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(54) Title: SECURITY PAPERS COMPRISING A NON-REFLECTIVE COATING

(57) Abstract: The present invention is concerned with improvements in security articles and papers such as bank notes, cheques, personal identification documents and the like. A security element for embedment into a security substrate, in which a matt non-reflective coating is applied to only a part of the security element.



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SECURITY PAPERS COMPRISING A NON-REFLECTIVE COATING

The present invention is concerned with improvements in security articles and papers such as bank notes, cheques,
5 personal identification documents and the like.

It is known to partially embed in security articles and papers security elements, in particular threads, so that they are exposed at one or both sides of the security paper
10 at intervals along the element, the regions of exposure being referred to as windows.

Whilst traditional security elements have been narrow and of constant widths, it is desirable to use wider elements or ones with varying widths, for aesthetic reasons or because
15 more information/indicia can be applied to the element.

The process of embedding security elements of varying widths in paper has been described in EP-A-0070172. The narrow portions become wholly embedded and the wider
20 portions remain exposed. One problem that has been identified using this method is that fibres get deposited around the wider regions in an uneven and unattractive manner. In particular, when embedding such security elements into security paper, an uneven deposition of paper
25 fibres along the edges of the elements, where the thread touches the paper, can cause the windows to appear unsightly and not aesthetically pleasing. It may be possible to overcome this effect by using air or water jets to clean off excessive fibres but this is difficult and expensive. The
30 current invention accepts that the fibres will be deposited and aims to mask their presence.

Although the unsightly effect of uneven fibre deposition can be limited to acceptable levels for security
35 elements having a continuous width of less than about 2mm, it has been found that for element with a varying width, or for elements having widths greater than about 2mm, this problem can reach an unacceptable level. As a consequence

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designs printed onto the security paper over the wider windowed elements may appear inconsistent and irregular.

Furthermore, recent approaches to embedding security
5 elements and wide polymeric bands into paper have suggested
binding fibres in discrete regions on the element, as
described in W0 00/39391. The binding is usually achieved
by applying an adhesive onto the thread as a design or
indicia. The approach outlined in W0 00/39391 is adequate,
10 but the effectiveness of the feature may be reduced by poor
paper fibre deposition.

The use of matt non-reflective coatings has been
described previously in EP-A-988157. This disclosure
15 describes a security element intended to be wholly
non-visible in reflected light when embedded in windowed
security paper.

However, the exposed part of the security thread
20 described in this document does not form a visually striking
feature of the appearance of the security article in
reflected light.

A further problem is that there is a continued need to
25 provide ever more secure documents for an increasing variety
of uses to prevent counterfeiting, as counterfeiters have
greater access to more sophisticated reproduction equipment.

The current invention therefore provides a security
30 element for embedding into a security substrate having a
matt non-reflective coating applied to only a part of the
security element.

The invention also provides a security substrate in
35 which a security element has been partially embedded such
that regions of the security element are exposed in windows
at least in one surface of the substrate, wherein a matt
non-reflective coating is applied to only a part of the
security element.

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It has been found that the aforementioned problems may be overcome by selectively applying a matt coating to the wider extremities of the security element, which coating is substantially the same colour as the substrate onto or into which the element is to be applied or embedded, thereby masking any areas of uneven fibre deposition and providing further enhancements to the appearance of the security document.

10

The present invention enables an additional level of complexity and security to be built into the security element without compromising the appearance of the thread once it has been embedded into a security document or the like.

15

The matt coating may also have additional machine-detectable functionality such as luminescence or magnetic properties, though it is preferable to use covert properties, such as magnetics, as portions of the matt coating will be covered by fibres.

20

Although the matt regions themselves are potentially machine-readable, as stated above, the regions may also conceal other machine-readable materials such as magnetic materials.

25

Furthermore, the matt regions of a security element according to the present invention are substantially invisible to the unaided eye in reflected light when the security element is included into a substrate. The matt regions of the security element may also contain an adhesive to promote adhesion of paper or other fibres within the treated area. Typically the regions will be coated with a matt non-reflective coating substantially the same colour as the substrate into which the security element is to be included. The matt coating may also have additional machine readable or authenticable properties.

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The current invention, seeks to improve and enhance the appearance of the security element in a windowed substrate in reflected light by masking defects that occur during the substrate making process. To this end, the matt coating is
5 applied in discreet regions to enhance and improve visualisation of the element in non-coated areas.

Preferred embodiments of the present invention will now be described in more detail, by way of example only, with
10 reference to the following Figures, in which:

Figure 1 shows a plan view of a first embodiment of a security element according to the present invention having a matt non-reflective coating;
15

Figure 2 shows a plan view of a second embodiment of a security element according to the present invention;

Figure 3 shows a plan view of a third embodiment of a security element according to the present invention;
20

Figure 4 shows a plan view of a fourth embodiment of a security element according to the present invention, which has a constant width with two matt non-reflective areas
25 running along either edge;

Figure 5 shows a plan view of a fifth embodiment of a security element according to the present invention;

Figure 6 shows a plan view of a sixth embodiment of a security element having matt non-reflective areas that also contain adhesive applied in such a way as to form designs and indicia;
30

Figure 7 shows a plan view of a seventh embodiment of a security element according to the present invention having
35 demetallised regions to further enhance security; and

Figure 8 shows a plan view of an eighth embodiment of a security element according to the present invention having

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both demetallised regions and regions that will remain wholly transparent when embedded in a windowed substrate.

Figure 1 shows a security element 1 according to a first embodiment of the present invention for partially embedding into a fibrous substrate, such as a security paper or the like. The security element 1, which is preferably made from metallised PET, is of varying width and may be of any desired length. The security element 1 is substantially elongate in shape and has alternating wide portions 3 and narrow portions 4. The element 1 is preferably symmetrical about a centre axis 5. The extremities of the wide portions 3 are coated with a matt non-reflective coating 2 which is substantially the same colour as the substrate into which the element 1 is to be embedded. This leaves a constant strip which is uncoated along the centre of the element 1, which is the width of the narrow portions 4.

The security element 1 is partially embedded within the substrate, preferably using known papermaking or similar apparatus such as cylinder mould or Fourdrinier machines. The process used is selected to produce a windowed substrate in which portions of the elements are exposed in windows at one or both surfaces of the substrate. As a further alternative, a method may be selected which enables a continuous strip of the element 1 to be exposed on one surface of the substrate, and portions exposed in windows in the other surface.

The narrow portions 4 of the element are typically less than 2mm in width. Typically the wide portion 3 is at least 1mm wider than the narrow portion 4. When embedded in a windowed substrate such as a security paper, the security element 1 will appear to be of a constant width in the windows when viewed in reflection. When viewed in transmission, the viewer will be able to see the overall shape of the element 1 including the coated parts of the wider portions 3 of the element 1 due to their increased opacity in contrast to the surrounding substrate.

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Figure 2 shows an alternative embodiment of a security element 1 according to the present invention. In this embodiment, the security element 1 has been die cut such
5 that the edges 6 are undulating. Security elements 1 with curved edges are harder to counterfeit and may also mirror a design applied to a security document or other article made from the substrate into which the security element 1 is embedded. Such a design may be created by demetallisation,
10 diffractive effects or printed using inks.

When viewed in reflective light, the security element 1 will appear as a visible security element that has a width variation that is less than that of the whole element and
15 may be designed so as to give the appearance of a security of constant width. In transmissive light, the whole element 1 will be seen.

Figure 3 shows a further embodiment of the present
20 invention. In this embodiment, the edges 6 of the security element 1 are castellated. The wide portions 3 are only partially coated with the matt non-reflective coating 2 at their very extremities, leaving the majority of the wide portions 3 and all of the narrow portions 4 uncoated.

25

When viewed in reflective light, the security element 1 will appear to be of constant width. In transmissive light, the whole element 1 will be seen.

Figure 4 shows how the current invention may be
30 employed in respect of an element having a constant width. It has been found that, when embedding elements of widths greater than 2mm, problems can occur with poor fibre deposition along the edges 6 of the element. Again this can
35 be unsightly and is certainly not desirable. The matt non-reflective coating is therefore used to mask this problem and is applied to the edges 6 of the security element 1. Although some of the width of the element is "lost" under the coating 2, the area of the element under

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the coating 2 may be used for non-visual information such as magnetic coding as described in EP-A-0516790.

5 In reflective light, only the uncoated portion of the security element 1 will be visible, whereas the whole element will be visible in transmission.

Figure 5 shows another embodiment of the present invention in which a security element 1 has a constant
10 width. In this embodiment, a matt non-reflective coating 2 is applied in a manner such that the uncoated section of the element 1 has undulating edges. When such a security element 1 is embedded in a windowed substrate it will appear to have a varying width when viewed in reflection. However,
15 in transmission, the entire shape of the security element 1 will be visible. This effect is both aesthetically pleasing and results in a security element 1 that is harder to counterfeit than standard elements, particularly if elaborate patterns are used along either edge 6. The
20 coating 2 can be applied in patterns which contrast or complement demetallised, holographic or printed features on the security document or article or to provide visual continuity.

25 The security element 1 shown in Figure 6 has a matt non-reflective coating 2 applied in discrete regions within the body of the security element 1. The matt non-reflective regions form both a design and alphanumeric. It will be appreciated by those skilled in the art that such an
30 approach could be used in combination with matt coatings along the edges 6 or on wide portions as required. In reflection, only the uncoated portions of the security element 1 will be seen, whereas the whole security element 1 will be visible in transmission.

35

The matt coatings illustrated in Figure 6 are intended to be used when embedding elements according to WO-A-00/39391 or similar methods where paper fibres are applied in discrete areas of an element but not necessarily

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extending across the element's full width. It has been found when trying to achieve these methods that poor deposition of paper fibres can lead to the element becoming exposed in areas that are intended to be embedded. It has
5 been found that this problem can be overcome by adding a suitable adhesive to the matt non-reflective coating 2 prior to or after its application on to the security element prior to its inclusion into a substrate.

10 Figure 7 shows a further example of how the invention may be employed. In this embodiment, the matt non-reflective coatings are combined in register with demetallised regions 7, thus producing a visually striking effect and also an enhancement in the security of the final
15 document, due to the added complexity of the security element. As for the embodiment shown in Figure 6, the whole security element will only be visible in transmission.

Figure 8 shows yet another embodiment of the present
20 invention. Areas 7 of a security element 1 which have a matt non-reflective coating 2 are also demetallised. In addition a second series of demetallised regions 8 are also shown. When the security element 1 is embedded into a substrate the series of demetallised non-reflective areas 7
25 will be covered by the substrate on one side and exposed in windows at the other side of the substrate. In contrast, the series of demetallised regions 8 form transparent apertures on which paper fibres are not deposited on either side of the paper. In transmission, the whole security
30 element 1 will be visible, whereas the coated portions will not be visible in reflective light.

It would also be appreciated by a person skilled in the art that a matt non-reflective coating 2 may be applied in
35 accordance with the present invention on one side of the security element only and the other side of the security element may remain uncoated or may be provided with a full coating or, alternatively, a partial coating may be applied on both sides of the security element to prevent thread

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turnover (?). Similarly, the security element 1 need not be symmetrical about the centre axis 5.

Furthermore, the security element to which the present
5 invention refers may be in the form of a security thread or
equally may be a planchette.

The security element can be embedded in a security
substrate used to make any security document, such as a
10 banknote, Passport, voucher, passport, bond, certificate and
the like.

Although several specific embodiments of the present
invention have been described above, the features described
15 may be used in any combination.

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CLAIMS

1. A security element for embedding into a security
substrate having a matt non-reflective coating applied to
5 only a part of the security element.
2. A security as claimed in claim 1 wherein the security
element is an elongate element.
- 10 3. A security element as claimed in claim 1 or claim 2
wherein the security element is of constant width.
4. A security element as claimed in any one of claims 1 or
2 wherein the security element is of varying width and has
15 alternating narrow portions and wide portions.
5. A security element as claimed in claim 4 wherein the
width of the narrow portions of the security element is no
greater than 2mm.
- 20 6. A security element as claimed in claim 4 or claim 5
wherein the width of the wide portions of the security
element is at least 1mm wider than the width of the narrow
portions.
- 25 7. A security element as claimed in any one of claims 4 to
6 wherein the narrow portions are uncoated and the matt non-
reflective coating is applied to parts of the edges of the
wide portions.
- 30 8. A security element as claimed in any one of the
preceding claims wherein the security element is further
provided with demetallised or metallised regions.
- 35 9. A security element as claimed in any one of the
preceding claims wherein the matt non-reflective coating is
applied to one or both edges of the security element.

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10. A security element as claimed in any one of the preceding claims wherein the matt non-reflective coating is combined in register with demetallised regions.
- 5 11. A security element as claimed in any one of the preceding claims wherein the matt non-reflective coating is machine readable.
- 10 12. A security element as claimed in any one of the preceding claims wherein the matt non-reflective coating conceals a machine readable material.
- 15 13. A security element as claimed in any one of the preceding claims wherein the matt non-reflective coating is applied to both sides of the security element.
- 20 14. A security element as claimed in any one of the preceding claims wherein the security element is planchette.
- 25 15. A security substrate in which a security element has been partially embedded such that regions of the security element are exposed in windows at least in one surface of the substrate, wherein a matt non-reflective coating is applied to only a part of the security element.
16. A security substrate as claimed in claim 15 wherein the security element is of a constant width.
- 30 17. A security substrate as claimed in claim 15 wherein the security element is of varying width and has alternating narrow portions and wide portions.
- 35 18. A security substrate as claimed in claim 17 wherein the width of the narrow portions of the security element is no greater than 2mm.
19. A security substrate as claimed in claim 17 or claim 18 wherein the width of the wide portions of the security

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element is at least 1mm wider than the width of the narrow portion.

20. A security substrate as claimed in any one of claims 17
5 to 19 wherein the narrow portions are uncoated and the matt non-reflective coating is applied to edges of the wide portions.

21. A security substrate as claimed in any one of claims 15
10 to 20 wherein the security element is further provided with demetallised or metallised regions.

22. A security substrate as claimed in any one of claims 15
15 to 21 wherein the matt non-reflective coating is applied to one or both edges of the security element.

23. A security substrate as claimed in any one of claims 15
to 22 wherein the matt non-reflective coating is combined in register with demetallised regions.

20 24. A security substrate as claimed in any one of claims 15 to 23 wherein indicia is applied to one or both surfaces of the security substrate by means of demetallisation, diffractive effects or ink-printing.

25 25. A security substrate as claimed in any one of claims 15 to 24 wherein the matt non-reflective coating has machine readable capability.

30 26. A security substrate as claimed in any one of claims 15 to 25 wherein the matt non-reflective coating conceals a machine readable material.

35 27. A security substrate as claimed in any one of claims 15 to 26 wherein the matt non-reflective coating is substantially the same colour as the first surface of the security substrate.

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28. A security substitute as claimed in any one of the claims 15 to 26 wherein the matt non-reflective coating is applied to both sides of the security element.

5 29. A security substrate as claimed in anyone of claims 15 to 27 wherein the security element is a planchette.

30. A banknote or other security document made from a security substrate as claimed in anyone of claims 15 to 29
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FIG. 1.

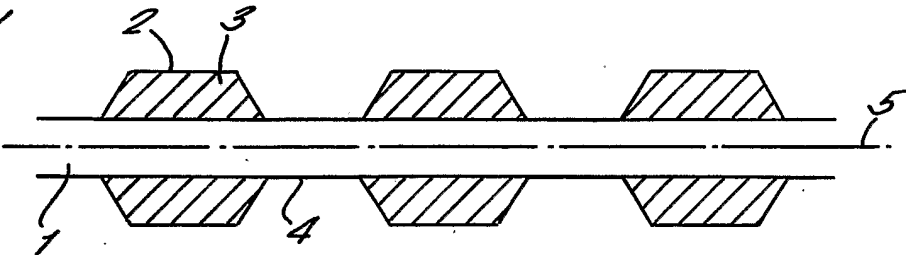


FIG. 2.

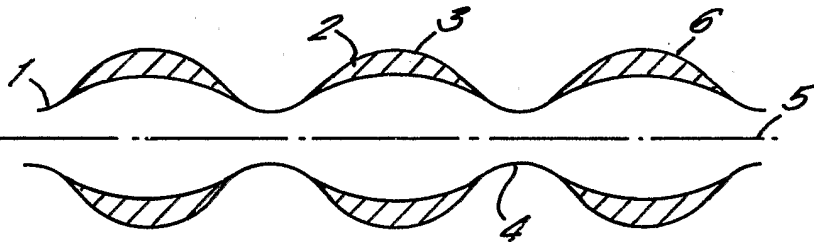


FIG. 3.

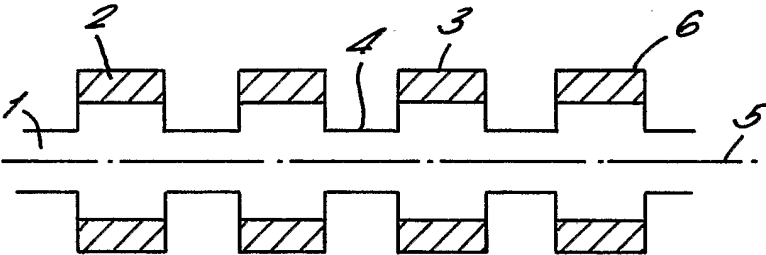


FIG. 4.

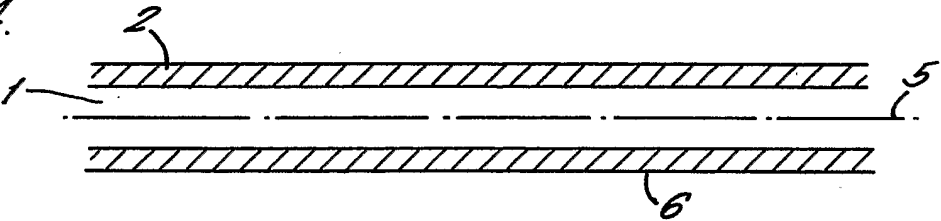
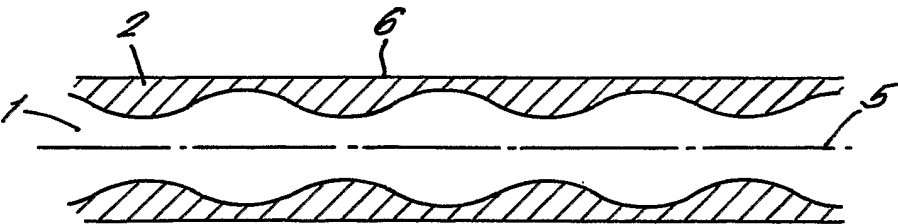


FIG. 5.



2/2

FIG. 6.

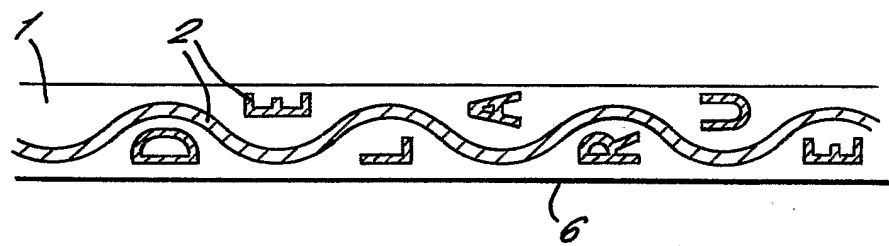


FIG. 7.

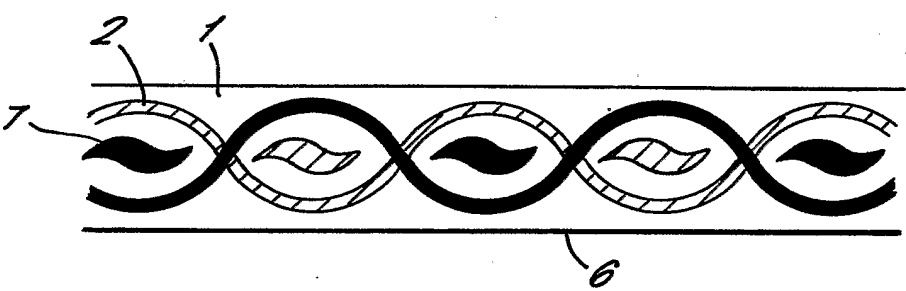
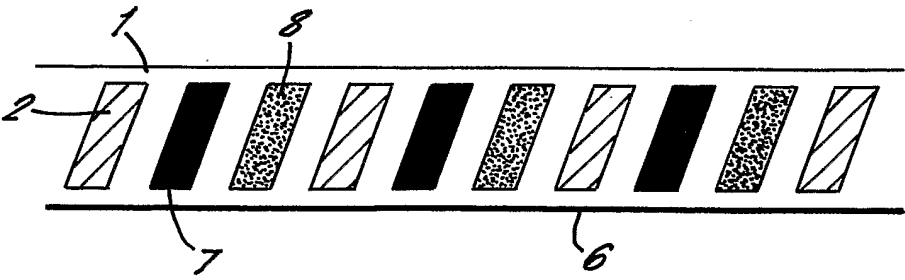


FIG. 8.



INTERNATIONAL SEARCH REPORT

Internat Application No

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 D21H21/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 D21H B42D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

Internal Application No

PCT/GB 03/04718

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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