates into a circular ridge formed by a lip portion round the border of the first element.

5. A pouring spout as claimed in claim 4, wherein the first element has an inviolability peg on its border, an external knife carried by said cover element being provided for slicing off said peg when the oblique wall portion is slit.

6. A pouring spout as claimed in claim 5, wherein a base portion of the cover element and the upper lip of the border of the first element are interrupted to permit passage of said peg, the interrupted end faces of said base portion being bevelled whereby to act as a knife for slicing off said peg.

7. A pouring spout as claimed in claim 1, wherein the border of the first element is integral with a radial projection of relatively large annular development joined by a radial



heel to said border and adapted to receive thereon an indication of warranty, said cover element having a base portion provided with an indent bearing against the inner face of said projection and being extended by an oblique-edged central indent surrounding said heel.

8. A pouring spout as claimed in claim 1, wherein the first element consists of a capsule having a skirt for fitting elastically over the edge of the neck of a container.

9. A pouring spout as claimed in claim 8, wherein the capsule is provided on its skirt with an external circular ridge whereby it may elastically penetrate into an aperture in a can-like container that is bordered by a conical rim directed inwardly and downwardly into said container, for closing said container.

10. A pouring spout as claimed in claim 8, wherein the capsule is integral with an upper circular ridge embodying on its outer surface a screw thread, the cover element being formed on its inner surface with a matching thread engaging said screw thread.

11. A pouring spout as claimed in claim 1, wherein the obturating wall is integral with an upwardly directed cylindrical tube terminating in a funnel and obturated by a cylindrical end-piece lodged therein and obliquely connected by a peripheral thinned-down portion to the inner wall of said tube, said funnel and end-piece being integral with said tube, the external face of the knife carried by the cover element bearing against the inner wall of said tube.

12. A pouring spout as claimed in claim 1, wherein the obturating wall is integral with an upwardly directed tube formed by a cylindrical section which has a longitudinal opening, terminating in a funnel element and obturated by a cylindrical end-piece upwardly projecting from said funnel element and obliquely connected by a peripheral thinned-down portion to the inner wall of said tube with the lower part of said end-piece simultaneously obturating said longitudinal opening at its bottom, said obturating wall having around said cylindrical section the shape of a bowl which spills directly into the container through said longitudinal opening after said peripheral thinned-down portion has been cut.

13. A pouring spout as claimed in claim 1, wherein the knife carried by the cover element has a cylindrical hole parallel to the axis of said element and which acts as a cylindrical tube, the upper transverse obturating wall embodying a flat lower portion upon which said

knife and tube rest and are locked by a peg when the container is not in use, said flat lower portion being joined to a flat upper portion by a ramp with thinned-down outer edge which forms the oblique wall portion, which ramp after slicing through the knife forms a lip turned downwardly into the container whereby to enable liquid contained therein to flow out.

14. A pouring spout as claimed in claim 13, wherein the knife is provided with an eccentric heel, with an external cylindrical surface bearing against a cylindrical wall of the first element and with an internal surface that bears against a cylindrical portion integral with a flat upper portion of said obturating wall.

15. A pouring spout as claimed in claim 1, wherein the first element is integral with the wall of a container made of flexible and relatively soft material.

16. A pouring spout as claimed in claim 1, wherein the knife is formed integrally with the cover element.

17. A pouring spout as claimed in claim 1, wherein the knife is fitted to the cover element.

18. A pouring spout as claimed in claim 1, wherein the first element is made of polyethylene while the cover element with its associated knife is made of shock-resisting polystyrene.

19. A pouring spout as hereinbefore described with reference to and as illustrated in Figs. 1 to 6 of the accompanying drawings.

20. A pouring spout as hereinbefore described with reference to and as illustrated in Figs. 7 to 10 of the accompanying drawings.

21. A pouring spout as hereinbefore described with reference to and as illustrated in Fig. 11 of the accompanying drawings.

22. A pouring spout as hereinbefore described with reference to and as illustrated in Figs. 12 and 13 of the accompanying drawings.

23. A pouring spout as hereinbefore described with reference to and as illustrated in Figs. 14 to 21 of the accompanying drawings.

24. A pouring spout as hereinbefore described with reference to and as illustrated in Fig. 22 of the accompanying drawings.

25. A pouring spout as hereinbefore described with reference to and as illustrated in Fig. 23 of the accompanying drawings.

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