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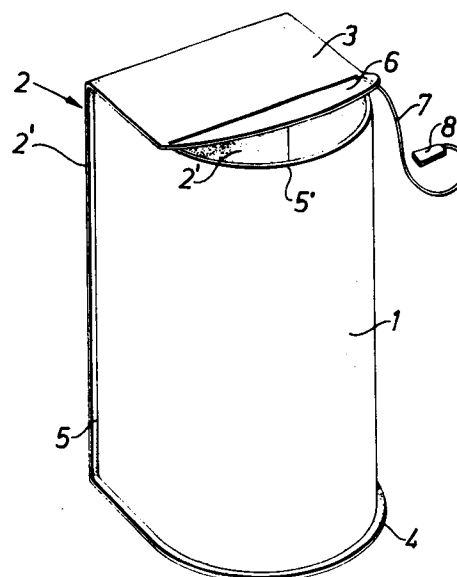
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## ⑤④ **Opening arrangement for packing containers.**

⑤⑦ Opening arrangements for packing containers are realized inter alia in the form of a portion of the wall of the packing container delimited by means of an opening indication line which portion is opened with the help of a tearing thread. The application of the tearing thread along a nonrectilinear opening indication line is difficult and up to now it has not been possible to realize it automatically in the rapid manufacture of packing containers from e.g. a moving material web. In accordance with the invention an opening arrangement is now provided wherein an openable part (6) of the container wall, limited by a curved opening indication line (5'), is opened with the help of a tearing thread (7) which extends rectilinearly between two points on the opening indication line (5'). The tearing thread (7) is applied so that on opening it follows and breaks up the material of the packing container along the curved opening indication line (5'). The possibility of applying the thread rectilinearly makes the opening arrangement especially suitable for application in the manufacture of packing containers from a moving material web, since the thread can be applied at high speed parallel with the direction of the web.



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OPENING ARRANGEMENT FOR PACKING CONTAINERS  
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The present invention relates to an opening arrangement for packing containers of the type wherein a part of the packing container wall which is openable by means of a tearing thread is limited by an opening indication line.

5           It is customary for an opening arrangement in a packing container wall of paper or laminated plastic material to be formed with the help of a weakening line arranged in the wall, which extends around an openable portion. When the packing container is to be opened, this is usually done  
10 in that the openable portion, delimited by the weakening line, is pressed into the package, whereupon it may be torn

off. This type of opening arrangement is customary in packing containers e.g. for washing powders or flakes.

In packing containers e.g. for liquid contents the opening arrangement described is not suitable. In packages  
5 for liquid contents other solutions have therefore been tried and a common one among these consists in providing the packing container wall with a punched-out hole which is covered by a tear-off tearing strip. However, this opening arrangement is both expensive and more complicated  
10 and moreover provides inferior impermeability to liquid and gas which is a disadvantage in particular in the case of sensitive foodstuffs.

A desirable solution consists therefore in modifying the firstmentioned opening arrangement in such a manner that  
15 the openable portion of the packing container wall can be opened without having to be pressed into the packing container and without the risk of splashing or spilling. This modification can take the form of the opening arrangement being provided with a tearing thread applied along the  
20 weakening line, one end of which is accessible from the outside of the package and by means of which the connection of the openable part of the wall with the remaining packing container wall can be broken. An opening arrangement comprising a tearing thread of this type functions very well  
25 but will be somewhat complicated to manufacture, since the application with sufficient accuracy of the tearing thread is time-consuming and difficult, especially when the tearing thread is to be applied along a curved opening indication line. In the mechanical, rapid manufacture of packing  
30 containers from a moving material web therefore it has not been possible up to now to apply the tearing thread with sufficient accuracy.

It is an object of the present invention to provide an opening arrangement for packing containers which  
35 is not subject to the abovementioned disadvantages.

It is a further object of the present invention to provide an opening arrangement which is simple and fairly

inexpensive and which moreover is easily openable.

It is a further object of the present invention to provide an opening arrangement with a tearing thread which is easy to apply also in the rapid, automatic manufacture of packing containers, especially from moving material webs.

These objects have been achieved in accordance with the invention in that an opening arrangement for packing containers of the type wherein a part of the wall of the packing container which is openable by means of a tearing thread is delimited by an opening indication line, is given the characteristic that the opening indication line is curved or arched, that the tearing thread extends substantially rectilinearly between two points of the opening indication line, and that the tearing thread is firmly attached to the packing container wall at least at one of the said points. Owing to the tearing thread being applied rectilinearly in such a manner that it coincides only in two points with the opening indication line, the application is appreciably facilitated without the openability being impaired, since the tearing thread, once the tearing has properly started, will follow the weakened opening indication line in the material.

An embodiment of the opening arrangement in accordance with the invention has been given the further characteristic that the tearing thread in packing containers which are manufactured from weblike material runs parallel with the direction of the web.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the tearing thread is fixed in a detachable manner to the surface layer of the packing container wall facing towards the inside of the package.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the opening indication line constitutes a sealing line between two wall parts forming the packing container.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the one end of the tearing thread extends through the opening indication line and is located outside  
5 the packing container.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the end of the tearing thread extending outside the packing container is connected to a part of the  
10 packing container material in the shape of a tearing tab.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the front end of the tearing thread located outside the packing container meets the opening indication  
15 line in an obtuse angle.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the openable part of the wall of the packing container is in the form of a turn-up lid which is pivotable  
20 about a straight line which extends between the end points of the opening indication line and delimits the openable lid part from an adjoining part of the packing container wall.

A further embodiment of the arrangement in accordance with the invention has been given the further characteristic that the said line coincides with the straight line  
25 along which the tearing thread is detachably fixed to the packing container wall.

The arrangement in accordance with the invention will be described in more detail in the following with  
30 special reference to the enclosed drawings which schematically show a preferred embodiment of the arrangement in accordance with the invention as provided in a known type of packing container.

Figure 1 shows a packing container with an opening  
35 arrangement in accordance with the invention before the opening.

Figure 2 shows the packing container in accordance

with figure 1 after the opening.

Figure 3 shows the successive phases in the manufacture of a packing container in accordance with figure 1.

The packing container shown in figure 1 is substantially of the same type as that described thoroughly in Swedish patent no. 330.505, to which reference is made. The packing container is made of a laminated all-plastic material which comprises an inside layer of foamed plastic material, e.g. polystyrene, which is covered on both sides by homogeneous layers of the same material. The central foamed carrier layer has a thickness of approx. 0,8 mm, whilst the two homogeneous outer layers have a thickness of only 0,1 mm. The combination of a relatively thick, central foamed layer and homogeneous surface layers imparts to the material a good rigidity and makes it liquid-tight at the same time. Through the choice of a thermoplastic material it becomes possible in a simple manner to heat-seal the packing container.

As will be evident from the drawing, the packing container is made of two parts, namely a semi-circular or U-shaped curved casing part 1 and a back part 2, the upper and lower end parts of which form the top part 3 and bottom part 4 of the packing container. The casing part 1 and back part 2 are joined to one another by means of a heat seal 5 extending around the whole edge surface of the casing part. The outer end of the top part 3 remote from the central portion 2' of the back part 2 has the shape of an openable lid 6, the boundary line of which against the remainder of the top part 3 coincides with a tearing thread 7 which is situated in the lower surface of the top part facing towards the inside of the package and runs substantially parallel with the folding line between the central portion 2' of the back part and the top part 3. The tearing thread 7 passes through the seal 5 in the vicinity of its end points, and the one end of the tearing thread extends a little outside the seal where it forms a gripping tab 8, wherein the tearing

thread end is attached to a projecting portion of the top part 3.

5 The tearing thread 7 extends substantially rectilinearly between two points situated symmetrically on the sealing line 5. The part of the seal 5 situated between these points (which may be weakened compared with the remaining extent of the seal) serves as an opening indication line 5' along which the seal is caused to break with the help of the tearing thread 7 when the packing container is  
10 to be opened. As mentioned previously, one end of the tearing thread 7 is attached to the opening tab 8, and the opposite end of the tearing thread, where it meets the opening indication line 5' is also durably attached to the packing container material. The portion of the tearing  
15 thread 7 situated between the said points of attachment is either wholly free or it is also joined detachably to the surface of the packing container wall facing the inside of the package.

In figure 2 the packing container in accordance with  
20 figure 1 is shown after its opening. The packing container according to figure 2 is otherwise identical with that shown in figure 1 and comprises a casing part 1, an elongated back part 2, the end parts of which form the top part 3 and bottom part 4. The lid part 6, located at the outer end of the top  
25 part 3, is shown in open or turned-up state, the straight line which extends between end points of the opening indication line 5', that is to say, the line along which the tearing thread 7 is situated before the opening, serves as a folding line or hinge. As can be seen from figure 2, after  
30 the opening of the packing container, the tearing thread 7 continues to be attached with its one end to the packing container. At the opposite end or front end of the tearing thread the opening tab 8 attached to the tearing thread is apparent which has been torn off the top part 3 on  
35 opening.

Figure 3 shows schematically the manufacture of a packing container in accordance with figures 1 and 2. The

casing part 1 and the back part 2 respectively of the packing container are manufactured from two separate webs which in the first place are mechanically processed and formed each for itself to be subsequently combined and attached to one another so as to form packing containers. The manufacturing process, which is also described in detail in Swedish patent no. 330.505 will here only be described schematically to facilitate understanding of the invention.

The two material webs consist as mentioned previously of a laminated material comprising a central layer of foamed plastic material which is covered on both sides with homogeneous thermoplastic material. One of the webs, that is to say, the web which is to form the back parts of the packing containers, is appreciably wider than the other web and is provided moreover in the vicinity of its upper edge (figure 3) with the tearing thread 7, which can be joined detachably to the homogeneous plastic layer which eventually will constitute the inside of the packing container. During the successive feed through the packing machine the packing material web is converted in that certain portions (including parts of the tearing thread) are punched out along these two edges so that a line of substantially U-shaped lugs or off-cuts located opposite one another is formed along the two edges. The lugs or off-cuts will subsequently form the top and bottom parts of the packing containers and are situated in pairs opposite one another transversely over the material web and they are connected via intermediate portions which correspond to the actual back part 2' of the finished packing container. The off-cuts, as mentioned previously, are substantially of U-shape and consist thus of a portion located closest to the centre back part 2' which is delimited by substantially parallel edge lines and an end portion which is limited by a substantially semicircular edge line. In the off-cut which is to form the top part of the packing container the semicircular edge line is broken by a pro-



jecting tearing tab 8, which extends unilaterally from the one side of the top part at even height with the tearing thread 7 running across the top part. To ensure a firmer attachment of the two end parts of the tearing thread to the top part 3 the area on the tearing tab 8 as well as the area on the opposite end or back end of the tearing thread 7 can be subjected to a warming up to softening temperature and to a compression which ensures attachment of the tearing thread ends to the material of the top part.

At the same time as the abovementioned conversion of the one material web a mechanical processing of the other material web, that is to say, the material web which is to form the casing parts 1 of the packing containers is also taking place. This material web is narrower than the material web forming the back parts and has a width which corresponds to the width of the punched-out area which is to form the actual back parts 2' of the packing container. The curved casing parts 1 of the packing containers are now formed in that the packing material web is warmed up to its softening temperature, whereupon it is subjected to a mechanical shaping process during which the material web with the help of a shaping tool is pressed down into a series of continuous U-shaped recesses. Thanks to the thermo-plastic characteristics of the material this shaping process can be done without any damage to the material and results in the material web being converted to a line of continuous U-shaped casing parts 1.

After this preliminary forming of the two material webs, they are made to run substantially parallel and are then brought together successively in such a manner that the end portions of the legs of the U-shaped casing parts come to rest against the central portion of the wider material web which is to constitute the actual back parts 2'. It is ensured that the casing parts are so placed opposite the top and bottom parts 3 and 4 respectively that these parts in a following folding-down operation end up in correct position and seal up the open sides of the casing

parts. After correct placing, a warming up of the material surfaces which are to be joined together with top and bottom parts 3 and 4 respectively takes place, whereupon the latter are folded down so that they come to rest against the lateral edges of the casing part 1 where a heat sealing is carried out in that the material parts are pressed together for a brief instant and are allowed to cool. Thereafter, the packing containers are filled with the help of a filler pipe not shown on the drawing which, making use of the flexibility of the material, extends into the continuous line of packing containers via the interspace between the back parts 2 and the end portions of the legs of the casing parts 1. The filling, like the whole of the manufacturing process, occurs whilst the material webs are in continuous movement, and simultaneously with a packing container having been filled to the required extent it is also being moved past the end of the filler pipe for the pack part to be pressed against and sealed to the leg end of the casing part, so that the packing container will now be fully closed. This continuous line of filled and closed packing containers is then divided whilst continuing its travel through the packing machine into individual packing containers, by means of a cutter, not shown, which by transverse cuts separates the still coherent packing containers from one another, whereupon the packing containers are ready.

When the packing containers are manufactured from the packing laminate mentioned earlier consisting of a central layer of foamed material, e.g. polystyrene, which is covered on both sides with thin homogeneous polystyrene layers, it is suitable for use as a tearing thread a cotton thread which is impregnated with an acrylic polymer. The thread should have a diameter of approx. 0,5 mm. As mentioned earlier, the two end parts of the thread are attached to the packing container material in that the portions which are to be joined are heated to the softening temperature of the material (approx. 235°C), whereupon the areas are allowed to cool under compression so that a heat-sealing takes place.

The part of the tearing thread located between these portions may either extend freely along the inner surface of the packing material or be joined detachably to the same, e.g. by spot heat-sealing or by a non-permanent sealing which can be achieved by carrying out the heat-sealing at a somewhat lower temperature and/or pressure.

Naturally, different materials or combinations of materials are conceivable for the layers combined in the packing laminate, bearing in mind a number of different factors, e.g. the contents for which the package is intended, the durability of the package, costs etc. The manner of realization of the tearing thread too may vary in respect of shape as well as of material and it is conceivable e.g. to give the tearing thread the shape of a relatively flat and wide band. It is also possible to attach the thread ends to the packing material with the help of an additional material, e.g. a so-called hot-melt. It is important, however, that the tearing thread should be placed so that it extends substantially rectilinearly between the two points of attachment on the edge lines of the lid part and furthermore that the tearing thread extends parallel with the direction of the web which appreciably facilitates the application. It is, of course, important that the end of the tearing thread should extend outside the packing container and it has been found appropriate to join in the manner described above the end of the tearing thread to a part of the packing container material shaped as a tearing tab 8, since this appreciably facilitates the opening of the package.

When the packing container is to be opened, the projecting tearing tab 8 is gripped and the tearing is started upwards or possibly obliquely outwards across the rounded edge lines of the openable lid part. The tearing tab will then break and will be separated from the top part proper of the packing container whilst the front end of the tearing thread 7 connected to the tearing tab 8 commences to run along and to cut through the seal between the top part 3 and the casing part 1 serving as an opening indication line 5'.

Since the end of the tearing thread 7 located outside the packing container, owing to the rounded-off outer end of the top part meets the opening indication line 5' at an oblique angle (the angle between the projecting front end of the tearing thread and the opening indication line is obtuse and preferably amounts to between 120 and 150°, which value has proved to give a safe control to allow a safe guiding of the thread), the thread will run in the right direction along the sealing line on opening. The tearing thread 7, if it is at all attached to the inside of the packing material, will then successively come loose and run along the whole opening indication line 5' until it is connected to the packing container only by its back end. Owing to the relatively great strength of the packing material compared with the strength of the opening indication line 5, the tearing thread runs without difficulty along the opening indication line. This is also helped of course by the fairly slight attachment of the major part of the thread and the fact that the inside of the packing container material is uniform and smooth, so that there is no risk of the thread running along a straight line towards its back end.

When the seal along the opening indication line 5 has been wholly broken by the thread 7, the front portion of the top part serving as a lid 6 can be folded upwards so that an opening is produced through which the contents can be emptied out. Thanks to the rounded shape of the casing part the packing container is given exceptional pouring properties and even relatively sluggishly running, highly viscous contents can be poured out in a well converging jet without after-drip.

Since the packing container material owing to its laminated and relatively thick build-up presents a certain resistance to bending, which can make the opening of the lid part 6 somewhat difficult, it may be advantageous in certain cases if the tearing thread 7 during the manufacture of the package is joined to the inner surface layer

of the packing material by a heat-seal, since this results in a certain weakening of the inner layer along the straight line between the end points of the opening indication line along which the tearing thread is fixed. This weakening of the inner layer of the packing material facilitates the folding up of the lid part and helps to make it possible moreover to keep the lid part 6 in open position without having to retain it in this position by hand.

With certain types of tearing thread there may be a risk of the tearing thread acting as a capillary tube and conducting contents through the seal and out to the end of the tearing thread located outside the packing container. This risk can, of course, be overcome in most cases by giving the tearing thread a suitable design or impregnation, but in order to obtain absolute safety it is also possible to place the thread underneath the surface layer of the packing laminate, that is to say, between the surface layer and the carrier layer. Since in such cases the thread is applied to the carrier layer before the surface layer, the thread will be partly embedded in the surface layer when the surface layer is extruded and pressed to the carrier layer, so that its function on opening of the packing container will not be jeopardized. Such a placing of the tearing thread has proved to work excellently together with e.g. the said type of laminate comprising carrier layers of plastic foam and surface layers of homogeneous polystyrene. By using such a placing of the thread it was found that the special sealing of the end parts of the tearing thread can be wholly omitted, since the fixing of the tearing thread in the material will be sufficiently strong in order to prevent the tearing thread from being pulled loose in longitudinal direction when the opening procedure is initiated.

To prevent the tearing tab 8 from suffering damage or causing a premature opening of the package catching and being pulled up during the handling of the packing container, it is possible to fold the tearing tab downwards so that it lies against the outer surface of the casing part 1 and to

fix it there with the help of an easily detachable seal. This does not make the opening any more difficult, but provides good safety against inadvertent opening.

Although the opening arrangement in accordance with  
5 the invention has been described in the foregoing in direct connection with a certain type of packing container, it is of course also possible to utilize the opening arrangement with other types of packing containers which e.g. may have a wholly different shape or be manufactured from a different  
10 material, be provided with conventional tearing indication lines in the form of weakening perforations or differ in some other manner from the preferred combination of packing container and opening arrangement shown. What matters here is only that the opening arrangement should be as specified by  
15 the invention, that it to say, that the tearing thread should extend substantially rectilinearly between two points on a non-rectilinear opening indication line and be firmly attached to the packing container wall at least at one of these points. As a result of the design in accordance with the invention,  
20 important advantages have been obtained when packing containers, e.g. of the type described, are to be manufactured automatically, which previously has not been possible. By placing the tearing thread so that its direction coincides with the direction of the web, the tearing thread of unbroken  
25 length can be applied to the packing container material at a very high rate.

Finally the opening arrangement in accordance with the invention will be very economical, since apart from the actual tearing thread no extra material is required. The tearing tab,  
30 as shown in the example described, can often be made of surplus material which otherwise would not be used.

CLAIMS

1. An opening arrangement for packing containers of the type wherein a part (6) of the packing container wall which is openable by means of a tearing thread (7) is limited by an opening indication line (5'), c h a r a c t e r i z e d  
5 i n that the opening indication line (5') is curved or arched, that the tearing thread (7) extends substantially rectilinearly between two points on the opening indication line, and that the tearing thread is firmly attached to the packing container wall at least at one of the said points.
- 10 2. An opening arrangement in accordance with claim 1, c h a r a c t e r i z e d i n that the tearing thread (7) in packing containers which are manufactured from web-like material runs parallel with the direction of the web.
3. An opening arrangement in accordance with claim 1,  
15 c h a r a c t e r i z e d i n that the tearing thread (7) is fixed in a detachable manner to the surface layer of the packing container wall facing towards the inside of the packing container.
4. An opening arrangement in accordance with any one of the  
20 preceding claims, c h a r a c t e r i z e d i n that the opening indication line (5') constitutes a sealing line between two wall parts (3, 1) forming the packing container.
5. An opening arrangement in accordance with any one of the preceding claims, c h a r a c t e r i z e d i n that the  
25 one end of the tearing thread (7) extends through the opening indication line (5') and is located outside the packing container.
6. An opening arrangement in accordance with claim 5,  
c h a r a c t e r i z e d i n that the end of the tearing  
30 thread (7) extending outside the packing container is connected to a part of the packing container material in the shape of a tearing tab (8).
7. An opening arrangement in accordance with any one of the preceding claims, c h a r a c t e r i z e d i n that the  
35 front end of the tearing thread located outside the packing container meets the opening indication line (5') at an obtuse

angle.

8. An opening arrangement in accordance with any one of the preceding claims, c h a r a c t e r i z e d i n that the openable part of the wall of the packing container is in
- 5 the form of a turn-up lid (6) which is pivotable about a straight line which extends between the end points of the opening indication line (5') and delimits the openable lid part (6) from an adjoining part of the packing container wall (3).
- 10 9. An opening arrangement in accordance with claim 8, c h a r a c t e r i z e d i n that the said line coincides with the straight line along which the tearing thread (7) is detachably fixed to the packing container wall.



Fig. 1

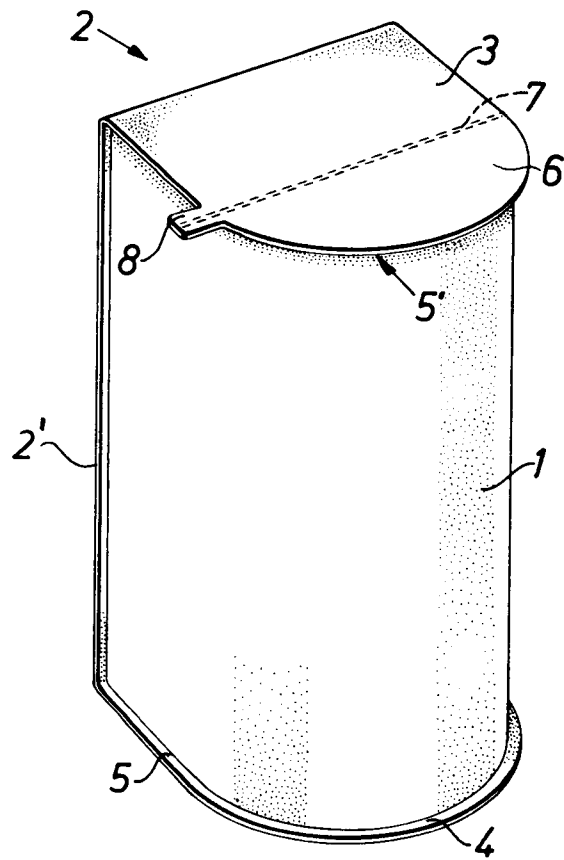
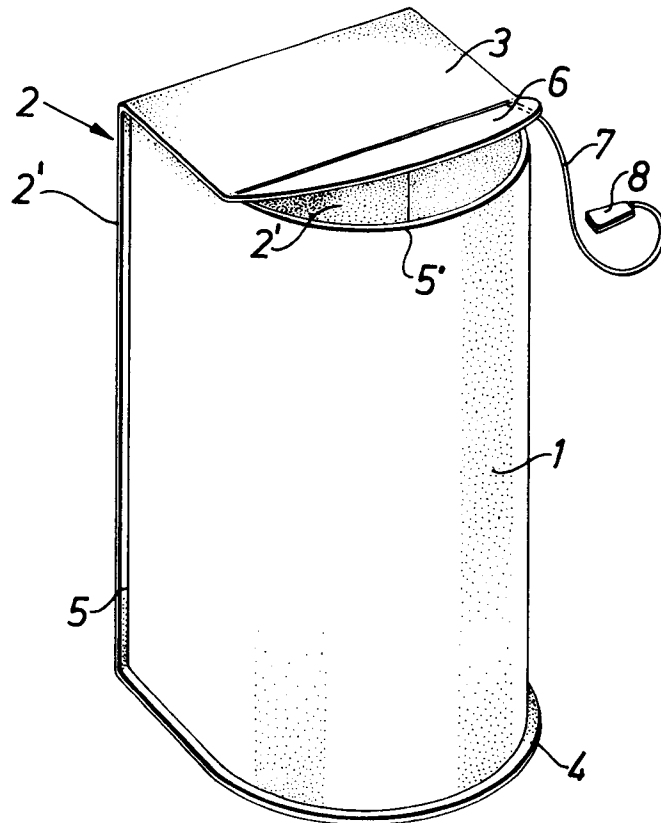
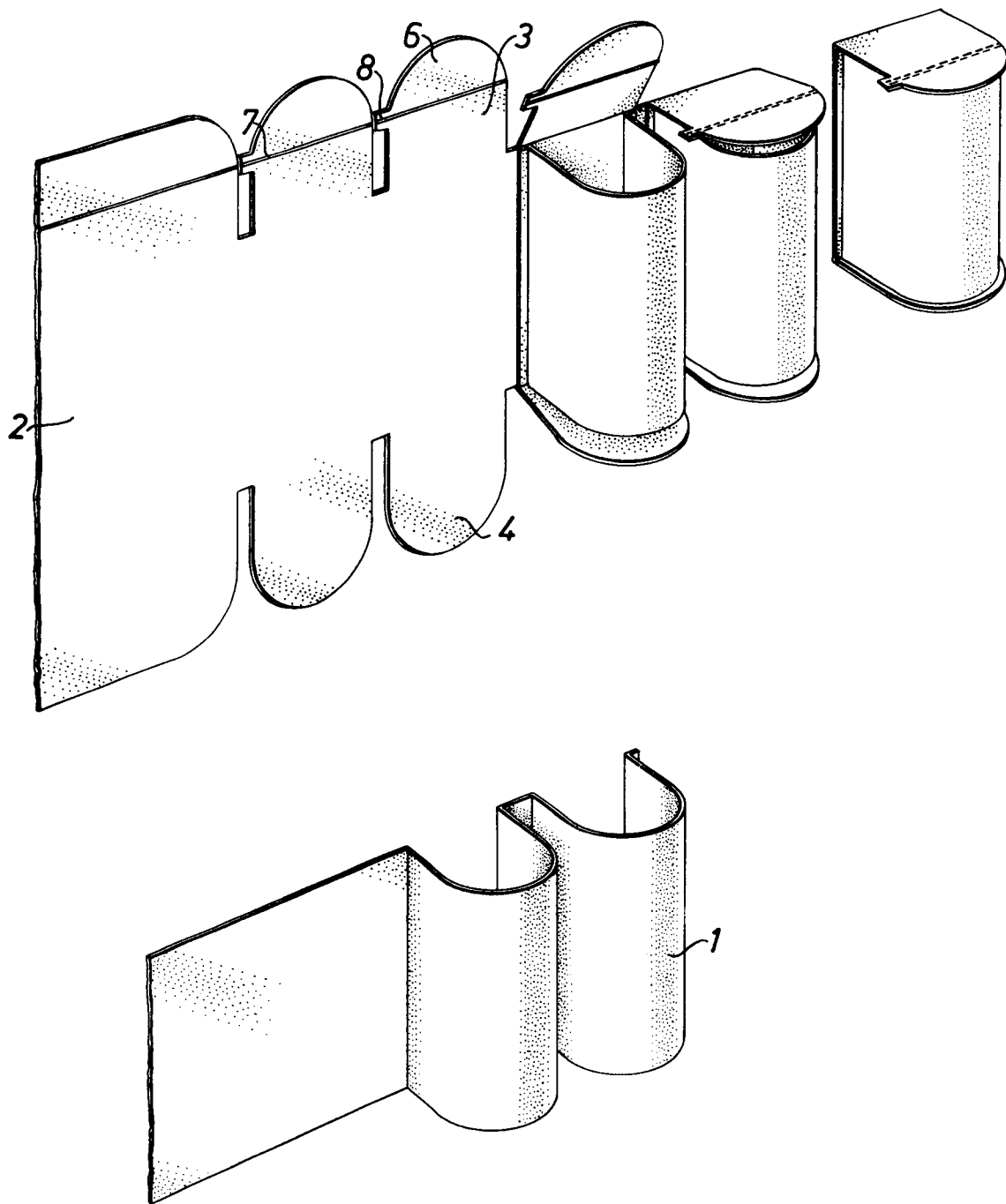


Fig. 2



*Fig. 3*



European Patent  
Office

# EUROPEAN SEARCH REPORT

0006652  
Application number

EP 79200294.1

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>DE - A - 1 611 678</u> (PAAL) --	1	B 65 D 17/46
X	<u>US - A - 1 878 677</u> (CURTIS) --	1,8	
	<u>FR - A1 - 2 332 923</u> (NATRONAG...) --	2,3,6	
D	<u>SE - A - 330 505</u> (TETRA PAK INT.) ----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.3)
			B 65 D 5/54 17/01 - 17/26
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X	The present search report has been drawn up for all claims		&: member of the same patent family, corresponding document
Place of search VIENNA		Date of completion of the search 10-09-79	Examiner JANC