

Method for Producing an Applicator, and Applicator

The invention relates to a method for producing an applicator for applying fluid or pasty media, comprising a container, which stores the medium in question, and an application element, which is attached to the container in a usage position in such a way that said application element provides the medium for application outside of the container through capillary action.

Applicators of this generic type are used for writing, drawing or painting and are particularly widely used as marking devices in the form of what are referred to as markers for forming color markings, for example for sections of text or drawings that are to be highlighted. In view of this wide range of applications, applicators of this kind are produced in large quantities, so that the level of the production costs incurred is a significant factor.

In view of this problem, the object of the invention is to provide a method, which makes it possible to produce applicators of the type being considered in a particularly efficient and therefore, cost-effective manner.

This object is achieved according to the invention by a method having the features of Claim 1 in its entirety.

According to the characterizing part of Claim 1, the invention provides that the container, which stores the medium in question, is formed in such a way that a flexible tube is formed out of a thermoplastic plastic material by extrusion, is inserted into a mold, and is expanded into a container in said mold, wherein the container that is formed is filled with the medium while said container is still inside the mold. In so doing, the invention exploits the production-related advantages of the known blow and fill process, which makes possible a particularly fast and efficient production of plastic containers, for example having an ampule form, wherein in the case of mass production, an especially short production rhythm can be achieved because the essential production processes such as forming the shape of the container can be carried out by means of applying an overpressure and/or a vacuum, as well as filling, while the container is still located inside the mold in a plastic, and therefore adaptable state.

While the formed and at least partially filled container is still located in the mold, the invention further provides that, by separating the container from the extrusion tube at the upper side of the container, an opening is formed, by means of which the container is accessible at the upper side thereof for affixing the associated application element, in particular for inserting said application element into the interior of the container, wherein the application element, which is disposed in the usage position at the opening of the container, is affixed by means of a closing movement of movable mold parts, in that the malleable plastic material of the container is correspondingly molded, preferably in order to simultaneously form a closure to the container. This approach makes it possible to produce applicators at a higher speed of production so that large production numbers are particularly economically feasible.

The container can be advantageously formed in such a way that the flexible tube is inserted through the opened, movable head jaws of the mold

into a lower mold, which forms the container, and in such a way that the head jaws are then closed in order to subsequently affix the inserted application element.

The configuration may be advantageously such that an application element is inserted, which has a retaining element, which forms an enclosure for a capillary material, a, strip-shaped material or a band-shaped material of the application element between a feed section, which extends into the container when in the usage position, and a delivery section, which is located outside of the container for the application, wherein the application element is affixed by molding the flexible tube on the retaining element by closing the head jaws.

It is of particular advantage that the flexible tube be separated above the head jaws in order to form a section of the flexible tube that protrudes over the fixing point on the retaining element of the application element. As a result, a free section of the flexible tube is available on the upper side of the container, which free section of said tube makes it possible, for a closure part, which encloses the delivery section of the application element, to be formed when closing the head jaws after inserting the application element.

It is of particular advantage in this case that, when molding the closure part, a predetermined breaking point is formed, at which the closure part, for example in the form of a cap formed in the manner of a toggle fastener, can be separated, and therefore removed, from the container.

In order to make the process of inserting the application element through the free section of the flexible tube, which is located above the container, simple and reliable, the protruding section of the flexible tube can be held open for the insertion of the application element in a defined shape by retaining jaws

provided on the head jaws, by applying a vacuum to the outside of said protruding section of the flexible tube.

For a use as what is referred to as a marker, the container may be provided with a marking fluid, which in particular also makes color markings possible, for example in a transparent form for highlighting text or the like.

According to Claim 9, the subject matter of the invention is also an applicator, which is produced using the method according to one of the Claims 1 through 8.

The invention is explained in greater detail below on the basis of the drawings. Shown are:

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| Fig. 1 | a partially cutaway front view, which has been enlarged by approximately 1.5 times as compared to a practical embodiment, of an embodiment of the applicator produced according to the method according to the invention; |
| Fig. 2 | a detailed depiction of only the application element of the applicator, which has been further enlarged as compared to Fig. 1; |
| Figs. 3a through 3d | schematic depictions in order to clarify the sequence of the method according to the invention and |

Fig. 4 and 5 a schematic and partially cut-away depiction of some parts of the device for an apparatus used to implement the method according to the invention.

The invention is described below based on the example of the production of an applicator in the form of what is referred to as a marker, as is shown by way of example in Fig. 1. In order to receive marking fluid 1, which is not shown in Fig. 1 and which is only visible in Figs. 3b through 3d, the applicator has a container 3, which is produced by means of blow molds out of a thermoplastic plastic material, for example polyethylene having a lower or higher density, or out of polypropylene. The broad side of the non-circular container 3 is visible in each of the Figs. 1 and 3, said container, rather than circular cylindrical, having an oval cross section.

Nevertheless, it is entirely possible to form the container 3 having a round cross section. A capillary material in the form of a band 5 having a stiff design is attached to the container 3 as an application element, which band of material is depicted in Figs. 1, 3c and 3d in the usage position thereof. In this usage position, a section of the band 5, which serves as a feed section 7, extends into the interior of the container 3 and is therefore in contact with the stored medium, in the present case, the liquid 1, while an upper longitudinal section of the band 5 is located outside of the container 3 as a delivery section 9. The delivery section 9 ends in a beveled discharge surface or marking surface 11, which is typical in the case of markers. The band 5 is made out of a sponge-like or felt-like material, which has capillaries, so that marking fluid 1, supplied in a wick-like manner, is available for application at the marking surface 11.

As can most clearly be seen in the detailed depiction of Fig. 2, the band 5 is enclosed by a sleeve-like retaining element 13 at the transition between the feed section 7 and the delivery section 9, wherein in the present example, the retaining element

is preferably made out of a thermoplastic plastic material, and has a radially projecting collar 15 on the circular cylindrical outside thereof. As can clearly be seen in Fig. 1, this collar serves to axially affix the retaining element 13, and in this way, the application element as a whole, to the neck section 17 of the container 3. A closure part 19 is connected to the neck section 17, which closure part forms a cap section 21, which encloses the application element, as well as a grip section 23. The closure part 19 can be removed from the closed position shown in Fig. 1 by manipulating said closure part by means of the grip section 23. As shown in Fig. 1, when in the closed position, the closure part 19 with the opening of the cap section 21 thereof on a cylindrical surface 25 (Fig. 2) of the retaining element 13.

Fig. 3 shows the sequence of the production process, starting with the molding of the container 3 (Fig. 3a). Said container is subsequently filled with the fluid 1 (Fig. 3b) and the application element with the band 5 having a capillary action is then inserted (Fig. 3c). Fig. 3 d depicts the finished product, in which the band 5 of the application element is affixed to the neck section 17 of the container 3 through the molding of the retaining element 13 thereon, wherein the container 3 is simultaneously sealed and the closure part 19 is formed.

Figs. 4 and 5 show some components of a device for carrying out the sequence of procedures shown in Fig. 3. The apparatus parts known to be provided for a conventional blow molding process such as an extruder apparatus for the formation of a plastic tube, to which apparatus a blow mandrel and filling mandrel are allocated for the fluid 1, are omitted in Figs. 4 and 5 since these may be of a conventional type. Fig. 4 shows those stages of the production process, in which the plastic tube 27 is inserted via the opened head jaws 29 of a blow mold 31 into the closed, lower mold 33 thereof. In the closed lower mold 33, the plastic tube 27 is molded into the container 3, which is closed at the bottom 35 and filled

with the fluid up to the filling level 37 by means of the blow mandrel (not shown). The flexible tube 27 is severed at a separation point 39 above the head jaws 29 in order to make an opening 41 accessible for the insertion of the application element 5. In so doing, vacuum-creating retaining jaws 43, which are located at the upper side of the head jaws 29, hold the opening of the flexible tube 41 open. Fig. 4 also shows that an application element 5 is removed from a magazine, which is not shown, by a movable transfer pusher 45 and transferred to a vacuum-creating retaining insert 47 of a horizontal carriage 49. This horizontal carriage can be moved vertically by means of a vertical cylinder 53 in a manner corresponding to the double arrow 51, and horizontally by means of a horizontal cylinder 55; see double arrow 57 of Fig. 5. Instead of the working cylinders, which are used here, conventional servo drives may also be used. Fig. 4 shows, in solid lines, the horizontal carriage 49 in a raised position, ready for the horizontal movement, which is carried out in a manner corresponding to the double arrow 57, into the insertion position shown in Fig. 5. The retaining insert 47 with the application element 5 can be moved in a manner corresponding to the double arrow 51 of Fig. 5 from this insert position, indicated with a solid line, into the insert position, which is indicated in Fig. 5 with a dashed line. After the insertion of the application element 5 and the raising of the horizontal carriage 49 from the insertion position shown as a dashed line in Fig. 5, the head jaws 29 can be closed. By molding the flexible tube 27 on the retaining element 13 of the application element 5, the application element is affixed to the neck section 17 and the container 3 is closed, wherein at the same time, the closure part 19 is formed from the projecting flexible tube 27, which extends through the head jaws 29. The inside of the head jaws 29 is formed in such a way that a constriction is formed in the wall of the flexible tube 27 above the collar 15 of the retaining element 13, so that a predetermined breaking point 59 is formed, see Fig. 1, at which the closure part 19 can be removed from the neck section 17 for the initial use of the applicator by manually manipulating the grip section 23.

Alternatively, instead of the method described thus far, instead of the above mentioned, movable mold parts 29 of the mold 31 for affixing the radially protruding collar 15 to the next section 17, a welding process may be used subsequent to the molding of the container 3, for example implemented by means of externally applied, heated molding plates (not shown) or by using an ultrasonic method or a laser welding method.

Claims

1. A method for producing an applicator for applying a medium in the form of a fluid or pasty media (1), comprising a container (3), which stores the medium (1) in question, and an application element (5, 13), which is attached to the container (3) in a usage position in such a way that said application element provides the medium (1) for application outside of the container (3) through capillary action, characterized by the following steps:

forming a flexible tube (27) out of a thermoplastic plastic material by extrusion and inserting the flexible tube (27) into a mold (31),

forming a container (3), which is closed at the bottom, by expanding the flexible tube (27) in the mold (31),

at least partially filling the container (3) located in the mold (31) with the medium (1) in question,

separating the container (3) from a section of the flexible tube (27) in order to form an opening (41), which is accessible at the upper side of the container (3),

placing the application element (5, 13) in the usage position thereof by at least partially inserting said application element through the opening (41) of the flexible tube (27), and

affixing the application element (5, 13).

2. The method according to Claim 1, characterized in that the affixing of the application element (5, 13) occurs while simultaneously forming a closure of the container (3) by moving movable mold parts (29) of the mold (31).
3. The method according to Claim 1 or Claim 2, characterized in that the flexible tube (27) is inserted through open, movable head jaws (29) of the mold (31) into a lower mold (33), which forms the container (3), and in that the head jaws (29) are closed in order to affix the inserted application element (5, 13).
4. The method according to Claim 3, characterized in that an application element (5, 13) is inserted, which application element has a retaining element (13), which forms an enclosure for a capillary material, a strip-shaped material, or a band-shaped material (5) between a feed section (7), which extends into the container (3) when in the usage position, and a delivery section (9), which is located outside of the container (3) for the application, and in

that the application element (5, 13) by molding the flexible tube (27) on the retaining element (13) is affixed by closing the head jaws (29).

5. The method according to Claim 4, characterized in that a section of the remainder of the flexible tube (27) is separated above the head jaws (29) in order to form another section of the flexible tube, this section protruding over a fixing point (15) on the retaining element (13) of the application element (5, 13).
6. The method according to Claim 5, characterized in that the protruding section of the flexible tube can be held open for the insertion of the application element (5, 13) by retaining jaws (43) provided on the head jaws (29), by applying a vacuum to the outside of said protruding section of the flexible tube.
7. The method according to Claims 5 or 6, characterized in that, when closing the head jaw (29), a closure part (19), which encloses the delivery section (9) of the application element (5, 13), is formed from the section of the flexible tube that protrudes over the fixing point (15).
8. The method according to Claim 7, characterized in that, when molding the closure part (19), a predetermined breaking point (59) is formed, at which the closure part (19) can be removed from the container (3).
9. The method according to any one of the preceding Claims, characterized in that the container (3) is provided with a marking fluid, in particular for a color marking.
10. An applicator, which is produced using the method according to any one of the preceding Claims.