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(54) **Tablet tube with tamper-proof closure.**

(57) A container for holding a stack of tablets comprises a tablet tube (1) provided with a tamper-proof closure. The tablet tube is made of a flexible plastic material, has a substantially flat bottom (2) and, at its other open end, is provided with external threads (4). Spaced from these threads (4) in direction of the closed end, seal rupturing means (5) and seal retaining means (6) are arranged. The tamper-proof closure made of a flexible plastic material comprises a cap portion (11) with interior threads (13) and a substantially annular seal portion (9) joined to the rim of the cap portion (11). When the seal (9) is broken by first opening of the container, the seal portion (9) is displaced along the container wall and retained by the seal retaining means (6), whereby a clear indication is obtained that the closure originally was of a sealed type and that the seal (9) had been broken.

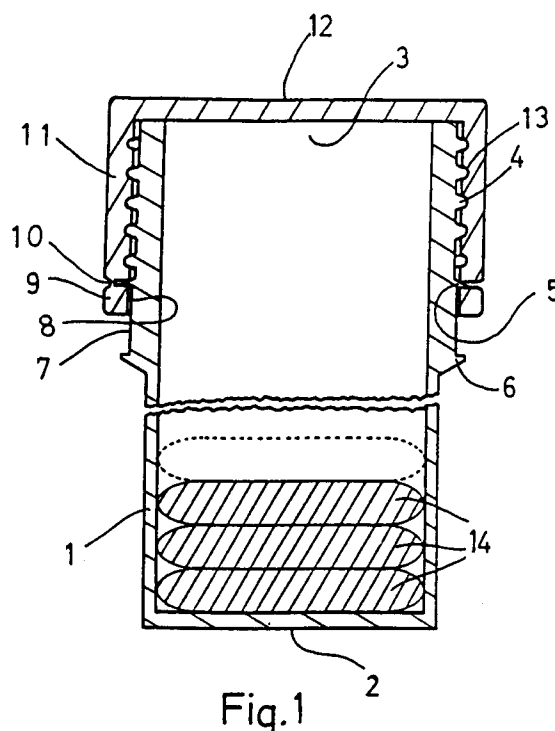


Fig.1

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The present invention relates to a tablet tube for holding tablets in stacked position provided with a tamper-proof closure.

Tablets for medical and similar use are packaged and dispensed in various types of containers. For certain applications, particularly such relating to tablets, particularly of tablets of larger than average size, the preferred package form is a tube with a bottom at its one end made in aluminum or similar material, the inner diameter of which is slightly larger than the larger diameter of the tablet. This provides for a stacking arrangement of the tablets in the container which protects the tablets, particularly fragile and/or large size tablets, from mechanical disintegration during filling, transport and handling. This stacking arrangement also has the advantage that the tablets are quite easily dispensed from the container tube one-by-one. This makes such containers particularly attractive for use by elderly or handicapped persons.

A drawback with these tubiform containers is that they are easily permanently deformed when only partially filled. The reason is that, in a fully filled state, the tablets themselves support the tube walls against radial compression. Emptying of the container removes this support. Since aluminum is only moderately resilient, deformation of the thin-walled unsupported upper part of a partially filled tube often exceeds the resilient deformation maximum of this material. The resulting permanent deformation traps the remaining tablets within the tube and makes them useless.

For a long time aluminum has been the material of choice for such applications. One reason is that its walls are an absolute barrier to humidity and carbon dioxide which may reduce the shelf life of the contents. Another is that it is especially suited for forming such tubes with high precision, and that the tubes keep their precise form at small external loads which provides the user with a feel of stability and, thus quality, but at the cost of functionality.

Because of the combination of two materials with entirely different properties - a polymer material for the cap and aluminium for the container tube - the provision of other desirable features has met with difficulty. Such desirable features include tamper-proof closures whose sealing condition is obvious to the user at a first glance.

The object of the present invention is to provide a tubiform container/closure assembly for holding a stack of tablets which is lacking the disadvantages of known containers entirely or at least to a substantially reduced degree.

In accordance with the present invention is disclosed a container for holding a stack of tablets, comprising a tablet tube provided with a tamper-proof closure, said tablet tube being made of a

flexible plastic material and having, at its one closed end, a substantially flat bottom and, at its other open end, being provided with external threads and, spaced from said external threads in direction of the closed end, seal rupture means and, spaced from said seal rupture means in the same direction, seal retaining means, wherein said tamper-proof closure made of a flexible plastic material comprises a cap portion with interior threads and a sealing means portion joined to the rim of the cap portion.

Further advantages and distinguishing features of the present invention are evident from the appended claims.

The invention will now be explained in more detail by reference to a drawing illustrating a preferred embodiment, in which is shown by

- Fig. 1 a tablet tube with tamper-proof closure according to the invention, in a sealed state and in axial section,
- Fig. 2 the assembly of Fig. 1 in the same view and in a partially disassembled state with the seal broken,
- Fig. 3 the assembly of Fig. 1 in the same view and in a re-assembled state with the seal broken, and
- Fig. 4 the assembly of Fig. 4 in the same view, with a modified cap and in a re-assembled state.

A polypropylene tablet tube 1 has a flat bottom 2 and, at its open end 3, an external thread 4 which extends about one tube 1 diameter's length in the direction of the bottom 2 end. Spaced from the end of the thread 4 facing the bottom 2 end the tube has an external seal-rupturing radial flange 5 and, spaced from the seal-rupturing flange 5 in the same direction, an external seal-retaining radial flange 6.

This polypropylene tablet tube 1 is shown in Fig. 1 in a state closed and sealed by a cylindrical cap 11 with a flat bottom part 12 and an internal thread 13 matching and co-operating with the external thread 4 of tube 1. An annular seal ring 9 is integrally attached to the rim of cap 11 by evenly circumferentially spaced score bridges 10 arranged about halfway between the inner and outer surface of the cylindrical part of the cap and the seal ring, respectively, of which only one is shown. The radial width of these bridges 10 is substantially smaller than the lateral wall thickness of the cap 11 or the seal ring 9. The rim of the seal-rupturing flange 5 extends into the only partially bridged gap between the cap 11 and the seal ring 9.

The tablet tube 1 in a closed and sealed state contains a stack of tablets 14, of which the three nearest to the bottom 2 end are shown in full. Not shown is a circular plastic foam insert inside the tube 1 at the open end 3. The foam insert is

slightly compressed between the uppermost tablet (not shown) and the bottom part 12 of cap 11, thereby keeping the tablets 14 in a stacked position. Instead of the foam insert, an elastomeric polymer spiral or similar compressible resilient means may be used for tablet stack fixation.

In Fig. 2 the tablet tube 1 is shown with the cap 11 in a partially unscrewed position. The score bridges 10 have been broken in the unscrewing operation because the seal ring 9 is being retained by the seal-rupturing flange 5. Since the tablet tube 1 when being opened or handled will normally be kept in a more or less upright position with the cap 11 at the top, the seal ring 9 will glide along part 7, 8 of the tube wall until it rests against the upper axial wall of the seal-retaining flange 6.

When the container has been closed after complete removal of the cap 11 and one or several of the tablets 14, the state illustrated in Fig. 3 is attained. The different position of the seal ring 9 in the closed and sealed (untampered) state shown in Fig. 1 and the closed but unsealed (potentially tampered) state shown in Fig. 3 will be evident to the user at the first glance because of the prominent gap between the seal ring 9 and the cap 11. In this latter state, the tube wall segment 8 originally masked by the seal ring 9 will be visible, and the wall segment 7 originally visible will be masked. Marking the respective wall segments 7, 8 by different colours or patterns will enhance this effect. Even if the position of the container 1 is temporarily reversed the seal ring 9 will be barred by the action of the seal-rupturing flange 5 from being removed. If the seal ring 9 were not retained at the tube according to the invention, a first-time user might not be aware of the fact the container was originally sealed, that the seal had been broken and, thus, that tampering might have occurred.

The second embodiment of the container according to the invention is shown in a sealed and closed position corresponding to that shown in Fig. 1 for the first embodiment. The difference between the two embodiments resides in the cap 11' and the bottom part 2' of the container 1' having been provided with torque application means comprising cylindrical rims 16, 18 formed by extension of the respective walls 1', 11' and two diametrically arranged slots 17 and 15, respectively (only one each shown), in which instruments for torque transfer, for instance rectangular bars, can be inserted. These instruments can be held by hand and provide a simple means for disabled or weak persons to open and close the container.

In practice the container assembly according to the invention may be provided with various additional features commonly used in the art, such as specifically designed sealing and locking tongues, dessicating or carbon dioxide-absorbing means,

and the like.

One of such optional features is shown in Fig. 4. A dessicating plastic capsule 14 is arranged at the bottom of the cap 11' for protecting the contents 14 of the container against moisture. The cup-shaped capsule 23 is attached to the cap 11' by snapping into a skirt 20 extending from its interior bottom and provided with an annular bead 22 at its inner wall adjacent to its rim and cooperating with a corresponding annular groove at the cylindrical outer face of the capsule 23. Capsule 23 is filled with a dessicating agent 19, such as silica gel. At its open end facing the bottom 2' of the tube 1' (the container then being in a closed position), the capsule 23 is covered with a porous plastic disc 21 permeable to water but not to dessicant.

An annular sealing flange 24 for abutment against the uppermost part of the inner wall surface of the tube 1' protects the contents 14 against intrusion of humidity when the container is in a closed state.

Other optional features have been omitted since they are additive and immaterial in respect to the present invention. For sake of visual clarity the wall thickness of the cap and the tube wall has been exaggerated in the Figures.

Claims

1. A container for holding a stack of tablets (14), comprising a tablet tube (1, 1') provided with a tamper-proof closure, said tablet tube being made of a flexible plastic material and having, at its one closed end, a substantially flat bottom (2, 2') and being provided, at its other open end, with external threads (4) and, spaced from said external threads (4) in direction of the closed end, seal rupturing means and, spaced from said seal rupturing means in the same direction, seal retaining means, wherein said tamper-proof closure made of a flexible plastic material comprises a cap portion (11, 11') with interior threads (13) and a substantially annular seal portion (9) joined to the rim of the cap portion (11, 11').
2. The container of claim 1, **characterized** in that said seal retaining means comprises full or broken external radial flange means (6), the outer diameter of which is larger than the inner diameter of the annular seal portion (9).
3. The container of claim 1 or 2, **characterized** in that said seal rupture means comprises full or broken external radial flange means, the outer diameter of which is larger than the inner diameter of the annular seal portion (9).

4. The container of claim 3, **characterized** in that the axial distance between the external radial flange means (6) of said seal retaining means and the external radial flange means (5) said seal rupture means is by 1 to 20 mm larger than the axial width of said annular seal portion (9). 5
5. The container of claim 4, **characterized** in that said axial distance is about 2 mm larger than the axial width of the annular seal portion. 10
6. The container according to any of preceding claims, **characterized** in that the cap portion (11') comprises an annular ridge (18) arranged at an axially opposite end of the cap portion (11') in respect of its rim to which the seal (9) is joined, said ridge (18) being provided with axially extending slots (15) or indentations for application of torque means. 15 20
7. The container according to any of preceding claims, **characterized** in that desiccation means (19, 21, 23) are arranged at the inside of the cap portion (11'). 25

Amended claims in accordance with Rule 86-(2) EPC.

1. A container for holding a stack of tablets (14), comprising a tablet tube (1, 1') provided with a tamper-proof closure, said tablet tube being made of a flexible plastic material and having, at its one closed end, a substantially flat bottom (2, 2') and being provided, at its other open end, with external threads (4) and, spaced from said external threads (4) in direction of the closed end, seal rupturing means and, spaced from said seal rupturing means in the same direction, seal retaining means, wherein said tamper-proof closure made of a flexible plastic material comprises a cap portion (11, 11') with interior threads (13) and a substantially annular seal portion (9) joined to the rim of the cap portion (11, 11'). 30 35 40 45
2. The container of claim 1, **characterized** in that said seal retaining means comprises full or broken external radial flange means (6), the outer diameter of which is larger than the inner diameter of the annular seal portion (9). 50
3. The container of claim 1 or 2, **characterized** in that said seal rupture means comprises full or broken external radial flange means, the outer diameter of which is larger than the inner diameter of the annular seal portion (9). 55

4. The container of claim 3, **characterized** in that the axial distance between the external radial flange means (6) of said seal retaining means and the external radial flange means (5) said seal rupture means is by 1 to 20 mm larger than the axial width of said annular seal portion (9).
5. The container or claim 4, **characterized** in that said axial distance is about 2 mm larger than the axial width of the annular seal portion.

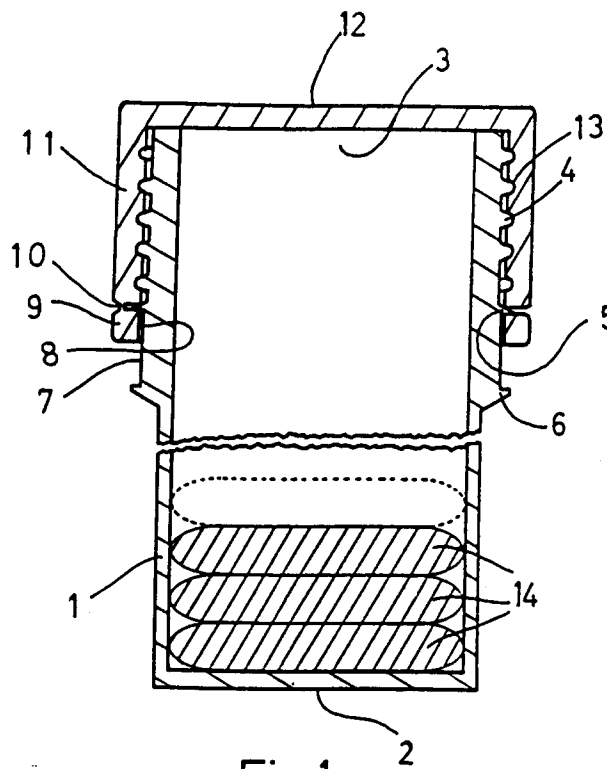


Fig. 1

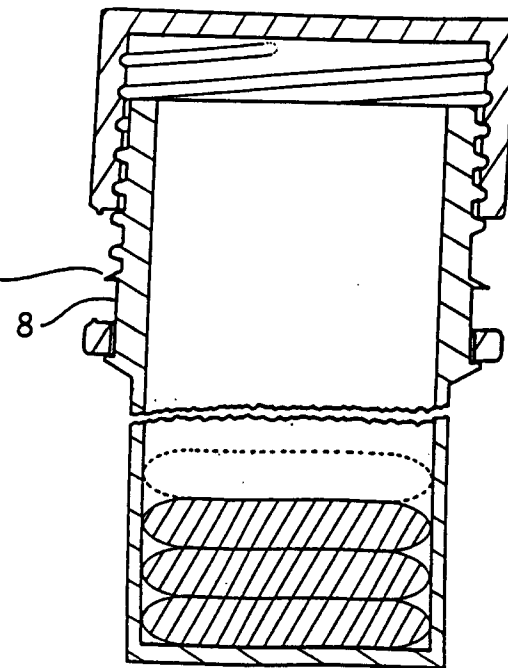


Fig. 2

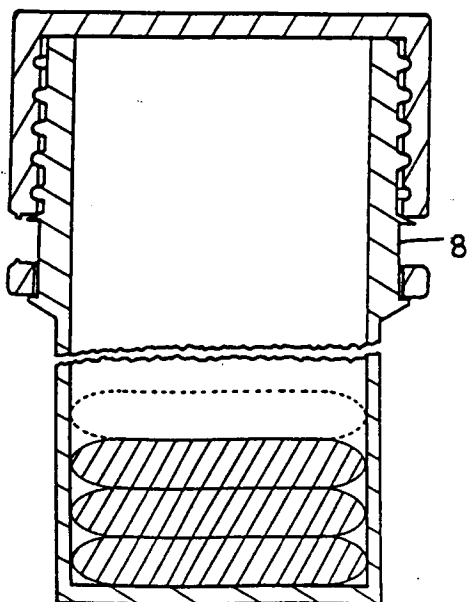


Fig. 3

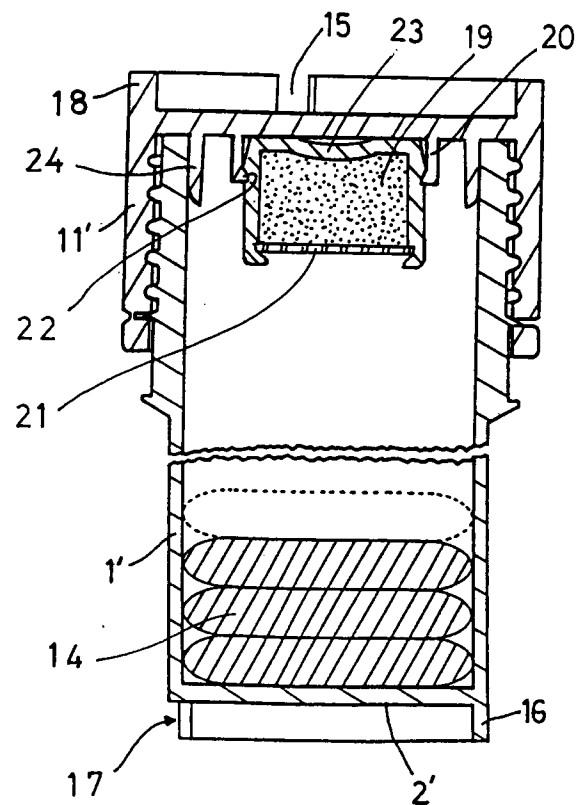


Fig. 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 85 0122

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 555 039 (V.N.CONTI) * figure 2 * ---	1-5	B 65 D 41/34
X	US-A-4 884 706 (R.K.JULIAN) * column 2, line 54 - line 56; figures * ---	1-4	
X	FR-A-2 416 849 (PATEL) * figure 4 * -----	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10-11-1993	Examiner ZANGHI A
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 O : non-written disclosure P : intermediate document 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 & : member of the same patent family, corresponding document			



CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet -B-

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims: 1-5



LACK OF UNITY OF INVENTION A POSTERIORI

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 2-5 : Details of a seal retaining means for a tamper-proof closure applied to a container.
2. Claim 6 : Means embedded in the cap portion for application or torque means (i.e. for facilitating the opening).
3. Claim 7 : Desiccation means arranged at the inside of the cap portion.

The subject matter of claim 1, being anticipated (lack of novelty, see US-A-4 555 039), claim 1 has to be considered as preamble for claims 2,6 and 7 which become independant.

The above mentioned subjects 1,2 and 3 are not so linked as to form a single general inventive concept. Consequently they do not satisfy the requirement of unity of invention.

Claim 1 as well as Subject 1 have been searched.