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(54) **Improvements in or relating to bags.**

(57) A security bag which exhibits a visible indication if an attempt has been made to gain access to the contents of the bag is formed of sheet material and has an opening (8) to enable access to be gained to the interior of the bag. The bag comprises first and second portions (3,4) of sheet material arranged to be superposable so as to close the opening. The bag is further provided with a tape (9) comprising a translucent or transparent substrate (11) differentially bonded to an opaque adhesive (13). The tape is located in a position such that, on superposition of the first and second portions, one face of the tape is adhered to one of said portions by said opaque adhesive and the other face of said tape is secured to the other portion by another adhesive (10).

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IMPROVEMENTS IN OR RELATING TO BAGS

This invention relates to bags and is concerned with security bags which exhibit a visible indication if an attempt has been made to gain access to the contents of the bag.

It is known for banking establishments and the like to use bags for transmitting specified sums of money from one department to another. The system operated by the establishment is ordinarily such that it can readily ascertain if such a bag is stolen in transit. Ordinarily, however, it is not readily possible to ascertain whether the bag has been opened in transit and then re-sealed after some of the money has been removed.

With a view to overcoming this problem, tamperevident bags have been devised wherein any attempt to gain access to the interior of the bag is visibly apparent.

Typically, such bags are formed of sheet material defining an opening and including first and second portions arranged to be superposed so as to close the opening by means of a band of high tack adhesive applied across one or other portion either from the molten state or in the form of a tape. It is known that such adhesives have a limited working temperature range because of their thermoplastic character. These adhesives also can be softened in common industrial and domestic solvents and precautions need to be taken to ensure that any attempt at entry into the bag by means of solvent is visibly apparent by, for example, using so-called indicator inks.

It is an object of the present invention to provide a bag which provides a novel indication of attempted opening.

According to one aspect of the present invention there is provided a bag formed of sheet material and having an opening to enable access to be gained to the interior of the bag wherein the bag includes first and second portions arranged to be superposable so as to close the opening, and a tape comprising a substrate portion which is at least translucent and is differentially bonded to an opaque adhesive, said tape being located in a position where, on superposition of the first and second portions, the tape is adhered to one of said first and second portions by said opaque adhesive.

The second portion may be in the form of a flap portion secured to the first portion.

In one form of the invention, the substrate portion of the tape constitutes one or other of the first and second portions.

Alternatively, in accordance with another form of the invention, the substrate portion is a separate component in which case said substrate portion may be secured to the other of said first and second portions by other adhesive.

In accordance with a first embodiment of said other form of the invention, the free surface of the substrate portion of the tape is adhered to one of the first and second portions by means of said other adhesive which is preferably a high tack adhesive and the opaque adhesive of the tape is covered by a releasable cover strip. In use, the cover strip is removed and the free surface of the opaque adhesive layer thereby revealed is adhered to the other of the portions so that it is superposed over the other of the portions and thereby the opening is closed by said one of the portions.

In another embodiment of said another form of the invention, the tape is secured, by the opaque adhesive, to one of the first and second portions of the sheet material in the vicinity of the opening which is provided in said one of the portions and said other adhesive, which is preferably a high tack adhesive preferably covered by means of a releasable cover strip, is applied to the other of the portions of the sheet material. In use, the removable cover strip is removed and the portions are superposed so that said other adhesive becomes bonded to the free surface of the substrate portion of the tape (and also to said one of the portions of sheet material) so as to be superposed over the opening.

The use of differentially bonded tape gives evidence of tempering over a wider working temperature range than is possible with simpler thermoplastic adhesive systems.

In an embodiment, the opaque adhesive is formed of an opaque composition comprising a transparent adhesive and an opacifying agent therefor. In this case, if any attempt is made to soften the opaque adhesive with solvent, the opacifying agent is disturbed by the solvent and tampering is indicated by a change in opacity. The transparent adhesive may be, for example, a solvent based acrylic adhesive and examples of suitable opacifying agents are barium sulphate, titanium dioxide, Cyan Blue, Phthalocyanine Blue, Benzidine Yellow, and 4B Red.

The tape used in accordance with this embodiment is produced by applying a suitable release agent pattern-wise to the substrate portion so that parts of the substrate portion are coated with release agent and parts are not. Thereafter, the opaque adhesive is coated onto the patterned release agent layer. Thus, those parts of the opaque adhesive which are applied to the release agent, are only weakly bonded to the substrate portion compared to those parts of the opaque adhesive which are directly contacting the substrate portion. Thus,

any attempts to separate the first and second portions to obtain access to the bag via the opening will result in the opaque adhesive in the weakly bonded areas being transferred to the portion adjacent thereto leaving a corresponding clear area on the substrate portion constituting a visible pattern. Since any attempts to reseal the bag involve the formation of a new interface between the substrate portion and the transferred opaque adhesive, resealing will not obliterate the pattern left on the substrate portion.

In another embodiment, the opaque adhesive is in the form of an opaque layer coated with transparent adhesive. In this case, if an attempt is made to soften the adhesive with solvent, the opaque layer will be disturbed by the solvent and again tampering will be indicated by a change in opacity. Similar transparent adhesives to those used in accordance with the previous embodiment may be used.

The tape used in accordance with this embodiment can be produced by applying a suitable release agent pattern-wise to the substrate portion and thereafter printing an opaque layer on to the substrate over the release agent. Thereafter, the adhesive is coated on to the opaque layer. Those parts of the opaque layer (and the overlying adhesive) which are applied to the areas coated with release agent are only weakly bonded to those areas compared to those parts of the opaque layer (and the overlying adhesive) which are applied directly to the substrate portion. Thus, as in the previous embodiment, any attempt to separate the first and second portions of the bag will generate a visible pattern which cannot be obliterated on resealing.

The sheet material from which the bag is made is preferably a transparent, or translucent, thermoplastic plastics material since disruption of the differentially bonded tape can then be readily seen from either surface of the bag. If desired, however, the sheet material may be opaque provided that the substrate portion is sufficiently translucent to permit disruption of the differentially bonded tape to be seen through it.

Any suitable material may be used for the substrate portion of the tape. However, in accordance with a preferred embodiment, the substrate portion is formed from a heat shrinkable material such as Mylar HS 65. This provides a secondary defence against tampering by the use of elevated temperature since shrinkage of the tape with heat would cause the bag to become wrinkled.

In accordance with a preferred embodiment, a security code is printed on the bag to provide further evidence of tampering. This can be printed on to the sheet material adjacent the opening so that attempts to tamper with the opening would cause disruption of the security code. In order to further increase the security of the bag and deter attempts to obtain access to the bag by removing the security tape with solvent, cleaning away the evidence of tampering using solvent, and substituting a fresh piece of tape, the tape is provided with a unique identification at the time it is initially applied to the sheet material. This can be done by printing a suitable code onto the substrate of the tape. Preferably, however, the code is printed onto a surface of the adhesive of the tape since attempts to tamper with the bag by interfering with the adhesive would then immediately be apparent because of disruptions to the printed code. In this case, the printing is preferably carried out by ink jet printing wherein a series of fine droplets of ink are controlled so as to form the letters, numbers and images forming the desired code. By applying an appropriately low density of ink, the ink will not have any significant effect on the bond strength of the adhesive. In this way, any attempt to substitute an alternative tape would be very difficult since the code would have to be reproduced exactly. Alternatively and/or additionally the security code may be printed onto any other adhesive used to form the bag.

Accordingly, another aspect of the invention provides a bag formed of sheet material and having an opening to enable access to be gained to the interior of the bag, said bag including first and second portions arranged to be superposable with a layer of adhesive inbetween so as to close the opening and a surface of the layer of adhesive being provided with printed matter.

The layer of adhesive carrying the printed matter may be in the form of a tape but is not necessarily so. If it is in the form of a tape it is preferably, but not essentially, a differentially bonded tape of the type used in accordance with the first aspect of the invention.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a diagrammatic front view of an open security bag in accordance with a first embodiment of the present invention,

Figure 2 is a diagrammatic section through a part of the bag of Figure 1 on an increased scale,

Figure 3 is a diagrammatic section showing the part of Figure 2 when the bag is closed,

Figure 4 is a diagrammatic section through a security bag in accordance with a second embodiment of the present invention in its open condition,

Figure 5 is a diagrammatic section showing the bag of Figure 4 in its closed condition,

Figure 6 is a diagrammatic section through a part of a security bag in accordance with a third

embodiment of the present invention, in its open condition, and

Figure 7 is a diagrammatic section through the part of Figure 6 with the bag in its closed condition.

Referring now to Figures 1 and 2, the bag is formed from a single strip 1 of flexible thermoplastics sheet material such as polyethylene or polypropylene which is folded laterally along a fold line 2 to form a first portion 3 and a second portion 4. The thermoplastics sheet material is preferably transparent, partially transparent or translucent, or a combination of opaque and transparent so as to make it easier to see the evidence of tampering. The folded portions 3 and 4 are heat welded to each other in a zone 5 which extends parallel with and close to each of the longitudinal and each of the lateral edges of the portions to produce an envelope-like bag 6 wherein the second portion 4 is longer than the first portion 3 and has a part in the form of a flap portion 7 to form a closure.

At an end region of the container 6 closer to the flap portion 7 an opening line in the form of a slit 8 extends across the first portion 3 terminating at each end at the weld zone 5. The slit 8 provides access to the interior of the bag 6. A tape 9 extends across the full width of a part of the flap portion 7 (which has preferably been subjected to corona discharge) and is adhered thereto by a band of high tack adhesive 10 which may optionally have a surface provided with a security code by means of an ink jet printing technique. The adhesive is a hot melt pressure sensitive adhesive such as Fullers DS 5762. The tape comprises a transparent or translucent substrate portion 11 having a first surface constituting a free face of the tape and a second surface coated with discrete areas 12 of release agent and then overcoated with an opacified adhesive 13 comprising a solvent based acrylic adhesive and titanium dioxide. The free surface of the adhesive constitutes another free face of the tape and is preferably provided with a security code by an ink jet printing technique before being covered by a releasable cover strip 14. The opacified adhesive 13 is differentially bonded to the transparent substrate portion 11 in that those areas applied to the release agent 12 are much more weakly bonded than are those areas applied directly to the substrate portion 11. The first surface of the substrate 11 is bonded to the flap portion 7 by the high tack adhesive 10.

In use of the security bag, the items to be held in the bag are introduced into the bag 6 through the slit 8, the cover strip 14 is removed from the tape and the flap portion 7 is folded over onto the portion 3 with the fold line being close to the adjacent laterally extending part of the weld zone 5. The disposition of the tape 9 relative to the fold line of the flap portion 7 is such that when the flap portion 7 is brought down onto the portion 3, the part of the flap portion 7 carrying the tape straddles the slit 8 so that the slit 8 is completely overlain by said part and the tape. Thus, as well as the flap portion 7 being bonded to the portion 3 by the opacified adhesive 13, the slit 8 is completely sealed and there is no access opening whatsoever to the interior of the bag 6 (see Figure 3). The parts of portion 3 adjacent the slit 8 have previously been subjected to corona discharge to assist adhesion.

Attempts to separate the flap portion 7 and the first portion 3 will ordinarily result in the opacified adhesive 13 separating from the substrate portion 11 in the weakly bonded areas with the more strongly bonded areas of the opacified adhesive 13 remaining adhered to the substrate portion 11 and thereby constituting a clearly visible pattern on the substrate. This pattern will not be obliterated even if attempts are made to reseal the bag by superposing flap portion 7 and the first portion 3 again. If someone attempting to open the bag should, in fact, succeed in lifting the flap portion 7 away from the substrate portion 11 by tampering with the high tack thermoplastic adhesive 10, the tape 9 will still remain in place over the opening 8 and any further attempts at opening the bag will immediately become evident by differential separation of the adhesive from the substrate portion 11 as above described.

Referring now to Figure 4, the bag is produced by folding longitudinally a continuous length of thermoplastic plastics sheet material (after it has been optionally printed as appropriate) into a J-form where it includes a first portion 21 folded longitudinally at 22 so as to be superposed on a part of a second portion 23 so as to leave a flap portion 24 of the second portion 23 exposed. The first portion 21 is heat sealed to the second portion 23 by a longitudinally extending heat seal denoted by reference numeral 25. Preferably, a longitudinally extending region of the flap portion 24, which region is generally parallel to the heat seal 25, is subjected to a corona discharge to improve its adhesion characteristics in that region. A band of high tack adhesive 28 is applied to that region and is covered by a removable cover strip 27 optionally after having been provided with a security code by means of an air jet printing technique. A differentially bonded tape is provided comprising a transparent or translucent substrate portion 30 having a first surface coated with discrete areas of release agent 31 and overcoated with an opacified adhesive 32. The second surface of the substrate portion 30 constitutes one free face of the tape and the free surface of the adhesive 32, constituting another face of the tape, is adhered to first portion

21, adjacent to slit 29, which has previously been subjected to corona discharge. Preferably the free surface of the adhesive 32 is provided with a security code by air jet printing before it is bonded to the first portion 21. The continuous length of sheet material is then cut transversely using a double heat sealing device comprising two pairs of heat sealing jaws between which is located a cutting blade so that the sheet material is cut into adjacent transverse sections each having heat sealed edges. Each of these sections constitutes a bag in accordance with the invention.

In use, articles are inserted into the interior of the bag through the slit 29. Then, when it is desired to seal the bag, the removable cover strip 27 is removed from the adhesive layer 28 and the flap portion 24 is folded over the first portion 21 so that the layer 28 is superposed over, and adhered to, the second surface of the substrate 30, and also the slit 29, so as to close the opening. Thus, the interior of the bag is completely sealed as shown in Figure 5.

In the event that any unauthorised person attempts to gain access to the interior of the bag by pulling the flap portion 24 and portion 21 apart, the tape will split differentially with those parts of the opaque adhesive 32 which are weakly bonded to the substrate 30 because of the presence of the release agent 31 remaining on the portion 21 and those parts of the adhesive which are more firmly bonded to the substrate portion 30 remaining bonded to the substrate portion 30. Thus, a readily visible pattern will be formed constituted by the opaque adhesive 32 remaining on the substrate portion 30 and this can not be obliterated by re-superposing the portions 24 and 21.

In this embodiment, the tape provides the evidence of tampering and the high tack thermoplastic adhesive 28 maintains the seal over the bag opening. This embodiment is particularly suitable for use with heavy duty bags for the transport of coins.

Referring now to Figure 6, parts corresponding to parts of Figures 1, 2 and 3 are denoted by like reference numerals.

In this case, the sheet material of portions 3, 4 and 7 is opaque and a line of perforations 15 is provided across second portion 4 to enable a part of the flap portion 7 to be torn off for use, for example, as a receipt. The substrate portion 11 is transparent and is secured to second portion 4 by a band of high tack adhesive 10 but this band is much narrower than the band used in Figures 1 to 3. Thus the substrate portion 11 is only secured to portion 4 along one marginal strip rather than over its entire width.

In use, the desired articles are introduced into the bag via opening 8 in the first portion 3. The flap portion 7 can then be removed via perforations 15. Then cover strip 14 is removed from the tape and the revealed surface of the opacified adhesive 13 is pressed on to the first portion 3 to close the opening. Any attempts to separate the tape and the first portion 3 will result in the opacified adhesive 13 separating from the substrate portion 11 in the weakly bonded areas and transferring to the surface of first portion 3 causing the formation of a visible pattern which cannot be obliterated by re-sealing. This disruption of the differentially bonded adhesive layer can be seen through the transparent substrate portion 11.

If desired, a security code or the like may be provided on the surface of the substrate portion 11 prior to coating with opacified adhesive 13.

Low density polyethylene has a low surface energy even after corona discharge treatment. Thus, when the first and/or second portions of the bag are formed from such material it is preferred to use a primer to improve the initial tack and the strength build up of the adhesive 13. Examples of suitable primers are emulsions of chlorinated polypropylene or an ink based on titanium dioxide filled nitrocellulose resin. A layer of such a primer is denoted by reference 16 in Figures 6 and 7.

Claims

1. A bag formed of sheet material and having an opening (8) to enable access to be gained to the interior of the bag wherein the bag includes first and second portions (3,4) arranged to be superposable so as to close the opening, and a tape (9) comprising a substrate portion (11) which is at least translucent and is differentially bonded to an opaque adhesive (13), said tape being located in a position where, on superposition of the first and second portions, the tape is adhered to one of said first and second portions by said opaque adhesive.

2. A bag as claimed in claim 1 wherein the substrate portion (11) constitutes one or other of the first and second portions.

3. A bag as claimed in claim 1 wherein the substrate portion is a component which is distinct from the first and second portions and said substrate portion is secured to the other of said portions by other adhesive (10).

4. A bag as claimed in claim 3 wherein said other adhesive is a high tack adhesive and the opaque adhesive of the tape is covered by a releasable cover strip (14).

5. A bag as claimed in claim 3 wherein the tape is secured, by the opaque adhesive, to one of the first and second portions in the vicinity of the opening which is provided in said one of the first and second portions and said other adhesive is

covered by means of a releasable cover strip (27) and is applied to the other of the first and second portions of the sheet material.

6. A bag formed of sheet material and having an opening (8) to enable access to be gained to the interior of the bag, the bag including a tape comprising a substrate portion (11) which is at least translucent and is differentially bonded to an opaque adhesive, the tape being located in a position where, by folding the bag, the opaque adhesive is superposed over the opening to close the opening.

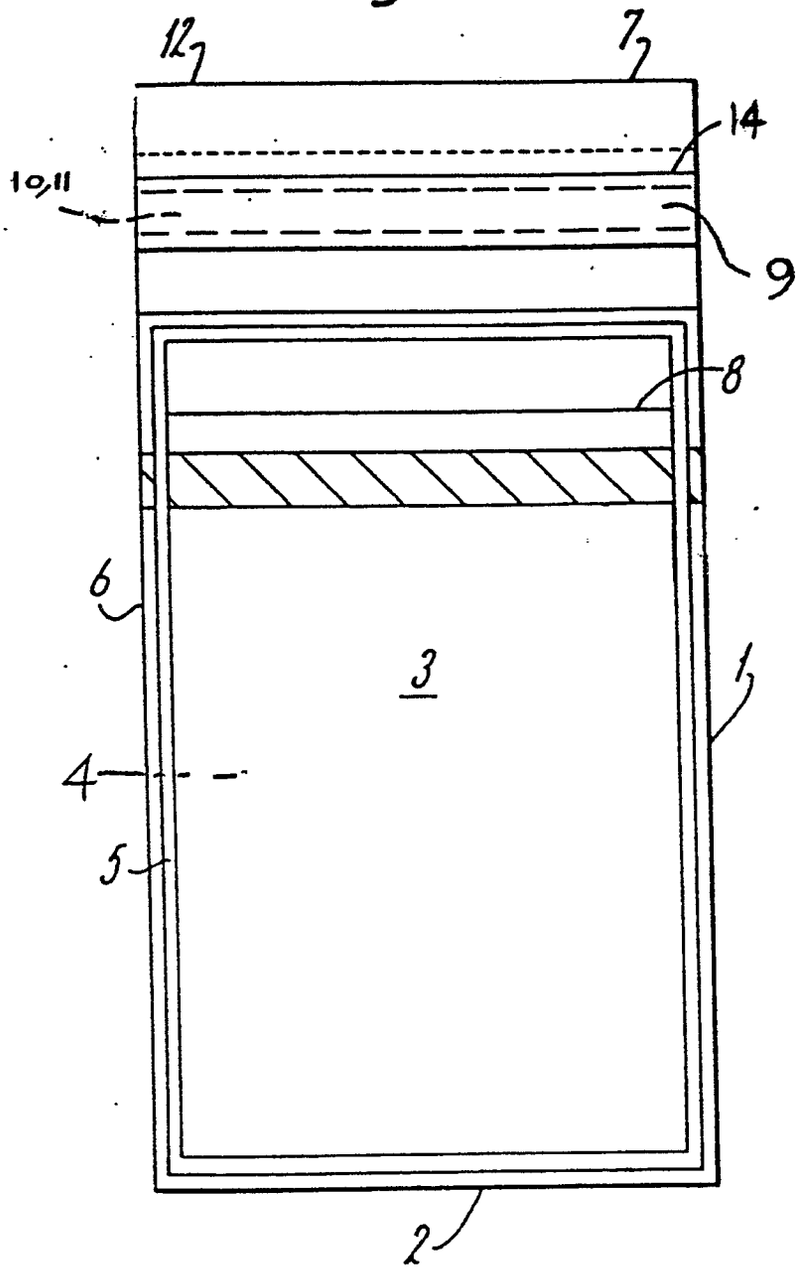
7. A bag as claimed in any preceding claim wherein the opaque adhesive is formed of a composition comprising a transparent adhesive and an opacifying agent therefor.

8. A bag as claimed in claim 6 wherein the transparent adhesive is a solvent based acrylic adhesive and the opacifying agent is selected from the group consisting of barium sulphate, titanium dioxide, Cyan Blue, Phthalocyanine Blue, Benzidine Yellow, and 4B Red.

9. A bag as claimed in any preceding claim wherein the substrate portion has a suitable release agent applied to it pattern-wise so that parts of it are coated with release agent and parts are not and the opaque adhesive is coated onto the patterned release agent layer.

10. A bag formed of sheet material and having an opening to enable access to be gained to the interior of the bag, said bag including first and second portions arranged to be superposable with a layer of adhesive inbetween so as to close the opening and a surface of the layer of adhesive being provided with printed matter.

Fig.1.



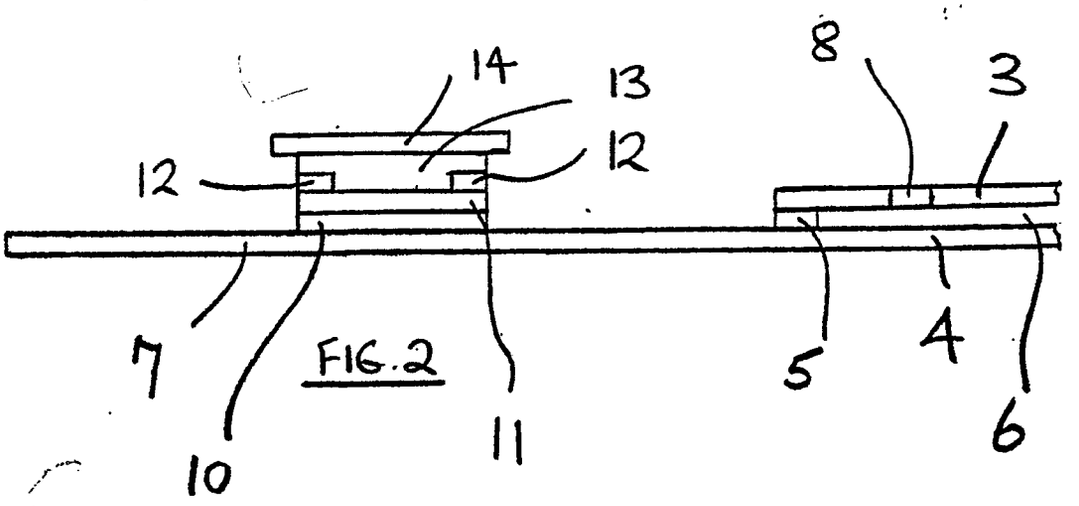


FIG. 2

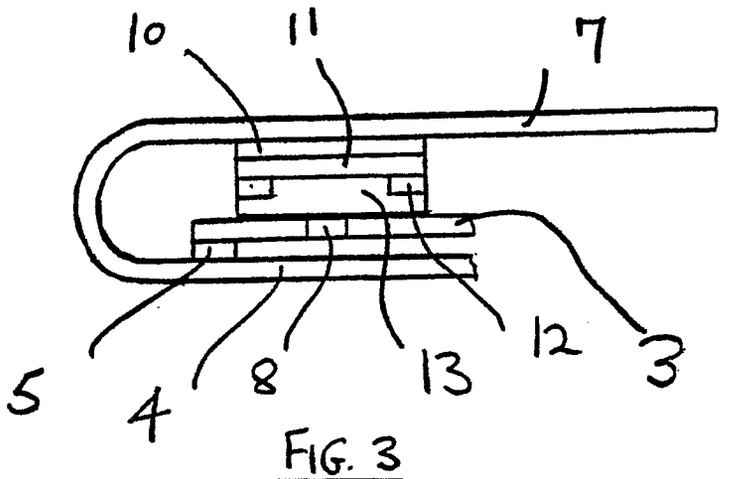


FIG. 3

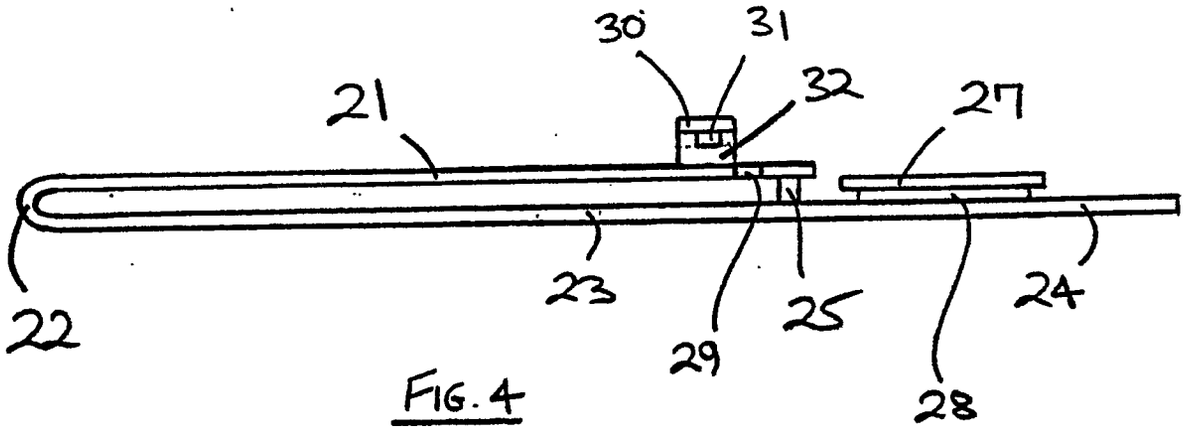


FIG. 4

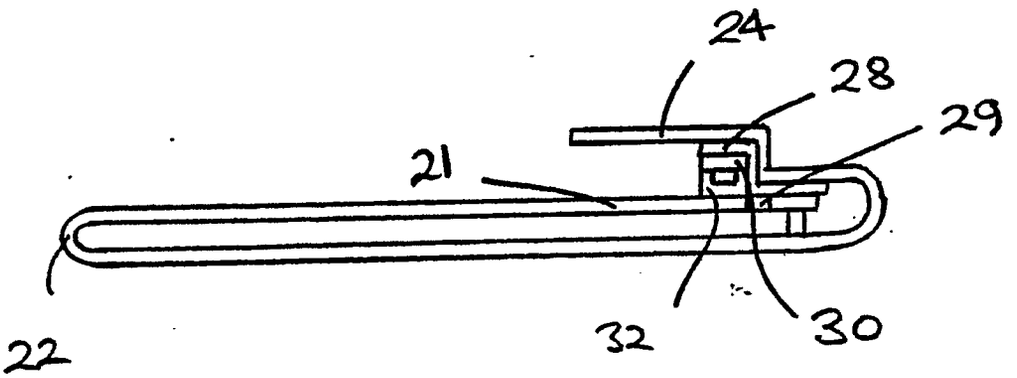


FIG. 5

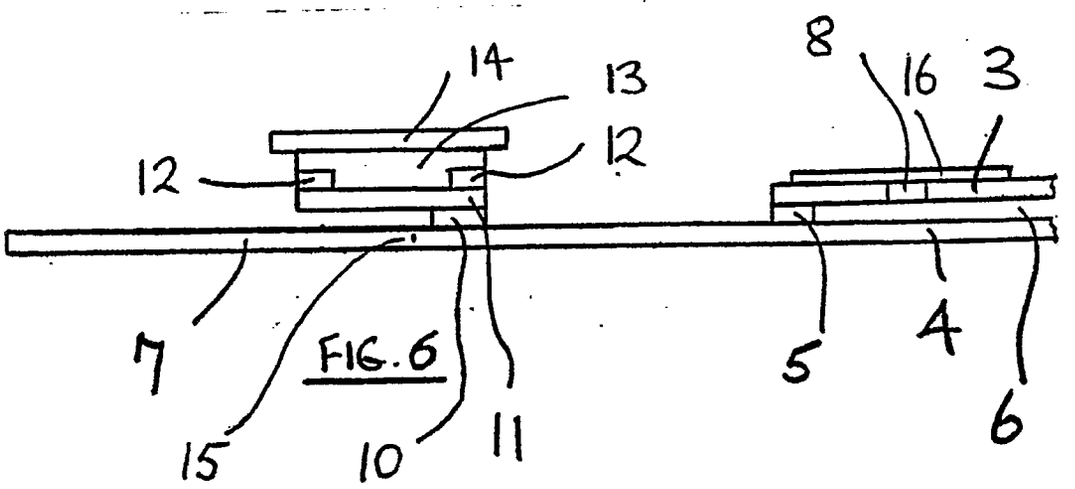


FIG. 6

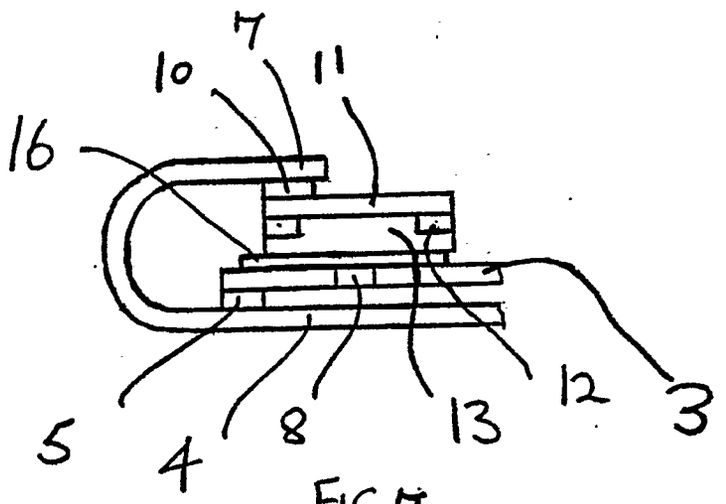


FIG. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 4886

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)
Y	US-A-4 709 396 (VOSHALL) * Column 4, line 13 - column 5, line 25; figures 1-4 *	1-10	B 65 D 33/34
Y	EP-A-0 259 068 (MARDON) * Column 3, line 4 - column 4, line 33; figures 1-8 *	1-10	
P,X	EP-A-0 341 699 (SEALCRAFT) * Page 15, claim 1; figures 5-8 *	1,3,6,8	
A	FR-A-2 029 611 (AVERY) * Page 4, lines 24-37 *	10	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 D
G 09 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25-06-1990	BESSY M.J.F.M.G.

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
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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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