

# UNITED STATES PATENT OFFICE.

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## FRAUD-PREVENTING SECURITY-BLANK.

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*To all whom it may concern:*

Be it known that I, ERNEST HOWARD FARMER, a subject of the King of Great Britain, residing at 136 Junction road, Upper Holloway, London, England, have invented new and useful Improvements in Fraud-Preventing Security-Blanks, of which the following is a specification.

This invention relates to methods of and processes for printing which are more especially applicable for the manufacture of bank-notes, checks, stamps, bonds, and other negotiable securities (hereinafter designated by the term "security") the ultimate purpose being the production of securities which cannot be forged.

Various means have hitherto been proposed for defeating forgery. The older methods and indeed some of the modern methods are based upon tinting the base of the security, or upon the use of a paper containing colored fibers, this latter early method including the use of a paper containing yellow fibers to prevent the photographic reproduction of the security. As the resources of photography for color reproduction advanced other methods were proposed, some of which involve the use of inks or colors of special character and color properties for printing the check or security. Other methods again include the production of safety grounds prepared from a pattern with continuous gradation of shade and presenting a very large range of gradations. Successive half-tone reproductions of this basic pattern are made in different colors with screens of different line inclination or design and different exposures, printed in super-position and in colors selected to defeat any analysis of the image. Now, owing to the extremely advanced art of color reproduction, while it may not be possible to analyze a picture it may still be possible to obtain a very perfect reproduction of half-tone color or other processes. Further it may be possible to neutralize or separate out any particular color of the groundwork or other part of the security and to reproduce these separately; or again it may be possible to neutralize simultaneously the photographic effect of all or any particular selection of colors in a multi-color groundwork, unless this is specially guarded against, whereby the designs or the matter on the security may be reproduced separately either

by camera photography or by contact printing as hereinafter more particularly explained.

In order to clearly understand the present invention I will first consider in detail some fundamental principles upon which the invention is based:—Firstly, when fibers are woven together to form a fabric or when a number of lines, geometric or other sharply defined shapes, or markings (hereinafter termed "elements"); are produced upon a surface of paper or other material, the appearance to the eye will depend upon the size of the elements, their color, their distance apart and their relative configuration; for instance, 1. If the fibers or elements are sufficiently large and far apart, the eye will see each individual detail, its shape, color and direction, and the resulting effect is what I may call a pattern. 2. If the elements are sufficiently small and close together, they will be visible to the unaided eye only, as a tone or tint, the different elements merging into one another, as the eye has not sufficiently resolving power to analyze the elements when they are sufficiently small and close together. 3. If, however, the elements are, as regards size and proximity, somewhere between (1) and (2), but not far enough apart for the eye to readily distinguish the separate elements, I have the effect of what I term a texture. The texture will moreover have a characteristic composite appearance due to and depending upon the several factors in combination, namely, the size, shapes, relative configuration and colors of the different elements. Particular examples of such textures are woven fabrics, as above referred to, or, again, autochrome screens and other pattern screens, such as used in color photography, the fineness of the screen determining whether there is a texture, a tone or a pattern.

Throughout the specification it is to be understood that black and white are to be regarded as particular examples of colors.

A combination of "elements" say for example a series of juxtaposed and differently colored hexagons will give the effect of a pattern or texture or tone according to the fineness or size of the individual color elements which, may be, say, red, green and blue, or red, yellow and blue, or other selected colors.

110

When dealing with subjects falling under the headings (2) and (3) above, if the details or elements are of sufficiently fine or broken lines of different colors or of sharp angulated or similar well defined color areas, such subjects can only be reproduced very defectively by camera photography, owing to the aberrations in lenses and defects in the various stages of the photographic and reproduction processes. If, therefore, a texture as above is obtained in or on the base of a security, and the elements of the texture exactly fit into one another, that is to say if the configuration of the elements is such that they fill the whole area of the safety portion of the security, or substantially so, a protection against camera reproduction is thereby obtained.

Although there are limits to the powers of reproduction by camera photography there are, as a matter of fact, no limitations of this character to the method of reproduction by contact printing. If, therefore, again, in addition to or in conjunction with, or as part of, the texture, there is produced a groundwork of lines, dots, design work or any other like groundwork, the elements of which are sufficiently opaque relatively to the design matter printed on the security, and, in the case where other colors than black and white are used for the ground, if contrasted colors are used and chosen so that the photographic effect of the three primary color sensations cannot all be suppressed or rendered ineffective simultaneously, by any combination of color filters, colored lights and color sensitive plates, then, if an attempt is made by contact printing to separate out the designs on the note or other matter on the security, there will inevitably be sufficient groundwork which cannot be rendered photographically ineffective and such groundwork will prevent any satisfactory or successful result from attempts to forge by contact printing. This groundwork can also be adapted as a security against forging by methods involving what is known as transfer printing, if the groundwork is printed in such a manner that it will be transferred along with any design, which transferred design cannot then be reproduced owing to the presence of the groundwork transferred with it.

Now, according to the present invention, there is produced, in or on the base of a security a texture made up of elements conforming as regards size color and relative proximity to the conditions defined above for a texture and filling the security portion of the base or approximately so. The texture will have a characteristic appearance which is a composite one due, first to the detailed elements themselves, their size, shape and color, and secondly to their relative configuration.

The characteristic texture may be (1) formed in the base of the note itself, or (2) composed of printed elements on the base of the note, the elements being definitely positioned to produce the visible texture effect, and it may cover the entire area of the note, or only part thereof. If the texture is formed by printing it will be in practice produced in sharply contrasted colors, other than black and white or monotone and white. If the texture is produced as a fabric, it may be in black and white or monotone and white or in any other selected colors because the black and white elements of the texture can be produced so fine, and yet visible as a texture, as to defy camera reproduction.

(1) To produce the characteristic texture in the base of the note or security, the latter may be formed by suitably selected weavings with selected fibers or threads and so that the textured material will have a definite visible characteristic texture appearance, similar for example to that frequently produced in a piece of finely woven cloth, fabric, silk or the like. Preferably, the base is woven sufficiently thin, translucent and open so that, by means of suitable dressings, the finished material may not only be of the same consistency and stiffness as usual paper material, but also so that any or some printings thereon will be partly apparent from both sides. The weaving may be so modified as to incorporate some of the informative matter of the note, for example, the amount.

(2) In producing the composite texture by the combination of printed elements, various alternative methods of procedure may be adopted, several of which will be apparent or obvious to a skilled color printer. For example:—(a) The composite texture design may be made on a large scale and reduced by successive photo reduction to a sufficiently small scale. (b) A single component texture design, for example, one produced by photographic reduction from a large scale texture, may be printed in two or more successive positions from one printing surface, and the successive printings may be in different colors. (c) The different components or elements of the composite texture may be directly engraved or etched on the printing blocks or plates. (d) Different printed elements may be obtained by successively or simultaneously printing in different colors from the intaglio and relief parts of the block. (e) The three color elements of a three color characteristic texture may be obtained in one printing, (I) one color being produced from the intaglio parts of the block; (II) a second color from the relief parts of the block; and (III) the third color by interposing a thin fabric, mesh or stencil which will print the third color, the first and second colors being printed through the open spaces. Or alter-

nately a third color will appear in the result if the base is colored by simply masking the base with the fabric mesh or stencil in lieu of printing therewith. (f) The blocks used

for printing may be reëtched or engraved and alterations thereby made in the printing values between the successive printings.

(g) Separate printing surfaces may be prepared from a single negative or positive or original in such a manner as to be capable of printing in practically absolute register with one another. For example, the fact that a negative and a positive are counterpart images and that the opaque spaces of one exactly fit into the transparent spaces of the other may be utilized to produce printing surfaces which will print a set of small areas which exactly fit into one another.

In so far as the characteristic effect of the texture is due to the exact relative configuration of the detailed elements themselves and inasmuch as these elements are themselves very small, it will be readily understood that the slightest margin of error in such relative configuration will produce a characteristically blurred effect which will thus be different from that of the original texture, and will thus at once render apparent any attempted reconstitution.

Further, according to the present invention there may be produced in combination or in conjunction with the texture; a groundwork, consisting of lines, dots or other markings or designs. This groundwork may be produced in or on the base of the security by methods similar to the methods used in producing the texture. Where this ground work is produced in colors other than black and white, the colors are not only so chosen that the photographic effect of the elements forming the groundwork cannot all be suppressed or rendered ineffective simultaneously, but these elements must also be sufficiently opaque relatively to the design or other like matter on the security, so that such matter will be broken up in any attempt to reproduce the note by contact printing.

Where the texture as above described is formed in the base, it may in itself comprise and perform the function of the groundwork, owing to the depth, and therefore, the opacity of the color elements themselves.

Again, when the texture is produced in the form of printed elements, these elements may include the groundwork elements which will then appear as part of the texture, in which case the texture itself will also constitute a security device against contact printing or transfer methods of forgery. For example, if a fine line work or similar system is repeated in three colors side by side it will form practically a tone according to the fineness of the printings, and if

upon this is impressed a fourth printing, at a slightly different angle a texture effect may be obtained, and if the dimensions of the printings are sufficiently small, and if the colors and opacity thereof or of some of them are suitably chosen as above described, these printings may constitute the groundwork.

It will be understood that complicated linework or bank note or security design of the kind usually appearing on securities is preferably and in practice will be used in combination with the security base of the character described. Such design may be printed before or after the production of the composite ground base. For example in the case of a fabric one or more printings may be done on the warp, and before the fabric is finished. Again, where the texture or the ground work is produced by successive printings the design or other matter may be printed as an intermediate printing, and in this or in any other way interwoven with the elements of the texture or of the groundwork forming the safety devices. Again, as already stated the safety devices need not extend over the whole area of the security. The elements thereof may for example be so produced as to themselves form part of the inforatory or of the decorative matter of the note.

It will be realized that the present means for preventing forgery are quite distinct from prior methods which have utilized a color ground work of juxtaposed colors forming a pattern, which, when viewed from a distance, so that the individual color designs are not separately perceived, show a single gray patch of medium luminosity, and in which the colors are selected so that they collectively absorb all kinds of visible spectrum rays which are absorbed by a superposed distinctive bank note design or texture, the object being that although the latter is well relieved and clearly defined upon the multicolor ground there is no group of spectrum rays by which it can be separately photographed. In the present invention the ground work is designed quite independently of the bank note design superposed, but it is specially devised so as to be itself unforgeable by camera reproduction, as, and for the reasons explained above, and further so as to have the appearance, not of a single gray patch of medium luminosity but on the other hand to have the appearance of a characteristic texture which is readily recognized, the characteristic being due to the size, colors, and precise relative configuration of the individual elements.

#### Claims.

1. A security blank having upon it a number of elements, consisting of sharply defined, geometric shapes, which are as re-

gards size, color, distance apart and relative configuration, not sufficiently large and far apart to enable the eye to clearly distinguish the shape, color and relative configuration of the individual elements, nor, 5 sufficiently small and close together as to be visible as a tone or tint, but which are between these conditions and which produces the effect of a characteristic texture 10 which will have the property of defeating reproduction, substantially as, and for the purpose, described.

2. A security blank having a texture composed of elements which as regards size, 15 color, distance apart and relative configuration are not sufficiently large and far apart to enable the eye to clearly distinguish the shape, color and relative configuration of the individual elements, nor sufficiently 20 small and close together as to be visible as a tone or tint, but which are between these conditions in combination with a groundwork of suitable designs, the elements of which will be substantially opaque, relatively to the design matter to be printed on 25 the security, and which produces the effect of a characteristic texture.

3. A security blank having a texture composed of elements not sufficiently large and 30 far apart to enable the eye to clearly dis-

tinguish the shape, color, size and relative configuration of the individual elements nor sufficiently small and close together as to be visible as a tone or tint, but somewhere between these conditions, in combination with 35 the elements of a groundwork substantially opaque relatively to the design matter printed on the security, said elements being in contrasted colors so chosen that the photographic effect of the three primary 40 color sensations cannot all be suppressed or rendered ineffective simultaneously, substantially as, and for the purpose described.

4. A security blank the base of which has upon it a design or groundwork composed 45 of a number of elements which as regards size, color, distance apart and relative configuration are not sufficiently large and far apart to enable the eye to clearly distinguish 50 the shape, color and relative configuration of the elements, nor sufficiently small and close together as to be visible as a tone or tint, but between these conditions, over printed with a fine line work or other bank note design, substantially as described.

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Witnesses:

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