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(71)(72) Applicant and Inventor: JØRGENSEN, Poul, Richter [DK/DK]; Saugskærvej 16, DK-5700 Svendborg (DK).

(74) Agent: BUDDE, SCHOU & CO. A/S; H.C. Andersens Boulevard 4, DK-1553 Køvenhavn V (DK).

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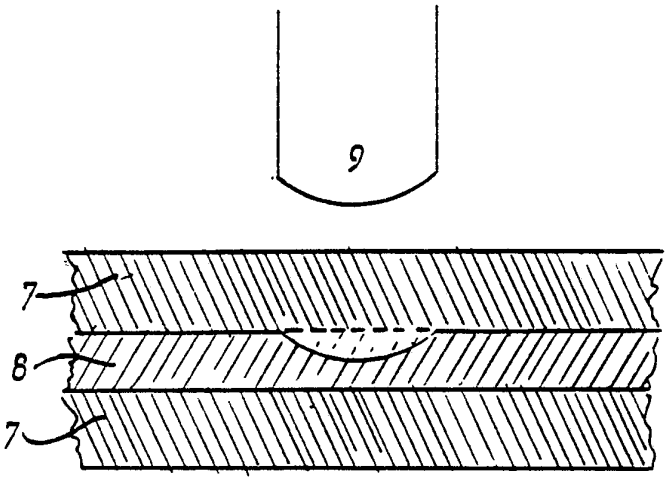
Published
With international search report.

(54) Title: METHOD OF PRODUCING TAGS COMPRISING RESONANT CIRCUITS WHICH CAN BE ACTIVATED AND DEACTIVATED



(57) Abstract

In order to assure a safe activation and deactivation of resonant circuits on tags used for being placed on or in articles by means of small electromagnetic or electric fields easy to handle, regions are created in the conductive elements forming part of the resonant circuit, especially in the capacitor parts where the insulating material between two conductive elements in a precise manner is made thinner than the material outside these regions. The thinning out of the insulating material is carried out whether by heating and slight pressure or by inserting small pieces of conductive material or non-conductive material with well defined dimensions in the insulating material under the production of the resonant circuit.

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+ **Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.**

Method of producing tags comprising resonant circuits which can be activated and deactivated.

The invention relates to a method of producing tags which can be activated and deactivated according to the preamble of claim 1.

A known and very spread method of securing articles against theft - especially in self-service stores - is to employ electronic security systems elaborated, for example, with a transmitter for emitting electromagnetic waves and a corresponding receiver. The articles are marked with special tags on which are placed one or more resonant circuit/s built up of a connection between a coil and a capacitor, however, several coils and capacitors may be used in the single circuits. Usually, these elements are made of aluminium on a bearing layer consisting of plastic or similar material having insulating properties, and the conductive layer may be placed whether on the one side only or on both sides of the bearing layer, as the bearing layer is acting as a dielectric medium within the used capacitor/s. The circuit is supposed to have a high quality factor (Q-value).

The transmitter is emitting signals having frequencies which systematically are varied within a specified range where the resonant frequency of the resonant circuit is lying, and due to the high Q-value of the circuit, the receiver will be able to detect the resonant circuit when the natural frequency of said resonant circuit is emitted.

When the articles provided with tags having resonant circuits are passing by the cashes at the exit of the premises where the accounts are to be settled, the removal or destruction of the tags has to take place. If this has not happened, the receiver is detecting the attempt to pass the controlled area and actuating an alarm.

In order to modify the resonant circuit, it is possible whether to bring about specific areas with reduction of the conductive cross-sectional area, said areas can be overbaked more easily by applying a field generating a current in the circuit than it is the case with other areas in the circuit, or there can be provided regions with an especially small distance between, e.g. the capacitor plates so that the field strength necessary to provoke a breakdown and thus a modification of the circuit assumes a limited size.

By applying a tag, said tag is exposed to an electromagnetic field in order to detect whether the resonant circuit of the tag has a specified natural frequency and obviously, said field may not cause modifications of the resonant circuit. On the other hand must a field which is applied in order to modify the circuit be able to accomplish that task perfectly at a determined field strength, thus it has to be required that the disctance between the capacitor plates in the area to be destroyed is well defined by a uniform size. It has appeared to be appropriate to apply a thickness upon the dielectric medium located between the capacitor plates in the area to be destroyed of about 3 μm. Minor thicknesses may reduce the Q-value of the circuit.

Instead of reduced thicknesses of the dielectric medium in the capacitor in single areas, the whole plate area of the capacitor could be covered by a dielectric medium of about 3 μm. However, the manufacture of such a dielectric medium is difficult to control with a sufficiently high accuracy.

From US Patent Specification No. 4.021.705 is known a method for destroying the coil in the resonant circuit of the tag, as the conductive path in the coil is kept very thin in a chosen area so that by application of a strong field, the path is broken in the region concerned.

This way of modifying the resonant circuit practically requires such a strong field that said field, without exten-

sive shielding, may affect the surroundings in a disadvantageous manner and in practice, the method is not applied.

US Patent Specification No. 4.498.076 discloses a method of producing a resonant circuit suitable for modification, in as much as a small distance between two capacitor plates within the resonant circuit is created by pressing the conductive layer - normally aluminium but other conductive materials may be used as capacitor plates as well- into the intermediate dielectric medium by means of a piston so that in a small region, the thickness of the dielectric medium becomes smaller than outside this region and thus it is possible to generate a breakdown in the capacitor at a lower voltage than it is the case outside such a region.

This method presents a number of disadvantages, as the compression of the dielectric medium to the size also preferred here, i.e. 3 μm within a limited region requires a very precise angle of 90° between the piston and the plane of the capacitor and a precisely controlled pressure to obtain usable reproducible results.

It appears that the compression is performed on a hard rubber base which contributes to another inaccuracy during the production.

A more detailed examination of the circuits produced according to the last-mentioned method has shown that a big number of said circuits has already been destroyed during the production phase, thus no well defined thickness of the dielectric medium is procured by means of that method which results in that:

- there are big variations in the size of the quality factor,
- the energy necessary for the deactivation is not well defined,
- the conductive layer is pressed down in such a manner that the thickness of the conductive layer is reduced, which may - as will be explained later on - result in the fact that the capacitor, in

spite of sparking breakdown may continue to act as a capacitor (self-healing capacitor), and the destruction is uncertain,

- the area pressed down has to be strongly limited in size as the risk for destroying the circuit during compression increases with the size of the piston,
- the base on which the compression is performed is changing nature in the course of time,
- variations in temperature in the production premises may cause problems when using the tool applied.

As thus, no well defined product can be obtained by this method, there is an evident need for another method of reducing the thickness of the insulating layer, whether between two capacitor plates or between other voltage carrying elements in disclosed resonant circuits.

The present invention provides a method where by means of heat impact on the insulated materials placed on the tags, regions are established where the thickness of the insulants by a slight pressure is reduced to a predetermined thickness with high precision so that a breakdown can be produced by applying electromagnetic or electric fields with low field strength.

The method comprises the heating of one or more smaller regions on a capacitor forming part of the resonant circuit. Thus, the dielectric medium is softened or possibly melted, and by applying a slight pressure on the heated region, there is with high precision brought about a region having the predetermined thickness of the dielectric medium layer.

The invention provides a method which is cheap, technically simple and easy to control, as the method comprises several parameters, such as temperature, size of the impact region, time of the impact, size of the pressure applied, shape of the impact region, which can be combined in accordance with the conditions of production.

The invention offers a complete liberty of choosing the way of heating as a heating element, laser, ultrasound, microwave or another appropriate process may be used, and finally, it has to be emphasized that the necessary pressure on the dielectric material is substantially lower than the pressures used in known prior art.

The production result obtained is well defined with a minor failure rate, and the thickness of the dielectric layer in the treated regions is procured with a bigger accuracy and uniformity than in the known prior art.

Thus, it is also obtained that the field strength necessary for modifying the resonant circuit can be determined rather precisely.

In connection with the resonant circuits treated according to the invention, the necessary field strength is very low, so that a breakdown, for instance, can be produced in the predetermined region with fields which are smaller than the field of the piezoelectric crystal in a gas igniter.

An alternative method of providing a region in the dielectric medium where the dielectric medium has the desired thickness, provides a dielectric medium with a hole throughout it. In this hole, a dielectric medium having the desired thickness is placed in such a way that in this area, only one thickness of the dielectric medium is present which corresponds to the size of the desired fields applied, so that a breakdown occurs for sure.

Instead of the dielectric medium, there can be placed a piece of a conductive material having a suitable thickness and being in conductive electrical connection with the one capacitor plate.

The capacitor is finished by compressive stress.

In connection with the above-mentioned method, the hollowing of the dielectric medium could be avoided by placing on the one capacitor plate as above a piece of conductive material of suitable dimensions in electrical connection with this capacitor plate, whereupon the dielectric layer

under pressure is applied to the capacitor plate and the other capacitor plate whether is applied at the same time with it or during another operational step.

Also these alternative methods are characterized by the high precision in providing regions which are suitable for breakdown.

The invention will be explained in details in the following in conjunction with the accompanying drawing, in which:

Fig. 1 is a plane representation of a resonant circuit forming part of a tag,

Figs. 2 and 2A show a section across a part of a capacitor in the circuit of Fig. 1,

Fig. 3 shows a section across a number of conductors being part of the winding of the coil in the circuit of Fig. 1,

Fig. 4 is a section across the capacitor where the dielectric layer between the capacitor plates has a thickness of a proportional size compared with the thickness of the capacitor plates,

Fig. 5 is a section across a capacitor where the dielectric layer between the capacitor plates has a relatively small thickness compared with the thickness of the capacitor plates,

Fig. 6 shows a section across a capacitor with a hole in the dielectric medium in which is placed a precisely dimensioned piece of dielectric medium,

Fig. 7 shows a section across a capacitor with a hole in the dielectric medium in which is placed a precisely dimensioned piece of conductive material, and

Fig. 8 shows a section across a capacitor being assembled and where a piece of conductive material is pressed into the dielectric medium.

The conductive material in the resonant circuit 1 shown in Fig. 1 will preferably be aluminium but other conductive materials may be used as well. The conductive layer

may be produced by acid etching and placed whether on the one side only of a bearing plastic material 2, or on both sides of said plastic material. In the latter, the bearing material can immediately act as a dielectric medium in the capacitor 3.

When the conductive layer is placed only on the one side of the bearing layer 2, a dielectric medium has to be placed on the capacitor plate located on the bearing layer, whereupon a conductive layer is applied to the dielectric medium. The one end 5 of the coil 4 is directly connected with the one plate in the capacitor 3, while the other end 6 for example is closed by a plate which is connected with the other plate in the capacitor, for instance as shown with the two dotted lines 4a, by means of leading a conductive path across the turns of the coil with an insulating layer between the turns of the coil and the conductive path, or also - in connection with a bearing layer having a conductive layer on both sides - by means of leading a connection through the plastic layer.

The conductive layer may also be produced by means of blank cutting.

Fig. 2 shows a cross-section across a part of a capacitor where the capacitor plates 7 formed in a conductive material are separated by a dielectric medium 8. In predetermined areas, or in only one area, this dielectric medium is subjected to, for instance, a heating element 9, by means of which a suitable insulating material is inflicted a consistency which makes it possible to reduce the thickness of the dielectric medium to the intended size by a slight pressure. The heating may be performed by a heating element but also other means for energy transfer may be used, such as for instance ultrasound, laser or microwaves. The pressure on the dielectric medium may be performed by the heating element or by creating vacuum or excess pressure on the surfaces of the capacitor.

The impact on the dielectric medium may be exerted

after the final assembling of the resonant circuit, as indicated in Fig. 2, or directly on the one side of the dielectric medium before the application of the capacitor plate on that side, see Fig. 2a.

Fig. 3 shows a part of a section across a coil in a resonant circuit on a tag where the single turns in the coil 10 are placed on a dielectric layer 11, and where above a number of turns 10 is located another dielectric layer 12 with the intended small thickness provided by the method explained herein, and on which is placed a conductive layer 13. By means of a suitable field impact, a breakdown will occur and after that, a subsequent short-circuiting of the coil. The plate 13 with the dielectric layer 12 may be placed in any area on the coil, it shall only cover two or more turns 10, or be located above the inlets of the coil.

Figs. 4 and 5 show a section through a capacitor for illustrating how such a capacitor can be "self-healing" after a breakdown.

Fig. 4 shows a capacitor where the dielectric material 15 is substantially thicker than the plates 16. The holes resulting from sparking breakdown are bigger in the capacitor plates 16 than in the dielectric material 15. Thus, the two capacitor plates 16 continue to be insulated from each other, and therefore, the capacitor continues to act like this and thus, an instable short-circuiting is provided.

Fig. 5 shows an embodiment of a capacitor which in a stable manner is destroyed by a deactivation signal. Here, the dielectric layer is much thinner than the capacitor plates 16, and the hole in the metal plates 16 after the breakdown is smaller than the hole in the dielectric layer 15, and therefore, a stable short-circuiting is provided.

Finally, Figs. 6, 7 and 8 show alternative methods of producing an element in the resonant circuit for activation and deactivation on tags, in as much as uniform parts have the same numeral reference. The dielectric medium 18 in Fig. 6 having a thickness of e.g. 10 μm is provided with

a hole 19 wherein is placed a small piece of a dielectric medium 20 with the intended thickness, e.g. 3 μm. The dielectric constant for the air is so little that the air in that part of the hole 19 which is not filled out with the dielectric medium 20 has no importance in comparison with the corresponding size of the dielectric material.

Instead of the dielectric medium, a strip of conductive material 21 in electric connection with the capacitor plate 17 could be inserted, as shown in Fig. 7, in order to obtain the intended precise distance between the capacitor plates 17.

Finally, Fig. 8 shows a method where a strip of conductive material 21 being in conductive connection with the plate 17 by pressure is pressed into the dielectric material 18 in such a manner that again, the intended precise distance between the capacitor plates 17 is obtained.

Under certain circumstances, it could be desirable to be able to activate the disclosed resonant circuits after the placing of the tags on or in the articles which shall be secured. This may be done in the same way as it is done for the deactivation of the resonant circuit, as the resonant circuit during the assembling of the tag has a natural frequency which is sheared in relation to the natural frequency after the activation of the circuit. By inflicting a field having a lower power than the destruction field, if the deactivation of the tag shall also be carried out, a connection between two ends can be established by a disconnected flow path, so that the missing connection is established.

Hereafter, the resonant circuit may again be cut off with a stronger field, as explained before. By activating the resonant circuit, a modification of the natural frequency of the circuit occurs. Even if the circuit is not activated, a resonant circuit will be created by scattered capacity. Therefore, the deactivation of the tag may be performed with two frequencies in order to detect the state of the tag.

PATENT CLAIMS.

1. Method of producing tags comprising resonant circuits with at least one coil and at least one capacitor, said resonant circuits being able to be activated and deactivated, and where the tags are especially adapted to be placed on or in the articles for which the accounts have to be settled when they are leaving sales premises, the control of which is performed by a system including a transmitter for electromagnetic waves and an appropriate receiver, where the transmitter is emitting signals with several frequencies, said frequencies are passing the natural frequency of the resonant circuit and where the receiver is recording the presence of such a resonant circuit, and where the dielectric material located between the capacitor plates in one or more areas has a thickness which is lower than the thickness of the conductive material, **characterized in** that by heat impact on the dielectric materials (2, 8, 15) placed on the tag are provided regions where the thickness of the heated dielectric material (8) by means of a slight pressure may be reduced so much that a breakdown will be produced by the application of electromagnetic or electric fields with low field strength.

2. Method according to claim 1, **characterized in** that the regions for activating the resonant circuit (1) are provided in such a manner that by breakdown is created a connection by means of which the coil (4) is connected with the capacitor (3) in such a manner to create a resonant circuit (1) having a natural frequency which differs from the natural frequency said resonant circuit had before activation.

3. Method according to claim 1, **characterized in** that for deactivation of the resonant circuit (1), regions between the capacitor plates (7,16) in the resonant circuit (1) are created with a thickness of the insulating layer (8, 15) between the plates which is minor than outside these regions, as the resonant circuit is destroyed by short-cir-

cuiting after breakdown of the capacitor plates (7,36).

4. Method according to claim 1, **characterized in** that for deactivation of the resonant circuit, a plate (13) of conductive material is provided opposite to an insulating layer (12) with a thickness which is minor than the other insulating layers (11) across a number of conductors (10) in the coil so that a number of the turns of the coil is short-circuited by breakdown across the layer 12.

5. Method according to claim 1, **characterized in** that a deactivation region in the resonant circuit (1) is created by letting pass the lead-in wires to the coil (4) closely to each other.

6. Method of producing tags comprising resonant circuits with at least one coil and at least one capacitor, said resonant circuits being able to be activated and deactivated , and where the tags are especially adapted to be placed on or in the articles for which the accounts have to be settled when they are removed form sales premises, the control of which is performed by a system including a transmitter for electromagnetic waves and an appropriate receiver, where the transmitter is emitting signals with several frequencies, said frequencies are passing the natural frequency of the resonant circuit and where the receiver is recording the presence of such a resonant circuit, and where the dielectric material located between the capacitor plates in one or more areas has a thickness which is lower thant the thickness of the conductive material, **characterized in** that one or more holes (19) are provided in the dielectric medium (18), where is placed a small piece of dielectric medium (20) having an uniform thickness suitable for activation and deactivation, after which the capacitor plates (17) are placed on the dielectric medium (18).

7. Method according to claim 6, **characterized in** that one or more holes (19) are provided in the dielectric medium (18) where a small piece of conductive material (21) having a thickness suitable for activation and deacti-

vation in electrically conductive connection with the one capacitor plate (17), after which the capacitor plates (17) and the dielectric medium (18) are assembled.

8. Method according to claim 7, **characterized in** that one or more pieces of conductive material (21) having a thickness which is suitable for activation and deactivation are placed in an electrically conductive connection with the capacitor plate (17), after which, with a slight pressure, they are pressed into the dielectric material (18) in connection with the assembling of the capacitor plates (17) and the insulating material (18).

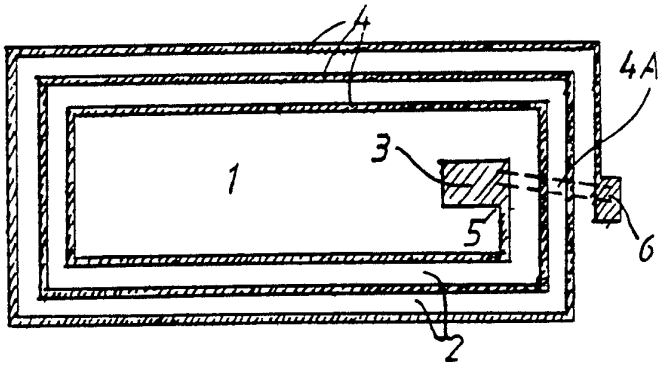

FIG 1

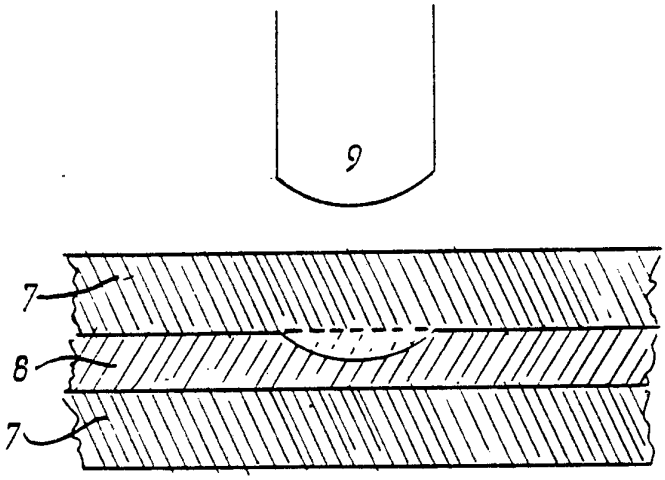

FIG 2

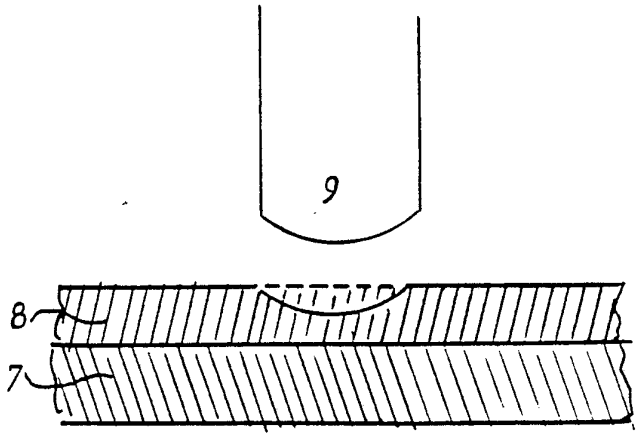

FIG 2A

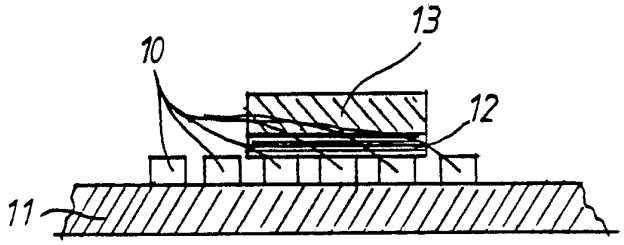

FIG 3

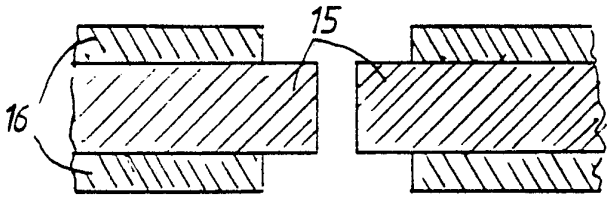

FIG 4

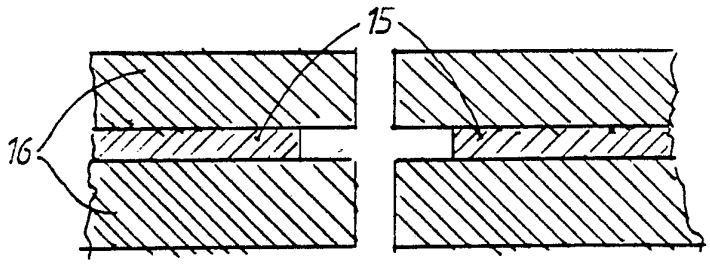

FIG 5

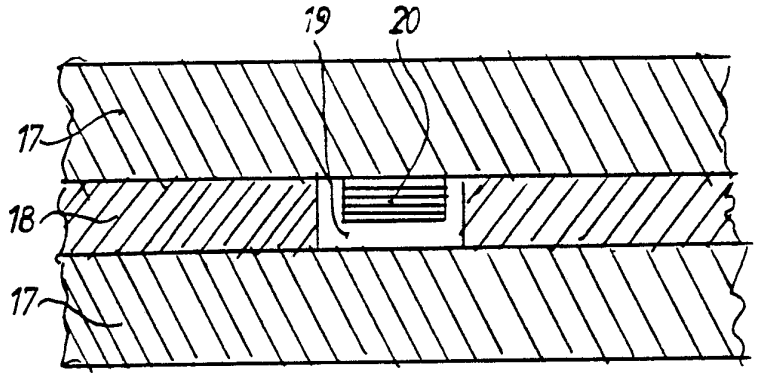

FIG 6

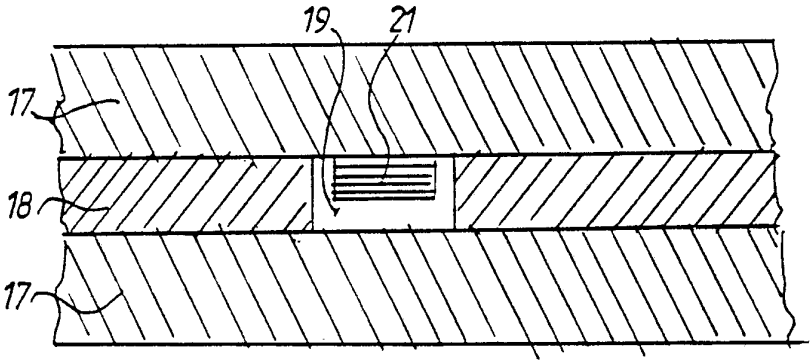

FIG 7

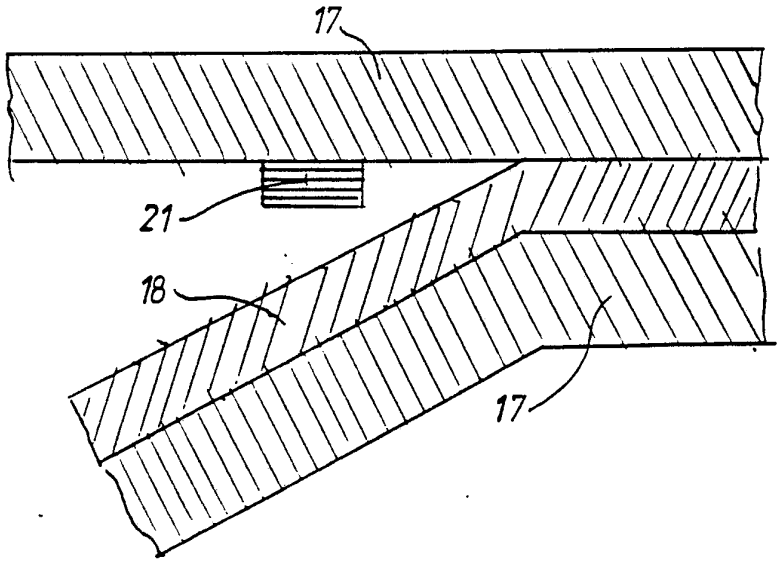

FIG 8

INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 91/00346

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: G 08 B 13/24

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
IPC5	G 08 B, H 01 Q

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched[8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US, A, 4689636 (WILLIAM C TAIT ET AL) 25 August 1987, see column 1, line 41 - column 2, line 29; column 2, line 64 - column 3, line 29; column 4, line 23 - line 66; figures 1-3	1,3-5
Y		2
A		6
	--	
X	EP, A2, 0340670 (TOKAI METALS CO, LTD.) 8 November 1989, see column 2, line 41 - column 3, line 13; column 9, line 43 - column 10, line 1	1,3
Y		2
A		4-6
	--	

* Special categories of cited documents:[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
17th February 1992	1992 -02- 20
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	MAGNUS STIEBE

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	CH, A5, 672854 (SCANMATIC SECURITY SYSTEMS AG) 29 December 1989, see page 2, column 2, line 42 - line 52; abstract; figures 1-4; claims 1-3 --	2
Y	US, A, 4021705 (GEORGE JAY LICHTBLAU) 3 May 1977, see abstract --	2
P,Y	WO, A1, 9106934 (CHECKPOINT SYSTEMS, INC.) 16 May 1991, see page 11, line 27 - line 35; abstract; figures 1-3 --	2
A	EP, A2, 0316847 (TOKAI METALS CO.) 24 May 1989, see abstract; figure 5 --	1,6
P,A	WO, A1, 9109387 (ACTRON ENTWICKLUNGS AG ET AL) 27 June 1991, see page 7, line 3 - line 32; figure 1 --	1,6
A	US, A, 4876555 (PAUL R JORGENSEN) 24 October 1989, see column 2, line 29 - line 47 --	6

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers....., because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

see next page.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the the claims. It is covered by claim numbers:

4. ☒ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additonal fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional seach fees.

FURTHER INFORMATION CONTINUED

Claims 1-5 define one invention relating to a method of producing deactivatable security tags having regions where the thickness of the dielectric material is reduced by heat impact and pressure.

Claims 6-8 define one invention relating to a method of producing deactivatable security tags in which one or more holes are provided in the dielectric medium. In each hole is placed a small piece of dielectric medium having an uniform thickness suitable for activation and deactivation.

The subjects, defined by the problems and their means of solution, are so different from each other that no technical relationship or interaction can be appreciated to be present so as to form a single general inventive concept.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. PCT/DK 91/00346

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 30/12/91
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4689636	87-08-25	NONE	
EP-A2- 0340670	89-11-08	JP-A- 1277791	89-11-08
		US-A- 4985288	91-01-15
		JP-A- 2045897	90-02-15
CH-A5- 672854	89-12-29	NONE	
US-A- 4021705	77-05-03	NONE	
WO-A1- 9106934	91-05-16	AU-D- 6542690	91-05-31
EP-A2- 0316847	89-05-24	JP-A- 1129396	89-05-22
		US-A- 4970495	90-11-13
WO-A1- 9109387	91-06-27	EP-A- 0458923	91-12-04
US-A- 4876555	89-10-24	EP-A- 0285559	88-10-05
		JP-A- 63237195	88-10-03