(19) LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

(11) N° de publication : **LU101715**

(12) **BREVET D'INVENTION** **B1**

(21) N° de dépôt: LU101715

(22) Date de dépôt: 30/03/2020

(51) Int. Cl.:
B29C 63/42, B65B 9/10, B65C 3/00

(30) Priorité:

(43) Date de mise à disposition du public: 30/09/2021

(47) Date de délivrance: 30/09/2021

(73) Titulaire(s):
FUJI SEAL INTERNATIONAL, INC. – Osaka-shi, Osaka 532-0003 (Japon)

(72) Inventeur(s):
PETERS Joop – Pays-Bas

(74) Mandataire(s):
Dennemeyer & Associates S.A. – L-1274 HOWALD (Luxembourg)

(54) **Method of making a sleeve for covering receptacle, apparatus for making sleeve.**

(57) A heat exchanger comprises a plurality of flat tubes (12) for conveying a fluid; a tank (14) to which the flat tubes are fluidly connected; and at least one header plate (16) closing said tank. The header plate has oblong apertures (22) receiving ends of the tubes inserted along an insertion direction, wherein the header plate is configured so that each oblong aperture is surrounded by a collar (24) to which a respective tube end is fixed by brazing. For at least some of the oblong apertures, the collar is connected to the header plate by means of an annular bulge (26) protruding from the front side of the header plate, wherein said annular bulge is formed by plastic deformation of the header plate and comprises an outer branch (28) joining with the header plate and an inner branch (30) joining the corresponding collar (24), the annular bulge being elastically deformable to absorb displacement along said insertion direction. The inner branch (30) has a generally smaller wall thickness than the outer branch (28).

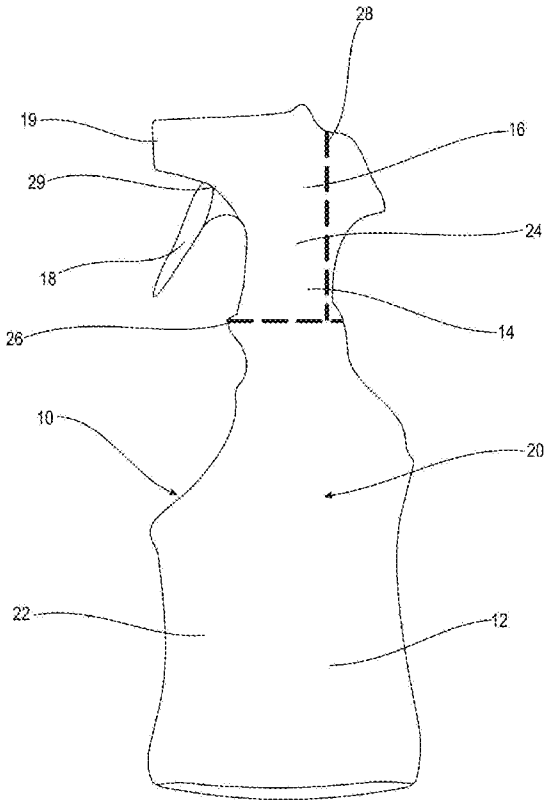

Fig. 1

Description

Method of making a sleeve for covering receptacle, and apparatus for making the sleeve

Technical Field

The present invention relates to a method of making a sleeve for covering a receptacle and an apparatus for making the sleeve.

Background Art

Containers such as bottles can have shrink labels attached thereon in order to display product names or the like and achieve decorative effects. For instance, a typical bottle may have a body that is configured to hold a product, such as a liquid, within an interior space of the body. The bottle may then have an opening to dispense product through the opening and a cap threadably coupled with the body to selectively close the opening of the bottle. In some other versions, the cap comprises a trigger and a nozzle to allow a user to squeeze the trigger to dispense the product within the bottle through the nozzle of the cap. A shrink label is typically applied to the bottle such that a top end of the shrink label is positioned just below the bottom of the cap such that the cap of the bottle is exposed.

US2013/0061559A1 discloses a device for arranging a sleeve-like foil envelope around an object. The foil material is made of a so-called shrink material which shrinks as a result of heat being applied and which forms with a close fit to the shape of the bottle or container around which the sleeve-like envelope has been arranged.

Summary of the Invention

The inventors have found that during shipping of the bottle, the cap may become loose relative to the bottle causing the product from the bottle to leak

through the opening. It may therefore be desirable to provide a shrink label that further secures a cap relative to a bottle to prevent the cap from becoming loose relative to the bottle. This may thereby prevent a product from leaking from the bottle during shipping.

In other words there is a desire for a shrink label that further secures a cap relative to a bottle to prevent the cap from becoming loose relative to the bottle. This may thereby prevent a product from leaking from the bottle during shipping. Such a shrink label is provided that extends upward from the bottle and onto a portion of the cap. The shrink label can thereby be (e.g. heat) shrunk onto the bottle and the cap to further secure the cap relative to the bottle and prevent the cap from loosening relative to the bottle during shipping. But this arrangement still leaves room for improvement with regards to hindering leakage. Corresponding objects apply generally to sleeves for covering a receptacle, a shrink label being a type of sleeve.

It is an object of the invention to achieve a way to make a sleeve for covering a receptacle hinder leakage of receptacle contents particularly reliably. The object is achieved by the subject-matter of each independent claim. Advantageous further developments are laid out in the dependent claims.

According to the invention, a method of making a sleeve for covering a receptacle, from a strip of flexible tubular material, wherein the sleeve has a given length measured from a first end to a second end, being measured in the longitudinal direction of the strip, comprises: puncturing the strip transversely to the longitudinal direction to form a longitudinally extending puncture being spaced apart from the first end and from the second end.

So by making a puncture in the strip the protrusion of a receptacle can be inserted through the puncture. When the protrusion is a trigger, undesired actuation causing leakage can be reduced. When the protrusion is a handle, the sleeve can interfere less with the handle. By spacing the puncture from the sleeve ends, each sleeve end portion comprising a sleeve end is not punctured by

making the puncture (there is a puncture-free region on either longitudinal end of the puncture); so the sleeve can better hinder loosening of any cap; when the receptacle has a nozzle, the sleeve can better hinder leakage from the nozzle.

The sleeve may be cut from the strip having greater length than the given length of the sleeve, such as a greater length before cutting the strip. So the production of multiple sleeves is facilitated.

The cutting and the puncturing may be performed at least partially simultaneously. The cutting may be performed at least partially before and/or at least partially after the puncturing. A feeding step may be interposed between these.

The method may comprise: feeding the strip, a free end of the strip being fed first, to an opening device, the opening device receiving the strip. So the strip is tubular even before it is fed.

The method may comprise: opening, by an opening device, a region of the strip by separating opposing inner peripheral portions of the strip; and puncturing the strip by puncturing the open region of the strip.

So by puncturing an open region, the strip can be more easily and accurately punctured in the wall thickness direction. Making an even number of punctures, a single puncture, or an odd number of punctures is facilitated in particular compared to a case of puncturing a strip where it is supported on rollers in its flattened state. This facilitates puncturing from the outer periphery to the inner periphery, without puncturing from the inner periphery to the outer periphery, of the strip. The strip may be (partially) flat or (partially) open where the opening device receives it. Opening a region of the strip by separating opposing inner peripheral portions of the strip may comprise further opening a region of the strip by further separating (and/or) reducing contact between) opposing inner peripheral portions of the strip.

The puncturing may be done at a first distance from the free end. The method may comprise cutting the free-end portion from the strip at a second distance from its free end, the second distance being greater than the first distance.

It may be provided that cutting the strip such as cutting the free-end portion is done by cutting the strip at the open region.

The method may comprise forming at least one perforation line in addition to making the puncture, and/or not comprising the puncture. The sleeve can be more easily removed by hand. It may be provided that the perforation line is separate from the puncture such as longitudinally and/or peripherally spaced from the puncture.

The at least one perforation line may include a peripheral perforation line extending in a peripheral direction of the strip, preferably being closer to a sleeve end than the puncture is. An end portion of the sleeve can be more easily removed by hand.

The at least one perforation line may include a longitudinal perforation line extending along the longitudinal direction.

The puncture may be formed by a slit-like opening. When the puncture is a slit no material need be removed by the puncturing. The puncture may be a cutout such as a partial cutout. The puncture may be a single slit or single cutout.

At least a part of the puncture may coincide in the longitudinal direction with, and be peripherally spaced from, the longitudinal perforation line. So a portion of the sleeve in the vicinity of the puncture can be easily removed by hand.

A longitudinal perforation line may join with the peripheral perforation line. When the user breaks one of the peripheral and longitudinal perforation lines, it is easier to break the other of the peripheral and longitudinal perforation lines.

It may be provided that the peripheral perforation line does not intersect the puncture. Removal of an entire peripheral portion of the sleeve is facilitated.

The perforation line may be configured to remain closed (e.g. to not form openings) even when the sleeve is shrunk around a receptacle. So the shrinking and sealing performance of the sleeve is maintained.

The perforation line may comprise one or more pairs of parallel perforation lines.

The method may comprise a subsequent step of transferring the sleeve from the opening device and optionally fitting it over a receptacle, while feeding the strip for making the next sleeve.

According to the invention, an apparatus for making a sleeve for covering a receptacle, in particular for making the sleeve according to the method, wherein the sleeve is made from a strip of flexible tubular material and has a given length measured from a first end to a second end, being measured in the longitudinal direction of the strip, comprises: an opening device for receiving a given length of the strip fed to the opening device, a free end of the strip being fed first, to open a region of the strip by separating opposing inner peripheral portions of the strip, and further comprises a puncturing means configured to puncture the open region of the strip transversely to the longitudinal direction to form a longitudinally extending puncture being spaced apart from the ends of the sleeve.

The opening device may comprise a recess configured to receive the puncturing means. The recess may be configured so that the puncturing means does not contact the opening device.

The apparatus may comprise a cutting means configured to cut the sleeve from the strip, the strip having greater length that the given length of the sleeve.

The apparatus may comprise a perforation means configured to form at least one perforation line, the at least one perforation line being in addition to the puncture (so does not comprise the puncture). The perforation line may be longitudinally and/or peripherally spaced from the puncture.

The apparatus may be configured to perform the method.

Short Description of the Figures

Preferred embodiments are described in more detail in the following with the help of the appended figures, wherein:

Fig. 1 depicts a side elevational view of a receptacle assembly having a shrink label made according to a first embodiment according to the invention,

Fig. 2 depicts a perspective view of the receptacle assembly of Fig. 1,

Fig. 3 depicts a side elevational view of the shrink label of the receptacle assembly, in an open configuration prior to shrinking,

Fig. 4 depicts a side elevational view of a shrink label of a receptacle assembly, made according to a second embodiment, in an open configuration prior to shrinking,

Fig. 5 schematically shows an apparatus for making the shrink label, and

Figs. 6A to 6E show a method for making the shrink label.

Similar or functionally equivalent features are provided in the figures with corresponding reference signs.

The drawings are not intended to be limiting in any way, and it is contemplated that various embodiments of the invention may be carried out in a

variety of other ways, including those not necessarily depicted in the drawings. The accompanying drawings incorporated in and forming a part of the specification illustrate several aspects of the present invention, and together with the description serve to explain the principles of the invention; it being understood, however, that this invention is not limited to the precise arrangements shown.

Detailed Description of Preferred Embodiments

The following description of certain examples of the invention should not be used to limit the scope of the present invention. Other examples, features, aspects, embodiments, and advantages of the invention will become apparent to those skilled in the art from the following description, which is by way of illustration, one of the best modes contemplated for carrying out the invention. As will be realized, the invention is capable of other different and obvious aspects, all without departing from the invention. Accordingly, the drawings and descriptions should be regarded as illustrative in nature and not restrictive. Various suitable ways in which the teachings herein may be combined will be readily apparent to those of ordinary skill in the art in view of the teachings herein. Such modifications and variations are intended to be included within the scope of the claims.

First Embodiment

Figs. 1 and 2 show views of a receptacle assembly having a shrink label made according to a first embodiment according to the invention.

Referring to Figs. 1 and 2, a shrink label 20 is shown attached to a bottle 10. In the illustrated embodiment, bottle 10 includes a body 12 defining an interior space for storing product. A top end portion of body 12 includes a neck 14 having an opening (not shown) to provide access to the product within body 12. Neck 14 is threadably coupled with cap 16. In some other versions, cap 16 may be coupled with bottle 10 using other suitable configurations, such as a snap fit, a friction fit, a living hinge, etc. Cap 16 includes a trigger 18 and a nozzle 19 such that a user

may squeeze trigger 18 to pivot trigger 18 inwardly towards bottle 10 to thereby dispense the product within body 12 through nozzle 19.

Shrink label 20 is shown positioned about bottle 10. Shrink label 20 may comprise any suitable plastic material that is configured to shrink and thereby form to bottle 10 when heated. Shrink label 10 comprises a lower portion 22 and an upper portion 24 separated by a first perforation line 26. Lower portion 22 of shrink label 20 thereby extends below first perforation line 26 to cover at least a portion of body 12 of bottle 10. Lower portion 22 may have a length of about 182 mm and a width of about 184 mm, but any other suitable dimensions may be used. In the illustrated embodiment, lower portion 22 extends to a bottom end portion of bottle 10. In some other versions, lower portion 22 only extends to cover a portion of body 12. Upper portion 24 of shrink label 20 extends above first perforation line 26 to cover at least a portion of cap 16 of bottle 10. Upper portion 24 may have a length of about 101 mm and a width of about 184 mm, but any other suitable dimensions may be used. In the illustrated embodiment, upper portion 24 extends to a top end portion of cap 16 such that upper portion 24 is configured to enclose nozzle 19. In some other versions, upper portion 24 only extends to cover a portion of cap 16.

First perforation line 26 is positioned to extend circumferentially about shrink label 20 near neck 14 of bottle 10. In the illustrated embodiment, first perforation line 26 is positioned just below neck 14, but in other versions first perforation line 26 may be positioned at or above neck 14. First perforation line 26 also extends continuously about the entire circumference of shrink label 20. In some other versions, first perforation line 26 extends about only a portion of shrink label 20. Shrink label 10 further comprises one or more second perforation lines 28 extending transversely relative to first perforation line 26, through upper portion 24 of shrink label 20, from first perforation line 26 to a top portion of bottle 10. As shown in Fig. 3, second perforation line 28 may be oriented obliquely relative to first perforation line 26 in an open configuration such that second perforation line 28 is oriented substantially vertical after shrink label 20 has been applied to bottle

10, as shown in Figs. 1 and 2. First and second perforation lines 26, 28 thereby allow a user to remove upper portion 24 of shrink label 20 prior to use of bottle 10.

Referring to Figs. 1 and 2, shrink label 20 further comprises an opening 29 extending through upper portion 24 to allow trigger 18 of bottle 10 to be exposed through opening 29. Referring to Fig. 3, shrink label 20 has a third perforation line 27 extending along upper portion 24 transverse to first perforation line 26. In the illustrated embodiment, third perforation line 27 extends along only a portion of upper portion 24 such that third perforation line 27 is positioned above first perforation line 26 and below a top end surface of upper portion 24. Third perforation line 27 may have a length of about 55 mm, and be positioned about 16 mm above first perforation line 26 and about 30 mm below the top end surface of shrink label 20, but any other suitable dimensions can be used. The length of third perforation line 27 thereby generally corresponds to the length of trigger 18, but any other suitable lengths can be used. Third perforation line 27 is formed such that third perforation line 27 is configured to rip more easily than First and second perforation lines 26, 28. Accordingly, when shrink label 20 is heated and shrunk about bottle 10 to form to bottle 10, third perforation line 27 breaks along third perforation line 27 to form opening 29. Trigger 18 of bottle 10 can thereby extend through opening 29. Additionally or alternatively, third perforation line 27 may be formed as a slit instead of perforations such that the slit is configured to expand as shrink label 20 is applied to bottle 10. Still other suitable configurations for third perforation line 27 will be apparent to one with ordinary skill in the art in view of the teachings herein.

Use of Shrink Label

Fig. 3 shows the shrink label 20 of the receptacle assembly described above in an expanded (i.e. not shrunk) configuration. A use of the shrink label 20 to cover a bottle, thus forming the receptacle assembly of Fig. 1, is described in the following.

To apply shrink label 20 to bottle 10, bottle 10 may be positioned within shrink label 20 in an open configuration, as shown in Fig. 3. For instance, body 12 of bottle 10 may be aligned with lower portion 22 of shrink label 20, neck 14 of bottle 10 may be aligned near first perforation line 26 of shrink label 20, and cap 16 of bottle may be aligned with upper portion 24 of shrink label 20 to position trigger 18 adjacent with third perforation line 27. Heat may then be applied to shrink label 20 such that shrink label 20 shrinks to form to bottle 10, as shown in Figs. 1 and 2. As shrink label 20 forms to bottle 10, third perforation line 27 breaks apart to form opening 29 to allow trigger 18 to extend through opening 29 while enclosing nozzle 19. Shrink label 20 thereby holds the position of the cap 16 relative to the bottle 10 to further secure the cap 16 with the bottle 10. This prevents the cap 16 from rotating and/or loosening relative to the bottle 10 to prevent product from leaking from the bottle 10. Opening 29 of shrink label 20 may also inhibit shrink label 20 from incidentally leaking product during the heat shrink process. For instance, as shrink label 20 is applied to bottle 10, compressive forces from shrink label 20 may pivot trigger 18 to incidentally leak product from bottle 10. Opening 29 thereby allows trigger 18 to extend through opening 29 to inhibit shrink label 20 from pivoting trigger 18 and incidentally leaking product.

A user may then pull downward on upper portion 24 of shrink label 20 to break upper portion 24 along second perforation line 28 down to first perforation line 26. Upper portion 24 of shrink label 20 can then be ripped along first perforation line 26 to remove upper portion 24 of shrink label 20 from bottle 10. Cap 16 may thereby be exposed to allow product to be dispensed from the bottle 10. Still other suitable configurations for shrink label 20 will be apparent to one with ordinary skill in the art in view of the teachings herein. For instance, in some versions, shrink label 20 may comprise a pull-tab to aid in removing a portion of the shrink label 20.

So a shrink label for application to a bottle, comprises a lower portion and an upper portion, wherein the lower portion is configured to be applied to at least a portion of a body of the bottle, wherein the upper portion is configured to be applied to at least a portion of a cap of the bottle, wherein the upper portion

comprises a perforation line extending along a portion of the upper portion, wherein the perforation line is configured to expand when the shrink label is applied to the bottle to form an opening, wherein a trigger of the cap is positioned to extend through the opening.

So a method of applying a shrink label to a bottle, wherein the bottle comprises a body and a cap having a trigger, comprises a lower portion and an upper portion having a perforation line extending along a portion of the upper portion, the method comprising the steps of: positioning the shrink label about the body such that the lower portion of the shrink label is aligned with at least a portion of the body and the upper portion of the shrink label is aligned with at least a portion of the cap, wherein the perforation line is positioned adjacent to the trigger; applying heat to the shrink label to form the shrink label to the bottle; expanding the perforation line to form an opening in the shrink label; and positioning the trigger through the opening.

Second Embodiment

A shrink label made according to a second embodiment of the invention is shown in Fig. 4 and differs from that made in the first embodiment in the following. The shrink label 20 of the second embodiment has a single slit 27 instead of the third perforation line 27. In this case it is not necessary to break apart any perforation line to form the opening 29. When the shrink label shrinks (e.g. upon applying energy such as heat) and /or when the trigger penetrates the slit, the slit widens to form the opening 29 having smooth sides. The slit 27 and above mentioned third perforation line 27 are each examples of a puncture. The puncture may extend along any or both of: at least parts of the upper portion 24, and at least parts of the lower portion 22. The puncture may extend at least partially longitudinally.

As respective modifications to the first and second embodiments, any or both of the first 26 and second 28 perforation lines may be omitted. Even here the

following advantages can still be achieved: the trigger is positioned through the opening, reducing leakage through an undesired trigger actuation; the nozzle is covered by the shrink label, further reducing leakage; the shrink label covers (is shrunk around) at least part of the cap and at least part of the body with a close fit, reducing undesired loosening of the cap; this hinders leakage; the shrink label has a larger surface area (advantageously a large design area can be implemented).

Apparatus

In the following an apparatus for making the shrink label according to the second embodiment is described. As shown schematically in Fig. 5, the apparatus 30 comprises a mandrel 32 configured to receive a continuous strip 36 of flexible tubular material. The mandrel 32 is essentially columnar and has a vertical and stationary longitudinal axis. A top portion (not shown) of the mandrel 32 has a spreading element known in the art which can convert a strip of flexible tubular material from a flat form to an open form. The lower portion of the mandrel is shown in Fig. 5 and has a circular section. In variants of the present embodiment the mandrel may have any one or more of a circular, oval, polygonal and plate-like section. The strip 36 can be introduced to the mandrel 32 from a roll (not shown) which is prepared in advance. The lower portion of the mandrel may be formed from a sleeve shot part of the mandrel.

The apparatus 30 comprises advancing means which are known in the art and not shown, for feeding the strip 36. The advancing means may comprise one or more first pairs of rollers which engage with the inner and outer faces of the wall of the strip 36. In this way the strip 36 can be fed onto the mandrel 32 from the mandrel's upper end. The advancing means may comprise one or more second pairs of rollers which engage with the inner and outer faces of the wall of the strip 36 at a lower position on the mandrel 32 than the first pair of rollers. In this way a sleeve cut from the strip 36 can be fed from the lower end of the mandrel to another production station. One or more of the rollers may be driven by an electric motor. One roller in each pair of rollers may be accommodated in recesses (not

shown) provided in the mandrel 32. The mandrel 32 may be supported by some of the rollers.

The apparatus 30 comprises a slitting blade 40, as a puncturing means, driven by a puncturing mechanism (not shown). More specifically, the mechanism moves the blade 40 toward and away from the mandrel in the radial directions shown by the double-headed arrow 42. In the present embodiment the movement is linear but in other embodiments the movement may comprise any or more of a linear, circular, and elliptical motion. For example the blade 40 may rotate about an axis: specifically the blade 40 may be a rotating (spinning) blade whose cutting profile is eccentric to its axis of rotation. The movement allows the blade 40 to penetrate the strip 36 to make a slit in a region of the strip 36. The motion of the blade 40 may be driven any one or more of: electrically, pneumatically, and hydraulically. For example the blade 40 may be driven by an electric motor such as a servomotor. In a preferable embodiment the blade 40 is driven by a reciprocating pneumatic actuator. The blade 40 punctures the wall-thickness of the shrink label 20 from one (outer) side while the mandrel 32 (opening device) supports the strip 36 from the other (inner) side. The slit is preferably straight and/or longitudinal. The slit may have a length (longitudinal extent) greater than or equal to any of: 2 mm, 5 mm, 10 mm, 15 mm, 20 mm, 25 mm, and 55 mm.

The blade 40 in the present embodiment has a triangular shaped profile. The blade profile may alternatively comprise a plurality of triangular shapes arranged in a vertical line. The leading vertex of the triangular shape may have an angle of 45 degrees. The blade 40 is configured to create a continuous slit of predetermined length in the strip 36. By providing more than one triangular shape, such as a saw-tooth like profile, the required stroke of the blade 40 for a given slit length can be kept short.

The mandrel 32 comprises a recess 44 on its surface for receiving the blade 40. The blade 40 can enter the recess 44 which is shaped in correspondence with the triangular profile of the blade 40. The recess may have other shapes, such as a straight or circular shape, and may extend in a peripheral direction at least partly

around the mandrel 32. The recess 44 may be a through-hole. The recess may be configured so that the puncturing means 40 does not contact the mandrel 32.

The apparatus 30 comprises a rotary cutter 46, as a cutting means, comprising one or more blades that can move toward and away from the mandrel in the radial directions shown by the double-headed arrow 43 so as to cut the strip 36 peripherally, above the blade 40. A rotary cutter known in the art can be used here. The rotary cutter 46 may be configured to make the peripheral cut at least during the puncturing of the strip 36.

The assembly has a perforation means 50 for making the first and second perforation lines. The perforation means 50 may comprise a respective perforating blade or blades for each perforation line and /or it may comprise a common perforating blade. The perforation means 50 is configured to reciprocatingly puncture a portion or portions of the strip 36 upstream of the mandrel 32, the directions of reciprocation being shown by the double-headed arrow 52. The perforation means 50 is thus configured to puncture a flattened portion of the strip 36, for example by applying a perforation means commonly known in the art. The perforation means 50 may be provided downstream of the mandrel.

The apparatus 30 may be adapted to make a shrink label according to the first embodiment by replacing the slitting blade 40 described above with a perforating blade. So the puncturing means may comprise a slitting blade or a perforation blade, wherein either further preferably extends along the mandrel axis.

In an alternative embodiment the perforation means 50 is configured to perforate a portion of the strip, provided on the mandrel, in a function corresponding to the puncturing means.

The apparatus 30 may be configured to make a shrink label of any of the modified first and second embodiments described above by omitting the perforation means.

Method

In the following a method for making a shrink label according to the second embodiment is described. Figs. 6A to 6E represent procedures of the method which are performed using the apparatus 30 described above and shown in Fig. 5. In Fig. 5 and Figs. 6A to 6E the parts of the mandrel 32 that are surrounded by the strip 36 are shown with broken lines.

As shown in Fig. 6A a strip 36 of tubular material is fed onto the mandrel 32 from the top portion of the mandrel 32, for example by means of the first roller pairs of the advancing means. The strip 36 is fed until the free end 33 of a free-end portion 34 of the strip 36 reaches a predetermined position along the mandrel 32, such as the bottom end of the mandrel 32 (Fig. 6B). Thus a region of the strip becomes an open region held open and/or supported by the mandrel 32. At this point the feeding is stopped.

Subsequently a puncturing step is performed (Fig. 6C), wherein the slitting blade 40 penetrates the strip 36 and enters the recess 44. The extents of the puncture 27 may be formed in correspondence with the extents of the blade 40. In other words a longitudinally upper extent of the puncture 27 may be formed by (or in correspondence with) the longitudinally upper extent of the blade 40, and a longitudinally lower extent of the puncture may be formed by (or in correspondence with) the longitudinally lower extent of the blade 40. So the strip 36 is punctured at a first distance from its free end 33. Longitudinal end portions of the sleeve are not punctured in making the puncture.

The strip 36 is cut about its periphery, optionally during the puncturing (Fig. 6C). The rotary cutter 46 may be configured to start and optionally complete the cutting before the puncturing. In this case the blade 40 punctures a shrink label 20 that is already cut from the strip 36. So the strip 36 is cut at a second distance from its free end 33, the second distance being greater than the first distance.

After cutting, the rotary cutter 46 is retracted. After puncturing, the blade 40 is retracted (see Fig. 6D). The end portion of the strip 36 forms the end portion of the shrink label. The free end 33 becomes an open end of the shrink label 20.

In summary of the above the sleeve is made from the strip of tubular material by: feeding a free-end portion of a given length of the strip onto a columnar mandrel; puncturing the free-end portion at a first distance from its free end, transversely to the feeding direction, to form a puncture; and cutting the free-end portion from the strip at a second distance from its free end, the second distance being greater than the first distance.

Subsequently the shrink label 20 is advanced (Fig. 6E) in the direction of the solid arrow of Fig. 6E by means of the second pairs of rollers so that it leaves the mandrel 32 from the mandrel's bottom end. The advancing means may transfer the newly-made free-end portion 48 of the strip 36 to the predetermined position at the same time that, or shortly after, the shrink label 20 is transferred from the mandrel 32. Preferably the shrink label 20 is transferred from the mandrel 32 to a receptacle (not shown in Fig. 6A to 6E), which is further preferably positioned under the mandrel 32.

The method comprises a step (not shown in Figs. 6A to 6E) of perforating a flattened portion of the strip 36, upstream to the mandrel, to form the first 26 and the second 28 perforation lines, by means of the perforation means 50. The first 26 and the second 28 perforation lines are provided on each shrink label 20.

Because the puncturing is performed on a portion of the strip 36, and the portion is provided on the mandrel 32, accuracy and repeatability are improved. Also the blade 40 is prevented from puncturing the wall of the strip 36 twice, as would be the case if the strip 36 were punctured in a flattened state. Puncturing is performed by moving the blade 40 in a plane parallel to the mandrel axis. So accuracy and repeatability of the puncturing can be further improved. Further preferably the slit (substantially) coincides in the peripheral direction with a

longitudinal crease in the tubular material. The crease may be formed when the tubular material is flat. So insertion of a protrusion on a receptacle is facilitated.

By forming the first and second perforation lines on a flattened part of the strip 36 it becomes easy to form pairs of parallel perforations, or to form a peripheral perforation.

The method may be adapted to make a shrink label made according to the first embodiment by replacing the slitting blade 40 described above with a perforating blade. The sleeve may be punctured more than once and/or have more than one puncture.

The method may be adapted to make a shrink label of any of the modified first and second embodiments described above by omitting perforating the strip 36 with the first 26 and/or the second 28 perforation lines.

The shrink label 20 may be placed over the receptacle in accordance with the use described above. Shrink labels 20 may be formed by sequentially cutting the strip 36 at predetermined intervals. Furthermore a linear series of receptacles 10 can be arranged, each receptacle 10 being sequentially conveyed to a common position for receiving a shrink label 20. Each receptacle 10 with a shrink label 20 may be conveyed to a processing station (not shown) for shrinking, such as a heater for heat-shrinking. In this way a receptacle assembly is made by performing the method to make a shrink label 20 followed by using the shrink label 20 to cover a receptacle 10.

Advantageously, by puncturing at the same time as cutting, the processing time can be short. The advancing means, the blade 40, and the rotary cutter 46 may be configured to cooperate with timed fashion by means of a not-shown control unit.

When the mandrel 32 is arranged with its axis vertical, free end 33;
longitudinally lower extent of the puncture 27, the longitudinally upper extent of the

puncture 27; and location of cutting are longitudinally spaced from each other in that order. Thus the puncture 27 is surrounded on all its sides by unpunctured material.

In the foregoing embodiments the puncturing means is provided below the cutter. The invention is not limited to this and the puncturing means may be provided in other locations, such as above the cutter. The method may be adapted accordingly, for example: after the puncturing, the tubular material may be fed, until the portion of the tubular material corresponding to a sleeve end coincides with the cutter. The cutting may then be performed. So the cutting may simultaneously create an (upper) end of the shrink label and a (lower) end of a next shrink label. The tubular material which will become the next shrink label may be punctured during said cutting. Cutting need not be performed if for example the strip length is the sleeve length.

In the foregoing embodiments the puncturing means is provided at the mandrel. The invention is not limited to this and the puncturing means may be provided at any place where the flexible tubular material is open (e.g. unflattenned). The opening may be performed by an opening device executed as a mandrel or in addition to a mandrel. The opening device may comprise a guide such as a plate-like guide, a guide of varying cross-section, or any a structural member that supports the inside of the strip. Alternatively or in addition the opening device may comprise a tunnel or passageway aligned in a feeding direction and having one or more porous inner surfaces connected to a vacuum; the wall of the strip is thus pulled apart by low air pressure as the strip is received by the opening device; the porous surfaces may be stationary or conveyable; even here the opening portion is formed by moving apart inner peripheral portions of the strip. At least part of the open portion of the strip may be spaced from the opening device. Alternatively or in addition the strip may be inflated with internal pressure.

The mandrel 32 may be stationary (e.g. rotationally stationary) during the puncturing and /or cutting. The strip 36 may be stationary relative to the mandrel 32 during the puncturing such as at least rotationally stationary. Alternatively or in

addition at least part of the puncturing may coincide with at least part of the feeding.

In the foregoing embodiments the blade is straight in the longitudinal direction, and has a triangular profile when viewed perpendicularly to the longitudinal direction; the puncturing means is not limited to this and may alternatively or in addition have other shapes. For example the puncturing means may comprise a punch having a circular, elliptical, or polygonal (e.g. square or rectangular) section. The puncturing may create a cutout as a puncture, such as by removing a portion of the tubular material, or by partially removing the portion so as to leave a flap of material. The puncture may have a predefined (e.g. non-zero) width. Puncturing may be understood to mean making a puncture. It may be provided that a single slit is formed, or multiple slits are formed, by making the puncture.

In the foregoing embodiments the cutter is provided as a rotary cutter. The invention is not limited to this and the cutter may be provided as a different type of cutter such as a flat cutter. It may be provided that the cutter peripherally cuts a part of the tubular material that is not on the mandrel. For example the part may be upstream or downstream of the mandrel.

In the foregoing embodiments the protrusion is formed as a trigger. The protrusion may alternatively or in addition comprise a handle and/or a nozzle-type opening. For example a handle can be grabbed by the user more easily when the handle is not covered or not completely covered by a shrink label. An exposed protrusion may be advantageous for other functional reasons, e.g. to expose a visual mark.

So the sleeve for covering a receptacle is made of flexible tubular material and is in particular made by a method described above, wherein the sleeve has a given length measured from a first end to a second end in a longitudinal direction and comprises a longitudinally extending puncture; the puncture is spaced apart from the first end and from the second end. The punctured region may be formed

by a slit-like opening. The sleeve may comprise least one perforation line in addition to the puncture.

So the use of the sleeve to cover a receptacle, wherein the receptacle comprises a longitudinally extending body and a protrusion extending at least partially transversally to the longitudinal direction, comprises: positioning the sleeve around the receptacle so that the puncture is aligned in the peripheral direction with the protrusion, and shrinking the sleeve around at least a portion of the receptacle to insert the protrusion through an opening formed by the puncture. So because the puncture is aligned with the protrusion, the protrusion extends from the body through the opening formed from the puncture during shrinking. Making a sleeve according to the method followed by the use of the sleeve may be understood to be a method of making and using a sleeve. The opening device, sleeve, and receptacle may be coaxial during at least some steps, such as when positioning the sleeve about the receptacle. Thus the sleeve can be easily positioned about the receptacle at (essentially) the same time that it is transferred from the opening device.

So the receptacle assembly comprises a receptacle and the sleeve, wherein the receptacle has a longitudinally extending body and a protrusion extending at least partially transversally to the longitudinal direction, the sleeve is in a shrunk state and covers at least a portion of the receptacle, and the protrusion extends through an opening formed by the puncture. The receptacle may comprise a body and a cap attached to the body, and further preferably the sleeve in the shrunk state covers at least a portion of the body and at least a portion of the cap. So it is less likely for the cap to unintentionally separate (e.g. unscrew) from the body. The receptacle may have a nozzle, optionally as part of the cap. After shrinking, the perforation line may extend over at least a portion of the cap. Removal of the sleeve near the cap is facilitated. The sleeve in the shrunk state may cover the nozzle. The receptacle assembly may be formed by the aforementioned use.

The shrink label as a sleeve may comprise pages for displaying e.g. a user manual, such as for medicines etc. The sleeve may show a decoration, such as

text or a design. The sleeve may have a packaging function. The sleeve may be only locally shrunk, such as for tamper evidence applications. The sleeve may have a single layer or multilayer (e.g. coextruded) composition. The sleeve may be provided as a full label or as a partial label, i.e. that covers only a portion of the receptacle, such as a portion of an upper and/or a portion of a lower part of the receptacle. The tubular material may comprise metal, such as a metal foil. The sleeve may have uniform thickness in a peripheral and/or a longitudinal direction. The tubular material may have, but is not limited to having, a circular or oval section; the tubular material may have a sectional shape conformable to the shape of any opening device or receptacle, with some oversize. The term “tubular” is understood to mean at least having an inner and an outer periphery. The tubular material may be foil-like and/or film-like.

When a first perforation line is provided, it may extend around at least part of the periphery of the shrink label.

The perforation lines and puncture may be sized to be adjacent to the corresponding features on the bottle taking into account a shrinkage of the shrink label. For example the trigger may be arranged to be adjacent to the third perforation line when the shrink label is in the shrunk state.

A portion of the sleeve comprising the puncture and any first and second perforation line may be understood to be a leak protection portion of the sleeve.

The first and second perforation lines are examples of a perforation line that is in addition to the puncture. In particular the first perforation line is an example of a peripheral perforation line; the second perforation line is an example of a longitudinal perforation line. A peripheral perforation line is understood to be a perforation line extending in an at least partially peripheral direction. A longitudinal perforation line is understood to be a perforation line extending in an at least partially longitudinal direction. The third perforation line is an example of a puncture being spaced from the sleeve ends, and may preferably extend at least partially longitudinally along at least parts of the upper portion. It may be

understood that, for the case that the sleeve has a perforation line, the perforation line comprising or joining with a puncture spaced from the sleeve ends, the entire perforation line may be spaced from the sleeve ends and/or may extend over only a portion of the sleeve periphery. Such a perforation line may extend longitudinally.

In foregoing embodiments the sleeve is formed as a shrink label. The sleeve may be changeable from an expanded state towards a shrunk state by applying energy, such as by any one or more of: UV-light, infra-red radiation, hot air, and steam. Alternatively or in addition to shrinking the sleeve may be contracted by mechanical fastening (e.g. ties or bands). Alternatively or in addition the sleeve may shrink by means of humidity change or by releasing elastic energy; for example the sleeve as a stretch sleeve may be elastically expanded (expanded state) while being placed over a receptacle, after which the elastic tension is released (shrunk state). This can be done using techniques known in the art, such as by an expandable and hollow transporting mandrel or by radially separable finger members. So the sleeve may be a label such as any or more of: a stretch label, a shrink label, and a shrink sticker.

A bottle is an example of a receptacle which includes a body and may include a cap. Other examples of a receptacle include container, cup, bowl, and pot. The body may have an interior space and may have an opening. A receptacle having a sleeve applied to it may be called a receptacle assembly. The receptacle and receptacle assembly may be empty or may hold a product such as a liquid or a powder.

Having shown and described various embodiments of the present invention, further adaptations of the methods and systems described herein may be accomplished by appropriate modifications by one of ordinary skill in the art without departing from the scope of the present invention. Several of such potential modifications have been mentioned, and others will be apparent to those skilled in the art. For instance, the examples, embodiments, geometrics, materials, dimensions, ratios, steps, and the like discussed above are illustrative and are not

required. Accordingly, the scope of the present invention should be considered in terms of the claims and is understood not to be limited to the details of structure and operation shown and described in the specification and drawings.

Reference Signs

10	bottle (receptacle)
12	body
14	neck
16	cap
18	trigger (protrusion)
19	nozzle
20	shrink label (sleeve)
22	lower portion
24	upper portion
26	first perforation line
27	third perforation line (puncture)
28	second perforation line
29	opening
30	apparatus
32	mandrel (opening device)
33	free end
34	free-end portion
36	strip of tubular material
40	blade (puncturing means)
42	arrows indicating movement of blade
43	arrows indicating movement of rotary cutter
44	recess
46	rotary cutter (cutting means)
48	newly-made free-end portion
50	perforation means
52	arrows indicating movement of perforation means

Claims

1. Method of making a sleeve (20) for covering a receptacle (10), from a strip (36) of flexible tubular material, wherein the sleeve (20) has a given length measured from a first end to a second end, being measured in the longitudinal direction of the strip, the method being characterized by comprising:

puncturing the strip (36) transversely to the longitudinal direction to form a longitudinally extending puncture (27) being spaced apart from the first end and from the second end.

2. Method according to claim 1, wherein the sleeve (20) is cut from the strip (36) having greater length than the given length of the sleeve (20).

3. Method according to claim 1 or 2, wherein the cutting and the puncturing are performed at least partially simultaneously.

4. Method according to one of the previous claims, comprising:

feeding the strip (36), a free end (33) of the strip being fed first, to an opening device (32), the opening device receiving the strip,

opening, by the opening device, a region of the strip by separating opposing inner peripheral portions of the strip, characterized by comprising

puncturing the strip is by puncturing the open region of the strip (36).

5. Method according to claim 4, wherein the sleeve (20) is cut from the strip having greater length than the given length of the sleeve, by cutting the strip at the open region.

6. Method according to any one of claims 1 to 5, comprising:

forming at least one perforation line (26, 28) in the sleeve, in addition to puncturing the sleeve.

7. Method according to claim 6, wherein

the at least one perforation line includes a peripheral perforation line (26) extending in a peripheral direction of the strip (36).

8. Method according to claim 6 or 7, wherein
the at least one perforation line includes a longitudinal perforation line (28) extending along the longitudinal direction.

9. Method according to any one of claims 1 to 8, wherein the puncture (27) is formed by a slit-like opening (27).

10. Apparatus for making a sleeve (20) for covering a receptacle, from a strip (36) of flexible tubular material, in particular for making the sleeve (20) according to the method of one of the previous claims, wherein the sleeve has a given length measured from a first end to a second end, being measured in the longitudinal direction of the strip (36), the apparatus comprising:
an opening device (32) for receiving a given length of the strip fed to the opening device, a free end of the strip being fed first, to open a region of the strip by separating opposing inner peripheral portions of the strip, characterized by comprising
a puncturing means (40) configured to puncture the open region of the strip transversely to the longitudinal direction to form a longitudinally extending puncture (27) being spaced apart from the ends of the sleeve.

11. Apparatus according to claim 10, wherein:
the opening device (32) comprises a recess (44) configured to receive the puncturing means (40).

12. Apparatus according to claim 10 or 11, comprising:
a cutting means (46) configured to cut the sleeve (20) from the strip (36), the strip having greater length than the given length of the sleeve (20)

13. Apparatus according to any one of claims 10 to 12, comprising:

a perforation means (50) configured to form at least one perforation line (26, 28), the at least one perforation line being in addition to the puncture (27).

Patentansprüche

1. Verfahren zum Herstellen einer Hülse (20) zum Abdecken eines Behälters (10) aus einem Streifen (36) aus flexiblem rohrförmigen Material, wobei die Hülse (20) eine gegebene Länge aufweist, die von einem ersten Ende zu einem zweiten Ende gemessen wird und in der Längsrichtung des Streifens gemessen wird, wobei das Verfahren dadurch gekennzeichnet ist, dass es umfasst:

Durchstechen des Streifens (36) quer zur Längsrichtung, um eine sich in Längsrichtung erstreckende Punktion (27) zu bilden, die von dem ersten Ende und von dem zweiten Ende beabstandet ist.

2. Verfahren nach Anspruch 1, wobei die Hülse (20) aus dem Streifen (36) geschnitten ist, der eine größere Länge als die gegebene Länge der Hülse (20) aufweist.

3. Verfahren nach Anspruch 1 oder 2, wobei das Schneiden und das Durchstechen mindestens teilweise gleichzeitig durchgeführt werden.

4. Verfahren nach einem der vorhergehenden Ansprüche, umfassend:

Zuführen des Streifens (36), wobei ein freies Ende (33) des Streifens zuerst zugeführt wird, an eine Öffnungsvorrichtung (32), wobei die Öffnungsvorrichtung den Streifen aufnimmt,

Öffnen eines Bereichs des Streifens durch die Öffnungsvorrichtung durch Trennen gegenüberliegender innerer Umfangsabschnitte des Streifens, dadurch gekennzeichnet, dass

es das Durchstechen des Streifens durch Durchstechen des offenen Bereichs des Streifens (36) umfasst.

5. Verfahren nach Anspruch 4, wobei die Hülse (20) aus dem Streifen geschnitten ist, der eine größere Länge als die gegebene Länge der Hülse aufweist, indem der Streifen in dem offenen Bereich geschnitten wird.

6. Verfahren nach einem der Ansprüche 1 bis 5, umfassend:

Bilden von mindestens einer Perforationslinie (26, 28) in der Hülse zusätzlich zum Durchstechen der Hülse.

7. Verfahren nach Anspruch 6, wobei

die mindestens eine Perforationslinie eine Umfangsperforationslinie (26) einschließt, die sich in einer Umfangsrichtung des Streifens (36) erstreckt.

8. Verfahren nach Anspruch 6 oder 7, wobei

die mindestens eine Perforationslinie eine Längsperforationslinie (28) einschließt, die sich entlang der Längsrichtung erstreckt.

9. Verfahren nach einem der Ansprüche 1 bis 8, wobei die Punktion (27) durch eine schlitzartige Öffnung (27) gebildet wird.

10. Vorrichtung zum Herstellen einer Hülse (20) zum Abdecken eines Behälters aus einem Streifen (36) aus flexiblem rohrförmigen Material, insbesondere zum Herstellen der Hülse (20) gemäß dem Verfahren nach einem der vorhergehenden Ansprüche, wobei die Hülse eine gegebene Länge aufweist, die von einem ersten Ende zu einem zweiten Ende gemessen wird und in der Längsrichtung des Streifens (36) gemessen wird, wobei die Vorrichtung umfasst:

eine Öffnungsvorrichtung (32) zum Aufnehmen einer gegebenen Länge des Streifens, der der Öffnungsvorrichtung zugeführt wird, wobei ein freies Ende des Streifens zuerst zugeführt wird, um einen Bereich des Streifens durch Trennen gegenüberliegender innerer Umfangsabschnitte des Streifens zu öffnen, dadurch gekennzeichnet, dass sie umfasst

ein Durchstechmittel (40), das ausgelegt ist, um den offenen Bereich des Streifens quer zu der Längsrichtung zu durchstechen, um eine sich in Längsrichtung erstreckende Punktion (27) zu bilden, die von den Enden der Hülse beabstandet ist.

11. Vorrichtung nach Anspruch 10, wobei:

die Öffnungsvorrichtung (32) eine Aussparung (44) umfasst, die zum Aufnehmen des Durchstechmittels (40) ausgelegt ist.

12. Verfahren nach Anspruch 10 oder 11, umfassend:

ein Schneidmittel (46), das ausgelegt ist, um die Hülse (20) von dem Streifen (36) abzuschneiden, wobei der Streifen eine größere Länge als die gegebene Länge der Hülse (20) aufweist.

13. Vorrichtung nach einem der Ansprüche 10 bis 12, umfassend:

ein Durchstechmittel (50), das ausgelegt ist, um mindestens eine Perforationslinie (26, 28) zu bilden, wobei die mindestens eine Perforationslinie zusätzlich zu der Punktion (27) vorhanden ist.

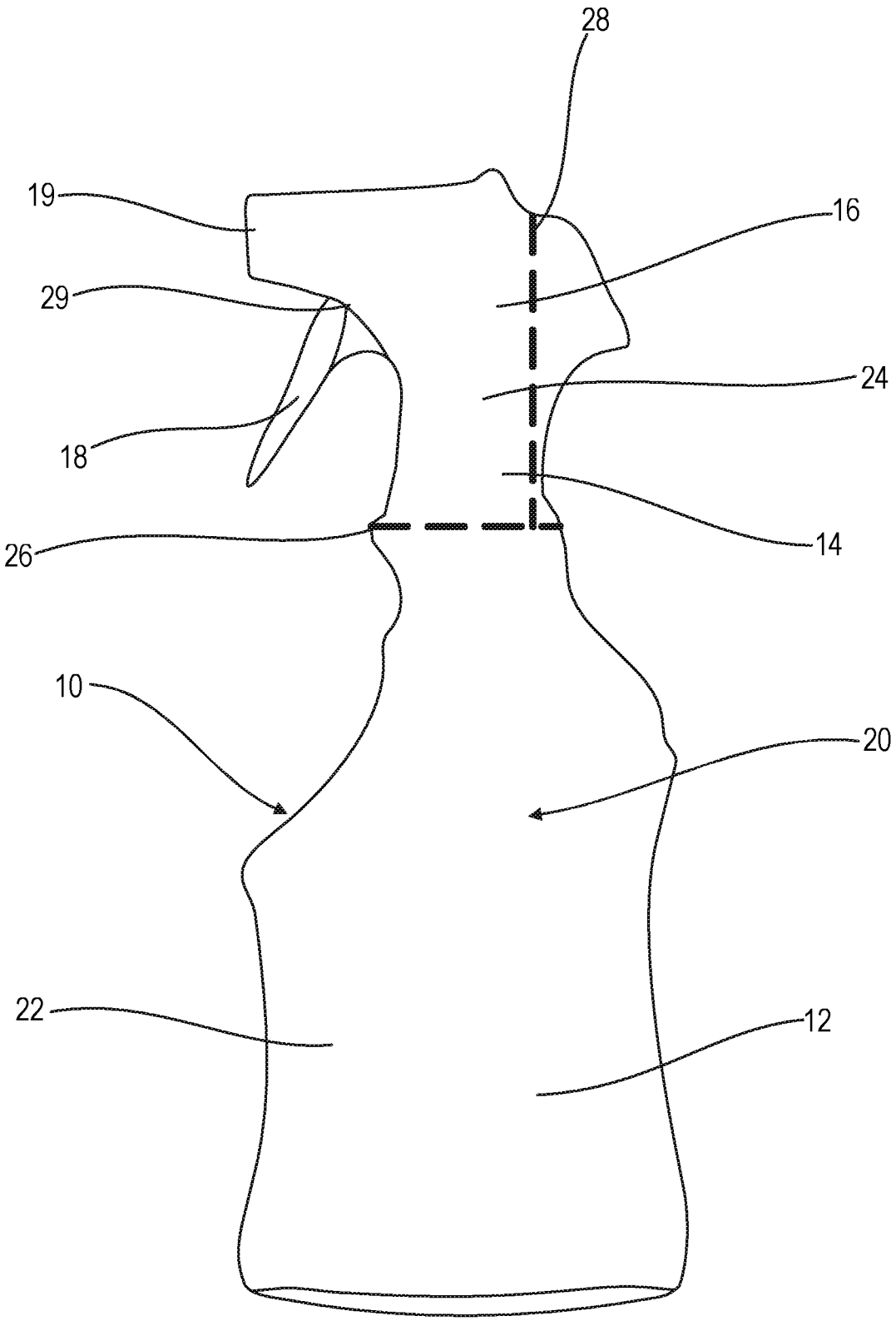

Fig. 1

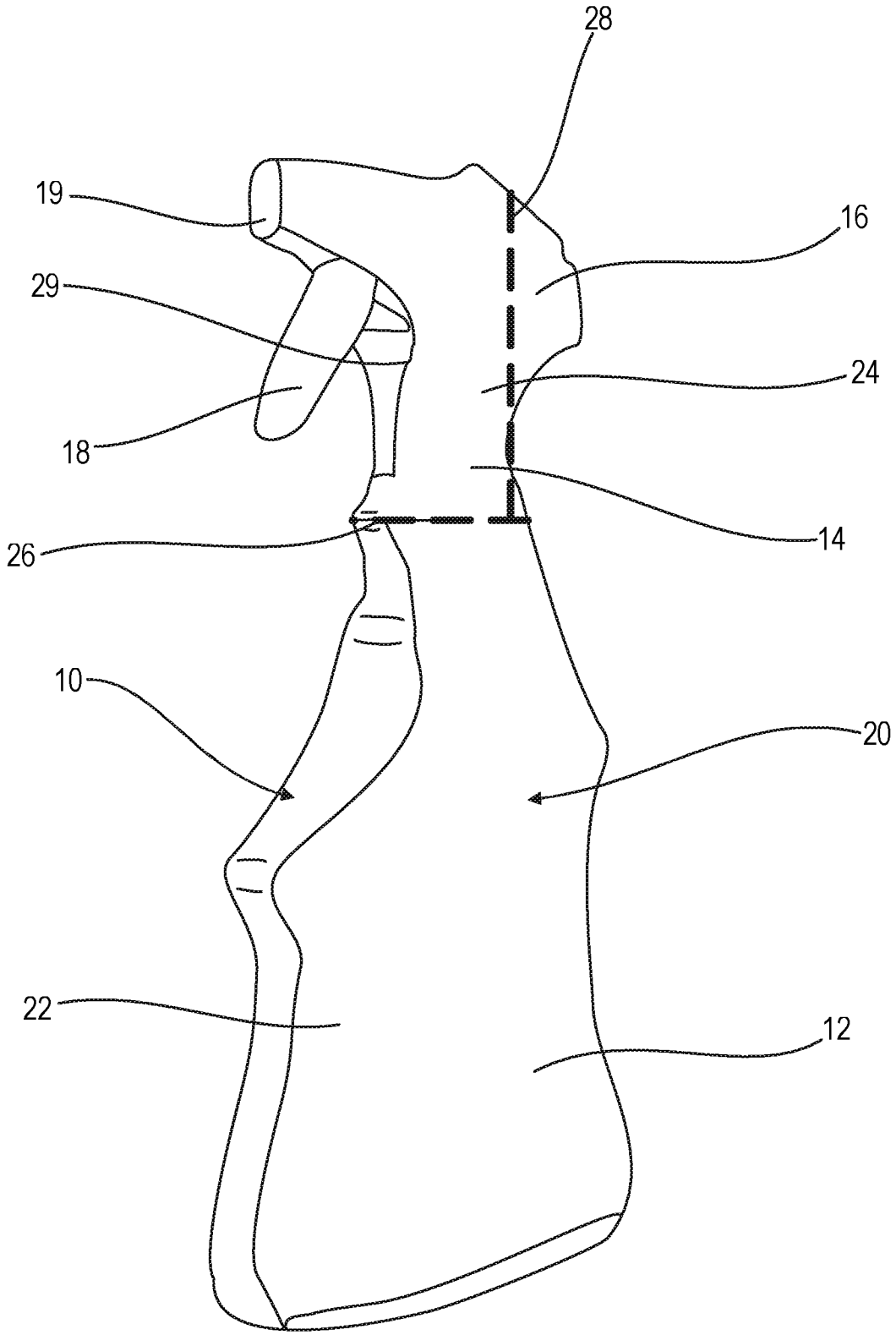

Fig. 2

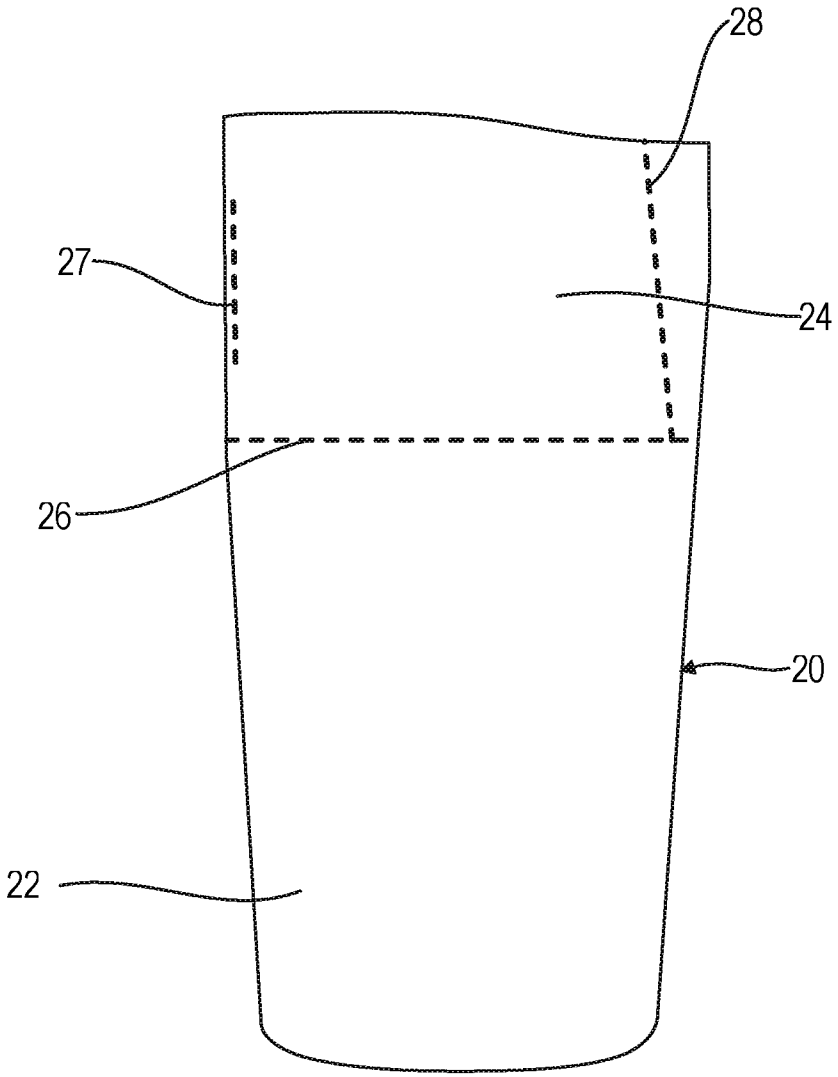

Fig. 3

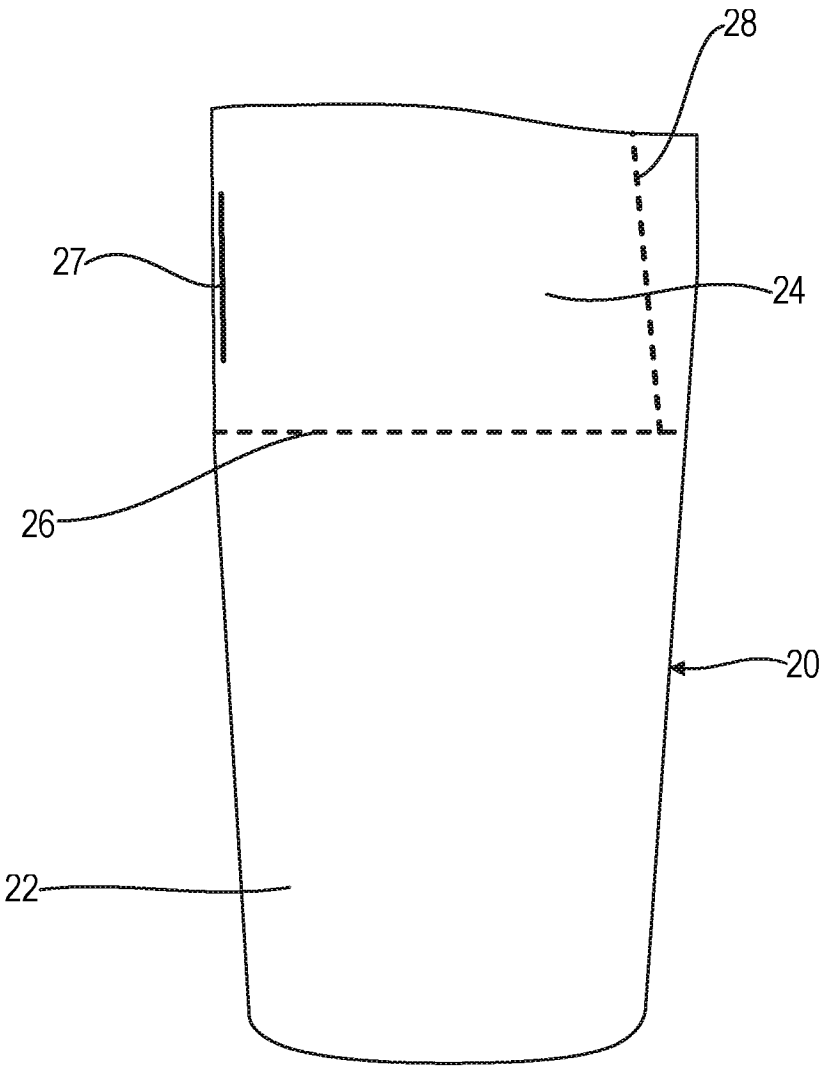

Fig. 4

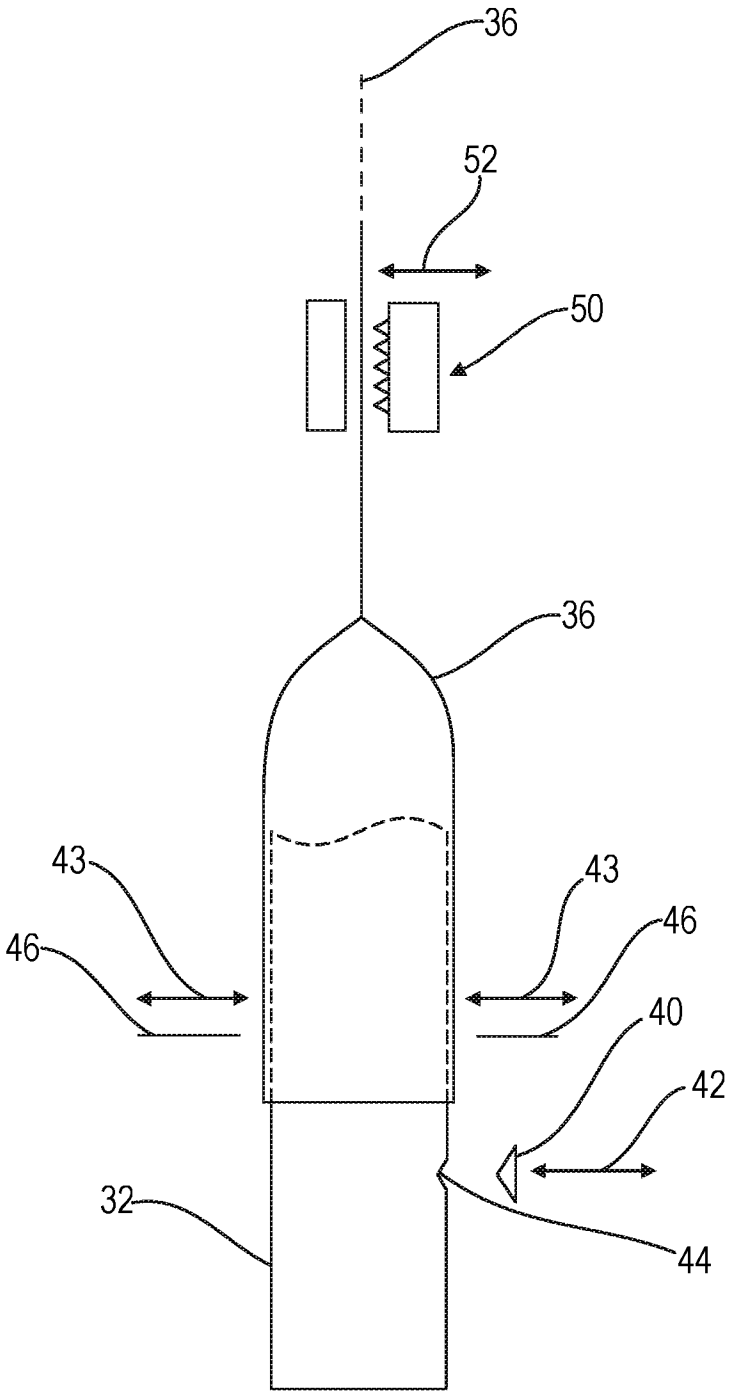

Fig. 5

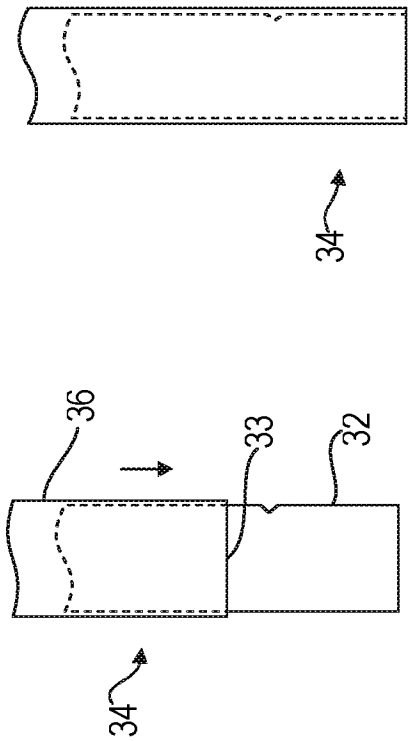

Fig. 6A

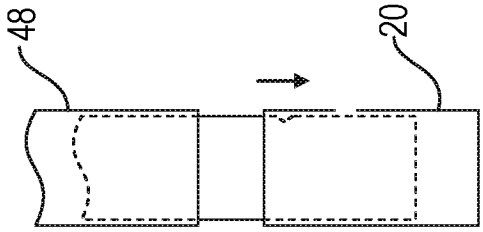

Fig. 6B

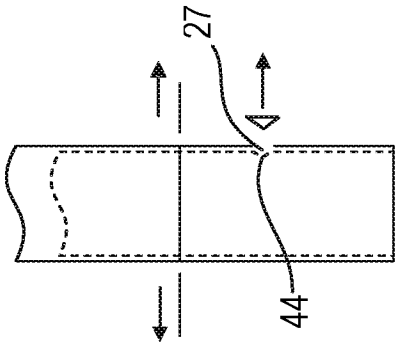

Fig. 6C

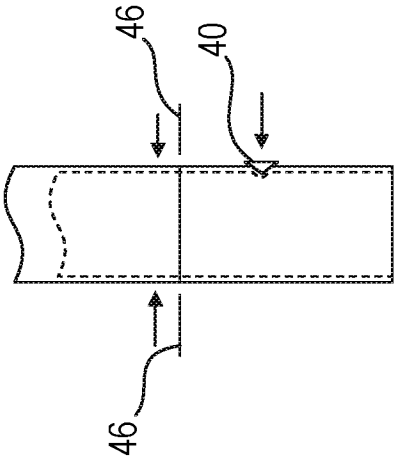

Fig. 6D

Fig. 6E