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Method of sealing containers made of
glass or the like, and sealing discs
which cling to the mouth of the container opening

The invention relates to a method of sealing containers made of glass or the like and sealing discs which cling to the mouth of the container opening.

It is known to fill containers made of glass or the like with products then to close them tightly. A known possibility is the sealing of such containers with so-called hot-adhesion films. With such films the container opening is first closed with the hot-adhesion film and only thereafter is the actual closure mounted, e.g. screwed on. Alternatively the sealing disc is inserted in the closure and the closure is mounted on the container. Sealing is then effected by heating. When the closure is removed the seal is maintained by the hot-adhesion film.

The problem underlying the invention is to provide a novel method for uncomplicated sealing of containers made of glass or the like, without any heating action on the sealing disc for sealing, and a novel sealing disc which clings to the mouth of the container opening and which can easily be recycled. The problem is solved by the invention characterised in the claims. Modifications of the invention are described in the sub-claims.

The sealing disc thus provided is easily produced, can be inserted in closures and, in the normal closing of the container particularly with a screw closure, is stuck to the mouth of the container opening in one operation. Owing to the use of foam plastic, the sealing disc itself is broken when the screw closure of the container is opened for the first time. Thus it is not possible to open the container unnoticed, detach the seal and remove the contents or replenish or replace them with unwanted contents. The use of a pressure-activatable adhesive instead of

the known heat-activatable one makes it possible to dispense with the metal films or thermoplastic layers otherwise required. The use of substantially only one material makes the sealing discs easy to recycle.

The method of the invention basically comprises the following features:

- the sealing discs are part of a web made of a foamed plastic and coated with a pressure-activatable adhesive which clings to the mouth of the container opening,
- the side of the web coated with the adhesive is laminated to a non-adhesive supporting strip which is detachable from the adhesive layer,
- the sealing discs are pre-punched from the side of the web remote from the supporting strip,
- the punching depth is less than the thickness of the coated web,
- the laminated pre-punched web is conveyed in curved or rolled form,
- the sealing discs are detached at one side from the web and from the supporting strip by changing the direction of the strip,
- the stiff sealing discs which are detached at one side are picked up by one or more plungers,
- each particular sealing disc is inserted in a closure, to the bottom of the closure, with the side remote from the adhesive foremost,
- the closure is placed on the container opening in such a way that the sealing disc is pressed against the container opening with the adhesive layer foremost and the adhesive is activated in the region of the mouth of the opening, and
- the adhesive is cured without any heating action.

"Pressure-activatable" means that under normal conditions the adhesive does not act as an adhesive unless a force is exerted on it. It displays its adhering or clinging effect only through the action of a pre-determinable force. It is advantageous to the method of the invention and the sealing disc to use an adhesive which already displays its clinging effect as a result of the

pressure exerted against the mouth of the container when the closure is put on the container.

The activated adhesive is cured by storage. Adhesion will have taken place after about 24 hours.

It is preferable to use polystyrene as the foamed plastic.

A material which cannot be bonded with the adhesive is used for the supporting strip. It may also be coated with such a material. This prevents the adhesive from clinging or even adhering to the supporting strip while still inside the production machines before the closure provided with a sealing disc with adhesive is fitted on the container.

The sealing process may take place in separate steps. By way of example, the web coated with adhesive and laminated to the supporting strip is produced in a separate manufacturing process, and the sealing discs are pre-punched in another process. Detachment of the sealing discs and their insertion in the closure caps take place in a further process during the manufacture of the caps, and activation of the adhesive by closing the containers takes place in a final manufacturing process for the product to fill the containers, for example tablets.

The punch for carrying out the punching process may be a normal commercial one, the punching depth of which is dimensioned to the surface of the supporting strip touching the adhesive at the maximum.

This is achieved by means such as spacers which are advantageously adjustable to the web thickness. The supporting strip is advantageously not punched with the sealing discs, in order to allow the discs with the adhesive to be loosened from it by changing the direction of the strip.

In the detaching apparatus the web is passed over a roller of small diameter, and a plunger is provided to engage the sealing

discs, which are lifted off the supporting strip at one side as a result of their stiffness, and to insert them in the closures for the containers.

The sealing disc for closing the containers is made of a foamed plastic such as polystyrene, coated with a pressure-activatable adhesive. To enable the disc inserted in the closure to be retained in it, the disc has tabs or the like which are jammed into the closure in which they are inserted. The tabs or the like advantageously hold the pre-punched discs firmly in the web and prevent them from dropping out of it prematurely before the detaching apparatus.

A closure for closing containers, such as is supplied as a component to the processing industry e.g. a pharmaceutical manufacturer, contains an already inserted sealing disc which is coated with a pressure-activatable adhesive at the side towards the container. The shape and dimensions of the sealing discs may be adapted to the closures particularly in the punching process.

As a further explanation of the invention an embodiment of it will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 shows the procedure, as if all the steps were carried out in one place without interruption

Fig. 2 is a plan view of a web of sheeting with sealing discs

Fig. 3 shows a sealing disc with tabs

Fig. 4 shows a closure with a sealing disc inserted, and

Fig. 5 is a section through a container with a closure and sealing disc.

Fig. 1 is a theoretical representation of the procedure for making sealing discs 1 for tightly sealing the openings 2 of containers 3. A web 4 of foamed plastic such as polystyrene is coated with an adhesive 5 which has no adhesive effect in its normal state but activates its adhesive function under pressure. The web 4 with the adhesive layer 5 is preferably made previously by a specialist producer and supplied in roll form, although it

may alternatively be made in a combined manufacturing process as illustrated. The side of the web 4 coated with the adhesive 5 is laminated to a supporting strip 6, to the surface of which the adhesive cannot adhere even when pressure is exerted. The strip preferably comprises a teflon-coated polyethylene film, that is to say, a plastic support coated with an anti-cling layer, a material to which the web 4 with the adhesive layer 5 only clings. The web 4,5,6 may also be manufactured previously.

The web 4 with the adhesive layer 5 and supporting strip 6 are together conveyed through calender rolls 7 and 8 to a punching apparatus 9 with a cavity block 10, anvil or the like which are only symbolised here. The punch 9 punches out a plurality of substantially circular sealing discs 1 across the web 4. The punching depth is chosen so that the punching does not reach the surface of the supporting strip 6. For this purpose the punch may, for example, have adjustable spacers or the like. Electronic scanning with sensors is also possible. The spacers or the control and/or regulating means for electronic scanning of the sensors may be adapted to the thickness of the sealing discs and the desired punching depth. In this way the supporting strip cannot be accidentally severed in the punching process. The sealing discs 1 which still cling to the surface of the supporting strip after punching thus substantially comprise the punched-out plastic foam 41 with the adhesive coating 51. The thus pre-punched web 4,5,6 is fed to a direction-changing roller 11, which feeds the conveyor belt 6 with the web 4 clinging to it and the coating 5 to a winding-up apparatus (not shown). Owing to the small diameter of the direction-changing roller 11, although the web 4 and supporting strip follow the prescribed path, the sealing discs 1 are lifted off the surface of the strip due to the stiffness of their material; they can thus be picked up by a plunger 12, which is indicated, and inserted in the opening 13 of the screw closure 14 for the container 3. The plunger engages each particular sealing disc from the adhesive side. It is advantageously coated with a material which can cling to the adhesive but cannot adhere to it. In selecting material for the sealing disc a certain degree of stiffness is advantageous in order to show the described effect of one-sided

detaching of the discs from the web. The diameter of the direction-changing roller 11 should be considered in this connection. The dimensions of the plungers 12 are advantageously adaptable or adapted to the surface dimensions of the discs.

In the next operation the screw closure 14 arrives in front of the opening 2 of the container 3 and is screwed, pressed or the like onto the opening 2 in such a way that the sealing disc 1 is placed over the opening. It covers the edge 21 thereof. The pressure exerted on the edge 21 during the closing of the container 3 activates the adhesive in layer 5 and sticks the sealing disc 1 firmly to the edge 21. As the disc 1 is not activated elsewhere, the tablets or the like in the container 3 are not stuck together.

Fig. 2 is a plan view of a piece cut out of a web 4 with the pre-punched sealing discs 1 with and without tabs. Many such discs 1 may be provided side by side. In that case a corresponding number of plungers 12 may be arranged side by side and can thus fit several screw closures 14 simultaneously. The area and thickness dimensions of the discs may also differ, dependent on the punch chosen.

Fig. 3 shows a sealing disc 1 which has tabs 15 to hold it securely in the screw closure 14. The tabs 15 additionally prevent the disc 1 from dropping out of the web 4 prematurely, before it reaches the direction-changing roller 11, since the reciprocal friction between the outer contour of the disc tabs and the surrounding contour of the web 4 reinforces the clinging effect.

Fig. 4 is a perspective view of the interior of the screw closure 14 with a sealing disc 1 inserted. The disc 1 may be inserted to the bottom of the closure. Its tabs 15 are then held firmly against the internal thread of the screw closure 14.

Fig. 5 is a section through a container 3 with a sealing disc 1 and a screw closure 14. Only the peripheral edge of the disc adheres firmly to the mouth of the container. When the container

is opened for the first time one layer of the disc therefore remains in the closure while the other layer, which is stuck fast to the mouth of the container, remains on the container and seals its opening. Hence the contents of the container can only be removed when that layer has been broken.

Abstract

A method of sealing containers made of glass or the like uses sealing discs which cling to the mouth of the container opening. For this purpose the discs are provided with a pressure-activatable adhesive and are part of a correspondingly coated web of foamed plastic. The web is laminated to a supporting strip which is detachable from the adhesive layer. The sealing discs are pre-punched from the side of the web remote from the supporting strip, the punching depth being less than the thickness of the coated web.

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Claims



1. A method of sealing containers made of glass or the like with sealing discs which are pre-punched from a web and inserted in a closure at the bottom of the closure, wherein the pre-punched web is conveyed,
characterised in that
the sealing discs (1) are part of a web (4) made of a foamed plastic and coated with a pressure-activatable adhesive (5) which clings to the mouth of the container opening,
that the side of the web (4) coated with the adhesive (5) is laminated to a non-adhesive supporting strip (6) which is detachable from the adhesive layer,
that the sealing discs (1) are pre-punched from the side of the web (4) remote from the supporting strip (6),
that the punching depth is less than the thickness of the coated web (4),
that the laminated pre-punched web is conveyed in curved or rolled form,
that the sealing discs (1) are detached at one side from the web (4) and from the supporting strip (6) by changing the direction of the strip (6),
that the stiff sealing discs (1) which are detached at one side are picked up by one or more plungers (12),
that each particular sealing disc (1) is inserted in a closure (14), to the bottom of the closure, with the side remote from the adhesive (5) foremost,
that the closure (14) is placed on the container opening in such a way that the sealing disc (1) is pressed against the container opening (2) with the adhesive layer foremost and the adhesive (5) is pressure-activated in the region of the mouth of the opening,
and
that the adhesive (5) is cured without any heating action.
2. A method according to claim 1 or 2,
characterised in that
the foamed plastic comprises polystyrene.



3. A method according to claim 1 or 2, characterised in that the method is carried out in separate steps, namely that production of the web (4) coated with the adhesive (5) and laminated to the supporting strip (6) takes place in one manufacturing process, pre-punching of the sealing discs (1) in another process, detaching of the sealing discs (1) and their insertion in the closure caps (14) in a further process, and activation of the adhesive (5) by closing the containers (3) takes place in an ensuing manufacturing process for the product.

4. A punch for carrying out the method of any of claims 1 to 3, characterised in that means are provided which dimension the punching depth to the surface of the supporting strip (6) touching the adhesive (5) at the maximum.

5. A detaching means for carrying out the method of any of claims 1 to 3, characterised in that the web (4) is passed over a roller (11) of small diameter, and one or more plungers (12) are provided to pick up the sealing discs (1) which are lifted off the supporting strip (6) at one side and to insert them in the closures (14) for the containers (3).

6. A sealing disc for closing containers, characterised in that it is made of a foamed plastic coated with a pressure-activatable adhesive (5).

7. A sealing disc according to claim 6, characterised in that it has tabs (15) or the like which jam in the closure (14) in which they are inserted.



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8. A closure for closing containers,
characterised in that

it contains a sealing disc according to claim 6 or 7, which is
coated with a pressure-activatable adhesive (5) at the side
towards the container (3).



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