



NEW EUROPEAN PATENT SPECIFICATION

Date of publication of the new patent specification : **03.11.93 Bulletin 93/44**

Int. Cl.⁵ : **B44F 1/12, B42D 15/02, B41M 3/14**

Application number : **83302342.7**

Date of filing : **25.04.83**

Manufacture of a sheet element having a reflective anti-counterfeiting device.

Priority : **27.04.82 GB 8212096**

Date of publication of application : **02.11.83 Bulletin 83/44**

Publication of the grant of the patent : **18.07.90 Bulletin 90/29**

Mention of the opposition decision : **03.11.93 Bulletin 93/44**

Designated Contracting States : **CH DE FR GB IT LI NL SE**

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US-A- 3 235 395
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EP 0 093 009 B2

Description

The present invention relates to a sheet element having a reflective anti-counterfeiting device and manufacture thereof, and in particular to security and other valuable documents having a security band in the form of a continuous protective pattern.

There is both a present and an increasing danger of security documents of all kinds being counterfeited by various graphic arts techniques including not only traditional printing methods but also, increasingly, photographic and electronic scanner half-tone colour separations and colour copiers. It is to be expected that these techniques will be improved in quality and speed and that consequently the future danger of security documents being counterfeited is likely to arise mainly from the automatic imaging and manufacture of plates or copies.

One aspect which all of these processes have in common is that they require illumination, which is incident on the surface of the security documents, to be diffusely reflected from the surface onto an imaging system. The reproduction of the prints on the original document is in the end carried out using coloured inks or toners. These processes could all, therefore, be prevented from producing effective counterfeits if a feature was incorporated on the documents whose reflection characteristic had a large specular component.

It has therefore been proposed to use metallic inks or coatings on the surface of documents. However, metallic inks are not effective in practice because they are made from metallic platelets or particles which cannot be strictly orientated with respect to a plane surface so as to produce a specular reflection over a large area. A contributing factor to this is the unevenness of most paper surfaces. A copy of a metallic ink printed original might therefore resemble the original too closely to be detected as a counterfeit.

Alternatively, methods are known whereby a thin metallic sheet having a mirror-like surface can be applied to the surfaces of paper and similar materials.

US-A-4066 280 teaches a method of a similar kind whereby part of the material on the document is printed in an ink containing a specularly reflective colouring material, for example, powdered aluminium. When documents having this type of surface are copied, the reproduction usually appears as either a dull matt colour or combination of colours, or as a non-printed area, depending on the method of illumination and imaging and the angles of incidence and reflection of the light from the light source. This provides a significant difference between the original and its copy. US-A-4066 280 also teaches a method whereby documents are printed with two overlapping imprints, one being in conventional colouring materials and the second being made in an ink including a specularly reflective colouring material. The second im-

print either overlaps or is overlapped by part of the first imprint. The second imprint comprises a multiplicity of fine, closely spaced marks.

It has also been proposed, for example in US-A-4146 664, to use adaptations of conventional labelling or hot foil stamping techniques, whereby shaped areas of metallised plastic film are adhesively applied to a security document at some point during the production process thereof to give areas exhibiting the desired effect during reproduction. However, this method has a disadvantage in that it requires an extra application process to be carried out in registration with the printed design. This method may also increase the thickness of a pile of such documents over that part of their area which is covered by the metallised plastic film, thus giving rise to difficulties in subsequent printing and handling processes.

The present invention provides a method for the manufacture of a bank note or other security document constituted by a paper sheet element having a reflective anti-counterfeiting device constituted by a specularly reflective foil material, the method comprising the steps (a) to (c) as defined in claim 1.

According to a further aspect of the invention, the foil material may be applied to the surface of the sheet element by a process of hot foil stamping or by a transfer process. The application is carried out with an elongate length of the foil material to constitute a plurality of the sheet elements thereby to result in a relatively convenient and inexpensive manufacturing process. In addition, the foil material is very thin when compared to the thickness of the sheet element and so the thickness of the sheet element is not substantially increased over that part of its surface on which the foil material is disposed.

A specific example of the present invention will now be described in greater detail with reference to the accompanying drawings, in which:

Figure 1 shows a diagram of a security document; and

Figure 2 shows schematically apparatus for applying foil material to a web of a sheet element.

Figure 1 shows a security document, such as a bank note 1, which has been manufactured in accordance with the present invention. The bank note 1 consists of a body of a sheet material having a particular shape, in the example shown the shape is rectangular, and a particular area, as desired. The sheet material may be, for example, paper.

The bank note 1 has a continuous band 2 of a thin-layered foil material disposed on its surface across its width at a specific position along its length. The foil material is a metallic foil or a similarly reflective film. The foil material is in the form of a continuous, repetitive pattern, which is preferably complicated and characteristic of the particular bank note 1 to which the foil material is applied.

The width of the band 2 is preferably between 0.5

centimetres and 2.5 centimetres.

The continuous band 2 is overprinted with at least one security tint 3. The security tint 3 is of a pattern and colouration which is a characteristic part of the particular bank note 1. The security tint 3 extends over both the surface of the continuous band 2 and the surface of the bank note 1 adjacent thereto.

The bank note 1 is printed over other portions of its surface with the normal printings which make up the remainder of the design of the bank note 1.

The methods of manufacture of the sheet element carrying the reflective anti-counterfeiting device which is later printed to become the bank note 1 are described hereinbelow with reference to Figure 2.

When the bank note 1 or other security document is to be made of paper, a known method of manufacture of paper bank notes involves the production of a reel or web of paper which may either be printed in web-form or cut into a number of sheets which are printed with a number of prints individually. Each web or sheet is then cut up into a number of individual bank notes 1 or other security documents.

According to the present invention and as is shown in Figure 2, a continuous band 4 of the foil material is applied to a reel of paper 5 before the reel is sheeted or printed. The reel 5 is unwound in the direction shown by the arrow A and the web of paper 6 is fed continuously through means 7 for applying the foil material. Figure 2 only shows the arrangement of the apparatus for the application of one band 4 of foil material, although it will be apparent to those skilled in the art that a number of means 7 may be employed to apply a corresponding number of bands 4. The web of paper 6 is then stored on a second reel 8 ready for subsequent printing or sheeting prior to printing.

The foil material may be applied by the method of hot foil stamping or by a similar method such as a transfer process.

A plurality of stamping stations each having a respective means 7 for applying bands 4, are arranged along a line transverse to the direction of feed A of the web of paper 6. The foil material is applied to the web of paper 6 along the length of the web at specific positions along the width of the web, such that after sheeting and printing of the paper a band 2 of foil material is disposed on the surface of each bank note 1 at a particular position, as is shown in Figure 1.

At each stamping station, the web of paper 6 passes between two rollers 20, 22. One of the rollers 20 is a die or wheel having a patterned outer cylindrical surface 24. In use, a length of suitable foil 9 which is disposed on a suitable backing material 10 is fed between the web of paper 6 and the patterned die or wheel 20.

When hot foil stamping is employed, the die or wheel 20 is maintained at an elevated temperature and the pressure applied by the die or wheel 20 to the foil 9, which is reflective, is such that the foil 9 is de-

tached from the backing material 10 and is applied to the web of paper 6 in a pattern corresponding to that on the die or wheel 20.

When a transfer process is employed, the arrangement is similar to that used for hot foil stamping but the foil material is applied to the web of paper 6 only by the pressure of the die or wheel 20 and not by the action of both heat and pressure. In addition the transfer process may be used when the foil material to be applied to the web of paper is other than metallised.

When a metallised foil is employed in accordance with one embodiment of the invention prior to application of the web of paper 6, the metallised foil material may be at least partly coated with a lacquer. The lacquer can be applied either in a single or multicoloured pattern such that simulation of the metallised foil material, by employing commercially available materials, is rendered very difficult. The particular pattern and colouration of the lacquer may be arranged to be characteristic of the particular bank note 1 or other security document to which the foil material is to be applied.

The foil material may be applied to not only one but both sides of the web of paper 6. In this case two patterned dies or wheels 20 may be employed, each being associated with a respective length of the foil 9 to be applied to the web of paper 6.

After the foil material has been applied to the web of paper 6 the paper is then passed, either in that form or via a sheeter in which the paper is cut into sheets of appropriate dimensions, to a security document printer. The paper is then printed with a security tint 3 in a known manner and with other desired prints, which is very convenient in operation. There is a considerable security value in the foil material being subsequently overprinted by the security tints normally employed in the manufacture of security documents, for example bank notes.

Preferred embodiments of the present invention provide security documents which are convenient and relatively inexpensive to manufacture and provide good security against counterfeiting.

The application of the foil material may readily be incorporated into the known methods of manufacture of paper for security documents. The application process is very quick and is of a continuous nature. The process also readily ensures that the foil material is applied to the correct portion of the web of substrate. A suitable choice of pattern avoids the necessity to align the foil material in machine direction registration with the documents to be printed on the substrate.

The application of the foil material to the web of substrate by stamping, such as hot foil stamping, provides a secure bond between the substrate and the foil material. This is particularly essential in the production of bank notes where the bank notes are likely

to be roughly handled in use.

The use of a foil, having a minimal thickness, provides that when a number of security documents, such as bank notes, are arranged together in a pile, the thickness of the pile in that part of its area which corresponds to the foil material is not substantially increased and the pile has a uniform thickness. This feature is very important for documents intended for use in automatic printing, handling and distribution apparatuses.

The provision of a reflective foil which is overprinted on at least part of its surface with a security tint ensures good protection against counterfeiting by, for example, photoreproduction. The combination of a characteristic pattern and colouration on the foil, which are applied to the foil prior to its incorporation onto the sheet element, with the security tint printed onto the foil and the surrounding surface of the sheet element, ensures even better protection against counterfeiting.

Claims

1. A method for the manufacture of a bank note or other security document constituted by a paper sheet element (6) having a reflective anti-counterfeiting device constituted by a specularly reflective foil material (2), characterised by:
 - (a) applying by means of pressure or both heat and pressure a continuous band (4) of the foil material in the form of a continuous repetitive pattern to a portion of the surface of the sheet element while the sheet element is in the form of an elongate web of paper, the pattern extending along the length of the web;
 - (b) printing the sheet element so as to overprint (3) at least a part of the foil material with a security tint which extends over both the surface of the continuous band and the surface of the paper sheet element adjacent the continuous band; and
 - (c) either before or after the printing of the sheet element, cutting the web into individual sheets, each having a respective length of foil material thereon.
2. A method according to claim 1 wherein the continuous band is applied to the sheet element by means of hot foil stamping.
3. A method according to any preceding claim wherein a continuous band of foil material is applied to each side of the sheet element.
4. A method according to any preceding claim wherein the continuous band is applied to the sheet element by feeding the elongate web of the

foil material and an elongate length of the sheet element through a pair of rollers (20, 22) of which at least one of the rollers (20) is heated and has a patterned cylindrical surface and the foil material is applied to the sheet element in a pattern corresponding to that on the roller.

Patentansprüche

1. Verfahren zur Herstellung einer Banknote oder eines sonstigen Sicherheitsdokuments, gebildet von einem Papierblattelement (6), das eine von einem spiegelnd reflektierenden Folienmaterial (2) gebildete reflektierende Fälschungsschutzeinrichtung aufweist, dadurch gekennzeichnet,
 - (a) daß mittels Druck oder mittels Druck und Wärme ein kontinuierlicher Streifen (4) des Folienmaterials in Form eines kontinuierlichen, sich wiederholenden Musters auf einen Teil der Oberfläche des Blattelements aufgebracht wird, während dieses in Form einer länglichen Papierbahn vorliegt, wobei das Muster in Längsrichtung der Bahn verläuft,
 - (b) daß das Blattelement derart bedruckt wird, daß mindestens ein Teil des Folienmaterials mit einer Sicherheitsfarbe überdruckt (3) wird, die sich sowohl über die Oberfläche des kontinuierlichen Streifens als auch die diesem benachbarte Oberfläche des Papierblattelements erstreckt, und
 - (c) daß entweder vor oder nach dem Bedrucken des Blattelements die Bahn in einzelne Blätter geschnitten wird, auf deren jedem eine betreffende Länge des Folienmaterials vorliegt.
2. Verfahren nach Anspruch 1, wobei der kontinuierliche Streifen mittels Warmfolienprägung auf das Blattelement aufgebracht wird.
3. Verfahren nach Anspruch 1 oder 2, wobei ein kontinuierlicher Streifen aus Folienmaterial auf jede Seite des Blattelements aufgebracht wird.
4. Verfahren nach einem der vorhergehenden Ansprüche, wobei der kontinuierliche Streifen dadurch auf das Blattelement aufgebracht wird, daß die längliche Bahn aus Folienmaterial und ein längliches Stück des Blattelements durch ein Walzenpaar (20, 22) hindurchgeführt werden, von dem mindestens eine der Walzen (20) beheizt ist und eine bemusterte Zylinderoberfläche aufweist, und wobei das Folienmaterial in einem dem Muster auf der Walze entsprechenden Muster auf das Blattelement aufgebracht wird.

Revendications

1. Procédé de fabrication d'un billet de banque ou d'un autre document de sécurité constitué d'un élément en feuille de papier (6) comportant un dispositif réfléchissant prévenant sa contrefaçon constitué par un matériau en lame réfléchissant de manière spéculaire (2), caractérisé par :
 - (a) l'application par pression ou, à la fois chauffage et pression d'une bande continue (4) du matériau en lame sous la forme d'un dessin répétitif continu sur une portion de la surface de l'élément en feuille lorsque l'élément en feuille se présente sous la forme d'une bande allongée de papier, le dessin s'étendant sur la longueur de la bande ;
 - (b) l'impression de l'élément en feuille de sorte à surimprimer (3) au moins une partie du matériau en lame avec une encre de sécurité qui s'étend à la fois sur la surface de la bande continue et la surface de l'élément en feuille de papier adjacente à la bande continue ; et
 - (c) la coupure, soit avant ou après l'impression de l'élément en feuille, de la bande en feuilles individuelles, chacune possédant une longueur respective du matériau en lame.
2. Procédé selon la revendication 1 dans lequel la bande continue est appliquée à l'élément en feuille par estampage de lame à chaud.
3. Procédé selon l'une quelconque des revendications précédentes dans lequel une bande continue de matériau en lame est appliquée sur chaque face de l'élément en feuille.
4. Procédé selon l'une quelconque des revendications précédentes dans lequel la bande continue est appliquée sur l'élément en feuille en faisant passer la bande allongée du matériau en lame et une longueur allongée de l'élément en feuille par une paire de rouleaux (20,22) dont l'un au moins des rouleaux (20) est chauffé et comporte une surface cylindrique à dessin et le matériau en lame est appliqué sur l'élément en feuille en un dessin correspondant à celui sur le rouleau.

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FIG. 1.

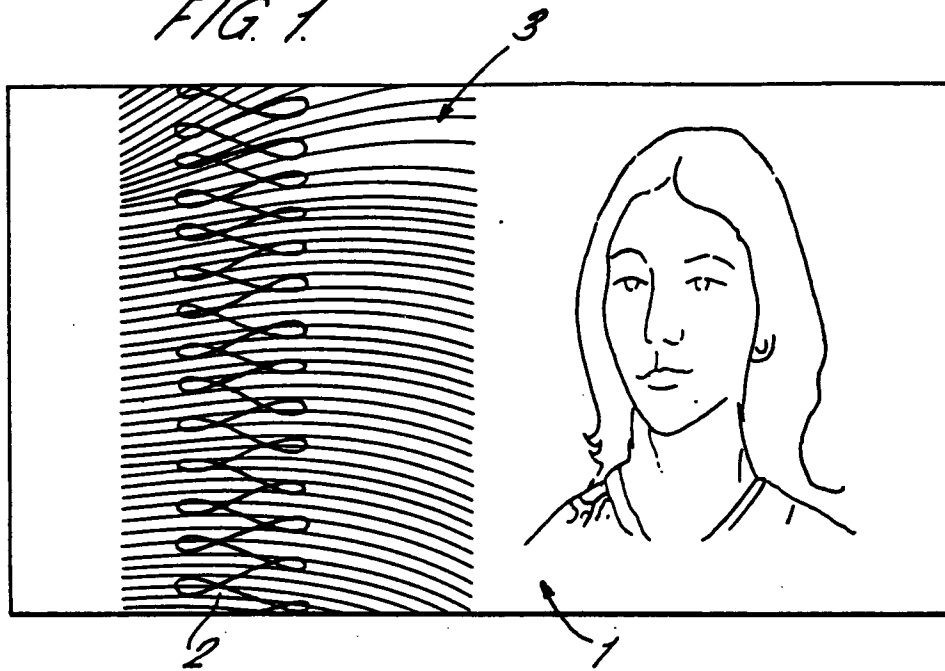


FIG. 2.

