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(54) Title: TAMPER-EVIDENT ADHESIVE TAPE

(57) Abstract: The invention relates to securing packages against tampering. The invention provides an adhesive tape which indicates on attempted removal and even if replaced provides clear evidence that the package to which it was applied has been tampered with. The tamper-indicating adhesive tape comprising a first top layer of transparent polymer film substrate having an upper and a lower side, provided with an adhesive-release coating on the upper side. A second layer being printed first indicia comprising a portion of the total indicia to be seen, printed on the lower side of the first layer. A third layer being transparent and containing a release varnish, the third layer being applied onto the second layer.

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TAMPER-EVIDENT ADHESIVE TAPE

Filed and Background of the Invention

5 The present invention relates to securing packages against tampering. More particularly, the invention provides an adhesive tape which indicates on attempted removal and even if replaced provides clear evidence that the package to which it was applied has been tampered with.

10 Products such as medicines, computer disks, military equipment, CD's, cigarettes perfumes etc are shipped by all kind of means and are subject to pilfering. The recipient may trust that the sender has dispatched the items required but will often need some assurance that the goods have not been accessed during transit. A convenient and economical way of achieving these aims is to apply tamper resistant adhesive tape to the
15 outside of the package. Such tape can be removed for purpose of opening the package; but any attempt at replacement of previously used tape is indicated clearly in a manner uncontrollable by anyone tampering with the package.

Tamper-resistant tapes or laminates intended for securing documents or products have
20 been disclosed in a number of US Patents, including no. 4,980,222 to Rivera et al., no. 5,683,774 to Faykish et al. and no. 6,395,376 to Cooley.

Prior -art tapes usually contain an intermediate layer comprising an acrylic adhesive which is hardened and on attempted tape removal the adhesive splits, leaving some of the
25 adhesive on the package and some of the adhesive on the removed portion of the tape. High-tenacity adhesives are not used in intermediate layers as the tape would then not delaminate as required to discourage re-use. With some care it is then possible to replace the tape in its original position. Furthermore, many prior-art tapes provide only a single
30 difficulty or barrier against attempts to replace removed tape, and those determined to avoid detection of reuse can with some effort succeed in opening a package without detection.

Objects of the Invention

It is therefore one of the objects of the present invention to obviate the disadvantages of prior art tamper-resistant tapes and to provide a tape which cannot be reused without detection.

- 5 It is a further object of the present invention to use an intermediate layer of a rubber-based adhesive, while yet retaining the delamination feature during tape removal.

Summary of the Invention

The present invention achieves the above objects by providing a tamper-indicating adhesive tape comprising a first top layer of transparent polymer film substrate having an upper and a lower side, provided with an adhesive-release coating on said upper side; a second layer being printed first indicia comprising a portion of the total indicia to be seen, printed on said lower side of said first layer; a third layer being transparent and containing a release varnish, said third layer being applied onto said second layer; 15 a fourth layer being a transparent UV cured or heat cured adhesive applied onto said third layer; a fifth layer being second indicia comprising the remaining portion of the total indicia, printed on said fourth layer to locate with and complete graphics of said first indicia; and 20 a sixth bottom layer of a pressure-sensitive rubber based hot melt adhesive applied onto said fifth layer; whereby attempted removal of said tape after application to a solid surface causes tape delamination between said third layer and either adjacent layer with additional conspicuous damage done by layers 1, 2, 5 and 6.

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In a preferred embodiment of the present invention there is provided a tamper-indicating adhesive tape wherein layers two, three and five include short zones wherein at least one such layer is absent, and on delamination reveal a previously hidden warning message.

In a most preferred embodiment of the present invention there is provided a tamper-indicating adhesive tape wherein layers 2-5 are printed applied by print, and layer 6 is applied by an application-specific coating machine.

5 Yet further embodiments of the invention will be described hereinafter.

It will thus be realized that the novel tape of the present invention serves to prevent reuse of applied tape as any attempt to re-align the delaminated tape is resisted by the conspicuous damage in layers 1, 2, 5 and 6. The adhesive of layer 4 nevertheless does not
10 prevent delamination during removal of applied tape, due to the third layer allowing its release.

The printed matter appearing on the tape can readily be suited to the requirements of the user - typically the company name and logo will appear, as well as any other desired text. Thus some part of the cost of the tape is paid for by advertising value.

15 Each zone may carry a whole or a part of a warning message, which is not visible before delamination Text may be "REJECT" or "WARNING: THIS PACKAGE HAS BEEN OPENED!" The warning message is printed as part of layer five (in addition to part of any user requested text) - and remains invisible before delamination because the printed matter in layer two is arranged to cover the warning.

20 An authentication feature can be added by the use of a machine readable security ink for at least a part of the printed text. The recipient of the package will have available a suitable reader. Coded text, invisible text and security inks can be added to layers 2-5 to achieve any degree of authentication desired.

25 **Short description of the Drawings**

The invention will now be described further with reference to the accompanying drawings, which represent by example preferred embodiments of the invention. Structural details are shown only as far as necessary for a fundamental understanding thereof. The described examples, together with the drawings, will make apparent to those skilled in the
30 art how further forms of the invention may be realized.

In the drawings:

FIG. 1 is a schematic side view, greatly enlarged, of a preferred embodiment of the tape according to the invention;

FIG. 2 is a schematic side view, greatly enlarged in thickness, of a further preferred embodiment of the tape divided into zones;

FIG. 3 is a plan view of a tape displaying a previously hidden warning following delamination;

and

10 **Full description of the Invention**

There is seen in FIG. 1 a tamper-indicating adhesive tape 10, typically composed of 6 layers, or if including the upper release surface there are 7 layers.

A first top layer 12 of transparent polymer film substrate has an upper 14 and a lower 16 side, and is provided with an adhesive-release coating 18 on the upper side 14 so that the tape 10 can readily be unrolled in use.

Suitable substrate films include mono-axially or bi-axially oriented polypropylene, and polyester oriented HDPE. The adhesive release coating 18 comprises a silicon-based release layer.

20 The lower side 16, as well as other surfaces to be printed, is preferably prepared for printing by a corona treatment.

A second layer 20 comprises printed first indicia which in turn comprises a portion of the total indicia to be seen when the tape is normally viewed. The text and graphics of the second layer 20 is incomplete; it will be completed by layer five 22. The second layer 20 is printed on the lower side 16 of the first layer 12.

Preferably, where an extra degree of security is desirable, the indicia are printed with machine-readable inks.

Thermochromic inks can be used if the recipient needs to know the temperature extremes to which the package has been exposed during transit. For example such tape is useful for the packaging of certain food products and some medical products which must be stored

under refrigerated conditions. The color of the ink on receipt of the package will indicate whether the consignment was stored and transported correctly.

5 A third layer 24 comprises a transparent coating, containing a release varnish. A desirable composition is at least 80% by volume of a transparent ink, the remainder being a silicone-based release varnish. The third layer 24 is applied onto the second layer 20.

10 The fourth layer 26 comprises a transparent coating of adhesive, which is cured during the course of production. Preferably the layer 26 comprises a transparent UV cured adhesive. It is applied onto the third layer 24.

15 The fifth layer 22 comprises second indicia completing the text and graphics which were intentionally missing from the second layer 20. The fifth layer 22 is printed onto the fourth layer 26.

20 Lastly the sixth bottom layer 28 is a pressure-sensitive adhesive of high peel strength which is applied onto the fifth layer 22. While adhesive strength is dependant on the surface to which the tape is applied, the adhesive strength is sufficient to ensure delamination during attempted removal.

25 In use, the tape 10 is applied to the package to be sealed (not shown) from a suitable dispenser in the same manner as any other adhesive tape. However any attempted removal of the tape after application to a solid surface causes tape delamination between the third layer 24 and either adjacent layer 20, 26. Any attempt at replacing the tape is easily detected by the inevitable misalignment of and damage caused to the texts carried by layers two and five 20, 22.

30 Additionally, removal of the tape after it has been applied will cause breakage of Layer 1 in at least one fault area (Zone C), thus further frustrating any attempt to conceal the tampering.

With reference to the rest of the figures, similar reference numerals have been used to identify similar parts.

5 FIG. 2 illustrates an embodiment of the tamper-indicating adhesive tape 30 wherein layers two, three and five 20, 24, 22 include short zones 32, 34, 36 wherein at least one such layer is absent. This increases the difficulties involved in replacing tape 30 which has been removed and delaminated after application to a package.

10 Turning now to FIG. 3, there is depicted a tape 38 including a zone 40 which displays a previously hidden warning 42, following removal of at least the first and the second layers 12, 20 as the tape delaminates during attempted removal. The warning 42 is printed as a part of layer five 22. Wording can be "DO NOT ACCEPT" or "TAMPERING DETECTED" or "REJECT" or the like.

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The scope of the described invention is intended to include all embodiments coming within the meaning of the following claims. The foregoing examples illustrate useful forms of the invention, but are not to be considered as limiting its scope, as those skilled in the art will readily be aware that additional variants and modifications of the invention
20 can be formulated without departing from the meaning of the following claims.

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WE CLAIM:

1. A tamper-indicating adhesive tape comprising

5 a first top layer of transparent polymer film substrate having an upper and a lower side, provided with an adhesive-release coating on said upper side;

a second layer being printed first indicia comprising a portion of the total indicia to be seen, printed on said lower side of said first layer;

10 a third layer being transparent and containing a release varnish, said third layer being applied onto said second layer; comprises at least 80% transparent ink and up to 20% of a silicone-based release varnish.

15 a fourth layer being a transparent UV cured or heat cured adhesive applied onto said third layer;

a fifth layer being second indicia comprising the remaining portion of the total indicia, printed on said fourth layer to locate with and complete graphics of said first indicia; and

20 a sixth bottom layer of a pressure-sensitive rubber based hot melt adhesive applied onto said fifth layer;

25 whereby attempted removal of said tape after application to a solid surface causes tape delamination between said third layer and either adjacent layer, with additional conspicuous damage done to layers 1-6.

2. A tamper-indicating and authentication tape, as claimed in claim 1, wherein said indicia are printed with machine-readable inks.

30 3. A tamper-indicating and authentication tape, as claimed in claim 1, wherein said indicia are printed with thermocromic inks.

4. The tamper-indicating adhesive tape as claimed in claim 1, wherein said third layer comprises at least 80% transparent ink and up to 20% of a silicone-based release varnish.
- 5 5. The tamper-indicating adhesive tape as claimed in claim 1, wherein layers two, three and five include short zones wherein at least one such layer is absent.
6. The tamper-indicating adhesive tape as claimed in claim 5, wherein said zones display a previously hidden warning following removal of at least said first and said second
10 layers as said tape delaminates during attempted removal.
7. A method of producing a tamper-indicating adhesive tape whereby layers 2-5 are applied by a printing process and layer 6 is applied by a coating machine.
- 15 8. A tamper-indicating adhesive tape substantially as described hereinbefore and with reference to the accompanying drawings.
9. A tamper-indicating and authentication adhesive tape substantially as described hereinbefore and with reference to the accompanying drawings.

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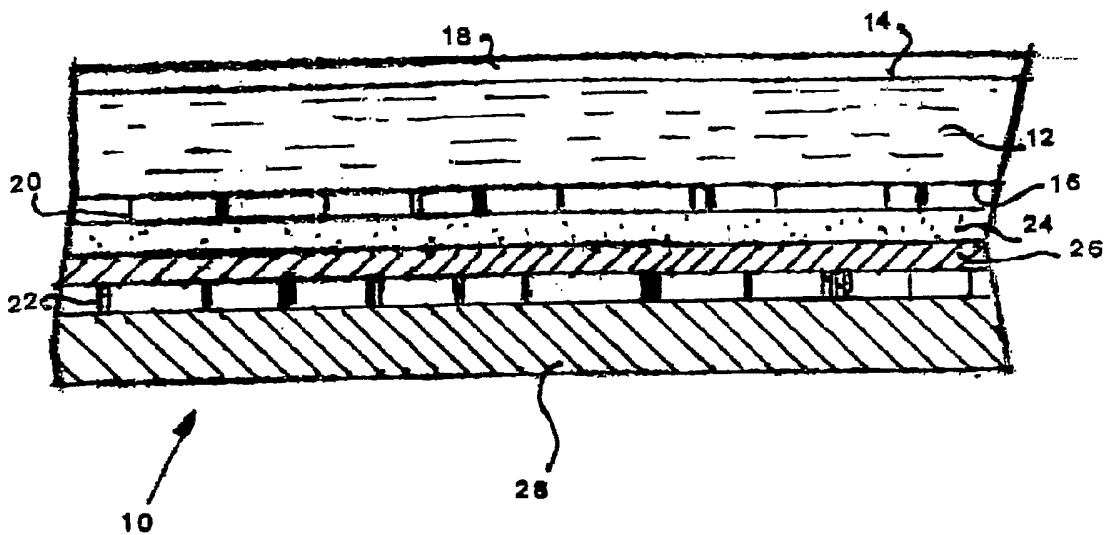


FIG. 1

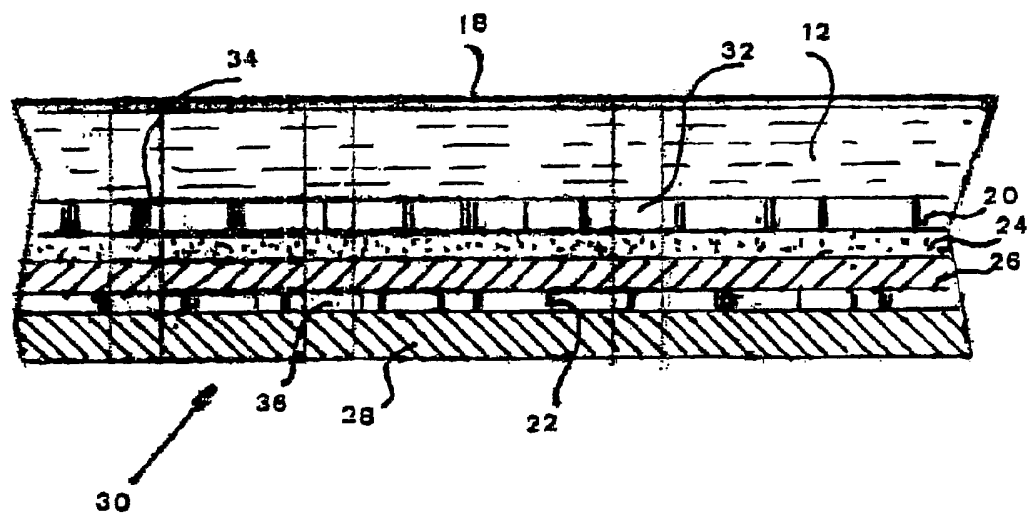


FIG. 2

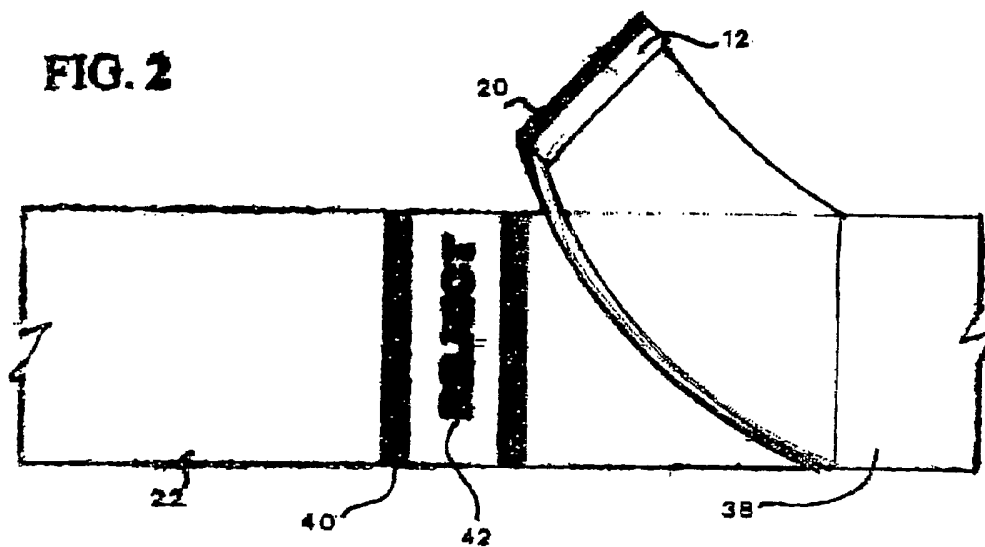


FIG. 3