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(54) Security paper

(57) Security paper is printed with a security ink including a security agent to a designed representation for detection by a short or longwave ultra-violet light source. The paper is provided with a specially formulated dense opaque coating which obscures the security representation. The coating provides a surface for printing by conventional techniques whilst the coating does not interfere with the desired detection of the phosphorescent or fluorescent security agent. The coating is applied as a slip and includes china clay in a binder having in an exemplary composition an acrylic resin with dispersant and selected wetting and keying agents.

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SPECIFICATION

Improvements in security paper and the manufacture thereof

This invention concerns improvements in security paper and the manufacture thereof, and has particular application for paper (as hereinafter defined) which is used for the manufacture of postal and revenue stamps, or for other specialised anti-fraud or counterfeiting uses such as labels, gift or other tokens, packaging and wrappings.

The word "paper" as used herein is deemed to cover papers and boards of fibrous structure in sheet or web form.

It is already known to employ special inks which are printed onto paper and which are formulated to be visual under ultra-violet or to be detected by electronic means. Such special inks may be formulated to be visible or invisible to the naked eye depending upon the particular application for which they are used. Many of the security applications are intended to replace the conventional water-marking in the paper.

A problem which arises in practice is that even though many of such applications are intended for security purposes, because the special inks are printed onto the paper, the printing with ink of the same or similar formulation or reaction can be copied or simulated to produce counterfeits. Particular problems arise in the "pirating" of branded products wherein brand labels or packaging are copied and affixed to similar products and it becomes most important to provide a security feature in the original label or packaging which can be identified to verify originality and which cannot be readily copied or simulated.

It is an object of this invention to provide a paper having an integral security representation to avoid the problems such as mentioned above.

Another object of this invention is to provide a paper for printing in the conventional manner but which has the integral security representation.

Other objects of this invention are to provide special methods and materials for the manufacture of paper having such integral security representation.

According to this invention we provide, a security paper wherein one face of a paper (as defined) has a security representation applied thereto by printing with a selected ink including a security agent, and the security representation is overlaid by a dense opaque coating through which the representation may be detected by means compatible with the security agent of the selected security ink, and said dense opaque coating providing a surface suitable for the application of conventional printing ink by printing techniques.

By this invention, the security representations are integral in the security paper and are not visible to the naked eye through the opaque coating which obliterates the security representations. The security representations can be detected by determination of the security agent as required by suitable means, such as by a short or longwave ultra-violet light source. The representations may be applied in any designed configuration or pattern to suit the eventual user.

The dense opaque coating is arranged to provide a surface to which any design or configuration of printing using conventional printing processes and inks may be applied.

Preferably, the dense opaque coating comprises a filler including coating clay applied to the paper as a coating slip in which the coating clay is dispersed in an aqueous binder.

The filler is selected so as to render the coating opaque and dense to visible light but to permit the detection of the security agent therethrough.

Preferably, the filler constitutes a significant proportion of the coating slip within the range of from 70% to 90% by weight. The filler may be selected from the following group:– china clay or kaolin, calcium carbonate, alumina hydrate, Barium sulphate, calcium silicate, calcium sulphate, silica, talc zeolite, (sodium calcium aluminate, sodium silico-aluminate) or satin white (hydrated calcium sulphoaluminate complex).

In a preferred coating, the filler may comprise china clay or kaolin together with a proportion of calcium carbonate (powdered chalk). The filler may comprise about 90% of china clay and about 10% of powdered chalk.

Preferably, the coating slip includes a dispersant.

The filler is slurried into an aqueous dispersion by the use of a dispersant, selected from inorganic polyphosphate or the sodium salt of a polyelectrolyte, such as polycarboxylic acid or polymethacrylate. This dispersant may comprise of 0.1 to 3.0% of the filler by weight.

The coating also consists of 9 to 29% by weight of a binder. The binder acts as a bonding agent which binds the filler and other ingredients of the coating into a cohesive layer bonded and keyed to the paper surface onto which the selected security ink has been applied. The binder provides a strong resilient bond which is desirable to permit the security paper to be later subjected to conventional printing techniques and cutting, perforating or slitting operations.

The binder may be selected from the following group:– styrene acrylic, polyvinyl acetate, styrene-butadiene, carboxymethyl cellulose, casein, polyvinyl alcohol, soya protein, and starch.

The preferred binder is an acrylic resin.

Various buffering agents may be added to the coating slip to control the pH within the

limits desired for the filler and binder system being used.

Preferably, the coating also includes wetting, keying and lubricating agents, which ensure the homogeneity of the coating over the security ink.

The wetting and keying agents are provided to ensure that the coating slip is absorbed to the required degree of penetration into the surface of the paper to which the security ink has been applied. Particular wetting and keying agents are required to achieve a controlled bond to the paper surface without causing any bleeding or displacement of the security representations formed by the prior application of the security ink.

Furthermore, in order that the eventual dense opaque coating provides a homogenous structure, the wetting and keying agents are selected to satisfy this requirement with respect to the composition of the binder and filler.

The wetting agent may be selected from various sulphonated oils, alkyl and fatty acid sulphonates.

The keying agents selected from resins of the urea-formaldehyde and melamine formaldehyde type prove to give the 'key' required to the security ink.

Lubricant agents such as calcium stearate, parafin waxes and polyethylene waxes are added to aid subsequent processes such as calendering.

In the preferred composition of the coating slip, the wetting and keying agents comprise a urea-formaldehyde resin and sulphonated castor oil.

The proportion of such wetting, keying and lubricant agents in the coating slip is preferably within the range of from 4% to 7%.

In accordance with a further feature of this invention, the security agent in the security ink is selected from compounds for phosphorescent or fluorescent reaction.

The security ink is preferably a water-based emulsion of an alkali soluble acrylic copolymer binder with a proportion of volatile alcohol to control the drying and soak conditions required to impregnate and print the security ink in the desired representation configuration to the paper. The security agent may comprise about 5% by weight of the ink.

Typical security agents for phosphorescent are copper activated zinc sulphate and manganese activated zinc sulphate. Other typical chemicals may be used for fluorescent.

The binder for the security ink may comprise other resins such as styrene acrylics, or ammoniacal alkali compounds such as monoethanolamine or triethanolamine may be used. The volatile alcohol may comprise industrial methylated spirits or iso-propyl alcohol.

In the manufacture of security paper according to this invention, one face of paper has a security ink applied thereto to provide a security representation, applying a slip coating to said face to overlie the security representation and to provide a dense opaque coating bonded and keyed to the paper, and subjecting the coated paper to a calendaring finish to provide a finish to the paper for printing with the dense opaque coating being such that the security representation may be detected by means compatible with a security agent of the security ink.

In this method, the weight and grade of paper can be selected to suit the eventual use, and the non-coated face can be left plain, be gummed or have pressure sensitive adhesive or agents for co-operation with adhesives applied thereto.

If desired both faces of the paper could be coated with the dense opaque coating.

The characteristics of the dense opaque coating are critical to any subsequent printing to permit high quality reproduction and the accurate detection of the security agent of the security representation underlying the coating. For this reason the composition of the slip coating is especially formulated in accordance with the selected and preferred compositions and ingredients as afore-mentioned.

The printing surface of the coating has to meet the qualitative and quantitative assessments prescribed in the art of printing by the techniques such as lithographic, photogravure and letterpress. Such assessments include determining splitting of the coating or paper, surface absorbency and resistance to oil, staining and surface smoothness.

In addition, on application of the eventual printing ink it is essential to ensure that the coating has a homogeneous structure so that the eventual printing ink applied has a consistent and uniform penetration, absorption, spread and drying rate through and on the coating. Thus the preferred composition of the coating is selected to meet these requirements with the coating being sufficient to penetrate uniformly into the face layer of the paper without disturbing the previously applied security ink.

This invention is deemed to include the method of manufacture of the invented security paper and the paper so manufactured.

As will now be appreciated the security paper may be employed for any desired application by a printer to produce postage stamps, labels or other such items requiring a security feature which is not detectable visibly and which cannot be counterfeited by simple copying of original printing.

CLAIMS

1. A security paper wherein one face of a paper (as defined) has a security representation applied thereto by printing with a selected ink including a security agent, and the security representation is overlaid by a dense opaque coating through which the representa-

tion may be detected by means compatible with the security agent of the selected security ink, and said dense opaque coating providing a surface suitable for the application of conventional printing ink by printing techniques.

2. The security paper according to claim 1 wherein the dense opaque coating comprises a filler including coating clay applied to the paper as a coating slip in which the coating clay is dispersed in an aqueous binder.

3. The security paper according to claim 2 wherein the binder comprises a resin and a dispersant.

4. The security paper according to claim 2 or 3 wherein the coating slip includes wetting and keying agents to bond the coating to the paper.

5. The security paper according to any one of the preceding claims wherein the security agent in the security ink is selected from compounds for phosphorescent or fluorescent reaction to short or longwave ultra-violet light.

6. The security paper substantially as described with reference to the examples of security inks and coating slips hereinbefore given.

7. A method of manufacturing a security paper wherein one face of paper has a security ink applied thereto to provide a security representation, applying a slip coating to said face to overlie the security representation and to provide a dense opaque coating bonded and keyed to the paper, and subjecting the coated paper to a calendaring finish to provide a finish to the paper for printing with the dense opaque coating being such that the security representation may be detected by means compatible with a security agent of the security ink.

8. The method according to claim 7 wherein both faces of said paper are coated with the dense opaque coating.

9. The method according to claim 7 or claim 8 wherein the slip coating comprises a filler dispersed in an aqueous binder.

10. The method according to claim 9 wherein the filler is selected from the following group:– china clay or kaolin, calcium carbonate, alumina hydrate, Barium sulphate, calcium silicate, calcium sulphate, silica, talc zeolite, (sodium calcium aluminate, sodium silico-aluminate) or satin white (calcium sulphoaluminate complex (hydrated)).

11. The method according to claim 9 wherein the aqueous binder comprises a dispersant.

12. The method according to claim 11 wherein the dispersant is selected from inorganic polyphosphate or the sodium salt of a polyelectrolyte, such as polycarboxylic acid or polymethacrylate.

13. The method according to claim 11 wherein the binder is selected from the following group:– styrene acrylic, polyvinyl acetate, styrene-butadiene, carboxymethyl cellulose, casein, polyvinyl alcohol, soya protein, and starch.

14. The method according to any one of claims 9 to 13 wherein the coating slip includes wetting and keying agents.

15. The method of manufacturing a security paper substantially as described with reference to the examples hereinbefore given.

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