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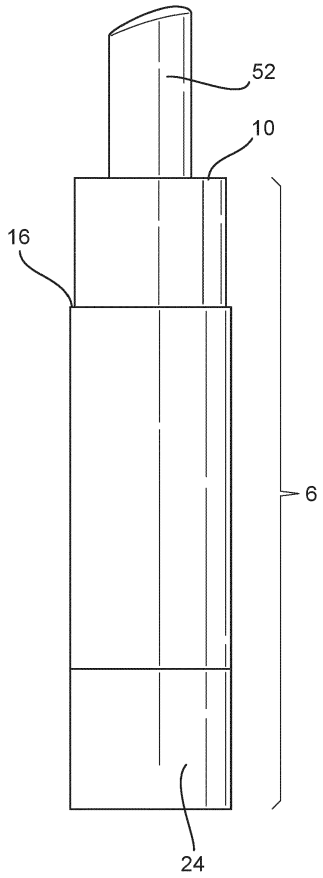
(54) **DISPENSERS**

(57) A dispenser (2) for a product in stick form comprises: a tubular body (4) having a longitudinal axis (A), the tubular body (4) including a tubular base part (6) and a removable cap (8) for closing an open end of the tubular base part (6). The tubular base part (6) comprises an outer tube (20) made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending helical slot (30) formed in a radially inner surface (36) thereof, an inner tube (22) received within the outer tube (20) and made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending slot (40) formed therethrough and a base (24) made from a paper-based or card-based material such as paperboard or cardboard which is rotatable about the longitudinal axis (A) relative to the outer tube (20) and to which the inner tube (22) is fixed so as to be rotatable therewith relative to the outer tube. A product stick carrier (50) is slidably received in the inner tube (22) and has a lug (54) projecting through the axially extending slot (20) of the inner tube (22) to engage with the axially extending helical slot (30) of the outer tube (20), whereby rotation of the base (24) relative to the outer tube (20) cams the lug (54) along the axially extending helical slot (30) so as to move the product stick carrier (50) along the inner tube (22) so as to extend the product stick (52) from the outer tube (20).

Fig. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to dispensers for products in stick form, for example cosmetics, deodorants, lipsticks, lip balms, adhesives and other products for topical application to a surface, for example to a person's skin or lips.

BACKGROUND

[0002] Stick products such as lipsticks are supplied in a number of dispensers. The most common dispenser comprises a tubular plastics shell having a removable cap. The container receives a cartridge of a material for application which can, after removal of the cap, be twisted in order to extend the stick of material from the shell and to retract the stick material into the shell after application, whereupon the cap may be closed once more.

[0003] Whilst this is a very effective form of dispenser, it is desirable to reduce the amount of plastic material used in the dispenser.

SUMMARY

[0004] In accordance with a first aspect of the invention there is provided a dispenser for a product in stick form. The dispenser comprises a tubular body having a longitudinal axis and which includes a tubular base part and a removable cap for closing an open end of the tubular base part. The tubular base part comprises an outer tube made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending helical slot formed in a radially inner surface thereof. It further comprises an inner tube received within the outer tube and made from a paper-based or card-based material such as paperboard or cardboard. The inner tube has an axially extending slot formed therethrough. It further comprises a base made from a paper-based or card-based material such as paperboard or cardboard which is rotatable about the longitudinal axis relative to the outer tube and to which the inner tube is fixed so as to be rotatable therewith relative to the outer tube. A product stick carrier formed of a paper-based or card-based material supports a product stick and is slidably received in the inner tube. The product carrier has a lug projecting through the axially extending slot of the inner tube to engage with the axially extending helical slot of the outer tube, whereby rotation of the base relative to the outer tube moves the lug along the axially extending helical slot so as to move the product stick carrier along the inner tube so as to extend the product stick from the outer tube.

[0005] The base may comprise a tubular body which is mounted to a lower end of the outer tube of the base part.

[0006] An upper portion of the tubular body of the base may be received in a recess formed at the lower end of the outer tube of the base part.

[0007] The base may be mounted to the outer tube by means of a collar received on the lower end of the outer tube.

[0008] The collar may comprise an upper portion attached to a radially inner surface of the upper portion of the base and a lower portion attached to a radially outer surface of the lower end of the outer tube. the lower portion of the collar prevents removal of the upper portion from the outer tube.

[0009] The upper portion and the lower portion may be attached to one another by a frangible connection which breaks upon initial rotation of the base relative to the outer tube to permit rotation of the base relative to the outer tube.

[0010] The frangible connection may comprise one or more frangible bridges formed between the upper portion and the lower portion of the collar.

[0011] The outer tube may be formed as a one piece element, with the axially extending helical slot being formed in a radially inner surface of the one piece element.

[0012] In an alternative embodiment, the outer tube may comprises a radially outer element and a radially inner element attached to the radially outer element, with the axially extending helical slot being formed through or in the radially inner element.

[0013] The outer tube or one or more of its elements may be a spirally wound tube.

[0014] The axially extending helical slot may be formed by a gap formed between adjacent spiral turns of one or more layers of the material of the outer tube.

[0015] The product stick carrier may comprise a lug support of a paper-based or card-based material. The lug projects radially outwardly from the lug support.

[0016] The lug support may comprise a plurality of layers of a paper or card material.

[0017] The lug may be formed only on selected layers of the lug support.

[0018] In some embodiments, the lug may be formed by the head of an element, for example a pin, inserted in a side wall of the lug support.

[0019] The head may be spherical in some embodiments.

[0020] The head and optionally the entire element may be metallic

[0021] The dispenser may further comprise a product support attached to an upper face of the lug support.

[0022] The product support may comprise a plurality of layers of a paper or card material.

[0023] The product support may be annular for receiving the product stick into a central opening thereof.

[0024] The product support may comprise a plurality of radially inwardly projecting teeth for engaging the product stick.

[0025] The dispenser may further comprise a spacer attached to a lower face of the lug support.

[0026] The spacer may comprise a plurality of layers of a paper or card material.

[0027] The spacer may be annular.

[0028] In accordance with a second aspect of the invention there is provided a dispenser for a product in stick form comprising:

a tubular body having a longitudinal axis, the tubular body including a tubular base part and a removable cap for closing an open end of the tubular base part;

the tubular base part comprising:

an outer tube made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending helical slot defined in a radially inner surface thereof;

an inner tube received within the outer tube and made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending cutout formed therein;

a base made from a paper-based or card-based material such as paperboard or cardboard which is rotatable about the longitudinal axis relative to the outer tube and to which the inner tube is fixed so as to be rotatable therewith relative to the outer tube;

a product stick carrier slidably movable relative to the inner tube, a portion of the product stick carrier being received within the inner tube, the product stick carrier comprising a helical element projecting from the cutout of the inner tube to engage with the axially extending helical slot of the outer tube, whereby rotation of the base relative to the outer tube cams the helical element along the axially extending helical slot of the outer tube so as to move the product stick carrier along the inner tube so as to extend the product stick from the outer tube.

[0029] Operation of this further aspect of the invention is similar to that of the first aspect described above. In accordance with this further aspect, movement of a product stick carrier relative to the inner tube for extending the product stick from the outer tube again occurs as a result of rotation of the base of the dispenser relative to an outer tube having an axially extending helical slot defined in a radially inner surface thereof. In this further aspect, the product stick carrier comprises a helical element projecting from an axially extending cutout in the inner tube. The helical element engages the axially extending helical slot of the outer tube such that rotation of the base relative to the outer tube cams the helical element along the axially extending helical slot of the outer tube so as to move the product stick carrier axially along the inner tube and thus extend the product stick from the outer tube.

[0030] Features in accordance with this second aspect of the invention will now be discussed.

[0031] The product stick carrier is slidably movable relative to the inner tube of the dispenser in an axial direction. The product stick carrier is not rotatable relative to the inner tube. The product stick carrier is not rotatable relative to the inner tube at any point within the available relative axial travel of the product stick carrier relative to the inner tube.

[0032] A radially outer portion of the product stick carrier may be disposed within the cutout in a manner which prevents rotation of the product stick carrier relative to the inner tube. The radially outer portion of the product stick carrier (e.g. helical element support as described below) may be snugly received between axially extending side edges of the cutout of the inner tube so as to prevent rotation of the product stick carrier relative to the inner tube. As the product stick carrier is only axially movable relative to the inner tube, and the inner tube is fixed to the base, rotation of the base of the dispenser relative to the outer tube will result in rotation of the inner tube and camming of the helical element along the axially extending helical slot of the outer tube.

[0033] Embodiments in accordance with this further aspect of the invention have been found to be associated with ease of manufacture, facilitating assembly in particular in the context of the paper-based or card-based materials used. The helical element is associated with benefits in terms of reliable operation, providing a threaded connection with the helical slot in the outer tube.

[0034] As in the earlier aspects and embodiments, the base may comprise a tubular body which is mounted to a lower end of the outer tube of the base part. The base may be mounted to the outer tube in any manner which permits rotation of the base relative to the outer tube.

[0035] The inner tube is fixed to the base of the dispenser. A base of the inner tube may be fixed to the bottom end of the base of the dispenser. For example, the inner tube may comprise an end closure e.g. plug, such as a disc, closing a bottom end thereof which is bonded to an end closure e.g. plug, such as a disc, closing a bottom end of the base of the dispenser. However, it is not necessary that the fixing of the inner tube to the base is via the bottom end of the base and the base of the inner tube, or at least need not be exclusively achieved in this manner. Any suitable technique may be used which does not interfere with the ability of the outer tube to rotate relative to the base of the dispenser.

[0036] The outer tube is preferably formed from a single tubular element, with the axially extending helical slot being defined in a radially inner surface of the tubular element. This may simplify the construction of the dispenser, reducing the number of components to be assembled. However, in an alternative embodiment, the outer tube may comprise a radially outer tubular element and a radially inner tubular element attached to the radially outer tubular element, with the axially extending helical slot being defined in a radially inner surface of the radially inner tubular element. The helical slot may be formed through or in the radially inner tubular element or

may be defined between spiral turns of a helical element bonded to a radially inner surface of the radially inner tubular element.

[0037] Regardless of whether the outer tube comprises one or more tubular element, the axially extending helical slot may be defined in any suitable manner.

[0038] The outer tube or one or more of its tubular elements may be a spirally wound tube. In such embodiments the axially extending helical slot may be formed by a gap formed between adjacent spiral turns of one or more layers of the material of the outer tube. However, the helical slot need not be formed in this manner.

[0039] Whether or not the outer tube or one of its tubular elements comprises a spirally wound tube, the axially extending helical slot is preferably defined between adjacent spiral turns of a helical element fixed e.g. bonded to a radially inner surface of a tubular element of the outer tube. The helical element is made from a paper-based or card-based material such as paperboard or cardboard. The helical element may be a strip of paper-based or card-based material. The outer tube preferably comprises a single tubular element having such a helical element bonded to a radially inner surface thereof.

[0040] In alternative embodiments, whether or not a single tubular element construction is used for the outer tube, the axially extending helical slot may be machined into the radially inner surface of the outer tube.

[0041] The product stick carrier is axially slidably movable with respect to the inner tube so as to extend the product stick from the outer tube as the helical element of the product stick carrier is cammed along the axially extending helical slot of the outer tube. A portion of the product stick carrier is received within the inner tube. The portion of the product stick carrier may be a radially inner portion of the product stick carrier which may comprise a product support. This enables movement of the product stick carrier relative to the inner tube to advance a product stick from within the inner tube.

[0042] The product stick carrier is rotationally fixed with respect to the inner tube. This enables rotation of the base relative to the outer tube to cam the helical element along the helical slot of the outer tube.

[0043] The product stick carrier is movable in an upward direction relative to the inner tube so as to extend the product stick from the outer tube as the base is rotated relative to the outer tube in a first direction so as to cam the helical element along the axially extending helical slot in an upward direction. The product stick carrier is movable in a downward direction relative to the inner tube so as to retract the product stick into the outer tube as the base is rotated relative to the outer tube in a second direction opposite to the first direction so as to cam the helical element along the axially extending helical slot in a downward direction.

[0044] The product stick carrier may be formed from one or more pieces, and, in embodiments, is formed from a plurality of pieces.

[0045] The product stick carrier may comprise a radially inner portion, and a radially outer portion, wherein the radially outer portion comprises a helical element support, the helical element projecting radially outwardly from the helical element support, and wherein the radially inner portion comprises a product support. The product support is configured to receive the product stick.

[0046] The radially inner portion of the product stick carrier may be received within the inner tube. The radially outer portion may be disposed within the cutout of the inner tube.

[0047] References to the radially inner portion being received within the inner tube refer to the portion being received radially within the inner tube i.e. within an interior space defined by the inner tube. The interior space is open over a portion thereof as a result of the presence of the cutout. The radially inner portion may be located within a cylindrical volume defined by the internal diameter of the inner tube. The radially outer portion is disposed radially within the cutout.

[0048] The radially inner and outer portions may be provided by separate elements which are fixed e.g. bonded to one another.

[0049] The radially inner portion and the radially outer portion may each be of a paper-based or card-based material, such as paperboard or cardboard.

[0050] The helical element support is preferably formed of a paper-based or card-based material. The helical element is fixed e.g. bonded to the exterior surface of the helical element support.

[0051] The helical element associated with the product stick carrier is preferably of a paper-based or card-based material, such as paperboard or cardboard. Preferably the helical element is of a paper-based or card-based material, such as paperboard or cardboard, and is bonded to the exterior surface of the helical element support. The helical element may be in the form of a strip of such material. The helical element is an axially extending helical element.

[0052] The angle of the helix defined by the helical element (and thus that of the helical slot of the outer tube) may be selected as desired. For example, the angle may be used to control factors such as the ease with which the product stick carrier may move relative to the inner tube.

[0053] The helical element may extend around the axis of the dispenser by any desired amount, depending upon factors such as the desired degree of rotation of the base of the dispenser relative to the outer tube required to advance the product stick. The helical element cooperates with the helical slot of the outer tube to provide a threaded connection thereto as the helical element is cammed along the axially extending helical slot of the outer tube on rotation of the base relative to the outer tube . This may provide greater stability and reliability in the connection.

[0054] The helical element may extend over the entire length of the helical element support in the axial direction. However, this need not be the case. The helical element

preferably extends to at least one axial end e.g. a lower end of the helical element support. This may facilitate assembly of the dispenser. For example the helical element may extend from the lower end edge of the helical element support to the top end edge or an upper end of one of the axially extending side edges of the helical element support.

[0055] The helical element support may be slidably received in the cutout of the inner tube. The helical support of the product stick carrier is then slidably movable within the cutout as the helical element is cammed along the helical slot of the inner tube. Movement of the helical element support will correspond to movement of the product stick carrier as a whole. The helical element support is axially and not rotatably movable within the cutout. This results in the product stick carrier being axially and not rotatably movable relative to the inner tube. The helical element support may be snugly received between the side edges of the cutout so as to prevent rotation of the helical element support relative to the inner tube.

[0056] The cutout in the inner tube may comprise a pair of parallel axially extending side edges. The helical element support may comprise a pair of parallel axially extending side edges which engage the side edges of the cutout as the product stick carrier moves along the inner tube. The side edges of the helical element support then slide over the side edges of the cutout as the product stick carrier moves relative to the inner tube. In this manner rotation of the helical element support within the cutout and thus rotation of the product stick carrier relative to the inner tube is prevented. The side edges of the helical element support may engage the side edges of the cutout over the full extent of available travel of the helical element support relative to the cutout. In these embodiments, the helical element support may be snugly received between the side edges of the cutout.

[0057] The helical element support preferably comprises a cylindrical shell segment slidably received in the cutout of the inner tube. The cylindrical shell segment may be a half cylinder. Of course, the cylindrical shell may extend around the axis of the dispenser through other angles.

[0058] The inner tube and the cylindrical shell segment providing the helical element support may be of the same external diameter. The exterior surface of the helical element support may be flush with the exterior surface of the inner tube.

[0059] The helical element support may be provided by a cylindrical shell segment cut from a tube. The tube may be a tube of paper-based or card-based material such as paperboard or cardboard. The tube may be a tube having a helical member fixed e.g. bonded to the exterior thereof. A helical element support with a helical element projecting radially outwardly therefrom for use in the embodiments of the invention described herein may then simply be provided by a cylindrical shell segment cut from the tube and including a portion of the helical member projecting from the exterior thereof.

[0060] The cutout in the inner tube has a length (in the axial direction) which is greater than a length of the helical element support to enable sliding of the helical element support relative to the inner tube along the length of the cutout.

[0061] The cutout may extend any suitable angle around the axis of the inner tube. In embodiments the angle is approximately 180 degrees. However, other angles may be envisaged. The most appropriate angle may be selected by reference to factors such as the overall size of the inner tube and/or the distance of travel desired between the inner tube and product stick carrier. For example the angle may be at least 135 degrees or at least 180 degrees. Alternatively or additionally, the angle may be less than 225 degrees, or less than 200 degrees. However these examples are by way of illustration only and not limitation.

[0062] The cutout may be in the shape of a cylindrical shell segment, such as a half cylinder. The cutout may be formed by removing such a cylindrical shell segment from a tubular element that provides the inner tube. The inner tube may comprise a wall portion extending between the level of the lower and upper edges of the cutout in the form of a cylindrical shell segment, such as a half cylinder.

[0063] The helical element support may be slidably movable between a lower and an upper position relative to the inner tube for extending the product stick. The lower and upper positions may be predetermined positions. The lower and upper positions may correspond to positions in which a respective end edge of the helical element support abuts a respective end edge of the cutout in the inner tube.

[0064] The cutout may comprise upper and lower end edges, and the helical element support may comprise upper and lower end edges, wherein the upper end edge of the helical element support abuts the upper end edge of the cutout to limit the axial travel of the product stick carrier relative to the inner tube in a direction so as to extend the product stick from the outer tube, and the lower end edge of the helical element support abuts the lower end edge of the cutout to limit the axial travel of the product stick carrier relative to the inner tube in a direction opposite to that for extending the product stick from the outer tube. Thus, the end edges of the helical element support and the cutout abut one another to limit travel of the product stick carrier relative to the inner tube. This may prevent complete removal of the product stick carrier from the dispenser.

[0065] The product stick carrier may further comprise a product support for receiving the product stick, which may be at an upper end of the product stick carrier.

[0066] In embodiments the product stick carrier comprises radially inner and outer portions, wherein the radially outer portion comprises a helical element support and the radially inner portion comprises a product support. The product support may be at an upper end of the radially inner portion.

[0067] The helical element support and product support are fixed in relation to one another such that movement of the helical element support as the helical element is cammed along the axially extending helical slot of the outer tube results in movement of the product support so as to extend the product stick from the outer tube. Thus the radially inner and outer portions, and hence the product support and helical element support move together as the product stick carrier moves as a result of the camming of the helical element along the slot.

[0068] The product support may be of a paper-based or card-based material, such as paperboard or cardboard. The product support may be of any suitable form.

[0069] The radially inner portion of the product stick carrier preferably comprises a tube. The tube may be of paper-based or card-based material, such as paperboard or cardboard.

[0070] The product support may be configured in any manner to receive a product stick. For example, the product stick may be arranged to engage the base and/or sides of a product stick. The product support may be provided by an upper end of the tube or may comprise one or more additional components. For example the lower end of a product stick may simply be inserted into the upper end of the tube. The upper end of the tube may or may not then comprise formations, such as a plurality of radially inwardly projecting teeth, for engaging the product stick. The product stick may be held by a friction fit in the upper end of the tube.

[0071] In other embodiments the tube may comprise a plug (e.g. disc) which may be at the upper end of the tube, and which forms at least a part of the product support. The plug e.g. disc is configured to receive a product stick. For example the plug may define a surface for supporting a base of a product stick. The plug e.g. disc may be solid or apertured. Where the plug is apertured, a lower end of the product stick may be inserted through a central aperture of the plug.

[0072] Whether it is solid or apertured, the plug e.g. disc may be of paper-based or card-based material, such as paperboard or cardboard. The plug e.g. disc may or may not be recessed from an upper edge of the tube. The extent to which the plug e.g. disc is recessed may be selected as desired depending upon the amount of support required for the sides of the product stick and/or the manner in which the product stick is to be introduced into the dispenser. Formations e.g. radially inwardly projecting teeth or recesses or other surface undulations in the product supporting surface, or any other suitable formations may additionally be provided for engaging the product stick.

[0073] It is envisaged that a product stick may be provided as a pre-form which may be fixed to a product support plug e.g. disc or received through an aperture in such a product support plug, or the product stick could be formed in the pack. In the latter such cases the inner tube of the product stick carrier may advantageously comprise a plug e.g. disc recessed from the upper end thereof to define a portion of the tube above the plug e.g. disc for receiving the material for providing the stick. The plug will then be a solid plug. It is also envisaged that the product support might comprise one or more additional component e.g. tube or cup attached to e.g. disposed within the inner tube of the product stick carrier for receiving the material.

[0074] In accordance with the invention in any of its embodiments, the upper end of the radially inner portion of the product stick carrier e.g. tube preferably extends axially beyond the upper end of the radially outer portion i.e. helical element support.

[0075] The radially inner and outer portions of the product stick carrier may be connected in any suitable manner. The portions are fixed together. This may be achieved through an indirect or direct attachment between the components providing the radially inner and outer portions.

[0076] The radially inner and outer portions of the product stick carrier may be bonded to one another. In embodiments in which the radially inner portion comprises a tube and the radially outer portion comprises a cylindrical shell segment, a radially inner surface of the cylindrical shell segment may be bonded to an radially outer surface of the tube. The radially inner and outer surfaces are circumferential surfaces of the cylindrical shell segment and tube respectively.

[0077] The product stick carrier may comprise a base. The presence of a base is optional but may help to provide the product stick carrier with greater stability. Where present, the base is preferably of paper-based or card-based material, such as paperboard or cardboard.

[0078] The base of the product stick carrier may comprise a base plug e.g. disc. The base may close a lower end of a tube providing the radially inner portion of the product stick carrier. The base supports the radially inner portion (e.g. tube). At least the radially inner portion e.g. tube and optionally also the radially outer portion e.g. cylindrical shell segment of the product stick carrier may be bonded to the base of the product stick carrier. Thus, an attachment between the radially inner and outer portions may be provided via the base in addition or alternatively to any direct attachment between the circumferential surfaces thereof.

[0079] Whatever the construction of the product stick carrier, the inner tube of the dispenser may comprise an upper end portion disposed between an upper edge of the cutout and an upper edge of the inner tube, wherein the upper end of the radially inner portion (e.g. tube) of the product stick carrier is movable into an interior space defined within the upper end portion of the inner tube when the product stick carrier is in an uppermost position relative to the inner tube. The uppermost position may be a position in which an upper edge of a helical element support of the product stick carrier abuts the upper edge of the cutout of the inner tube of the dispenser. These embodiments may enable the product stick to be more fully extended from the inner tube.

[0080] In general, regardless of the construction of the product stick carrier in these further aspects and embodiments of the invention, the product stick carrier may be of a paper-based or card-based material, such as paperboard or cardboard. All components of the product stick carrier may be of a paper-based or card-based material, such as paperboard or cardboard.

[0081] Any reference to a paper-based or card-based material herein encompasses the examples of paperboard and cardboard if not otherwise stated.

[0082] References to "upper" and similar refer to positions closer to the product stick dispensing end of the dispenser or any component part thereof. References to "lower" or similar, refer to positions closer to the base of the dispenser i.e. the end that is grasped by the user. The terms "upper" and "lower" may be replaced by references to a first and second end (or product dispensing and user end) of the dispenser and are not intended to confer any limitation to the orientation of the dispenser in use.

[0083] While embodiments of the invention have been described in relation to the case in which the radially inner portion of the product stick carrier comprises a tube, it is envisaged that it might alternatively comprise a solid cylindrical element. A product stick might be mounted to the upper end of such an element, or the element might comprise a recess at one end for receiving the product stick. However a tubular construction is advantageous in that it may be readily implemented using paper-based or card-based materials.

BRIEF DESCRIPTION OF DRAWINGS

[0084] Some embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 shows a dispenser in accordance with the invention in a closed configuration;

Figure 2 shows the dispenser of Figure 1 in an open, partially extended configuration;

Figure 3 shows an exploded view of the dispenser of Figure 1;

Figure 4 shows a sub-assembly of the dispenser of Figure 1;

Figure 5 shows a collar of the dispenser of Figure 1 in greater detail;

Figure 6 shows a lug support of the dispenser of Figure 1 in greater detail;

Figure 7 shows a product support of the dispenser of Figure 1 in greater detail;

Figure 8 shows a detail of a further embodiment;

Figure 9 shows a detail of a further embodiment;

Figure 10 shows an alternative view of the detail of Figure 9;

Figure 11 shows a dispenser in accordance with a further embodiment of the invention in a closed configuration;

Figure 12 shows the dispenser of Figure 11 in an open, partially extended configuration;

Figure 13 is an exploded view of a dispenser in accordance with the embodiment of Figures 11 and 12;

Figure 14 is a view similar to Figure 13 but additionally showing the components of the product stick carrier in exploded form;

Figure 15 illustrates one technique for providing an outer tube with a helical slot on the interior surface;

Figure 16 illustrates one technique for providing a tube from which a cylindrical shell segment may be cut illustrating the manner in which a helical element support of a product stick carrier in accordance with the embodiment of Figures 11 to 14 may be provided;

Figure 17 illustrates the base of the dispenser of the embodiment of Figures 11-14 in greater detail;

Figure 18 illustrates the outer tube of the dispenser of the embodiment of Figures 11-14 in greater detail;

Figure 19 illustrates the inner tube of the dispenser of the embodiment of Figures 11-14 in greater detail;

Figure 20 illustrates the components of the product stick carrier of the dispenser of the embodiment of Figures 11-14 in greater detail;

and Figure 21 illustrates the sub-assembly of the base and helical element support portions of the product stick carrier in greater detail, being a view from the bottom end of the sub-assembly.

DETAILED DESCRIPTION

[0085] With reference to Figures 1 a dispenser 2 for a product in stick form in accordance with the invention comprises a paper-based or card-based, e.g. paperboard or cardboard tubular body 4. The tubular body 4 includes a tubular base part 6 and a removable cap 8 for closing an open upper end 10 of the base part 6. In this embodiment both the base part 6 and the cap 8 are formed of the paper based material but certain embodi-

ments may only have a base part 6 so formed. One or both of the bottom end 12 of the base part 6 and the upper end 14 of the cap 8 are closed by respective discs of paper-based or card-based material.

[0086] The upper end 10 of the base part 6 is formed with a shoulder 16 to receive the lower edge 18 of the cap 8. The external circumferential surfaces of the base part 6 and the cap 8 are flush in this embodiment. Tubes of this general type are known in the art and are manufactured for example by Chicago Paper Tube & Can Company Inc. of Chicago USA.

[0087] The features of the tubular base part 6 can be seen most clearly from Figure 3.

[0088] The tubular base part 6 comprises an outer tube 20 made from a paper-based or card-based material such as paperboard or cardboard, an inner tube 22 also made from a paper-based or card-based material such as paperboard or cardboard and a base 24 also made from a paper-based or card-based material such as paperboard or cardboard. As will be described further below, the base 24 is rotatable about the longitudinal axis A of the dispenser relative to the outer tube 20 and the inner tube 22 is fixed to the base 24 so as to be rotatable relative to the outer tube 20 with the base 24.

[0089] The outer tube 20 may be made in one piece or in two or more concentric nested tubular pieces. In all embodiments, the outer tube 20 comprises an axially extending helical slot 30 formed in a radially inner surface 36 thereof. In the embodiment shown, the outer tube 20 comprises a radially outer element 32 and a radially inner element 34 which is bonded to the radially outer element 32. In this embodiment, the axially extending helical groove 30 is formed entirely through the radially inner element 34, but in other embodiments it may not extend completely through the thickness of the radially inner element 34. The helical slot 30 advantageously extends the entire length of the radially inner element 34, being open at its axial ends.

[0090] The radially outer element 32 may itself be made from more than one element, for example a radially outermost element 32a and a radially more inner element 32b.

[0091] In alternative embodiments, however, the outer tube 20 may be made in one piece and the axially extending helical slot 30 be formed into the inner surface 36 of the outer tube 20 by any suitable means, for example by machining, for example routing.

[0092] The inner tube 22 has an axially extending slot 40 formed therethrough. In this embodiment, the axially extending slot 40 terminates short of the upper edge 42 of the inner tube 22. In other embodiments, however, it may extend to the upper edge 42 of the inner tube 22. While the axially extending slot 40 is shown as extending parallel to the axis A of the dispenser, it may be angled relative thereto in other embodiments.

[0093] The dispenser 2 further comprises a product stick carrier 50 formed of a paper-based or card-based material and supporting a product stick 52 (Fig. 1). The product stick carrier 50 is slidably received in the inner tube and has a lug 54 which projects through the axially extending slot 40 of the inner tube 22 into the axially extending helical slot 30 of the outer tube 20. As will be described further below, rotation of the base 24 relative to the outer tube 20 will cam the lug 54 along the axially extending helical slot 24 so as to extend the product stick 52 from the outer tube 20.

[0094] The outer diameter of the product carrier 50 may be chosen such that the product carrier 50 frictionally engages the radially inner surface of the inner tube 22 so that there is a sliding frictional engagement therebetween to help retain the product carrier 50 in an extended position within the inner tube 22. However, the frictional engagement should not be so great as to interfere with proper movement of the product carrier 50 along the inner tube 22.

[0095] It will be seen that the base 24 comprises a tubular body 58 which is mounted to a lower end 60 of the outer tube 20 of the base part 6. As illustrated, an upper portion 62 of the base 24 may be received over the lower end 60 of the outer tube 20 of the base part 6. The lower end 60 of the outer tube 20 may be formed, as shown, with an annular recess 64 to receive the base 24. The radially outer diameter of the annular recess 64 and the radially inner diameter of the base 24 may be such as to allow the base 24 to rotate freely on the outer tube 20.

[0096] The base 24 is mounted to the outer tube 20 by means of a collar 66 received in the recess 64 at the lower end 62 of the outer tube 20. The collar 66 is made from paper-based or card-based material such as paperboard or cardboard. As can be seen from Figure 6, which shows the collar 66 in more detail, the collar 66 comprises an upper section 68 and a lower section 70 which, prior to first use of the dispenser, are attached to one another only by a frangible connection 72. As will be described further below, the frangible connection 72 must be broken to allow rotation of the base 24 relative to the outer tube 20.

[0097] In this embodiment the frangible connection comprises one or more frangible bridges 72 extending between the upper section 68 and the lower section 70 and separated by cuts. The frangible bridges 72 may be circumferentially equi-spaced around the collar 66.

[0098] The upper section 68 is bonded only to the radially inner surface 73 of the upper portion 62 of the base 24 and the lower section 70 is bonded only to the radially outer surface 74 of the recess 64 of the outer tube 20. The upper section 68 is therefore located between the lower section 70 and a shoulder 76 formed at the upper end of the recess 64. The collar 66 may have an axial length which is substantially equal to that of the recess 64.

[0099] The frangible bridges 72 will maintain the first ring part 68 and second ring part 70, and thus the base 24 and outer tube 20 in circumferential alignment until the base 24 is twisted upon first use, whereupon the base 24 may rotate relative to the outer tube 20. The frangible bridges 72 therefore advantageously act as a tamper ev-

ident feature - breaking of the bridges 72 indicating that the base 24 has been twisted. The size of the frangible bridges 72 may be designed such that a predetermined torque needs to be applied to the base 24 to break them. This should be sufficiently high to prevent accidental breakage during handling.

[0100] Once the frangible bridges 72 have been broken, the base 24 will be able to rotate relative to the outer tube 20. However, the base 24 will be retained axially on the outer tube 20 by means of the upper section 68 and lower section 70 of the collar 66. Specifically, the lower section 70 which is attached to the outer tube 20 will prevent axial movement of the upper section 68 which is attached to the base 20 in a direction away from the outer tube 20.

[0101] Returning now to the product stick carrier 50 as can be seen in greater detail in Figure 6, this comprises a generally circular lug support 80 which is sandwiched between and bonded to an upper product support 82 and a lower spacer 84. The product support 82 is bonded to an upper surface 92 of the lug support 80 and the spacer to a lower surface 94 thereof.

[0102] The lug 54 of the product stick carrier 50 projects radially outwardly from the lug support 80. In this embodiment, the lug 54 is formed integrally with the lug support 80.

[0103] The lug support 80 may be formed as a laminate from multiple layers 86 of a paper, card or board material. In this embodiment, the lug support comprises six layers 86 of a card material. Typically each layer 86 may be from 0.5mm to 1.5 mm, for example 1mm in thickness. The layers 86 may be bonded together in any suitable manner. The total axial thickness of the lug support may typically be 4-8 mm, for example 6 mm.

[0104] In other embodiments, the lug support 80 may be formed as a unitary component for example made from a single thickness of board for example.

[0105] The upper product support 82 and lower spacer 84 are also formed as laminates from multiple layers 88 of a paper, card or board material in this embodiment. In this embodiment, they both comprise six layers 88 of a card material. Typically each layer 86 may be from 0.5mm to 1.5 mm. The layers 88 may be bonded together in any suitable manner. The total axial thickness of each component may typically be 4-8 mm, for example 6 mm. In other embodiments, the product support 82 and spacer 84 may be formed as unitary components for example made from single thicknesses of board for example.

[0106] The upper product support 82 and the lower spacer 84 may be the same to facilitate construction of the dispenser. Alternatively they may differ for example in thickness and/or construction.

[0107] The upper product support 82 receives the product stick 52. In this embodiment, the upper product support 82 is annular having a central opening 90 which receives the lower end of the product stick 52. To facilitate retention of the product stick 52 in the upper spacer 82, the upper spacer 82 may comprise, as shown, a plurality of radially inwardly projecting teeth 102 for engaging the product stick 52.

[0108] In other embodiments, the upper product support 82 may be a circular disc, with the product stick 52 simply being received on an upper surface thereof. In certain embodiments, the upper product support 82 could be omitted, or be integrally formed with the lug support 80.

[0109] The lower spacer 84 provides stability to the lower end of the product stick carrier 50, helping to prevent tilting of the product stick carrier 50.

[0110] The lower spacer 84 may have such an axial thickness that it engages the end of the base 24 when the product stick 52 is fully retracted into the dispenser 2 so acting as a stop for the product carrier 50. While the lower spacer 54 is shown with an annular body, like the product support 52, it may be a solid disc. In may also be omitted or be integrally formed with the lug support 80.

[0111] Having described the general structure of the dispenser 2, its manufacture and assembly will now be described.

[0112] As discussed above, the outer tube 20 may be a one piece component or made from a radially inner element 34 attached to a radially outer element 32. The radially outer element 32 may comprise a radially outermost element 32a and a radially more inner element 32b bonded together. The radially inner element 34 may be bonded to or be a part of the radially more inner element 32b of the radially outer element 32. The radially more inner element 32b of the radially outer element 32 extends axially beyond the ends of the radially outermost element 32a of the radially outer element 32 to form the recess 64 at the lower end of the outer tube 20 and a recess 98 at the upper end of the outer tube 20 for receiving the cap 8.

[0113] Of course the recesses 64, 90 may be formed in some other manner, for example by machining.

[0114] Typically the tube 20, or its component elements 32, 34 may be by spiral winding. The helical slot 30 may be formed by a gap formed between adjacent turns of the tube material. This can be achieved by appropriate an appropriate angle and speed of feed of one or more base layers of paper or card material into the spiral winding machine. Subsequent layers of the material can be formed over these layers so as to overlap axially, thereby forming the base of the slot 30.

[0115] Of course, the helical slot 30 could be formed in some other way, for example by machining the slot 30 into a tube.

[0116] The outer tube 20 and/or its components may of course be made in some other manner than spiral winding, as would be known to a person skilled in the art, for example by wrapping.

[0117] The inner tube 22, base 24 and product carrier 50 are assembled for insertion into the outer tube 20. Such an assembly 100 (without the product stick 52) is illustrated in Figure 4. The product carrier 50, comprising the lug support 80 and the optional product support 82 and spacer 84 are received within the inner tube 22, with

the lug 54 projecting through the axial slot 40 therein. It may be necessary to assemble the lug support 80, product support 82 and spacer 84 in situ within the inner tube 22 to allow the lug 54 to engage the axial slot 44. For example, the lug support 80 may have to be rotated to be non-perpendicular to the dispenser axis A to allow insertion of the lug 54 into the axial slot 40 and then rotated back into a perpendicular orientation. The product carrier 50 may be inserted into the inner tube 22 either before or after the inner tube 22 is attached, for example bonded to the base 24. A product stick 52 may then be mounted to the product stick carrier 50 and retracted into the inner tube 22.

[0118] The assembly 100 is then mounted into the outer tube 20. The upper section 68 of the collar 66 is bonded to the inner radial surface 72 of the base 24 and the lower section 70 of the collar 66 is bonded to the radially outer surface 74 of the recess 64 of the outer tube 20. Although not clearly seen in the schematic Figure 4, a space is defined between the radially inner surface of the base and the radially outer surface of the inner tube 22 of the assembly 100. Bonding of the collar 66 to the base 24 may take place before the assembly 100 and the collar 66 are assembled into the outer tube 20, with the lower section 70 of the collar 66 then being bonded to the radially outer surface 74. Alternatively, the lower section 70 may be bonded to the radially outer surface 74 first, and the upper section 68 only bonded to the base after the assembly 100 has been fully inserted into the outer tube 20.

[0119] The cap 8 may be applied to the outer tube 20 at any convenient time.

[0120] The dispenser 2 is then ready for shipping and use.

[0121] When a user first uses the dispenser, it will be necessary to rotate the base 24 about the axis A relative to the outer tube 20. The frangible bridges 72 will break when this occurs, allowing the base 24 to rotate. Should a user note that the frangible bridges 72 are broken prior to first use, that may indicate that the dispenser 2 has been tampered with.

[0122] Rotation of the base 24 will cam the lug 54 along the helical slot 30 in the outer tube 20 and along the axial slot 40 in the inner tube 22 so as to extend the product stick 52 from the upper end of the outer tube 20. The upper end of the axially extending slot 40 will act as a stop for the product stick carrier 50, preventing the product stick 52 from protruding too far from the outer tube 20. After use, the base 24 may be rotated to retract the product stick 52 into the outer tube 20.

[0123] The dispenser 2 as described is advantageous in that apart from the product stick 52, it is made entirely from a paper-based or card-based material. It will therefore be fully recyclable.

[0124] Various modifications may be made to the described embodiment without departing from the scope of the invention.

[0125] For example, in some embodiments, the collar 66 may be constituted by two separate rings corresponding to the upper section 68 and lower section 70, with no frangible bridges 72 therebetween. If desired some other form of tamper evident feature may be provided.

[0126] A different frangible connection 72 may be provided in the collar 66, for example a frangible band of a paper-based material wrapped around and bonded across the interface between the upper section 68 and lower section 70 of the collar 66, or one or more tabs of a paper-based material bonded across the interface between the upper section 68 and lower section 70 of the collar 66.

[0127] Also, the lug 54 of the product stick carrier 50 may have a different construction from that illustrated in the embodiment above.

[0128] In some embodiments, the lug 54 need not extend across the entire height of the carrier 50. Such an arrangement is illustrated in Figure 8. In this embodiment, the lug 54' is formed in only a central section 104 of the carrier 50'. The lug 54 is formed on just selected layers 86' of the carrier 50', for example the central two layers 86'. These may be of the same thickness or, as shown, of a different thickness from the remaining layers.

[0129] Also, while the edges of the 54 illustrated in the above embodiment extend generally parallel to the axis of the dispenser 2, in other embodiments, the edges of the lug 54 may be at an angle thereto, for example such that they extend parallel to the edges helical slot 30.

[0130] In other embodiments, the lug 54 may be formed as a separate element from the carrier 50 and mounted thereto. In one embodiment, illustrated in Figures 9 and 10, the lug 54" may be formed as the head 106 of an element 108 inserted into a side wall 110 of the carrier 50". For example the element 108 may be a pin, with the pin head 108 protruding from the side wall 110. The element may be metallic for example. The use of a protruding head 106, for example of metal, may reduce friction within the helical slot 30, avoiding a card/card sliding interface. The protruding head 106 may advantageously be spherical so as further to reduce frictional engagement with the helical slot 30. Of course in such a construction, the dispenser 2 will not be made entirely of a paper-based or card-based material, but the minimal amount of for example metallic material in the dispenser should easily be separable from the remainder during recycling.

[0131] A dispenser in accordance with a further embodiment of the invention will now be described with reference to Figures 11-21.

[0132] This embodiment provides a dispenser 200 for a product in stick form of a similar appearance as that shown in Figures 1 and 2.

[0133] The construction of the dispenser 200 will be described by reference to Figures 11 and 12, which illustrate respectively the dispenser in a closed configuration, and the dispenser of in an open, partially extended configuration.

[0134] The dispenser 200 thus includes a paper-based

or card-based, e.g. paperboard or cardboard tubular body 204. The tubular body 204 includes a tubular base part 206 and a removable cap 208 for closing an open upper end 210 of the base part. As in the earlier embodiments, one or both of a bottom end of the base part 206 and an upper end of the cap 208 may be closed by respective discs of paper-based or card-based material. The bottom end of the base part and the upper end of the cap may be rolled inwardly to provide a lip to assist in retaining their respective closure discs.

[0135] The external circumferential surfaces of the base part 206 and the cap 208 are flush in this exemplary embodiment.

[0136] Figure 12 illustrates the dispenser with the removable cap 208 removed and the product stick 252 extended.

[0137] Figure 13 is an exploded view showing the components of the tubular base part 206 in more detail. Figure 14 is a similar exploded view with components of the product stick carrier also being in exploded form.

[0138] The tubular base part 206 comprises an outer tube 220 made from a paper-based or card-based material such as paperboard or cardboard, an inner tube 222 also made from a paper-based or card- based material, such as paperboard or cardboard, and a base 224 also made from a paper-based or card-based material such as paperboard or cardboard. The base is shown in more detail in Figure 17. As in the previous embodiments, the base 224 is rotatable about a longitudinal axis A of the dispenser relative to the outer tube 220, and the inner tube 222 is fixed to the base 224 so as to be rotatable relative to the outer tube 220 with the base 224. In the illustrated embodiment a portion of an end plug 243 closing a lower end of the inner tube 222 which projects axially from the lower end of the outer tube 220 is bonded to an end disc closing one end of the base 224. However, other techniques may be used to fix the inner tube 222 to the base 224 while still permitting rotation of the outer tube relative to the base and inner tube.

[0139] In the embodiment illustrated in Figures 11-14 the outer tube 220 is made from a single tubular element with an axially extending helical slot 230 defined in the inner surface 236 of the outer tube 220. The helical slot 230 is defined between spiral turns of a helical element of a paper-based or card-based material such as paperboard or cardboard which has been bonded to the interior surface of the tubular element of the outer tube 220. It has been found that this technique may provide the interior of the outer tube of paper-based or card-based material with a helical slot in the form of a female thread which may operate in an efficient manner in cooperation with a male thread of the product stick carrier as described below.

[0140] The outer tube is shown in more detail in Figure 18.

[0141] An example of an outer tube 300 with an internal helical slot formed in this manner by bonding a helical element 302 of paper-based or card-based material to the interior surface of a tubular element of paper-based or card-based material is shown in Figure 15. The helical element may be provided by a coil of paper-based or card-based material. The outer tube illustrated in Figure 15 differs in relation to the angle of the helix defined by the helical element from that shown in Figures 11-14, but illustrates the general principle of construction.

[0142] Of course, other methods may be used to provide the helical slot 230. For example, the slot may be formed by machining, for example routing.

[0143] The outer tube may be of any suitable construction, and is preferably a spirally wound tube. In the embodiment exemplified herein the outer tube with its helical slot 230 is produced by bonding together an outer tube formed of a single tubular element, which may be produced in a single step, and a helical element to provide the helical slot in the interior surface of the outer tube. This may provide a dispenser of simpler construction than the earlier embodiments in which the outer tube includes multiple tubular elements. Of course, an outer tube formed of multiple tubular elements i.e. radially inner and outer tubular elements could alternatively be used in accordance with the further embodiment described by reference to Figures 11-14.

[0144] It is also noted that where the outer tube is a spirally wound tube, the axially extending helical slot 230 might alternatively be provided by a gap formed between adjacent spiral turns of one or more layers of the material of the outer tube as described in the earlier embodiments.

[0145] The helical slot 230 extends the entire length of the outer tube 220, being open at its axial ends. However, it will be understood that the helical slot 230 need not extend the entire length of the outer tube, and may terminate short of one of the axial ends of the outer tube. For ease of assembly, the helical slot 230 extends to at least one end edge e.g. the upper end edge of the outer tube.

[0146] In exemplary embodiments the lower edge of the outer tube 220 may be rolled inwardly to define a lip. This may be achieved using any suitable method to roll the upper edge of the outer tube inwardly. This lip may help to locate a lower end edge 244 of the inner tube 222 when inserted in the outer tube. Alternatively or additionally, an apertured disc may be bonded to the lower edge of the outer tube. An apertured disc may be used in combination with an inwardly rolled lower edge of the outer tube. In the embodiments with a disc the hole will be large enough for the end plug 243 of the inner tube 222 to extend therethrough in use for bonding to the base 224 of the dispenser. It is envisaged that an upper end of the outer tube might alternatively or additionally be rolled inwardly e.g. to avoid a visible raw edge at the upper end of the tube.

[0147] The inner tube 222 has an axially extending cutout 240 therein. In this embodiment, the axially extending cutout 240 terminates short of both the upper edge 242 and lower edge 244 of the inner tube 222. The axially extending cutout 240 has an upper edge 244 and a lower

edge 246, and side edges 248, 250. The side edges are axially extending side edges, and extend parallel to one another.

[0148] The axially extending cutout 240 extends in the direction of the axis A of the dispenser. The cutout is in the form of an axially extending channel. In the embodiment illustrated the cutout 240 extends around the axis of the dispenser (and inner tube) through an angle of around 180 degrees. However, this angle is merely exemplary, and not limiting. The inner tube 222 defines an axially extending portion 251 which is in the form of a cylindrical shell segment, and in the embodiment illustrated, a half cylindrical shell. The axially extending portion 251 is located intermediate lower and upper end portions 254, 256 of the inner tube 222. The axially extending portion 251 extends axially over a length of the inner tube 222 over which the cutout 240 extends. The lower and upper end portions 254, 256 of the inner tube 222 extend from the upper edge 244 of the axially extending cutout 240 to an upper axial edge 242 of the inner tube 222 and from a lower edge 246 of the axially extending cutout 240 to a lower axial edge 244 of the inner tube 222 respectively.

[0149] The inner tube is shown in more detail in Figure 19.

[0150] As may be seen most clearly in Figures 14 and 19, the lower end of the inner tube 222 is a closed end, and the upper end is an open end. The closed end may be seen in more detail in Figure 19, and is illustrated as being provided by a plug of paper-based or card-based material which extends axially beyond the lower end edge of the inner tube 222. Any suitable end closure may be used e.g. a disc or plug, and such a closure may or may not extend axially beyond the lower end edge of the inner tube depending upon the way in which the inner tube is to be bonded to the base of the dispenser.

[0151] The dispenser 2 further comprises a product stick carrier 260 formed of a paper-based or card-based material and which will support a product stick 252. The product stick is not shown in Figure 11, 13 or 14, but is schematically shown in Figure 12.

[0152] The product stick carrier 260 is shown in assembled form in the view of Figure 13. Figure 14 is a further exploded view in which certain components of the product stick carrier 260 are shown in exploded form. The components of the product stick carrier are shown in more detail in Figure 20, with the radially inner portion and optional base disc shown in more detail in Figure 21.

[0153] The product stick carrier 260 includes a radially outer portion 262 and a radially inner portion 264. The radially inner portion 264 is disposed within the interior space of the inner tube 222. The radially inner portion 264 comprises a product support 266 at an upper end thereof. The radially inner portion 264 is cylindrical. The radially inner portion 264 is in the form of a tube, and is made of card-based or paper-based material e.g. cardboard or paperboard. For example, the radially inner portion 264 may be provided by a spirally wound tube. In the embodiment illustrated, the product support 266 is provided by a closure which closes the upper end of the tube providing the radially inner portion 264. The closure is made of card-based or paper-based material e.g. cardboard or paperboard. The closure is illustrated as being a disc of the card-based or paper-based material. The upper product support 266 receives the product stick. In the illustrated embodiment, the closure is recessed from the upper edge of the tube providing the radially inner portion 264. The recessing of the closure may help to support the sides of the product stick at its base, but it is envisaged that the product support could be provided by a closure e.g. closure disc at the upper end of the tube providing the radially inner portion 264 which is not recessed from the upper edge of the tube.

[0154] The product stick may be mounted to the product support 266 in any suitable manner, for example using adhesive, or by melting a portion of the base of the product stick, which portion may then solidify and act to adhere the product stick to the product support 266. In other embodiments, the product support 266 might comprise formations, such as spikes or surface undulations for engaging the base of the product stick to facilitate mounting of the product stick. Rather than being provided as a preform, the product stick could be formed in the pack e.g. through hot injection. In these cases, a recessed product support disc may be used to define a portion of the inner tube of the product stick carrier above the disc for receiving the material. It is envisaged that a portion of the product stick extending above the tube 264 could be retained appropriately by a removable mould, e.g. sleeve or similar during solidification of the material.

[0155] Of course, other forms of product support may be used. In some embodiments, the product support might simply be provided by the upper end of the tube providing the radially inner portion 264, whose walls may frictionally engage the base of the product stick. Thus, it is envisaged that the closure disc 266 might be omitted. Alternatively an apertured product support disc might be used to grip the base of the product stick rather than the solid disc illustrated.

[0156] The radially outer portion 262 of the product stick carrier 260 is disposed within the cutout 240 of the inner tube 222 and provides a support for the helical element 276. The radially outer portion 262 is in the form of a cylindrical shell segment, being a half cylindrical shell in the embodiment illustrated. The radially outer portion 262 is snugly slidably received in the cutout 240 with the axially extending side edges 270, 272 of the radially outer portion 262 engaging the axially extending side edges 250,248 of the cutout 240 respectively. The side edges of the radially outer portion 262 engage the side edges of the cutout during sliding of the radially outer portion relative to the inner tube 222. The radially outer portion 262 has a length less than that of the cutout 240 (in the axial direction). Thus the radially outer portion is not rotatably movable within the cutout 240 and may move only axially relative thereto.

[0157] A helical element 276 is bonded to an exterior surface of the cylindrical shell segment providing the radially outer portion 262. Thus the radially outer portion/cylindrical shell segment provides a helical element support. In the illustrated embodiment the helical element extends the full length of the helical element support. However, this need not be the case.

[0158] In the embodiment illustrated, the circumferential surface of the inner tube 222 surrounding the cutout 240 and the circumferential surface of the cylindrical shell segment providing the radially outer portion 262 of the product stick carrier 260 are flush with one another. Thus the cylindrical shell segment of the radially outer portion 262 and the inner tube 222 are of the same outer diameter.

[0159] The cylindrical shell segment of the radially outer portion 262 may be provided by a portion cut from a tube of the same radius as the inner tube 222 and having a helical member bonded to the exterior surface thereof. In this way, the resulting cylindrical shell segment will have a helical element already fixed to the exterior surface thereof corresponding to (at least a portion) of the helical member bonded to the exterior of the tube from which the segment has been cut. This may provide greater ease of manufacture. However, a helical element could alternatively be bonded to the exterior surface of a cylindrical shell segment after it has been cut from a tube. An example of a such a tube 400 with a helical element 402 bonded to the exterior thereof is shown in Figure 16. The angle of the helical element differs from that used in the embodiments described herein, but this Figure illustrates the principle of construction.

[0160] The radially inner portion 264 of the product stick carrier 260 is coupled to the radially outer portion 262 thereof such that the radially inner portion 264 and radially outer portion 262 move as a unit. Thus movement of the radially outer portion 262 in the manner described herein relative to the inner tube 222 will result in movement of the product stick carrier 260 relative to the inner tube 222, including the product support 266 provided by the radially inner portion 264.

[0161] An interior surface of the radially outer portion 262 of the product stick carrier i.e. of the cylindrical shell segment is bonded to a radially outer surface of the tube providing the radially inner portion 264 of the product stick carrier.

[0162] The product stick carrier 260 optionally includes a base 274 (not visible in Figures 13 and 14 and shown most clearly in Figure 21) which closes a bottom end of the radially inner portion 264 i.e. a bottom end of the tube providing the radially inner portion 264. The base 274 is bonded to the bottom end of the tube 264. In the illustrated embodiment the base 274 is also attached to a bottom end of the radially outer portion 262 i.e. to the bottom end of the cylindrical shell segment. It will be appreciated that the base 274 might alternatively be bonded only to the radially inner portion and not the radially outer portion of the product stick carrier. For example, it might be in the form of an end plug inserted into the bottom end of the radially inner portion e.g. tube of the product stick carrier. In the illustrated embodiment the base is in the form of a disc of paper-based or card-based material. As illustrated, the cylindrical shell segment is bonded to the exterior circumferential surface of the base 274. It is envisaged that the base 274 might, in alternative embodiments, be omitted. However, its presence provides improved stability of the product stick carrier.

[0163] In the embodiment of Figures 11 and 12, the tube providing the radially inner portion 264 is of greater height than the cylindrical shell segment providing the radially outer portion 262 of the product stick carrier 260. The upper end of the radially inner portion 264 projects from the upper end of the radially outer portion 262. The radially inner portion 264 (i,e. the tube) has a radius less than a radius of the upper portion 256 of the inner tube 222. This enables the upper end of the radially inner portion 222 which extends axially beyond the end of the radially outer portion 262 and comprises the product support 266 to extend into the upper portion 256 of the inner tube 22 beyond the upper end of the cutout 240 enabling the product stick to be advanced into this region and provide fuller extension of the product stick.

[0164] The radially outer portion 262 of the product stick carrier 260 comprises a helical element 276 which projects out of the cutout 240 of the inner tube 222 into the axially extending helical slot 230 of the outer tube 220. As will be described further below, rotation of the base 224 relative to the outer tube 220 will cam the helical element 276 along the axially extending helical slot 230 so as to extend the product stick from the outer tube 220. The helical element 276 may be provided by a separate element 276 bonded to the exterior of the cylindrical shell segment providing the radially outer portion 262 of the product stick carrier 260. A helical element support including such a helical element bonded thereto may be provided in the manner earlier described by reference to Figure 16. The helical element 276 is made of card-based or paper-based material e.g. cardboard or paperboard. The helical element is shown as extending the full height of the cylindrical shell segment 262, although this need not be the case. Furthermore, the angle over which the helical element extends about the axis of the dispenser may differ from that shown. The extent and inclination of the helical element may be selected as desired to provide a suitable amount of extension of the product stick carrier 260 through cooperation with the axially extending helical slot 230 of the outer tube 220.

[0165] The radially outer portion 262 i.e. the cylindrical shell segment provides a support for the helical element 276. The radially outer portion and helical element may be provided by a section cut from a tube having a helical element bonded to the outer surface thereof. The helical element may be provided by a coil of paper-based or card-based material. One suitable tube 400 is shown in Figure 16. The thickness and angle of the helical element should be selected appropriately such that it provides a

male thread which may cooperate with the female thread provided by the axially extending helical slot 230 of the outer tube 220. The threaded connection may provide a reliable and robust connection between the parts leading to more reliable and stable operation.

[0166] The outer diameter of the helical element support 262 may be chosen such that the exterior of the helical element support 262 frictionally engage the radially inner surface of the outer tube 220 so that there is a sliding frictional engagement therebetween. This may help retain the product stick carrier 260 in an extended position within the outer tube 220. However, the frictional engagement should not be so great as to interfere with proper movement of the product stick carrier 260 along the outer tube 220.

[0167] As in the earlier embodiments, the base 224 comprises a tubular body which is mounted to a lower end of the outer tube 220 of the base part 206. A friction fit may be provided between the base and the lower end of the outer tube. An upper portion of the base 224 may be received over the lower end of the outer tube 220 of the base part 206. The radially outer diameter of the outer tube 220 and the radially inner diameter of the base 224 may be such as to allow the base 224 to rotate freely on the outer tube 220. It is envisaged that the lower end of the outer tube may be recessed as in the earlier embodiments.

[0168] Having described the general structure of the dispenser 200, its manufacture and assembly will now be described.

[0169] One example of the manufacture and assembly of the product stick carrier 260 will now be described. It will be appreciated that this is by way of illustration only, and the sequence of steps may differ from those described.

[0170] First the product stick carrier 260 is assembled.

[0171] In a first step the radially inner portion i.e. tube 264 of the product stick carrier is provided. This is in the form of a tube of card-based or paper-based material, which may be a spiral wound tube. A paper-based or card-based disc is inserted into one end of the tube so as to close the end of the tube. The disc is recessed from the end edge of the tube. The disc is bonded to the interior of the tube. For example, adhesive may be applied to the interior of the tube and the disc then pushed into position. The disc will provide the product support 266.

[0172] Next the radially outer portion i.e. helical element support 262 of the product stick carrier is provided. This component is produced by providing a tube of paper or card-based material, e.g. a spirally wound tube. A strip of paper-based or card-based material is wrapped around the outside of the tube and bonded thereto so as to define an axially extending helical element, in the manner illustrated in Figure 16. A segment is then cut from this tube including a portion of the axially extending helical element. The segment is, in the illustrated embodiment, a half cylinder. The resulting cylindrical shell segment provides the radially outer element i.e. helical element support 262 of the product stick carrier assembly, and has a helical element 276 projecting radially from the exterior thereof.

[0173] The interior surface of the cylindrical shell segment is then bonded to the exterior surface of the tube 264 which is to provide the radially inner portion of the product stick carrier to secure the cylindrical shell segment to the tube and hence secure the radially outer and inner portions of the product stick carrier together. The tube 264 has a length greater than that of the helical element support 262 and extends axially beyond the end thereof. The lower ends of the cylindrical shell segment and the tube 264 are aligned with one another in the illustrated embodiment, although this need not be the case.

[0174] A disc of paper-based or card-based material is bonded to the bottom end of the tube 264 to close the bottom end thereof. This provides the base 274 of the product stick carrier. The inner surface of the helical element support is also bonded to the circumference of the base 274. It will be appreciated that the presence of the base 274 is optional, and where provided, it need not necessarily be bonded to the helical element support as well as the tube 264.

[0175] Next the inner tube is produced. A tube of card based or paper based material is provided for providing the inner tube 222. The tube is, in exemplary embodiments, a spiral wound tube, although other tube forming techniques, such as wrapping methods may instead be used. The tube has the same outer diameter as the tube from which the cylindrical shell segment providing the radially outer portion of the product stick carrier was cut. The inner tube 222 has a greater internal diameter than the outer diameter of the tube 264 providing the radially inner portion of the product stick carrier to enable the radially inner portion of the product stick carrier to be freely slidably movable within the inner tube 222 when inserted into the cutout 240 with the radially outer portion i.e. cylindrical shell segment snugly received in the cutout.

[0176] An end plug 243 of card based or paper based material is inserted into one of the open ends of the tube for providing the inner tube 222 to close the end thereof. The The end plug 243 is bonded to the interior surface of the tube to secure it in place and projects axially beyond the end of the tube. The other end of the tube is left open. A cut out in the shape of a cylindrical shell segment is removed from the wall of the tube 222 in order to provide the cutout 240. This results in a component as illustrated in Figure 19.

[0177] In the exemplary embodiment, the cut out is in the shape of a half cylinder. The shape of the cutout and the cylindrical shell segment providing the helical element support of the radially outer portion of the product stick carrier are chosen such that helical element support will fit snugly within the cutout formed in the inner tube 222 with its axially extending side edges engaging the axially extending side edges of the cutout. The cutout

has a length greater than a length of the cylindrical shell segment such that the cylindrical shell segment will be slidably movable in the axial direction relative to the inner tube.

[0178] Next product stick carrier 260 is assembled with the inner tube 222. The product stick carrier 260 is inserted into the cutout 240 in the inner tube with the radially inner portion of the product stick carrier 260 i.e. the tube 264 becoming inserted into the interior of the inner tube 222, and with the radially outer portion 262 i.e. the cylindrical shell segment which provides the helical element support being disposed within the cutout, with its side edges in contact with the side edges of the cutout. The radially inner portion i.e. tube 264 of the product stick carrier is configured such that it provides a running fit to the inside diameter of the inner tube 222. This enables the product stick carrier to move axially relative to the inner tube within the cutout 240 when the helical element is cammed along the helical slot of the outer tube. The edges of the cylindrical shell segment providing the radially outer portion of the product stick carrier are flush with the edges of the cutout.

[0179] Next the outer tube 220 is assembled. The outer tube 220 is formed from a single tubular element of paper or card-based material, such as a spiral wound tube. The tube has an internal diameter greater than the outer diameter of the inner tube 222 to enable the inner tube 222 to be snugly and slidably received within the outer tube 220 even after the helical element has been bonded to the interior of the tubular element to provide the axially extending helical slot of the outer tube. The axially extending helical slot is provided on the interior surface of the outer tube 220 by bonding an axially extending helical element i.e. strip of paper based or card based material to the interior surface in the manner described by reference to Figure 15. The slot is defined between the turns of the helical element. Of course, alternative methods e.g. machining might be used to provide the helical slot.

[0180] One end of the outer tube 220 may be rolled inwardly to provide a lip. This end is the end which will be at the lower end of the outer tube 220 in the dispenser. This lip may help to locate the lower end edge 244 of the inner tube 222. Alternatively or additionally an apertured disc may be bonded to the lower end of the outer tube 220. Where an apertured disc is provided, the aperture will have a size to enable the end plug of the inner tube 222 to project therethrough enabling the end plug 243 to be bonded to the base of the dispenser as described below.

[0181] Next the outer tube 220 is mounted over the sub-assembly of the inner tube 222 and product stick carrier 260. This involves pushing the outer tube 220 over one end of the sub-assembly and threading the end of the helical slot 230 in the interior of the outer tube on to the helical element 276 of the product stick carrier of the sub-assembly of the product stick carrier and inner tube. This step thus involves rotating the outer tube 220 as it is inserted over the end of the inner tube 222 of the sub-assembly. The helical element 276 thus provides a male portion of a threaded connection with the helical slot 230 providing a female portion. In exemplary embodiments, the open end of the outer tube 220 which will provide the upper end of the outer tube is inserted over the end of the lower tube 222 which will provide the lower end of the lower tube in use. In exemplary embodiments, prior to performing the step of assembling the inner tube 222 and product stick carrier 260, the product stick carrier 260 is in its uppermost position closest to the end of the inner tube 222 which will form the upper end of the inner tube in the dispenser. Of course, these arrangements are only exemplary and any suitable assembly method to result in a dispenser operable as described herein may be used. For example, the outer tube may be held still while the sub-assembly is moved into the outer tube with the helical element being threaded into the helical slot of the outer tube, and/or the end of the outer tube through which the inner tube sub-assembly is inserted may differ from the exemplified process. Any method may be used to provide the necessary relative movement between the parts to mount the outer tube over the inner tube and product stick carrier sub-assembly.

[0182] However this is achieved, the inner tube and product stick carrier assembly is inserted into the outer tube 220 until the plug 243 closing the lower end of the inner tube projects slightly from the bottom end of the outer tube 220.

[0183] The cap 208 and base 224 are provided by identical tubular elements of paper or card based material. Each may be formed of a spirally wound tube. In the illustrated embodiment they are of the same length and inside and outside diameters, although this need not be the case. For example, either one might include a recessed end as described in relation to the earlier embodiments. The tubular elements have an interior diameter greater than the exterior diameter of the outer tube 220.

[0184] One of the ends of each of the tubular elements is rolled inwardly, and a base disc located on the lip provided by the rolled end of the tubular element so as to close the end of the tubular element. The base disc is bonded in position. In this way, both the cap and base have one closed end and one open end. Rather than using a rolled end to the tube, a base disc may be mounted to e.g. bonded to the end of the tube without inward rolling.

[0185] The sub-assembly including the inner tube 222, outer tube 220 and product stick carrier 260 is pushed into the open end of the base 224. Prior to performing this step, a bonding agent e.g. adhesive is applied to the protruding base 243 of the inner tube 222. The sub-assembly is inserted into the base 224 until the base 243 of the inner tube 222 contacts the base disc of the base 224, thereby bonding the inner tube to the base 224. The closure disc of the base 224 is thus bonded to the closure plug 243 of the inner tube to fix the base 224 to the inner tube 222, and prevent relative movement therebetween. As the plug 243 protrudes beyond the lower end of the

outer tube 220, the outer tube 220 does not become fixed to the base 224 and is free to rotate relative thereto. Thus, in use, rotation of the base 224 relative to the outer tube 220 will result in rotation of the inner tube 222 with the base 224. The force will then be transmitted to the product stick carrier 260. The product stick carrier 260 will be forced to move axially as the helical element 276 travels up the helical slot 230 in use.

[0186] The cap 208 is now mounted over the upper end of the outer tube 220. The cap may be arranged to be a push on pull off type component.

[0187] In the illustrated embodiment, the ends of the cap 208 and base 224 are flush with one another and abut one another when the cap is fully located over the end of the outer tube.

[0188] The product stick may be inserted into the upper end of the product stick carrier so as to be mounted on the product support 266 at any suitable stage. This may be performed after assembly of all components of the dispenser other than the cap, with the cap then being inserted over the product stick, or the cap may be removed for insertion of the product stick and then replaced. The product stick may be inserted at a different time and place to the assembly of the dispenser. The product stick may be secured in any suitable manner to the product support 266 e.g. using a bonding agent, or by simply melting an end of the product stick if it is made of a material which may become bonded to the product support 266. As mentioned above, the product support 266 might alternatively or additionally include formations e.g. teeth for engaging the base of the product stick.

[0189] Rather than being provided as a pre-form which is mounted to the product support 266, the product stick could be formed within the pack i.e. introduced to the upper end of the product stick carrier e.g. through hot injection, and allowed to solidify to form a product stick. In these embodiments, the product support 266 is advantageously recessed from the upper end of the radially inner portion i.e. tube to provide a tubular region for receiving the material for forming the product stick. Alternatively, an additional tubular element for receiving the product material might be inserted into the upper end of the tube of the radially inner portion. The material for forming the portion of the product stick extending beyond the radially inner portion might be retained using a suitable removable mould e.g. sleeve until solidifed.

[0190] It will be appreciated that the order of the steps may differ from that described. For example, the inner tube, outer tube and product stick carrier components may be assembled in a different order before being assembled to one another, or some of the assembly steps could be carried out contemporaneously. The ends of tubes may be closed using the base closures at a different time to that exemplified.

[0191] The angles of the helices defined by the helical element and slot, and the extent that the cutout and hence helical element support extends around the axis of the dispenser may be selected as desired. For example, the most appropriate values may depend upon the desired amount of rotation of the base relative to the outer tube to advance the product stick, and the dimensions of the dispenser and its components e.g. inner tube. Factors such as the stability of the connection between the helical slot and helical element and the ease of movement of the product stick carrier relative to the outer tube may also be balanced. For example, a smaller helix angle for the helical slot may make it more difficult to advance the product stick carrier.

[0192] In use the cap is removed. Rotation of the base 224 relative to the outer tube 220 will cam the helical element 276 along the helical slot 230 in the outer tube 220 and along the cutout 240 in the inner tube 222 so as to advance the product stick carrier 260 as a whole. This will advance the product support 266 and thus extend the product stick 252 from the upper end of the outer tube 220. The upper end of the cutout 240 will act as a stop for the helical element support 262 of the product stick carrier 260, preventing the product stick 252 from protruding too far from the outer tube 220. After use, the base 224 may be rotated in the opposite direction relative to the outer tube 220 to retract the product stick 252 into the outer tube 220. The lower end 246 of the cutout 240 will acts as a stop for the lower end of the helical element support 262, defining a fully retracted position of the product stick carrier and hence product stick.

[0193] Thus, operation of the dispenser 200 is identical to that of the dispenser 2 of the earlier embodiments.

[0194] The dispenser 200 as described is advantageous in that apart from the product stick 252, it is advantageously made entirely from a paper-based or card-based material. It will therefore be fully recyclable. The dispenser 200 may be produced using a relatively simple manufacture process, including relatively few parts, and may provide advantages in terms of reliable operation as a result of the use of the threaded connection between the product stick carrier and inner tube provided by the helical element.

[0195] Where a fully card/paper based construction is not needed, it is envisaged that the radially inner portion 264 might be constructed in other manners. For example, a solid cylindrical body could be used, with an upper end of the cylinder, or a recess at an upper end thereof providing the product support. Such a body may be made of a plastics material.

[0196] While the tubular parts of the embodiments described herein have been exemplified as spiral wound tubes, other methods may instead be used to produce any or all of the tubes e.g. wrapping processes.

[0197] Any references to bonding herein may refer to adhesive bonding or any other suitable bonding technique, which may or may not involve the use of a bonding agent.

Claims

1. A dispenser (200) for a product (252) in stick form comprising:
a tubular body (204) having a longitudinal axis (A), the tubular body (204) including a tubular base part (206) and a removable cap (208) for closing an open end of the tubular base part (206);
the tubular base part (206) comprising:

an outer tube (220) made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending helical slot (230) defined in a radially inner surface thereof;
an inner tube (222) received within the outer tube (220) and made from a paper-based or card-based material such as paperboard or cardboard and having an axially extending cutout (240) formed therein;
a base (224) made from a paper-based or card-based material such as paperboard or cardboard which is rotatable about the longitudinal axis (A) relative to the outer tube (220) and to which the inner tube (222) is fixed so as to be rotatable therewith relative to the outer tube (220);
a product stick carrier (260) slidably movable relative to the inner tube (222), a portion of the product stick carrier (260) being received within the inner tube (222), the product stick carrier (260) comprising a helical element (276) projecting from the cutout (240) of the inner tube (222) to engage with the axially extending helical slot (230) of the outer tube (220), whereby rotation of the base (224) relative to the outer tube (220) cams the helical element (276) along the axially extending helical slot (230) of the outer tube (220) so as to move the product stick carrier (260) along the inner tube (222) so as to extend the product stick (252) from the outer tube (220).

2. The dispenser of claim 1, wherein the product stick carrier (260) comprises a radially inner portion (264) and a radially outer portion (262), wherein the radially outer portion (262) comprises a helical element support of a paper-based or card-based material such as paperboard or cardboard, the helical element (276) projecting radially outwardly from the helical element support, and wherein the radially inner portion (264) comprises a product support (266); optionally wherein the radially inner portion (264) is made of a paper-based or card-based material such as paperboard or cardboard.

3. The dispenser of claim 2, wherein the radially inner portion (264) is received within the inner tube (222) and the radially outer portion (262) is disposed within the cutout (240) of the inner tube (222).

4. The dispenser of claim 2 or claim 3, wherein the product support (266) is at an upper end of the radially inner portion (264).

5. The dispenser of any one of claims 2 to 4 wherein the cutout (240) in the inner tube (222) comprises a pair of parallel axially extending side edges (248, 250), and the helical element support comprises a pair of parallel axially extending side edges (270, 272) which engage the side edges (248, 250) of the cutout (240) and slide along the side edges (248, 250) of the cutout (240) as the product stick carrier moves along the inner tube (222).

6. The dispenser of any one of claims 2 to 5, wherein the helical element support comprises a cylindrical shell segment slidably received in the cutout (240) of the inner tube (222).

7. The dispenser of claim 6, wherein the cylindrical shell segment is a half cylinder.

8. The dispenser of any one of claims 2 to 7 wherein the radially inner portion (264) comprises a tube of paper-based or card-based material, such as paperboard or cardboard.

9. The dispenser of claim 8 as dependent on claim 6 or claim 7 wherein an exterior surface of the tube of the radially inner portion (264) is bonded to an interior surface of the cylindrical shell segment.

10. The dispenser of claim 8 or claim 9 wherein the tube comprises a plug at the upper end thereof defining at least a portion of the product support (266); optionally wherein the plug is in the form of a disc of paper-based or card-based material, such as paperboard or cardboard.

11. The dispenser of any one of claims 2 to 10, wherein the cutout (240) comprises upper and lower end edges (244, 246), and the helical element support comprises upper and lower end edges (263, 265), wherein the upper end edge (263) of the helical element support abuts the upper end edge (244) of the cutout (240) to limit the axial travel of the product stick carrier (260) relative to the inner tube (222) in a direction so as to extend the product stick (252) from the outer tube (220), and the lower end edge (265) of the helical element support abuts the lower end edge (246) of the cutout (240) to limit the axial travel of the product stick carrier (260) relative to the inner tube (222) in a direction opposite to that for extending the product stick (252) from the outer tube (220).

12. The dispenser of any one of claims 2 to 11, wherein

the product stick carrier (260) comprises a base; optionally wherein the base comprises a disc of paper-based or card-based material, such as paperboard or cardboard.

13. The dispenser of any one of claims 2 to 12, wherein the inner tube (222) of the dispenser (200) comprises an upper end portion (256) disposed between an upper edge (244) of the cutout (240) and an upper edge (242) of the inner tube (222), wherein the upper end of the radially inner portion (264) of the product stick carrier (260) is movable into an interior space defined within the upper end portion (256) of the inner tube (222) when the product stick carrier (260) is in an uppermost position relative to the inner tube (222).

14. A dispenser as claimed in any preceding claim, wherein:

the base (224) of the dispenser (200) comprises a tubular body which is mounted to a lower end of the outer tube (220) of the base part (206); and/or
the outer tube (220) is formed from a single tubular element; and/or
the axially extending helical slot (230) is defined between adjacent spiral turns of a helical element (302) bonded to the radially inner surface of a or the tubular element of the outer tube (220); and/or
the outer tube (220) or one or more of its elements is a spirally wound tube.

15. A dispenser as claimed in any preceding claim, wherein the product stick carrier (260) is made of a paper-based or card-based material such as paperboard or cardboard.

Fig. 1

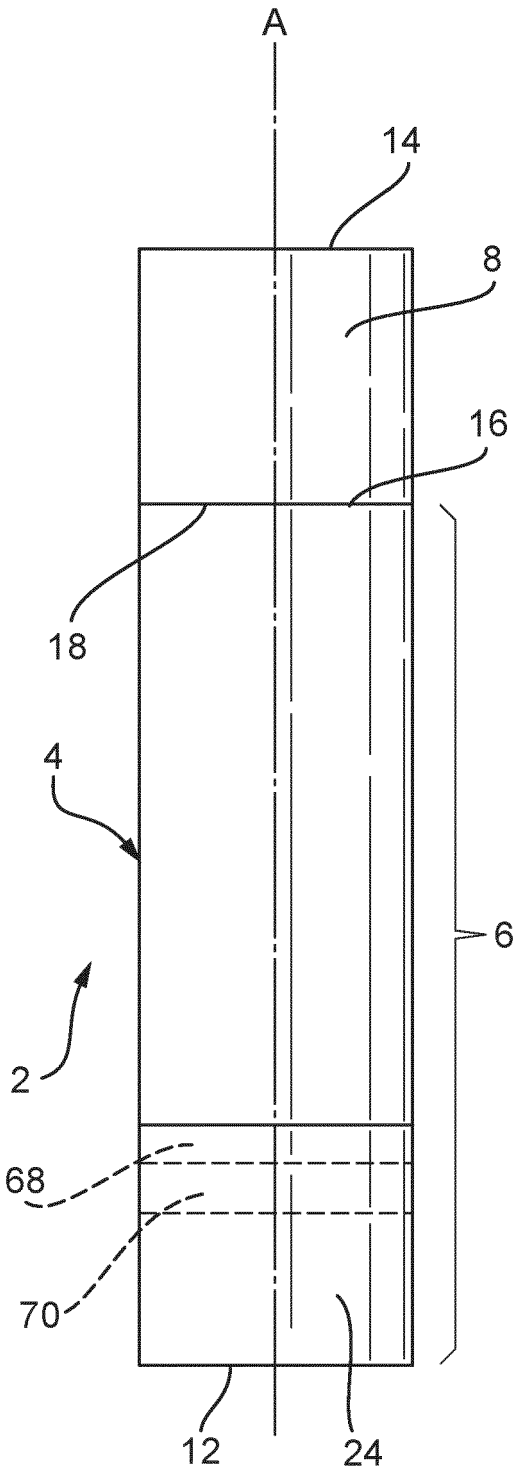

Fig. 2

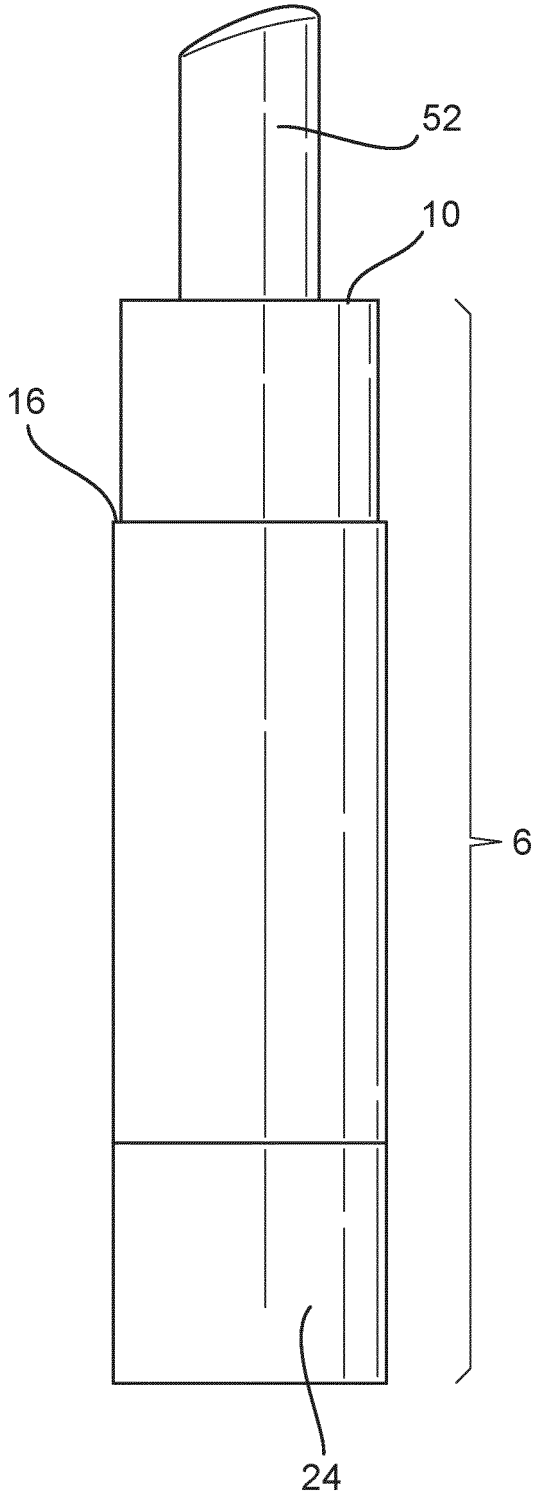

Fig. 3

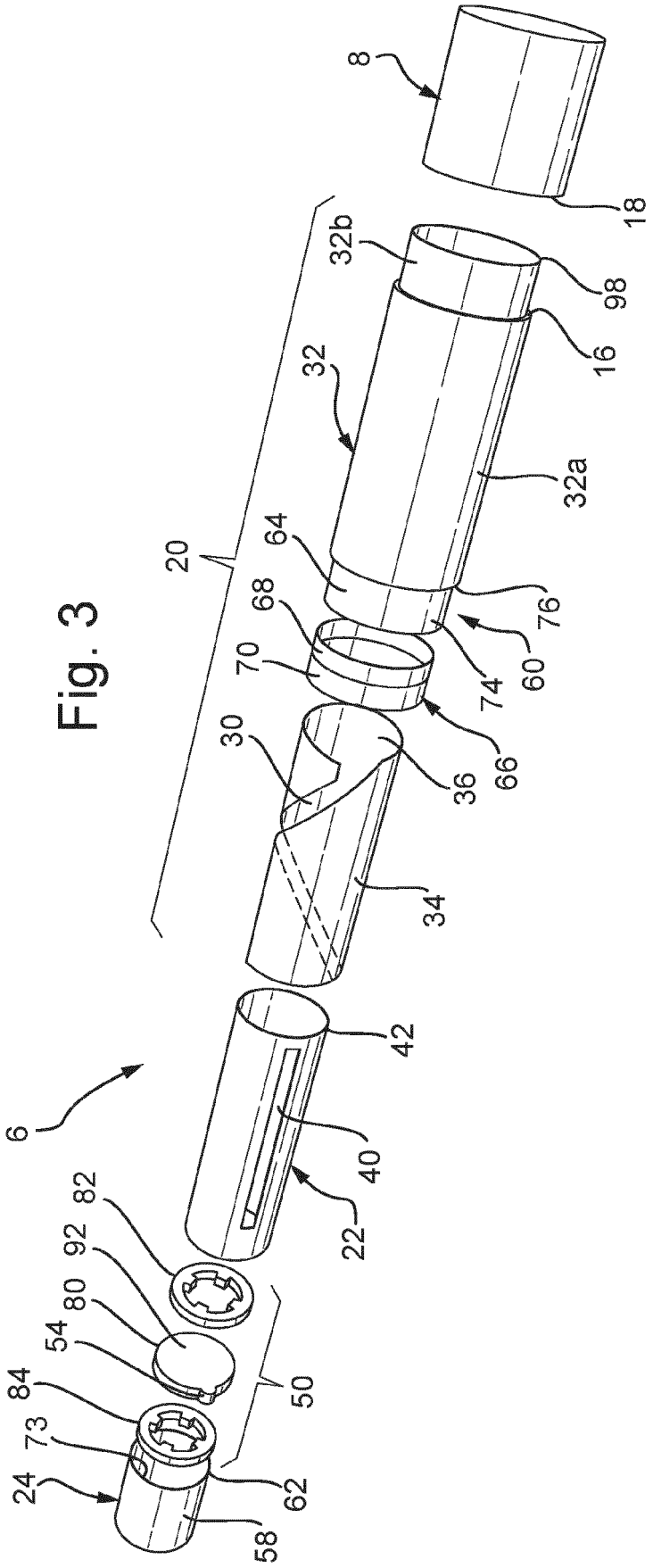
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Fig. 4

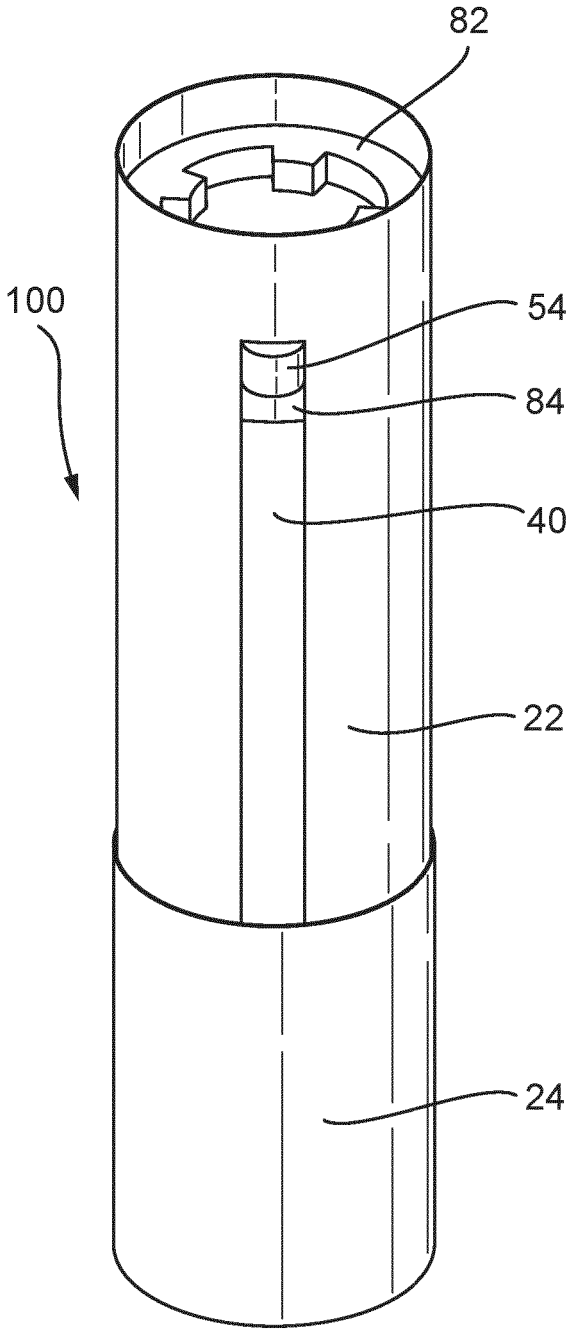

Fig. 5

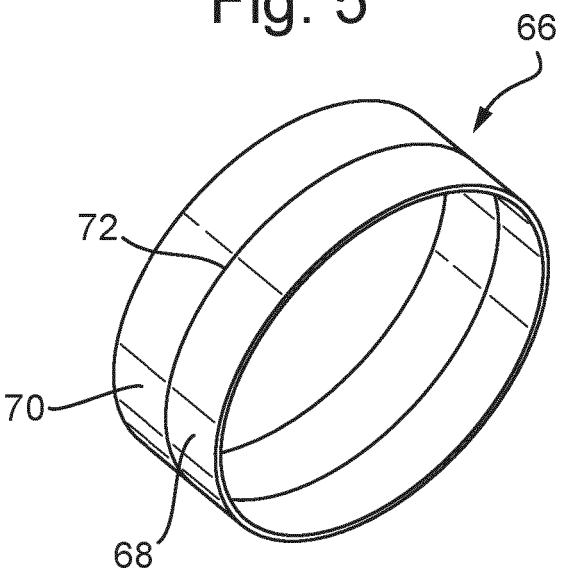

Fig. 6

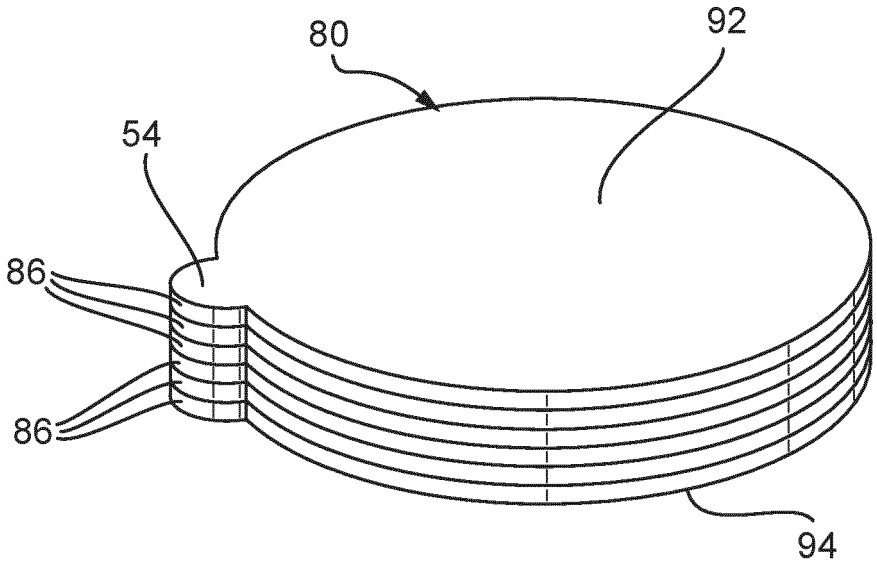

Fig. 7

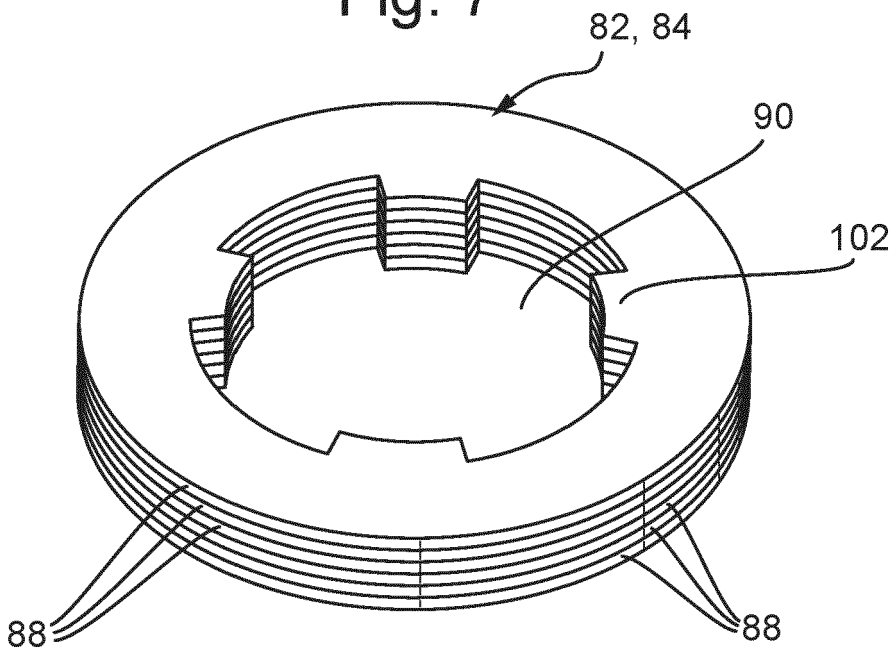

Fig. 8

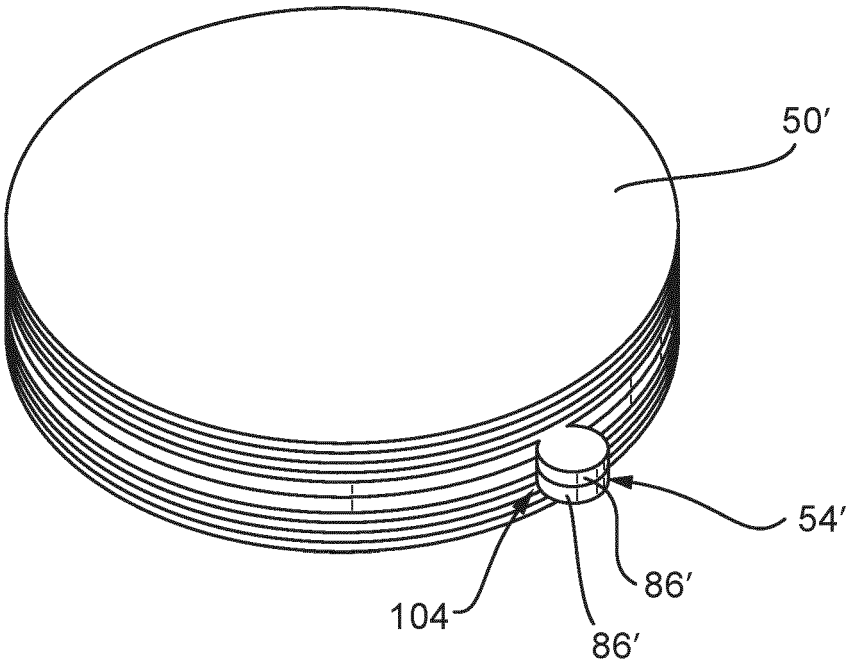

Fig. 9

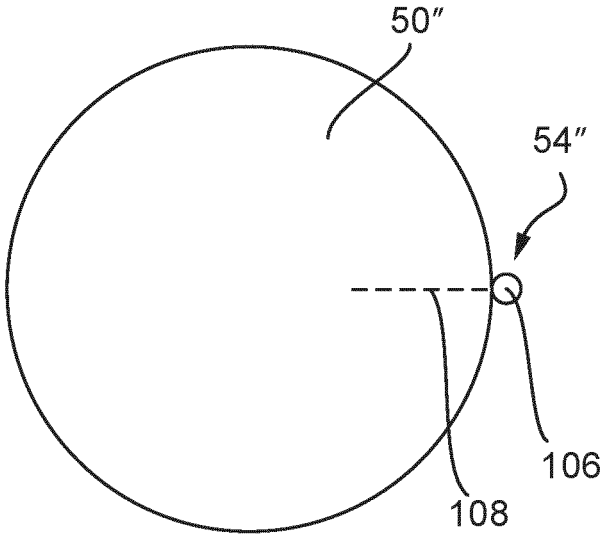

Fig. 10

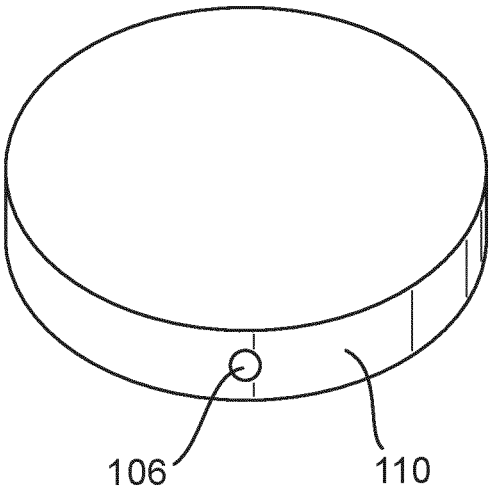

Fig. 11

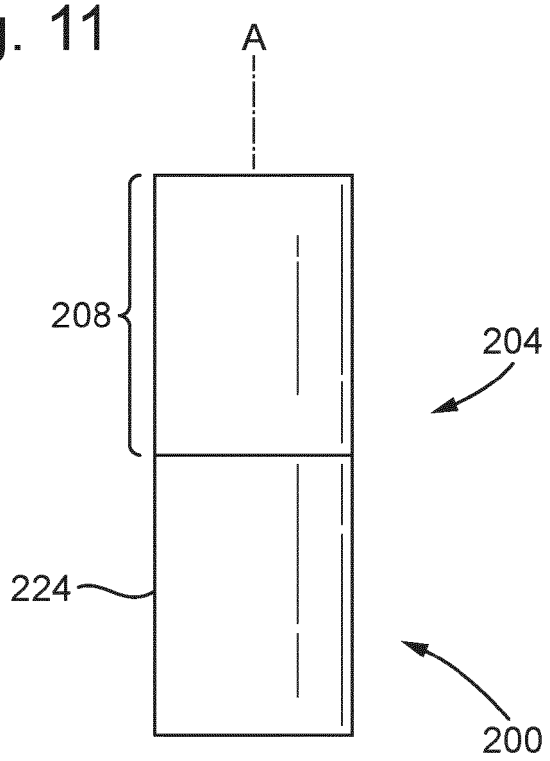

Fig. 12

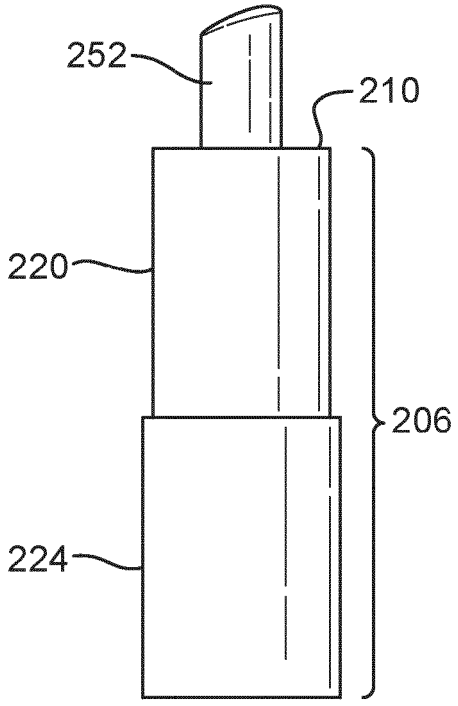

Fig. 13

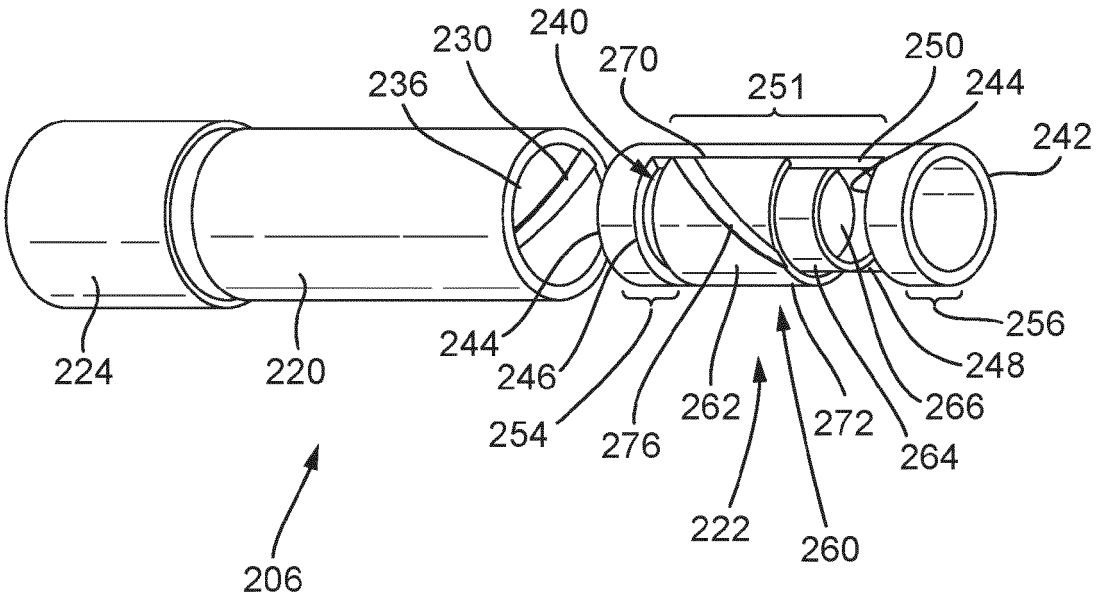
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Fig. 14

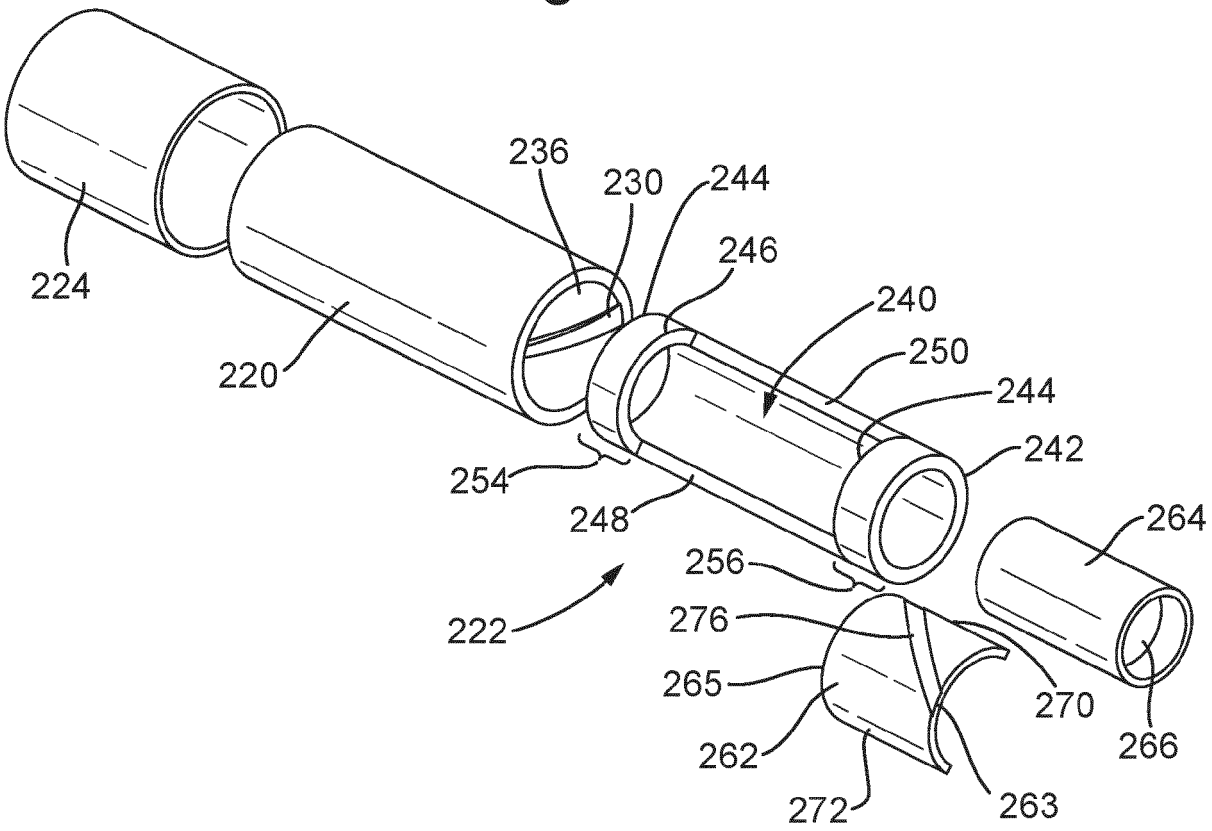
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Fig. 15

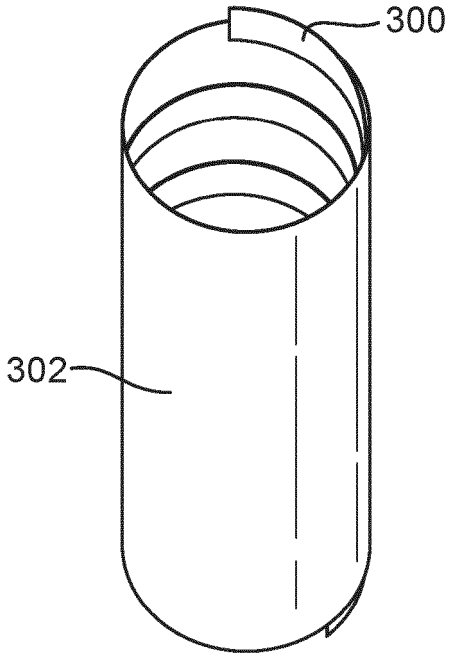


Fig. 16

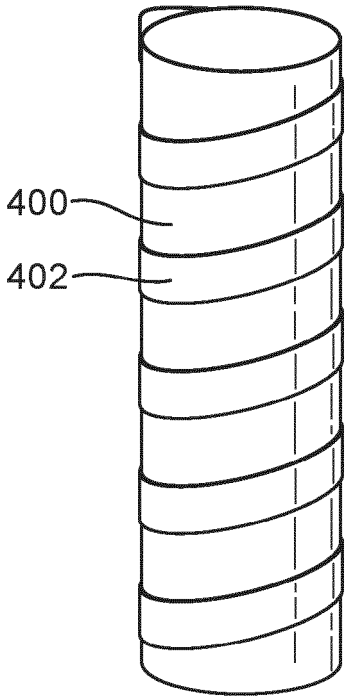


Fig. 17

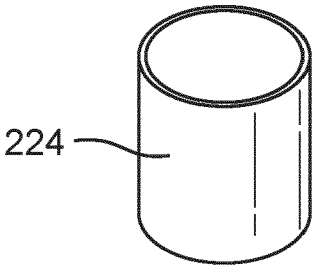


Fig. 18

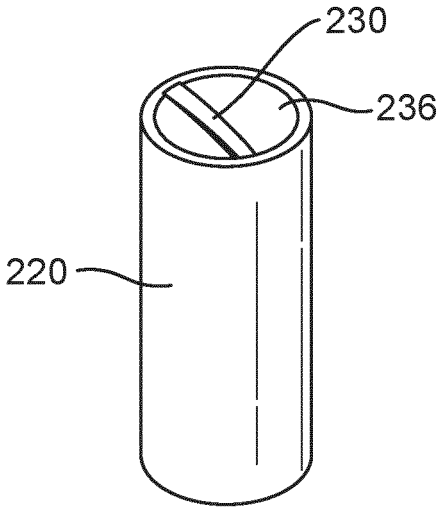


Fig. 19

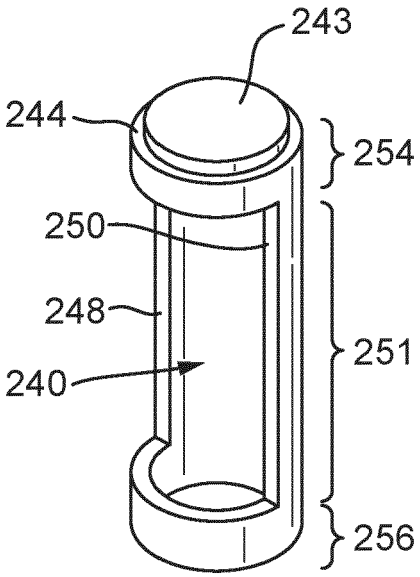


Fig. 20

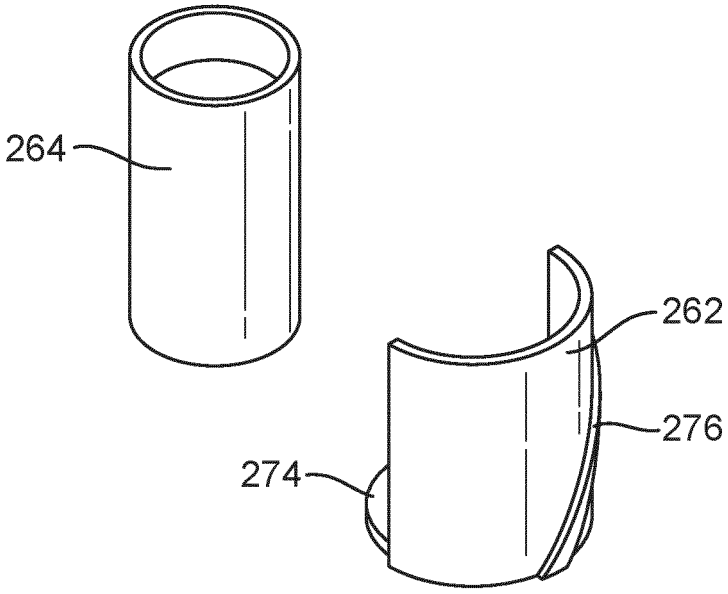
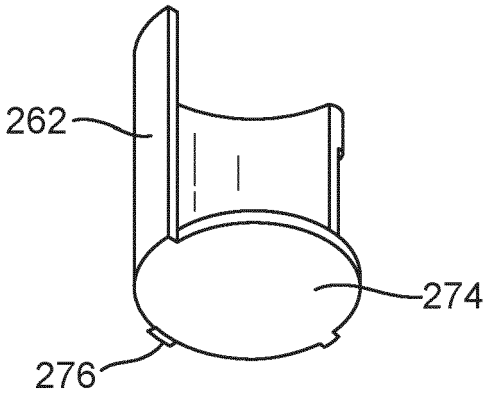


Fig. 21



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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 4600

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2 368 044 A (SEAGER JOHN C ET AL) 23 January 1945 (1945-01-23) * page 1, column 1, line 1 - page 3, column 1, line 14; figures 1-5 *	1	INV. A45D40/06
X	US 2 394 961 A (ABRAHAM AUERBACH) 12 February 1946 (1946-02-12) * page 1, column 1, line 1 - page 3, column 1, line 57; figures 1-7 *	1-15	
X	US 2 354 136 A (MOREY RICHARD M) 18 July 1944 (1944-07-18) * page 1, column 1, line 1 - page 2, column 2, line 10; figures 1-7 *	1	
			TECHNICAL FIELDS SEARCHED (IPC) A45D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 May 2023	Ionescu, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 21 4600

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-05-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2368044 A	23-01-1945	NONE	
US 2394961 A	12-02-1946	NONE	
US 2354136 A	18-07-1944	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82