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(71) Applicant: **Envopak Group Limited**
**Planmail House Edgington Way**
**Sidcup Kent, DA14 5BH(GB)**

(72) Inventor: **Benjamins, Arthur**
**Planmail House, Edginton Way**
**Sidcup, Kent, DA 14 5BH(GB)**

(74) Representative: **Lewin, John Harvey**
**Elkington and Fife Prospect House 8**
**Pembroke Road**
**Sevenoaks, Kent TN13 1XR (GB)**

## (54) A locking device.

(57) The invention provides a device for locking an article closure member (4) in its article closing position, comprising:

a base member (1) securable permanently to the article and having means (11) for aligning the closure member (4) in said article closing position so that it overlaps at least part of said base member;

the aligning means (11) defining at least part of an entrance for receiving part of a disposable locking element (27); and

a disposable locking element (27), completely separate from said base member (1) and made of synthetic plastics material;

the disposable element (27) having a plug part (32) which is resiliently yieldable and slidingly insertable through, but not slidingly retractable from, the entrance of said aligning means.

The base member (1) includes means (34) for temporarily holding the disposable element (27) with the plug part adjacent to but outside said entrance, and for guiding sliding insertion of the plug part of the disposable element into said entrance.

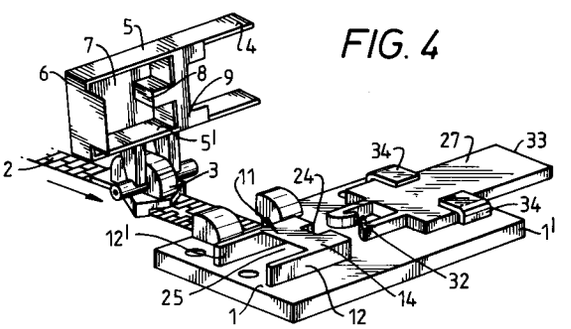



FIG. 4

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This invention relates to a locking device, and more particularly to a device for locking a container such as a re-usable envelope or a box in tamper-evident fashion.

Our earlier GB-A-1 424 680 discloses a locking device which has been in commercial use with great success for several years. Figures 1 and 2 of the accompanying drawings show a preferred embodiment of locking device according to this prior patent. According to this embodiment, a zip fastener 13 on a re-usable envelope 10 can be locked in tamper-evident fashion, i.e. if it is unlocked by other than authorised personnel, such interference will be evident by damage to a disposable locking element 18. Upper and lower plates 19 and 20 are attached to the envelope 10 near the end of the zip. The closing mechanism of the zip includes a slider 15 with pull tab 16 which, when the zip has been fastened, can lie flat over the upper plate 19, guided by upstanding lugs 19', a central hole in the tab 16 passing over a raised housing 23' integral with the upper plate 19. The housing 23' has a slot-shaped entrance 22 for receiving a disposable locking element 18 of synthetic plastics material. The locking element has a plug part 29, joined by a stem part 28 with a narrow weakened section 31, to a head part 26. The plug part is of flat arrow-head formation with swept back barbs 30 which are resiliently deformable within the general plane of the arrow-head to reduce the span of the barbs. This span in the non-deformed condition is slightly greater than the width of the entrance 22. The plug part 29 can thus be pushed through the entrance 22 with inward deformation of the barbs 30, and after such insertion the barbs return to their original span. withdrawal of the plug part from the housing is then prevented by engagement between the barbs and the internal surface of the housing on each side of the entrance 22. The head part 26 remains outside the housing and lies flat on top of part of the pull tab 16, thereby preventing the pull tab from being lifted. The zip can then only be undone by breaking the locking element at the weakened section 31, thereby permitting the pull tab to be lifted.

We have sought to improve the above device. In the use of the above device, the disposable locking element has to be inserted into the housing when the zip is in the closed position and not before. In a typical office there may be a large number of such re-usable envelopes which all have to be sealed in a short period at the end of the working day. In many such operations it is often desirable that a seal of selected identity is used with a given container. It would therefore be advantageous if the disposable locking elements could be "pre-loaded" in such a way that they could easily be inserted into the housing on closing of the zip fasteners. The present invention is based on a recognition of this problem and the provision of a solution thereto.

The present invention provides a device for locking an article closure member in its article closing position, comprising:

a base member securable permanently to the article and having means for aligning the closure member in said article closing position so that it overlaps at least part of said base member;

the aligning means defining at least part of an entrance for receiving part of a disposable locking element; and

a disposable locking element, completely separate from said base member and made of synthetic plastics material;

the disposable element having a plug part which is resiliently yieldable and slidingly insertable through, but not slidingly retractable from, the entrance of said aligning means;

the disposable element also having a head part connected to the plug part, the head part being outside said aligning means, and also covering part of the closure member to prevent it being disengaged from the aligning means, when the plug part has been inserted through the entrance, and whilst in such position being accessible for manual manipulation for allowing the head part to be rupturably removed from the plug part, thereby to allow the closure member to be removed from the aligning means and the now separate plug part to be removed, whereafter the base member and the aligning means can be re-used with a fresh disposable element to re-lock the article closure member when desired,

characterised in that the base member includes means for temporarily holding the disposable element with the plug part adjacent to but outside said entrance, and for guiding sliding insertion of the plug part of the disposable element into said entrance.

Reference is now made to the accompanying drawings, in which:

Figure 1 is a perspective view of a locking device according to GB-A-1 424 680 as already described;

Figure 2 is a central longitudinal section of the locking device shown in Figure 1;

Figure 3 is a perspective view showing a base member and disposable locking element in one embodiment of the present invention;

Figure 4 corresponds to Figure 3 and shows the article closure member in the open position;

Figure 5 corresponds to Figure 4 and shows the article closure member in the closed position;

Figure 6 corresponds to Figure 5 and illustrates the manual breakage of the disposable locking element;

Figure 7 corresponds to Figure 6 and shows the reopening of the article closure member with release of the broken disposable element;

Figure 8 shows an application of a locking device according to the invention to a box-type container, in the open position; and

Figure 9 corresponds to Figure 8 and shows the closed position.

Referring now to Figures 3 to 7, there is shown a base member 1 which is permanently attached to an article to be locked, such as a re-usable envelope. The article is closed by a zip fastener 2 provided with a slider 3. The base member 1 is adjacent to the end of the zip fastener 2 at the point where it is finally closed by the slider 3. Hinged to the slider 3 is an article closure member 4 such that it acts as a pull tab for the slider.

The article closure member 4 is generally rectangular, and comprises side walls 5 and 5', an end wall 6, and a roof 7. The end opposite to the end wall 6 is generally open, but includes a central pillar 8 and a base part 9.

The base member 1 includes aligning means 11 in the form of upstanding side walls 12 and 12', and an end portion 14 which includes a shaped recess 24 and an opening 25.

The base member 1 extends to one side of the zip 2 and this extended portion 1' is for temporarily holding a disposable locking element 27. The element 27 is made of synthetic plastics material, such as polypropylene which has the required balance of resilient and brittle properties, as described below. The disposable element includes a plug part 32 comprising two arrow-head formations with inwardly directed barbs. The plug part is integral with a head part 33.

The closure member 4 is shaped and dimensioned so as to be capable of fitting over the aligning means 11, as shown in Figure 5. In this position, the side walls 5 and 5' of the closure member fit on the outside of the side walls 12 and 12', respectively, of the aligning means. The end wall 6 of the closure member is provided with an extended lower end 6' which fits over the edge of the base member 1, and completely obscures access to the chamber defined by the closure member, the aligning means and the base member. This chamber has an end opening defined by the open end of the closure member and the opening 25 in the aligning means. The recess 24 in the aligning means cooperates with the pillar 8 of the closure member to assist in aligning the closure member in its closed position. In this closed position, locking is effected by sliding the plug part of the disposable element 27 through the opening and into the chamber. In this sliding action, the arrow-head formations of the plug part 32 pass to each side of the pillar 8 and the barbs are outwardly deformed. Once the barbs have passed the pillar, they resiliently return to their original shape and prevent sliding withdrawal of the locking element 27 without breaking part of it.

When opening is to be effected by authorised personnel, the head part 33 of the disposable element, which remains outside the chamber in the locked position, is manually manipulated upwardly as shown in Figure 6, until the disposable element is ruptured at the point where the plug part meets the head part. The thickness of the disposable element at this part, and the properties of the synethetic plastics material, are chosen so that such breakage is effected fairly easily, whilst also permitting the resilient deformation of the plug part. In the locked position, the plug part covers the base portion 9 of the closure member, and prevents lifting of the closure member without breakage of the disposable element. However, once the disposable element has been broken, in the authorised fashion, the closure member can be lifted again, as shown in Figure 7, and the zip 2 can then be opened as usual. The broken plug part 32 is removed from the now open chamber and locking can thereafter be effected with a fresh disposable element.

The base member 1 includes holding and aligning means 34 on the extended side portion 1'. The holding and alignment means comprise a pair of upstanding lugs with upper, inwardly overhanging portions. These define at least part of a channel which cooperates with the lateral edges of the disposable element 27. The disposable element can thus be temporarily held in position on the base plate, as shown in Figure 4, with the plug portion 32 just outside the entrance to the chamber defined by the aligning means 11 and closure means 4 in the locking position. When the closure means is in the closed postion, the disposable element is thus ready for sliding into the chamber and thus effecting locking. The sliding of the disposable element is guided by the holding and aligning means 34.

The inward facing barbs of the plug part 32 constitute an improvement over a conventional arrow head formation with outward facing barbs. Unauthorised interference with locking mechanisms of this type is sometimes effected by inserting a probe through the chamber opening in an attempt to release the barbs of the arrow head formation. It is much more difficult to do this if the barbs face inwardly than if they face outwardly. Also, whilst the disposable element may be made of a plastics material having significant resistance to repair by adhesive means, there is a further impediment to such repair in the present design in that, on breaking, each barb separates from the head part as an individual piece. Consequently, the stress induced

by deformation of the barbs when inserted in the base member would be applied directly to the area of a repair should one have to be made.

A further improvement is effected by making the closure member 4 of metal, such as a zinc alloy, rather than of plastics material. With certain types of plastics material, unauthorised interference can be effected by pushing a hot wire through the housing, and releasing the barbs of the locking mechanism in this way. When the hot wire is removed, the hole may sometimes seal itself and make the interference difficult to detect. However, this is not possible if the closure member is made of metal.

Although Figures 3 to 7 illustrate the use of the locking device with a container closed by a zip fastener, it can also be used with other types of closure device. Figures 8 and 9 show the application of the device to a box-type container 40 having a hinged lid 41. The base member 1 and article closure member 4 have similar construction to that shown in Figures 3 to 7, and corresponding reference numerals are therefore used. The base member 1 is fixed to a side of the box, and the article closure member 4 is hinged to a bar member 42 attached to the lid. The article closure member 4 is hinged outwardly to permit closing of the box lid 41, then hinged inwardly into engagement with the base member 1. Locking is then effected by pushing the disposable element 27 into the opening formed by the article closure member and base member. Unlocking is effected in the same way as described in relation to Figures 3 to 7.

## Claims

**1.** A device for locking an article closure member (4) in its article closing position, comprising:

a base member (1) securable permanently to the article and having means (11) for aligning the closure member (4) in said article closing position so that it overlaps at least part of said base member;

the aligning means (11) defining at least part of an entrance for receiving part of a disposable locking element (27); and

a disposable locking element (27), completely separate from said base member (1) and made of synthetic plastics material;

the disposable element (27) having a plug part (32) which is resiliently yieldable and slidingly insertable through, but not slidingly retractable from, the entrance of said aligning means;

the disposable element (27) also having a head part (33) connected to the plug part (27), the head part being outside said aligning means, and also covering part of the closure member (4) to prevent it being disengaged from the aligning means (11), when the plug part has been inserted through the entrance, and whilst in such position being accessible for manual manipulation for allowing the head part (33) to be rupturably removed from the plug part (32), thereby to allow the closure member (4) to be removed from the aligning means (11) and the now separate plug part to be removed, whereafter the base member (1) and the aligning means (11) can be re-used with a fresh disposable element to re-lock the article closure member (4) when desired,

characterised in that the base member (1) includes means (34) for temporarily holding the disposable element (27) with the plug part adjacent to but outside said entrance, and for guiding sliding insertion of the plug part of the disposable element into said entrance.

**2.** A device according to claim 1, in which the holding and guide means (34) comprise a pair of upstanding lugs with upper, inwardly overhanging portions.

**3.** A device according to claim 1 or 2, in which the plug part (32) comprises two arrow-head members with inward facing barbs.

**4.** A device according to any of claims 1 to 3, in which the closure member (4) is made of metal.

FIG.1

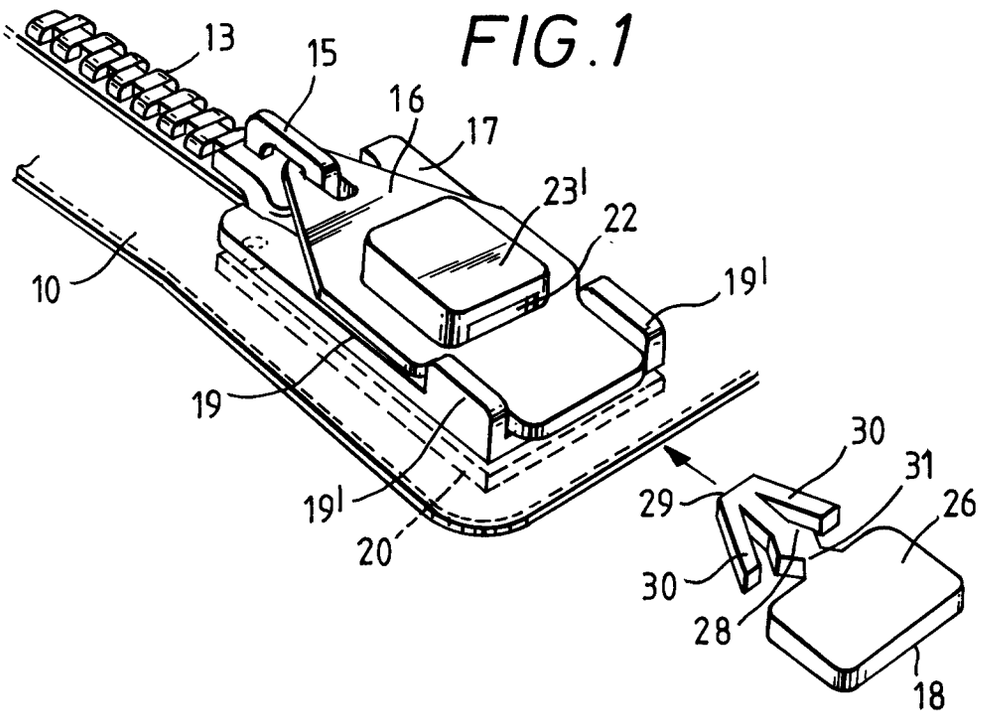

13
15
16
17
23'
22
19'
10
19
19'
20
30
31
29
26
30
28
18

FIG.2

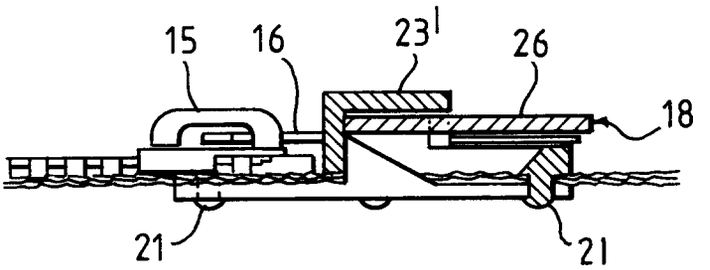

15
16
23'
26
18
21
21

FIG. 3

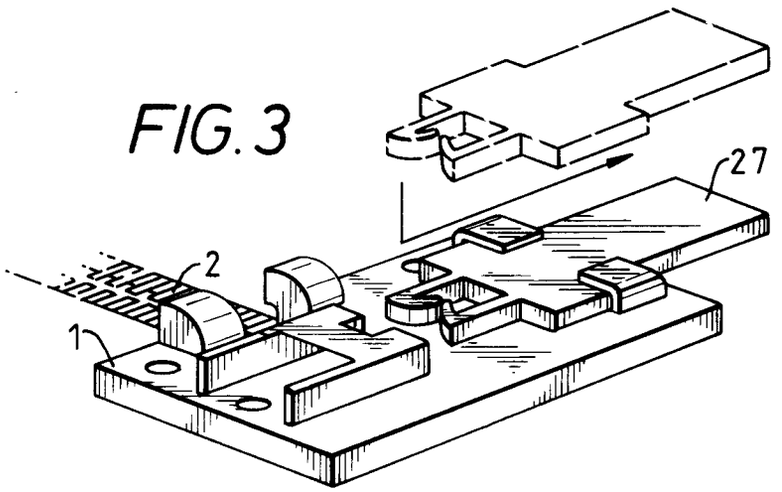



FIG. 4

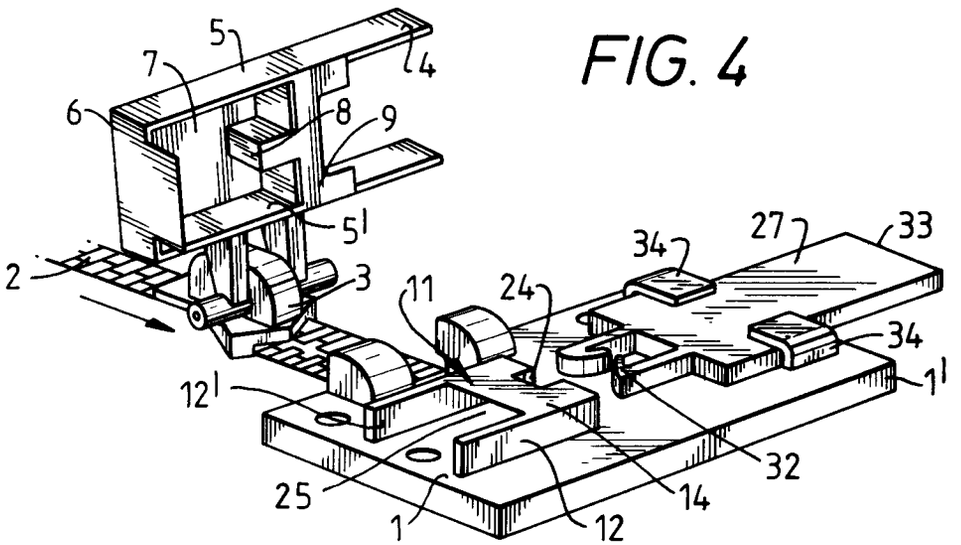



FIG. 5

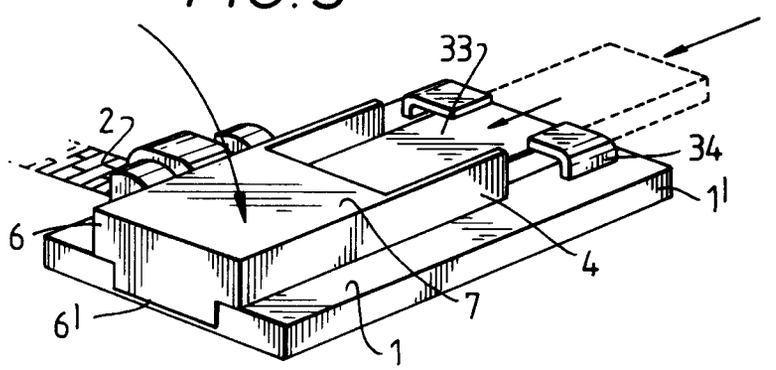


FIG. 6

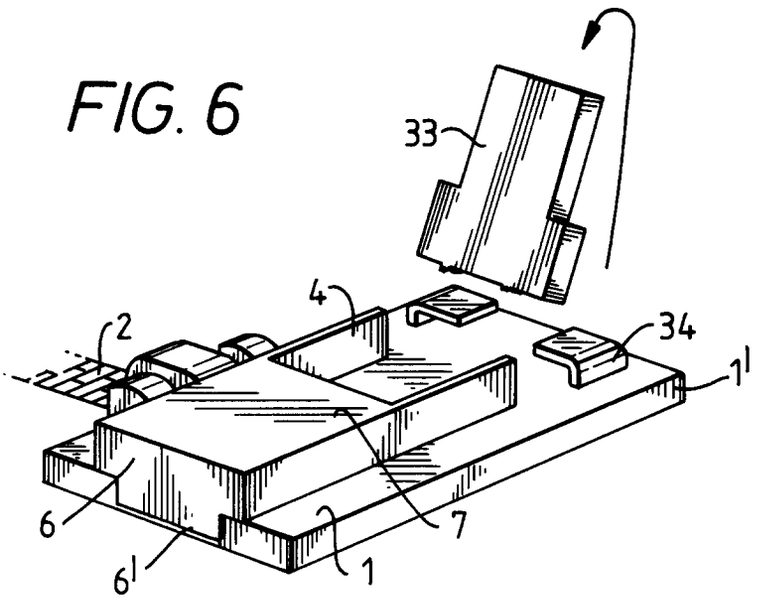



FIG. 7

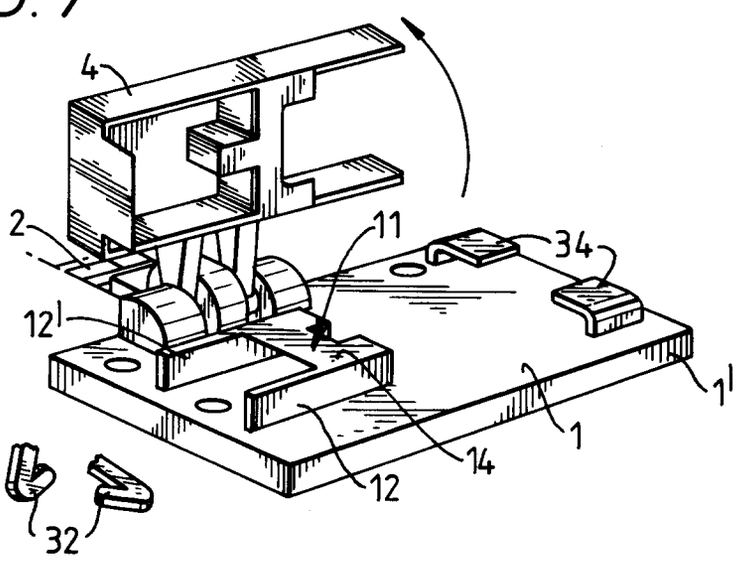


FIG.9

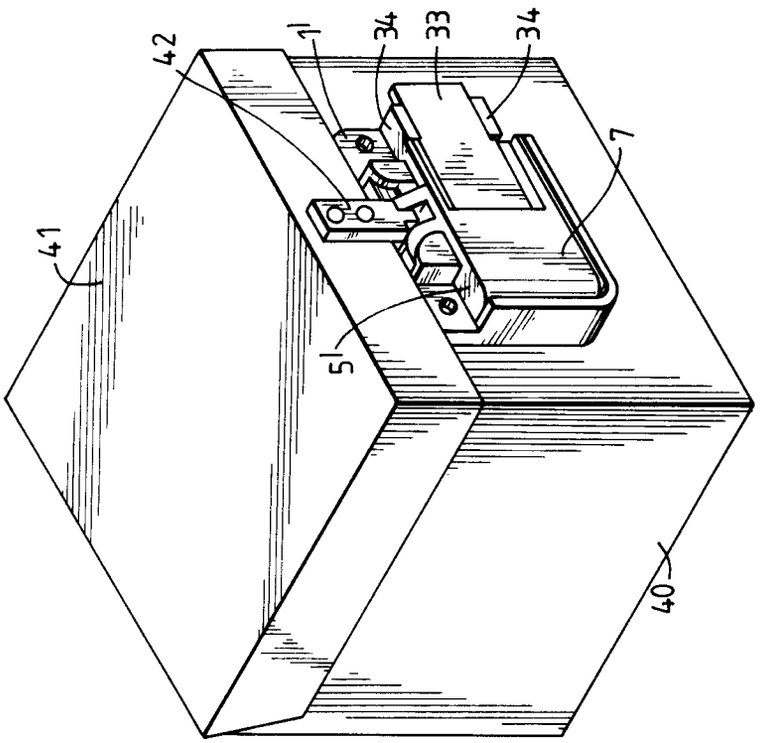
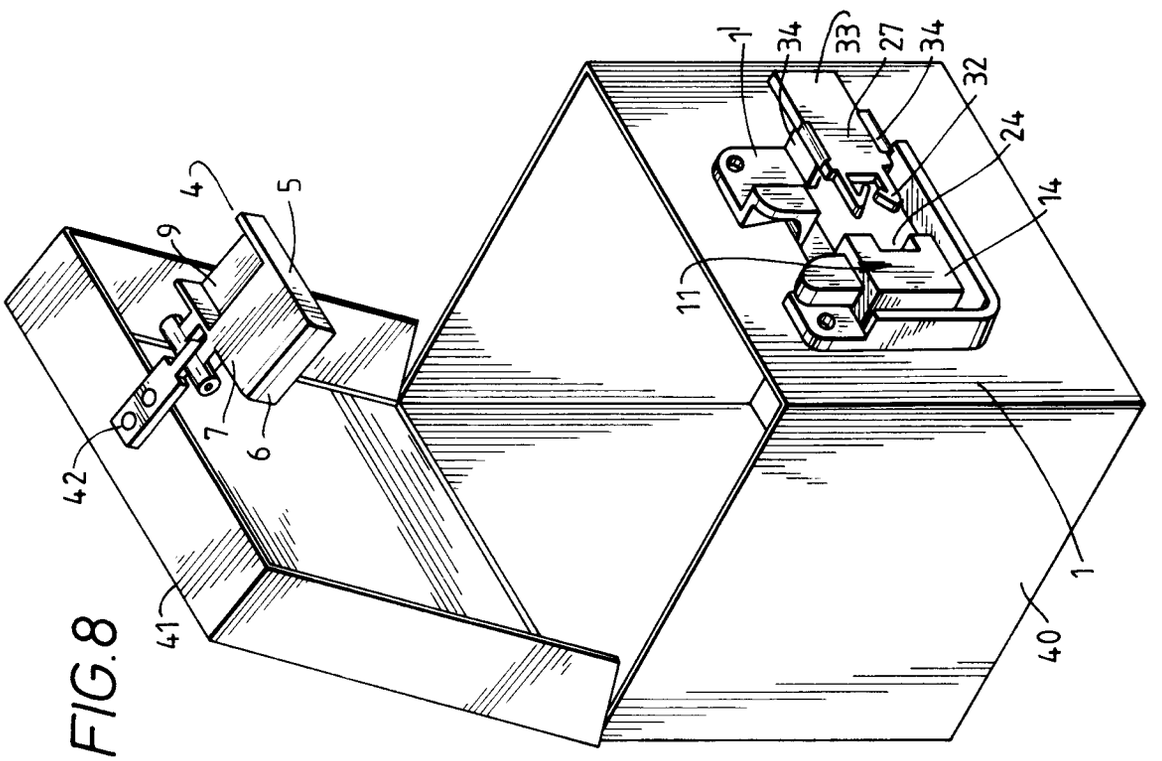



FIG.8



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# EUROPEAN SEARCH REPORT

Application Number

EP 93 30 0438

## 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) |
|---|---|---|---|
| A | GB-A-2 115 354 (E. DE LIMA CASTRO NETTO)<br>* the whole document * | 1 | A44B19/30<br>G09F3/03 |
| A | EP-A-0 422 905 (ELC PRODUCTOS DE SEGURANCA INDUSTRIA E COMERCIO LTDA)<br>* column 5, line 9 - column 9, line 15; figures 1-8 * | 1 | |
| A | FR-A-2 482 177 (EMAGUR TRADERS CORP.)<br>* page 7, line 4 - page 9, line 8; figures 1-4 * | 3 | |

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A44B
B65D
G09F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 19 APRIL 1993 | GARNIER F.M.A.C. |

CATEGORY OF CITED DOCUMENTS

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