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(54) **SECURITY PAPER HAVING EMBEDDED SECURITY FEATURE AND METHOD OF PREPARING SAME**

SICHERHEITSPAPIER MIT DARIN EINGEBETTETEM SICHERHEITSELEMENT UND VERFAHREN ZU SEINER HERSTELLUNG

PAPIER DE SECURITE INTEGRANT UN DISPOSITIF DE SECURITE ET PROCEDE DE PREPARATION DUDIT PAPIER

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Description

Field of the Invention

[0001] The present invention relates to a security paper having an embedded security feature, and a method of preparing same using a hot-melt film bearing a printed security image.

Background of the Invention

[0002] Security documents such as banknotes, checks, stocks and the like need to be guarded by anti-falsification measures and they are often made from a security paper having an embedded security element in the form of security features, security threads, security fibers and planchettes.

[0003] For example, Japanese Patent Publication Nos. 88-270898 and 90-133697 describe a method of manufacturing a security paper having an embedded security image, which comprises the steps of inserting a water-soluble polyvinylalcohol film having a print layer bearing the security image in the form of a figure or pattern between two sheets of wet paper and dissolving the film, thereby imprinting the security image on the interface of the two paper sheets.

[0004] However, the method has problems in that the dissolution rate of the water-soluble film is not easy to control and the handling of such a film sandwiched between two sheets of paper during a paper making process is difficult due to the differences in properties of the film and paper sheets in terms of expansion coefficient and tensile strength.

[0005] European Patent 0 453 131 A2 discloses a method of impregnating a security feature in paper using a bonding agent. This method comprises applying a print layer onto a sheet of paper and then covering another sheet of paper thereon using a bonding agent. This method which is complex and requires the use of a bonding agent may not be suitably employed in a commercial process.

Summary of the Invention

[0006] Accordingly, it is an object of the present invention to provide an improved method of making a security paper having an embedded security feature.

[0007] Further, it is another object of the present invention to provide a security paper having an enhanced security feature.

[0008] In accordance with one aspect of the present invention, there is provided a method of making a security paper having an embedded security feature in the form of a figure, character or pattern, which comprises, inserting a polyolefin film bearing a print ink layer of the security feature between two sheets of wet paper; pressing the sheets together; and heating the pressed sheets at a temperature above the melting temperature of the polyolefin.

[0009] In accordance with another aspect of the present invention, there is provided a security paper having an embedded security feature formed by the above method.

Brief description of the drawings

[0010] The above and other objects and features of the present invention will become apparent from the following description thereof, when taken in conjunction with the accompanying drawings wherein:

Figure 1 exhibits a schematic representation of the method of manufacturing a security paper according to one embodiment of the present invention;

Figures 2 shows the cross-sectional side view of a composite film (30) composed of a print layer (33), a hot-melt film layer (32) and a supporting base film layer (31);

Figure 3 illustrates an apparatus used in stinging a composite film (30).

Detailed Description of the Invention

[0011] Referring to Figure 1, one preferred embodiment of the present invention may be conducted as follows using a Fourdrinier paper making machine (10) and a cylinder mould paper making machine (20).

[0012] In the Fourdrinier machine, a fiber stock, a slurry of paper fibers, deposits onto a continuous moving wire mesh (12) and a paper fiber web formed thereon passes through a preliminary wet press (11) to form a wet paper sheet (1).

[0013] Another wet paper sheet (2) is prepared using the cylinder mould paper making machine (20), wherein cylinder (21) equipped with a wire mesh on its surface dips into a vat containing a fiber stock. As cylinder (21) rotates, paper fibers deposit on the mesh and wet paper sheet (2) is formed. Wet paper sheet (2) is couched from cylinder (21) by couch roll (22).

[0014] In accordance with the present invention, polyolefin-based hot-melt film (3) bearing a printed security image in the form of a figure, character or pattern is introduced and inserted between two converging wet paper sheets (1 and 2). The hot-melt film may be made of polyethylene, polypropylene, polybutene or polystyrene, polyethylene being the preferred.

[0015] Subsequently, the converged wet paper sheets (1 and 2) with film (3) sandwiched therebetween pass through two sets of wet press (6) to remove excess water therefrom, and then, are dried and fused together by the adhesive action of molten polymer of film (3) over drying drum (4) heated at a temperature above the melting point of the hot-melt film, preferably 80 to 120 °C.

[0016] According to the present invention, film (3) comprises polyolefin layer (32) and print ink layer (33)(Fig. 2). Film (3) is preferably very thin and has a thickness

ranging from 10 to 25 μm.

[0017] Because polyolefin layer (32) is so thin, it does not have a sufficient tensile strength to support mechanical tension during a printing process to produce print layer (33) thereon. Accordingly, referring to Fig. 2, polyolefin layer (32) is laminated on reinforcing support layer (31), a polyester, polyethylene or polypropylene layer having a thickness of about 30 μm, and, then, the reinforced polyolefin layer is subjected to a printing process to provide print layer (33) on polyolefin layer (32), to form composite film (30).

[0018] Then, composite film (30) may be preferably passed through roll (5) which has several sting needles (51) at regular intervals as shown in Fig. 3. This perforation treatment imparts good air permeability to film (3), which is beneficial in terms of enhancing drying of the sheets on the drying drum.

[0019] The reinforcing support layer (31) is removed from composite (30) just before film (3) is introduced into the paper making apparatus shown in Fig. 1.

[0020] When the hot-melt layer of polyolefin melts on the drying drum, it is preferred that the ink of the print layer also melts to make imprints on the interface of the two paper sheets. A laroflex-based gravure ink thus may be preferably used because it has a melting point and expansion coefficient similar to that of a preferred hot-melt polyethylene resin.

[0021] In accordance with the inventive method described above, a high-quality security paper containing an enhanced security feature can be conveniently prepared at a low production cost.

[0022] While the invention has been described with respect to the specific embodiments, it should be recognized that various modifications and changes may be made by those skilled in the art to the invention which also fall within the scope of the invention as defined by the appended claims.

Claims

1. A method of making a security paper having an embedded security feature in the form of a figure, character or pattern, which comprises, inserting a polyolefin film bearing a print ink layer of the security feature between two sheets of wet paper; pressing the sheets together; and heating the pressed sheets at a temperature above the melting point of the polyolefin.

2. The method of claim 1, wherein the polyolefin is a polyethylene having a melting point in the range of 80 to 120 °C.

3. The method of claim 1, wherein the polyolefin film has a thickness ranging from 10 to 25 μm.

4. The method of claim 1, wherein the print ink layer comprises a laroflex-based gravure ink.

5. The method of claim 1, wherein the polyolefin film bearing the print ink layer is prepared by laminating a polyolefin layer on a reinforcing support layer, providing the print layer on the polyolefin layer, and removing the reinforcing support layer.

6. The method of claim 1, wherein the polyolefin film bearing the print ink layer is perforated at regular intervals.

7. A security paper having an embedded security feature made by a method as in any one of claims 1 to 6.

Patentansprüche

1. Verfahren zum Herstellen eines Sicherheitspapiers mit einem darin eingebetteten Sicherheitskennzeichen in der Gestalt einer Figur, eines Schriftzeichens oder Musters, das aufweist: Einsetzen eines Polyolefinfilms, der eine Druckfarbenschicht des Sicherheitskennzeichens trägt, zwischen zwei Lagen nassem Papier, Zusammenpressen der Lagen und Erwärmen der zusammengepressten Lagen bei einer Temperatur über dem Schmelzpunkt des Polyolefins.

2. Verfahren nach Anspruch 1, wobei das Polyolefin ein Polyethylen mit einem Schmelzpunkt im Bereich von 80 bis 120 °C ist.

3. Verfahren nach Anspruch 1, wobei der Polyolefinfilm eine Dicke zwischen 10 und 25 μm hat.

4. Verfahren nach Anspruch 1, wobei die Druckfarbenschicht eine laroflex-basierte Tiefdruckfarbe aufweist.

5. Verfahren nach Anspruch 1, wobei der Polyolefinfilm, der die Druckfarbenschicht trägt, durch Laminieren einer Polyolefinschicht auf einer verstärkenden Stützschicht, die die Druckschicht an die Polyolefinschicht abgibt, und Entfernen der verstärkenden Stützschicht hergestellt ist.

6. Verfahren nach Anspruch 1, wobei der Polyolefinfilm, der die Druckfarbenschicht trägt, in regelmäßigen Abständen perforiert ist.

7. Sicherheitspapier mit einem darin eingebetteten Sicherheitselement, hergestellt nach einem der Ansprüche 1 bis 6.

Revendications

1. Une méthode de fabrication d'un papier de sécurité ayant un moyen de sécurité incorporé sous la forme d'une figure, d'un caractère ou d'une marque, qui consiste à insérer un film de polyoléfine portant une couche d'encre d'impression du moyen de sécurité entre deux feuilles de papier humide ; à presser les feuilles ensemble ; et à chauffer les feuilles pressées à une température supérieure au point de fusion de la polyoléfine.

2. Méthode telle que décrite dans la revendication 1, selon laquelle la polyoléfine est un polyéthylène ayant un point de fusion compris dans la plage de 80 à 120°C.

3. Méthode telle que décrite dans la revendication 1, selon laquelle le film de polyoléfine a une épaisseur allant de 10 à 25 μm.

4. Méthode telle que décrite dans la revendication 1, selon laquelle la couche d'encre d'impression comporte une encre hélio à base de laroflex.

5. Méthode telle que décrite dans la revendication 1, selon laquelle le film de polyoléfine portant la couche d'encre d'impression est préparé en laminant une couche de polyoléfine sur une couche de support de renfort, en plaçant la couche d'impression sur la couche de polyoléfine et en enlevant la couche de support de renfort.

6. Méthode telle que décrite dans la revendication 1, selon laquelle le film de polyoléfine portant la couche d'encre d'impression est perforé à intervalles réguliers.

7. Un papier de sécurité ayant un moyen de sécurité incorporé fabriqué par une méthode selon l'une des revendications 1 à 6.

Fig. 1

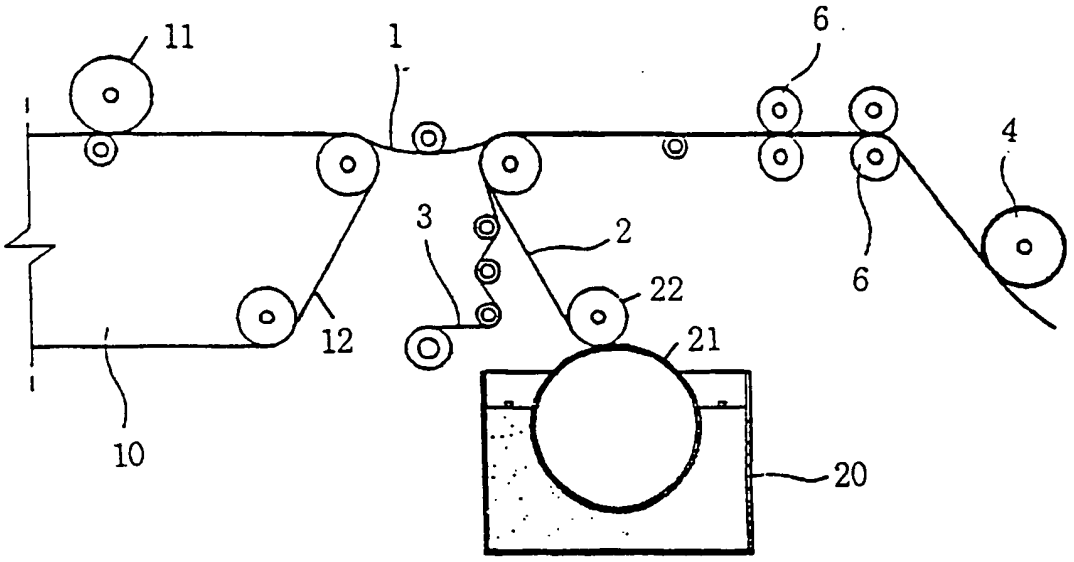

Fig. 2

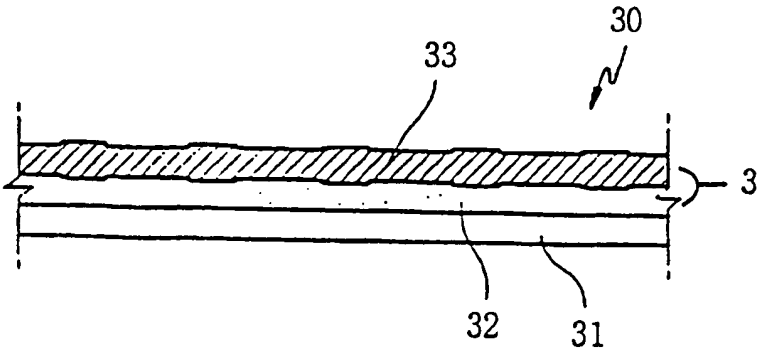

Fig. 3