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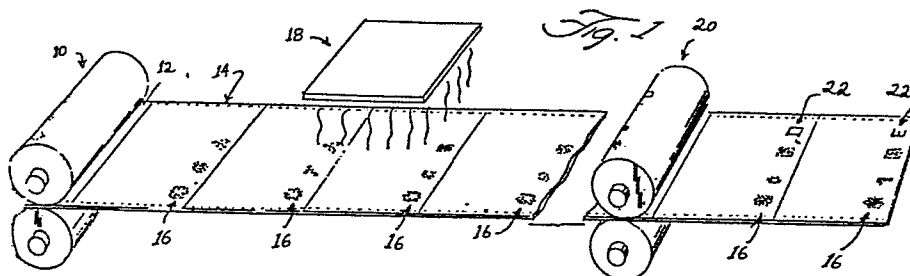
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54 Document bearing characteristic ink-printed indicia juxtaposed with corresponding characteristic synthetic watermark and method for producing same.

57 A document security system is provided by providing each document with a synthetic watermark, for instance using the process, compositions and apparatus disclosed in the aforementioned U.S. patent of Norris, et al and, within the perimeter of at least one of the symbols which is provided by the synthetic watermark, an identical complementary or

otherwise corresponding symbol is printed using ink, paint, dye, stain or similarly contrastingly pigmented substance so as to create, in combination with the synthetic watermark a juxtaposition that can be looked-for as evidence that the document is genuine and its serial number unaltered.



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TITLE:

Document Bearing Characteristic Ink-Printed
Indicia Juxtaposed With Corresponding
Characteristic Synthetic Watermark
5 And Method For Producing Same

BACKGROUND OF THE INVENTION

Many documents have monetary value. Some
are even recognized to be privately issued
substitutes for money -- Traveler's Checks, money
10 orders and stock certificates to name but a few.
Also, other documents have great value to show
origin, titles, personal identification, etc.,
motor vehicle certificates of origin, birth
certificates and Social Security cards are but a
15 few examples.

The U.S. patent of Norris, et al.,
3,985,927, issued October 12, 1976 discloses
compositions and a method for producing chemical
watermarks in finished paper products, the
20 watermarks being produced by applying to the
surface of the paper a chemical composition,
which, after suitable treatment to render its
effect permanent replicates the appearance of a
conventional mechanical watermark, without
25 detracting from the finishing, use and keeping-
quality of a document made from the paper. In
contrast to printing, a chemical watermark is
colorless and cannot be dissolved from the

paper. It is detected primarily as a pattern of difference in translucence of the paper. The entire disclosure of this patent of Norris, et al is incorporated herein by reference, inasmuch as
5 it further illuminates the state of the prior art, as well as teaches ways, means and compositions for applying chemical watermarks to paper.

Other U.S. patents disclosing useful ways and means for synthetically watermarking paper,
10 using synthetic resins which, in contrast to those of Russell, do not require application of ultraviolet light for curing, are shown and described in the following U.S. patents, the entire disclosures of which are incorporated
15 herein by reference:

| | | |
|---------------|-----------|---------------|
| Vaurio | 3,085,898 | Apr. 16, 1963 |
| Vaurio | 3,140,959 | Jul. 14, 1964 |
| Skofronick | | |
| et al. | 3,293,062 | Dec. 20, 1966 |
| 20 Skofronick | 3,441,427 | Apr. 29, 1969 |
| Skofronick | 3,443,979 | May 13, 1969 |
| Skofronick | 3,464,841 | Sep. 2, 1969 |
| Skofronick | 3,486,923 | Dec. 30, 1969 |

The term "synthetic watermark" is used
25 herein to denote a watermark which is produced on paper mainly with the aid of a chemical process, in contrast to its being created in the paper by mechanical means as a pattern of local thickness discontinuity during manufacture of the paper from
30 pulped fibers.

The term "serial number" is used herein to denote the unique string of indicia (characters) which is applied to a document in

order to distinguish that document, both from ones that are otherwise identical but have applied indica series which differ as to at least one indicium (character) and from ones which are not
5 genuine. Use of the term is not intended to imply that the string of indicia consists either partly or wholly of numbers; in other words, a "serial number" as that term is used herein may include any combination of numbers, letters, punctuation
10 marks and specialized symbols. Falling within this definition, in addition to conventional serial number, are amounts, names and combinations thereof.

Summary of the Invention

15 A document security system is provided by providing each document with a synthetic watermark, for instance using the process, compositions and apparatus disclosed in the
aforementioned U.S. patent of Norris, et al and,
20 within the perimeter of at least one of the symbols which is provided by the synthetic watermark, an identical complementary or otherwise corresponding symbol is printed using ink, paint, dye, stain or similarly contrastingly pigmented
25 substance so as to create, in combination with the synthetic watermark a juxtaposition that can be looked-for as evidence that the document is genuine and its serial number unaltered.

In a preferred practice of the invention,
30 both a synthetic watermark serial number and a conventionally printed serial number are provided on each document in a set of documents. Each document is thus made to be different from all of

the others in the set as well as from documents not in the set. In this preferred practice the synthetic watermark serial number is the same as, but is applied in a larger typeface than the
5 conventionally printed serial number, with each character of the latter being centered within the corresponding character of the former. As a result, when held to the light a water mark "halo" appears around each of the conventionally printed
10 characters, thus complicating the task of replicating, photocopying or altering the document.

The principles of the invention will be further discussed with reference to the drawing
15 wherein a preferred embodiment is shown. The specifics illustrated in the drawing is intended to exemplify, rather than limit, aspects of the invention as defined in the claims.

20 Brief Description of the Drawing

Figure 1 is a diagrammatic flow sheet illustrating successive steps in the practice of preferred embodiment of the present invention; and

Figure 2 is a diagrammatic representation
25 of an examination of a sample of the product for genuineness and lack of alteration.

Detailed Description

By way of example, in Figure 1, the process of the invention is shown being carried
30 out on a web of successive paper documents at a stage of document manufacture, the web being

conventionally advanced by engagement of tension pull rolls with the web. (Preferably, the opposite marginal series of holes which may later be used for advancing the web using conventional drive sprockets engaged therein are not formed in the web until a later stage, although they could be provided earlier and used at this stage for web advancement.)

In practicing the present invention in a preferred way, at a first station 10, a sheet of paper 12 in a series of such sheets 14 is imprinted with a first string of characters 16, of which at least one preferably is different for each successive sheet in the series, so that the string of characters 16 imprinted on each sheet taken as a whole string is unique and thus capable of functioning as a serial number of uniquely identifying that particular sheet.

At this first station 10, the fluid material used for the imprinting is not like an ink, in the sense that it does not use a solution or suspension of pigment applied in a visible pattern which contrasts in color, chroma, hue or brilliance with the paper substrate constituting the sheets 14.

Rather that fluid material is a composition which, when dried or cured, e.g. at a subsequent curing station 18, which may include application of photons of a particular band of energy levels and/or application of air drying with or without added heat, causes the paper to sharply differ in degree of translucence where imprinted in comparison with its degree of translucence where not so imprinted.

The pattern may either be one in which the imprinted characters, when a sheet of the paper is viewed from the front with strong back-lighting, constitute a regional pattern where the paper is more translucent than the non-imprinted remainder of the sheet, or partly more translucent and partly less translucent.

The first string of characters 16 as illustrated in dashed lines in Figure 1, on successive sheets typically may show-up under strong back lighting as a series of successive segments e.g., which read, "...,*6A, *7A, *8B, *9B, *0B, *1B,...".

At a third station, 20, each sheet of paper is printed with a pigmented ink so that each bears a second string of characters 22, illustrated in full lines, of which at least one preferably is different for each successive sheet in the series, so that the string of characters 22 imprinted on each sheet taken as a whole string is unique and thus capable of functioning as a serial number for uniquely identifying that particular sheet. Although it is preferred that both strings of characters on each document be printed on the same line, the principles of the invention can be practiced even if the two strings of characters are provided on lines which adjoin one another or bear some other predetermined relationship.

By preference, at least one of the characters of the first string 16 applied and developed as a synthetic watermark at stations 10, 18 is juxtaposed with at least one of the characters of the second string 22 applied as a contrasting-color serial number at station 20.

For instance the corresponding two characters may be alike and superimposed so that one of them skirts the perimeter of the other about all of or a substantial part of that
5 perimeter.

In the instance depicted, the contrasting color-imprinted second series has a segment which reads "... *1 E, *0 D, *9 D, *8 D, *7 D, *6 D...".

10 In this example, the typefont used for producing the synthetic watermark serial number is similar to but larger-charactered than that used for producing the contrasting color-imprinted serial number, so that if the resulting documents
15 D are held up to the light, they are seen to be successively read "...*1BE, *OBD, *9BD, *8BD, *7AD, *6AD,...", in which the characters "*" of the synthetic watermark-type first strings appear to halo 26 (border, perimetrally surround) like characters "*" 28 imprinted with ink in the second
20 series. In this example, the comparable situation is true for the corresponding second character, A, in each of the two strings. However, it is not true for the third character "...A, A, B, B, B, B...", which is present only in the first strings
25 16, but not in the second string 22, where the corresponding space is left non-imprinted, i.e. blank. Nor is it true for the fourth character position, which in the first strings 16 is left blank, but in the second strings 22 is imprinted
30 with a character, e.g. "... E, D, D, D, D, D, E...".

Thus, although the process and compositions and apparatus used for imprinting each of the documents with each of its two strings
35 of characters are known, the combination, if

performed in accordance with the principles of the present invention easily provides a unique system for readily not only keeping track of the documents by serial number, but also for conveniently examining them for lack of alteration, and for genuineness.

For instance, upon strongly back-lighting a document D (Figure 2), the examiner can conveniently look for the fact that the "*" in the first character position of the synthetic watermark "halos" the "*" of the ink-printed serial number, for the fact that the "...1, 0, 9, 8, 7, 6,..." in the second character position of the synthetic watermark "halos" the respective "...1, 0, 9, 8, 7, 6,..." in the second character position of the ink-printed serial number, for the fact that the synthetic watermark character "...B, B, B, B, A, A,..." in the third character position corresponds to a no imprinted space in the third character position of the ink-printed serial number, and for the fact that no synthetic watermark character appears in the fourth position, where the ink imprinted serial number has a character "...E, D, D, D, D, D,..."

In looking at any one document D (Figure 2), the examiner can be looking for completeness of the serial number (e.g. that it reads *6AD"), the examiner can be looking for lack of alteration of the serial number (e.g. that the "*6" of the synthetic watermark both "halos" an "*6" of the ink-imprinted serial number) and that the juxtaposition is characteristic of a genuine one (e.g. that one *6 is precisely centered on the other, that both are of the same type face and that the halo extends one-half millimeter beyond

the respective printed characters, this example of juxtaposition and relative characteristics being only one among many which could be adopted by the designer and issuer of the genuine documents D),
5 and the examiner can be looking for the side-by-side juxtaposition of synthetic and ink-imprinted characters, rather than their juxtaposition (e.g. that no ink-imprinted character appears in the third character position, but a synthetic
10 watermark character does, and vice versa as to the fourth character position, these being made as checks against spurious addition or deletion of characters by a counterfeiter who is unwitting of the code adopted for the serial number printing
15 process).

Clearly, the examiner which performs the examination referred to in connection with the above discussion can be but need not be a human, in that the system provided by the invention lends
20 itself easily to rapid and reliable routine examination of large numbers of documents by light-sensitive electronic instruments, e.g. sets of photo-electric cells in sensor circuits programmed to look for and distinguish presence
25 and absence of correspondence with characteristic features of the particular code adopted.

Registration systems used in printing processes are well-known and may be used in a conventional manner for providing proper
30 juxtaposition of the two strings of characters on each document. Because these techniques are so well known in the trade, it is believed unnecessary to describe them in further detail.

Various, conventional printing processes
35 may be used for applying the two character strings

using presses which are sheet fed or web fed, and which apply the synthetic watermark imprinting fluid of the first character string and the ink of the second character string by stamping, rotary
5 printing, felt printing, ink jet printing, ribbon-impact printing or the like.

Likewise, the devices used for stepping-up the serial number from document to document may be any convenient ones of such devices as are
10 presently commercially available for serial numbering of documents, e.g. ones in which the serial numbering is stepped manually by rotating endless rubber mats of reverse characters as on a hand-operated date-stamper, ones in which the
15 serial number is automatically mechanically stepped using a series of cams, pawls, ratchets and cam followers operating endless wheels or bands of reverse characters, or ones in which serial number stepping is electronically
20 programmed, e.g. into the controller for a daisy wheel or ink-jet printer.

It should now be apparent that the document bearing characteristic ink-printed indicia juxtaposed with corresponding
25 characteristic synthetic watermark and method for producing same as described hereinabove, possess each of the attributes set forth in the specification under the heading "Summary of the Invention" hereinbefore. Because it can be
30 modified to some extent without departing from the principles thereof as they have been outlined and explained in this specification, the present invention should be understood as encompassing all such modifications as are within the scope and
35 spirit of the following claims.

CLAIMS

1. A document printed on at least somewhat translucent paper and provided with identifying characteristics, including:

5 a first string of characters provided as a synthetic watermark field in which the relative translucence but not the color of the paper is contrasted, this string including at least one character; and

10 a second string of characters provided as an ink-imprinted field in which the color of the paper is contrasted, this string also including at least one character;

15 wherein at least one character in said synthetic watermark field is provided to have a characteristic relative juxtaposition with at least one character in said ink-imprinted field.

2. The document provided with identifying characteristics of claim 1, wherein:

20 said at least one character in said synthetic watermark field at least partially surrounds a respective said at least one character in said ink-imprinted field.

25 3. The document provided with identifying characteristics of claim 2, wherein:

30 said at least one character in said synthetic watermark field which at least partially surrounds said at least one character in said ink-imprinted field is a replication of the same character, so that said at least one character in said ink-imprinted field is haloed by said at least one character in said synthetic watermark field.

4. The document provided with identifying characteristics of claim 1, wherein:
said at least one character in said synthetic watermark field lies non-overlappingly
5 characteristically adjacent said at least one character in said ink-imprinted field.

5. The document provided with identifying characteristics of claim 4, wherein:
on each document said strings are
10 provided in a line common to both of them.

6. The document provided with identifying characteristics of claim 5, wherein:
at least one of said at least one characters in at least one of said fields is
15 provided in a gap in the corresponding other of said fields.

7. A series of documents printed on paper, each being provided with a unique serial number, which includes:
20 a first string of characters provided as a synthetic watermark field in which the relative translucence but not the color of the paper is contrasted, this string including at least one character; and
25 a second string of characters provided as an ink-imprinted field in which the color of the paper is contrasted, this string also including at least one character;
30 wherein at least one character in said synthetic watermark field is provided to have a characteristic relative juxtaposition with at least one character in said ink-imprinted field.

8. The series of serially numbered documents of claim 7, in which:

said documents are severally connected in series as a web.

5 9. The series of serially numbered documents of claim 7, wherein:

said at least one character in said synthetic watermark field at least partially surrounds a respective said at least one character
10 in said ink-imprinted field.

10. The series of serially numbered documents of claim 9, wherein:

said at least one character in said synthetic watermark field which at least partially surrounds said at least one character in said ink-
15 imprinted field is a replication of the same character, so that said at least one character in said ink-imprinted field is haloed by said at
least one character in said synthetic watermark
20 field.

11. The series of serially numbered documents of claim 7, wherein:

said at least one character in said synthetic watermark field lies non-overlappingly
25 characteristically adjacent said at least one character in said ink-imprinted field.

12. The series of serially numbered documents of claim 11, wherein:

on each document said strings are
30 provided in a line common to both of them.

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13. The series of serially numbered documents of claim 12, wherein:

at least one of said at least one characters in at least one of said fields is provided in a gap in the corresponding other of said fields.

14. A method for providing each document in a series of paper documents with a serial number, which includes:

printing on each document a first string of characters as a synthetic watermark field in which relative translucence but not the color of the paper is contrasted; and
printing on each document a second string of characters as an ink-imprinted field in which the color of the paper is contrasted, while providing that at least one character in said synthetic watermark field has a characteristic relative juxtaposition with at least one character in said ink-imprinted field.

15. The method of claim 14, wherein:
at least one said character in at least one said field is stepped in identity on successive documents in said series.

16. The method of claim 15, wherein:
said at least one characteristically juxtaposed character in said synthetic watermark field at least partially surrounds a respective said at least one characteristically juxtaposed character in said ink-imprinted field.

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17. The method of claim 16, wherein:
at least one respective said surrounded
and surrounding juxtaposed character in said
fields is said at least one character which steps
5 in identity on successive document in said series.

18. The method of claim 16, wherein:
said at least one character in said
synthetic watermark field which at least partially
surrounds said at least one character in said ink-
10 imprinted field is a replication of the same
character, so that said at least one character in
said ink-imprinted field is haloed by said at
least one character in said synthetic watermark
field.

15 19. The method of claim 14, wherein:
said at least one character in said
synthetic watermark field lies non-overlappingly
characteristically adjacent said at least one
character in said ink-imprinted field.

20 20. The method of claim 19, wherein:
on each document said strings are
provided in a line common to both of them.

25 21. The method of claim 20, wherein:
at least one of said at least one
characters in at least one of said fields is
provided in a gap in the corresponding other of
said fields.

