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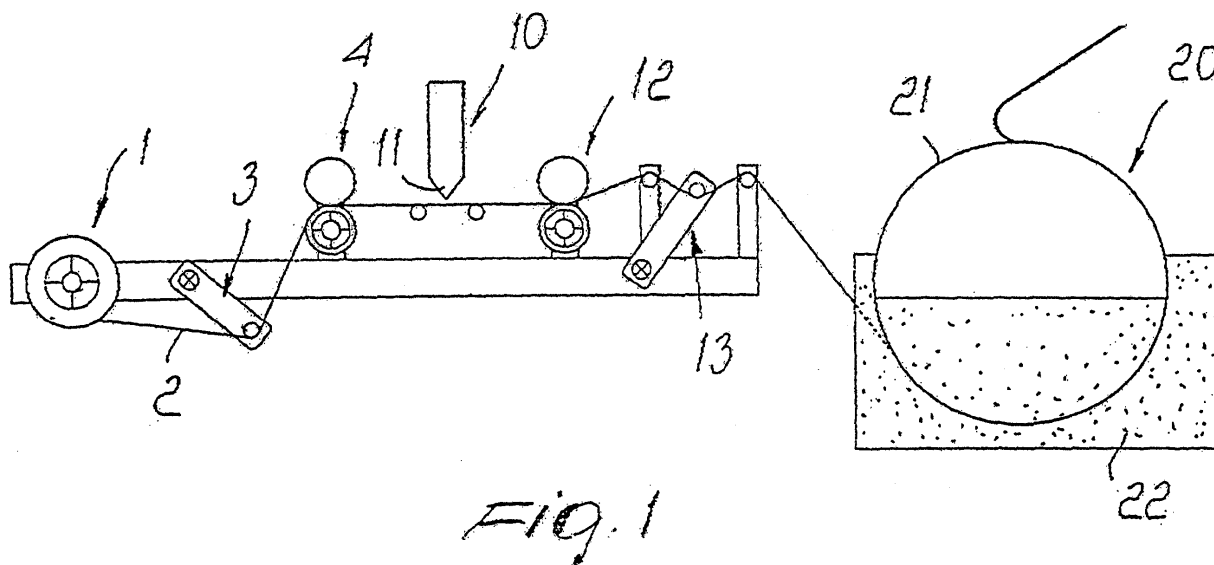
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(54) **Method for producing security documents and its products**

(57) A method for producing documents, securities, banknotes and the like with security elements, which consists in producing a sheet-like element inside which a security element is partially incorporated. The particularity of the invention is constituted by the fact that distinctive

markings are provided on the security element directly before the step for incorporating the security element in the sheet-like element. The distinctive markings are arranged in register with at least one portion of said sheet-like element and can be differentiated for each document.



## Description

**[0001]** The present invention relates to a method for producing documents, securities, banknotes and the like with security elements, and to the document, security, banknote and the like thus obtained.

**[0002]** It is known that the production of documents, securities, banknotes and the like normally employs a paper substrate that is manufactured in paper mills with high specialisation by virtue of manufacturing and control procedures that give high security to the product.

**[0003]** For example, in a banknote one introduces security systems derived from counterfeit banknote monitoring in order to have an exact picture of the most counterfeited elements or systems. These elements or systems are the normally interpreted by ordinary people to identify whether a banknote is genuine, or counterfeit, such as the watermark, the security thread with particular inscriptions, the "sound" of the paper, its consistency, color and so forth.

**[0004]** The additional elements that are used by professionals in the field, such as tellers and the like, to check the authenticity of banknotes are generally not known to ordinary people, and are microprinting, the shifting colors of some inks, and the recognition of special holographic images such as kinegrams in more recent banknotes.

**[0005]** All these elements pose anti-counterfeiting problems that are intrinsic to them, since they are all identical for each individual value of the banknote.

**[0006]** In particular, it is noted that security threads are incorporated in the paper substrate of a banknote, said threads being manufactured externally to the machine that shapes the paper sheet-like element, i.e., in a different production process.

**[0007]** In practice, said threads are produced with devices and processes that transfer total completion of the security element outside the paper-making machine.

**[0008]** Accordingly, the security thread is an element that is constantly identical over time and is incorporated in the paper substrate without any specific correlation between the thread element and the paper substrate that will subsequently become a banknote.

**[0009]** From this example it is evident that a few years' production of paper for banknotes having a specific value contains elements that are identical and therefore cannot be distinguished from one another.

**[0010]** It is evident that some elements, such as for example the security thread as regards the visual aspect, can be reproduced more easily, since by not changing over time they justify considerable investments on the part of counterfeiters, since the security thread, once counterfeited, can be produced more than once without causing particular problems.

**[0011]** Furthermore, since the thread is incorporated in the paper only with a lateral register with respect to the edge of the banknote, generic and non customised use is possible.

**[0012]** Furthermore, some elements, such as for ex-

ample the incorporated thread and/or the applied holograms, by not being constrained to the individual specific banknote in any way, can be removed and applied to fraudulently duplicated documents, raising preponderantly the uncertainty of whoever has to check the authenticity of the banknote.

**[0013]** Currently, banknote paper is produced with watermarking machines with a so-called "dandy-roll" process, i.e., with machines in which the watermark is produced by using watermarking screens that reproduce the image created by watermark artists as many times as required by the sheet of the printing machines. These watermarks are wrapped around rollers, hence the name of "dandy-roll" process.

**[0014]** The manufacturing process substantially consists in creating a hollow in the watermarking roller so that the mix in which said roller is immersed for approximately 55-60 % of its lateral surface can be attracted by the hollow. In this way, the paper fibers dispersed in the mix attach themselves to the watermarking roller, which during rotation, once it has left the mix, releases the fibers onto a screen that carries them to the steps for drying, sizing, glazing, checking and reeling. Therefore, one can say that banknote paper is produced starting from a mixture of water, cotton fibers, security elements such as cotton fibers treated with fluorescent pigments and the like, in order to obtain rolls with a length of approximately 10,000 meters. The rolls are therefore ribbons of paper from which sheets are subsequently obtained, said sheets bearing a number of watermarks that corresponds to the number of banknotes to be produced on that sheet. The sheets are arranged not only longitudinally but also transversely, i.e., side by side, two or three at a time.

**[0015]** The resulting paper, which when measured has an elongation of approximately 2-3 % with respect to the nominal pitch, then passes through additional processes, where it is trimmed, checked and, if the presence of holographic stripes is required, treated in delicate devices meant to apply the holographic strips with a thermal process. Once the holographic strips have been applied, the paper reels are sent to the step for cutting, squaring and final finishing, so that the sheets having the required format are produced.

**[0016]** The security threads that are most widely used are threads with microprint characters produced by removing aluminum deposited in vacuum on a polyester support alternated with regions having encoded magnetic characteristics.

**[0017]** This production, which is highly specialised, is achieved by providing on the thread texts or otherwise graphic markings that repeat with a given pitch, in the same manner, along the entire length of the thread.

**[0018]** The distance between one inscription and the next, known in the jargons as pitch, is provided so that on the banknote there is at least one inscription alternated by a region without microprinting, where the magnetic code is generally placed; in this case also, said magnetic code, once decoded, reproduces the face value of the

banknote.

**[0019]** The threads are generally produced with a pitch that is required to be shorter than the pitch of the watermark, and therefore of paper manufacture by an extent on the order of approximately 2-3 %.

**[0020]** The security threads are incorporated into the paper during the manufacturing step with a process that is used by all paper mills that manufacture banknote paper.

**[0021]** The threads are unwound from spools located proximate to the watermarking roller that produces the watermarked paper, and the unwound thread is drawn by the manufacturing roller during the forming of the paper.

**[0022]** The spool on which the thread is wound is braked slightly so as to keep said thread tensioned and therefore allow, once inserted in the paper lateral positioning with tolerances of  $\pm 2$  mm. Clearly, the microprinting and the magnetic code that are present on the thread have no longitudinal register with respect to the manufactured paper, and therefore the position of the microprinting with respect to the edge of the banknote is purely random; moreover, all banknotes of the same type have an identical thread.

**[0023]** As mentioned, this fact causes a severe security limitation, since counterfeiting is possible because no customising element is provided for each banknote.

**[0024]** The object of the invention is indeed to solve the above described problem, providing a system by virtue of which each individual element that is incorporated, inserted or applied, such as for example the security thread, the holograms and the like, are customised and rendered unique for each banknote without altering the conventional production process.

**[0025]** Within the scope of the above object, it is preferably to provide a method for producing documents, securities, banknotes and the like in which the incorporated security elements can be positioned longitudinally and transversely with univocal characteristics that are strictly linked to the banknote in which the security element is incorporated.

**[0026]** It is preferably to provide a method that can be applied for customisation of holographic ribbons during their application to reels of paper for banknotes; similar customisations can be obtained for holograms and the like.

**[0027]** It is preferably to provide a method that has very modest costs while obtaining a product that has univocal characteristics and that is fully comparable to those that can be achieved according to conventional methods.

**[0028]** This object and other aspects that will become apparent hereinafter are achieved by a method for producing documents, securities, banknotes and the like with security elements according to the invention, which consists in producing a sheet-like element inside which at least one security element is partially incorporated, characterised in that it consists in providing, on said at least one security element, distinctive markings directly

before the step for incorporating said at least one security element in said sheet-like element, said distinctive markings being arrangeable in register with at least one portion of said sheet-like element.

**[0029]** Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of the method for producing documents, securities, banknotes and the like with security elements, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Fig. 1 is a schematic view of the apparatus for the portion of the method;

Fig. 2 is a schematic view of the sheet-like element at the exit of the watermarking assembly;

Fig. 3 is an enlarged-scale schematic sectional view of a security thread;

Fig. 4 is an enlarged-scale schematic sectional view of a security thread with a magnetic layer;

Fig. 5 is a schematic plan view of a possible configuration of distinctive markings provided on a magnetic layer and of the analogue signal that can be detected with a manual magnetic signal reader.

**[0030]** With reference to the above figures, the method for producing documents, securities, banknotes and the like with security elements according to the invention consists in providing a sheet-like element made for example of paper-like material, inside which at least one security element, constituted for example by a security thread, is at least partially incorporated.

**[0031]** In the specific case, an unreeling assembly 1 is provided and a spool of thread 2 is placed thereon by means of a conventional step motor and an encoder mounted on the shaft.

**[0032]** The thread 2 is guided on a tensioning assembly 3 that has an arm with a load cell mounted on the fulcrum, so as to ensure a preset tension of the thread by virtue of the load cell that controls the voltage of the motor of the spool unreeling assembly.

**[0033]** The thread 2 is then introduced in a first traction assembly, constituted by a first pair of advancement rollers 4 that are made of rubber and have a controlled pressure; one of the rollers is actuated by a step motor with an encoder mounted thereon.

**[0034]** At the exit of the first traction assembly, the thread is inserted in a scribing station, generally designated by the reference numeral 10, where there is a laser head 11 that emits a YAG (Yttrium Aluminum Granat) laser beam with a wavelength between 850 and 1100 nm, preferably 1060 and 1070 nm, and with a depth of focus of  $\pm 0.3$  mm and with associated electronic systems; said head is controlled, as explained in greater detail hereinafter, so as to provide distinctive markings

that are constituted for example by a removal of the aluminum deposited in vacuum, without affecting the polyester substrate, making the thread advance at a speed of even 150 m per minute.

**[0035]** At the exit of the customisation assembly 10, the thread 2 is subjected to a second traction assembly 12, which is constituted by rubber rollers that are driven by the motor; downstream of said second traction assembly there is a second tensioning assembly 13, which drives the encoder-fitted motors of the first and second traction assemblies, so as to feed the thread 2 into an embedding assembly 20 provided with a watermarking roller 21 that is partially immersed in the mix, which is generally designated by the reference numeral 22.

**[0036]** In the customisation station, customised distinctive markings are applied to the thread by applying the laser, which is driven by a signal that is detected directly on the paper after the glazing step, i.e., when the paper has already passed all the stress-generating steps of production.

**[0037]** The system is entirely driven by a computer, which continuously processes the information that arrives from the various elements: in particular, the computer receives from the central system the indication of the speed of the paper-making line, i.e., the speed of the watermarking roller and sets accordingly the unwinding speed of the thread wound on the spool.

**[0038]** In order to obtain a thread provided only with scribing, it is possible to use a thread 2, shown schematically in Fig. 3, that has a width of  $1.2 \text{ mm} \pm 0.05$ , a 19-micron polyester substrate 30, a layer of vacuum aluminum 31 obtained by vacuum metallisation with an optical density of approximately 2 and a protective layer 32 obtained by spreading clear nitrocellulose lacquer, with a thickness of 2 microns in order to protect the vacuum demetallisation.

**[0039]** The laser beam can provide distinctive markings of any kind, which can be positioned in register with at least one portion of the sheet-like element so that the incorporated thread has a demetallised inscription that is perfectly in register with the edges of said banknote.

**[0040]** It is optionally possible to provide distinctive markings that can be in register with the watermark of the paper or with printed elements provided on the body of the banknote.

**[0041]** The possibility to position the distinctive markings in register arises directly from the fact that the distinctive markings are applied direct before the step for incorporating the thread in the sheet-like element, so that it is possible to have a control that allows to apply the distinctive marking by means of the laser beam, for example as described in patent application MI 2000 A000773 dated 10 April 2000, assumed included herein by reference.

**[0042]** With reference to Fig. 2, it is evident that it is possible to obtain banknote, designated by the reference numeral 40, in which the thread 2 has distinctive markings 41 that are always located in the same point with respect

to the edge of the banknote, and it is furthermore possible to apply variable distinctive markings, designated by the reference numeral 42, which vary for each banknote.

**[0043]** Again with reference to Fig. 2, said figure illustrates the notches 35 which allow to place the security thread in register with the watermark, so as to be able to customise the inscriptions that can be obtained.

**[0044]** By utilising the same criterion, it is possible to provide, in addition to distinctive markings of the simply visual or optical type, such as the one described above, also security elements that have magnetic characteristics.

**[0045]** Considering a magnetic thread, designated by the reference numeral 50 in Fig. 4, said thread has a polyester substrate 51 on which there is a magnetic layer 52 that lies between a first covering layer 53 and a second covering layer 54, which are constituted for example by vacuum aluminum.

**[0046]** Furthermore, usually there is a protective layer 55 of nitrocellulose lacquer and there is a hot-melt adhesive surface layer 56.

**[0047]** In this case, again by using the laser beam, it is possible to customise the thread not only optically but also with a magnetic coding characterised by the presence or absence of magnetic material, and the magnetic signal can be read with ordinary commercially available devices.

**[0048]** It is evident that the optical and magnetic customisation, by being provided simultaneously, has absolute precision, and that the laser beam regardless of whether it enters from the side bearing the polyester layer 51 or from the side bearing the hot-melt adhesive layer 56, will customise simultaneously the two layers of aluminum in vacuum and the internal magnetic layer.

**[0049]** The product thus manufactured clearly reveals the difference in thickness of the line produced by the different energy absorption of the materials.

**[0050]** The distinctive markings, which can be constituted by an inscription or by a graphic marking, furthermore have registration precision also with respect to the edges of the banknote, as described above.

**[0051]** It should also be added that the same scribing principle and the same laser beam can be used on the machine that applies the holographic strips, so that it is possible to customise the holographic strips that are commonly used in banknotes, utilising all the various possible forms even with latest-generation holograms, such as kinegrams, Pixelgrams, Exelgrams, and the like.

**[0052]** From what has been described above it is thus evident that the invention achieves the proposed object, and in particular the fact is stressed that a method is provided in which it is possible to provide, on the security element constituted by a thread or any other element incorporated in the sheet-like element that will constitute the document or the like, distinctive markings that are obtained by virtue of a scribing station that modifies the surface in a manner that is absolutely customisable according to any reference and with the possibility to intro-

duce the distinctive element in the banknote with precise references and alignments, by virtue of which the security element is different in any document in which it is inserted.

**[0053]** This, by virtue of the use of the laser beam, that object can be achieved with particularly modest costs.

**[0054]** As a substantial feature of the present invention, the distinctive customised markings are arranged in register with at least one portion of said sheet-like element. Preferably, the distinctive markings are to be arranged in register with the watermarks so that a scribing operation of the customisation or scribing station 10 has to be synchronised with the watermarks.

**[0055]** For this purpose, the notches 35 are arranged on the sheet-like element in particular positions as synchronisation markings. In the embodiment shown in Fig. 2, the notches 35 are aligned to the watermarks. Preferably, the notches 35 are formed in the paper manufacture process by means of corresponding projections (not shown) projecting from a circumferential surface of the watermarking roller 21.

**[0056]** The notches 35 are detected by a detecting device (not shown) such as a optical transmission and receiving means which is preferably mounted in the vicinity of the embedding or incorporating assembly 20.

**[0057]** The detecting device outputs a detecting signal to the computer which serves as a control device (not shown) for controlling the scribing station 10

**[0058]** In particular, the control device computes a timing of a scribing operation of the scribing station 10 on the basis of the input detecting signals, which will be described in more detail in the following.

**[0059]** The thread 2 passes a route between the unreeling assembly 1 and the incorporating assembly 20, while the advance speed of the thread 2 within this route is always constant. Additionally, the speed of the thread 2 is the same like a speed of the sheet-like element formed around the circumferential surface of the watermarking roller 21. Consequently, the speed of the sheet-like element is the same like the speed of the thread 2 at the scribing station 10, whereby a synchronisation of the scribing operation of the scribing station 10 with the watermarks in the sheet-like element can be enabled with ease by means of the notches 35.

**[0060]** The control device computes the timing of the scribing operation in real-time on the basis of the timing of the input detecting signals in consideration of the route of the thread 2 between the scribing station 10 and the incorporating assembly 20 so that the distinctive markings are in register with the watermarks.

**[0061]** Moreover, it is possible to synchronise a scribing speed of the scribing station 10 with the speed of the sheet-like element on the basis of the input detecting signals provided that the notches 35 in the sheet-like element are sufficiently narrow to each other.

**[0062]** In the above embodiment, the scribing station 10 is realised by a YAG-laser, but it is obvious that the scribing station 10 can also be realised by other equivalent devices.

lent devices.

**[0063]** For example, the scribing station 10 can be realised by an ink-jet recording device. The ink-jet recording device prints the distinctive markings onto the polyester substrate with an ink, for example a grey colour nitroacryl-soluble resin basis ink containing less than 5 % aluminum powder. The markings preferable are negative characters which are readable against the backlight. At the same time, instead of the layer of vacuum aluminum 31 as described in the embodiment, simply a printed ink layer can be applied onto the polyester substrate 30. The step of applying the vacuum aluminum 31 onto the polyester substrate 30 and the step of demetalisation the vacuum aluminum 31 for forming the markings can be omitted which results in reduced manufacturing costs.

**[0064]** In another modification, the scribing station 10 is realised by a thermal transfer device which form the customised markings by a thermal transfer process such as an irreversible thermal transfer process, where first an ink is applied onto the polyester substrate 30, and then thermal energy is applied upon the ink, whereby the ink changes its colour and forms the distinctive markings.

**[0065]** In a further modification, the scribing station 10 is realised by an impact printing device which form the distinctive markings by an impact printing process, wherein a punch, a needle or a similar device is pressed against vacuum aluminum 31 and/or the polyester substrate 30. In this case, the polyester substrate 30 is not necessarily transparent.

**[0066]** In a further modification, the scribing device 10 is an etching device which etches the distinctive markings into the vacuum aluminum 31 and/or the polyester layer 30 or another appropriate layer.

**[0067]** In a further modification, the scribing device 10 is realised by a device for performing a chemical and/or electrolytical stripping process of any metal layer applied onto the polyester substrate 30.

**[0068]** The scribing device 10 of the above embodiment can be modified so as to sublimate or burn negative distinctive markings into the vacuum aluminum 31 and/or the polyester layer 30.

**[0069]** The position of the scribing station 10 between the first traction assembly 4 and the second traction assembly 12 can be modified, provided that the position is anywhere between the unreeling assembly 1 and the incorporating assembly 20.

**[0070]** It is further obvious that, instead of the watermarking roller 20, a plain machine can be used, wherein no watermarks are created.

**[0071]** The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

**[0072]** All the details may furthermore be replaced with other technically equivalent elements.

**[0073]** In practice, the materials used, as well as the contingent shapes and the dimensions, may be any according to the requirements.

**[0074]** This application is a divisional application of European patent application no. 02 798 014.3 (the "parent application"), also published under no. EP - A - 1 436 461. The original claims of the parent application are repeated below in the present specification and form part of the content of this description as filed.

1. A method for producing documents, securities, banknotes and the like with security elements, which consists in producing a sheet-like element inside which at least one security element is at least partially incorporated,

characterised in that

it consists in providing, on said at least one security element, distinctive markings directly before the step for incorporating said at least one security element in said sheet-like element, said distinctive markings being arrangeable in register with at least one portion of said sheet-like element.

2. The method according to claim 1, characterised in that said sheet-like element is made of paper-like material.

3. The method according to claim 2, characterised in that said security element is constituted by a security thread, stripe and/or patch.

4. The method according to one or more of the preceding claims, characterised in that said security element is constituted by a hologram.

5. The method according to one or more of the preceding claims, characterised in that said distinctive markings are provided by one of a laser beam radiation process; an ink-jet recording process, preferably by use of a grey colour nitroacryl-soluble resin basis ink containing less than 5 % aluminum powder; a thermal transfer process, preferably an irreversible thermal transfer process; an impact printing process, preferably by use of a punch or a needle; an etching process; and a chemical and/or electrolytical stripping process.

6. The method according to one or more of the preceding claims, characterised in that said laser beam is of the YAG type with a wavelength of substantially 1060-1070 nm and with a depth of focus of substantially 0.3 mm.

7. The method according to one or more of the pre-

ceding claims,

characterised in that

it consists in unwinding a thread with a plastic substrate bearing a layer of metallic material, in tensioning said thread, in subjecting said thread to a station for customisation by virtue of a laser beam, in which the thread is retained between a first traction assembly and a second traction assembly with encoders driven by a signal detected on said sheet-like element downstream of a unit for incorporating said thread in said sheet-like element.

8. The method according to one or more of the preceding claims, characterised in that said incorporating assembly has a watermarking cylinder that is at least partially immersed in a cellulose mix.

9. The method according to one or more of the preceding claims, characterised in that said distinctive markings are provided in register with the edges of the document and the like being produced.

10. The method according to one or more of the preceding claims, characterised in that said distinctive markings are provided on said thread in register with said watermark.

11. The method according to one or more of the preceding claims, characterised in that said distinctive markings are provided on a layer of aluminum and are optically detectable.

12. The method according to one or more of the preceding claims, characterised in that said distinctive markings are provided on a layer of magnetic material and can be detected with a magnetic reading apparatus.

13. The method according to one or more of the preceding claims, characterised in that said distinctive markings are provided in a printed ink layer.

14. The method according to one or more of the preceding claims, characterised in that said distinctive markings are different for each document.

15. The method according to one or more of the pre-

ceding claims,  
characterised by  
the steps of  
forming synchronisation markings in the sheet-like  
element;  
detecting the synchronisation markings, preferably  
by means of an optical transmission and receiving  
means;  
inputting the detected synchronisation markings to  
a control device;  
computing in the control device a timing for the pro-  
vision of the distinctive markings on the basis of the  
input synchronisation markings.

16. A document, security, banknote and the like,  
comprising a sheet-like element that at least partially  
incorporates a security element,  
characterised in that  
it comprises, on said security element, distinctive  
markings that can be arranged in register with at least  
one portion of said sheet-like element.

17. A document, security, banknote and the like ac-  
cording to claim 16,  
characterised in that  
said distinctive markings are provided by virtue of  
one of  
a laser beam;  
an ink-jet recording process, preferably by use of  
a grey colour nitroacryl-soluble resin basis ink con-  
taining less than 5 % aluminum powder;  
a thermal transfer process, preferably an irreversible  
thermal transfer process;  
an impact printing process, preferably by use of a  
punch or a needle;  
an etching process; and  
a chemical and/or electrolytical stripping process.

## Claims

1. A method for producing documents, securities, ban-  
knotes (40) and the like, having a sheet-like element,  
and a security element (2; 30; 50) being at least par-  
tially incorporated inside the sheet like element,  
wherein a customisation of the security element (2;  
30; 50) is performed by creating distinctive markings  
(41), followed by at least partially incorporating the  
security element (2, 30; 50) into the sheet-like ele-  
ment, the method being  
**characterised in that**  
the security element (2; 30; 50) is incorporated into  
the sheet-like element in such a manner that the dis-  
tinctive markings (41) are in register with a predeter-  
mined portion of the sheet like element.
2. The method according to claim 1, wherein the pre-  
determined feature (35) is applied to the sheet-like

element during the step of incorporating the security  
element (2; 30; 50) into the sheet-like element.

3. The method according to claim 1 or 2, wherein the  
sheet-like element is made of paper-like material.
4. The method according to any of claims 1 to 3, **char-  
acterised in that** said security element is constitut-  
ed by a security thread (2; 30; 50) made of a magnetic  
(52) or non magnetic (31) material, by a stripe and/or  
by a patch or by a hologram.
5. The method according to any of claims 1 to 4, where-  
in said distinctive markings (41) are provided by one  
of the following processes:
  - a laser beam radiation process;
  - an ink-jet recording process, preferably by  
use of a grey colour nitroacryl-soluble resin ba-  
sis ink containing less than 5 % aluminium pow-  
der;
  - a thermal transfer process, preferably an irre-  
versible thermal transfer process;
  - an impact printing process, preferably by use  
of a punch or a needle;
  - an etching process; and
  - a chemical and/or electrolytic stripping proc-  
ess.
6. The method according to claim 5, wherein said laser  
beam is of the YAG type with a wavelength of sub-  
stantially 1060-1070 nm and with a depth of focus  
of substantially 0.3 mm.
7. The method according to any of claims 1 to 6, further  
comprising the steps of  
unwinding a thread (2; 30; 50) with a plastic substrate  
bearing a layer of metallic material (31; 52),  
tensioning said thread (2; 30; 50),  
subjecting said thread (2; 30; 50) to a customisation  
station (10) by virtue of a laser beam, in which the  
thread (2) is retained between a first traction assem-  
bly (4) and a second traction assembly (12) with en-  
coders driven by a signal detected on said sheet-like  
element downstream of an incorporating assembly  
(20) for incorporating said thread (2; 30; 50) in said  
sheet-like element.
8. The method according to any of claims 1 to 7, where-  
in said incorporating assembly has a watermarking  
cylinder that is at least partially immersed in a cellu-  
lose mix.
9. The method according to any of claims 1 to 8, where-  
in said distinctive markings (41) are provided in reg-  
ister with the edges of the document, security or ban-  
knote (40) being produced, or are provided in register  
with said watermark.

10. The method according to any of claims 1 to 9, wherein said distinctive markings are provided on a layer of aluminium (31) and are optically detectable and/or said distinctive markings are provided on a layer of magnetic material (52) and are detectable by means of a magnetic reading apparatus and/or said distinctive markings are provided in a printed ink layer. 5
11. The method according to any of claims 1 to 10, wherein said distinctive markings are different for each document. 10
12. The method according to any of claims 1 to 11, further comprising steps of 15
- forming synchronisation markings (35) in the sheet-like element;
  - detecting the synchronisation markings (35), preferably by means of an optical transmission and receiving means; 20
  - inputting the detected synchronisation markings to a control device;
  - computing, in the control device, a timing for the provision of the distinctive markings on the basis of the input synchronisation markings. 25
13. A production line for producing documents, securities, banknotes (40) and the like, comprising transport means (1, 3, 4, 12) for transporting a security element (2; 30; 50) via a customisation station (10) for applying distinctive markings (41) onto the security element (2; 30; 50) towards an embedding assembly (20) for at least partially embedding the security element (2; 30; 50) into a sheet-like element, **characterised by** 35
- control means capable of controlling the application of the distinctive markings (41) onto the security element (2; 30; 50) and/or the feeding speed of the security element in such a manner that the distinctive markings (41) are in register with a portion of the sheet like element. 40
14. A production line according to claim 13, wherein the transport means comprises an unreeling assembly (1), a tensioning assembly (3), a pair of advancement rollers (4) forming a first traction assembly, and a pair of rubber rollers (12) forming a second traction assembly; and/or the customisation station is a scribing station (10) comprising a laser head (11); and/or the embedding assembly (20) comprises a water-marking roller (21). 45 50
15. A document produced by a method according to any of claims 1 to 12 and/or by using a production line according to claim 13 or 14. 55

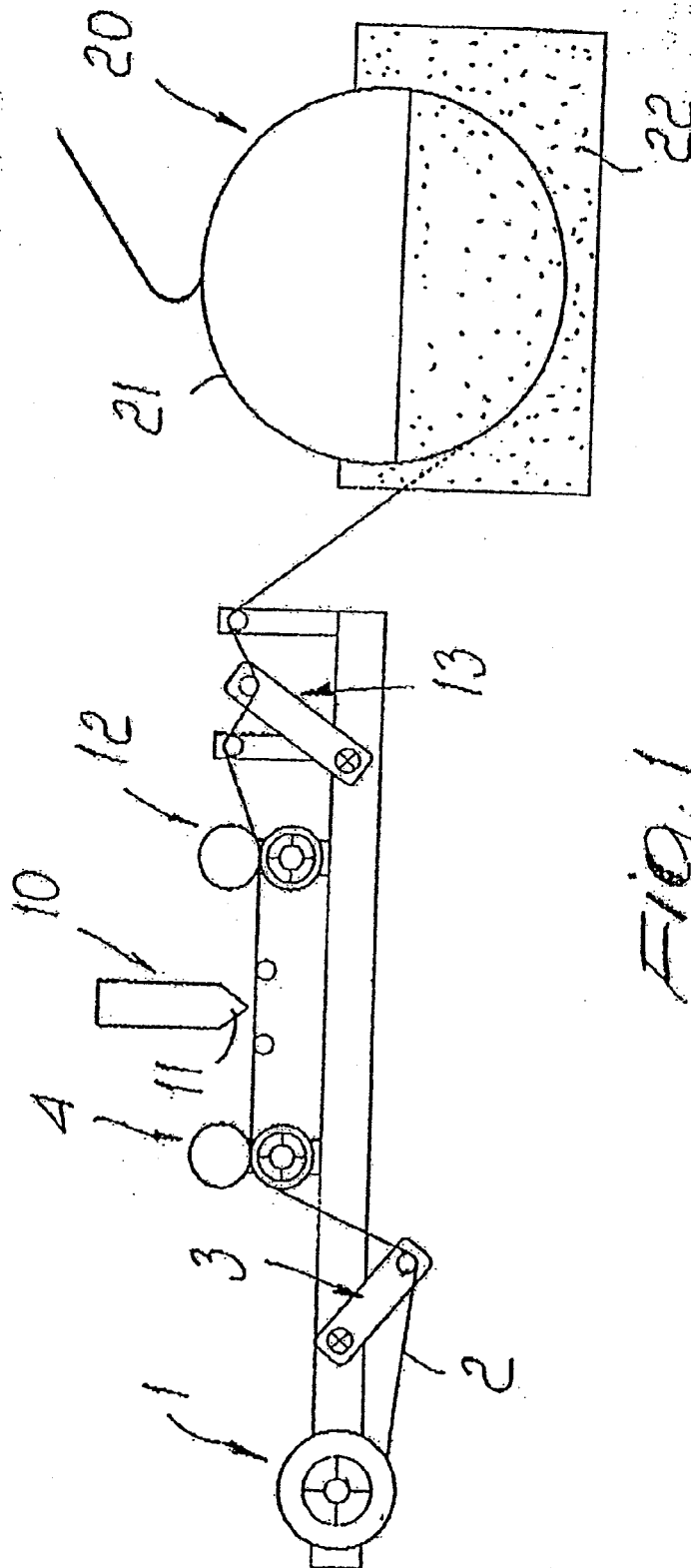
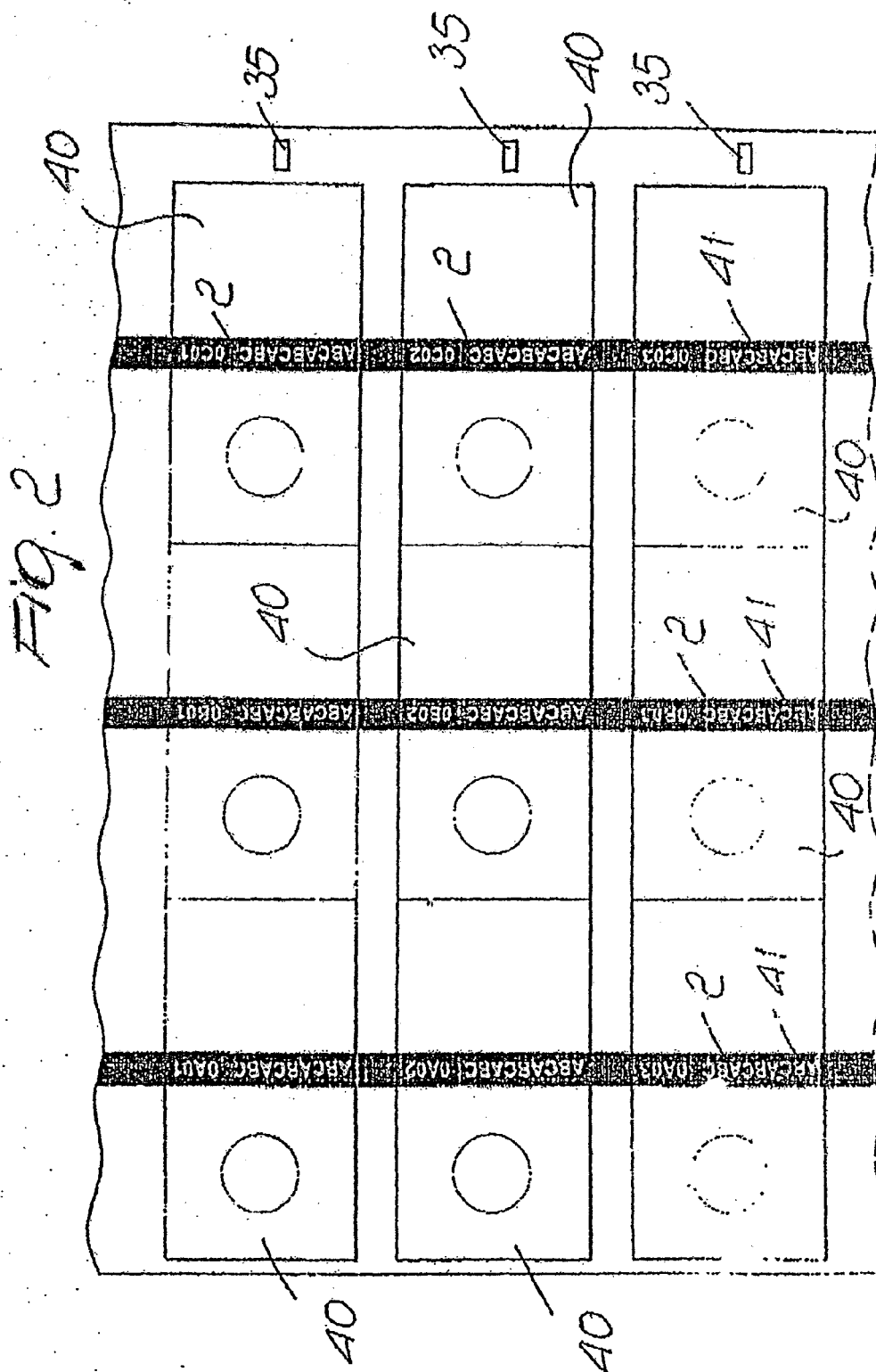


Fig. 1



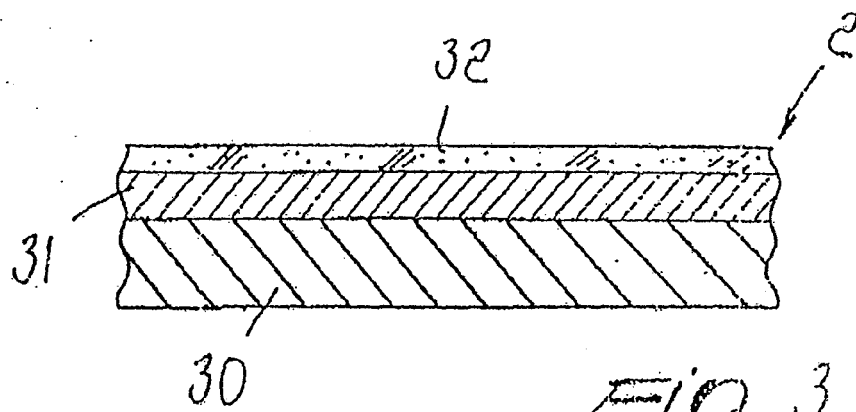


Fig. 3

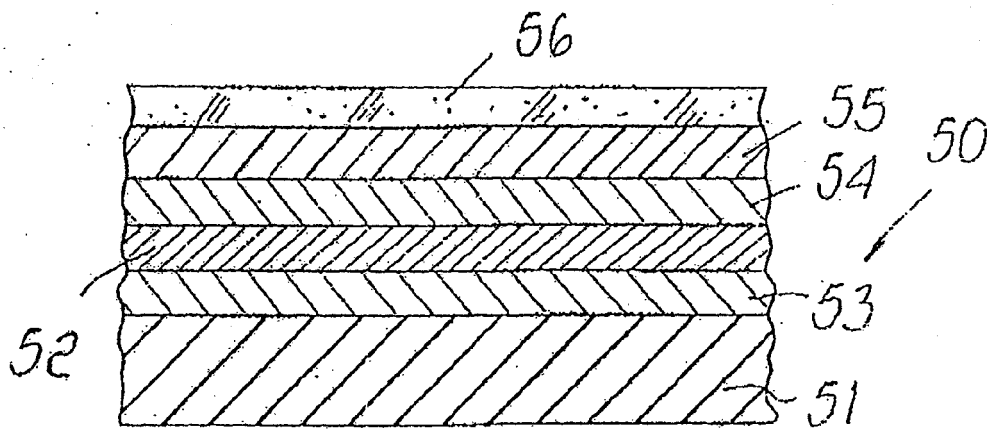


Fig. 4

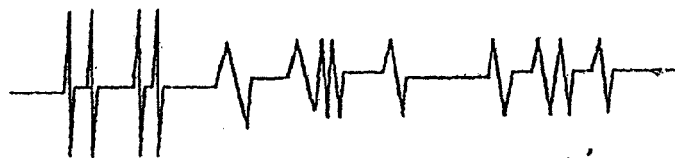
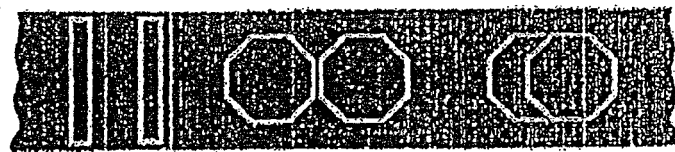


Fig. 5



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