

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **87306714.4**

(51) Int. Cl.⁴: **B 65 D 53/06**

(22) Date of filing: **29.07.87**

(30) Priority: **29.07.86 GB 8618468**

(43) Date of publication of application:
03.02.88 Bulletin 88/05

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **Envopak Group Limited**
Powerscroft Road
Sidcup Kent, DA14 5EF (GB)

(72) Inventor: **Adamson, Donald**
53 Oakley Road
Warlingham Surrey (GB)

(74) Representative: **Lewin, John Harvey et al**
Elkington and Fife High Holborn House 52/54 High
Holborn
London WC1V 6SH (GB)

(54) Tamper-Evident seal assembly.

(57) The invention relates to a tamper-evident seal assembly for use with a locking mechanism, the locking mechanism including a sliding member 5 which is slidable between a locked position and an unlocked position, said sliding member having a transversely projecting peg portion 11. The seal assembly comprises a channel portion 20 defining in its base a longitudinally aligned slot 21 through which the peg portion 11 can protrude, and a disposable breakable seal member 22 which is longitudinally slidable in the channel portion. The seal member 22 has means 23 for engagement with the projecting peg portion 11, such that, in the unlocked position, the seal member can be placed in the channel portion and in engagement with the peg portion, the seal member then being slidable in the channel portion and engagement between the seal member and the peg portion causing corresponding sliding of the sliding member to its locked position. In this position retaining parts 24 of the channel portion prevent lifting of the seal member, whilst the engagement between the seal member and the peg portion prevents sliding withdrawal of the seal member, whereby the locking mechanism is held in the locked position until the seal member is broken.

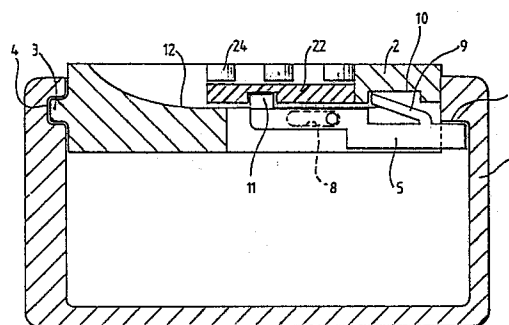


Fig.1A.

Description

TAMPER-EVIDENT SEAL ASSEMBLY

This invention relates to a tamper-evident seal assembly for use with a locking mechanism. It is particularly suited for sealing a locking mechanism on lids of boxes or on doors, but other applications are also possible.

Tamper-evident seals are generally known, their purpose being to indicate when any unauthorised attempt has been made to interfere with them. Seals previously used for securing items such as the lids of boxes have generally incorporated in their design some feature such as an arrowhead or barb. To provide tamper-evident properties, it is necessary for mating parts which engage the barbs to be within an enclosed housing. With such a design, it follows that there will be a point of transition between the outside of the housing, where the seal is on view and accessible, and the inside where the seal is hidden and inaccessible. At this transition point, it is theoretically possible for a seal to be cut through, thereby allowing the sealing device to be opened, followed by repairing the seal by either welding or use of adhesives. Since such a repair would be located in line with the mouth of the housing, it is possible for it to be overlooked at the time of inspection prior to opening of the seal by authorised personnel.

A further feature of many seals at present used for securing lids of boxes is that they include fasteners (such as toggle fasteners which require the use of wire or string on which the ultimate seal is fixed. The use of such ancillary tying media is undesirable in the security seal field.

An object of the present invention is to provide a tamper-evident seal for use such as the securing of lids or doors, without the disadvantages referred to above.

The present invention accordingly provides a tamper-evident seal assembly for use with a locking mechanism, the locking mechanism including a sliding member which is slidable between a locked position and an unlocked position, said sliding member having a transversely projecting peg portion, the seal assembly comprising a channel portion defining in its base a longitudinally aligned slot through which the peg portion can protrude, and a disposable breakable seal member which is longitudinally slidable in the channel portion, the seal member having means for engagement with the projecting peg portion, such that, in the unlocked position, the seal member can be placed in the channel portion and in engagement with the peg portion, the seal member then being slidable in the channel portion and engagement between the seal member and the peg portion causing corresponding sliding of the sliding member to its locked position, in which position retaining parts of the channel portion prevent lifting of the seal member, whilst the engagement between the seal member and the peg portion prevents sliding withdrawal of the seal member, whereby the locking mechanism is held in the locked position until the seal member is broken.

Reference is now made to the accompanying drawings in which:

Figure 1A is a section through a box with a lid having a locking mechanism and a tamper-evident seal according to an embodiment of the invention, and Figure 1B is a plan view of the bolt forming part of the locking mechanism;

Figure 2 is a perspective view of the seal member and channel portion of a seal assembly according to a preferred embodiment of the invention;

Figures 3A and 3B are longitudinal sections of the seal assembly respectively in the unlocked and locked positions;

Figures 4A and 4B are transverse sections of the seal assembly, respectively with the seal member intact and with the seal member broken;

Figures 5A and 5B are respectively side and underplan views of a seal-breaking tool for use with a seal assembly according to the invention; and

Figure 6A is a plan view of a box and lid having an alternative mechanism for operating the lid bolt and Figure 6B is a section on line A-A through this alternative arrangement showing the engagement between the sliding member which connects with the seal and the independently operated bolt.

The tamper-evident seal assembly according to the invention can be used with any kind of locking mechanism which includes a sliding member slidable between a locked position and an unlocked position, the sliding member having an upstanding peg or handle portion. An example of such a locking mechanism, applied to the locking of the lid of a box, is shown in Figures 1A and 1B. In this example, the upstanding peg or handle portion has to be initially lifted to permit unlocking by retraction of the sliding member and has to be depressed to permit locking by sliding forward the sliding member. An alternative example is shown in Figures 6A and 6B in which no lifting or depressing of the sliding member peg is necessary. It should be understood that these examples are only for purposes of illustration, and the seal assembly according to the invention can be used with any kind of locking mechanism having the requirements indicated above.

As shown in Figure 1A, a box 1 has a lid 2. One edge of the lid has a projecting portion 3 capable of engaging with a corresponding channel portion 4 near the top of one inside wall of the box. Locking of the lid to the box is effected by a sliding bolt 5 which, in the locked position, engages beneath an overhanging portion 6 of an inside wall of the box. As shown in Figure 1B, the bolt 5 has laterally extending trunnions 7 which engage for sliding and rotational movement in longitudinal slots 8 in the lid.

The upper surface of the bolt 5 has a resilient barb 9. This is adapted to engage with a downwardly directed cut-out portion 10 of the lid for retention of

the bolt in the locked position. An end of the bolt remote from the locking portion has an upwardly projecting peg portion 11 which projects through an opening in part of the top surface 12 of the lid.

When the bolt is in the locked (forward) position, as shown in Figure 1A, the trunnions 7 are at the forward end of the slot 8. Unlocking is effected by initially lifting the peg portion 11, thereby causing slight clock-wise rotation of the bolt about the trunnions, to disengage the barb 9 from its retaining opening 10. The bolt can then be slid backwards to its unlocked position, in which the trunnions are at the rearward end of the slots 8. Locking is then effected by initially depressing the peg portion 11 and sliding the bolt towards the forward position. During this sliding movement, the barb 9 is resiliently pressed by the underside portion of the lid against the top surface of the bolt, until it meets the retaining opening 10, at which point the barb resiliently swings out from the bolt to engage in the opening 10 and thereby retain the bolt in the locked position.

The purpose of the tamper-evident seal assembly according to the invention is to retain the bolt 5 in its locked position in such a way that it can only be unlocked by breakage of a seal member. Such breakage is only to be carried out by authorised personnel. The bolt cannot be unlocked without breakage of the seal, and any breakage and subsequent repair of the seal member would be immediately evident on inspection before authorised opening.

As shown in Figure 2, the seal assembly comprises a channel portion 20 which is integral with or permanently fixed to the upper surface 12 of the lid 2. In the base of the channel there is defined a longitudinally aligned slot 21 through which projects the peg portion 11 of the bolt 5. In the unlocked (rearward) position shown in Figure 2, the peg portion 11 is at the rearward end of the slot 21, the peg portion being slidable to the forward end of the slot 21 on locking as described below. A seal member 22 is of substantially rectangular plate shape and is adapted to slide longitudinally in the channel member. The seal member has in its underside (see Figure 3A) a socket 23 which is adapted to receive the protruding peg portion 11 when the seal member is placed downwardly into the channel portion. The socket 23 is dimensioned such that when the seal member 22 rests on the base of the channel portion 20, it depresses the peg portion 11 to the extent necessary to rotate the bolt 5 anti-clockwise until it is substantially horizontal. At this point, the peg portion 11 still protrudes through the slot 21 to a sufficient extent for it to be engaged within the socket 23. Thus, forward sliding of the seal member 22 in the channel portion 20 causes the bolt 5 to slide forwardly to its locked position. The path taken by the seal member 22 on locking is thus initially downward into the channel portion 20, and then forward, as shown in Figures 3A and 3B.

The opposing inner longitudinal faces of the channel portion 20 have castellated projecting substantially semi-circular retaining parts 24. The seal member 22 has on its opposing longitudinal edges correspondingly spaced and shaped indenta-

tions 25. Thus, when the seal member is placed downwardly into the channel portion, the retaining parts 24 and indentations 25 have to be in register with each other. The socket 23 is positioned such that it fits over the protruding peg portion 11 at this point. Subsequent sliding forward of the seal member 22 causes the retaining parts 24 and indentations 25 to become out of register, the retaining parts 24 then overlapping the tops of the longitudinal edge portions of the seal member. Thus, in the locked position, the retaining parts 24 prevent lifting of the seal member 22 and hence the peg portion 11 is kept in the depressed position (Figure 3B). The bolt 5 is retained in its locked position by the engagement between the barb 9 and the opening 10, and, by virtue of the engagement of the peg portion 11 in the socket 23, the seal member 22 is prevented from sliding backward. Thus, in this locked position, unlocking can only be effected by initial breakage of the seal member 22.

To facilitate breakage of the seal member, it has a central longitudinal portion 26 which is relatively thin, compared with the longitudinal outer portions. The socket 23 is positioned in the relatively thick outer longitudinal portion, on one side of the central portion. A "spare" socket may be positioned in the opposite side portion, so that the seal member 22 is symmetrical and can be positioned facing either longitudinal direction in the channel portion. The base of the channel portion has a central undercut part 27 extending from about half way along and gradually sloping upwardly to the top surface at one end. This facilitates the insertion beneath the seal member 22 of a seal breaking tool or lever 28. This is introduced by authorised personnel when the seal member is to be broken. The tool is introduced beneath the seal member and then levered upwardly to break the seal member along its thin central portion 26, as shown in Figure 4B. The tool has an upper protective screen 29 which covers the top of the seal member at the time of breakage, to prevent accidental injury from parts of the broken seal member flying upwards.

Once the seal member has been broken and removed, the peg member 11 can then be lifted and used to slide the bolt backwards to the unlocked position. When the lid is to be locked again, a fresh seal member will have to be used.

The seal member 22 is preferably made of relatively rigid plastics material so as to exhibit easily discernible evidence if it is damaged. The features of engagement of the seal member and the channel portion are all clearly visible, thereby affording no opportunity for tampering which could be hidden. The top surface of the seal member is a simple flat shape, and ideal for presentation of printed information and identification such as an individual bar code or sequential number. It will be noted that the non-expendable parts of the seal assembly are conveniently housed within an enclosure, and so ancillary tying media such as string or wire are necessary.

Figures 6A and 6B show a box 40 with a lid 41. One edge of the lid has a projecting portion 42 capable of engaging with a channel portion 43 near the top of

the box wall. Locking of the lid to the box is effected by a sliding bolt 44 which in the locked position engages beneath an overhanging portion 45 of an inside wall of the box. The bolt 44 has a peg or handle 46 projecting through a slot 47 in the lid permitting its operation by hand.

Securing of the bolt in its locked position is accomplished by the seal 48 which, when in its operating position in the channel 49, prevents the handle 46 moving along the slot 47. A sliding member 50 has a peg 51 which engages with a socket in the underside of the seal 48. This sliding member 50 is provided at its rearward end 55 with a resilient portion 52. In operation, subsequent to the engagement of the bolt 44, the seal is inserted in its channel and located on the peg 51. Forward movement of the seal causes the member 50 to slide in a direction lateral to the bolt 44 but closely adjacent to it until the resilient portion 52 springs into engagement against the lip 53 of the bolt 44.

In this condition the bolt 44 and the sliding member 50 are prevented from further movement until upward movement of the seal by breaking disengages it from both pegs 46 and 51. With the seal removed the bolt 44 is free to be withdrawn from the locked position allowing the resilient portion 52 of the member 50 to pass through the gap 54 in the lip 53.

Claims

1. A tamper-evident seal assembly for use with a locking mechanism, the locking mechanism including a sliding member which is slidable between a locked position and an unlocked position, said sliding member having a transversely projecting peg portion, the seal assembly comprising a channel portion defining in its base a longitudinally aligned slot through which the peg portion can protrude, and a disposable breakable seal member which is longitudinally slidable in the channel portion, the seal member having means for engagement with the projecting peg portion, such that, in the unlocked position, the seal member can be placed in the channel portion and in engagement with the peg portion, the seal member then being slidable in the channel portion and engagement between the seal member and the peg portion causing corresponding sliding of the sliding member to its locked position, in which position retaining parts of the channel portion prevent lifting of the seal member, whilst the engagement between the seal member and the peg portion prevents sliding withdrawal of the seal member, whereby the locking mechanism is held in the locked position until the seal member is broken.

2. A seal assembly according to claim 1, wherein the seal member is a substantially rectangular plate, the opposing edges of which are adapted to slidingly engage with longitudinal aligning means on opposing sides of the

channel portion.

3. A seal assembly according to claim 2, wherein the opposing sides of the channel portion have castellated projecting retaining parts, and the opposing edges of the seal member have correspondingly spaced indentations, whereby the seal indentations are in register with the retaining parts, while sliding of the seal member in the channel portion causes the indentation and retaining parts to become out of register, the retaining parts then preventing lifting of the seal member.

4. A seal assembly according to claim 3, wherein the retaining parts and the indentations are substantially semi-circular.

5. A seal assembly according to any of claims 1 to 4, wherein the channel portion has an undercut part to permit introduction beneath the seal member of a seal-breaking tool.

6. A seal assembly according to any of claims 1 to 5, wherein the central longitudinal portion of the seal member is relatively thin to facilitate breakage.

7. A seal assembly according to any of claims 1 to 6, wherein the sliding member has to be initially lifted to permit sliding from the locked position to the unlocked position and to be depressed to permit sliding from the unlocked position to the locked position.

8. A seal assembly according to any of claims 1 to 6, wherein the sliding member, a second sliding member and seal member have an interlocked relationship in the locked condition and can only be unlocked by breaking of the seal member.

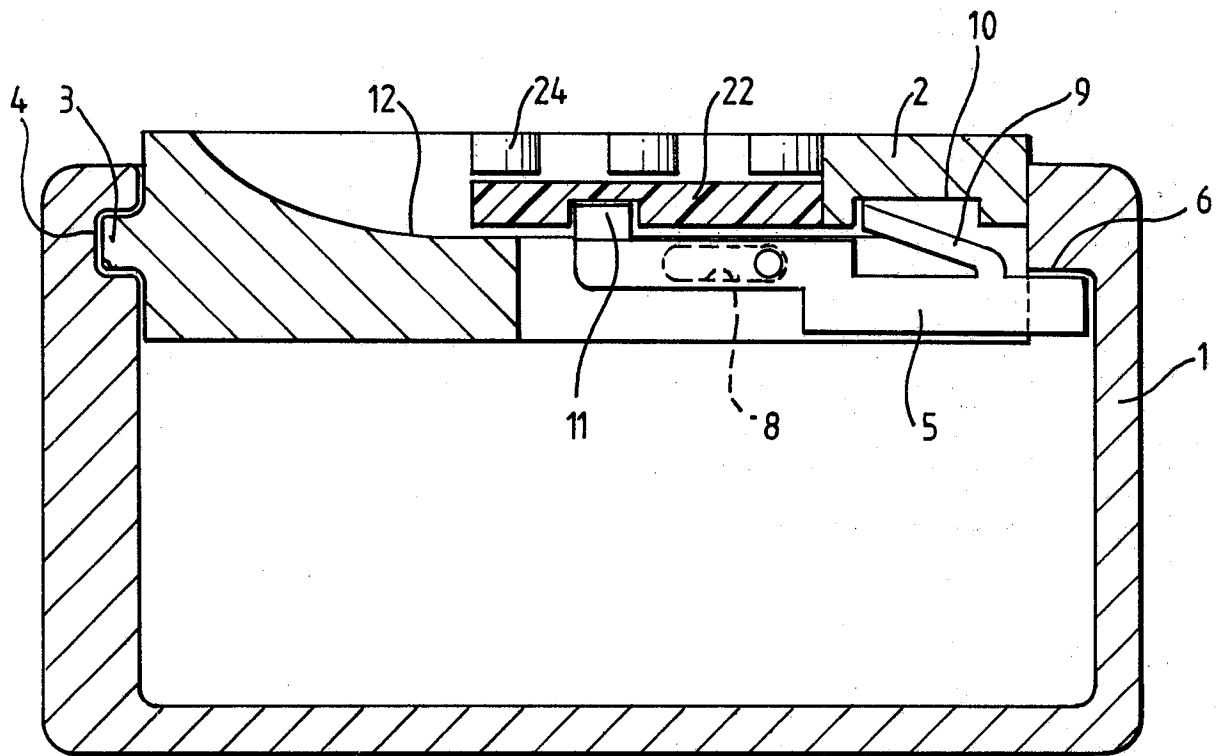


Fig.1A.

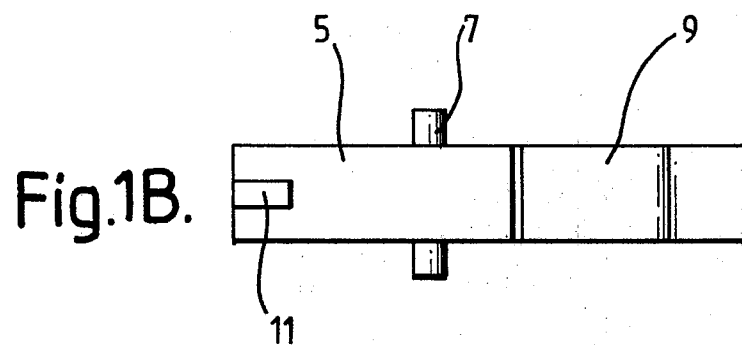


Fig.1B.

0255365

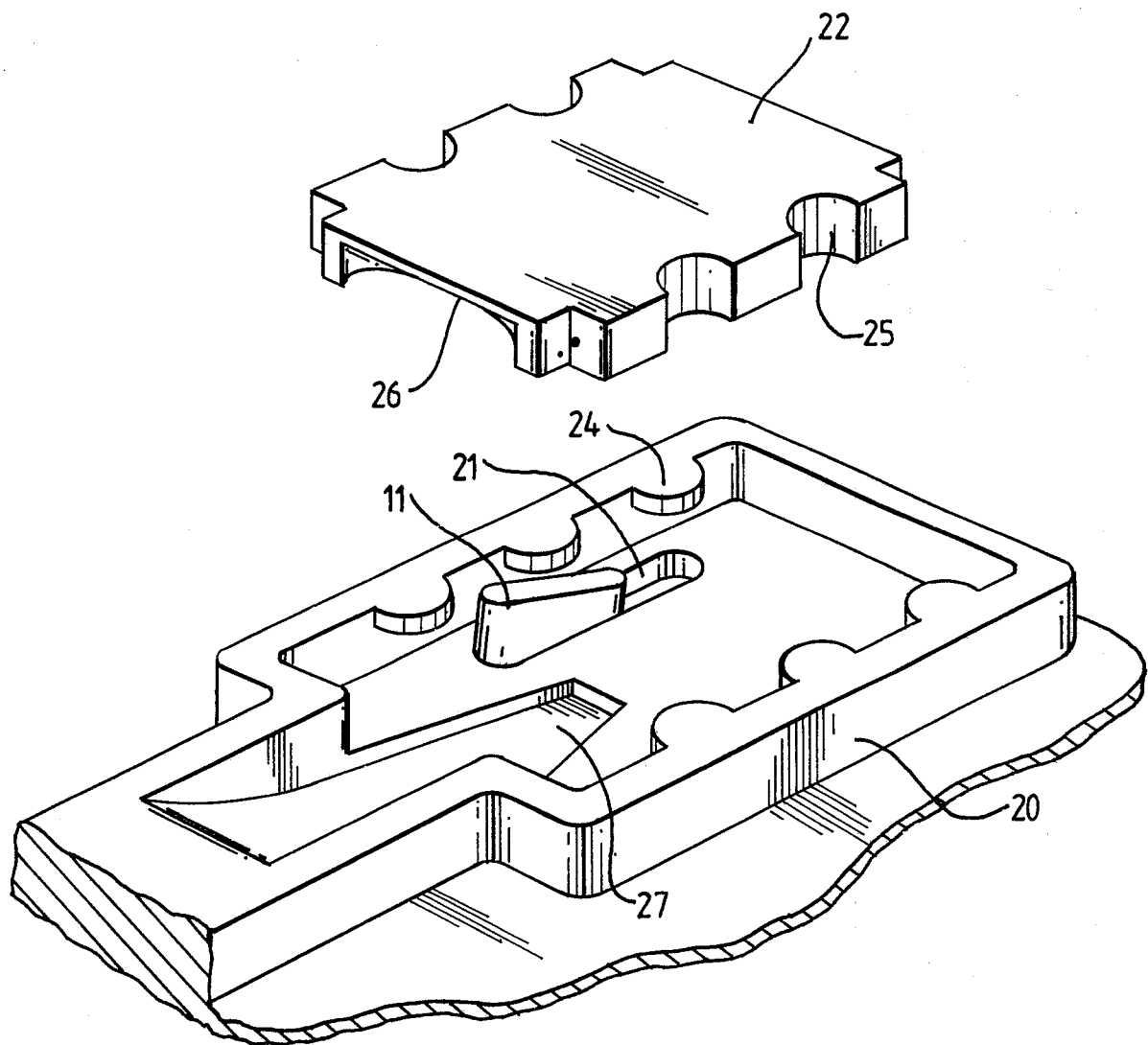


Fig.2.

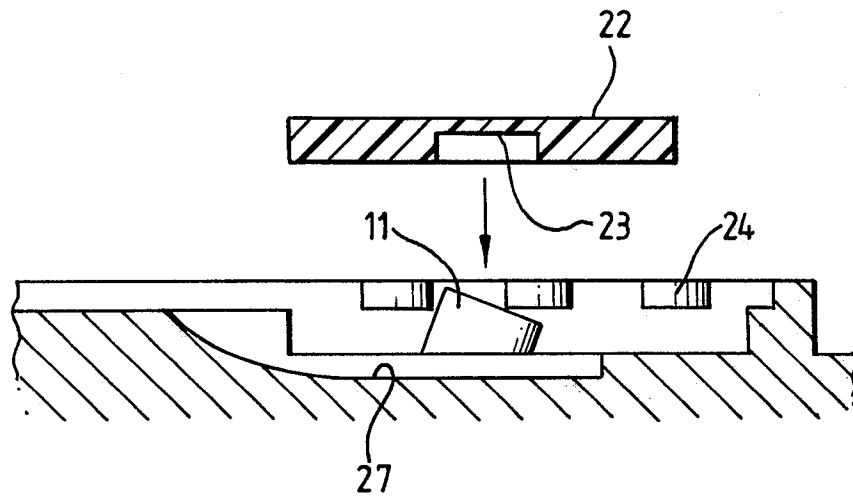


Fig.3A.

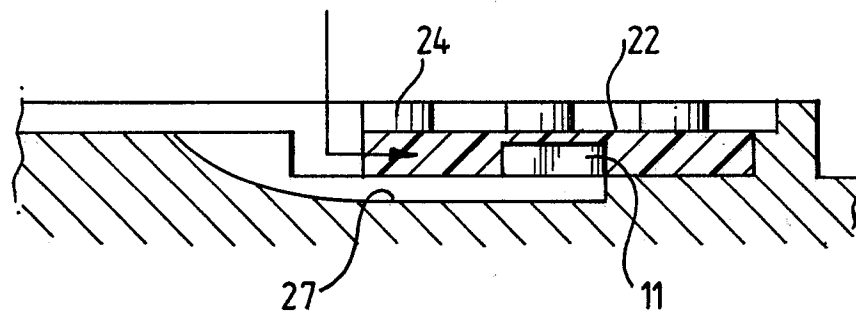


Fig.3B.

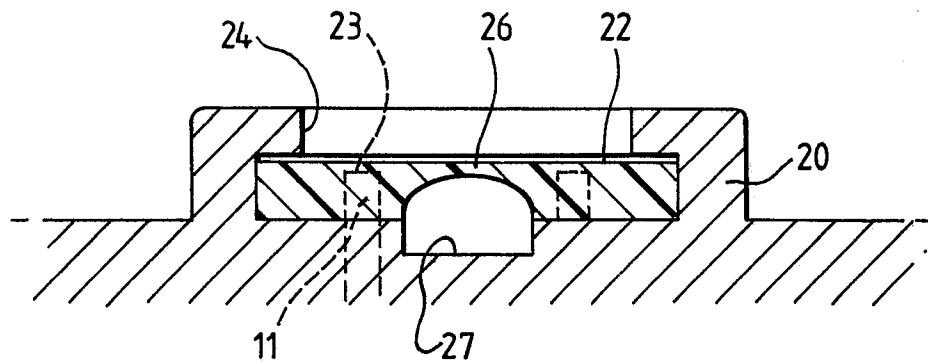


Fig. 4A.

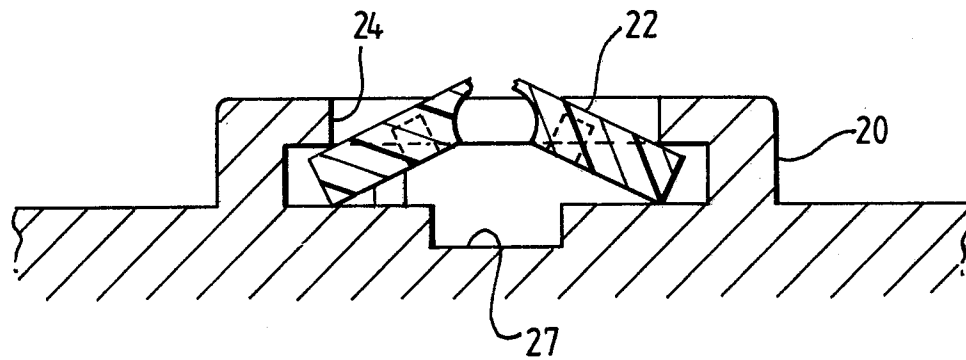


Fig. 4B.

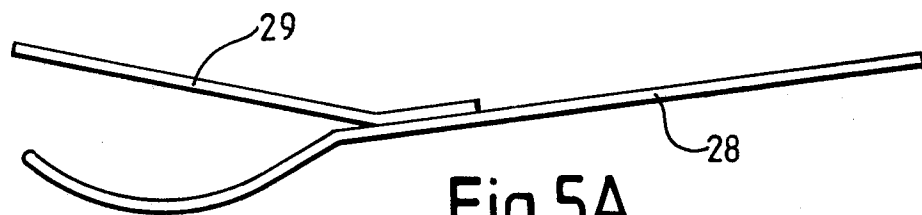


Fig. 5A.

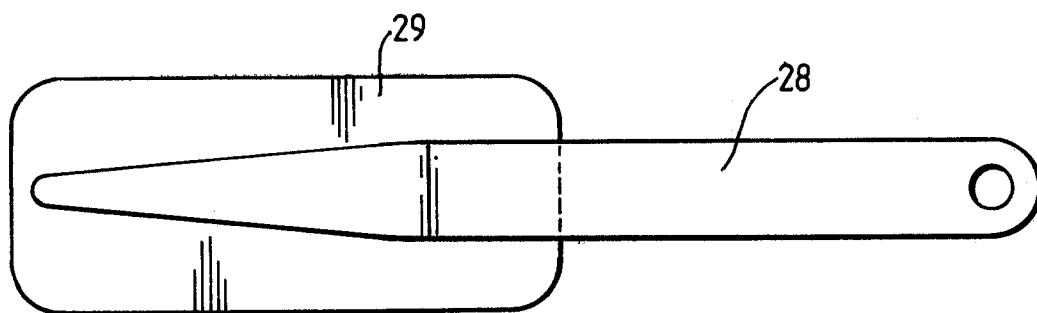


Fig. 5B.

0255365

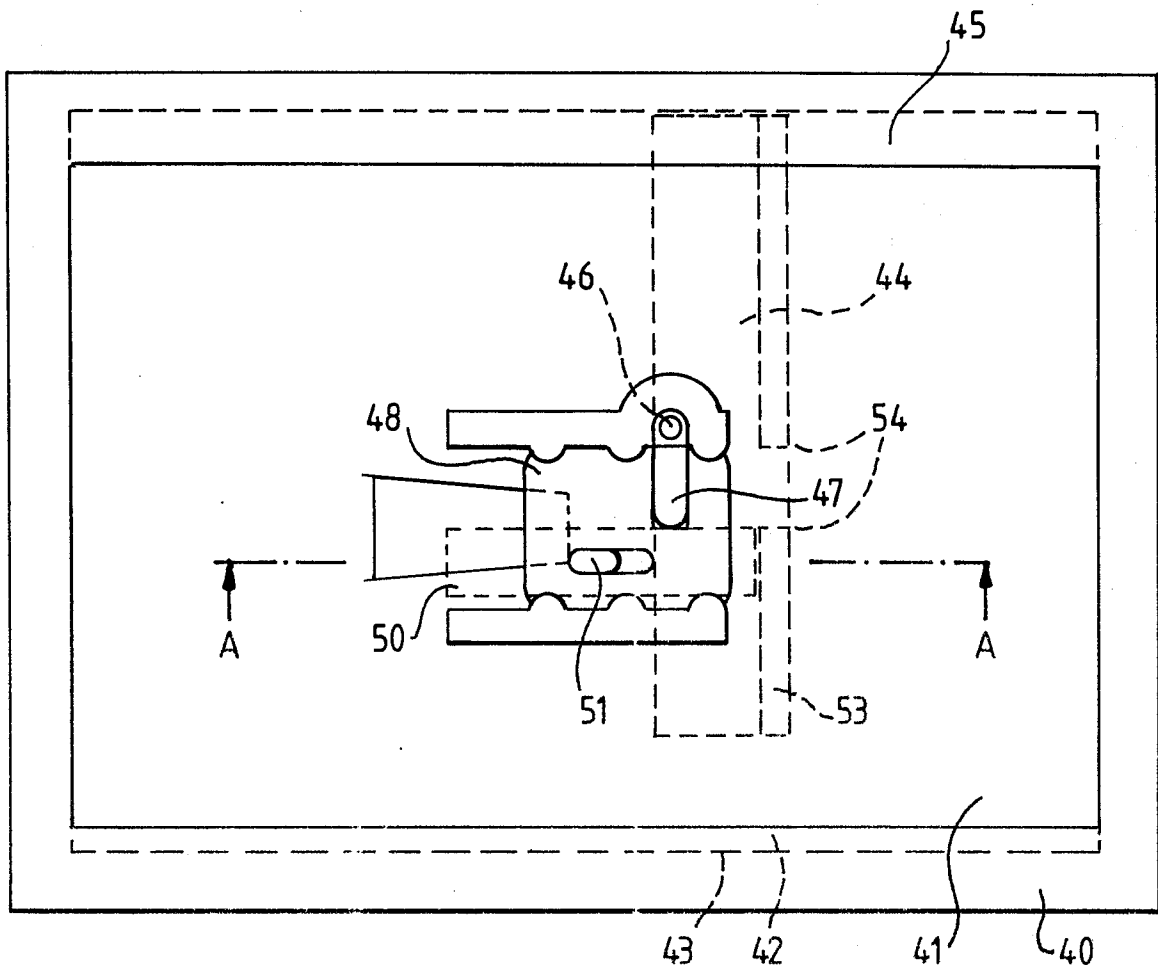


Fig. 6A.

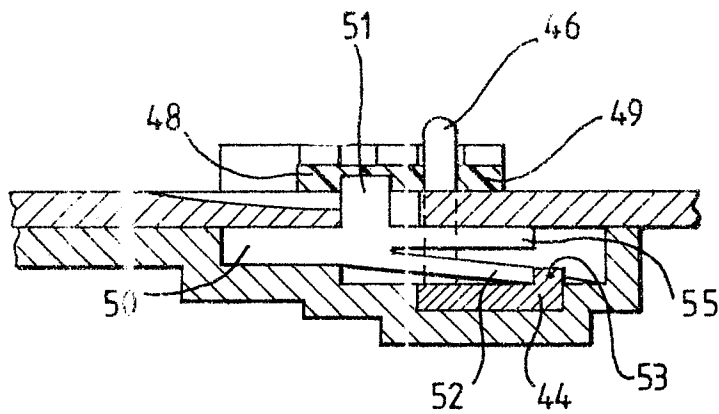


Fig. 6B.