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(54) **Protective insert, particularly for the packaging of a substantially plate-like object, and method for producing said insert**

(57) Protective insert (13), particularly for the packaging of a substantially plate-like object (30), the insert (13) comprising at least one sheet of corrugated cardboard (20), defined between a first side (14) and a second opposite side (15), the sheet (20) including a peripheral region (22) and an internal region (21) slightly behind the

peripheral region so as to define a recess for housing said object (30), characterized in that the internal region (21) is a portion of the sheet of cardboard (20) surrounded by a cut (24) which extends from said first side (14) in the thickness of said sheet (20) and deformed through compression.

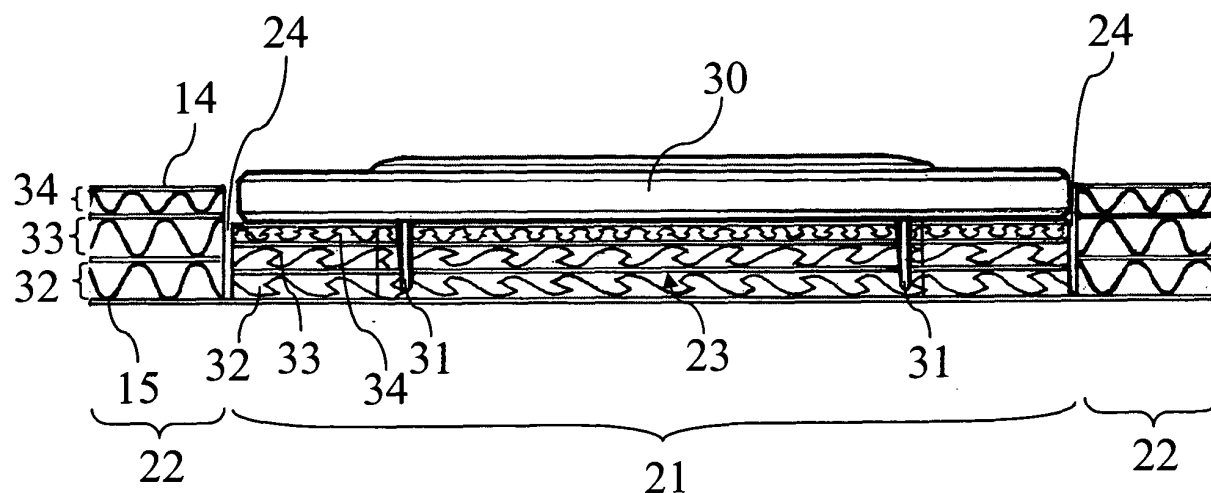


FIG. 3

Description

[0001] The present invention relates to the technical sector of packaging and, in particular, relates to a protective insert for the packaging of a substantially plate-like object and a method for producing said insert.

[0002] As is known, in the packaging sector, packaging containing an external container is often used, usually made of corrugated cardboard, with one or more internal protective inserts such as to immobilize an object housed inside the container and to protect said object by absorbing any possible shocks.

[0003] For example, for the packaging of fragile objects, external containers in corrugated cardboard are used which include one or more protective inserts, shaped if necessary, made of a foam-type material. A particular packaging of this type is described, for example, in the patent US 6981589.

[0004] Other types of packaging of the prior art use cardboard protective inserts, for example, in corrugated cardboard. Packaging of this type is described, for example, in the application for European patent published as EP 0 333 666. Other examples of packaging with protective inserts in corrugated cardboard are described in Japanese patent abstracts published with numbers JP 2000153878 e JP 10211967.

[0005] In the Japanese patent abstract published with number 2004284596, a protective insert is described which includes a central elastic portion made of a film.

[0006] Regarding packaging of the prior art, the need is felt to produce packaging, especially for fragile and flat objects, which offers high protective efficiency and which is simple and cheap to produce.

[0007] The object of the present invention is to provide a protective insert for packaging which can satisfy the above-described need.

[0008] Said object is reached by means of a protective insert for packaging as defined in general in the attached claim 1. Preferred embodiments of the protective insert according to the present invention are defined in the dependent claims.

[0009] A further object of the present invention is to provide a method for producing the protective insert. Said object is reached by means of the method as defined in general in claim 11.

[0010] Further features and advantages of a protective insert according to the present invention will become more apparent from the following detailed description of an exemplary but non-limiting embodiment thereof, as illustrated in the accompanying drawings, in which:

- figure 1 shows a prospective view of a packaging element, including an external container and at least one protective insert according to a preferred embodiment of the present invention;
- figure 2 shows a prospective view from above of the protective insert in figure 1;
- figure 3 schematically shows a lateral cross-section

of the protective insert in figure 2;

- figures 4a-4c schematically show the intermediate results of a method for producing a protective insert according to a preferred embodiment of the invention.

[0011] In the figures, the same or similar elements are indicated with the same reference numbers.

[0012] With reference to the attached figures, and in particular to figure 1, reference number 1 generally indicates a packaging element including an external container 2', 2'' with a substantially box-like shape.

[0013] In the particular embodiment illustrated, the external container 2', 2'', produced for example by means of folding preformed corrugated cardboard, preferably micro-corrugated, includes a base 2' provided with an internal space 3 and a cover 2'' with one side hinged to the base 2'. In the embodiment in figure 1, the cover 2'' includes a folding wing 8 hinged to the cover 2'' from the side opposite the side of the cover 2'' hinged to the base 2'. The cover 2'' further includes a plurality of lateral flaps 4, 5, 6, 7 of which 4 and 5 are intended to be received inside the base 2' and the remaining 6 and 7 are connected to the folding wing 8 and are intended to be received in suitable pockets 9 and 10 made in the base 2' in order to keep the cover 2'' in the closed position compared to the base 2'.

[0014] As illustrated in figure 1, the external container 2', 2'' is preferably provided with a transparent window 11 to allow inspection of the contents of the packaging 1 from the outside even when the cover 2'' is closed on the base 2'. For example, the window 11 is conveniently made by making a hole through the cover 2'' and lining a portion of the cover 2'' on the inside, centered around said opening, with a sheet 12 of transparent film.

[0015] The packaging in figure 1 can be advantageously used to contain and protect a substantially flat object, such as a covering plate of an electrical apparatus.

[0016] The packaging 1 includes at least one protective insert 13 such as to be received inside the external container 2', 2'', to immobilize and protect an object to be kept inside said external container 2', 2''. In the preferred embodiment in figure 1, the packaging 1 includes two opposite and identical protective inserts 13 and, in particular:

- a lower insert 13 shown inside the base 2' and in particular in the space 3;
- an upper insert 13, shown merely for exemplary purposes, near the cover 2'' (and in particular shown leaning against the latter) and intended to be received in the space 3 of the base 2'.

[0017] The two protective inserts 13 are provided with opposite sides 14 intended to abut against each other when both the inserts 13 are received inside the space 3 provided in the base 2'.

[0018] Figure 2 shows a view in perspective of a preferred embodiment of a protective insert 13 according to the present invention.

[0019] The protective insert 13 comprises at least one sheet of corrugated cardboard 20 defined between a first side 14 and a second opposite side 15. The sheet of corrugated cardboard 20 includes a peripheral region 22 and an internal region 21 slightly behind the peripheral region 22 so as to define a recess suitable to house at least in part a substantially plate-like object, such as a covering plate for electrical apparatus.

[0020] Preferably, the peripheral region 22 has a frame plan which surrounds the internal region 21. More preferably, the internal region 21 also has a frame plan which surrounds a through opening 23 defined in the thickness of the cardboard sheet 20. Conveniently, the internal region 21 is a framed region with at least one side L1 which is interrupted and such that, aligning the interruption of the side L1 with the window 11 of the cover 2" of the external container 2', 2" (visible in figure 1), it is possible to inspect the contents of the packaging 1 from the outside.

[0021] Advantageously, the internal region 21 is a portion of the cardboard sheet 20 surrounded by a cut 24, which extends from the side 14 in the thickness of the corrugated cardboard sheet 20, and deformed through compression.

[0022] Preferably, but not limited to, the cardboard sheet 20 is a sheet of multi-layered corrugated cardboard.

[0023] Figure 3 represents a lateral cross-section of the axis X-X of the protective insert 13 in figure 2, where it can be seen how the internal region 21 is slightly behind the peripheral region 22 so as to define, in the cardboard sheet 21, a recess such as to house at least in part a covering plate 30 (not illustrated in figure 3). The opening 23, makes it possible to house projecting parts of the substantially plate-like object, such as the fixing flaps 31 of the covering plate 30.

[0024] In the particularly advantageous embodiment in figure 3, the cut 24 is a partial cut. In other words, the cut 24 extends, through one or more layers of corrugated cardboard 20, for a depth less than the distance between the side 14 and the opposite side 15 of the sheet of corrugated cardboard 20. More preferably, but not limited to, the side 15 is made of a flat panel of paperboard and the peripheral region 22 and the internal region 21 are connected to each other only by means of said paperboard panel. In the particular embodiment illustrated in figure 3, the sheet of corrugated cardboard 20 is a multi-layer sheet including three layers 32, 33, 34, the cut 24 goes through all three layers 32, 33, 34 starting from side 14, but leaving intact the paperboard panel 15.

[0025] As can be seen in figure 3, the internal region 21 is more compressed than the peripheral region 22, since it is subjected to compression which is such as to deform the ridges of the sheet of corrugated cardboard 20 in order to make the internal portion 21 more elastic

than the peripheral region 22. For example, as a result of said compression, the ridges 32, 33, 34 in the internal region 21 are more compressed and deformed than the corresponding ridges 32, 33, 34 in the peripheral region 22.

[0026] It should be noted that, in the particular embodiment illustrated in figure 3, the sheet of corrugated cardboard 20 has three layers of which two 32, 33 with ridges of a greater width (for example equal to approximately 5 mm) and one 34 with ridges of smaller width (for example equal to 2.5 mm). In order to produce a protective insert 13 according to the present invention, also in relation to the maximum thickness of the object intended to be placed inside the packaging, it is however possible to start with a sheet of corrugated cardboard 20 having a different number of layers or differing ridge widths of the various layers. For example, for a thin plate-like object (if related to the maximum width of the ridges of the cardboard sheet 20), it is possible to produce a protective insert 13 starting from a sheet of corrugated cardboard having a single layer, i.e. made of an upper paperboard panel, a lower paperboard panel and a sheet of corrugated cardboard between the lower panel and the upper panel.

[0027] With reference to figures 4a-4c, a preferred embodiment of a method for producing a protective insert 13 according to the present invention, starting from a sheet of corrugated cardboard 20, for example with three layers, will be described hereunder.

[0028] The method preferably includes a first step in which, as illustrated in figure 4a, two through openings 23 are cut in the thickness of the sheet of corrugated cardboard 20.

[0029] The method includes a second step in which, as illustrated in figure 4b, a cut 24 is made in the thickness of the corrugated cardboard such as to identify an internal region 21 and a peripheral region 22. In a particularly advantageous embodiment, said cut is a partial cut. Simultaneously with the cutting operation, carried out with a punch or die-cutting machine, a further operation is carried out to apply a pressure force $\bar{P}$ to the internal region 21 perpendicular to the side 14 of the cardboard sheet 20 and such as to deform the ridges of the cardboard sheet inside the internal region 21. Alternatively, the operation to apply the pressure force, i.e. the operation to compress the internal region 21, can follow the cutting operation 24.

[0030] In a preferred embodiment, as shown in figure 4c, a further step can be provided for:

- making another partial cut 25 in the thickness of the sheet of corrugated cardboard 20 which is such as to divide said sheet 20 into two semi-portions 20a and 20b;
- folding the two semi-portions 20a and 20b (in the example so that the two openings 23 fit together), so obtaining a protective insert with a thickness twice that of the initial sheet of corrugated cardboard 20.

[0031] As can be seen from the above description, it is evident how a protective insert according to the invention makes it possible to satisfy the above-described requirements with reference to packaging of the prior art.

[0032] In particular, it should be observed that, advantageously, the elastic internal portion 21 made by cutting and compressing a sheet of corrugated cardboard, makes it possible to produce economically a protective insert which can immobilize a substantially plate-like object and to absorb or cushion any mechanical shock which might damage said object. Various experimental tests, carried out by competent and qualified laboratories, for example tests on a container 2, 2' falling on various sides, corners or edges, acceleration tests and rotating tests in a drum roller, have proved that a protective insert according to the present invention makes it possible to produce packaging suitable to contain particularly fragile plate-like objects, such as thin sheets of crystal or stone (for example, marble or slate).

[0033] Naturally, in order to satisfy contingent and specific requirements, a person skilled in the art may apply to the above-described protective insert according to the invention many modifications and variations, all of which, however, are included within the scope of protection of the invention as defined by the following claims.

Claims

1. Protective insert (13), particularly for the packaging of a substantially plate-like object (30), the insert (13) comprising at least one sheet of corrugated cardboard (20), defined between a first side (14) and a second side (15), the sheet (20) including a peripheral region (22) and an internal region (21) slightly behind the peripheral region so as to define a recess for housing said object (30),
characterized in that
the internal region (21) is a portion of the sheet of cardboard (20) deformed through compression and surrounded by a cut (24) which extends from said first side (14) in the thickness of said sheet (20).
2. Protective insert (13) according to claim 1, said internal region (21) including ridges which are more compressed and deformed than the corresponding ridges in said peripheral region (22).
3. Protective insert (13) according to any of the previous claims, wherein the cut (24) extends for a depth which is less than the distance between said first (14) and said second opposite (15) side.
4. Protective insert (13) according to claim 3, wherein the second opposite side (15) is made of a flat panel of paperboard and wherein the peripheral region (22) and the internal region (21) are connected to each other only by means of said paperboard panel.
5. Protective insert (13) according to any of the previous claims, wherein the peripheral region (22) is a region with a frame plan.
6. Protective insert (13) according to claim 5, wherein said internal region (21) is a region with a frame plan which extends around a through opening (23) provided in said sheet of corrugated cardboard (20).
7. Protective insert (13) according to claim 6, wherein said internal region (21) is a region with a frame plan having one side (L1) interrupted.
8. Protective insert (13) according to any of the previous claims, wherein said sheet of corrugated cardboard (20) is made up of two portions (20a, 20b) of the same sheet of cardboard (20) separated by a partial cut (25) and folded along said cut (25).
9. Packaging element (1), particularly for plate-like objects (30), including an external container (2', 2'') **characterized in that** it includes at least one protective insert (13) according to any of the previous claims.
10. Packaging element (1) according to claim 9, wherein the at least one protective insert (13) includes a first and a second protective insert opposed to each other.
11. Method for producing a protective insert (13), particularly for plate-like objects (30), starting from a sheet of corrugated cardboard (20) including the operations for:
 - making a cut (24) in the thickness of said sheet of corrugated cardboard (20), the cut delimiting an internal region (21) from an peripheral region (22), the peripheral region surrounding the internal region;
 - deforming through compression the internal region (21) so that said region is slightly behind the peripheral region (22).
12. Production method according to claim 11, wherein the operation for making a cut (24) is such as to leave the internal region (21) and the peripheral region (22) united.
13. Production method according to claims 11 or 12, further including an operation for making at least one through opening (23) in the internal region.

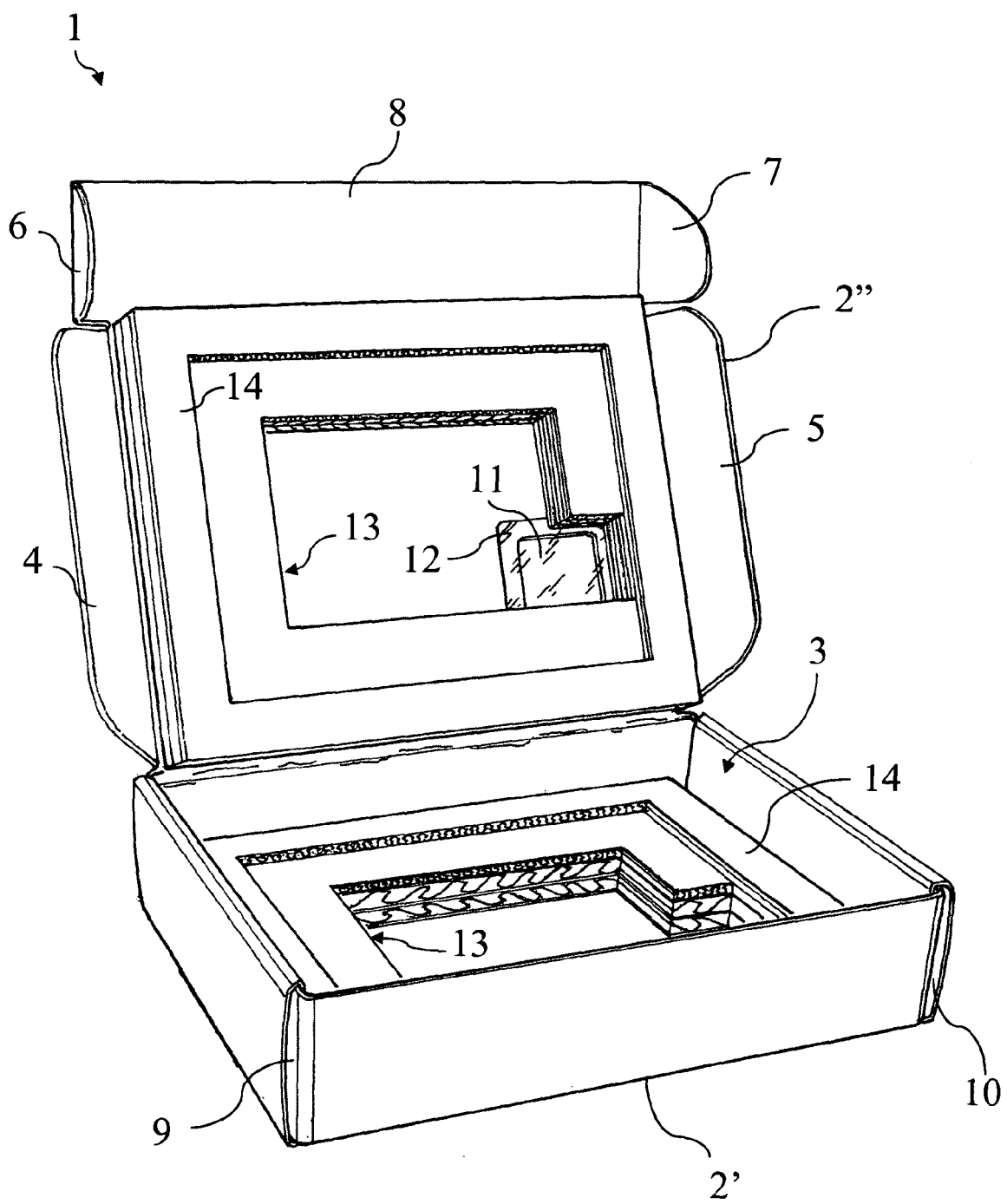


FIG. 1

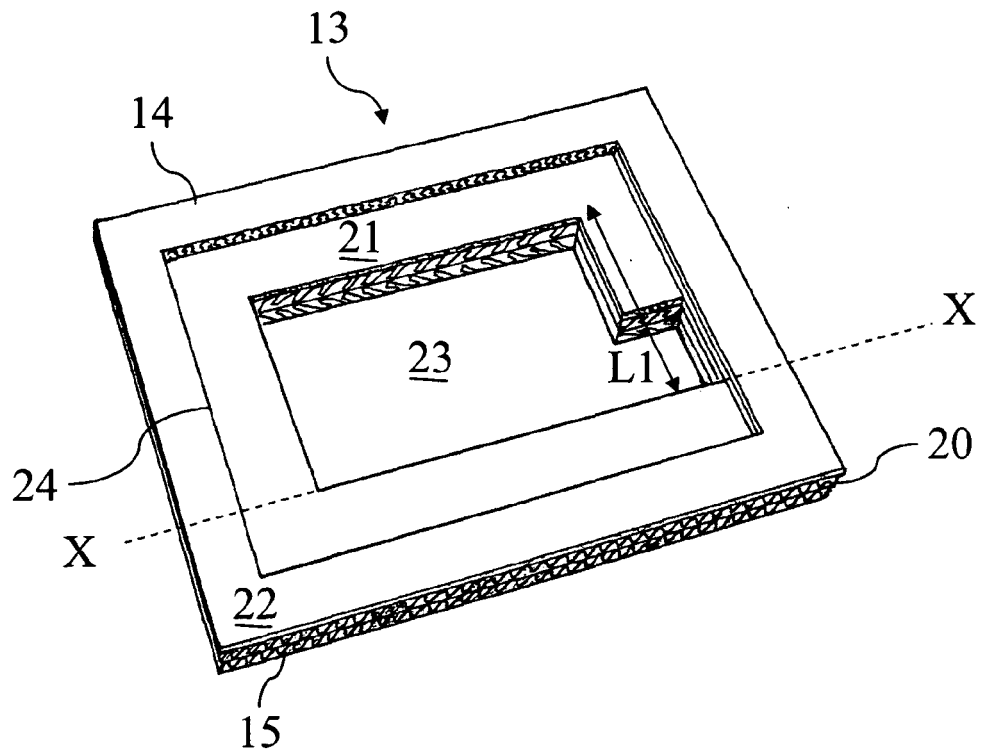


FIG. 2

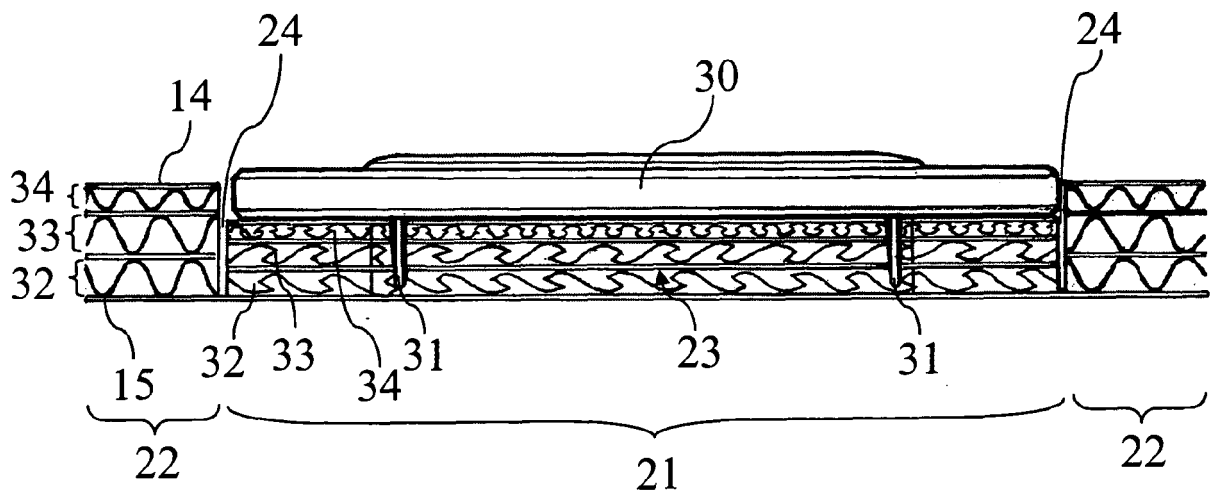


FIG. 3

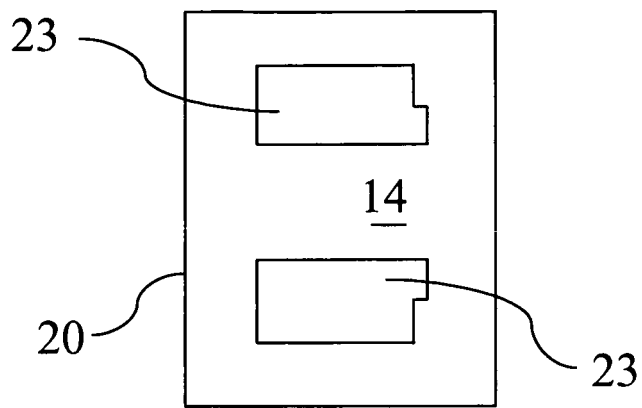


FIG. 4a

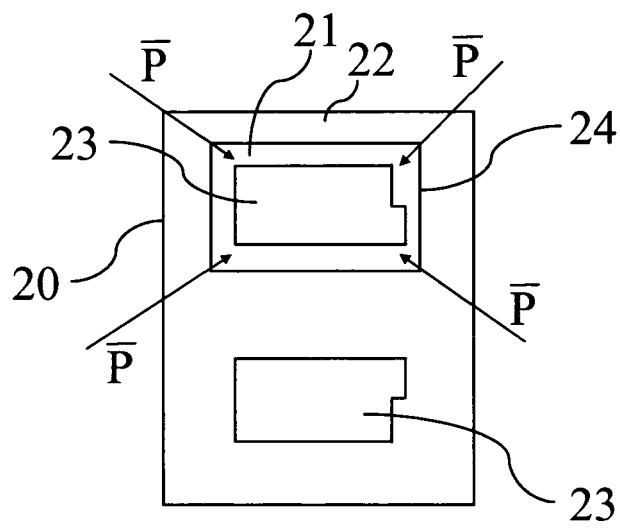


FIG. 4b

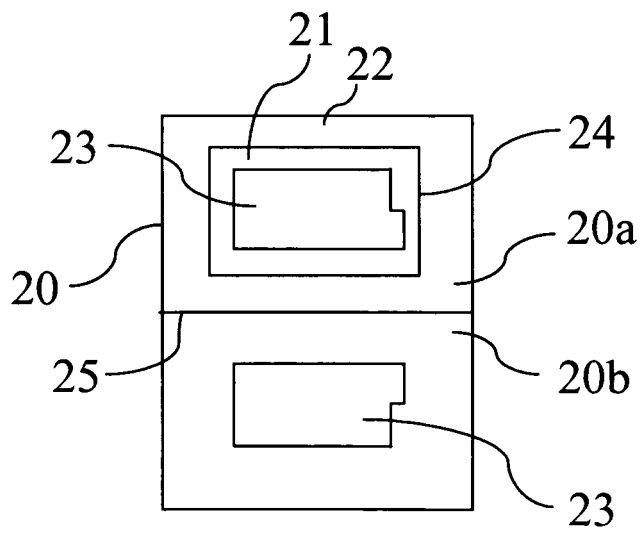


FIG. 4c



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5488

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 January 2008	Examiner Bevilacqua, Vincenzo
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 07 42 5488

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