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(54) Light and insulating device and system for buildings

Füll- und Dämmelement und Bausystem mit solch einem Element

Elément de remplissage et d'isolation et système de construction avec un tel élément

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Description

[0001] The present invention relates to a lightening and insulating device and system for building. More particularly, the invention relates to a device and a component system comprising this device, for the use in buildings as a lightening structure for floors, an insulating structure for ground floor loose stone foundations and the outer walls of the foundations, an insulating and ventilation structure for roof floors.

[0002] The lightening devices which are traditionally known and used for providing building floors are the so-called "hollow bricks", i.e. tiles of a considerable dimension, being internally lightened, which are rested either on joists or plates. These tile elements have proved to be bulky, heavy, difficult to be positioned and dangerous because they are subject to be broken. Furthermore, they are not very flexible because they may not be cut to size in order to be adapted to the space to be taken during laying.

[0003] Various types of devices alternatively to the tile "hollow bricks" have been known for a long time, being usually manufactured in plastic materials. An example of these devices are either the parallelepipeds in foam polystyrene or the balls in plastic material which are used as means for lightening floor plates.

[0004] Modular elements in plastic material to be applied on said plates or to be laterally rested on the joists for the floor or to be used for manufacturing ground floor loose stone foundations are also known; the element modularity allows the elements to be arranged side by side and aligned in order to cover the desired space. An example of these elements is described, for example, in EP-A-0803618. This document describes modular elements having a structure consisting of four legs and a slightly convex upper wall; an arch is present between each pair of legs. In order to stiffen the structure on the upper wall a plurality of ribs is present, and at least one stiffener, being usually centrally positioned, extends downwards from said upper wall in the form of a small pillar. In one embodiment, the central small pillar is fixed and hollow, for a subsequent filling up thereof with concrete.

[0005] FR 2858343 discloses a modular element for construction, according to the preamble of claim 1.

[0006] Modular elements with a C-shaped section to be rested on the joists for floors are also known; these elements are aligned to one another in the same way of the conventional tile hollow bricks.

[0007] Both the four-leg embodiments and the ones free of legs, with a C-shaped section, have the drawback of having an insufficient stiffness and little use flexibility. Moreover, the four-leg embodiments can not be used for floors on joists.

[0008] Therefore, there is need for providing a modular element or device for the use in buildings as a lightening, insulating or ventilation element, which is cost-effective to be manufactured, reliable, stiff enough to support an operator's weight (besides the concrete one) without problems, sure and flexible.

[0009] A further object of the invention is to provide a device which can be used in insulating, ventilation, lightening systems for structures, both for floors and ground floor loose stone foundations and garrets.

[0010] Another object of the invention is to provide an insulating and protecting structure for foundations.

[0011] These objects are achieved by means of the present invention, which concerns a modular device according to claim 1.

[0012] According to the invention said device is provided with a plurality of ribs being located parallel to one another transversally to the device. Preferably, these ribs have a trapezoidal section, along the device longitudinal axis, with its smaller base being located at the element upper wall.

[0013] According to the invention, the device upper wall is provided with an upright flat rib extending along the device longitudinal axis.

[0014] Preferably, the device of the invention is open on either cross side in order to have a series of elements being connected to one another along the cross sides and have a space longitudinally extending along the latter. Closed elements on all sides and provided in any case with mutual coupling means are used for example either for ground floor loose stone foundations or cast-in-situ floors.

[0015] The invention further relates to a system for manufacturing ground floor loose stone foundations in buildings, comprising a modular element according to what has been described above, a tube crop end, a support element on the ground having means for housing said tube crop end, a T-shaped element in which the lower end of the leg of said T can be housed in said tube crop end. With this system labour force and materials are saved and ground floor loose stone foundations are obtained with a wide space below.

[0016] Furthermore, the invention relates to the use of a modular element of the type described above for insulating the foundations of buildings and building structures in general.

[0017] The invention also relates to the use of a modular element of the type described above for insulating and ventilating roofs and building pavements. The modular element according to the invention has several advantages compared to the modular elements known in the art.

[0018] In fact, the element according to the invention has a huge use flexibility, due to the presence of anchor and engaging means with similar elements being present on all sides; in fact, it can be used as a replacing element for the hollow bricks in floors with either cap joists or lattice joists, by being rested on said joists with its own longitudinal sides and thus coupling with other elements on the (open) cross sides. On floors with double T-shaped iron beams, the element of the invention may be arranged with the (usually closed) cross sides thereof being insert-

ed between the base and the top of the double T; in this case, the elements are fastened to one another at the longitudinal sides.

[0019] On plates for floors, the elements of the invention can be both transversally and longitudinally coupled with one another and can operate as lightening elements, for example, either in place of foamed balls or blocks. In this case, closed elements are advantageously used, which in one embodiment are arranged spaced from one another and mutually engaged by means of "C-shaped" junction elements engaging corresponding coupling housings on the element sides.

[0020] As already mentioned, the modular elements according to the invention can be used being vertically arranged, coupled with one another, against the building foundations, as an insulating structure for the latter; moreover, the same elements being mutually coupled and arranged with a mutual overlapping of the coupling means which is similar to what has been used in the tiles, may be used for ventilating roofs and insulating the latter from water.

[0021] A line of elements being horizontally aligned may be used either as cable ducts (e.g. for electric cables) or as a protection for underground ducts, elements being vertically aligned may be used as a box for closing and insulating, even acoustically, exhaust pipes in a building.

[0022] Furthermore, the structure with the C-shaped section and multiple ribs provides a stiffness and structural characteristics which allow the use thereof in absolute safety.

[0023] These and other advantages will be understood from the following description and the annexed drawings, which are given by way of illustrative and non-limiting example, in which:

- Fig. 1 is a top view of a modular element according to the invention,
- Fig. 2 is a front view taken along B-B longitudinal axis of the element from Fig. 1,
- Fig. 3 is a cross-sectional view of the element from Fig. 1,
- Fig. 4 is a perspective view of the element from Fig. 1,
- Fig. 5 is a longitudinal sectional view of the element from Fig. 1,
- Fig. 6 is a side view of the modular element from Fig. 1,
- Fig. 7 is a perspective view of the element from Fig. 4, with different support means,
- Fig. 8 and Fig. 9 are a perspective side view of a further embodiment of the modular element according to the invention,
- Figs. 10 and 11 are top and bottom perspective views of an end of a modular element side according to the invention,
- Fig. 12 is a top perspective view of the end being opposite to the one from Figs. 10 and 11,
- Fig. 13 is a cross side view of two modular elements being coupled with each other,
- Fig. 14 and Fig. 15 are bottom and top perspective views of an end of the module side opposite to the side of the above Figs. 10-12,
- Fig. 16 is a top perspective view of the opposite end of the side from Fig. 14 and Fig. 15,
- Fig. 17 is a sectional view of an element according to the invention installed on joists for a floor,
- Fig. 18 is a perspective view of a closure grating of the element according to the invention,
- Fig. 18A is a view of the grating from Fig. 18 from the opposite side,
- Fig. 19 is a perspective view of a closure plug for the modular element according to the invention,
- Fig. 20 is a top perspective view of an accessory for providing ground floor loose stone foundations,
- Fig. 21 is a top perspective view of a further accessory for providing ground floor loose stone foundations,
- Fig. 22 and Fig. 22A are schematic perspective views of ground floor loose stone foundations being provided according to the invention,
- Fig. 23 is a perspective view of an accessory for the modular element according to the invention,
- Fig. 24 is a perspective view of a further embodiment of a ground floor

loose stone foundation according to the invention,

- Figs. 25 and 26 are a sectional perspective view of an accessory for the element of the invention,
- Fig. 27 is a perspective view of a further accessory according to the invention.

[0024] With initial reference to Figs. 1-6, the modular element according to the invention has a parallelepiped structure having a substantially "C-shaped" cross section. The element 1 is provided with a B-B longitudinal axis and an A-A cross axis, an upper wall 2, two longitudinal solid walls (or sides) 3 and 4 and two cross walls 5 and 6 which are usually open and define a connection between an empty space under the modular element 1 and the outside. As may be appreciated, the element 1 is free of legs and uses the sidewalls 3 and 4 as a support on the building structures with which it cooperates. According to the invention, the element 1 has engaging means with other modular elements, being either identical or of the same type, which are arranged along the longitudinal sides 3 and 4 and along the cross sides 5 and 6. The engaging means which are present on each side (preferably on the whole side) are different on each side; the side 5 is provided with means 7 formed by a "U-shaped" edge with the concavity turned downwards; the side 6 is provided with a "U-shaped" edge 8 with the concavity turned upwards; the side 4 is provided with an edge in the shape of a projecting tongue with an edge having a "U" shape and the U concavity turned downwards; the side 3 is provided with means 10 in the shape

of a tongue with an edge turned upwards.

[0025] It is understood, even from the observation of Figs. 1-6, that the shape of the means 7 is complementary to the shape of the means 8 and that the shape of the means 9 is complementary to the shape of the means 10.

[0026] The element 1 is provided with a plurality of stiffening ribs 11 being arranged parallel to one another transversally to the device. These ribs have a trapezoidal section, along the device longitudinal axis, with the smaller base 12 located at the upper wall 2 and the bigger base 13 located at the tongue 9 or 10 on the element sides. These ribs have a significant width and shape the surface of the upper side 2 in a series of raised stripes alternating to sags (corresponding to the surface of the side 2) with a width substantially equal to the one of the ribs 11.

[0027] There is further provided a further rib 14, which is arranged longitudinally with respect to the element 1, on B-B median axis, and which has both the function of stiffening and a means for maintaining the optional iron rod grid forming the reinforcement for the concrete casting above the elements 1 slightly raised; if the grid is raised from the upper side 2, it will be better embedded into the concrete.

[0028] Fig. 8 and Fig. 9 show another modular element according to the invention, being provided with a larger number of stiffening ribs, and i.e. with further ribs 11a extending from the surface 2, between two adjacent ribs 11.

[0029] According to a preferred embodiment, the sidewalls 3 and 4 are provided with at least one predetermined break line 16 defining a portion 15 of the side which can be removed from the latter for providing at least one aperture. The object of this aperture is to house and end of a tube crop end being inserted into a corresponding aperture of an adjacent element 1 in order to allow the passage either of cables or ducts transversally to the element in-situ; on the other hand, the passage of the same cables or ducts being usually clear in the longitudinal direction because the modular elements are usually free of cross sides. Should the element 1 be provided with cross sides, the latter would be provided with lines 16 and removable portions 15 in the same way to what has been described above with reference to the longitudinal sides 3 and 4.

[0030] In the embodiments from Figs. 1-6 and 8-9, the element 1 is provided with support means on and engaging means of the building structure with which it has to cooperate consisting of a longitudinal wing 18 vertically extending downwards on each of the sides 3 and 4. The wing 18 is provided with a plurality of slots 18a having the function of ensuring a cross ventilation in the case of wall insulation or floor ventilation, as well as a coupling means for the false ceiling elements (see Fig. 17).

[0031] According to the use, these means can be either different, such as for example the feet 17 shown in Fig. 7, or can be formed only by the lower end of the sides 3 and 4.

[0032] Figs. 10 to 16 show the details of the ends of the mutual engaging means for the elements according to the invention. More particularly, Fig. 10 and Fig. 11 show the detail of the X-end of the edge 10 from Fig. 1, seen from the top and the bottom. As may be seen, the ending portion of the edge 10 is provided with a part 19 with a thickness and a width being lower than the remaining edge 10. A projection 18 is present at the end lower side of the part 19 for locking the X-end on the corresponding and complementary W-end (see Fig. 1). W-end from Fig. 12 comprises a depressed ending portion 20 having a projection 21 at the upper side of the end with locking functions which cooperates with the projection 18 of the portion 19 of the X-end. Both these ends are on the side 3 and belong to the edge, i.e. of the engaging means 10, for holding possible water leakages for the use of the ventilated roof.

[0033] On the opposite side, side 4, the engaging means 9 have Y- and Z-ends which are illustrated in Figs. 14-16. In Figs. 14 and 15 the Y-end comprising a raised portion 21 relative to the remaining edge 9 is shown. A projection 22 is present at the end of the portion 21 with locking functions in the longitudinal direction which cooperates with a corresponding projection 23 being provided at the Z-end on the side 9 (Fig. 16). When two modular elements 1 are engaged with each other in the longitudinal direction, the X-and Y-ends of an element overlap at the W- and Z-ends, respectively, of an element already in-situ according to the diagram:

Z-Y on Z-Y on Z-Y
W-X on W-X on W-X

[0034] In the cross direction, the means 9 overlap the means 10 and therefore there will be the four ends overlapping one another in the following order (from the bottom): W-X-Z-Y.

[0035] Therefore, the four X-W-ends allow a locking both in the longitudinal and cross direction; Fig. 13 schematically shows the locking in the cross direction of the means 9 and 10.

[0036] In Figs. 1-4, a housing 24 for a pivot 25 being provided (Fig. 23) with a lower part 26 to be inserted into the housing 24 and an upper part 27 which, after it has been inserted, protrudes from the element 1 of a predetermined length in order to visually show the height of the concrete casting to be fed above the set of elements 1 is also shown. In fact, the pivot 25 is selected among a plurality of pivots having a different length of the portion 27 as a function of the desired thickness for the concrete layer.

[0037] Fig. 17 shows an element 1 in-situ in a prestressed reinforced concrete joisted floor 40. As may be seen, in this case the edges 9 and 10 do not have the function of side mutual engaging means but only of support means on the sides of the joists 40, whereas the lower upright wing 18 ensures that the element 1 is not transversally moved. Either a metallic or plastic profile

41 to which a layer 42 of polyurethane foam or a similar insulating material and, at the lower side of the foam, a plaster-holding element such as for example a zinc plated and stretched sheet 43, provided with a mesh being capable of holding a plaster layer indicated with the dashed line 44 is fastened, is fastened at the bottom of the element 1. The profile 41 is fastened by means of coupling stirrups 41a engaging with the slots 18a of the element 1. The profile 41 acts as a base onto which various types of false ceiling elements can be fastened.

[0038] The elements 1 are longitudinally aligned and are engaged with one another at the means 7 and 8, such as shown for example in Fig. 22, relating to an embodiment of a ventilated ground floor loose stone foundation.

[0039] In this embodiment a series of joists 50 support the modular elements 1, being aligned and linked in the same way to what has been described above, i.e. the X- and Y-ends of an element 1c overlap the W- and Z-ends of the element 1d and the X- and Y-ends of the element 1b overlap the W- and Z-ends of the element 1c and the X- and Y-ends of the element 1a overlap the W- and Z-ends of the element 1b in order to obtain the structure of modular elements in line and engaged with one another. As said, the modular elements 1 are laterally rested on the joists 50. The joists 50 are, in turn, supported by a structure comprising a plurality of arches being connected to one another and consisting of a base 32, a tube crop end 36 and a capital i.e. a "T-shaped" element 37, engaged with one another in the vertical direction, the T-shaped elements 37 being engaged with one another in the lateral direction.

[0040] The base 32 (Fig. 20) comprises a flat support portion 33 from which two concentric circular walls 34 and 34' defining an annular space 35 having the function of housing and holding an end of a tube crop end 36 of suitable diameter and thickness vertically extend at the upper side thereof. At least two portions 33a of a tubular shape extend from the base 33 for housing "C-bar" ends or similar engaging means 33c, which have to fasten two (or more) bases 33 to one another, as shown in Fig. 28. The opposite end, being not engaged at 35, acts as a housing at the lower end of the leg 38 of the T-shaped element 37 shown in Fig. 21. The "horizontal" part of the T shape is concave and is provided with mutual engaging means 39 and 48, so as to be capable of connecting various aligned T shapes to one another such as shown in Fig. 22. The means 39 and 48 are for example of a complementary "C" and "U" shape and are preferably provided with a pair of projecting teeth 48a which are to be inserted into corresponding housings 39a on the side of the means 39 of the adjacent element 37.

[0041] In the ground floor loose stone foundation from Fig. 22 the bases 32 are rested on two concrete stripes 46 with a low cement batching (150-200 kg/mc) and a T shape end is rested, i.e. is fastened, to a foundation wall 45. The joists 50 transversally extend between the two lines of arches and the modular elements 1 are rested on the joists. A structure of a ventilated ground floor loose stone foundation which is very effective and economical to be embodied is thus obtained.

[0042] Alternatively, the desired ground floor loose stone foundation structure can be obtained by directly resting the modular elements on the "capitals" 37, as shown in Fig. 24, thus avoiding the use of reinforced concrete joists. In order to maintain all the ground floor loose stone foundation components connected to one another, the elements are laterally engaged with the means 9 and 10 and are fastened to one another at the cross sides 5 and 6. The sides 5 and 6 are closed and provided with housings 51 into which the C-bar ends 52 (or of similar fastening elements) are inserted, which ensure a better seal along the longitudinal axis.

[0043] Fig. 22A shows a more general view of the structure from Fig. 24; similar references are used for like elements in Figs. 22, 24 and 22A.

[0044] In both the embodiments shown, when the concrete casting is carried out, after the structure has been reinforced, the concrete will fill up the tube crop ends 36 and the T-shaped capitals 37, in order to provide a structure extremely solid and suitable to the loads which it will have to support.

[0045] Fig. 22 also shows the use of the elements 1 as insulating means for the foundations 45. To this purpose the elements 1 are aligned and engaged with one another in a similar way to what has been described above, with the difference that in this case they are vertically aligned in seven lines 1e-1m; each line is engaged with the adjacent lines by overlapping the means 9 above the means 10 such as described above (Fig. 2 and Fig. 3). Thereby, a "bi-dimensional" structure 49 extending on the foundation wall 45 for protecting and insulating the latter is obtained. The lower ends of the elements 1 are housed in the elements 28 provided with a grating 29 shown in Fig. 18, thus engaging the housing 28a which has a shape corresponding to the profile of the element 1 with which it has to cooperate. The grating 28 has another housing 28c (being embodied by four pairs of tongues in the example) with a function which is similar to the housing 28a on the opposite side of the same grating so as to be also capable of acting as a connecting element between two elements 1 in an upright position; therefore, the appendixes 28b of the grating 28 can be used as wall anchor points of the insulating structure. The grating 28 is, in turn, mounted on conduits 47 for water outlet being optionally present between elements 1 and foundation 45. An advantage of this ventilation system is that the inside of the building can be connected to the space between elements 1 and foundation wall, by making a hole in the wall 45; thereby, the inside is put in communication with the outside through the "duct" formed by the stacked elements 1 (the latter are in communication with the outside in the upper part thereof).

[0046] The elements 1 being vertically stacked as above may be used as a protection either for release pipes or the like, within the building.

[0047] In order to obtain a continuity of the structure,

angle sections being provided with engaging means for the sides 9 and 10 of the modular elements, for example teeth and grooves 58 and 59 are used at the corners or edges. Furthermore, the structure 49 with modular elements being height and width linked can be advantageously used for providing ventilated roof floors. In this case the structure is situated on the floor and acts as a base for a concrete layer on which the tiles are rested. The closure element 28 shown in Fig. 18 and provided with a grating 29 serving to close the access to the space between elements 1 and floor though maintaining the ventilation of the latter. On the other hand, the closure element 30 such as shown in Fig. 19 serves to close the ends of a line of elements 1, for example the elements 1a-1d from Fig. 22, and preventing that the concrete may penetrate into the non-closed ends. A series of break lines 31 allow to obtain, if desired, apertures either of a longer or shorter diameter according to the duct which optionally has to pass beneath the elements. In order to maintain the elements coupled with one another and with the wall there is provided the use of plates or stirrups (not shown) which can be fastened either to the foundation wall or the roof floor and which are provided with teeth or similar engaging means of modular elements; the plate or stirrup teeth, being usually four, engage the slots 18a located at the ends of the modular elements (shown in Figs. 1-6) in order to hold the angles of four adjacent modular elements on the wall.

[0048] Figs. 25-27 show two accessories for the use with the elements according to the invention.

[0049] In Fig. 25 and Fig. 26 a junction element 54 is shown with an H-shaped section having the object to connect two pieces of element 1 (or 9) to each other when the latter has been cut for example longitudinally in order to be adapted either to the floor or ground floor loose stone foundation sizes. Tongues 55 having the function of engaging the edges of the two portions of modular element 1 (or 9) extend within the walls of the junction element 54. Fig. 27 shows a support 56 for the side of the element 1 being provided at the end of the sequence of modular elements in-situ and not resting on a joist, the object of the support 26 being to compensate for the height difference and to hold the element 1 horizontal. The grating 57 being provided in the lower side has the object to allow the cast concrete to reach the element lower side and thereby to be useful for allowing the plaster to be held more easily.

Claims

1. A modular element (1) for the use in buildings as a lightening, insulating or ventilation element, said element having a longitudinal axis (B-B) and a cross axis (A-A), a substantially C-shaped section with an upper wall (2) and two longitudinal solid sidewalls (3,4), means (7-10) for being engaged with other modular elements, said means being arranged at least along said longitudinal walls (3,4) and a plurality of ribs (11) located parallel to one another transversally to said element, **characterized in that** the element upper wall (2) is provided with an upright flat rib (14) extending along said longitudinal axis, said upright flat rib (14) connects said plurality of parallel, transversal ribs (11) and the upper edge of said upright flat rib extends above the upper wall (2) and the parallel, transversal ribs (11) of the element such that said upright flat rib (14) has both the function of stiffening and means for maintaining an optional iron rod grid forming the reinforcement for the concrete casting above the elements slightly raised.

2. The modular element according to claim 1, wherein said engaging means with other modular elements are further transversally present on the two element ends.

3. The element according to 1 or 2, wherein said ribs (11) have a trapezoidal section, along the device longitudinal axis (B-B), with the smaller base located at the upper wall (2) of said element.

4. The element according to one of the preceding claims, **characterized in that** it is open on both cross sides.

5. The element according to one of the preceding claims, wherein said sidewalls (3,4) are provided with at least one predetermined break line (16) for providing at least one aperture (15).

6. A system for manufacturing ground floor loose stone foundations in buildings, comprising: a modular element (1) according to any preceding claims, a tube crop end (36), a support element on the ground having means for housing an end of said tube crop end, a T-shaped element (37) in which the leg lower end of said T shape can be housed in said tube crop end.

7. Use of an element according to one of claims 1 to 6 for insulating foundations of building structures.

8. The use of an element according to one of claims 1 to 6 for insulating and ventilating roofs of building structures.

Patentansprüche

1. Modulares Element (1) für den Einsatz in Gebäuden als Element zur Gewichtsverringerung, Isolierelement oder Lüftungselement, wobei das Element eine Längsachse (B-B) und eine Querachse (A-A) aufweist, einen im Wesentlichen C-förmigen Querschnitt mit einer oberen Wandung (2) und zwei längs verlaufenden, stabilen Seitenwandungen (3, 4),

Hilfsmittel (7-10) zum Eingreifen in andere modulare Elemente, wobei die Hilfsmittel zumindest entlang den Längswandungen (3, 4) angeordnet und mehrere Rippen (11) parallel zueinander und quer zu dem Element angeordnet sind, **dadurch gekennzeichnet, dass** die obere Wandung (2) des Elements mit einer aufrechten flachen Rippe (14) versehen ist, die entlang der Längsachse verläuft, diese aufrechte flache Rippe (14) die mehreren parallelen Querrippen (11) verbindet, und die Oberkante der aufrechten flachen Rippe oberhalb der oberen Wandung (2) und der parallelen Querrippen (11) des Elements verläuft, so dass die aufrechte flache Rippe (14) sowohl die Funktion einer Versteifung aufweist als auch als Hilfsmittel dazu dient, ein gegebenenfalls vorhandenes Rundstahlgitter, das die Verstärkung für den Betonguss über den Elementen bildet, leicht angehoben zu halten.

2. Modulares Element nach Anspruch 1, wobei die in andere modulare Elemente eingreifenden Hilfsmittel des Weiteren quer an den beiden Elementenden vorhanden sind.

3. Element nach Anspruch 1 oder 2, wobei die Rippen (11) einen trapezförmigen Abschnitt entlang der Längsachse (B-B) der Vorrichtung aufweisen, wobei die kleinere Basis sich an der oberen Wandung (2) des Elements befindet.

4. Element nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** es an beiden Querseiten offen ist.

5. Element nach einem der vorstehenden Ansprüche, wobei die Seitenwandungen (3, 4) mit wenigstens einer Sollbruchlinie (16) zur Bereitstellung wenigstens einer Öffnung (15) versehen sind.

6. System zur Herstellung von Lockerstein-Erdgeschossfundamenten in Gebäuden, umfassend: ein modulares Element (1) nach einem der vorstehenden Ansprüche, ein Rohrabschnittende (36), ein Trägerelement am Boden mit Hilfsmitteln zur Aufnahme eines Endes des Rohrabschnittendes, ein T-förmiges Element (37), wobei das untere Fußende der T-Form im Rohrabschnittende untergebracht werden kann.

7. Verwendung eines Elements nach einem der Ansprüche 1 bis 6 zur Dämmung von Fundamenten in Bauwerken.

8. Verwendung eines Elements nach einem der Ansprüche 1 bis 6 zur Dämmung und Belüftung von Dächern von Bauwerken.

Revendications

1. Elément modulaire (1) à utiliser dans les immeubles comme un élément d'éclairage, d'isolation ou de ventilation, ledit élément ayant un axe longitudinal (B-B) et un axe transversal (A-A), une section sensiblement en forme de C avec une paroi supérieure (2) et deux parois latérales solides longitudinales (3, 4), des moyens (7, 10) destinés à être mis en prise avec d'autres éléments modulaires, lesdits moyens étant disposés au moins le long desdites parois longitudinales (3, 4), et une pluralité de nervures (11) situées parallèlement les unes aux autres transversalement audit élément, **caractérisé en ce que** la paroi supérieure de l'élément (2) est dotée d'une nervure plate verticale (14) s'étendant le long dudit axe longitudinal, ladite nervure plate verticale (14) reliant ladite pluralité de nervures transversales, parallèles (11) et le bord supérieur de ladite nervure plate verticale s'étendant au-dessus de la paroi supérieure (2) et des nervures transversales parallèles (11) de l'élément, de sorte que ladite nervure plate verticale (14) ait à la fois une fonction de renfort et des moyens pour maintenir une grille en tige de fer en option formant le renfort pour le coulage en béton au-dessus des éléments légèrement surélevés.

2. Elément modulaire selon la revendication 1, dans lequel lesdits moyens de prise avec d'autres éléments modulaires sont en outre transversalement présents sur les deux extrémités de l'élément.

3. Elément selon la revendication 1 ou 2, dans lequel lesdites nervures (11) ont une section trapézoïdale, le long de l'axe longitudinal du dispositif (B-B), la base plus petite étant située au niveau de la paroi supérieure (2) dudit élément.

4. Elément selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il est ouvert sur les deux côtés transversaux.

5. Elément selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdites parois latérales (3, 4) sont dotées d'au moins une ligne de rupture prédéterminée (16) pour fournir au moins une ouverture (15).

6. Système de fabrication de fondations en pierre au niveau du sol dans les immeubles, comprenant : un élément modulaire (1) selon l'une quelconque des revendications précédentes, une extrémité de jabot tubulaire (36), un élément de support sur le sol ayant des moyens pour abriter une extrémité de ladite extrémité de jabot tubulaire, un élément en forme de T (37) dans lequel l'extrémité inférieure de la patte de ladite forme de T peut être abritée dans ladite extrémité de jabot tubulaire.

7. Utilisation d'un élément selon l'une quelconque des revendications 1 à 6, pour isoler les fondations de structures d'immeubles.

8. Utilisation d'un élément selon l'une des revendications 1 à 6 pour isoler et ventiler les toits des structures d'immeubles.

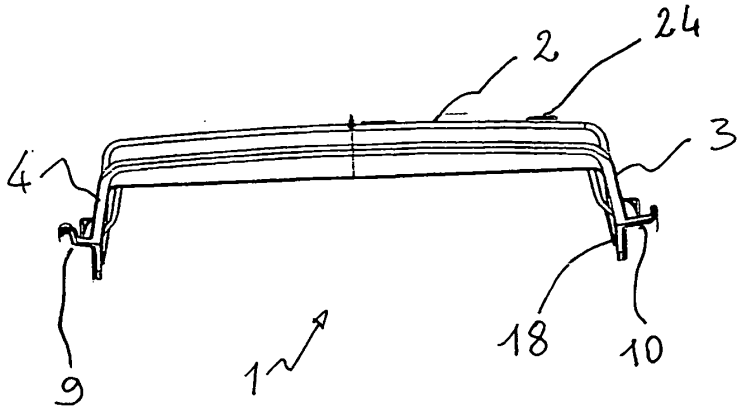


Fig. 2

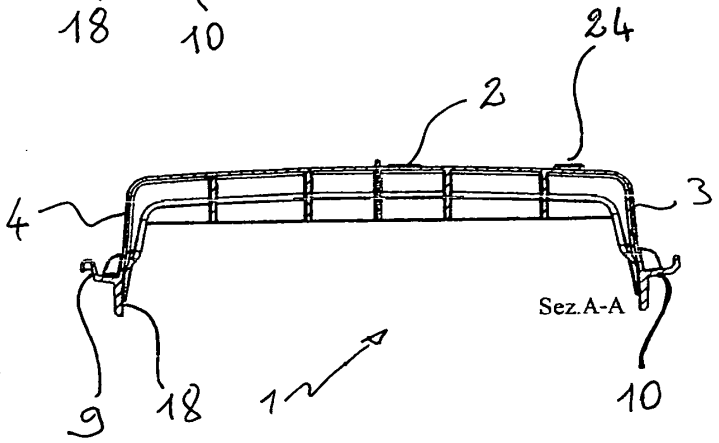


Fig. 3

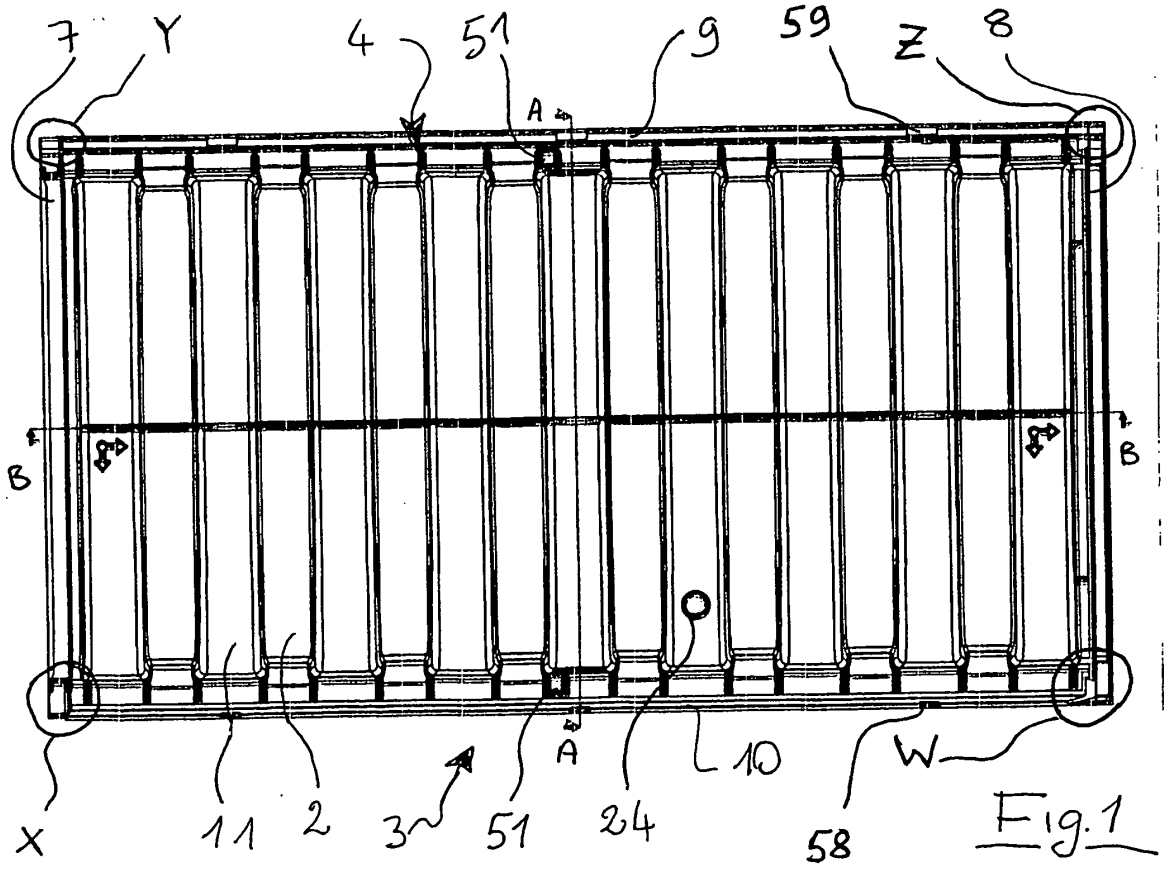


Fig. 1

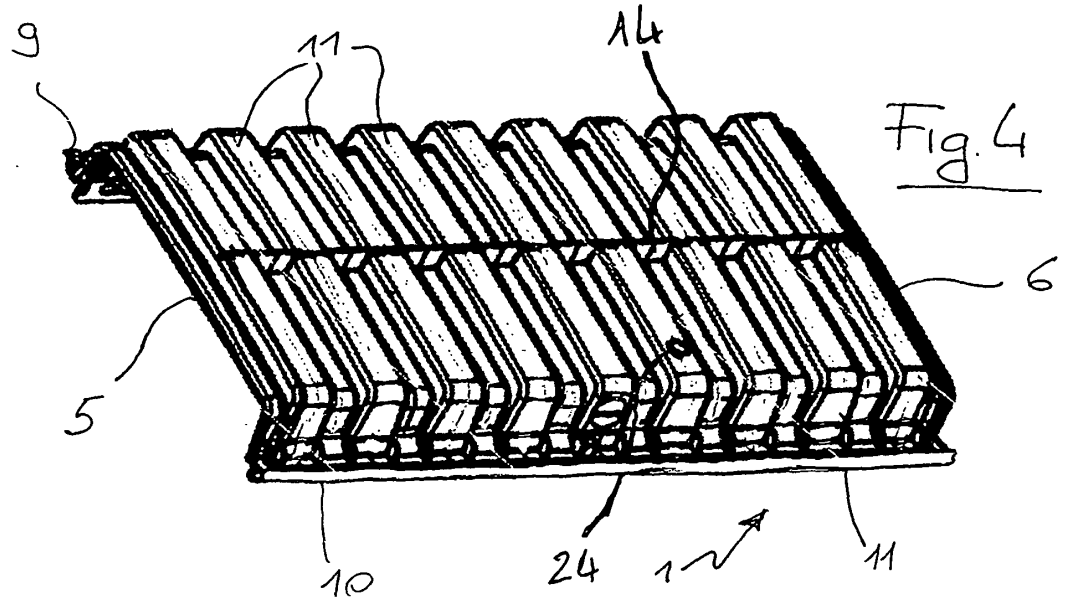


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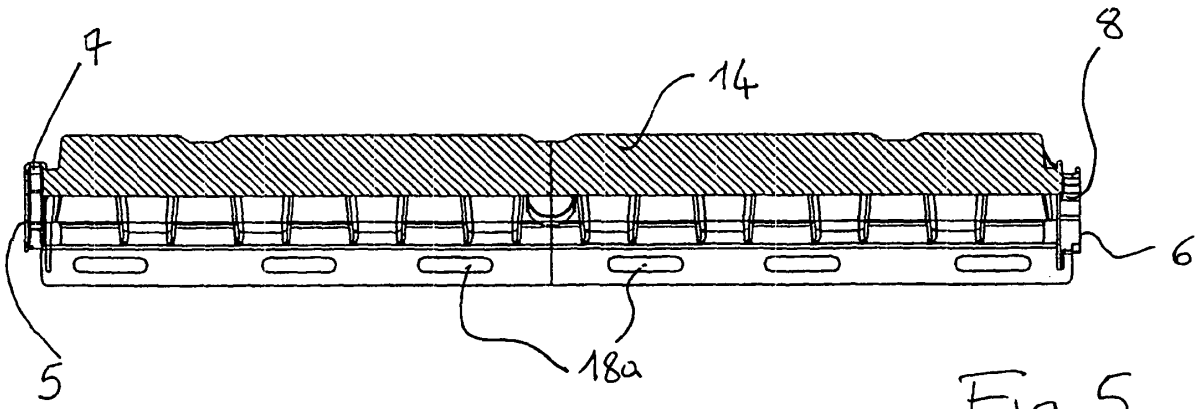


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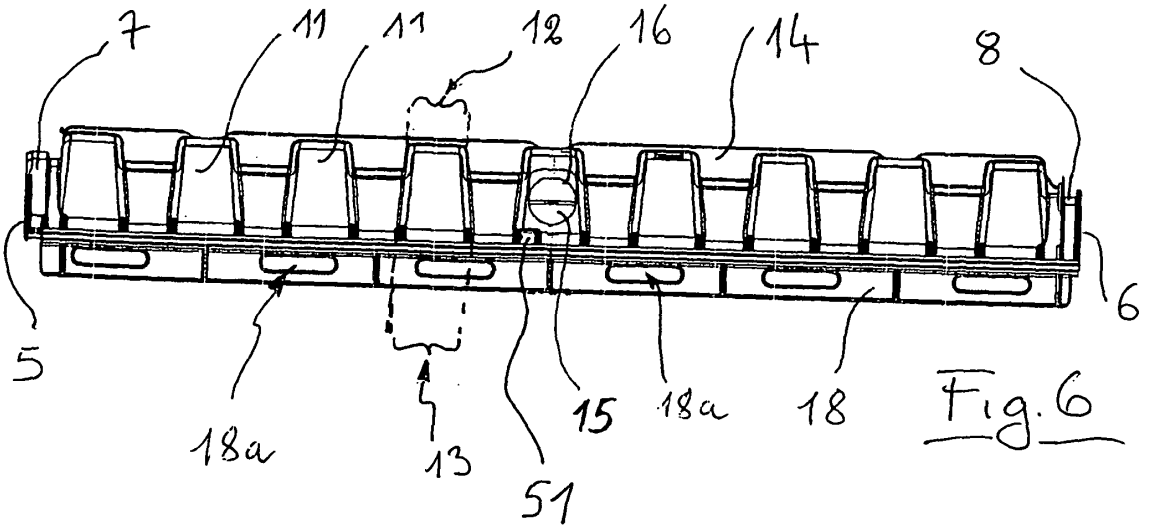


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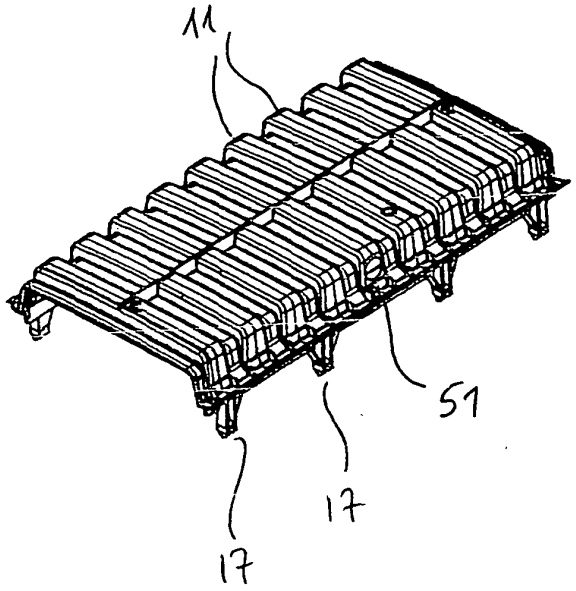


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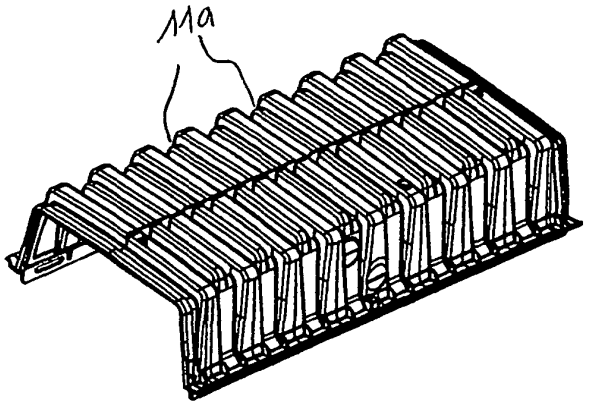


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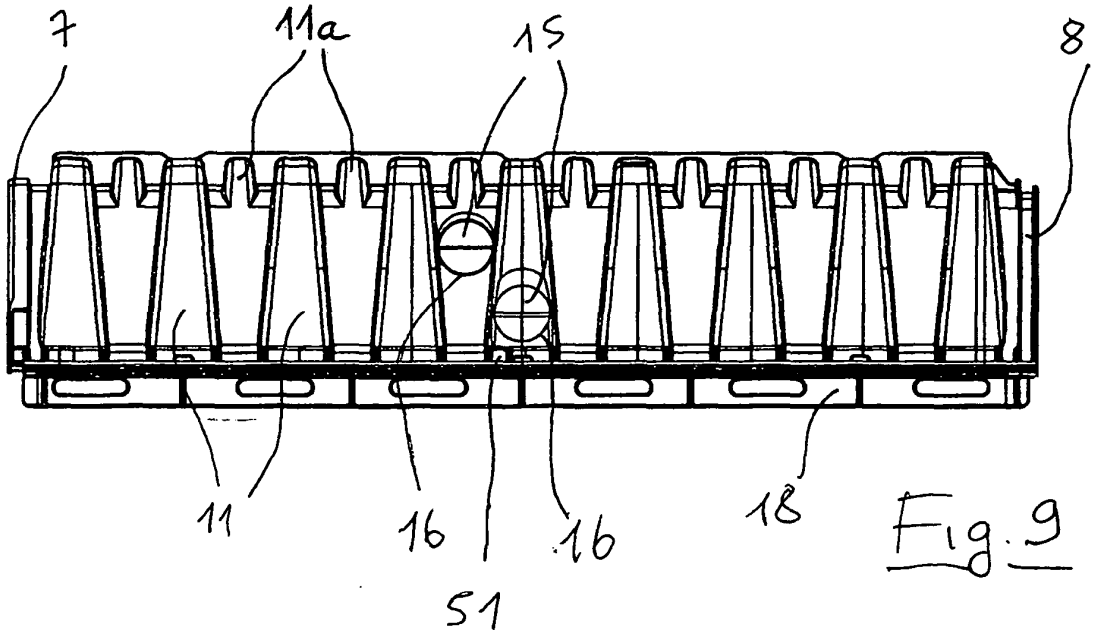


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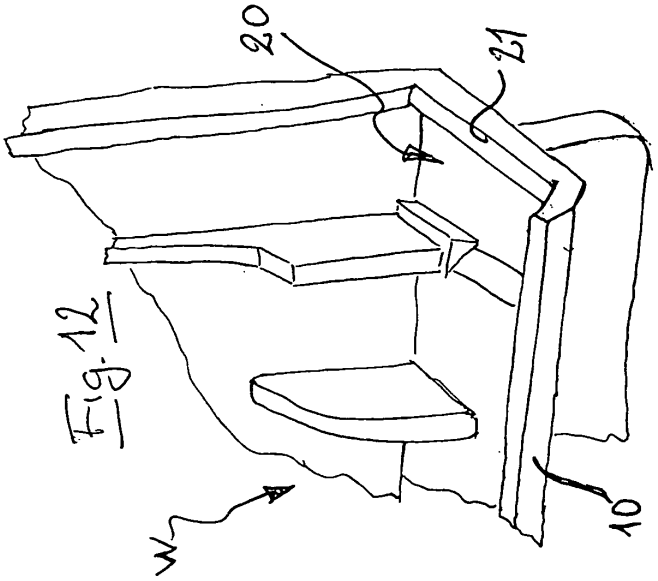


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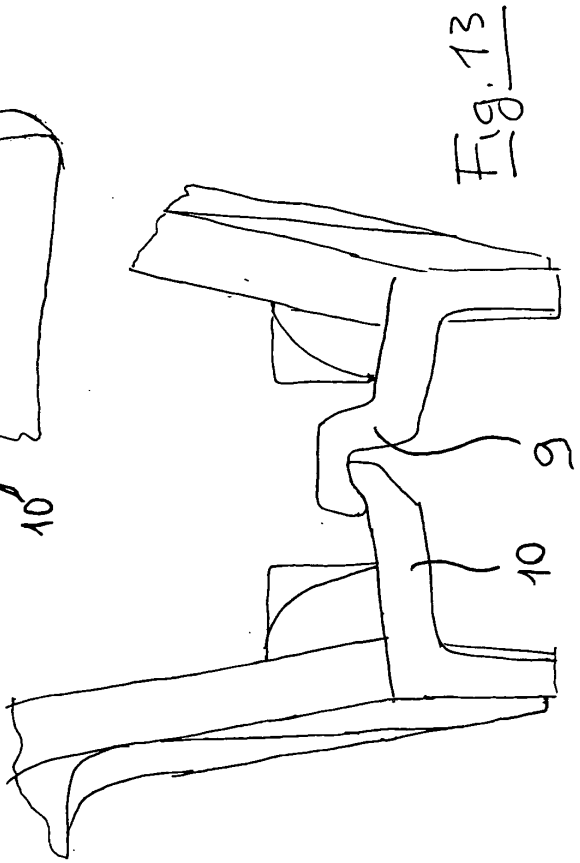


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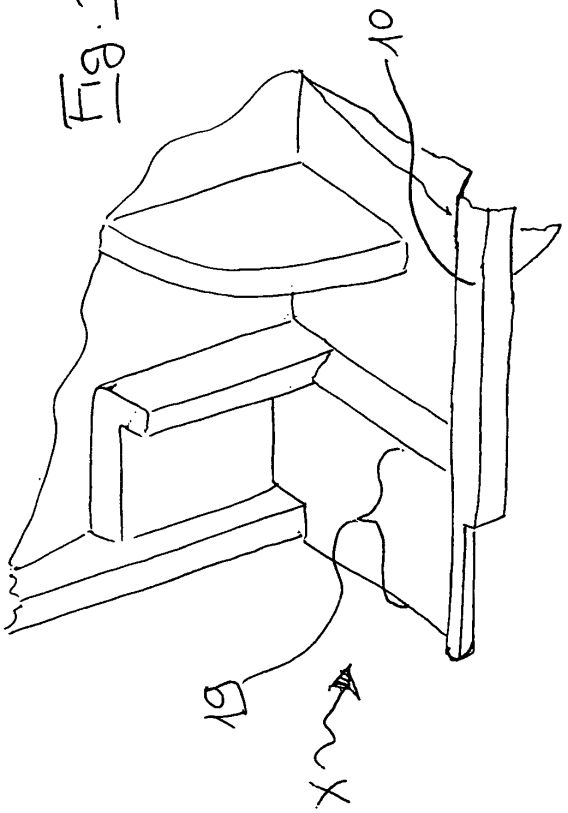


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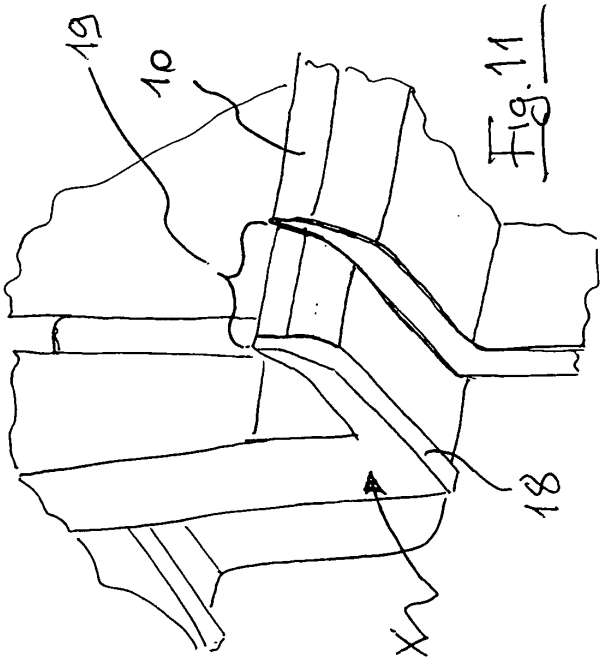


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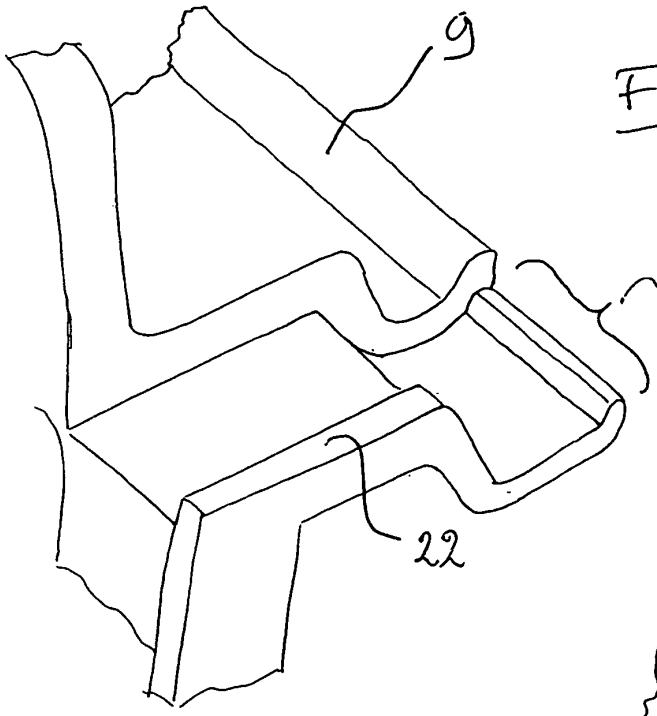


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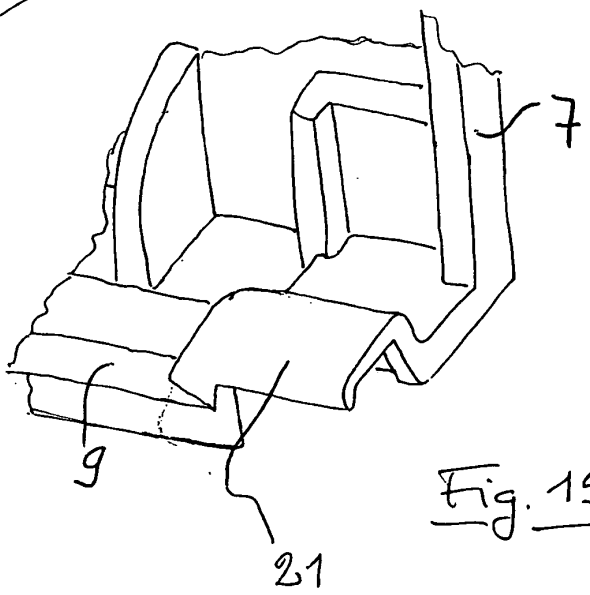


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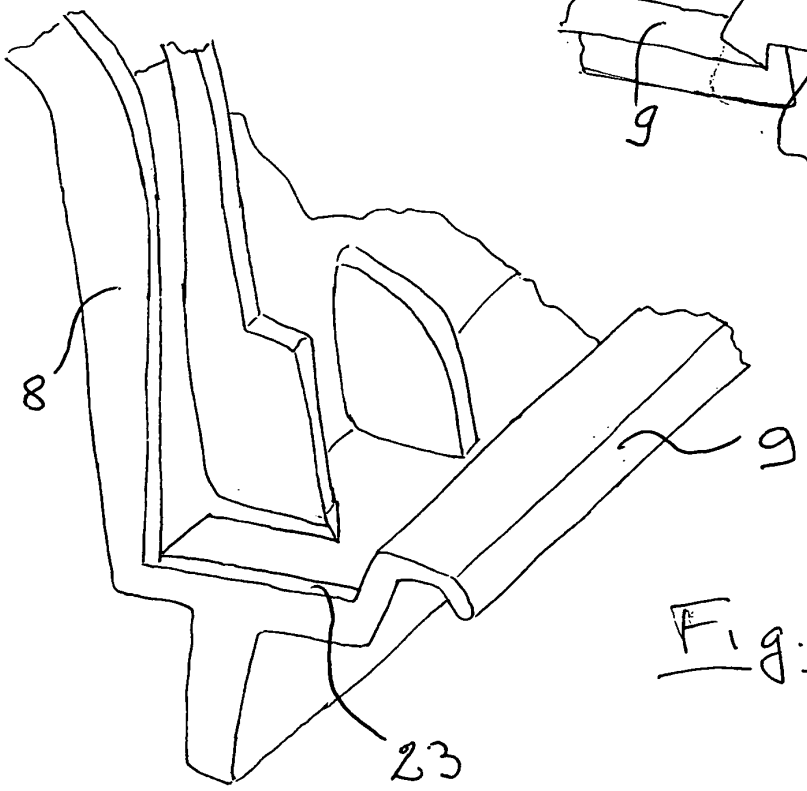


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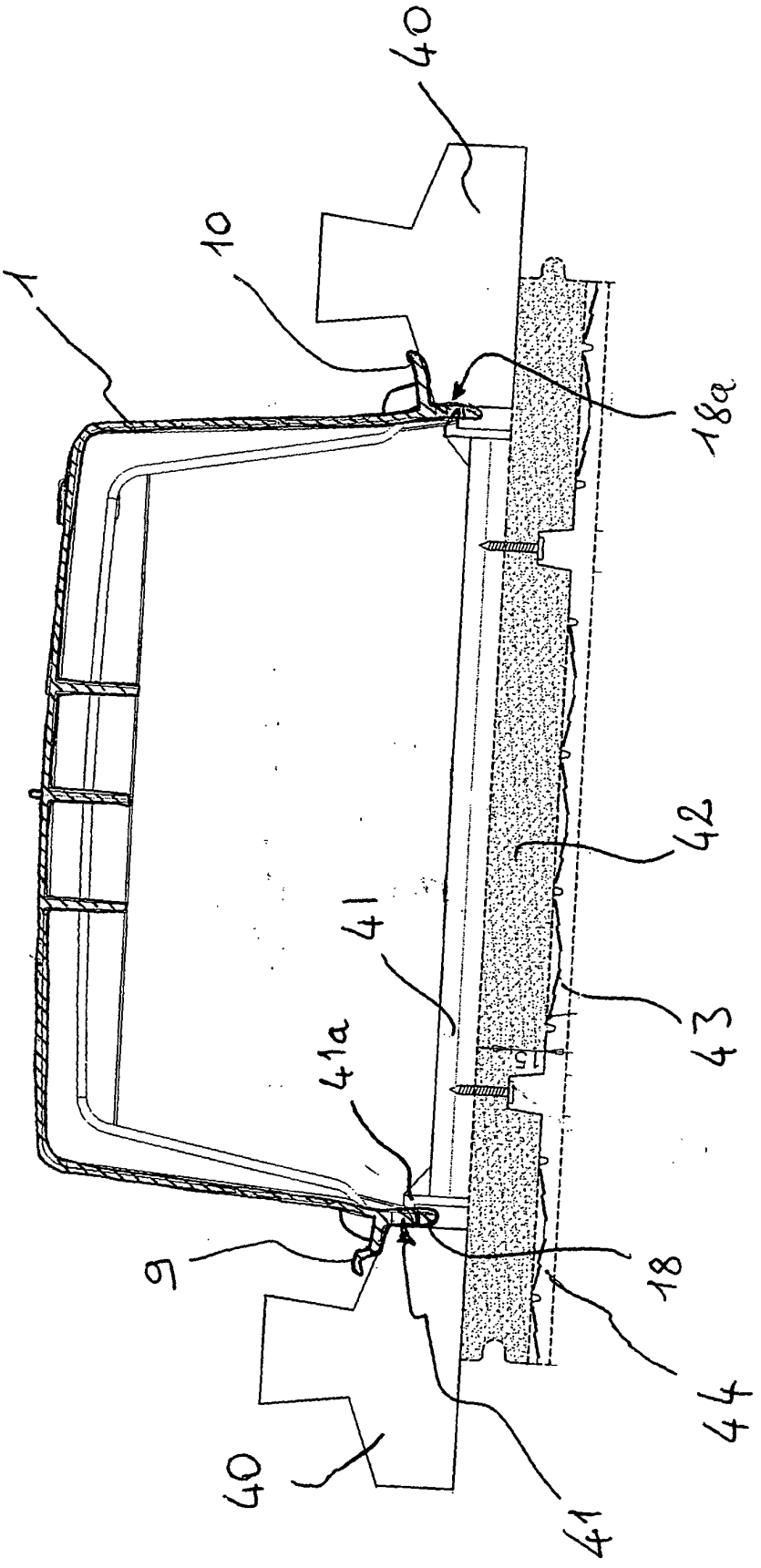


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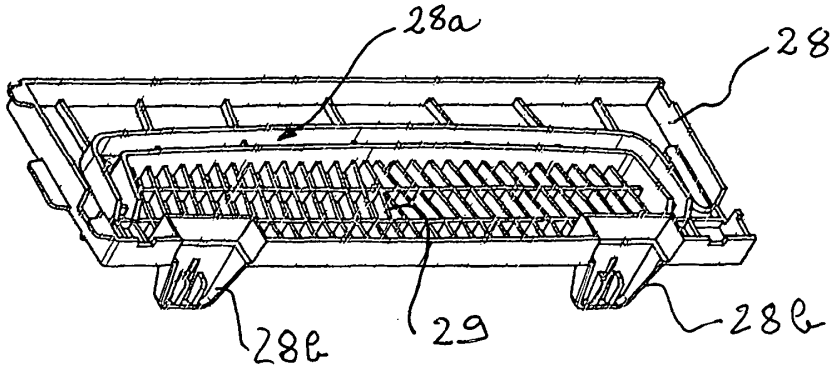


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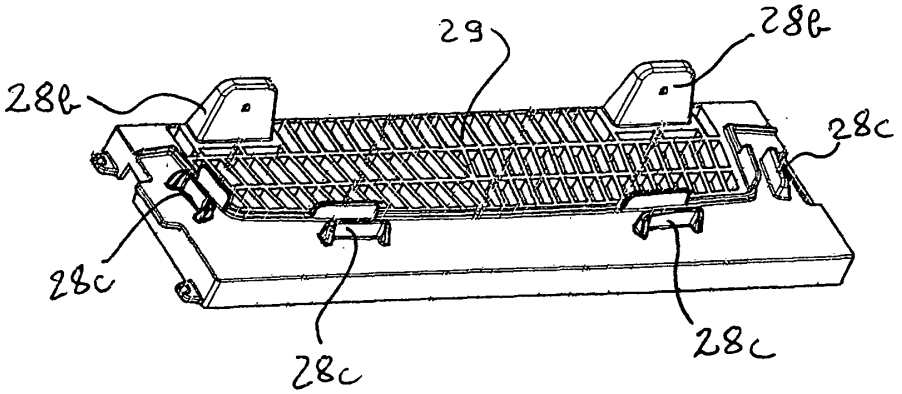


Fig. 18A

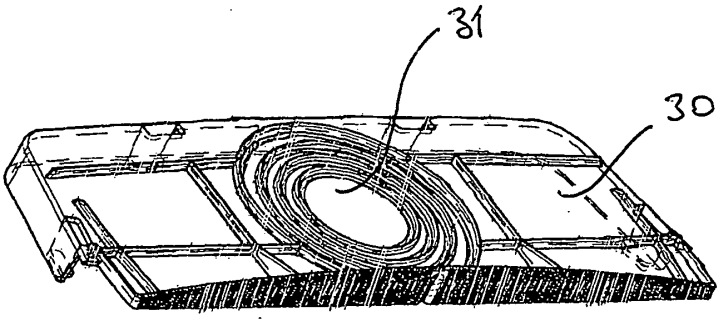


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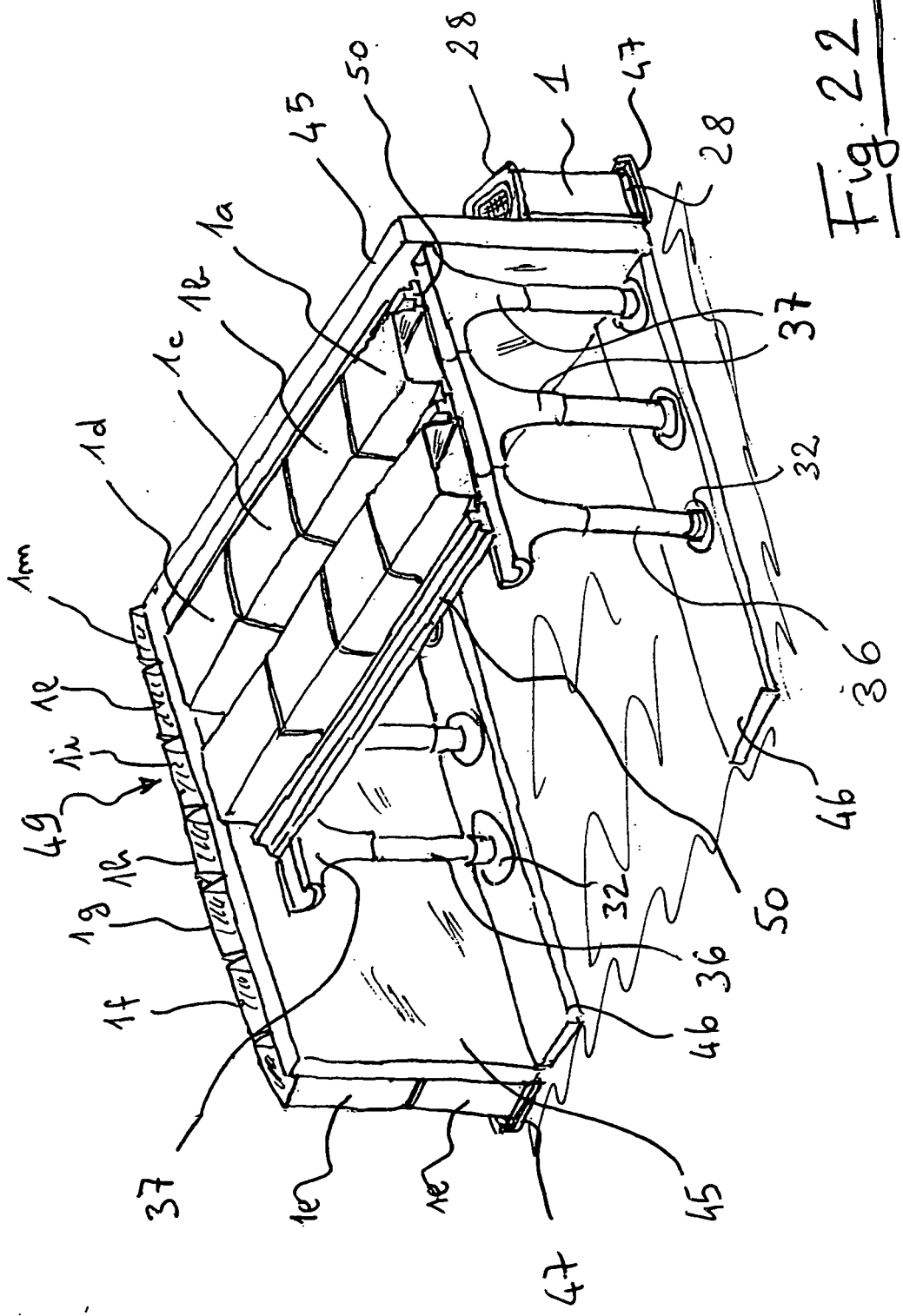


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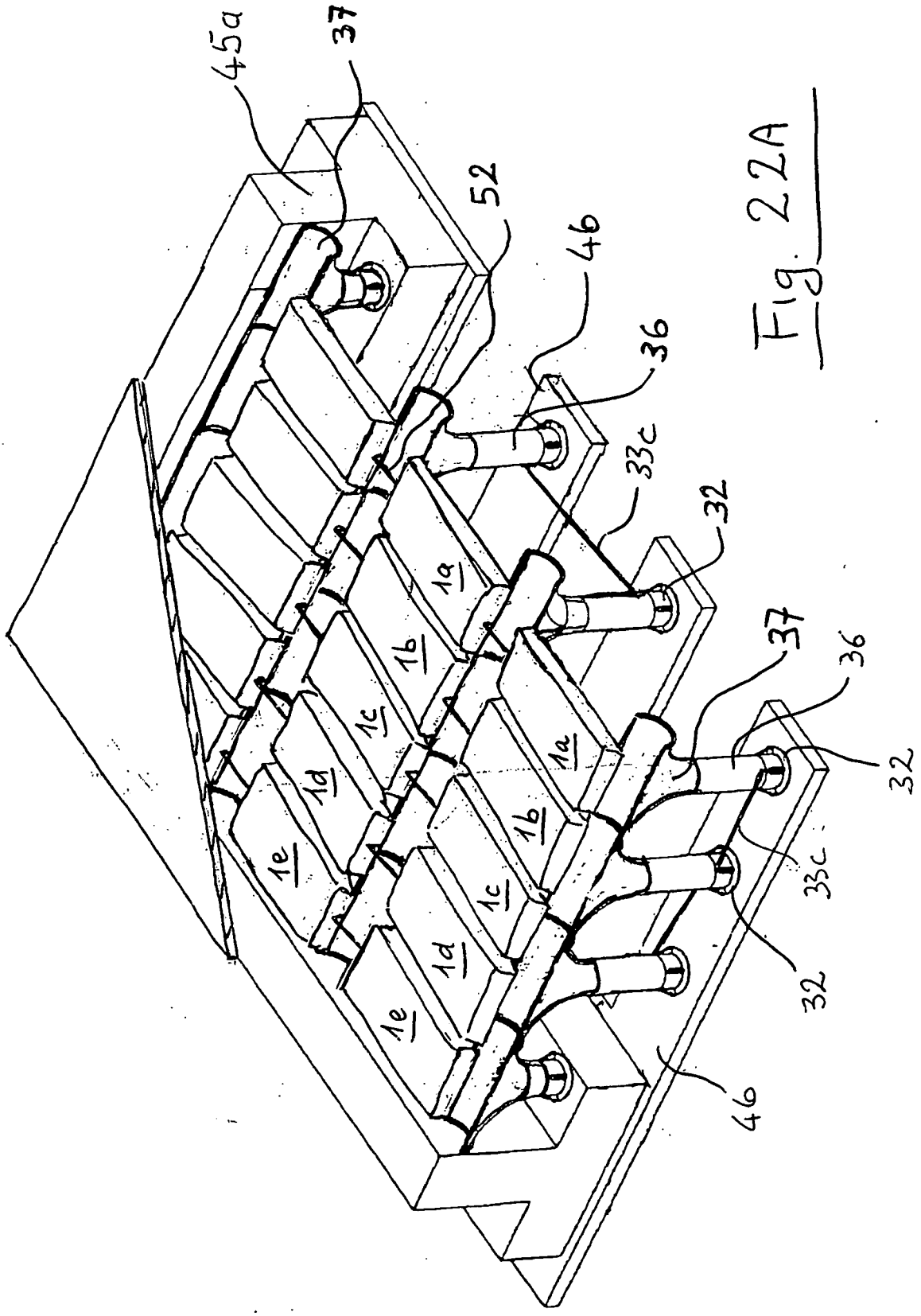


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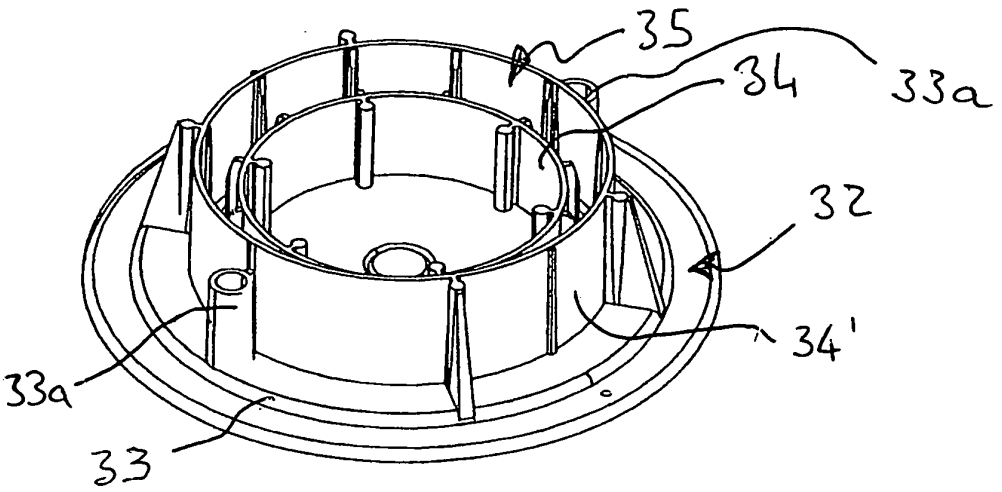


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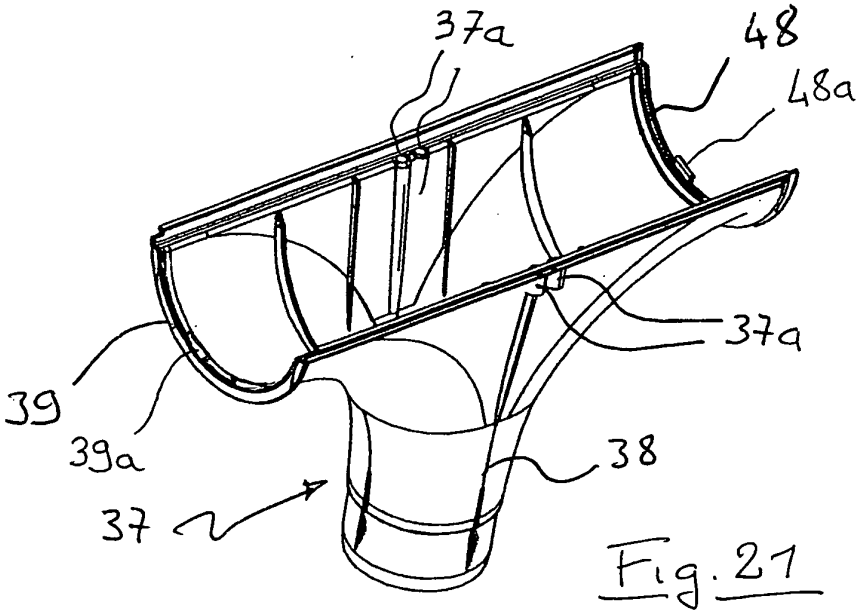


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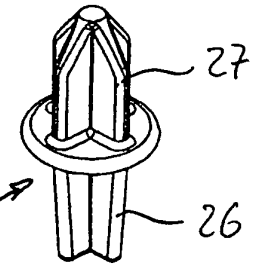


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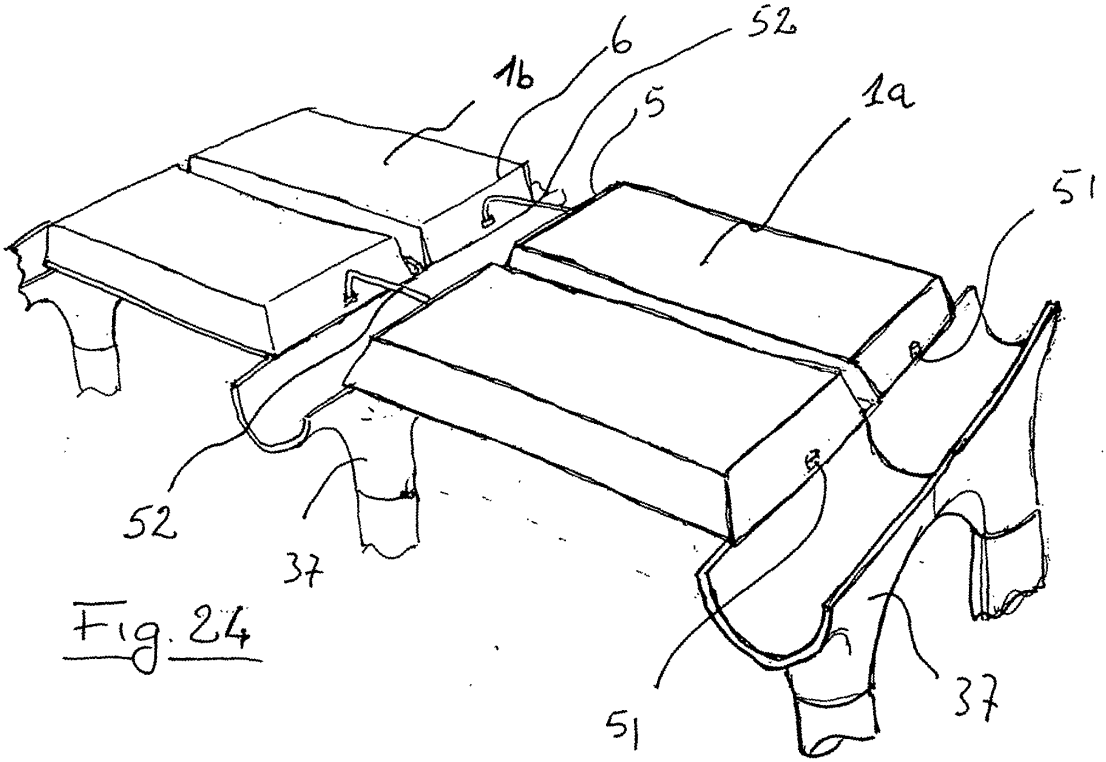


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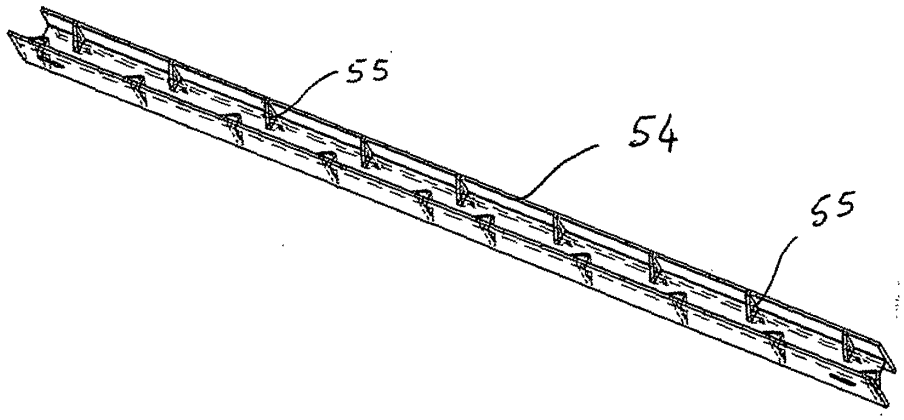


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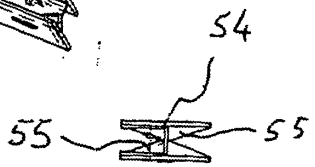


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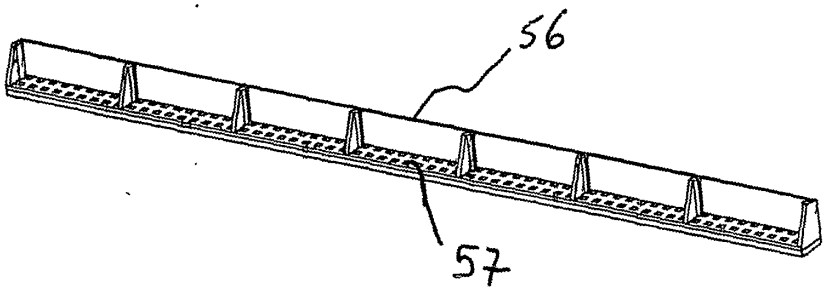


Fig. 27

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Patent documents cited in the description

- EP 0803618 A **[0004]**
- FR 2858343 **[0005]**