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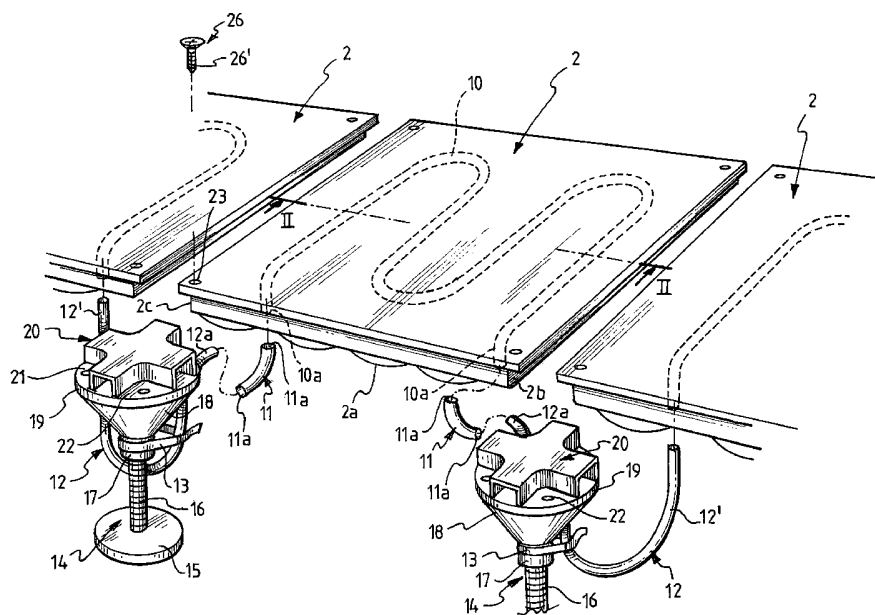
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- (71) Applicants and
(72) Inventors: QUAGLIA, Natale [IT/IT]; Viale Monte Penice, 6, I-20089 Rozzano (Milano) (IT). MORETTIN, Enrico [IT/IT]; Via Garibaldi, 8, I-20085 Locate Di Triulzi (IT).
- (74) Agents: LONG, Giorgio et al.; Jacobacci & Partners S.p.A., Via Senato, 8, I-20121 Milano (IT).

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(54) Title: FLOOR PANEL AND FLOOR



(57) Abstract: A floor modular panel comprises a lower receptacle member (2), an upper cover member and preferably a plate-like intermediate member sandwiched between said lower receptacle member (2) and said upper cover member. The lower receptacle member (2) preferably comprises a filling material. The modular panel comprises a system section (10) e.g. a tube for heating/cooling, a radiant panel, an electric cable, provided with connections for connecting to sections of other modular panels or other systems.

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DESCRIPTION**"Floor panel and floor"**

The present invention relates to a floor panel and a floor.

5 Particularly, the present invention relates to a panel suitable to be used in a raised platform floor.

These floors are known to be formed by panels supported by standards resting, in turn, on an underlaying floor. Particularly, each standard receives
10 adjacent corners of four squared panels due to a support positioned at the end thereof. Thereby, a spacing is obtained between the underlaying floor and the raised platform floor where tubings or cables are generally housed, which are normally rested on the underlay, which
15 is usually made of cement. In other words, between the panels and the cement underlay there is a gap suitable to receive tubings or cables.

These tubings or cables normally correspond to electric, hydraulic, heating, cooling, data transmission
20 systems, etc. Particularly, heating systems generally consist of radiant panels, which are essentially made of tubes positioned in contact with the lower face of the floor panels, within the gap between the raised floor and the underlay.

25 This heating system, however, has a number of

drawbacks. The radiant panel is in a simple (and only partial) contact with the lower face of the panels being the raised floor (referred to as the "modular panels" herein below), which causes a decrease in the radiant efficacy of the system. More energy will be then required to obtain a suitable heating temperature in the rooms, with increased costs for the users.

The radiant panels positioned just below the modular panels of the floor prevent, or however hinder access to other electric, hydraulic, data transmission systems, etc., which are positioned within the gap between the floor and the underlay, and which is the reason for providing the use of the raised floor. This results in restraints in system sizing and increases the maintenance costs thereof.

While the raised modular panels can be easily removed, the radiant panels, which substantially consist of tube bundles, cannot be partially removed, since the tubes extend uninterruptedly in the environment. This entails restraints in the control and maintenance of the radiant system.

The radiant panels thus positioned have a bulky thickness and define, in the case of restructuring rooms having a reduced height between the floor and the ceiling, a restriction in the sizing of the systems, and

in the case of new construction, an increase in the costs of the construction.

Raised floor are known in which, mainly for electrical and data systems, connector blocks or turrets are provided, which are associated with a modular panel of the floor. Practically, the outer part of a panel is cut such as a housing is obtained for the block or turret which are fitted by means of screwing or embedding. Holes are also made for cables to be passed therethrough. The system which runs in the space beneath the raised floor is connected to these blocks or turrets which have receptacles for housing the sockets to which the equipment to be served, such as computers, printers, lamps, TV sets, etc. are connected. The blocks or turrets, however, only define inputs or outputs for the system and accordingly, they still suffer from the above-mentioned drawbacks because they will have to be associated with continuous systems positioned within the gap between the panels and the cement underlay.

The problem at the heart of the present invention is thus to provide a panel for a raised platform floor which solves said drawbacks.

Accordingly, the present invention provides a modular panel for raised floor comprising at least two elements, the lower one being a hollow receptacle, and

the upper one being a cover, characterized in that it comprises a system section therein, which comprises connections to connect this system section to other system sections comprised within the adjacent modular panels. Advantageously, the panel is insulated with a suitable material, such as cement or other suitable material contained therein, the hollow receptacle member being filled therewith.

The connections are advantageously provided at a panel surface such that the system section contained within the panel can be either connected to other panels containing other system sections or other systems.

Said lower hollow receptacle member is advantageously a metal sheet base and is filled with an insulating material which is provided with the desired mechanical and thermal-acoustic characteristics, such as cement or expanded material, preferably cement. Said modular panel may also comprise a plate-like intermediate member that is sandwiched between the lower and upper members, comprising at least a reinforcement means substantially right angled relative to the base and extending to contact said base or preferably to hook the latter.

By "system" and "system section" is meant tubes, which are normally folded up to a coil, for heating

water or cooling freon gas to pass therethrough (e.g. they may be metal radiant panels), or electric cables, such as serpentines for electric heating or normal cables for the current to pass therethrough. They may
5 also be phone cables, or data transmission cables, such as network cables, optical fibers, etc.

These tubes, cables, etc. normally end with connecting means, for example quick male-female couplings for connection to other tubes, cables, etc.,
10 which are comprised within the adjacent modular panels. Thereby, by connecting the panels to each other, a radiant, hydraulic cooling system, etc. is formed, which is perfectly integrated in a raised floor system.

These system sections may be either dipped within
15 the insulating material of the lower member, or positioned between the lower member and the upper member, or further, when the modular panel also comprises an intermediate member, said system sections may be positioned between the intermediate member and
20 the upper member. In a further embodiment, the intermediate member and the system section are joined to each other to obtain an individual piece.

Any type of modular panel commercially available can be integrated with the system according to the
25 present invention. Preferably, the system is integrated

within the panels described in PCT/IT90/00026 and subsequent improvement thereof described in IT MI2001A002567.

Further characteristics and the advantages of the floor panel being the object of the present invention will be better understood from the description of the preferred embodiments thereof, which are given herein below as illustrative and non-limiting examples, with reference to the following Figures:

10 Fig. 1 is a perspective view of the base of the modular panel comprising a system section, support feet for the raised floor and connection systems for the system sections;

15 Fig. 2 is a sectional view, according to line II-II from Fig. 1, of a modular panel being assembled according to an embodiment of the present invention;

Fig. 3 is a perspective, top view of a plate-like intermediate member of the panel from Fig. 2;

20 Fig. 4 is a sectional view, according to line II-II from Fig. 1, of an assembled panel according to a particular embodiment of the invention;

Fig. 5 is a sectional view according to line II-II from Fig. 1, of a panel assembled according to a further embodiment of the invention;

25 Fig. 6 is a sectional view of a modular panel

assembled according to the particular embodiment from Fig. 5 in which the base has a drawn shape;

Fig. 7 is a perspective view of a support foot for the raised floor and a reinforcement and stiffening member, according to a particular embodiment of the invention;

Fig. 8 is a partially sectional perspective view of a detail of an embodiment of the panel, and in general of the floor according to the present invention;

10 Fig. 9 is a top view of a detail from Fig. 1;

Fig. 10 is a partially sectional perspective view of a floor portion made with panels according to a further possible embodiment of the present invention.

With reference to the annexed figures, the panel according to the present invention is indicated as a whole with numeral 1.

As shown in Fig. 1 to 3, the panel according to the invention comprises a lower hollow receptacle member 2, an upper cover member 3 and a plate-like intermediate member 4 sandwiched between said lower receptacle member 2 and said upper cover member 3.

Said lower member 2 has an undulated base 2a from which there extend, in a substantially vertical direction, shoulders 2b and 2c. Said shoulders 2b and 2c end with a peripheral rim 2d at the top thereof, which

protrudes outwards in the perpendicular direction to the shoulders 2b and 2c. Said peripheral rim 2d allows joining the lower receptacle member 2 to the upper cover member 3, such as by folding the edge of the cover.

5 Said lower receptacle member 2 is made of metal such as, for example, steel and preferably has a thickness ranging between about 0,5 and 1,5 mm.

The lower receptacle member 2 is suitable to be filled with a filling material 5 provided with the
10 desired mechanical and thermal-acoustic characteristics.

A preferred example of this filling material 5 is cement, particularly cement lightened by adding a foaming agent.

Said filling material 5 may also contain additives,
15 such as wood, polyesther, vermiculite grains and, when required, catalyzers in order to facilitate the cross-linking of the filling material 5 within the lower receptacle member 2.

Said filling material 5 is introduced in the panel 1
20 of the present invention, when the latter is in the assembled configuration, such as through a hole provided in one of the shoulders 2c and 2d of the lower receptacle member 2.

With reference to Fig. 1 or 2, the lower hollow
25 receptacle member 2 also comprises a system section 10

dipped in the filling material 5. In the particular embodiment illustrated the system is a radiant system.

Said radiant system 10 comprises a tube folded up to form a serpentine. Said tube has two ends 10a, for example positioned near two opposing peripheral rims 2d of the lower hollow receptacle member 2. Advantageously, both ends 10a may be positioned on the same side of the panel.

Said ends 10a protrude downwards and jut out from the base 2a of the lower hollow receptacle member 2 through two apertures made on the base.

Said ends 10a are, for example, provided with male-female quick couplings allowing connection to a joint 11.

Said joint 11 is a stiff tube, normally made of plastics, having two open ends 11a for example provided with male-female quick couplings allowing connection, with the end 10a of the system 10 and an end 12a of a connection means 12, respectively. This joint 11 allows the modular panel 1 to be removed from the connection means 12 in a quick manner and avoiding the risk of water leakage. Said connection means 12 advantageously comprises a flexible tube 12' of a suitable length, normally made of plastics, having two open ends 12a for example provided with male-female quick couplings

allowing the same to be connected to the ends 11a of two joints 11.

Said connection means 12 is positioned within the gap existing between the raised floor and the underlay and is preferably anchored to a support means 14 of said floor, such as by means of a clamp 13. Said clamp 13 may also be omitted, the connection means 2 being then either freely arranged within the gap or otherwise fixed to the support means.

10 In accordance with a possible embodiment, the support means 14 comprises a support base 15 for example having the shape of a planar ellipse and sufficiently large to provide a firm support for the entire support means 14. From the midpoint of said support base 15, there protrudes upwards a threaded member 16, a threaded rod 17 being screwed at the opposite end thereof. From said threaded rod 17 there protrudes upwards an overturned cone 18, the vertex thereof being screwed in the threaded rod 17 and ending with a circular base 19.

20 In accordance with an advantageous embodiment, the outer surface of said circular base 19 has a relief 20 shaped as a Greek cross, being preferably hollow therein. The midpoint of said relief 20 coincides with the midpoint of said circular base 19 and the four arms thereof extending outwards in a substantially

25

perpendicular direction to each other, each having substantially the same length as the circumference radius of said circular base 19.

Said arms of said Greek-cross shaped relief 20, in
5 pairs of two, define four fourths of said circular base 19, all being designated with 21.

Advantageously, the Greek-cross shaped relief 20 has either the same thickness as the height of the shoulders 2b and 2c of the lower hollow receptacle member 2 or is
10 preferably greater than the latter.

When the floor is assembled, the four corners of the lower hollow receptacle member 2 of four modular panels 1 rest on the midpoint of the relief 20 thereby covering the circular base 19. The shoulders 2c or 2b parallelly
15 face respective vertical walls of the relief 20. Consequently, also a border 3a of the upper cover member 3 of four modular panels 1 arranged in a square will substantially rest in the midpoint of the Greek-cross shaped relief 20 (Fig. 9).

20 Said four fourths 21 of said circular base 19 each have a preferably threaded hole 22 being positioned near the circumference of said circular base 19.

When the floor is assembled, each threaded hole 22 will match with a preferably threaded hole being formed
25 in the lower hollow receptacle member 2 of panel 1,

possibly with a preferably threaded hole being formed in the plate-like intermediate member 4, and with a preferably threaded hole being formed on the upper cover member 3. The position of said holes has been designated
5 in the figures with numeral 23.

Fixing means 26 are also provided, which comprise a screw 26', of a length suitable to pass through the threaded holes of the lower receptacle member, the upper cover member, possibly the plate-like intermediate
10 member and the support means 14. This screw, when the floor is assembled, connects and removably fixes the support means 14 to the modular panel 1.

The upper cover member 3 is advantageously a metal sheet that ends with a border 3a which, in the assembled
15 configuration, is folded up to form a C, such as to engage with the peripheral rim 2d of said lower receptacle member 2, thereby allowing the upper cover member 3 to be firmly coupled with the lower receptacle member 2.

20 In accordance with a possible embodiment, the lower receptacle member 2, and the upper cover member 3 are sandwiched by the plate-like intermediate member 4.

Said plate-like intermediate member 4 is for example metal sheet having a thickness preferably ranging
25 between 0,5 and 1,5 mm, and preferably ending, on the

four sides thereof, with a downward folding 4a substantially right angled relative to the plate-like intermediate member 4.

Thereby, the plate-like intermediate member 4 can be arranged on the lower receptacle member 2 with the folding 4a inside the latter such that both members 2 and 4 are stopped relative to each other.

Said plate-like intermediate member 4 further has an angled reinforcement member 4b at each corner which, after it has been folded on the corners formed by said folding 4a, increases the thickness thereof thereby providing a strengthening of the corners.

In accordance with a possible embodiment, such as illustrated in Fig. 2, the plate-like intermediate member 4 further has at least one anchoring means 6 for anchoring the filling material 5 to the lower receptacle member 2. This anchoring means 6 is optional and an embodiment thereof is known, for example, from IT MI2001A002567, being incorporated herein by reference, and is briefly described herein below.

Said at least one anchoring means 6 is a bridge member curved in the direction of the lower receptacle member 2, and the concavity thereof facing upwards.

This curved shape allows said at least one anchoring means 6 to penetrate in the filling material 5, when the

latter is still in the fluid state, and accommodating therein that part of filling material 5 sufficient to allow the firm connection between the plate-like intermediate member 4 and the lower receptacle member 2, when said filling material 5 is in the solid state.

A method for forming said at least one anchoring means 6 on the surface of said plate-like intermediate member 4 comprises the steps of cutting two substantially parallel notches on the surface of said plate-like intermediate member 4, such as to define a bridge member of the surface of said plate-like intermediate member 4 and then bending said bridge member downwards in the direction of the lower receptacle member 2.

Said at least one anchoring member 6 may be arranged in any location in the surface of said plate-like intermediate member 4 or only along the sides thereof or only in the midpoint or along ideal geometric lines.

Said plate-like intermediate member 4 may also comprise, in addition to said at least one anchoring means 6 at least a reinforcement means 7 being also formed on the surface of said plate-like intermediate member 4.

Preferably, said at least one reinforcement means is that described in the International Patent Application

No. PCT/IT90/00026, incorporated herein by reference with regards to the description of said reinforcement means 7.

Particularly, said reinforcement means has the shape
5 of a tab being obtained by cutting the surface of said
plate-like intermediate member 4 by means of three
notches and by folding the tab thus obtained at a right
angle relative to said plate-like intermediate member 4
inwardly of the lower receptacle member 2. Thereby, an
10 aperture 9 is formed of a preferably rectangular shape.
Said tab-like reinforcement means 7 has one or more
protuberances 7a on the side facing the folding side.

In Fig. 3 there are illustrated four apertures 9,
and as many reinforcement means 7, which are arranged
15 parallel to each other. This arrangement has been
particularly studied for allowing the use of said plate-
like intermediate member 4 either in the presence of a
system section 10 dipped in the filling material 5 of
the lower hollow receptacle member 2, or in the presence
20 of a radiant panel or such as to allow the same to be
integrated with the radiant panel, such as illustrated
in Fig. 4, 5 and 6 and described in detail herein below.

Accordingly, when the plate-like intermediate member
4 of the present invention also comprises, in addition
25 to said at least one anchoring means 6 according to the

present invention, said tab-like reinforcement member 7, the base 2a of the lower receptacle member 2 advantageously has a channel 2g arranged at said reinforcement member 7.

5 Thereby, the projection 7a of said reinforcement member 7 is inserted in a slot 2g' provided in the channel 2g and then folded on channel 2g such as to clamp the base 2a to the plate 4. The channel 2g is for example arranged at a location being at a lower distance
10 from the plate-like intermediate member along the undulated edge of base 2a. In accordance with a different embodiment, the base 2a has an undulated edge such as illustrated in Fig. 10 and preferably the reinforcement means 7 is inserted in a slot being formed
15 at a location being at a greater distance from the plate-like intermediate member along the undulated edge of base 2a (Fig. 10). Fig. 10 further illustrates an advantageous embodiment of a panel in which the base 2a has an undulated edge symmetrical to a middle axis, i.e.
20 the ends thereof corresponding to the shoulders 2b and 2c are substantially identical.

In the panel 1 of the present invention, the upper cover member 3 can directly rest on said plate-like intermediate member 4. However, according to a preferred
25 embodiment of the present invention, between said upper

cover member 3 and said plate-like intermediate member 4 there is interposed a layer of adhesive material 8 such as glue.

In addition, said upper cover member 3 is made of a special material, such as stainless steel. It may optionally have finishings on its surface, at sight, either directly obtained on the surface of the member or applied thereon.

Preferred examples of finishing directly obtained on the surface, at sight, of the upper cover member 3 are selected from engraving, polishing, embossing and painting.

Preferred examples of finishing applied on the surface at sight of the upper cover member 3 are selected from a linoleum sheet, a sheet of suitable plastics, and a parquet sheet. Said finishing is generally applied to the upper cover member 3 by means of bonding, or crimping.

Fig. 4 shows a further embodiment of the invention in which the radiant system 10 is not dipped within the filling 5 of the lower hollow receptacle member 2, but it is replaced by a radiant panel 27.

Said radiant panel is positioned between the plate-like intermediate member 4 and the upper cover member 3. The upper surface 27a of the radiant panel is planar and

in contact with the upper member 3. In accordance with an advantageous embodiment, the lower surface 27b facing the intermediate member 4, has channel-shaped relieves 29 defining the system section according to the present invention.

In a preferred embodiment, the upper planar surface 27a of the radiant panel 27 is fixed to the upper cover member 3 by means of suitable fixing means, preferably by means of adhesives.

The plate-like intermediate member 4 has at least one drawing 28, or generally at least one projection in contact with the lower surface 27b of the radiant panel 27 and higher than the channel-shaped relieves 29 of the lower surface 27b. Thereby, this drawing 28 avoids the contact between the channel-shaped relieves 29 provided on the lower surface 27b of the radiant panel 27, and the plate-like intermediate member 4. The channel-shaped relieves 29 are, in fact, very delicate and the provision of at least one drawing 28 protects said channel-shaped relieves from possible crushing due to the loads present on the upper face of the upper cover member 3.

Advantageously, the projections are arranged at and near a channel-shaped relief, for example parallel to the greater development dimension of the reinforcing

means 7.

The radiant panel 27 used in the modular panel 1 of the present invention may be any radiant panel known to those skilled in the art. Preferably, it is the known
5 radiant panel of aluminium manufactured by means of the roll-bond rolling process, also well known to those skilled in the art. According to a possible embodiment, the radiant panel 27, or other panels such as described below, define a section of the system by means of a
10 plate consisting of two metal sheets of which at least one has channel-shaped relieves. The two metal sheets are fixed to each other for example by means of bonding or welding such that the channel-shaped relieves of at least one of the two metal sheets are detached
15 from the other metal sheet to allow a fluid (freon, water, ...) to pass therethrough. Preferably, the two metal sheets are made of aluminium.

In accordance with a possible embodiment, the plate is manufactured by applying a rolling process to two
20 sheets. On one of the sheets, there has been previously moulded a circuit such that the plating is not carried out at the circuit and the latter can be subsequently inflated by means of compressed air thereby obtaining a channel.

25 Fig. 5 shows a further embodiment of the invention,

in which the radiant panel and the plate-like intermediate member are ideally joined to form an individual piece, generally designated with 30.

In practice, the member 30 is a radiant panel, obtained by modifying the radiant panel 27 described above.

The radiant panel 30 comprises an upper planar surface 30a and a lower surface 30b, which has channel-shaped relieves 29. Furthermore, the radiant panel 30 can have apertures, obtained by cutting the upper 30a and lower 30b surfaces of said radiant panel 30, or only the lower surface 30b. In Fig. 5 there is illustrated the latter embodiment, in which the aperture 9 is provided in a lower sheet of the radiant panel 30. This aperture is provided by means of three notches and subsequently the tab 7 thus obtained is folded at right angle relative to said radiant panel 30 inwardly of the lower receptacle member 2.

Said tab 7 functions as the reinforcement means 7 detailed above.

Said apertures 9 are positioned on the radiant panel 30 between the loops of channel 29.

In this embodiment, the plate-like intermediate member 4 is replaced by a radiant panel 30 which is positioned with the upper surface 30a in contact with

the upper cover member 3 and having the lower surface 30b in contact with the filling material 5 of the lower hollow receptacle member 2, with the channel-shaped relieves 29 preferably dipped within the material 5.

5 Preferably, the upper surface 30b is fixed to the upper cover member 3 by means of suitable fixing means, such as adhesive. In other words, the embodiment such as illustrated in Fig. 5 integrates the reinforcement means 7 of the radiant panel 30 thereby avoiding having to

10 introduce the plate-like intermediate member such as described for the above embodiment.

In the embodiment illustrated in Fig. 5 the channel-shaped relieves are preferably formed in the lower surface 30b but they may also be formed in the upper

15 surface 30a or only therein.

Fig. 6 shows a further embodiment of the modular panel 1 in which the lower hollow receptacle member 2 has the base 2a drawn to form a plurality of ridges 31.

In the embodiment illustrated in Fig. 6 the radiant

20 panel 30 has apertures 32 obtained by cutting the upper 30a and lower 30b surfaces of said radiant panel 30, by means of four notches and removing the middle part.

Said apertures 32 are positioned on the radiant panel 30 between the loops of channel 29.

25 The drawings or ridges of the base 2a, which are all

designated with 31, when the panel is mounted, jut out from the apertures 32 of the radiant panel 30 and touch the upper cover member 3. Preferably, the top of the drawings is fixed to the lower surface of the cover, for example by means of binding or welding. The base 31a of each drawing 31 has a width corresponding to the width of the aperture 9, such as to ensure a perfect fitting between the lower hollow receptacle member 2 and the radiant panel 30.

10 In this embodiment, the reinforcement means are the drawings of the base 2a of the lower hollow receptacle member 2 extending to the upper cover member 3, thereby ensuring the required stiffness to the modular panel. In other words, Fig. 6 shows an embodiment in which neither
15 a plate-like intermediate member, nor a reinforcement member in the form of a tab such as shown in Fig. 2 have been provided. These members may be optionally provided both simultaneously and alternatively in further embodiments, not illustrated.

20 Fig. 7 is a particular embodiment of the invention in which an embodiment of a support means 14 for the floor is illustrated in greater detail. In accordance with a possible embodiment, with 33 has been designated a crosspiece having an end 33a suitable to be inserted
25 and locked on a free end of one of the arms of relief

20. For example, suitable shape-coupling can be provided to hold the outer surface of the crosspiece flush with the outer surface of the relief 20.

Advantageously, the crosspiece 33 extends between
5 two support means 14 in which the ends 33a of crosspiece 33 are inserted, respectively, and defines an abutment plane for the edge of panel 1, particularly the folded border 3a. In other words, the shoulders 2b and 2c of the lower receptacle member are arranged parallel to
10 side walls of crosspieces whereas the borders 3a rest on the upper wall of the respective crosspieces. The provision of the crosspieces thus allows defining an abutment plane for the entire panel edge, thereby stiffening the floor and preventing the panel middle
15 portions from bending.

In accordance with a possible embodiment, the crosspiece 33 defines a cavity 34 therein; preferably, the crosspiece 33 has a C-shaped cross-section, for example suitable to abut against the end of an arm of
20 the relief 20 such that the cavity 34 extends the cavity of the arms of the relief 20.

In accordance with a possible embodiment, the cavity defined by the arms of the relief 20 houses the end 12a of the connecting means 12 and defines a joining member
25 with adjacent connecting means or other sections of the

system. Advantageously, the crosspiece 33 comprises a further connecting member 35 within the cavity 34, which is suitable to be connected to the connecting means 12 and/or directly to the system section integrated in
5 panel 1.

Fig. 8 illustrates an exemplary embodiment of direct connection between the further connecting means 35 housed in the crosspiece 33 and a panel 1. Preferably, the further connecting means 35 has an end 35a which
10 opens laterally of the crosspiece 33, preferably by passing through a side wall of the crosspiece. In other words, the side wall of the crosspiece has an aperture 36 suitable to receive the end 35a of the further connecting means 35.

15 In accordance with the embodiment described above, the panel advantageously comprises a section of a system, the ends 10a thereof opening laterally at the aperture 36 to obtain a direct connection with the further connecting means 35 that are housed within the
20 crosspiece 33.

The advantages of the floor panel of the present invention will be apparent from what has been discussed above.

In fact, the panels according to the present
25 invention resolve the drawbacks cited with reference to

the prior art. The provision of a sectional system, and in which a system section is provided within a panel allows obtaining a modular panel which can be removed thereby making the gap beneath the panels completely
5 accessible. In other words, the present invention allows eliminating any obstacle within the gap thereby making the system and the floor very versatile in terms of design and sizing, and allows reducing the maintenance costs.

10 Whereby, a floor can be provided by connecting the modular panels such as to obtain a radiant (or other, as provided above) system integrated in a raised floor system. The irradiation performance is optimum, in that the system is directly integrated within the panel,
15 thereby also making other applications feasible, such as using this system to obtain a cooling effect by means of irradiation, without increased costs.

In general, the present invention provides that the panel is an integral part of the (radiant, electric,
20 data,...) system by comprising equipment and systems integrated within the casing of the panel.

As stated above, the section of a panel system may be a section of an electric, data system, or of a different nature. It may also be a section of a heating
25 system, both by providing a radiant system such as

described above, and by providing other heating means, such as electric cables.

The advantageous configurations illustrated, particularly those in Fig. 5 and 6, allow reducing the height thereby facilitating the laying in case of reconstruction.

It is understood that those described above are only several particular embodiments of the panel of the present invention, to which those skilled in the art will be able to carry out all those modifications required for adapting the latter to particular applications, without however departing from the scope of protection of the present invention.

CLAIMS

1. A modular panel(1) for raised floors comprising at least one lower hollow receptacle member (2) and at least one upper cover member (3), characterized in that
5 it comprises a system section (10, 29) therein, comprising connections to connect said system section to other system sections comprised within the adjacent modular panels.
2. The panel according to claim 1, wherein said lower
10 hollow receptacle member (2) is filled with insulating material.
3. The panel according to claim 2, wherein said system section (10) is dipped within said insulating material.
4. The panel according to claim 3, wherein a plate-
15 like intermediate member (4) is provided between said upper cover member (3) and said insulating material.
5. The panel according to claim 4, wherein said plate-like intermediate member (4) is fixed to the upper cover member (3).
- 20 6. The panel according to claim 5, wherein said plate-like intermediate member (4) is bound to the upper cover member (3).
7. The panel according to one of claims 4 to 6, wherein said plate-like intermediate member (4)
25 comprises reinforcement means (7) suitable to be dipped

within the insulating material.

8. The panel according to claim 7, wherein said reinforcement means (7) pass through the insulating material by alternating with portions of the system
5 section (10) dipped therein.

9. The panel according to claim 1 or 2, comprising a radiant panel (27; 30) defining said system section.

10. The panel according to claim 9, wherein said radiant panel (27) comprises an upper planar surface
10 (27a) suitable to be fixed to the upper cover member (3).

11. The panel according to claim 10, wherein said upper surface (27a) is bound to said upper cover member (3).

12. The panel according to one of claims 9 to 11,
15 wherein said radiant panel comprises channel-shaped relieves (29) extending from a lower surface (27b) of the radiant panel, said relieves defining a panel system section.

13. The panel according to one of claims 9 to 12,
20 wherein a plate-like intermediate member (4) is further provided, which is placed between said radiant panel (27) and said insulating material.

14. The panel according to claim 13, wherein said plate-like member (4) comprises reinforcement means (7)
25 suitable to be dipped in the insulating material.

15. The panel according to claim 13 or 14 when depending on claim 12, wherein said plate-like intermediate member (4) has at least one projection (28) in contact with the lower surface (27b) of the radiant panel (27), of a greater height than the height of the channel-shaped relieves (29) of the lower surface (27b).

16. The panel according to one of claims 9 to 12, wherein said radiant panel (30) comprises reinforcement means (7) suitable to be dipped in the insulating material.

17. The panel according claim 16, wherein said reinforcement means (7) are arranged between loops of the system section comprises within the radiant panel (30).

18. The panel according to claim 16 or 17, wherein said reinforcement means (7) comprise at least one tab being cut and folded from said radiant panel (30).

19. The panel according to claim 18, wherein said tab defines an aperture (9) being arranged between loops of the system section comprised within the radiant panel (30).

20. The panel according to one of claims 9 to 12, wherein said radiant panel (30) has at least one aperture (32) suitable to house a ridge or drawing (31) extending from a base (2a) of the lower hollow receptacle member (2).

21. The panel according to claim 20, wherein said aperture (32) is obtained by cutting upper (30a) and lower (30b) surfaces of said radiant panel (30).

22. The panel according to claim 20 or 21, wherein said
5 apertures (32) are positioned on the radiant panel (30) between the loops of the system section (10).

23. The panel according to one of claims 20 to 22, wherein the drawing or ridge (31) has a height suitable to jut out from the respective aperture (32) of the
10 radiant panel (30) and come in contact with the upper cover member (3).

24. The panel according to one of claims 20 to 23, wherein a base (31a) of the drawing (31) has a width corresponding to the width of the aperture (9).

15 25. A floor comprising a plurality of panels according to one of claims 1 to 24 which are arranged staggered, wherein the corner portions of four adjacent panels rest on a support means (14) of said floor.

26. The floor according to claim 25, wherein said
20 panels rest on a relief (20) which is hollow therein and suitable to receive connecting means (12) of system sections of different panels.

27. The floor according to claim 26, wherein said relief (20) is Greek-cross shaped, the four arms
25 defining four fourths (21) of a circular base (19).

28. The floor according to claim 27, wherein said relief (20) has a thickness greater than or equal to the height of shoulders (2b, 2c) of the lower hollow receptacle member (2) of the panel.

5 29. The floor according to claim 27 or 28, wherein fixing means (26) are provided, which are placed between a fourth (21) and a corner portion of a panel to be fixed.

30. The floor according to one of claims 25 to 29,
10 comprising at least one crosspiece (33) suitable to be arranged between two support means (14).

31. The floor according to claim 30 when depending on one of claims 26 to 29, wherein said crosspiece (33) has ends (33a) suitable to be inserted and locked on free
15 ends of arms of the relief (20).

32. The floor according to claim 30 or 31, wherein the crosspiece (33) defines a cavity (34) therein extending the cavity of the relief (20).

33. The floor according to claim 32, wherein the
20 crosspiece (33) comprises within the cavity (34) a further connecting member (35) suitable to be connected with a connecting means (12) and/or directly with the system section integrated within the panel (1).

34. The floor according to claim 33, wherein the
25 further connecting means (35) has an end (35a) opening

laterally of the crosspiece (33) by passing through an aperture (36) and is suitable to be connected with a system section of a panel, the ends (10a) thereof laterally opening at the aperture (36).

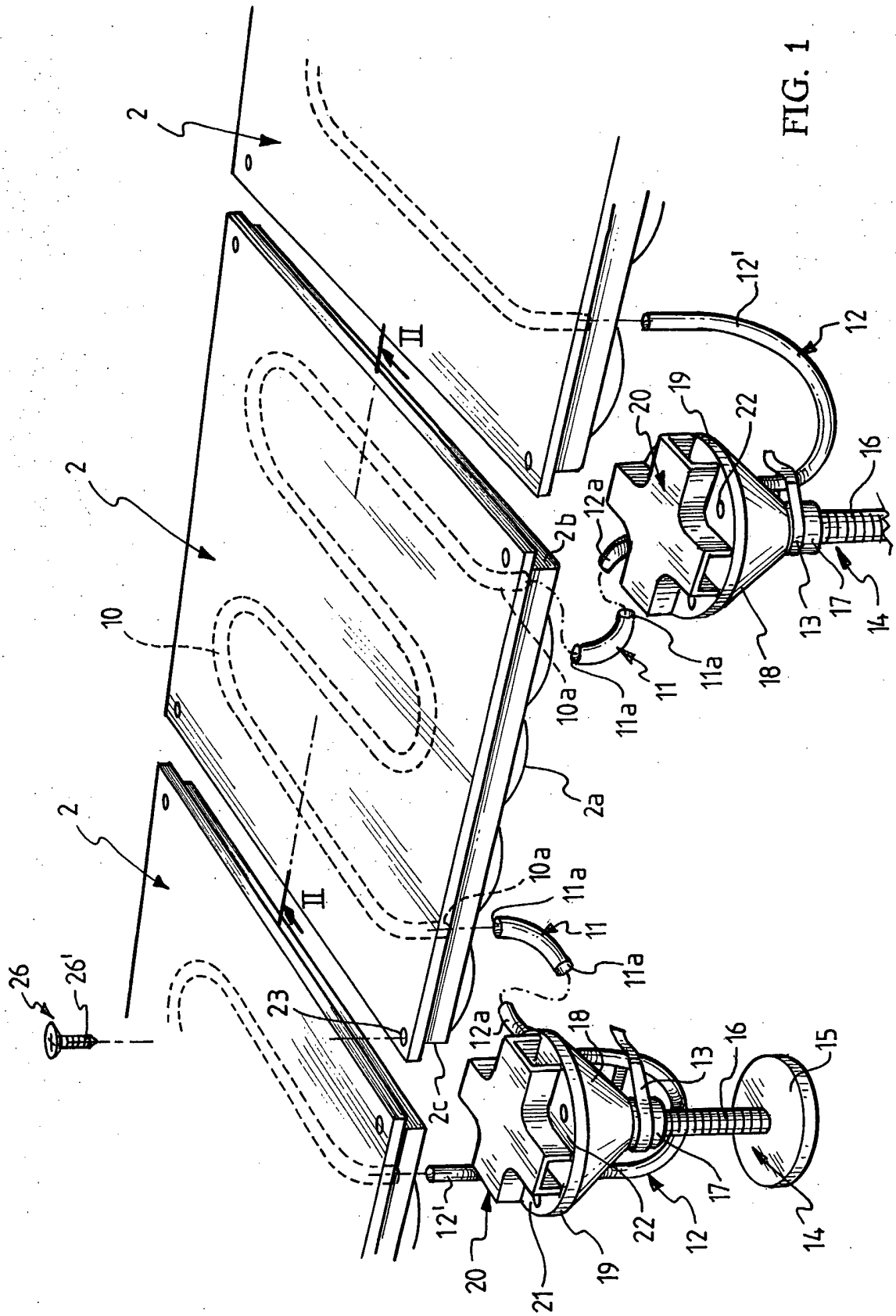


FIG. 1

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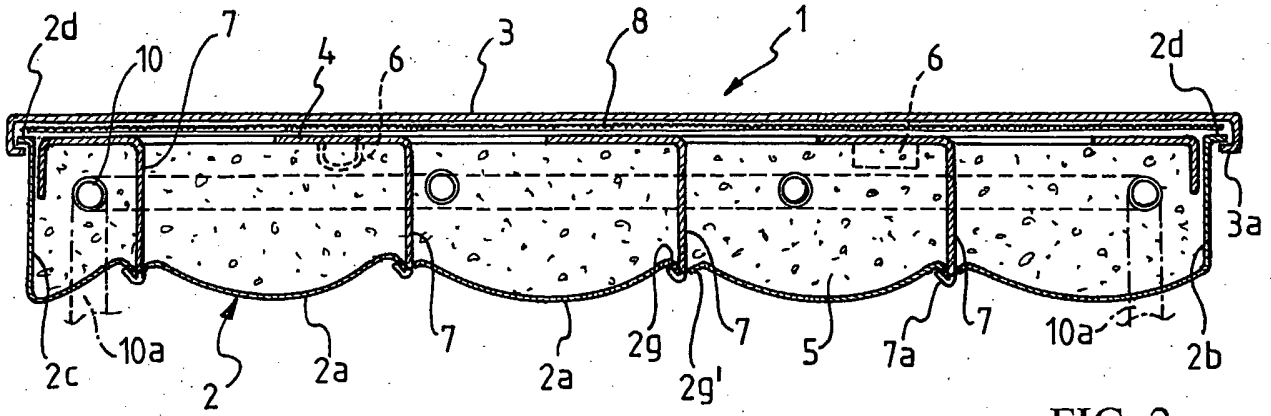


FIG. 2

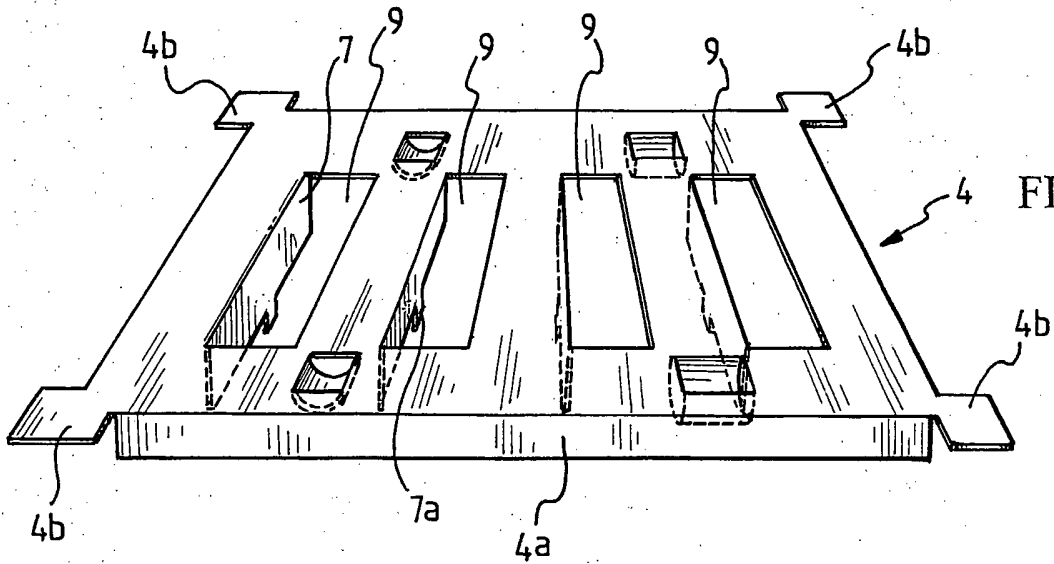


FIG. 3

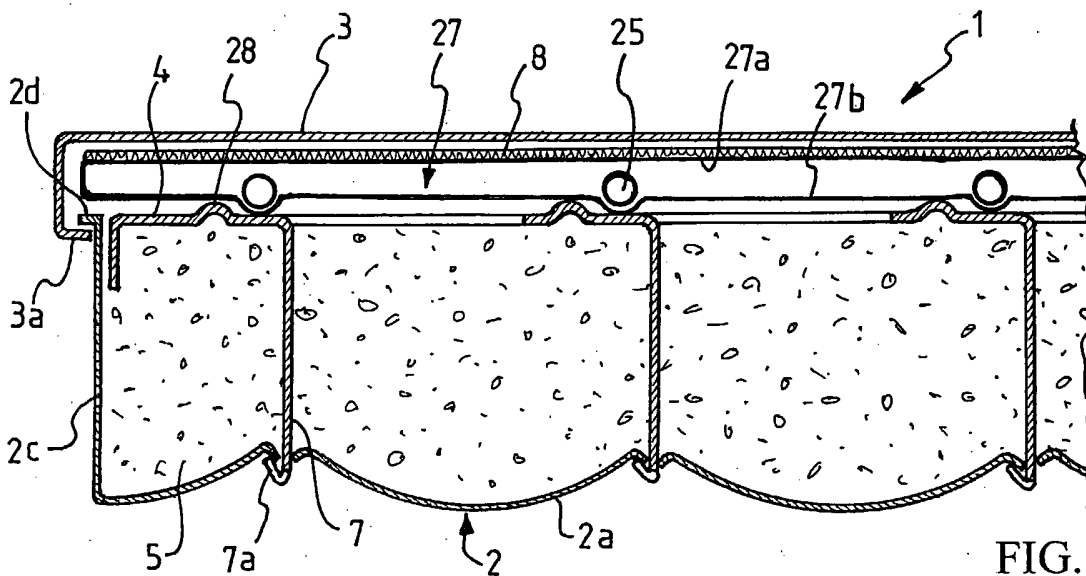


FIG. 4

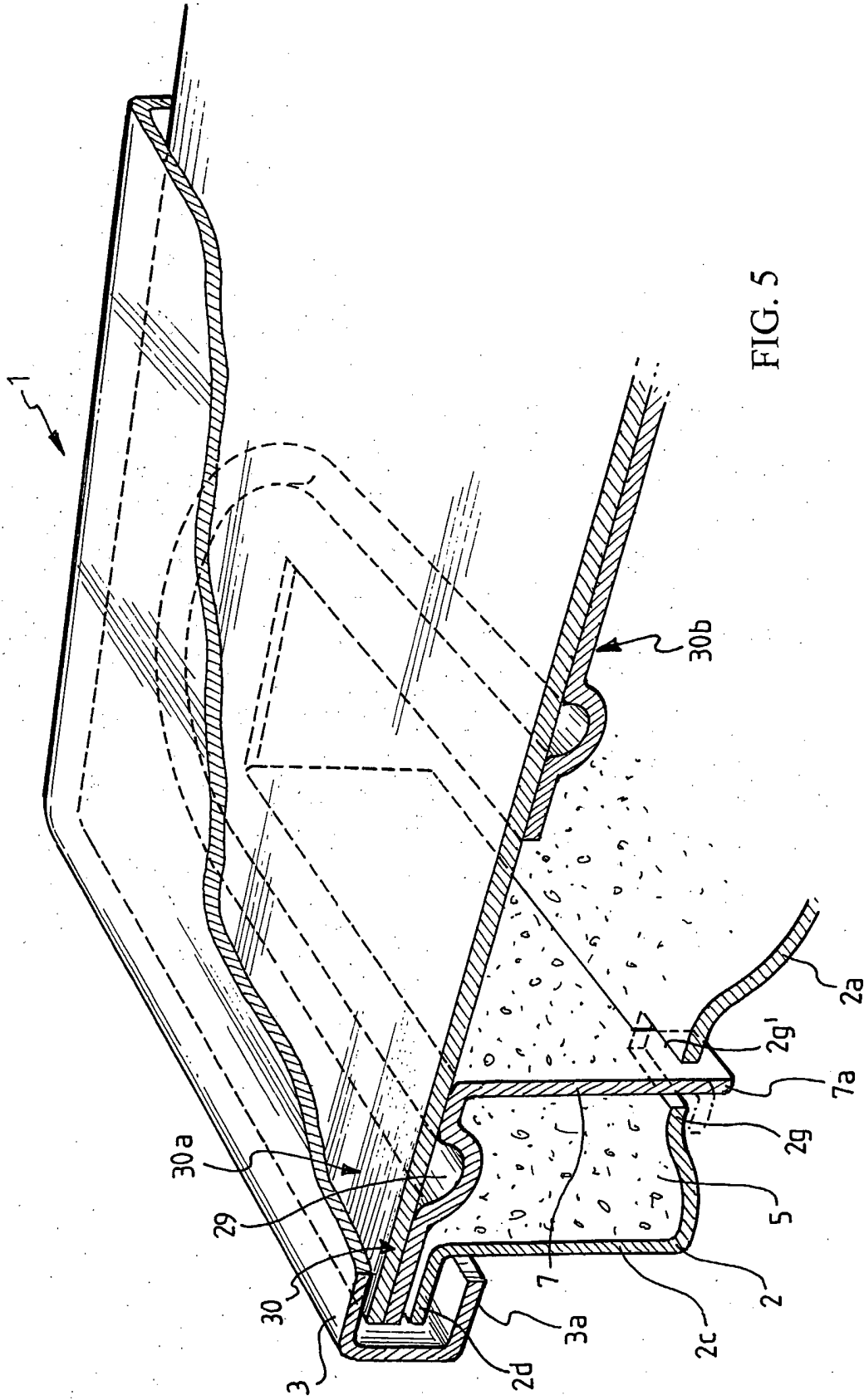


FIG. 5

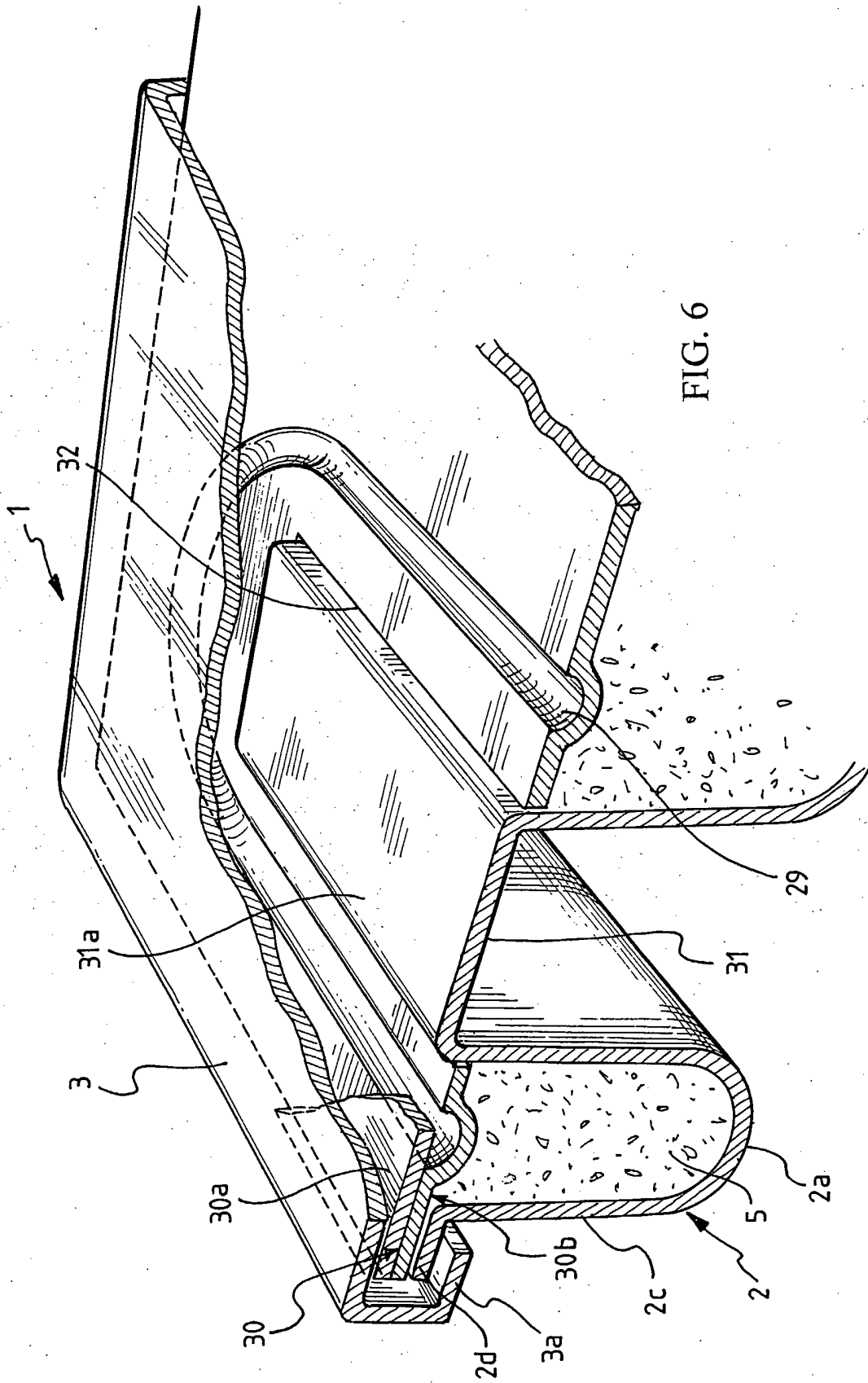


FIG. 6

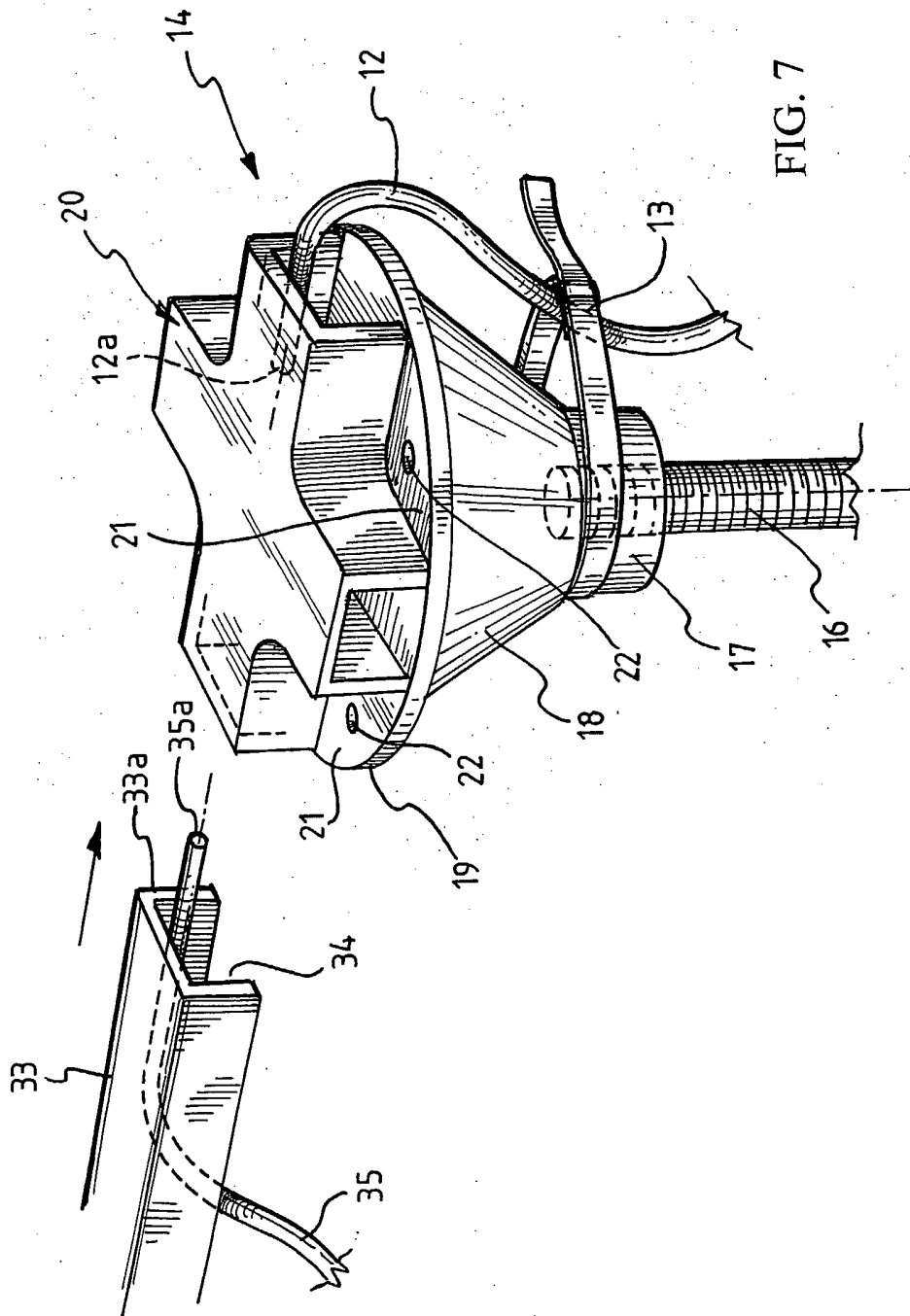


FIG. 7

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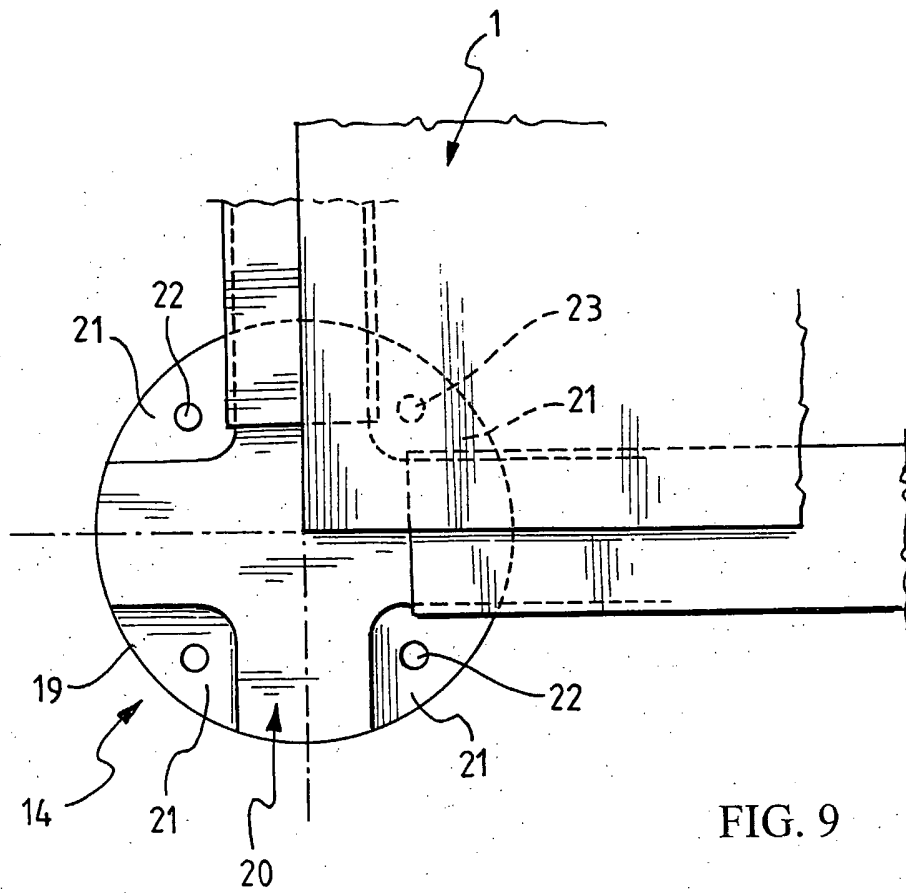


FIG. 9

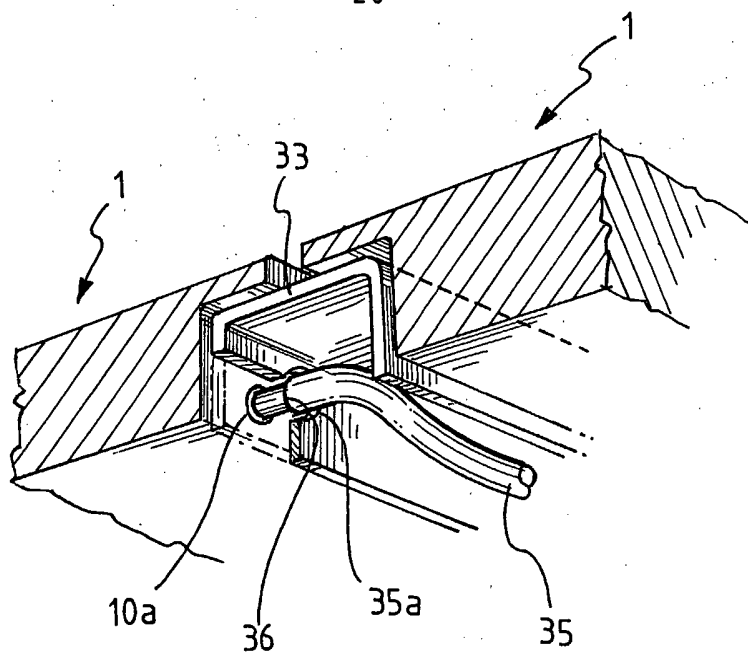


FIG. 8

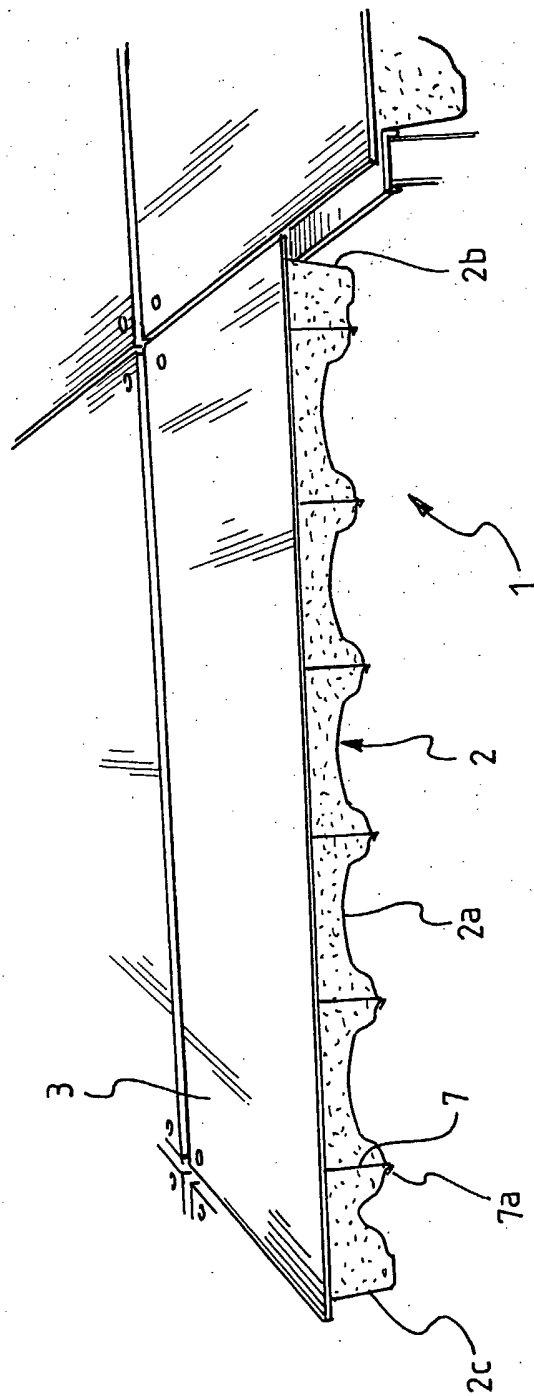


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2005/000738

A. CLASSIFICATION OF SUBJECT MATTER
E04F15/024 H02G3/36 F24D3/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E04F H02G F24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 37 14 419 A1 (FOERSTER, MICHAELA; FOERSTER, MICHAELA, 8702 ALTERTHEIM, DE) 5 November 1987 (1987-11-05)	1-3, 9, 25
Y	column 1, line 61 - line 63 column 2, line 42 - line 67 column 3, line 64 - column 4, line 50 figure	4-8, 10-14, 26-30
X	US 4 948 943 A (BRUECKNER ET AL) 14 August 1990 (1990-08-14) column 2, line 66 - column 3, line 32 figures	1-3, 25
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"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.</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 10 March 2006	Date of mailing of the international search report 05/04/2006
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Bouyssy, V
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INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2005/000738

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	US 4 850 163 A (KOBAYASHI ET AL) 25 July 1989 (1989-07-25) column 2, line 22 - line 64 figures	30

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International application No

PCT/IT2005/000738

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