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(54) Tamper-evident closure of a folding box

(57) The present invention provides a tamper-evident closure of a box providing a latch (107,104) with at least one side flap (108,106) and an opening (111,113) wherein the width of the opening (111,113), is smaller

than the width of the latch (107,104) and the expandable at least one side flap (108,106); the at least one side flap (108,106) is foldable prior insertion into the opening (111,113); and the at least one side flap (108,106) is expandable after insertion into the opening (111,113).

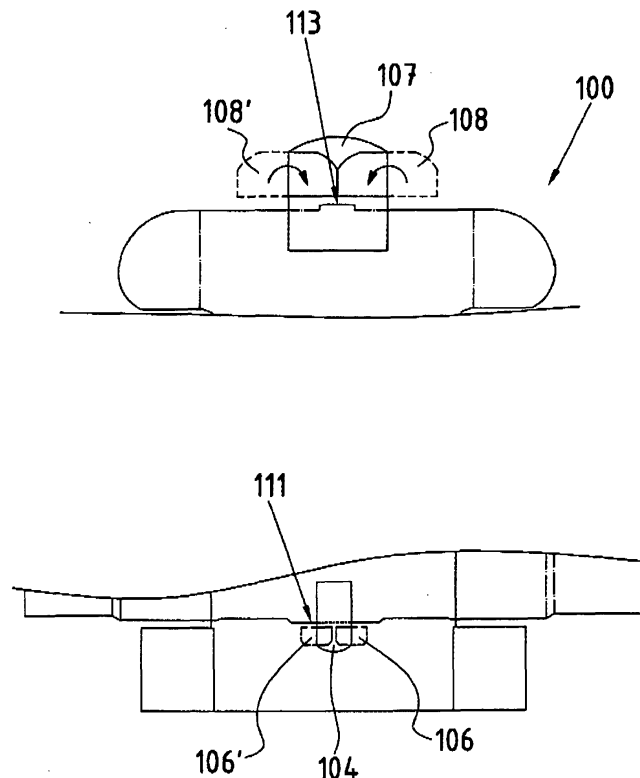


Fig.2

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Description

[0001] The invention relates to tamper-evident closures of boxes providing a latch with at least one side flap and an opening.

[0002] According to the prior art, folding boxes are known which comprise a tamper-evident closure, wherein the closure must be glued during the final assembly of the folding box. Alternatively, folding boxes are provided with an adhesive label or sealed by thermoplastic adhesive gluing. In the case that boxes are individually packed due to customer requests, additional steps for gluing the closure prolong the final assembly process and make the shipment more expensive. Hence, there is a need for a folding box provided with a tamper-evident closure without adhesive.

[0003] The objective of the invention is to provide a tamper-evident closure for a folding box which can be closed without gluing, and which only can be opened by mechanically damaging the packing material.

[0004] According to the invention this objective is achieved by a tamper-evident closure of a box providing a latch with at least one side flap and an opening

- wherein the width of the opening, is smaller than the width of the latch and the expandable at least one side flap;
- wherein the at least one side flap is foldable prior insertion into the opening and
- wherein the at least one side flap is expandable after insertion into the opening.

[0005] The embodiments of the present invention provide a box with at least one tamper-evident closure including a first latch and a second latch and at least one opening, wherein the closure of the box can be mechanically closed without the need for gluing, and the closure can be opened only by destroying the original tamper-evident closure, wherein the box comprises

- a first latch with at least one side flap;
- a first opening of the box for inserting the first latch;
- wherein the at least one side flap of the first latch is foldable; and
- wherein the at least one side flap is expandable after inserting the side flap through the first opening into the inside of the box due to the intrinsic elasticity of the material.

[0006] The idea of the present invention is to provide a folding box with a tamper-evident closure. The closing mechanism provides an irreversible process of expansion of some side flaps of insertion latches once on closure inserted into the folding box. Due to irreversibility of the tamper-evident closure, the reopening of the folding box can merely occur by visibly damaging the packing material. Further, the combination of several latches also provides a high stiffness of the paperboard material at

the closure. Thus, a tool i.e. knives or scissors are needed to open the latches. As a result unauthorised opening e.g. during the periods of transport or storing, will become difficult and will be apparent. Nevertheless, the tamper-evident closure may be closed with just manual folding of the side flaps of the latches during insertion of the latches into provided openings of the folding box. Thus, the originality of transported and packed goods, e.g. in case of providing a special quality or service to the customer can be guaranteed, if the folding box is evidently undamaged.

[0007] In an advantageous implementation the latch is made of a piece of material with an intrinsic elasticity comprising paperboard, rubber, metal or a plastic material. Advantageously the elasticity of the material allows the expanding of the side flaps of the latches inside the box. A combination of several elastic materials or inelastic and elastic materials may be chosen. The choice of the elasticity of the materials and the shape of the side flaps for supporting the particular property of elasticity depends on the properties of expandability, favourable for achieving the irreversibility of the tamper-evident closure.

[0008] In an advantageous Implementation the at least one side flap of the first latch provides a break line along a folding line, for allowing that the first time the box is opened, the side flap cooperates with the box side walls and is torn off at the predetermined break line when the side flap is moved beyond the tearing edge. Advantageously the side flap may be thorn off, once the box is opened. In some applications of tamper-evident closures the mere fact that the closure has once been opened is crucial, but the opening should be easy to handle, the break lines may support the opening, by pulling the latch and coincidentally provide information of the originality of the closure.

[0009] In an advantageous implementation the at least one side flap is provided with a rounded corner in the area of the folding line and that a latch is provided with at least a rounded edge in the area of the folding line in order to allow a smooth insertion when the side flaps are foldable adjacent towards the centre of the particular first or second latch.

[0010] In an advantageous implementation at least part of the side flap and particular latch are made of an electric conducting material crossing the break line in order to allow triggering an alarm when at least one side flap is being torn off the particular latch, while breaking the tamper-evident closure. Advantageously an alarming may be connected to the closure, for allowing, that and when the closure of the box has been broken.

[0011] In an advantageous implementation the opening provides a height dimension which is at least as high as the material thickness of the latch and the foldable side flap.

[0012] In an advantageous implementation the width of the opening is at least the width of the latch main body and at least smaller than the overall width of the at least

one side flap and the latch main body.

[0013] In an advantageous implementation the opening provides a width and a height dimension wherein the height is at least two times the material thickness of the box.

[0014] In an advantageous implementation the box is provided with

- a second latch with at least one side flap;
- a second opening in the first latch for inserting the second latch;
- wherein the at least one side flap of the first latch is foldable and
- wherein the at least one side flap is expandable after inserting the flap through the first opening into the inside of the box due to the intrinsic elasticity of the material.

[0015] In an advantageous implementation a blank for folding the box is designed as a single piece of material, comprising all of the flaps and latches cited.

[0016] In an advantageous implementation the at least one side flap of the second latch is securing the first latch of the tamper-evident closure by interlocking. Advantageously, the interlocking provides an additional security against unauthorised opening of the box. Also it provides more mechanical stiffness of the closure of the box.

[0017] In an advantageous implementation the dimensions of the second latch is at least smaller than the dimensions of the first latch.

[0018] Additional advantages, special features and practical refinements of the invention can be gleaned from the subordinate claims and from the presentation below of preferred embodiments making reference to the figures.

[0019] The figures show the following:

- Figure 1 a schematic view of the paperboard blank;
- Figure 2 a schematic view on the first and second latch providing side flaps;
- Figure 3 a perspective view of the folded box folding the first latch;
- Figure 4 a perspective view on the folded box folding the second latch with side flaps into the first latch; and
- Figure 5 a perspective view of the inside of the folded box on the interlocking first and second latch with expanded side flaps.

[0020] The box 300 according to the present invention provides a package sealed with a tamper-evident closure for transporting of physical mail object in particular for goods of high value or quality.

[0021] Figure 1 shows a box 300 in form of a paper-

board blank 100 according to the present invention.

[0022] The box 300 provides several insertion tabs, latches and flaps, which are folded together in a kind of self-explanatory way for easily forming a universal transport box 300 e.g. for the transportation of physical mailing goods or other physical objects. Similar boxes are known to the person of skill in the art.

[0023] This embodiment of the present invention provides a first latch 107 and a second latch 104 each provided with side flaps 108, 108' in the case of the first latch 107, and side flaps 106, 106' in the case of the second latch 104.

[0024] The first latch 107 is made of one piece of paperboard, which is cut out as one piece of the paperboard blank 100. The first latch 107 provides an opening adjacent to the folding line of the first latch 107 which is in particular one third of the latch gauge in the area of the folding line 117. However the second opening 113 is at least as broad as the gauge of the second latch 104, in order to receive the second latch 104 with folded side flaps 106, 106' inside the box 300 after entering through the first opening 111.

[0025] The second latch 104 is made of one piece of paperboard, which is at least partly cut out as one piece of the paperboard blank 100. The second latch 104 provides two openings adjacent to the folding line 127 on either side of the latch. When the box 300 is being assembled the cut out of the second latch 104 together with the adjacent parts of the first opening 111 form one first opening 111, which is in particular at least as broad as the width of the first latch 107, in order to receive the first latch 107 with side flaps 108, 108' in folded state inside the box 300 after entering through the first opening 111.

[0026] The first and second latch 107, 104 are provided with both an interior side and an exterior side. The exterior side is equally the exterior side of the folded paper box 300 and the opposite side to the exterior side is defined as the interior side.

[0027] Figure 3 shows a partly folded box 300 with a hinged lid 305, about to be closed by inserting the first latch 107 into the first opening 111 at the front face of the box 300. Prior insertion of the first latch 107 of the paperboard material has to be folded at the folding line 117 in a rectangular manner at the middle of the first latch 107, adjacent to the second opening 113, providing second latch 104 in form of a preferably round capped head type part to be inserted and a latch main body. The term latch main body indicates the body of the latch without the additional side flaps. The first latch 107 is provided two side flaps 108, 108' which are folded towards the centre of the interior side of the first latch 107 as implied by the curved arrows 301, 301' into a folded position as indicated in dashed lines. Then the box 300 is closed by folding the hinged lid 305 and inserting the first latch 107 into the first opening 111 in step 303.

[0028] Once inserted into the first opening 111 the side flaps 108, 108' of the first latch 107 will expand inside the box, because of the intrinsic elasticity forces of the

paperboard material. In order to allow an expanding, a cavity or some space will be provided inside the box 300 to allow the expanding of the side flaps 108, 108' of the first latch 107.

[0029] Figure 4 shows the way to fold the side flaps 106, 106' of the second latch 104 toward the interior side of the second latch 104. Further the second latch 104 is folded at the folding line 127 in preferably the middle of the second latch 104. The second latch 104 is now inserted into the second opening 113, which is now adjacent to the first opening 111 and the folding line 127 of the hinged lid 305 of the box. After insertion the second latch 104 provides a smooth and flat surface of the box. The side flaps 106, 106' once entering the inside of the box, will expand due to the intrinsic elasticity of the material. Some space in the environment of the side flaps of the first and second latch 107, 104 has to be reserved for expanding the side flaps 108, 108', 106, 106' inside the box.

[0030] Once first latch 107 with its side flaps 108, 108' is inserted into the box 300 by means of the expansion of the side latches 108, 108' the first latch 107 is providing an interlock with the box 300 material surrounding the first opening 111.

Once the first latch 107 has been inserted, the expansion of the side flaps 108, 108' is irreversible because the user cannot act on reversing the expansion of the side flaps 108, 108' in the interior of the box. Hence, the first latch 107 can not be extracted of its position. Thus, the box 300 cannot be reopened by simply extracting the first latch 107 through the first opening 111. The side flaps 108, 108' will provide a mechanical shear force on the side walls of the box 300 when pulling back the first latch 107. If the user will try to reopen the box 300 by simply extracting the first latch 107, he will either tear off the side flaps 108, 108' of the first latch 107, or he will damage the sidewalls of the folding box. Also by means of some tools like a pair of scissors or a knife, it would be not possible to reverse the expansion the side flaps 108, 108' of the first latch 107. The only way to be open the box 300 is to either damage either the sidewalls or the latches of the box 300 in order to open up the first opening 111, thus that the side flaps 108, 108' of the first latch 107 with the possible to pass the opening, all by clearing of the side flaps 108, 108' or by damaging the first latch 107. In any of the aforementioned cases, the tamper-evident closure will be destroyed or some damage will be made to the outside of the box, which is recognizable and easily visible from a distance.

[0031] Figure 5 shows the expanded side flaps 108, 108' of the first latch 107 and the side flaps 106, 106' of the second latch 104 expanded inside the box. As well the interlocking of the first latch 107 and the second latch 104 is schematically shown. As described before concerning the first latch 107, the second latch 104, with its side flaps 106, 106' is interlocking the first latch 107. As mentioned above in case that the user will try to reopen the box 300 by simply extracting the second latch 104,

either the side flaps 106, 106' of the second latch 104 will be torn off, or the first latch 107 and the sidewalls of the folding box 300 will be damaged.

[0032] By means of the interlocking between the first latch 107 which is rectangular to the second latch 104, and the latter, the mechanical forces to pull one of the latches in order to open the box 300 need to be rather high. Further the material of the latches reinforces the paperboard material in the closure area, hence, the forces to be injected by reopening need to be rather high.

[0033] Thus, it is not possible to reopen the box 300 by just pulling one of the two latches. The use of a tool e.g. a knife or a pair of scissors for damaging the sidewalls of the folding box 300 or cutting the latches is necessary. The damaged on the folding box 300 are visible, obvious to recognize even from a distance.

[0034] In one embodiment both the latches and the site flaps are provided with rounded caps in order to achieve a more easy insertion of the respective first latch 107 or second latch 104 into the respective opening on the folding box.

[0035] The material for providing such an intrinsic elasticity may not only be limited to paperboard or corrugated board. There is a choice of materials coming into the mind of the person of skill in the art which provides an intrinsic elasticity which can be used to design latches with suitable elastic expansion side flaps. A choice of these materials may be any kind of plastic material, metal, rubber, etc.

[0036] Also the combination of the above materials without the material for example by providing an inflexible material for that match and a highly flexible material like rather for the sites that may come into the mind of the person skilled in the art.

[0037] Further the site flaps may in particular be formed in order to have a break line 115, 115', 125, 125' which will be very easy to be tom-off, by pulling the respective latch out of the opening of the box. The torn-off side flaps of the latch will then be left over in the inside of the box. The break lines can be realised by grooves in the material, with perforation or by cutting the material along the folding line adjacent to the respective latch. Further the material of the site flaps may be especially shaped for example with notches or cuts, in order fail under excess mechanical stress.

[0038] Additionally further in one embodiment the site flaps may not only be provided with break lines in order to be torn off, further carrier material for example paperboard could be provided with a layer of an electrical conducting material, which will provide an electrical connection between the latch and the side flaps. Providing mechanical stress by pulling the latch in order to shear off the side flaps at the break line, an electrical conductor will be disrupted. This could lead to the interruption of an electrical circuit which itself for providing an automatic remote or local alarm of a security system inside the box.

List of reference numerals:**[0039]**

100	Foldable paperboard blank	5
104	Second latch	
106, 106'	Side flap of second latch	10
107	First latch	
108, 108'	Side flap of first latch	
111	First opening	15
113	Second opening	
115, 115'	Break line at first latch	20
117	Folding line	
125, 125'	Break line at second latch	
127	Folding line	25
210	First latch and first opening	
220	Second latch and second opening	30
301, 301'	Folding the latches	
303	Insertion of the first latch	
305	Hinged lid	35
500	Inside view of the folding box	

Claims

1. A tamper-evident closure of a box providing a latch (107, 104) with at least one side flap (108, 108', 106, 106') and an opening (111, 113)

- wherein the width of the opening (111, 113), is smaller than the width of the latch (107, 104) and the expandable at least one side flap (108, 108', 106, 106');
 - wherein the at least one side flap (108, 108', 106, 106') is foldable prior insertion into the opening (111, 113); and
 - wherein the at least one side flap (108, 108', 106, 106') is expandable after insertion into the opening (111, 113).

2. The tamper-evident closure of claim 1, wherein the latch (107, 104) is made of a piece of material with

an intrinsic elasticity comprising paperboard, rubber, metal or a plastic material.

3. The tamper-evident closure of claim 1 to 2, wherein the at least one side flap (108, 108', 106, 106') of the first latch (107) provides a break line (115, 115') along a folding line, for allowing that the first time the box is opened, the side flap (108, 108', 106, 106') cooperates with the box side walls and is torn off at the predetermined break line (115, 115') when the side flap (108, 108', 106, 106') is moved beyond the tearing edge.

4. The tamper-evident closure of claim 1 to 3, wherein the at least one side flap is provided with a rounded corner in the area of the folding line and that a latch (107, 104) is provided with at least a rounded edge in the area of the folding line in order to allow a smooth insertion when the side flaps (108, 108', 106, 106') are foldable adjacent towards the centre of the particular first or second latch (107, 104).

5. The tamper-evident closure of claim 1 to 4, wherein at least part of the side flap (108, 108', 106, 106') and particular latch (107, 104) are made of an electric conducting material crossing the break line in order to allow triggering an alarm when at least one side flap (108, 108', 106, 106') is being torn off the particular latch (107, 104), while breaking the tamper-evident closure.

6. The tamper-evident closure of claim 1 to 5, wherein the opening provides a height dimension which is at least as high as the material thickness of the latch (107, 104) and the foldable side flap (108, 108', 106, 106').

7. A box (100) with at least one tamper-evident closure including a first latch (107) and a second latch (104) and at least one opening according to claim 1, wherein the closure of the box (100) can be mechanically closed without the need for gluing, and the closure can be opened only by destroying the original tamper-evident closure, wherein the box (100) comprises

- a first latch (107) with at least one side flap (108, 108');
 - a first opening (111) of the box for inserting the first latch (107);
 - wherein the at least one side flap (108, 108') of the first latch (107) is foldable; and
 - wherein the at least one side flap (108, 108') is expandable after inserting the side flap (108, 108') through the first opening (111) in the inside of the box due to the intrinsic elasticity of the material.

8. The box (100) of claim 7, wherein the box is provided with
- a second latch (104) with at least one side flap (106, 106'); 5
 - a second opening (113) in the first latch (107) for inserting the second latch (104);
 - wherein the at least one side flap (108, 108') of the first latch (107) is foldable and
 - wherein the at least one side flap (106, 106') 10 is expandable after inserting the flap through the first opening (111) in the inside of the box due to the intrinsic elasticity of the material.
9. The box (100) of claim 8, wherein a blank for folding the box (100) is designed as a single piece of material, comprising all of the flaps and latches cited. 15
10. The box (100) of claim 8 to 9, wherein the at least one side flap of the second latch (104) is securing the first latch (107) of the tamper-evident closure by interlocking. 20
11. The box (100) of claim 8 to 10, wherein the dimensions of the second latch (104) is at least smaller 25 than the dimensions of the first latch (107).

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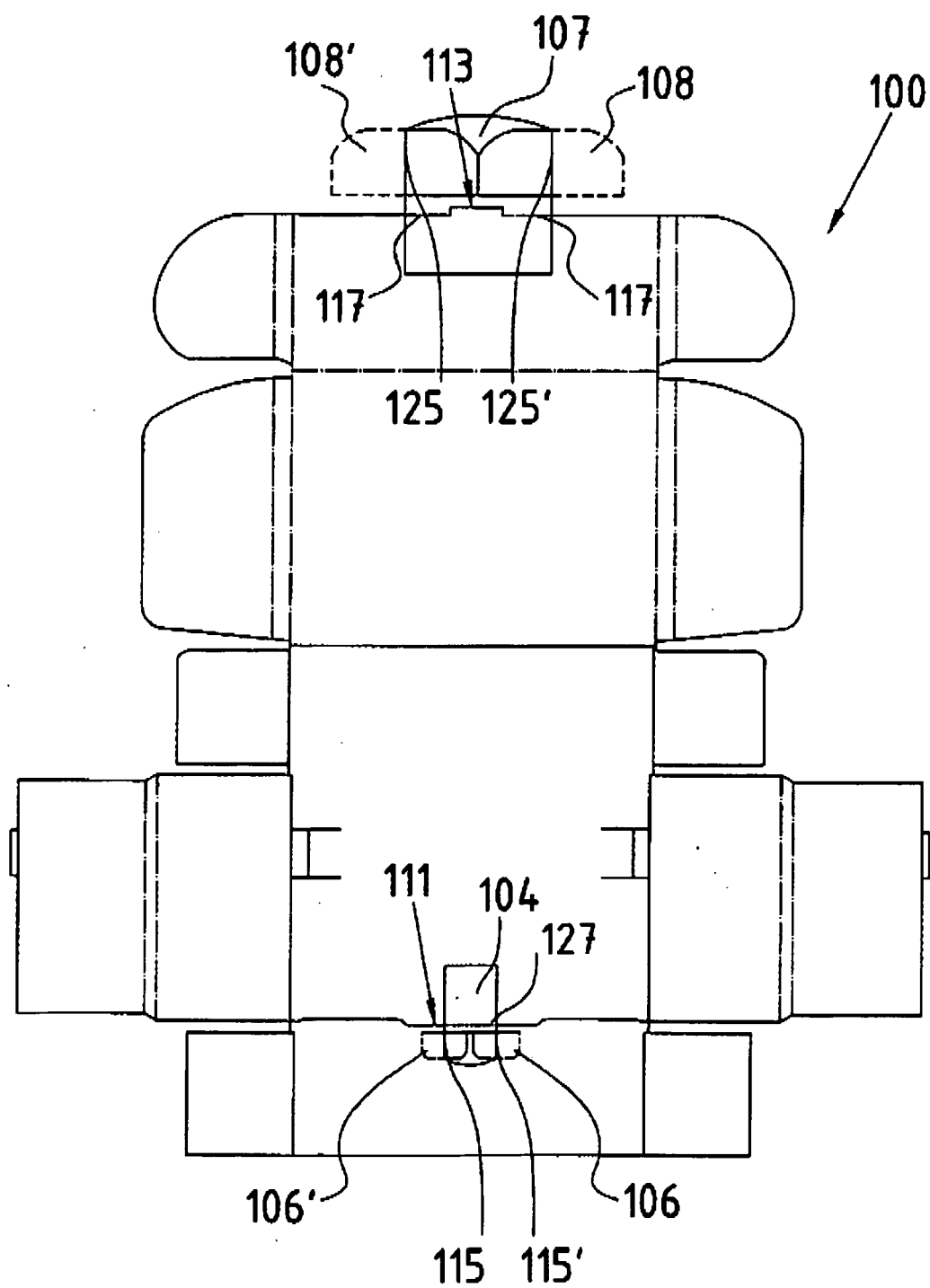


Fig.1

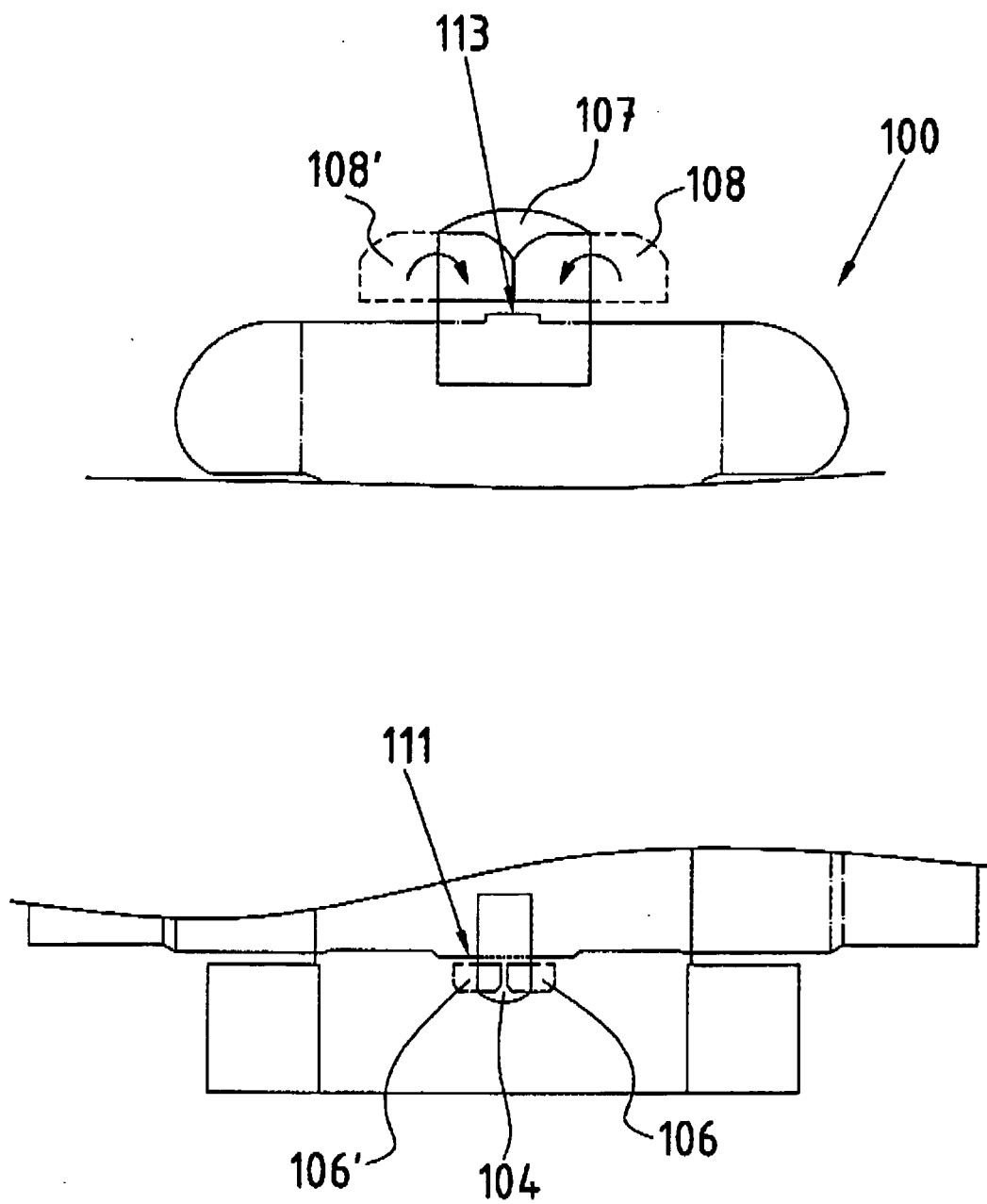


Fig.2

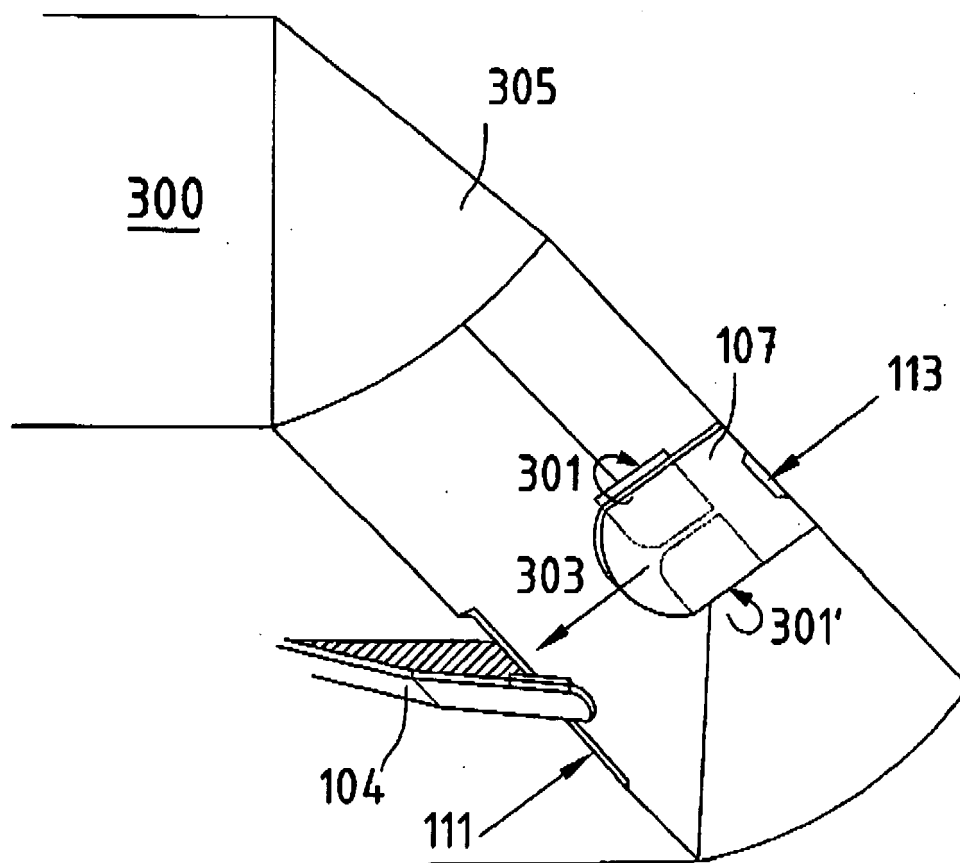


Fig.3

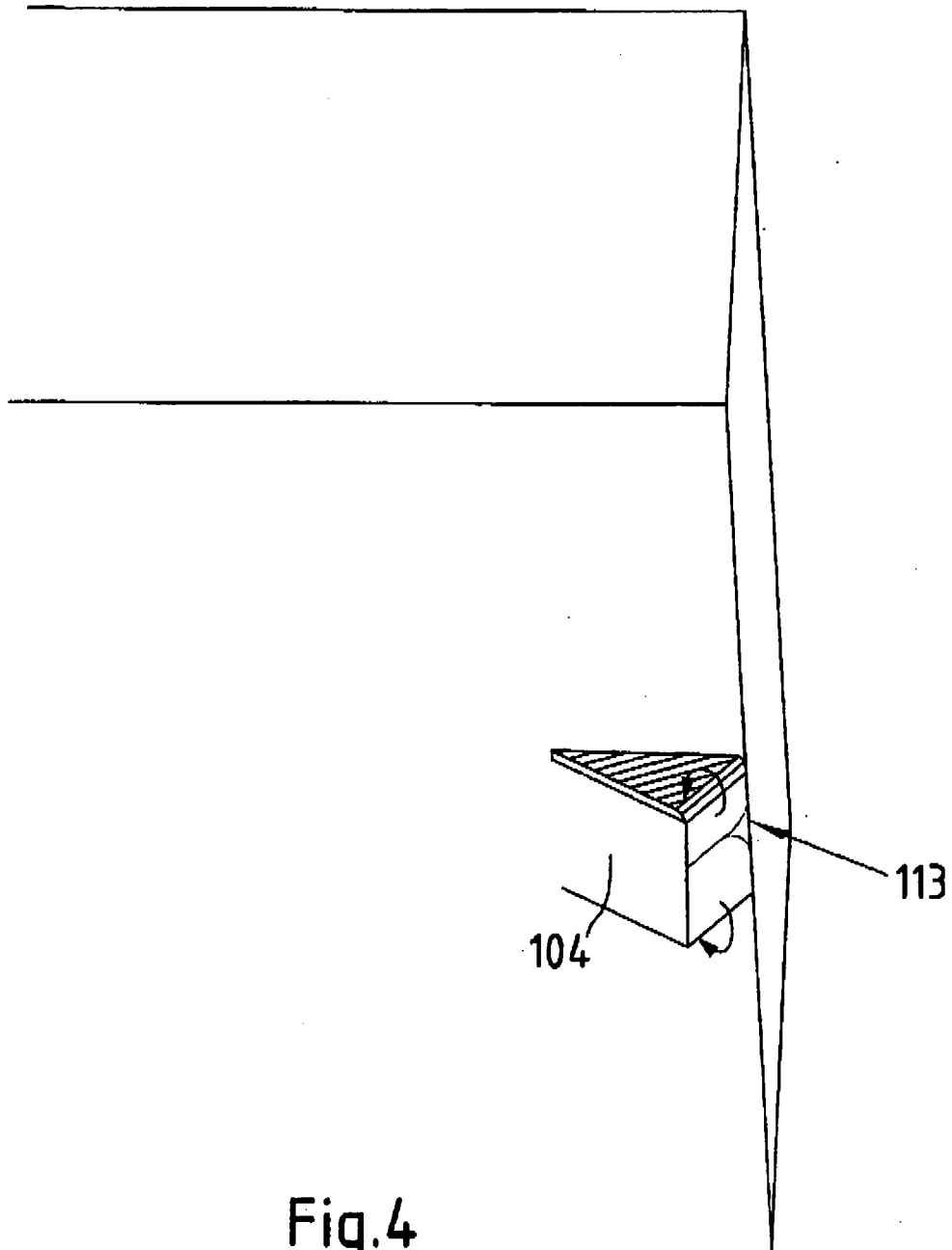


Fig.4

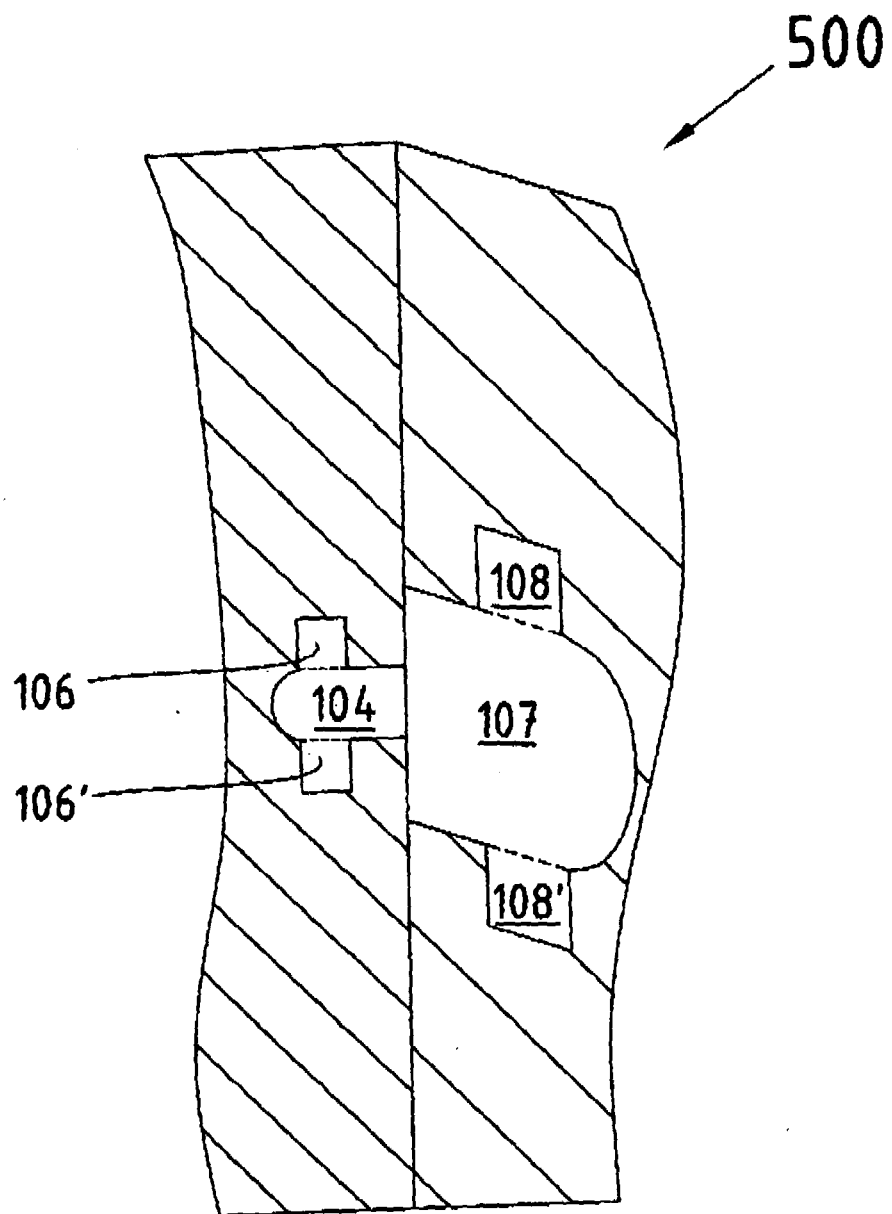


Fig.5



EUROPEAN SEARCH REPORT

Application Number
EP 09 01 3291

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 1 108 464 A (F.W. MOREY) 25 August 1914 (1914-08-25)	1-2,6-7	INV. B65D5/54 B65D5/66
Y	* page 1, line 27 - line 55; figures 1,4 *	8-11	
Y	US 2 331 754 A (WOHLERS FRIEDRICH H N) 12 October 1943 (1943-10-12) * page 1, left-hand column, line 36 - right-hand column, line 12; figure 1 *	8-11	
X	US 5 236 122 A (BALLARD JEFFREY A [US]) 17 August 1993 (1993-08-17) * column 2, line 9 - line 20 * * column 3, line 5 - line 16; figure 1 *	1-2,6-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 March 2010	Examiner Vesterholm, Mika
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			

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EPO FORM 1503 03.82 (P04C01)



Application Number

EP 09 01 3291

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements 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.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ 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 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 invention first mentioned in the claims, namely claims:

see additional sheet(s)

☐ The present supplementary 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 (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 09 01 3291

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

1. claims: 1-2, 6-11

Tamper evident closure for a box which can be closed without
gluing

2. claim: 3

Providing easy opening for the tamper evident structure

3. claim: 4

Allowing smooth insertion of the latch

4. claim: 5

Triggering an alarm when the flap is torn off

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 01 3291

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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17-03-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1108464	A	NONE	
US 2331754	A	12-10-1943	NONE
US 5236122	A	17-08-1993	CA 2093245 A1 24-03-1994