

DESCRIPTION

The invention relates to a closure device of the type referred to in the precharacterising portion of claim 1. Such a closure device is known from US-A-3283964 - ANDERSON. The closure device illustrated in Figures 2 and 4 thereof has a plate-like member 16,17. It is screwed with the aid of a threaded sleeve into a fitting threaded sleeve on the container. In order that the filling opening of the container is sealed, it must be completely screwed in. Depending on the inevitable tolerances, a peg serving to close the removal opening may then be somewhat to the left or to the right of it (when the removal opening is viewed in plan) but only in a few exceptional cases is it in a suitable position.

A closure device in accordance with Figures 5 and 6 of the said document is constructed as a cap and is merely pushed on. The closure device can thus adopt any desired position with respect to the container and it is not ensured that its stopper enters the removal opening when closing the container.

In the present invention a closure device in accordance with the precharacterising portion of claim 1 is to be constructed for a connection of the correct orientation to the container itself or to an overcap of the container and this is to be realised in a closure device which in contrast to the document referred to above is constructed as a snap hinge so that the

closure limb snaps out of a position of unstable equilibrium either into the closed position or into the open position.

Closure devices of this type are known per se, inter alia from FR-A-2288683 - L'OREAL. A difficulty therewith, however, is realising the snap hinge on a closure device of plate-like construction. The closure device should be plate-like so that it fits snugly into a recess in the wall referred to in claim 1 and does not project outwardly beyond the container. For instance, the closure device in Fig. 4 of ANDERSON projects beyond the upper wall of the container. This is unattractive. It is therefore the aim of the invention that the closure device completely disappears within the wall so that its upper surface lies in the same plane as the upper surface of the said wall.

With such a flat closure device there was a problem of nevertheless realising the snap function, and this to a significant extent. The closure limb should not move out of the dead centre position into the closed position in a slow, weary movement but with a real snap action. When marketing such articles it is very important to appeal to the play instinct of the consumer. Thus a snap action must be a real snap action otherwise the product does not induce the enthusiasm which prompts a purchase. It was absolutely not to be expected that it would be sufficient to arrange the main joint and subsidiary joints in accordance with feature i of claim 1 on opposing

surfaces of the plate-like hinge members. In L'OREAL very considerable spaces were provided between the main pivotal axis (in that case at 19) and the subsidiary axes (20a and 21) in order to ensure the snap action.

The closure device in accordance with the invention is intended to render it possible to manufacture even containers of relatively complicated shape in an injection moulding process without complicated moulds. It should not be necessary to take the container or its overcap itself into account. Since these can be manufactured separately, also as injection moulded components, it is possible to manufacture not only the container and optionally its overcap but also the closure device with respective simple moulds by an injection moulding process. Thus an economically favourable totality of these components is produced.

The said conditions are all fulfilled by the invention in accordance with claim 1.

It transpires surprisingly that an arrangement of the axes in accordance with feature i of claim 1 on opposing surfaces of the plate-like members is sufficient for the intended snap action. Even after a multitude of operations adequate snap actions are obtained.

In contrast to ANDERSON, a plate-like closure device in accordance with the invention enables an efficient assembly with high speed. Instead of the time-

consuming screwing in of Figures 2 and 4 of ANDERSON,

a force fitting or welding operation is sufficient, whereby the necessary orientation and its securement are taken care of at the same time due to the spatial arrangement.

The closure device in accordance with the invention may be utilised economically only by virtue of the totality of these features and the consequent production advantages and application advantages for the user.

Reference is made to the following differences to the closure device of L'OREAL sitting on an overcap: In this are provided an overcap and a closure limb fastened to it and the snap hinge. The associated removal opening to be closed is now not also arranged in the overcap, as would be sensible for a satisfactory functioning, but in the container. The overcap has a window and a cut-out in order to provide access to the removal opening. The orientation guide is thus also absent. Depending on the tolerances of the overcap and the associated receiving section of the container for the edge of the overcap the closure peg may in general move to a position adjacent the removal opening and only in special cases enters into it without difficulties.

In the construction of L'OREAL it is also not possible to hide the closure device in the outer skin of the overcap that it does not appear to be an additional component. As is shown in Figure 1, a very ugly article results with an inorganic recess with side

walls of considerable size.

Attention need no longer be paid to the construction of the hinge, particularly the snap hinge, when constructing the injection moulds for the container, optionally its overcap, and for the closure device. The different components are each manufactured in specially constructed moulds and only subsequently connected together.

In accordance with claim 2, a particularly favourable type of construction may be achieved if the resilient connecting piece of the snap hinge is directed towards the wall of the container or of the overcap in the closed position. Thus when the container is closed it does not have a visually disruptive effect. In the closed position the outer surface of the snap hinge forms e.g. a plane or a domed surface which is matched to the container or its overcap and includes the main joint so that a satisfactory aesthetic impression is produced. No parts of the hinge project outwardly in a disturbing manner.

With relatively thin plates the subsidiary joints can, in accordance with claim 3, be attached to projecting bars on the hinge members.

The fastening member of the closure device may be so constructed in accordance with claim 4 that it may be connected to the said wall by adhesive or by welding.

In accordance with claim 5 the fastening member can have at least one plug member whose head may be connected to the inner surface of the wall by welding.

In accordance with claim 6 a flat recess, in which a flat closure device may be accommodated in an aesthetic manner, can be provided in the wall.

In accordance with a further embodiment according to claim 7, the invention relates also to a container for elongate articles, particularly diagnostic test carriers, with a closure device as claimed in one of the preceding claims.

In this further embodiment of the invention the advantages of the closure device in accordance with the invention are used for a container on which unusually high demands are made with regard to the articles to be packed.

The reactive layer of diagnostic test carriers is very sensitive to damp. It should nevertheless be possible to store the test carriers in the container for up to many years without their function being impaired. The container must thus be moisture-tight and capable of being reclosed in a moisture-tight manner after the removal of test carriers. The handling should be simple since test carriers are also used by non-medical personnel, e.g. for testing ones own blood sugar content. Diabetics, for instance, desire a container which may e.g easily be carried in a jacket pocket and

permits a simple removal of the (generally strip-like) test carriers.

A container for test carriers may be provided in accordance with claim 7 which fulfills the requirements and may also be manufactured economically.

The flattened cross-section in accordance with feature d permits the container to be accommodated comfortably. Individual strip-like test carriers may be easily removed if the package is turned upside down. The removable bottom element of feature e permits a rapid filling of the container. In accordance with feature f a drying agent can be accommodated in the bottom element instead of in the closure as was previously common. The service life of the drying agent is prolonged if it is no longer completely exposed to the room humidity when the container is opened.

A high mechanical stability and moisture-tightness of the container may be achieved in accordance with claim 8.

An effective seal of the closure may be realised at low cost in accordance with claim 9 and/or 10.

Exemplary embodiments with further features of the invention will be described below with reference to the drawings.

Figure 1 is a view from below of a first embodiment of a closure device in accordance with the invention equipped with a snap hinge.

Figure 2 is a side view of the same closure device.

Figure 3 is a central longitudinal section through this closure device.

Figure 4 is a central longitudinal section through the upper portion of an associated container.

Figure 5 is a side view of the closure device in accordance with Figure 2, but open.

Figure 6 shows a closure device in accordance with a second embodiment of the invention in central longitudinal section.

Figure 7 shows the closure device in plan view from the exterior (above).

Figure 8 shows in central longitudinal section an overcap for receiving a closure device in accordance with Figures 6 and 7 and for applying to a container.

Figure 9 is a plan view of half of this overcap from above.

Figure 10 is a perspective view of a third embodiment comprising a container for receiving test carriers, similar to that of Figure 4.

Figure 11 is a perspective view of an associated bottom element.

Figure 12 is a longitudinal section through the

container and bottom element of Figures 10 and 11.

In all exemplary embodiments terms such as "upper", "lower" and the like refer in all cases to the position of a closure device on an upright container in which the opening is directed upwardly or on an overcap pushed onto the container.

All the illustrated closure devices are unitary injection mouldings, e.g. of polypropylene

FIRST EMBODIMENT

The closure device 1 illustrated in Figures 1 to 3 and 6 has two plate-like components, namely a fastening member 2 and a closure limb 4 which are connected together by a main joint 6 in the form of a film hinge. The main joint is of two-part construction. Between its two portions there is an opening 8 in which a resilient connecting piece 10 is accommodated. The connecting piece 10 is connected by two subsidiary joints 12 and 14 to the fastening member 2 and the closure limb 4. The fastening member 2 carries a plug sleeve 16 which is provided with an inner bead 18.

Situated on the upper wall 22 of a container 20 (Figure 4), of which only the upper portion is shown, is a plug sleeve 24 with an external bead 26. The fastening member 2 may be anchored with the aid of its hollow sleeve 16 on the plug sleeve 24 of the container. A wall portion 28 extending around the wall 22 is responsible for a consistent orientation of the closure device 1.

On the left-hand side the container has a removal opening 30. On the closure limb 4 there is a closure element 32 which fits it in the form of a short tube. Situated on the closure limb 4 is a projection 34 of the breadth of the resilient connecting piece 10. The projection is so arranged that when the closure limb 4 snaps downwardly it comes into grazing contact with an associated abutment 36, namely the edge of the removal opening 30. The closure limb thus remains initially open but can then be closed by overcoming the resistance between the projection 34 and abutment 36.

In the following embodiments components in Figures 6 et seq. which have the same or similar function to those described above are provided with the reference numerals used above but with a 1 or 5 placed in front of them.

SECOND EMBODIMENT

Figures 6 and 7 show a snap hinge 101 which may not be applied directly to a container but to an overcap 140 as shown in Figures 8 and 9 which in turn is to be fastened to a container. Whilst the resilient connecting piece 10 in the first embodiment is angled, in this case it is arcuate (110). However, it has the same function. The two subsidiary joints 112 and 114 in Figure 6 are not directly on the fastening member 102 and closure limb 104 but on bars 142 and 144 which project downwardly. The closure limb 104 is stiffened by lateral wall strips 133.

The overcap 140 illustrated in Figures 8 and 9 has an oblique lower edge. Near its lower edge the overcap has snap beads 146 which engage in corresponding

recesses in a container, which is not shown, when it is plugged on. At the top left-hand side the overcap has on its interior a cup 148, which is intended to surround the container mouth, and an outlet opening 150 in the centre thereof. A closure element 132 in the form of a hollow peg which fits it is provided on the closure device 101.

At its top the overcap 140 has a flat recess 152 for receiving the closure device 101. Provided on the fastening member 102 are three plugs 154 which at their bottom each have an external annular bead 156. The plugs may be pressed into holes 158 passing through the overcap 140 and are secured by their annular beads 156 against slipping out or being pulled out and hold the fastening member 102 firmly in the flat recess 152 in the overcap.

A recess in the form of a transversely extending channel 160 is provided in the upper wall 186 of the overcap to accommodate the resilient connecting piece 110.

The open position of the closure device is similar to that of Figure 5.

After being pushed into the holes 158 the plugs 154 can also be welded to the underside of the upper wall 186 through which the holes pass for the purpose of greater security. Alternatively, the fastening member 2,102 without plugs can be welded or secured by adhesive to the wall beneath it over its area or at points.

THIRD EMBODIMENT

Figures 10 to 12 show a modification of the first

embodiment, namely a container 520 for a plurality of test carriers 521, of which only two are shown. The container has a container body 523 and a closure device 501, as is illustrated in principle in Figures 1 to 3.

A bottom element 525 may be plugged into the lower, open end of the container body 523. The inner wall of the lower end of the container body and the outer wall 527 of the bottom element are so matched that the bottom element may be plugged into the container body in a moisture-sealing manner. The outer wall of the bottom element can be connected in an airtight and thus also moisture-tight manner to the inner wall of the lower end of the container body by ultrasonic welding.

With the exception of a filling opening 529 the bottom element surrounds a chamber 531 which serves to receive a drying agent. The chamber is sealed with respect to the interior space of the container 520 with an element, for instance a cardboard disc, which regulates the moisture absorption.

As shown in Figure 10, the container 520 is flat. It has parallel side walls 538 and rounded end sides 539. It could also have an elliptical cross-section. The removal opening 530 is arranged approximately concentrically with the curvature of one end side. The removal of test carriers is thus simplified. For this purpose the package need only to be tilted in the direction of the removal opening.

A closure which fits this container is illustrated in Figures 1 to 3 and was described above in the first exemplary embodiment. The upper wall 522, which represents the upper end surface of the container body, is an integral component of the container body. The

only upwardly directed opening in the container body is the circular removal opening 530. This may be closed by the closure element 532 which is on the closure limb 504. The closure element 532 has in this case (in contrast to that of Figures 2 and 3) the shape of a ring whose outer wall is of circular arcuate shape in cross-section. This outer wall forms the sealing surface which in the closed state engages an interior bead 537 in the removal opening 530 in a sealing manner. The upper wall of this interior bead extends conically. It tapers towards the interior of the container. The interior bead and the wall portion surrounding it are together relatively thick and only yield slightly when closing the container. On the other hand, the closure element 532 has relatively thin walls and is compressed slightly towards the centre of the opening when closing the vessel. The circular shape of the removal opening 530 and of the closure element 532 lead in this case to a favourable annular stress behaviour and thus to a good seal.

The function of the projection 534 on the closure limb 504 was described in the first exemplary embodiment. It is important that a container with moisture-sensitive contents is always completely closed. The user is made aware that the container is not closed by the engagement of the projection 534 with the edge of the removal opening (abutment 536) which would be less clearly recognisable if the closure limb 504 were to close further. The user is thus required to press the closure limb completely down.