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54 **Security paper and its manufacture procedure.**

57 Security paper and its manufacture procedure which includes a metallic thread of magnetic material, subjected to a termic treatment with quick cooling to give a solid amorphous without normal cristaline structure whose presence and constitution can be detected by simple sight as well as by electronically.

It will be used in the manufactured banknotes, identification cards or any other document.

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The present invention indicates the security paper and value documents which incorporate a thread or a security mark, to the manufactured documents with this paper and to the procedure for the manufacture as much of thread or mark as the paper, according to the method which describes.

The use is known for the security paper and value documents particularly the cards, banks, sheets or thread of plastic or another nature called security thread and in the bibliography of english language "security threads" with the mission to constitute in "security elements" and provide the minimum to difficult the document falsification.

The security threads have some physical characteristics and they introduce in the paper during the phase of the leaf formation in the method that they remain surrounded by cellulosic fibres. Any intention to extract them from the paper mass, results in paper breakage produced the document manipulation, that it can be invalited when we leave it incomplete.

In the case, that it was impossible to reach the thread partial extraction from the paper interior, its introduction in another paper to give the sensation that the second was authentic, because only in the paper disposition to introduce the thread in the leaf mass interior in a regular form.

In this mode, the security thread presence is, together with another security element, a warranty near the document authenticity, because it authenticates the origin and the paper origin legitim, used in the document printing.

The falsifiers have employed different mediums to give the authentic appearance to document without security thread, being that it is necessary to improve of the original invention.

Since its appearance in the value document world, the primitive security thread model had be perfected, in big measure to avoid the falsification technic which had intended parallel with special method to reach from one side the improvement of the adequated identification through the document handling through selection automatic machines, of difficult manipulation through the falsifiers.

Between other mediums employed, the thread recognition had been seeked to facilitate through the inclusion of microsheets texts in the plastic film which cuts the threads, and which they make some allusion for example to the emitting country to the document nominal value or to the date emission and must be easy to recognize and read with help of a small magnifying glass of through the inclusion of luminiscent pigments (Fluorescent to the ultraviolet light, with colour change or no to the day light) which are easily detectable with help of a bulb of pocket ultraviolet light with this way in the commerce, a false document presence can be controlled.

In another step that the public can recognize the security thread easily, procedures had been developed, which facilitate its appearance to the paper surface at regular intervals, good modified its nature more or less porous, good acted on the cloth formed in the paper machine and making to coincide the security thread in a zone of water mark alternating of ways which push the thread to appear with the same periodicity in the paper surface.

This types to developpe which expose the thread to the direct vision allows to employ effects of optic interference, as are the iridescence or the holograms, or good reinforce which are classic of micro and which are luminiscent, in a way to make more patents to the public and more difficult to produce by graphic technicians, included the photocopy technic. Never the less, it was not possible to avoid the falsification.

Between the development which through the opposit facilitate the handling and the document automatic selection, wich is less manipulation susceptible of side of the falsifiers, who employ phisical mediums of detection of photometer type, the magnetic type etc.

In the first case, it can be clasified a big number of possible more or less simple. The most sophisticated include the type which be employed by the impregnator technic or to lac the film, which give the security to the thread after cutting it, with a material with a composition of strange earth, which emits in determined condition of luminous exitation an infrared radiation of intensity, easy to measure in one narrow band of specter.

To secure that it does not produce strange influences during the document selection, the development would be improved, including the incorporation of masked substance which must be added to the fibrous paste with the paper, must be manufactured, with which the specter band will be restricted, in which is possible to observe infrared mission to which are property of material formed with the strange earth.

The same product class can be employed in form of ink, if good in this case no to contribute to guarantee the legitimate source of the security paper and make that the resultant document must have the protection against the falsified less effective.

This procedure types have the inconvenient of high cost for the products employed in the thread lacs, and to the electronic optic sensors.

Other phisical principals employed can be similar to the types which will be employed to engrave and then recuperate informations in a magnetic band with a plastic base similar to the magnetophone and apparatus of similar technology, also exists the possibility of magnetic band

with an adequate informatic equipment every time it reaches to the big public.

The object of the present invention is to develop a security thread and the paper and the documents produced which include them, must be susceptible to include informations for its detection and identifications through automatic machines, with vanguard technology to difficult the falsifications through individual falsifiers (more difficult to detect than the types which produce with technic more complicated which give origin to a great necessity of equipment of side the falsifiers) able to substitutes and improves the existing systems in which to indicate a protection against the falsification more simple to the sensor effective and to a lesser cost.

To destine for its use not only in banknotes but possible for another documents as the identification cards passports etc.

The developement must be based in special metallic material whose technology to describe as a continuation.

Material foundation: it is an alloy of magnetic metallic material (Fe/Co, Ni/B, Ni/P) which suffers a thermish treatment and consists of a strong cooling from initial temperature between 800 and 1500° C. Preferably 1000° to 1250° C, to a final temperature between -180° and -225° C preferential -190° to -215° C giving a solide amorphous without the normal metallic cristalline structure.

The solid can be obtained in form of very fine band, as a tape with a rectangular section similar to the actual security threads with a minimum thickness of 10 microns and depends of the alloy or good in form of thread of circular section, changing for them the cooling system of metallic after the fusion phase, the minimum diameter which can be obtained in that time is about 5 microns.

More later it is possible to submit the material to an operation of thermic type between 150° and 500° C preferently between 200° and 300° C which modifies its magneter hysteresis cyclos in a method that every alloy and for every treatment received, that some different armonics can be obtained, with an adequate sensor in the presence of magnetic field.

Totally more than a centenary of various or different codes throught the composition variety can be made, the thermic treatment and the form (mass quantity) with a future expansion with the employment of sensores more fine or throught another technic. The sensor consists in essence in two coils, one emisor who creates a perfect sinusoidal to avoid any influence of the materials in the armonics and a receptor.

Only high temperatures over 200° C can modify the code. The lecture is very weak (-120 db). To endow to the system some filters "to pass the

band" of 5-6 Hz of band thickness and of software for distiguish the other bands. As the thread volume or its number (mass quantity) also it is a factor to observe in the lecture, the sensor can be able to distinguish through the measure amplitude the aproximate quantity of thread and in result the present banknote.

One particularity very important of the system, is not to put banknotes into an recipient (for exemple a valise). It looses the possibility of semicuantitative detection, which will make this developement, specially able to controll the foreign currency movement and to treat problems of presence control.

Carried out proofs of the industrial incorporation of different classes of thread to the bank notes paper and its previous printing, realized proofs of printing of different class for identifiables incorporated to bank paper, to come to the following conclusions:

The metallic threads wich would be introduced directly without modify its structure (as to produce in the oven in bands from or cylinderish thread) in the mass paper, in oportunities and its function in its thickness and its ductility characteristics and bad ability, it would be observed irregulars intervals and as it would be introduced in the paper mass, it would be seen in the exterior that it was inform, being the hypotesis most consistent which the metallic thread is not able to follow always the contraction which produces during the drying process in parallel to the paper to be less delatable.

On the other side the metallic threads identifiable inform efected with base to a plastic material conventional as the employed in another security threads more primitive resist good without suffer the breakage and the printing results of paper manufactured with them is correct exsept in the cases in that thickness of plait is higher than 100 microns, being this as a limitation in the design. This is an important problem to consider because for any fracture modifies the reply for the adequate material.

Neither the treated threads through a prefragmented system present the difficulty exposed over the breakage to irregulars intervals, because in this case it finishes a wish the length of the fragments, can have advantages to obtain fragments of adequate length to reach mixed signals, which makes more complicated for the falsifier his production for any procedure.

Another alternative for the invention object to the present patent is the repair of the material in solide particle form, with which there is possibility to manufacture on lac or ink to incorporate to the plastic film (with which the threads will be made) or only some simple inks of printing to applicate to the paper.

Surface constituting it in security marks for the sensor, there are in the present invention for the following possibilities:

- Revision automatic machine for the emisor bank.
- Automatic cashier.
- Manual sensor for the commerce (Kiosks, shops, service station etc...).

All this with the same basic characteristics, although they are adapted to the necessity of every employer.

Good understood, different modifications can be adapted by the technician on the material, or to the form of execution, which has been written only to the title of examples, without to go out by them the following claims:

Claims

1. Security paper and its manufacture procedure which includes: on thread or identifiable metallic security mark, the paper and the produced documents which include it, also as the procedure employed to ensure the inclusion of security thread in the paper in the formation phase of leaf or of the mark or security printing in the document printing phase, characterized, because the employed in that thread is an alloy of magnetic material (to base of Fe/Co, Ni/B, Ni/P between another chemical elements which suffers a thermic treatment consistent in strong cooling at an initial temperature between 800° and 1500° C, preferently from 1000° to 1250° C, to a final temperature between -180° and -225° C, preferently -190° to -215° C giving a solide amporhous so without the normal metallic cristalline structure.
2. Security paper, according to characterized previous claims because the metallic material is in form of band or thread very fine or one rectangular section band or circular.
3. Security paper, according to the characterized previous claims because the thread section obtained, has some diminsions from 10 to 50 microns in the case of rectangular section and 5-20 microns in the case of the circular section.
4. Security paper, according to the claims (1) in which to obtain the metallic material in the form of pigments utilizable in form of lac or printing ink with a volume of particle of 5-20 microns.
5. Procedure according to the previous claims, characterized because the metallic material suffers a thermic tratment to 150° - 500° C,

preferently between 200° - 300° C in order to modify its hysteresis armonics in a sinusoidal magnetic field, with the possibility to create multiple marks or different codes, in conjuntion with variation in the material composition and the particle dimensions (thread or pigments) individual obtained.

6. Security paper according to characterized previons claims because the security thread must be prepared, good naked or good covered with a plastic wrapping in a similar method as to produce the isolated electrical cable, to facilitate its breakage fixed spaces during the drying phase of paper leaf avoiding the interior tensions of leafstructure.
7. Security paper according to characterized previous claims because the security thread must be prepared in plait form or in spiral rolling with one or different bands of plastic material or sinthetic, to facilitate its stretching during the drying phase of the paper leaf.
8. Procedure, according to the characterized previous claims because the thread introduced in the paper leaf during the same formation, of the traditional method as to introduce the security threads.
9. Procedure, according to the characterized previous claims through the pigments incorporation lacs or inks obtained in the paper surface during the document printing process.
10. Security paper, according to the characterized previous claims, because the thread is recognized with help of a sensor formed in essence with two coils: one magnetic field broadcasting and another analyzer incorporated in every case the necessary circuits for the recognition of signals for the case of sensor small volume for particular use and commercial as in the case of sensors to employ with the broadcasting banks and official organism.



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 0019

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	EP-A-0 030 507 (ARJOMARI-PRIOUX) * the whole document * - - -	1-9	D 21 H 21/48 C 21 D 6/04
Y	FR-A-2 398 809 (ALLIED CHEMICAL CORPORATION) * the whole document * - - -	1-10	
Y	US-A-4 114 032 (J.BROSOW ET AL) * the whole document * - - -	1-3,5-8, 10	
A	GB-A-1 488 660 (EMI LTD) * the whole document * - - - - -	1-10	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D 21 H C 21 D C 22 C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 19 September 91	Examiner SONGY O.M-L.A.
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