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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :		(11) International Publication Number:
D21H 15/04, 21/42, B44F 1/12	**A1**	**WO 99/45200**
		(43) International Publication Date: 10 September 1999 (10.09.99)

(21) International Application Number: PCT/KR99/00087

(22) International Filing Date: 26 February 1999 (26.02.99)

(30) Priority Data:
1998/6705 2 March 1998 (02.03.98) KR

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(81) Designated States: CN, RU, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: SECURITY FIBERS AND PROCESS FOR THE PREPARATION THEREOF

(57) Abstract

Security fibers having enhanced antifalsification features are prepared by a process which comprises the steps of: i) braiding 5 to 30 denier fibers to form a twine; ii) dyeing the twine with a dye or pigment; iii) drying the dyed twine; and then iv) cutting the dried twine to give the security fibers in the form of cut fibers.

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SECURITY FIBERS AND PROCESS FOR THE PREPARATION THEREOF

Field of the Invention

The present invention relates to security fibers, a process for the preparation thereof and a security paper containing same.

Background of the Invention

Security documents such as bank notes, stocks, bonds, checks, warrants and identification cards need to be guarded by antifalsification measures and they are often made from a security paper having a security element in the form of fibers, strips or threads embedded therein.

Japanese Laid-open Patent Application No. 90-293500 discloses a security paper containing security fibers prepared by dyeing a natural or synthetic fiber uniformly with a visible or invisible fluorescent dye and cutting the dyed fiber to a given length. However, such monochromatic security fibers have limited effectiveness in the prevention of counterfeiting.

Korean Patent No. 111,723 describes multi-colored security fibers prepared by a process comprising the steps of: placing a mask over a section of a fiber and dyeing the exposed section of the fiber with a first dye; replacing the mask over to the dyed section thereby exposing the undyed section; dyeing the undyed section of the fiber with a second dye; and cutting the fiber to a suitable length to obtain multi-colored security fibers having an enhanced security feature.

However, this complicated process has a low productivity.

Summary of the Invention

Accordingly, it is a primary object of the present

invention to provide an improved process for preparing security fibers suitable for use in a security paper.

It is another object of the present invention to provide novel security fibers suitable for use in a security paper.

It is still another object of the present invention to provide a security paper containing security fibers having an enhanced security features.

In accordance with one aspect of the present invention, there is provided a process for preparing security fibers which comprises the steps of: i) braiding 5 to 30 denier fibers to form a twine; ii) dyeing the twine with a dye or pigment; iii) drying the dyed twine; and iv) cutting the dried twine to give the security fibers in the form of cut fibers.

Brief Description of the Drawings

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

Figure 1 shows a schematic diagram of braided fibers in the form of a two-thread twisted twine;

Figures 2 depicts a schematic diagram of braided fibers in the form of a three-thread twine;

Figure 3 demonstrates one embodiment of the security fibers prepared in accordance with the present invention; and

Figure 4 illustrates one embodiment of the inventive security paper containing embedded security fibers prepared in accordance with the present invention.

Detailed Description of the Invention

In practicing the present invention, a 5 to 30 denier fiber 1, which may be any one conventionally used in the art

including natural fibers and synthetic fibers such as polyamide, rayon, polyester and cotton thread, may be braided in the form of a two-thread twisted twine 21 as shown in Figure 1, a three-thread twine 22 as illustrated in Figure 2, a twine twisted around a suitable pad, e.g., a wire, a twisted twine with a marking band and the like.

The braided fibers are dyed with a dye or pigment in a conventional manner. Exemplary dye or pigment which may be used in the present invention may be any one conventionally used in the art including acid dyes and direct dyes such as Acid Blue AS, Acid Rhodamine B, Uvitex, Papilion Yellow F, TBF(terasile brilliant flavine) and GFF.

The braided fibers dyed in accordance with the present invention have various shades of color because each fiber is partially masked by other fiber(s) and sections thereof are dyed to different shades depending on the degree of masking.

The shades of color in a fiber can be controlled by adjusting the extent of twist torsion and dyeing time. When the twist strength is high and the dyeing time is short, the area of the twisted fiber which is tightly shielded by other fibers may remain undyed as shown in Figure 3 wherein the portion 31 is dyed whereas the portion 32 is not dyed.

The dyed fiber may be cut by using any of the conventional method well known in the art to a given length, preferably 3 to 6 mm.

In practicing the present invention, the dyed and cut fiber may be further dyed with another dye/pigment to obtain fibers having various shades of two or more colors. The dye/pigment suitable for use in the second dyeing step may be any one conventionally used in the art including acid dyes and direct dyes such as Acid Blue AS, Acid Rhodamine B, Uvitex, Papilion Yellow F, TBF(terasile brilliant flavine) and GFF.

When the second dyeing process is carried out at a high temperature, e.g., from 80 to 100°C, the fiber may be transformed into an S-shaped form, thereby enhancing its anti-counterfeiting feature.

The security fibers having varying color shades prepared in accordance with the present invention may be used in manufacturing a security paper by employing any of the conventional papermaking method well known in the art.

For example, the security fibers of the present invention may be mixed with papermaking materials to provide a security paper containing the security fibers uniformly dispersed therein as illustrated in Figure 4.

The following Examples are intended to further illustrate the present invention without limiting its scope.

Example 1: Preparation of security fiber

20 denier polyamide fiber was braided in the form of two-thread twine as shown in Figure 1.

Acid Blue AS was dissolved in water at pH 4-5 to a concentration of 1-2wt% to obtain a dye solution. The braided fiber was added to the dye solution and dyed at about 90°C for 10-30 minutes, washed thoroughly with warm water and dried. Then, the dyed fiber was cut to a length of 3-5mm.

The cut fibers above were dyed in a 1-2wt% TBF solution at about 90°C for 10-30 minutes, washed thoroughly with water and dried to give security fibers of the present invention.

Example 2: Preparation of security paper

10wt% of a mixture of titanium dioxide, white carbon, talc and calcium carbonate, and 0.1-1wt% epoxy resin were added to a 0.2-1% wood pulp suspension in stock chest to form a paper making stock.

The security fibers obtained in Example 1 were added to the paper making composition obtained above, to a concentration of 0.002-1.0%. The mixture was stirred well and formed into a security paper of 60-100 g/m^2.

While the invention has been described with respect to

the above specific embodiments, it should be recognized that various modifications and changes may be made to the invention by those skilled in the art which also fall within the scope of the invention as defined by the appended claims.

What is claimed is:

1. A process for preparing security fibers which comprises the steps of: i) braiding 5 to 30 denier fibers to form a twine; ii) dyeing the twine with a dye or pigment; iii) drying the dyed twine; and then iv) cutting the dried twine to give the security fibers in the form of cut fibers.

2. The process of claim 1, further comprising the step of v) dyeing the cut fibers with another dye or pigment after step iv).

3. The process of claim 1 or 2, wherein the twine is in the form of a two-thread plait.

4. The process of claim 1 or 2, wherein the twine is in the form of a three-thread plait.

5. The process of claim 2, wherein the cut fibers are dyed at a temperature ranging from 80 to 100°C.

6. A security fiber prepared by the process of any one of claims 1 to 5.

7. A security paper containing the security fiber prepared by the process of any one of claims 1 to 5.

Figure 1

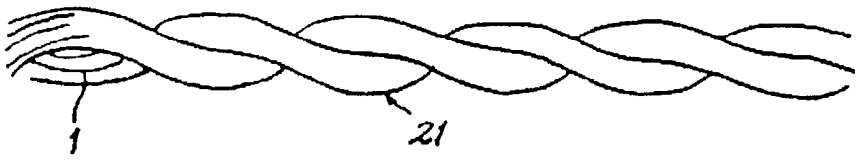


Figure 2

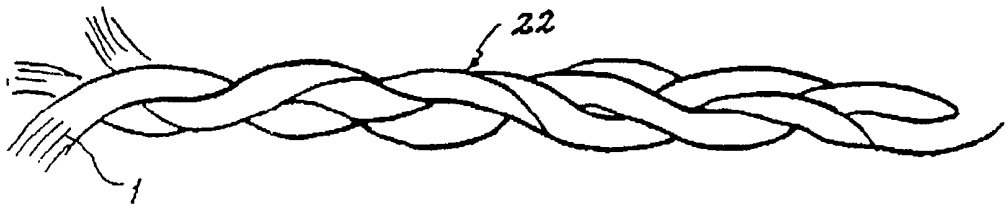


Figure 3

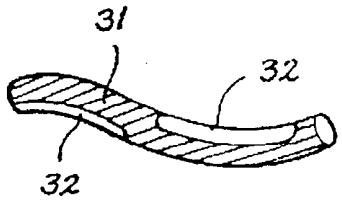
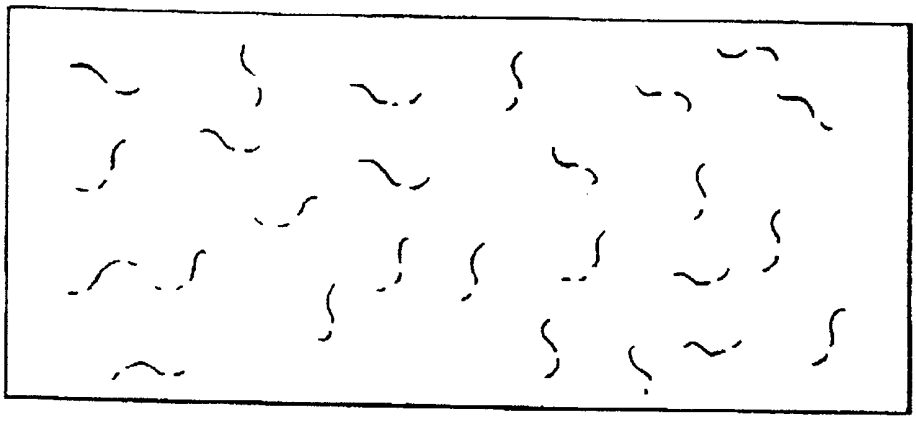


Figure 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00087

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: D 21 H 15/04, 21/42; B 44 F 1/12

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[6]: D 21 H 15/04, 21/42; B 44 F 1/12

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 practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94/11 577 A1 (AB TUBMA BRUK) 26 May 1994 (26.05.94), claims 1-11.	1-7
A	EP 0 319 157 A2 (PORTALS LIMITED) 07 June 1989 (07.06.89), claims 1-13; fig.8.	1-7
A	WO 92/03 296 A1 (EASTMAN KODAK COMPANY) 05 March 1992 (05.03.92), claims 1-11.	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
17 May 1999 (17.05.99)	21 June 1999 (21.06.99)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer Brus Telephone No. 1/53424/519

Form PCT/ISA/210 (second sheet) (July 1998)

WO 94/11577

This invention relates to a method of producing visible, preferably transparent or translucent, continuous streaks and/or delimited fields in paper in conjunction with forming a paper web in a paper machine. The method is characterized by essentially preventing dewatering of paper stock/paper fibres on one or more surfaces of a wire in the forming unit of a paper machine in conjunction with forming a paper web in the machine, and by applying a special stock that contains fibres which differ from the other fibre material deposited on the wire, optionally together with an arbitrary filler and/or binder. The invention also relates to a valuable document, such as a banknote, produced from the afore described paper.

EP 319157

Security papers according to the invention comprise opposed surfaces for the provision of printing to identify a document formed from the paper, and depositioned at least partially between the two surfaces of the paper as a public security feature a security device of not more than 5 mm width, which device comprises a flexible, water-impermeable substrate with a layer of metal on one or both sides of the substrate, there being present on one side of the device a continuous metal path along its length, wherein said device has metal-free portions of between 10% and 50% of the area of the device, said metal-free portions along the length of the device providing a repeating pattern, design, indicia or the like with at least some of the metal-free portions across the transverse direction of the device being wholly surrounded by the metal. The metal-free portions may provide characters of a language, such as letters of the English alphabet. The security device may be a strip or thread and this may be positioned in a window, or in an aperture where two windows are impartial or complete register.

WO 92/03296

A new imaging paper, capable of giving a visual (3-dimensional) image in response to imaging stimuli (heat) comprises a dry sheet of randomly distributed cellulosic paper making fibres and uniformly disperse therein at least 20 (preferably 30 – 70, especially 35 – 65) weight % of 5 – 20 (preferably 10 – 15) microns diameter unexpanded polymer microsperes which can be expanded to 20 – 80 microns.

The imaging method, involving imagewise heating of the paper is also claimed, as a method comprising addition of the microspheres to paper slurry, separating water and drying at a temperature below the expansion temperature of the microspheres.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 99/00087

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