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(72) Inventor: **Vyslouzil, Harald**  
**3110 Rotselaar (BE)**

(74) Representative: **Jilderda, Anne Ayolt et al**  
**Octrooibureau LIOC B.V.,**  
**Postbus 13363**  
**3507 LJ Utrecht (NL)**

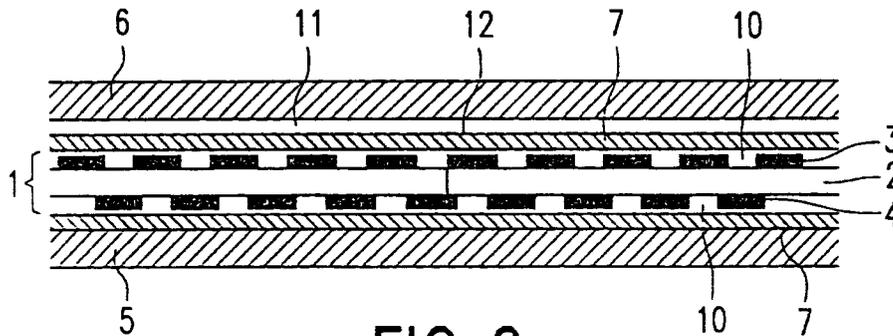
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(71) Applicant: **IQ. SEC N.V./S.A.**  
**1050 Brussels (BE)**

(54) **Perimeter securing means**

(57) Security means (1) intended for coupling to at least a part of a shell of a substantially closed space comprise a carrier (2) on which a pattern of electrically conducting members (3) is arranged. The means are connected to registration means for registering a resist-

ance change in the conducting members. The pattern of electrically conducting members (3,4) is herein arranged on either side of the carrier and at least the aperture between the pattern of electrically conducting members (3,4) is provided with insulating material (10).



**FIG. 2**

## Description

The present invention relates to security means intended for coupling to at least a part of a shell of a substantially closed space, comprising a carrier on which a pattern of electrically conducting members is arranged, wherein the means are connected to registration means for registering a resistance change in the conducting members.

Such means are known and are particularly used to secure spaces which have to be secured for whatever reason. Here can be envisaged relatively small spaces such as - small - safes, electronics housings, security cases and value containers, but also larger spaces such as for instance archive areas. By coupling at least a part of the shell of such closable spaces - and preferably that part of the shell through which an unauthorized person can most easily gain access to the space - to the security means according to the preamble a detection of attempted forced entry by unauthorized persons into the space can take place.

The operating principle of the above stated security means is based on a measurement of a resistance change of the conducting members. The carrier with the electrically conducting members which is coupled to the shell of the space for securing, preferably along the surface thereof through which an unauthorized person could possibly gain access to the secured space by means of forced entry, has a determined resistance. When the pattern of electrically conducting members is for instance damaged or distorted, a resistance change occurs which is registered by means of the registration means. These latter can for instance be coupled to an alarm system so that an alarm is immediately set into operation.

The security means discussed in the foregoing have a number of drawbacks however. Firstly, it is found that the pattern of electrically conducting members along the openings left clear by the pattern can usually be penetrated in relatively simple manner with assist means suitable for the purpose in order to deactivate the electronic system, introduce substances having an adverse effect on or disabling the operation of the security means or even to remove the - valuable - goods situated in the secured space.

The security means are moreover found not to possess the desired sensitivity and to respond over-sensitively in some cases and under-sensitively in other cases.

The present invention has for its object to provide security means as according to the preamble which do not have the above stated drawbacks. The invention provides for this purpose security means as according to the preamble which are characterized in that the pattern of electrically conducting members is arranged on either side of the carrier and that at least the aperture between the pattern of electrically conducting members is provided with insulating material.

By providing the carrier on either side with a pattern of electrically conducting members the danger of unnoticed penetration thereof is markedly reduced. The insulating material situated between the conducting members protects the members against mechanical damage during further operations such as coupling of the security means to the shell of a space for securing. In addition, the presence of the insulating material prevents the security means responding over-sensitively to for instance a treatment of the space for securing in which the security means are applied which is somewhat rough but not consistent with an attempted forced entry.

In a particular embodiment of the present invention the pattern of electrically conducting members is formed in tracks and the electrically conducting tracks cover a larger surface area than the intermediate insulating material.

The danger of unnoticed penetration of the pattern is hereby reduced still further.

In order to reduce if possible the danger of unnoticed penetration of the pattern still further, the pattern of electrically conducting members on the one side of the carrier is preferably shifted by at least one width relative to the pattern of electrically conducting members on the other side of the carrier.

The patterns of electrically conducting members are thus "overlapping" on either side of the carrier; where insulating material is situated on the one side of the carrier, a part of the pattern of electrically conducting members is situated on the other side, and vice versa.

In a following preferred embodiment, in order to achieve the above stated effect the pattern of electrically conducting members on the one side of the carrier is displaced relative to the pattern of electrically conducting members on the other side of the carrier.

The electrically conducting members advantageously comprise a conducting ink comprising a mixture of carbon and metal powder.

The composition of such a carbon-metal powder mixture is determined as a function of the desired resistance value of the conducting members. In an advantageous composition an ultraviolet-sensitive resin is also added to the ink. The mixture of carbon and metal powder in combination with the patterns of mutually overlapping conducting members on either side of the carrier make the pattern of conducting members invisible to X-ray examination. It is thus precluded that the orientation of the pattern can be determined using advanced means and manipulations made possible. It will be apparent that this provides an exceptional advantage.

In order to enhance the above stated effect still further, as well as to render impossible visualization of the device using a microscope, in an advantageous embodiment the security means are coated on at least one side with a light-absorbing layer.

The present invention also relates to a device for securing value goods, in particular value documents, comprising a closable space which is enclosed by a

shell, wherein the goods for securing can be received in the space and wherein the shell is at least partially provided with security means according to the present invention.

By providing the shell of the device, and preferably that part through which an unauthorized person can most easily gain access to the space, with or coupling it to the security means according to the present invention an attempted forced entry into the secured space can be detected by registration of a resistance change.

If the secured goods must not fall into the hands of unauthorized persons, but may optionally be replaced by authorized persons, which may for instance be the case for value documents, it can be advantageous to at least partially destroy the goods when an attempt at forced entry is made by an unauthorized person. To this end the registration device in the device according to the present invention is advantageously coupled to destruction means such that, when a determined limit resistance value is reached or exceeded, activation of the destruction means and at least partial destruction of the secured goods takes place.

The device according to the present invention is preferably applied for transport of value documents, such as money, and in a preferred embodiment comprises a case.

The shell of the case preferably takes a double-walled form, while the security means are situated between the walls. In this embodiment the security means are invisible from the outside of the case.

The present invention will be further elucidated hereinbelow with reference to the annexed drawing, in which:

- figure 1 shows schematically a section of - a part of - security means according to the prior art;
- figure 2 shows schematically a section of - a part of - security means according to the present invention; and
- figure 2 shows schematically a section of a device for securing value goods.

The figures are purely schematic and not drawn to scale. For the sake of clarity some dimensions in particular are shown in greatly exaggerated manner. Corresponding components are designated as far as possible in the figures with the same reference numeral.

Figure 1 shows schematically a section of - a part of - security means 1 according to the prior art. Such security means are intended for coupling to a shell, at least a part thereof, of a substantially closed space. When an unauthorized person attempts to break into or otherwise manipulate the substantially closed space provided with a security means, detection of such an attempt can take place using the security means.

Security means 1 comprise a carrier 2 on which a pattern of electrically conducting members 3 is arranged. The carrier normally comprises a flat sheet of

carrier material. In the shown embodiment the security means 1 are placed between two walls 5,6 of the shell of a substantially closed space and coupled thereto using a glue connection 7. Device 1 is moreover connected to registration means - not shown in the figure - for registering a resistance change in conducting members 3.

The operation of security means 1 is based on a measurement of a resistance change in conducting members 3. The carrier 2 with electrically conducting members 3 which is coupled to shell 5,6 of the space for securing, and preferably along the surface thereof through which an unauthorized person could possibly gain access to the secured space by means of forced entry, has a determined resistance. When during an attempted forced entry the shell of the secured space and therewith the pattern of electrically conducting members is damaged or distorted, a resistance change occurs which is registered by means of the registration means. The registration means can for instance be coupled to an alarm system so that an alarm is immediately set into operation.

As discussed in the foregoing, the security means 1 of the prior art have a number of drawbacks. As shown in figure 1, "openings" 8 left clear by the pattern are situated between the pattern of electrically conducting members 3. It has been found that these openings 8 can be penetrated in a relatively simple manner with assist means suitable for this purpose in order to deactivate the electronic system, introduce substances having an adverse effect on or disabling the operation of the security means or even to remove the - valuable - goods situated in the secured space. The security means are moreover found to respond over-sensitively and to already set off the alarm in the case of a treatment which is somewhat rough but not consistent with an attempted forced entry.

The security means 1 according to the present invention, an embodiment of which is shown in figure 2, does not display these drawbacks. Security means 1 according to the present invention likewise comprise a carrier 2 on which a pattern of electrically conducting members is arranged. In this case, however, the pattern of electrically conducting members 3,4 is arranged on either side of carrier 2. Furthermore, at least the aperture 8 (or: opening 8) between the pattern of electrically conducting members 3, and in the embodiment shown in figure 2 also a small part of the space directly above and below the pattern of electrically conducting members 3, is provided with insulating material 10. In the shown embodiment the electrically conducting members 3 are formed in a track-like pattern and cover a larger surface area than the intermediate insulating material 10. The pattern of electrically conducting members 3 on one side of carrier 2 is herein shifted by one width in relation to the pattern of conducting members 3 on the other side of carrier 2. This substantially precludes an unauthorized person being able to penetrate the substantially closed space through the aperture (or openings) be-

tween the pattern using assist means suitable for this purpose. The presence of the insulating material 10 moreover prevents the security means responding oversensitively to for instance a treatment of the space for securing in which security means 1 are applied which is somewhat rough but not consistent with an attempted forced entry.

In figure 2 the security means 1 according to the present invention are connected using glue connections 7 to the walls 5,6 of the shell of the substantially closed space. A connection of the security means 1 to the shell in other manner, for instance by means of clamping, is of course also possible. The shell can take an inflexible form, although a flexible embodiment is likewise possible. On the side of outer wall 6 the security means are further provided with a light-absorbing layer 12, so that the chance that the security means can be discerned from outside is if possible decreased still further.

The carrier 2 of the security means according to the present invention must be sufficiently strong so that it neither tears nor is otherwise damaged during a movement of the shell of the substantially closed space. The carrier must herein display some degree of elasticity in longitudinal and transverse direction so that it ensures the required tolerance when the electrically conducting members 3 are arranged, and does not cause too great a resistance change as a consequence of manipulation of the shell. Since the security means can be applied in both a flexible and inflexible shell, the carrier must be flexible for bending and folding movements. It is also recommended that the carrier is not hygroscopic and not very temperature-sensitive. Finally, the carrier must adhere well to the pattern of electrically conducting members 3.

The material of carrier 2 preferably comprises polyester. Polyester sheets serving as carrier material advantageously have a thickness of a maximum of 75  $\mu\text{m}$ .

The electrically conducting members 3 are preferably formed by printing inks composed of conducting materials which are not visible, or hardly so, using X-rays, such as a mixture of carbon and metal powders. Using such a mixture an acceptable total resistance value of the electrically conducting members 3 can be obtained. The printing inks for the conductive tracks must have a good adhesion to both carrier 2 and glue layers 7. This adhesion must be such that when the security means are pulled loose of the adhesion surfaces the pattern of electrically conducting members is separated or at least interrupted.

The glue layers must display a good adhesion to the applied printing inks and to the walls of the shell.

Security means 1 are connected to registration means - not shown in the figure - for registering a resistance change of conducting members 3. The registration means are preferably programmed such that an alarm system will be set into operation only when a determined limit value is exceeded. Such an alarm system can generate for instance an audibly or visually discernible

signal. Another possibility is that the registration means are coupled to destruction means, wherein an activation of the destruction means takes place when a determined limit resistance value is exceeded.

Use can for instance be made of the this latter option if the security means according to the present invention is applied in a device for securing value goods in the form of a container or case for transporting value documents such as money. A section of such a case 14 is shown schematically in figure 3, wherein closable access from outside to the inside of the case is situated on the side and is not shown. The shell of case 14 encloses a space 15 in which value goods such as for instance value documents and money can be received. The shell of case 14 is double-walled and comprises an inner wall 5 and an outer wall 6. Situated between the two walls 5,6 are the security means 1 according to the present invention which are coupled to the respective walls 5,6. This coupling can be effected using a glue connection; other coupling methods obvious to the skilled person can however likewise be applied for this purpose.

Case 14 is preferably enclosed on all sides by the security means 1, also designated an electrode for shell security. When in such an embodiment the shell of the case is provided along the whole surface thereof with shell security means 1, this is also termed perimeter security of the case. Security means 1 can be arranged integrally or as one or more separate sheets along the periphery of the space 15 for securing. Although security means 1 are placed in the shown embodiment between the two walls 5,6 of the shell, subject to the objective and the desired security, the security means can likewise be arranged on the inside of inner wall 5 or on the outside of outer wall 6.

If an unauthorized person attempts to gain access to the space 15, he will come into contact with the security means and herein bring about a resistance change, whereby the destruction means are activated and the goods situated in the space will be at least partially destroyed.

Although the present invention is described with reference to the above discussed embodiments, the invention is in no way limited thereto. The application of the security means according to the present invention is not limited to the detection and registration of attempted forced entry or guarding against theft of secured goods, and other applications are likewise possible. The security means can thus be used as liquid detector or distortion detector. Other applications obvious to the skilled person are likewise included herein.

## Claims

1. Security means (1) intended for coupling to at least a part of a shell of a substantially closed space, comprising a carrier (2) on which a pattern of elec-

trically conducting members (3) is arranged, where-  
 in the device is connected to registration means for  
 registering a resistance change in the conducting  
 members, characterized in that the pattern of elec-  
 trically conducting members (3,4) is arranged on ei-  
 ther side of the carrier and that at least the space  
 between the pattern of electrically conducting mem-  
 bers (3,4) is provided with insulating material (10).

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2. Security means (1) as claimed in claim 1, charac-  
 terized in that the pattern of electrically conducting  
 members (3,4) is formed in tracks and the electri-  
 cally conducting tracks (3,4) cover a larger surface  
 area than the intermediate insulating material (10).

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3. Security means as claimed in claim 1 or 2, charac-  
 terized in that the pattern of electrically conducting  
 members (3) on the one side of the carrier (2) is  
 shifted by at least one width relative to the pattern  
 of electrically conducting members (4) on the other  
 side of the carrier (2).

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4. Security means as claimed in one or more of the  
 foregoing claims, characterized in that the pattern  
 of electrically conducting members (3) on the one  
 side of the carrier (2) is displaced relative to the pat-  
 tern of electrically conducting members (4) on the  
 other side of the carrier (2).

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5. Security means as claimed in one or more of the  
 foregoing claims, characterized in that the electri-  
 cally conducting members (3,4) comprise a con-  
 ducting ink comprising a mixture of carbon and met-  
 al powder.

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6. Security means as claimed in one or more of the  
 foregoing claims, characterized in that the device is  
 coated on at least one side with a light-absorbing  
 layer (11).

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7. Device for securing value goods, in particular value  
 documents, comprising a closable space (15) which  
 is enclosed by a shell (5,6), wherein the goods for  
 securing can be received in the space (15) and  
 wherein the shell (5,6), at least apart thereof, is pro-  
 vided with security means (1) as claimed in one or  
 more of the claims 1-6.

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8. Device as claimed in claim 7, characterized in that  
 the registration means of the security means (1) are  
 coupled to destruction means such that, when a de-  
 termined resistance value is reached, activation of  
 the destruction means and at least partial destruc-  
 tion of the secured goods takes place.

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9. Device as claimed in claim 7 or 8, characterized in  
 that the device comprises a case (14).

10. Device as claimed in claim 9, characterized in that  
 the shell (5,6) of the case (14) takes a double-walled  
 form, wherein the security means (1) are situated  
 between the walls.

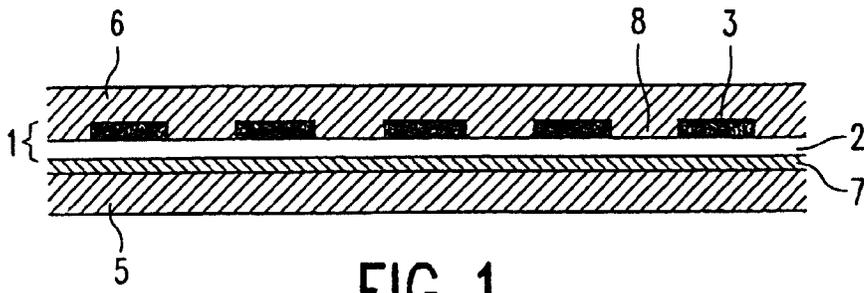


FIG. 1

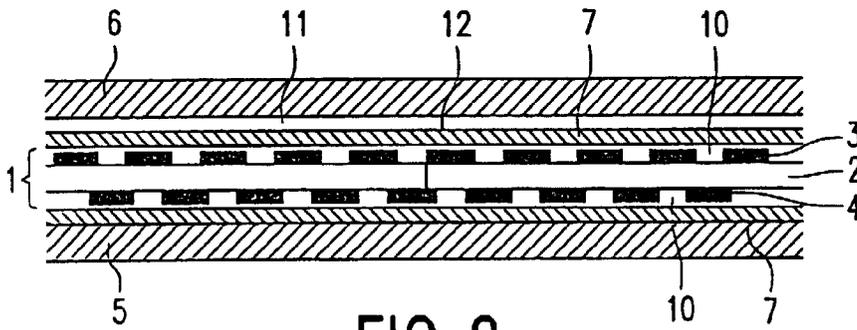


FIG. 2

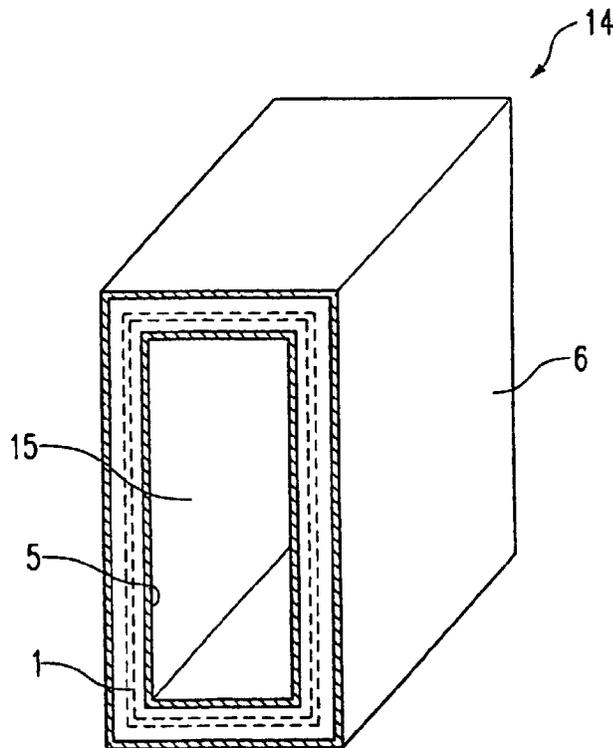


FIG. 3



European Patent  
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EUROPEAN SEARCH REPORT

Application Number  
EP 98 20 0874

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.6)
A	GB 2 297 540 A (W. L. GORE & ASSOCIATES) 7 August 1996 * page 8, line 15 - page 12, line 7; figures 1,4 *	1-10	G08B13/12
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A	GB 2 270 785 A (W. L. GORE & ASSOCIATES) 23 March 1994 * page 15, line 2 - page 16, line 22 * * page 23, line 5 - page 24, line 21; figure 5 *	1-10	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G08B
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	26 June 1998	Sgura, S	
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