(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 261 096 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.10.2023 Bulletin 2023/42

(21) Application number: **22305527.8**

(22) Date of filing: **12.04.2022**

(51) International Patent Classification (IPC):
B61D 17/10 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B61D 17/10

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) FIXATION SYSTEM FOR FASTENING AN OBJECT TO A FLOOR OF A VEHICLE AND METHOD FOR FASTENING

(57) The invention relates to a fixation system (1000) for fastening an object (600) to a floor (1), especially a floating floor (1), of a vehicle in amounting position flexibly chosen in affixation area comprising: said floor (1) with a continuous unbroken floor cover (400); said object (600); and at least one fixation element (800); wherein said object (600) comprises at its bottom a fastening element (700) not protruding beyond said object's (600) outer faces (640, 660), said fastening element (700) comprising an oblong hole (720), wherein said floor (1) comprises at least one floor panel (100) with an insert (300) flush with the surface (210) of the floor panel body (200) of said at least one floor panel (100); wherein the surface (210) of the floor panel body (200) is covered by the continuous unbroken floor cover (400), said insert (300) comprising a plurality of fixation element receptacles (370) at different point-localized positions for receiving said fixation element (800) inserted through the oblong hole (720) of the fastening element (700) and a hole in continuous otherwise unbroken floor cover (400), in order to clamp the fastening element (700) of the object (600) to the floor (1) in a tightened position of the fixation element (800). In one Embodiment the said floor fixation system (1000) further comprises a jig (500), said jig (500) comprising an arrangement of alignment holes (570) corresponding to the plurality of fixation element receptacles (370) and wherein said at least one floor panel (100) and said jig (500) comprise mating alignment elements (394, 395, 594, 595) for a mechanically aligning said jig (500) with respect to said at least one floor panel (100), and wherein one of the alignment holes (570) is centered with each of the plurality of fixation element receptacles (370) when the jig (500) is mechanically aligned. The invention further relates to a method for fixing an object (600) to a floor (1).

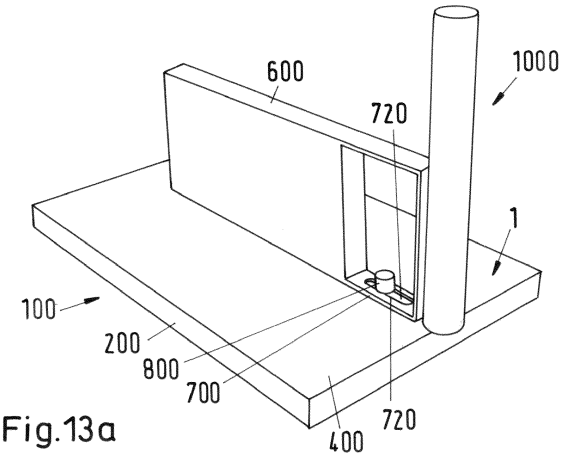

Fig.13a

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Description

[0001] The invention relates to a fixation system for fastening an object, such as a fixture, especially a partition wall, a hand bar or alike, to a floor, in particular to a floating floor in a rail vehicle or other vehicle, as well as the method for fastening such an object to a floor.

[0002] It is common to subdivide the car body of a vehicle in its interior to provide for separate compartments or subdivide the space into different areas.

[0003] EP 3 865 366 A1 relates to a public transport vehicle, in particular a rail vehicle, comprising at least one passenger reception room bounded by at least first and second side walls, a ceiling and a floor. The reception room is arrangeable between an open configuration and a compartmentalized configuration wherein the reception room comprises at least one removable partitioning device extending between the side walls. The partitioning device comprises at least: - a support structure, - at least one partition removably mounted on the support structure, and - a panel movable between a plurality of positions, including a closed position in which the panel completely closes a through opening.

[0004] JP2009041240A is related to a partition structure applied to partition an indoor space such as a house or an office into a room or space having a desired size by a partition material such as a partition panel or a sliding door, particularly for a lower (floor side) partition. The partition material is built between the rail members provided on the ceiling side and the floor side.

[0005] EP 1 657 134 A1 relates to a component for the fastening of components such as passenger seats, partitions or similar to the supporting floor structure of a railway carriage has two rail-form components interconnected by a layer of elastic material, whereby the top component has an extension penetrating the layer of elastic material and engaging in the bottom component. The extension and the lower component are formed in such a way that an upper stop is formed to limit the upwards movements of the upper component.

[0006] CN108819968 (A) relates to a fixing structure of a novel sleeping carriage berth wherein in a side wall end fixing structure, a T-shaped connecting piece is connected to a side wall steel structure, the other end of the T-shaped connecting piece is fixedly connected with an aluminum honeycomb transverse partition wall, and after installation, force of the berth and a passenger can directly act on the side wall steel structure; and in a corridor end fixing structure, the aluminum honeycomb transverse partition wall and an aluminum honeycomb corresponding partition wall are connected through an aluminum profile upright, the lower portion of the aluminum profile upright is fixed to a floor, the upper portion of the aluminum profile upright is fixed to a vehicle roof, after installation, the force of the berth and the passenger can directly act on the aluminum profile upright, and lightening holes are formed in the main portion of the aluminum profile upright. The berth can be fixed safely and reliably, fireproof boards bonded to the two sides of each aluminum honeycomb partition wall can be prevented from cracking due to stress. The T-shaped connecting pieces protrude with respect to the faces of the partition wall.

[0007] KR20090007261U relates to a partition fixing structure for a train, and more specifically, in order to efficiently partition and install a passenger compartment and a cab inside a vehicle located at the head of the moving direction of the train, it is possible to simplify the configuration and work. It is an object of KR20090007261U to provide a partition fixing structure for a train that can make the partition fixing work easier and reduce cost by reducing man-hours and parts needed, and can make the appearance more beautiful. In order to achieve these objectives, KR20090007261U provides a partition fixing structure for a partition installed on the floor to divide the passenger compartment and the cab of the train, one side facing the passenger compartment and the other side facing the cab. The partition, which is a partition wall, has at its lower end a narrowed portion inserted into an extension piece, which a bracket for receiving the narrow end of the partition wall. The extension piece has at its bottom a plate-like shaped support accommodating a groove on each side of the bracket. The support plate is in direct contact with a floor fixed to the underframe of the floor. Thus, the support structure protrudes with respect to the partition wall faces, even though it might be coved by a floor cover raised on each side of the partition. This type of installation requires that the floor cover is installed after the partition has been mounted. Further the area covered by the floor cover is increased.

[0008] These installations are carried out before the floor with its final floor cover has been installed. As the floor cover provides a waterproof seal of the floor, it is desired to have a continuous preferably unbroken floor cover. A floor cover is considered to be uninterrupted and unbroken and continues when it does not have any punctures holes or other penetrations not filled and/or sealed by other devices or material.

[0009] To improve the appearance of the interior of rail vehicles it has become common to seal large areas with the continuous floor cover. This fulfills technical needs with regard to sealing the floor against water, dust, etc. as well as design needs. A continuous floor cover reinforces the impression of spaciousness. Further, it is beneficial to reduce the thickness of any objects to fulfill design aspects as well as to maximize the space for passengers and/or luggage.

[0010] Even though rail vehicles are manufactured to high precision it is necessary to provide for certain tolerances, especially in the finishing of the interior. Therefore, it is preferential to have a floating floor which floats with respect to the support structure of the rail vehicle body. Especially when mounting objects being fixtures like partition walls that are fixed to the floating floor as well as to parts of the rail vehicle with regard to which the floor floats, the exact position for fastening such a

fixture to the floor cannot be determined precisely beforehand. Thus, the position is chosen flexibly at the time of mounting the object, i.e., the fixture.

[0011] Nevertheless, for fulfilling certain stability criteria it is necessary to provide certain mounting structures for example receptacles for fixation elements like threaded screws, etc. like threaded holes, etc. upon manufacturing the floor or floor components like floor panels. According to the prior art, in order to expose these receptacles, the floor cover is penetrated during the process of manufacturing the floor. For fixtures with a small contact area with the floor or limited extension, for example for partition walls perpendicular to their wall faces, protruding base parts and covers have been used in the prior art in order to achieve an overlap of the fixture with such a pre-manufactured receptacle or other mounting device.

[0012] It is an object of the present invention to improve the fixation of objects to floors, especially floating floors, in vehicles having a floor with the continuous, unbroken floor cover, especially in situations where the exact mounting position is variable.

[0013] The objective is met by a fixation system for fastening an object to a floor, especially a floating floor, with the features of claim 1 and a method for fastening an object to a floor, especially a floating floor preferably in a vehicle, with the features of claim 9. Further advantageous embodiments are defined by the dependent claims.

[0014] The basic idea of the invention is to provide an insert in a panel body of at least one floor panel. The insert comprises a plurality of fixation element receptacles like threaded holes or female parts of a bayonet lock, etc. The insert is preferably flush with the top surface of the panel body of the at least one floor panel. The insert is covered by a continuous and unbroken floor cover. The insert is located in the at least one floor panel such that the insert is located in the final floating floor in an area where an object is to be attached to the preferably floating floor. The insert comprises a plurality of such receptacles which are point-localized. Thus, they provide good stability for the final mounting. The receptacles are provided in a plurality of positions where the final mounting of the object to the floor can be performed due to the floating of the floor. A fastening element of the object comprises an oblong hole to receive a fixation element that can be tightened in one of the receptacles to clamp the fixation element or a part thereof. Preferably, the oblong hole and the arrangement of the receptacles are such that the oblong hole has a complete overlap with one of the receptacles in each possible mounting position associated with the insert. The insert can be prefabricated. This ensures a good stability and structural strength of the fixation element receptacles. Even though the floor has only a limited thickness one tightened fixation element might suffice to fasten the respective object. For this reason, point-localized receptacles are superior to fixation systems using rail form components. Point-localized receptacles are receptacles that define a point at which they receive a fixation element. Thus, the fixation element received by one of the point-localized receptacles can transfer forces to the floor acting in any direction parallel to the floor. This way a form-fit connection is realized.

[0015] Thus, according to one embodiment the fixation system for fastening an object to a floor, especially to a floating floor, at a flexibly chosen mounting position in a fixation area comprises

said floor with a continuous and unbroken floor cover,
said object,
and at least one fixation element,
wherein said object comprises at its bottom a fastening element not protruding beyond said object's outer face or outer faces, said fastening element comprising an oblong hole, wherein said floor comprises at least one floor panel with an insert flush with the surface of the floor panel body of said at least one floor panel; wherein the surface of the floor panel body is covered by the continuous and unbroken floor cover, said insert comprising a plurality of fixation element receptacles at different point-localized positions for receiving said fixation element inserted through the oblong hole of the fastening element and a hole in continuous floor cover, in order to clamp the fastening element of the object to the floor in a tightened position of the fixation element.

[0016] Further, a method for fastening an object to a floor at a flexibly chosen mounting position in a fixation area is provided, wherein the floor comprises a continuous and unbroken floor cover, covering at least one floor panel, wherein the at last one floor panel comprises a panel body with an insert flush with the top surface of the floor panel body of the floor panel, said insert comprising a plurality of fixation element receptacles at different point-localized positions for receiving a fixation element, the method comprises:

(a) prepositioning the object on the floor, wherein said object comprises at its bottom a fastening element not protruding beyond the object's outer faces, said fastening element comprising an oblong hole, wherein the object is prepositioned such that the oblong hole of the fastening element is placed in the fixation area and
(b) identifying the position of the fixation element receptacle having the best overlap with the area of the oblong hole;
(c) penetrating the continuous floor cover at the location of said identified fixation element receptacle;
(d) insert a fixation element through the oblong hole of the fastening element of the object and the penetration of the floor cover into the uncovered identified fixation element receptacle and tighten the fixation element such that the fastening element of the

object is clamped to the floor.

[0017] The fixation system and the method provide the opportunity to offer optional objects that can be installed during the lifetime of the rail vehicle. The prefabricated receptacles for fixation elements are covered and hidden by the continuous floor cover. One of the advantages of the newly provided fixation system and fixation method is the opportunity to pre-manufacture the floor or its components off-site and/or separate of the finishing work of the interior of the rail vehicle. Further objects having a small or limited extension specially parallel to a direction in which the floor floats can be fastened to the floor via preinstalled and prefabricated fixation element receptacles in the desired mounting position, not precisely known at the time of manufacture of the floor. There is no need for any base elements or covers protruding with respect to the outer faces of the rest of the object. Further the need to penetrate the continuous, unbroken floor cover is minimized. This has optical as well as technical advantages as reclosed and/or resealed penetrations are more susceptible to leakage than the underpenetrated continuous and unbroken floor cover.

[0018] In cases when the oblong hole and the plurality of fixation element receptacles are adapted such that there is a complete overlap of the oblong's hole area with one of the fixation element receptacles in each possibly intended mounting position, one can find a suitable fixation element receptacle by puncturing the floor cover in the area of the oblong hole. In case one does not hit the correct completely overlapping fixation element receptacle, one gets at least enough information to, combined with the knowledge of the layout of the insert, easily find the correct fixation element receptacle. It is even possible to remove the floor cover in several spots or completely in the area of the oblong hole without negatively influencing the appearance of the floor as these punctured parts of the floor are hidden and sealed by the fastened object eventually.

[0019] In a more sophisticated embodiment to ease the identification and localization of a suitable fixation element receptacle for fastening the object the fixation system also comprises a jig. The jig comprises alignment holes. The alignment holes are arranged in correspondence with the arrangement of the plurality of fixation element receptacles in the insert. The jig and the at least one floor panel with the insert comprise mating alignment elements which enable the mechanical alignment of the jig with respect to the at least one floor panel. In an aligned position of the jig one of the alignment holes is centered with each of the plurality of fixation element receptacles of the insert. I.e., for each of the fixation element receptacles a different one of the alignment holes is centered on top of it in the aligned position of the jig.

[0020] The object to be attached comprises said fastening element with an oblong hole. To identify the suitable fixation element receptacle, one determines the alignment hole providing the best or a complete overlap with the oblong hole of the object's fastening element, when the object is in the intended mounting position. Having determined the respective alignment hole, one knows the position for penetrating the floor cover to reveal the appropriate identified fixation element receptacle of the insert. To finally fasten the object to the preferably floating floor, the fixation element is inserted through the oblong hole of the fastening element and the penetration of the continuous and otherwise unbroken floor cover into the revealed receptacle and tightened to thereby clamp the fastening element of the object in a tightened position of the fixation element.

[0021] The terms mechanical alignment and aligning mechanically both refer to an alignment where alignment elements provide or withstand forces acting on the jig relative to the at least one floor panel. An alignment where a jig is positioned relative to optical marks, even though the jig is moved mechanically, is not considered a mechanical alignment in terms of this specification. Optical alignments also tend to be error-prone. The mechanical alignment in terms of the specification provides the advantage that the jig can be positioned precisely and reliably. This holds true even in situations where a protective cover to be finally removed is applied to the floor cover during the finishing of the interior.

[0022] Alignment holes may have the same dimension as the receptacles they correspond to. In other embodiment their dimensions may differ from the dimensions of the receptacles. Their diameter might be smaller. In this case the alignment hole having the best overlap with the area of the oblong hole is that one being centered best with regard to the longitudinal direction as well as the direction perpendicular thereto of the oblong hole. The identified alignment hole is used in this case to mark the respective location on the floor cover, where it needs to be penetrated. In preferred embodiments the diameter is chosen such that a punch or a drill can be applied to penetrate the floor cover while the jig is still in the mechanically aligned position.

[0023] In some cases, the alignment hole is equal or little smaller in diameter than the fixation element receptacle such that the floor cover itself serves as a seal surrounding the fixation element in its for fastening to position, when the protrusion's diameter corresponds to alignment hole diameter.

[0024] One embodiment of said floor fixation system thus further comprises a jig, said jig comprising an arrangement of alignment holes corresponding to the plurality of fixation element receptacles and

wherein said at least one floor panel and said jig comprise mating alignment elements for mechanically aligning said jig with respect to said at least one floor panel, and wherein one of the alignment holes is centered with each of the plurality of fixation element receptacles when the jig is in an aligned position.

[0025] A corresponding embodiment of the method further comprises

(b1) mechanically aligning a jig comprising alignment holes with respect to the at least one floor panel by utilizing mating alignment elements of the said jig and said at least one floor panel such that one of said alignment holes is centered over each fixation element receptacles in an aligned position;
(b2) identifying the position of said fixation element receptacle having the best overlap with the area of the oblong hole by identifying the alignment hole having the best overlap with the area of the oblong hole; and
(b3) remove the jig prior of inserting and tightening of the fixation element, wherein step (b1) is carried out prior or after step (a) and step (b3) is carried out prior or after step (c).

[0026] Thus, the best overlap of the oblong hole or more precisely of its area, while the object is in the indented mounting position, with one of the alignment holes of the jig is determined, while the jig is in the aligned position, in order to identify the fixation element receptacle of the hidden insert.

[0027] Once it is decided to install an optional object the precise position of the hidden fixation element receptacles can be identified by use of the corresponding jig. At the time of production of the floor and/or the floor panels it is only necessary to know the intended fixation areas roughly to provide for the respective inserts.

[0028] Floor panels and the resulting floor are often raised at opposite sides which are preferably parallel to the moving direction of the rail vehicle. Advantageously. These raised sides or edges of the floor and of the respective floor panels are covered by sidewall panels overlapping the raised side edges.

[0029] To allow for the mechanical alignment of the jig with respect to the at least one floor panel in one embodiment the alignment elements comprise at least one protrusion and at least one mating indentation. For example, such a protrusion can be provided on the side edge of the at least one floor panel. The jig would in turn comprise a mating indentation. In other embodiments, the side edge of the at least one floor panel comprises an indentation and the jig comprises the mating protrusion.

[0030] To further improve the alignment in one preferred embodiment the jig comprises an alignment leg with a contact edge for engaging with a side edge of the at least one floor panel, when the jig is in the alignment with respect to said at least one floor panel. This ensures for a perfect angular orientation of the jig was respect to the insert.

[0031] Preferably, if the alignment elements comprise a protrusion and the mating indentation these are located on/in the contact edge and in/on the respective engaging part of the at least one floor panels side edge.

[0032] More sophisticated embodiments comprise at least two mating protrusions and indentations on/in the side edges of the at least one floor panel and the jig's contact edge, respectively.

[0033] Jigs relying on alignment elements located at the edge of the at least one floor panel suffer from the disadvantage that other objects of the interior might block or hinder the mechanical alignment of the jig with respect to the at least one floor panel. In a more sophisticated embodiments of the jig at least one of the mating alignment elements is magnetic such that the mechanical alignment is enacted and/or ensured by magnetic forces.

[0034] In very simple embodiments, the jig or the at least one floor panel, preferably within the insert, comprise a magnet producing a magnetic field mainly parallel to the surface of the at least one floor panel's panel body or the surface of the jig facing the at least one floor panel in the aligned position. In such an embodiment, the north pole and the south pole of the magnet are both located in a plane parallel to the respective surfaces in the aligned position. A magnet is oriented parallel to a plane if a straight line connecting the north pole and the south pole within the magnet is parallel to said plane. The mating alignment element can be a ferrimagnetic body or another magnet oriented in the opposite direction in the aligned position with regard to its poles.

[0035] In other embodiments, the alignment elements comprise at least two magnets and corresponding mating ferrimagnetic bodies or corresponding mating magnets. In these embodiments, the magnets are preferably oriented traverse, preferably perpendicular, to the surfaces of the floor panel body of the at least one floor panel and to the surface of the jig facing the at least one surface panel in the aligned position. A magnet is considered to be oriented traverse to a surface when the line connecting the north pole and the south pole within the magnet is oriented traverse to the respective surface. Accordingly, a magnet is considered to be oriented perpendicular to the surface when said connecting line is perpendicular to the surface.

[0036] The number of magnetic mating alignment elements needed for a precise alignment varies with the arrangement of the fixation element receptacles and the size, arrangement and shape of these alignment elements. The jig comprising magnetic alignment elements can be adapted in size roughly to the size of the insert and is easy to apply.

[0037] An alignment element can be incorporated or inserted into one or more of the fixation element receptacles and/or alignment holes.

[0038] Usually, the floating floor is floating with respect to a vehicle body of a rail vehicle and the final fastening position of the object is determined by a direct or indirect fixation of the object to the vehicle body. An indirect fixation of the object with a vehicle body is a fixation via one or more intermediate construction parts that are rigidly fixed to each other and/or the vehicle body. Due to the fact that the floor is floating with respect to the vehicle body, the precise location of the object on the floor is known only at the time of fastening the object to the floor, when finishing the interior.

[0039] In order to provide an unbroken sealing of the

floor in some embodiments the fastening element is provided with an elastic seal on its bottom side surrounding the oblong hole to tightly seal the penetration of the continuous floor cover in a fastened position of the object.

[0040] In other embodiments an O-ring like seal may be placed like a washer and used additionally or alternatively when tightening the fixation element.

[0041] The dimensions of the oblong hole and the arrangement of the point-localized fixation element receptacles are preferably adapted such that the oblong hole's area is capable to overlap with at least two of the fixation element receptacles at least partly at the same time.

[0042] More preferably, the dimensions of the oblong hole and the arrangement of the point-localized fixation element receptacles are adapted such that the oblong hole area overlaps at least two of the fixation element receptacles at least partly at each possible mounting location of the object. I.e., preferably each insert provides this feature for a core fixation area. There exist fixation positions of the object where this criterion is not met at the edges of this core fixation area. The width of this core fixation area is determined in one direction, usually by the longitudinal dimension of the oblong hole. In a direction traverse usually perpendicular the dimension is determined by the arrangement of the plurality of fixation element receptacles. Depending on the spacing and arrangement of the plurality of fixation element receptacles and the dimensions of the oblong hole in the fastening element of the object the object can be fastened at any position within the core fixation area or within a predetermined tolerance.

[0043] In a preferred embodiment for fastening, for example, a partition wall or another object having an elongated rectangular contact area with the floor, which in a mounting position is oriented for example perpendicular or almost perpendicular to sidewall of the rail vehicle with regard to which the floors floats, preferably, the fixation element receptacles are arranged along several parallel and preferably equally spaced lines which are oriented substantially transversely, in particular perpendicularly, to a longitudinal direction of the elongated hole of the fastening element of the object in a possible mounting orientation of the object, wherein the fixation element receptables on each of these parallel lines are, preferably equally, spaced and wherein the spacings on the different parallel lines are preferably equal to each other and wherein the positions of the fixation element receptacles on each of said lines are offset parallel to said lines with regard to the positions of the fixation element receptacles on any other of said parallel lines. The oblong hole is positioned and oriented within the rectangular contact surface such that its longitudinal direction coincides with the longer side of the rectangular contact area.

[0044] In one embodiment thus the fixation element receptacles are arranged in groups along several parallel lines, preferably equally, spaced apart, which are oriented substantially transversely, in particular perpendicularly, to a longitudinal direction of the oblong hole of the fastening element of the object in a possible mounting orientation of the object, wherein a different one of said parallel lines is associated with each different one of said groups, wherein the fixation element receptables on each of these parallel lines are, preferably equally, spaced and wherein fixation element receptacles on each of said parallel lines are offset parallel to said parallel lines with regard to the positions of the fixation element receptacles on any other of said parallel lines. Preferably, the spacings of the positions of the fixation element receptacles on each of the parallel lines are identical.

[0045] Preferably, the offset is a fraction of the spacing of the fixation element receptacles along one of the lines. The fixation element receptacles of any one of the groups are offset to the other groups preferably a multiple of 1/n parallel to those parallel lines, where n is the number of existing groups or number of groups simultaneously overlapped by the oblong hole.

[0046] When the object is a pole or a hand-rail rod having a circular shape, other arrangements might be of advantage. "Square-centered" arrangements have proven to be suitable in these situations. The offset is preferably equal or less then ineffective with of the oblong hole perpendicular to the longitudinal direction, for such an embodiment. The effective width is equal to the possible displacement of the fixation element received in the oblong hole perpendicular to the longitudinal direction of the oblong hole. Respectively, the effective length of the oblong hole corresponds to the maximum possible displacement of received fixation element in the longitudinal direction of the oblong hole.

[0047] The fixation element is preferably a threaded screw or a threaded screw with the washer and/or a spring washer. The fixation element receptacles in turn are threaded core holes. In other embodiments, the fixation element may be a male bayonet lock part and the fixation element receptacles the female bayonet lock parts or vice versa. Other fixation elements and fixation element receptacles may be used as long as the fixation element can be tightened relative to the fixation element receptacle to clamp the fastening element of the object to be fastened.

[0048] In a preferred embodiment the object is a partition wall having a fastening element at its bottom, said fastening element being a strip element with said oblong hole and wherein at least one surface cover of the object in the area of the fastening element is removable for fastening said at least one partition wall. In such an embodiment, the object can be pre-positioned and stay in this position usually until finally fastened as one can access the fastening area to locate and identify the appropriate covered fixation element receptacle.

[0049] The invention will be explained in greater detail with reference to the drawing. The figures show:

Fig. 1 a schematic is an isometric view of a bare floor panel;

Fig. 2 an enlarged view from a different perspective of the top surface of the floor panel with the insert according to fig. 1;

Fig. 3a a schematic isometric view of part of the object in a distal mounting position on the bare floor panel of fig. 1;

Fig. 3b a schematic isometric view of part of the object in a proximal mounting position on the bare floor panel of fig. 1;

Fig. 4a an enlarged view of the fastening element of the object in the distal mounting position positioned over the insert of the floor panel of fig. 3a;

Fig. 4b an enlarged view of the fastening element of the object in the proximal mounting position positioned over the insert of the floor panel of fig. 4a;

Fig. 5 a schematic isometric view of a floor section with an unbroken continuous floor cover;

Fig.6 a schematic view of the bare floor panel with a nonaligned jig;

Fig.7 a schematic view of the bare floor panel and the jig of fig. 6 in an aligned position;

Fig.8a and 8b schematic isometric views of floor sections with an unbroken continuous floor cover;

Fig.9a a schematic isometric view of the floor section of fig. 8a with the object pre-positioned in a distal mounting position;

Fig.9b a schematic isometric view of the floor section of fig. 8b with the object pre-positioned in a proximal mounting position;

Fig.10a a schematic isometric view of the floor section and the pre-positioned object in a distal mounting position of fig. 9a together with a jig in an aligned position;

Fig.10b a schematic isometric view of the floor section and the pre-positioned object in a proximal mounting position of fig. 9b together with a jig in the aligned position;

Fig. 11a a schematic enlarged view of the overlap area of the jig with an oblong hole of the fastening element of the object in the distal mounting position of fig. 10a;

Fig. 11b a schematic enlarged view of the overlap area of the jig with an oblong hole of the fastening element of the object in the proximal mounting position of fig. 10b;

Fig. 12a a schematic view depicting the penetration of the floor cover by drilling at the position of the alignment hole having the best overlap with the oblong hole of the fastening element of the object in the distal mounting position;

Fig. 12b a schematic view depicting the penetration of the floor cover by drilling at the position of the alignment hole having the best overlap with the oblong hole of the fastening element of the object in the proximal mounting position;

Fig 13a a schematic isometric view of the object in the distal mounting position fastened to the floor by the tightened fixation element received by the revealed receptacle for the distal mounting position of the covered insert;

Fig 13b a schematic isometric view of the object in the proximal mounting position fastened to the floor fixation element received by the revealed receptacle for the proximal mounting position of the covered insert;

Fig 14 a rotational symmetric object prepositioned on a floor as well as a hidden insert with fixation element receptacles in an arrangement that is suited for a rotational symmetric object;

Fig. 15 a bottom face of a jig corresponding to the insert of fig. 14;

Fig. 16 a situation to identify the position of the fixation element receptacle having the best overlap with the oblong hole of the fastening element of the object having rotational symmetry with the aid of a jig;

Fig. 17 a schematic isometric view of the spigot as fastening element of a handbar fastened to a floor;

Fig. 18 a schematic view of an insert with the spigot positioned centered with regard to the fixation element receptacles; and

Fig. 19 a schematic view of the insert with the spigot placed in an extreme position with regard to the fixation element receptacles.

[0050] Fig. 1 depicts a schematic isometric view of a bare floor panel 100. The floor panel comprises a floor panel body 200 and an insert 300. The floor panel body 200 has a top surface 210 and a bottom surface 220. When viewed from the top surface 210, the panel body 200 has in clockwise orientation a left side edge 230, a distal side edge 240, a right side edge 250, and a proximal side edge 260. Sides and faces of the floor panel 100 correspond to the edges and faces of the floor panel body 200 and have not been assigned reference numerals not obscure the invention.

[0051] The insert 300 is inserted into the top surface 210 of the floor panel body 200. A top face 310 of the insert 300 is preferably flush with the top surface 210 of the floor panel body 200. The insert 300 has in clockwise direction a left edge 330, a distal edge 340, a right edge 350, and a proximal edge 360.

[0052] The insert comprises receptacles 370 in its top face 310. The receptacles 370 are each designed to receive a fixation element (not shown), which when inserted into one of the receptacles 370 can be tightened to clamp a fastening element (not shown) between the insert and a clamping element of the fixation element. Thereby, the fastening element is fastened to the floor 1 composed of the at least one floor panel 100. Receptacles 370 are each point-localized. I.e., each receptacle has an exact location within the insert 300 defined by a point. Thus, each receptacle 370 defines the precise position for fastening a fixation element.

[0053] In fig. 2, an enlarged view of the top surface of the floor panel body 200 with the insert 300 is depicted. Alike features are identified by identical reference numerals in all figures.

[0054] In the embodiment depicted in fig. 2 the receptacles 370, which are preferably threaded core holes, are arranged in four groups 371, 372, 373, and 374. For purposes of identification the individual receptacles are referenced by the reference number of their group and an index. Thus, the has rightmost group 371 comprises the receptacles 371-1, 371-2 and 371-3. The other groups comprise the receptacles 372-1, 372-2; 373-1, 373-2; and 373-1, 373-2, respectively.

[0055] The receptacles 370 of the four groups 371 to 374 are arranged along for parallel lines 381, 382, 383, and 384, respectively. These parallel lines 381, 382, 383, and 384 are equally spaced. Along any one of these lines 381, 382, 383, and 384 the receptacles are equally spaced. The spacing is identical on each of the lines. The groups themselves on the other hand are offset with regard to the other groups parallel to the parallel lines 381, 382, 383, and 384. The offset is preferably one over the number of groups multiplied by the spacing of receptacles along such a line. In this embodiment, there are n=4 groups. The spacing of the receptacle 371-1, 371-2, 371-3 along the parallel line 381 is referenced by the letter d. The Thus the offset with regard to the rightmost group 371 for the other groups 372, 372, 373 is always a multiple of d/4.

[0056] Fig. 3 depicts a schematic isometric view of part of the object 600 in a distal mounting position on the bare floor panel 100 of fig. 1. The object 600 comprises a fastening element 700. In this particular embodiment, the objects 600 is a partition wall delimited on one side by a pole 650. Only parts of the object 600 are shown. Neither is a distal cover nor a proximal cover closing off a fastening area 680 are shown in any of the figures, depicted here.

[0057] The fastening element 700 comprises in this embodiment a fastening strip 710. The fastening strip 710 comprises a through hole designed as an oblong hole 720. A longitudinal direction 722 of the oblong hole 720 is oriented perpendicular to the parallel lines, 381 2 384 long which the receptacles of the insert 300 are oriented, when the object 600 is in a possible mounting position. In fig. 3a, the object 600 is in an intended mounting position that is called distal mounting position compared to the mounting position, depicted in fig. 3b, which is called the proximal mounting position to separate these different possible mounting positions of the object 600. In the distal mounting position, the distal face 640 of the object 600 is closer to the distal edge 240 of the floor panel body 200 than in fig. 3b. In turn in fig. 3b, the proximal face 660 is closer to the proximal edge 260 of the floor panel body 200 than in fig. 3a.

[0058] The longitudinal extension 725 of the oblong hole 720 along the longitudinal direction 722 is adapted to the plurality of receptacles of the insert 300 such that the area 728 of the oblong hole 720 overlaps all four parallel lines, 381 to 384, along which the receptacles 370 of all four groups 371 to 374 are positioned. In each possible intended mounting position, the area 728 of the oblong hole 720 overlaps at least one of the receptacles 370 out of each of the groups 371 to 374 at least partly. As they are offset with regard to each other parallel to the lines 381 to 384, which are oriented almost perpendicular to the oblong hole 720, the overlap between the area 728 of the oblong hole 720 with the respective receptacle 370 varies from group to group. Taking into account the traverse extension 726 of the oblong hole 720 there exists a perfect, i.e., complete, overlap with one of the receptacles 370 in each possible intended mounting position.

[0059] The traverse extension 726, also called width, of the oblong hole 720 has advantageously an effective width that corresponds to the offset of the groups at least within the acceptable mounting tolerance. The effective width corresponds to the distance a fixation element re-

ceived in the oblong hole 720 can be moved in the width-direction.

[0060] As can be inferred from the enlarged view of the fastening areas 680 of the object 600 in figures 4a (distal mounting position), and fig. 4b (proximal mounting position) the oblong hole 720 has a matching or best overlap with different ones of the receptacles 370 of the insert 300 in different mounting positions. In the distal mounting position of fig. 4a the best overlap between the oblong hole 720 or better its area 728 and one of the receptacles 370 is identified for receptacle 373-2. In the proximal mounting position of fig. 4b the best overlap is found for receptacle 371-2. Thus, within the limits of the object 600 contact area with the floor 1 it can be attached to the floor 1 without being influenced by the exact floating of the floor 1, made up of floor panel 100, even though the object 600 is also fastened to a structural part, with regard to which the floor 1 is floating.

[0061] Fig.5 depicts a section of a floating floor 1 with the final outer unbroken and continuous floor cover 400 applied on the top surface 210 of the floor panel body 200 of the floor panel 100. The insert 300 and the receptacles 370 are covered. Due to the floating of the floor 1 for example with regard to the structure of a vehicle, for example a rail wagon, it is not possible to precisely find the positions of the different receptacles when trying to fasten the object 600 in the area of the covered insert 300.

[0062] In order to enable the location of the positions of the receptacles 370 the floor fastening system comprises in jig 500.

[0063] Fig.6 shows a schematic view of the bare floor panel 100 with a nonaligned jig 500. The jig 500 comprises a jig area 565 comprising alignment holes 570 which are arranged in correspondence with the receptacles 370 of the insert 300. For each receptacle 370 in the insert 300 exists and alignment hole 570 in the jig 500. In the depicted example, the jig comprises a top face 510 and the bottom face 520. Further, it comprises in the depicted example a body leg 505 and in alignment leg 591. The alignment leg 591 comprises a contact edge 592 with two protrusions 593, one of which is covered in the view of fig. 6 by the body leg 505 connecting the alignment leg 591 with the jig area 565.

[0064] When the jig 500 is moved into an aligned position as depicted in fig. 7 the contact edge 592 of the alignment leg 591 contacts the left side edge 230 of the floor panel body 200. In this embodiment, the alignment leg 591 and its contact edge 592 together with the left side edge 230 of the floor panel body guarantee for rotational alignment of the jig area 565 with regard to the insert 300. In order to guarantee the correct positioning of the jig 500 between the proximal edge 260 and the distal edge 240 of the floor panel body 200 the left edge 230 of the floor panel body 200 comprises two indentations 231 as alignment elements 232 mating with the protrusions 593 as alignment elements 590 on the contact edge 592.

[0065] As can be inferred from fig. 7. There is a correspondence between the alignment holes 570 and the fixation element receptacles 370. Over each of the receptacles 370 one of the alignment holes 570 is centered when the jig is in the aligned position. Thus, by identifying and alignment hole and its position one can also identify the corresponding fixation element receptacle 370 and its position. The alignment holes can be referred to by an analogous scheme of alignment hole groups 571 to 574 and individual reference numerals 571-1 to 574-2.

[0066] The process of fastening an object 600 to a floor 1 having an unbroken continuous floor cover 400 will be explained with regard to figures 8a to 13b. There are always figures numbered by "a" and "b". Figures "a" refer to the distal mounting position whereas figures "b" refer to the proximal mounting position. Figures 8a and 8b show an identical section of the floor 1 with an unbroken continuous floor cover 400 hiding at least one floor panel 100 with a floor panel body 200 comprising an insert 300 with a plurality of receptacles 370 the latter of which are all covered and hidden by the continuous floor cover 400. Even though only one the at least one floor panel 100 is depicted in these figures it will be appreciated by the person skilled in the art that the number of floor panels used to form the floor 1 is of no importance. Regardless of the number of floor panels used to form the floor1, there is only one continuous and unbroken floor cover 400 of the floor 1.

[0067] In figures 9a and 9b an object 600 being for example, a partition wall like the one explained with regard to fig. 3a to 4b is pre-positioned in the distal mounting position (fig. 9a) or the proximal mounting position (fig. 9b).

[0068] Next, a jig 500 corresponding to the covered floor panel 100 and its floor panel body 200 is positioned in its aligned position. This is depicted in figures 10a and 10b. I.e., the contact edge 592 of the alignment leg 591 of the jig 500 is in contact with the left edge 230 of the floor panel body 200. In the aligned position, the protrusions (not shown) of the contact edge 592 mate with the indentations 525 in the left edge 230 of the floor panel body 200. It will be appreciated by the person skilled in the art that other alignment elements could be used, to bring jig 500 into the aligned position. The alignment is a mechanical alignment where the alignment elements withstand certain mechanical forces or bring up certain mechanical forces in order to a position the jig in the correct aligned position. In the shown example, the contact edge 592 as alignment element 590 withstands forces acting on the jig 500 perpendicular to the left side edge 230. The alignment elements 590 provided as mating protrusion 593 of the contact edge 592 and indentation 231 of the side edge 230 withstand forces acting parallel to the side edge 230 when they are in the mating position or otherwise guarantee that, when the jig is moved, the protrusions 593 and indentations 231 are brought into mating positions.

[0069] The jig 500 is facing the floor 1 with its bottom face 520. Further, the jig 500 has a recess 525 at its

bottom face 520 in the jig area 565. This way the body leg 505 can be in contact with the floor 1, while the jig area 565 slides over the fastening strip 720 of the fastening element 700 of the object 600.

[0070] In railway cars the left edge 230 and/or the opposite right edge 250 are often raised (not shown). Further, these edges 230, 250 are often covered by overlapping side wall panels (not shown). Nevertheless, the alignment leg of the jig can be slid between the overlapping side wall panel and the raised floor in order to engage with the side edge of the respective floor panel. In these embodiments, the jig's body leg itself is preferably curved appropriately to be adapted to the raised side edge 230, 250 of the at least one floor panel 100.

[0071] Figures 11a and 11b each show an enlarged view of the fastening area 680 of the object 600. In these views the alignment holes 773-2 (distal mounting position) and 771-2 (proximal mounting position) having the best overlap with the oblong hole 720 are easily identified.

[0072] Thus, as a next step, depicted in figures 12a and 12b, the floor cover 400, is penetrated for example by drilling a hole in the position of the alignment hole 573-2 or 571-2, respectively, with a drill 900 to uncover and reveal the corresponding receptacles 373-2 or 371-2, respectively.

[0073] As a final step, after removing the jig 500, a fixation element 800, which preferably is a threaded screw with the washer or a spring washer or the combination of both, is inserted through the oblong hole 720 of the fastening element 700 and the penetration of the floor cover 400 into the respective receptacle 373-2 or 371-2, respectively, being preferably a threaded core hole, and tightened to clamp the fastening element 700 to the floor 1. The fixation system 1000 for fastening the object 600 being a partition wall is shown in Fig. 13a and 13b.

[0074] It is pointed out that the fixation element 800 is positioned and located within the object 600 to be fastened at the floor 1. Thus, there are no elements involved in the fastening of the object 600 that protrude the side faces 640, 660 of the object in order to overlap the fixation receptacle in the insert of the floor panel 100. The fastening of the object 600 is carried out within the contact surface of the object with the floor, even though this has a very small footprint on the floor 1.

[0075] Other embodiments use a jig with magnetic alignment elements. Such embodiments have the advantage that other preinstalled objects cannot hamper the use of the jig. For this purpose, the jig and the insert comprise mating magnetic alignment elements. One of the mating magnetic alignment elements is a magnet the other can be a magnet or a ferromagnetic element. When the mating alignment elements have asymmetric shapes, it is possible to achieve an alignment with just one pair of mating alignment elements. Otherwise, usually two or more pairs of mating magnetic alignment elements are preferred.

[0076] The embodiments described above covered objects like a partition wall having one orientation of the oblong hole more or less fixed due to their nature. Other objects like hand bars, or poles have a circular symmetry. In these embodiments, the fastening element also comprises an oblong hole. The possible overlap with receptacles underneath the floor cover depends though on the rotational orientation of this fastening element.

[0077] Fig. 14 depicts such a situation of an object 600 with rotational symmetry. In this situation it is more difficult to find the perfect or best overlap of the oblong hole 720 with one of the receptacles 370 (depicted by dashed lines due to the covered nature) or the alignment holes (not shown), respectively, when the corresponding jig (not shown) is placed in the aligned position. In this case, one can pre-position the object 600 and mark the area 728 of the oblong hole 720 or more preferably, an area 729 possibly covered by the oblong hole 720, for example with erasable ink. The area 729, possibly covered by the oblong hole 720 is the area that is swept by the area 728 of the oblong hole 720 when the oblong hole 720 is rotated around the center of the object 600, or its rotational part to be fastened to the floor 1. One yields a marked area 429 on the floor cover 400 corresponding to the area 729 possibly covered by the oblong hole 720.

[0078] Afterwards, the jig can be positioned to identify the alignment hole or holes providing the best overlap with the marked area 429. After one of the alignment holes 570 has been identified yielding an optimum overlap the floor cover 400, the floor cover 400 is penetrated for example by drilling or punching a hole in the location indicated by the respective one of alignment holes 570 of the jig 500.

[0079] The jig 500 is then removed and the fixation element 800 is threaded through the oblong hole 720 of the fastening element, the drilled or punctured penetration in the otherwise unbroken continuous floor cover 400 and inserted into the uncovered or revealed one of the receptacles 370 to tighten the fixation element 800 and fasten the fastening element 700 of the object 600 to the floor 1.

[0080] The insert 300 shown in fig. 14 further comprises two magnetic alignment elements 394,395. One alignment element 394 comprises a magnet having a north pole depicted by N facing the top surface 310 of the insert. The other alignment element 395 comprises a magnet having a south pole depicted by S facing the top surface 310 of the insert 300. The alignment elements could be integrated into fixation element receptacles 370 in other embodiments. In this embodiment they are separate from the fixation element receptacles 370.

[0081] The bottom face of the corresponding jig 500 shown in fig. 15. It comprises mating magnetic alignment elements 590 in its bottom surface 520 facing the floor in the aligned position. The alignment element 594 corresponding to the alignment element 394 of the insert 300 comprises a magnet having a south pole S facing the bottom face 520. Respectively, the other alignment element 595 of the jig 500 is a magnet having the north

pole N facing the bottom face of the jig 500. This corresponds to the other alignment element 395 of the insert 300.

[0082] The situation to find the correct receptacle when the insert is covered by the floor cover 400, is explained in connection with fig. 16. A jig 500 with magnetic alignment elements 594, 595, is placed on the floor cover 400 in the area of the insert covered and hidden by the floor cover 400. It is mentioned that one now sees the top face 510 of the jig. Thus, the magnetic poles closer to the viewer of the alignment elements 590 being magnets 594, 595 are the north pole N and the south pole S, respectively. The area 729 possibly covered by the oblong hole 720 of the fastening element 700 of the object 600 has been marked by erasable or non-erasable ink, as marked area 429 beforehand. For this purpose, the fastening element 700 or the object 600 as a whole are rotated around a rotational symmetry axis being oriented perpendicular to the contact face and passing through the center of the contact face as well as the center of the oblong hole 720 in this embodiment. Parts of the marking covered by the jig 500 are dashed only. Now one of the alignment holes 570 having the best overlap with the marked area 429 is identified. In this situation it is the alignment hole 570-3 which corresponds with the receptacle 370-3 of the insert shown in fig. 14. The unbroken continuous floor cover 400 is penetrated in the area of the alignment hole 570-3.

[0083] Afterwards, the jig is removed and the fastening element of the object is placed over the uncovered receptacle, being preferable a threaded core hole. The fixation element is inserted through the oblong hole of the fastening element into the uncovered receptacle and tightened to fasten the object to the floor. The fastening element may comprise an elastic seal (not shown) on the side facing the floor in order to seal the floor cover even though it has been punctured.

[0084] Fig. 17 depicts the fastening element 700, being a spigot for a rod like handbar. It is fastened to the floor 1. For illustration purposes only, the floor cover is missing. Thus, one can see the floor panel body 200 with the insert 300. The insert comprises the alignment elements 394 and 395 being magnets. One can also see some of the receptacles 370, 370-1, 370-5, 370-6 partially.

[0085] Instead of pre-positioning the object first and marking the area of the oblong hole or the area possibly covered by rotating the object in the pre-positioned mounting position, one can first align the jig with the insert covered by the floor cover. Then the object can be pre-positioned on top of the aligned jig and rotated in the pre-positioned mounting position to identify the alignment hole of the jig providing the best overlap with the oblong hole. (Also, the best orientation for the object or its fastening element are identified.) Having identified the alignment hole with the best overlap, the respective alignment hole is used, to guide for example a drill or a punch to penetrate the otherwise unbroken and continuous floor cover to reveal and uncover the identified respective receptacle underneath the alignment hole. The jig is removed prior to inserting the fixation element through the oblong hole, the penetration in the floor cover into the respective uncovered fixation element receptacle. Finally, the fixation element is tightened to fasten the object in the correct mounting position.

[0086] With regard to fig. 18 and fig. 19 the fixation area 1100 for the embodiment of Fig. 14 to 17 is explained. Depicted are the receptacle 370, 370-1 to 370-7. The separation between centers of neighboring receptacles 370 is less than an effective length of the oblong hole 720 of the fastening element 700 of the object 600 to be mounted. The effective length 731 of an oblong hole 720 corresponds to the maximum distance a fixation element 800 can be displaced when received in the oblong hole720. In fig. 18 a fixation element 700 with the oblong hole 720 in centered with regard to the receptacle 570-7 in the center of the insert 300. The point labeled with A and B mark the extreme positions in the oblong hole at which the fixation could be received. The distance between points A and B corresponds to the effective length 731 of the oblong hole 720.

[0087] Fig. 18 and fig. 19 depict circles 1170-1 to 1170-7 centered around the receptacles 370-1 to 370-7 each having a diameter corresponding to the effective length 731 of the oblong hole 720. The circle 1170-7 encloses all possible mounting locations for the center of the fastening element 700 or its object 600 that could be "served" by the receptacle 370-7 in the center of the insert 300. The same holds true analogous for the other receptacles 370-1 to 370-6 and their corresponding circles 1170-1 to 1170-6.

[0088] The outer contour 1150 of all circles 1170 encloses the fixation area 1100. It should be noted that each location within the fixation area is inside at least one of the circles 1170. Fig. 19 depicts a situation where the object 600 and its fastening element 700 are moved to one extreme position. The center of the object 600 is located on the outer contour of the fixation area 1100 and the respective circle 1170-3 of the receptacle 370-3 defining the part of the outer contour 1150. The fixation element 800 is positioned at one extreme end of the oblong hole 720 when fastening the object 600 in this mounting position.

[0089] The person skilled in the art will appreciate that the different features of the different embodiments can be combined to form other embodiments. For example, a jig may comprise magnetic alignment elements as well as the contact edge or the like to achieve the aligned position. It is once more pointed out that optical marks on the floor panel, the floor and/or the jig are not considered reliable enough to achieve a good and robust alignment of the jig with respect to the covered insert. The alignment elements thus must withstand on their own and/or in combination with other alignment elements at least one force directed parallel to the surface of the floor or otherwise provide a force itself for aligning the jig when being in proximity with the insert.

Reference numerals

[0090]

1	floating floor
100	floor panel
200	panel body
210	top surface
220	bottom face
230	left edge
231	indentations
232	alignment elements
240	distal edge
250	right edge
260	proximal edge
300	insert
310	top faces
320	bottom face
330	left edge
340	distal edge
350	right edge
360	proximal edge
370	receptacles
370-x	receptacle x, x being an index
371 to 374	groups of receptacles
371-1 374-2	individual receptacles
381 to 384	parallel lines
394	alignment element
395	alignment element
d	spacing of receptacles along the parallel line within the group
x*d/4	offset of receptacles in group 37(x-1) along the parallel lines with respect to receptacles of group 371 (x being a natural number)
400	floor cover
429	marked area (swept by the oblong hole upon rotating the object in its mounting position)
500	jig
505	body leg
510	top face
520	bottom face
525	recess
565	alignment area
570	alignment holes
570-x	alignment hole x, x being an index
571 - 574	alignment hole groups
590	alignment elements
591	alignment leg
592	contact edge
593	protrusions
594	alignment element (magnet)
595	alignment element (magnet)
600	object
660	proximal face
640	distal face
650	delimiting pole
670	footprint/contact area
680	fastening area
700	fastening element
710	fastening strip
720	oblong hole
722	longitudinal direction
725	longitudinal extension
726	transverse extension
728	area of the oblong hole
729	area possibly covered by the oblong hole
730	contact area
731	effective length
800	fixation element
900	drill
1000	fixation system
1100	fixation area
1150	outer contour
1170	circle
1170-x	circle x, x being an index

Claims

1. Fixation system (1000) for fastening an object (600) to a floor (1), especially to a floating floor(1), at a flexibly chosen mounting position of a fixation area comprising said floor (1) with a continuous and unbroken floor cover (400),

said object (600),
and at least one fixation element (800),
wherein said object (600) comprises at its bottom a fastening element (700) not protruding beyond said object's (600) outer faces, said fastening element (700) comprising an oblong hole (720),
wherein said floor (1) comprises at least one floor panel (100) with an insert (300) flush with the surface (210) of the floor panel body (200) of said at least one floor panel (100); wherein the surface (210) of the floor panel body (200) is covered by the continuous and unbroken floor cover (400), said insert (300) comprising a plurality of fixation element receptacles (370) at different point-localized positions for receiving said fixation element (800) inserted through the oblong hole (720) of the fastening element (700) and a hole in the continuous and otherwise unbroken floor cover (400), in order to clamp the fastening element (700) of the object (600) to the floor (1) in a tightened position of the fixation element (800).

2. Fixation system (1000) for fastening an object (600) to a floor (1) according to claim 1, wherein said floor fixation system (1000) further comprises a jig (500), said jig (500) comprising an arrangement of alignment holes (570) corresponding to the plurality of

fixation element receptacles (370) and
wherein said at least one floor panel (100) and said jig (500) comprise mating alignment elements (230, 231, 394, 395, 590, 591, 592. 593, 594, 595) for a mechanically aligning said jig (500) with respect to said at least one floor panel (100), and wherein one of the alignment holes (570) is centered with each of the plurality of fixation element receptacles (370) when the jig (500) is mechanically aligned.

3. Fixation system (1000) for fastening an object (600) to a floor (1) according to claim 2, wherein at least one of the mating alignment elements (230, 231, 394, 395, 590, 591, 592. 593, 594, 595) is magnetic such that the mechanical alignment is enacted by magnetic forces.

4. Fixation system (1000) for fastening an object (600) to a floor (1) according to claim 2 or 3, wherein the alignment elements (230, 231, 394, 395, 590, 591, 592. 593, 594, 595) comprise at least one protrusion (593) and at least one mating indentation (231).

5. Fixation system (1000) for fastening an object (600) to a floor (1) according to any one of the claims 2 to 4, wherein the jig (500) comprises an alignment leg (591) with a contact edge (592) for engaging with a side edge 230 of the at least one floor panel (100), when the jig (500) is mechanically aligned with respect to said at least one floor panel (100).

6. Fixation system (1000) for fastening an object (600) to a floor (1) according to any one of the preceding claims, wherein the floor (1) is floating with respect to a vehicle body and the fastening position of the object (600) on the floating floor (1) is determined by a fixation of the object (600) to the vehicle body.

7. Fixation system (1000) for fastening an object (600) to a floor (1) according to any one of the preceding claims, wherein the dimensions of the oblong hole (720) and the arrangement of the point-located fixation element receptacles (370) are adapted such that the oblong hole's area (728) overlaps with at least two of the fixation element receptacles (370) for each possible mounting position of the object (600) in a core mounting area of the fixation area, the core mounting area being defined by the insert's position.

8. Fixation system (1000) for fastening an object (600) to a floor (1) according to any one of the claims 2 to 7, wherein the fixation element receptacles (370) are arranged in groups (371 to 374) along several parallel lines (381 to 384), preferably equally, spaced apart, which are oriented substantially transversely, in particular perpendicularly, to a longitudinal direction (722) of the oblong hole (720) of the fastening element (700) of the object (600) in a possible mounting orientation of the object (600), wherein a different one of said parallel lines (381 to 384) is associated with each of said groups (371 to 374), wherein the fixation element receptables (370) on each of these parallel lines (381 - 384) are, preferably equally, spaced and wherein fixation element receptacles (370) on each of said parallel lines (381 - 384) are offset parallel to said parallel lines (381 - 384) with regard to the positions of the fixation element receptacles (370) on any other of said parallel lines (381 - 384).

9. Method for fastening an object (600) on a floor (1) at a flexibly chosen mounting position of a fixation area by means of the fixation system according to any one of the claims 1 to 8, wherein the floor (1) comprises a continuous and unbroken floor cover, covering at least one floor panel (100), wherein the at last one floor panel (100) comprises a panel body (200) with an insert (300) flush with the top surface (210) of the floor panel body (200) of the at least one floor panel (100), said insert (300) comprising a plurality of fixation element receptacles (370) at different point-localized positions for receiving a fixation element (800), the method comprises:

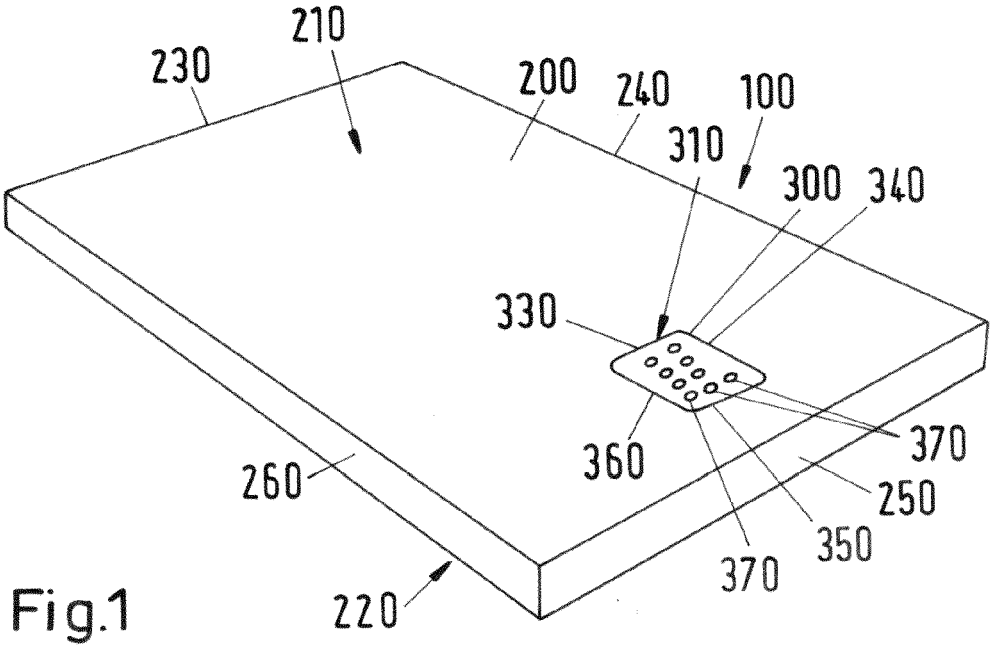
(a) prepositioning the object (600), wherein said object (600) comprises at its bottom a fastening element (700) not protruding beyond object's (600) outer faces (640, 660), said fastening element (700) comprising an oblong hole (720), wherein the object is prepositioned such that the oblong hole of the fastening element is placed in the fixation area and
(b) identifying the position of the fixation element receptacle (370) having the best overlap with the area of the oblong hole (720);
(c) penetrating the continuous floor cover (400) at the location of said identified fixation element receptacle (370;
(d) insert a fixation element (800) through the oblong hole (720) of the fastening element (700) of the object (600) and the penetration of the cover layer (400) into the fixation element receptacle (370) and tighten the fixation element (800) such that the fastening element (700) of the object (600) is clamped to the floor (1).

10. Method for fastening an object (600) on a floor (1) according to claim 9, comprising the further steps (b1) mechanically aligning a jig (500) comprising alignment holes (570) with respect to the at least one floor panel (100) by utilizing mating alignment elements (230, 231, 394, 395, 590, 591, 592. 593, 594, 595) of the said jig (500) and said at least one floor panel (100) such that one of said alignment holes (570) is centered over each fixation element recep-

tacles (370); (b2) identifying the position of said fixation element receptacle (370) having the best overlap with the area (728) of the oblong hole (720) by identifying the alignment hole (570) having the best overlap with the area (728) of the oblong hole (720); and
(b3) remove the jig (500) prior of inserting and tightening of the fixation element (800), wherein step (b1) is carried out prior or after step (a) and step (b3) is carried out prior or after step (c).

11. Method for fastening an object (600) on a floor (1) according to claim 10, wherein the jig (500) is mechanically aligned by magnetic forces of magnetic alignment elements (590) in the insert (300) and the jig (500).

12. Method for fastening an object on a floor (1) according to claim 10 or 11, wherein step (b2) comprises rotating at least the object's fastening element (700) around the rotational symmetry axis, if the object (600) or its fastening element (700) have a rotational symmetry axis passing through the oblong hole (720).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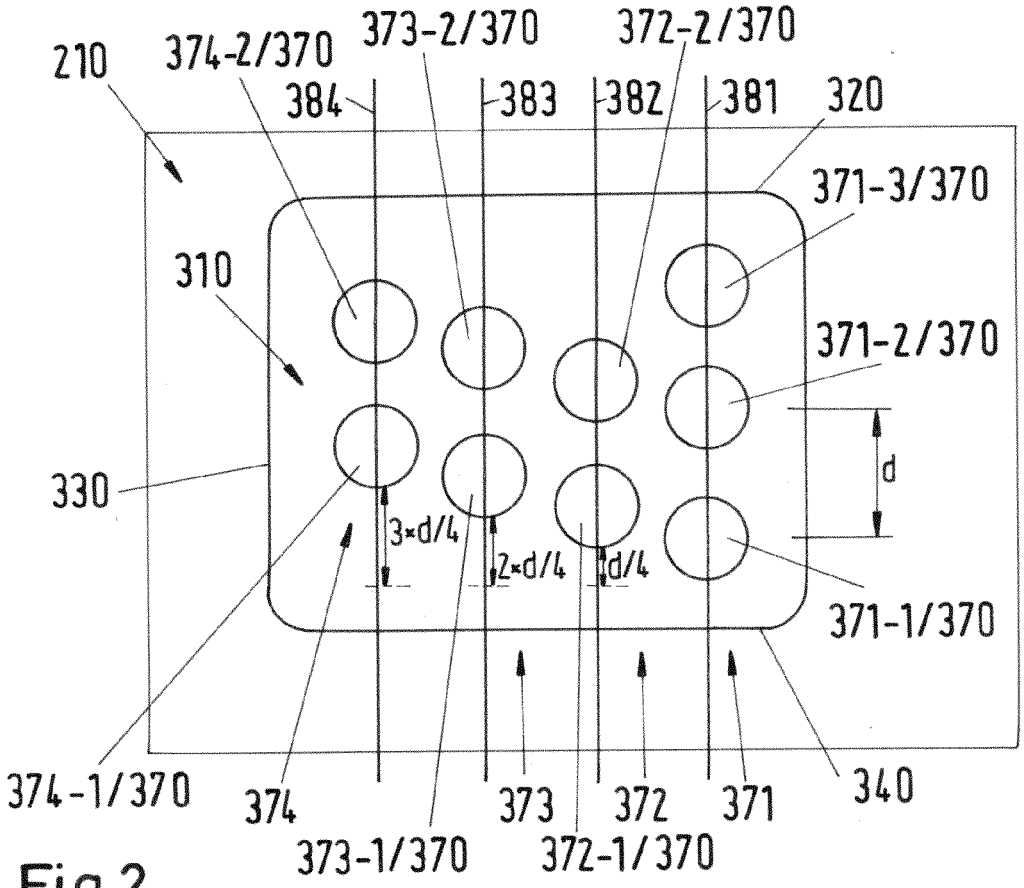
370
220

Fig.1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371-3/370
310
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d
3×d/4
2×d/4
d/4
371-1/370
374-1/370
374
373
372
371
340
373-1/370
372-1/370

Fig.2

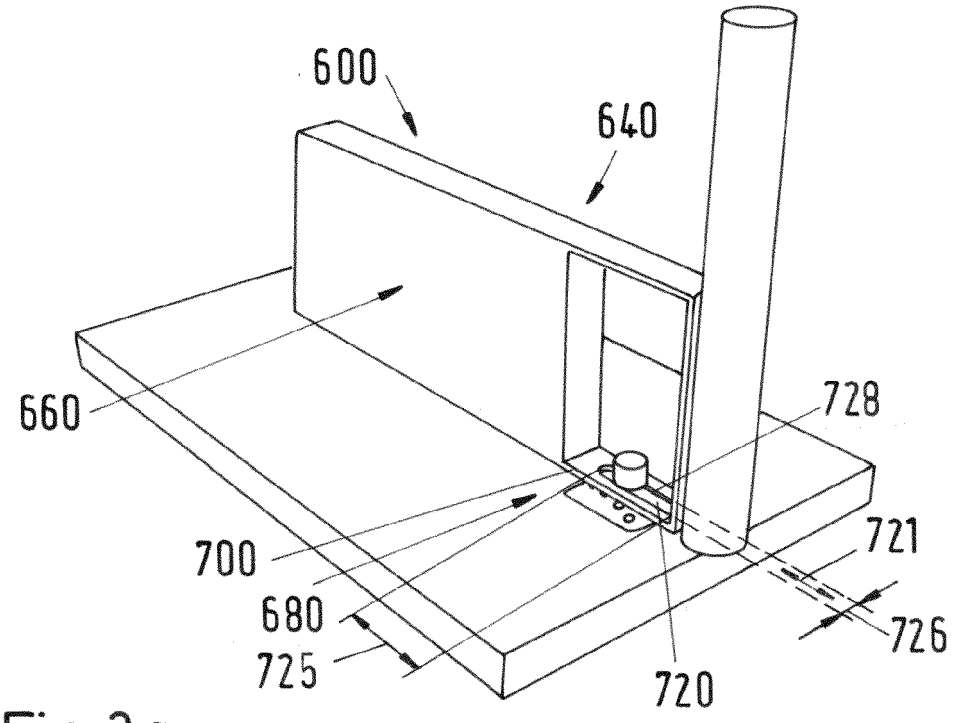
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Fig.3a

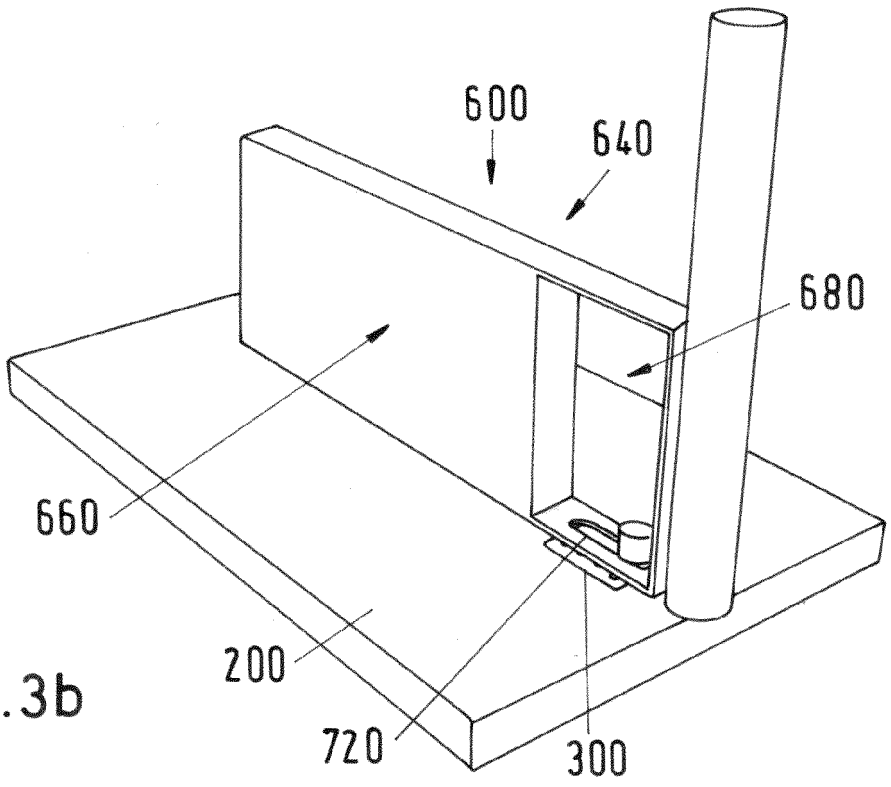
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Fig.3b

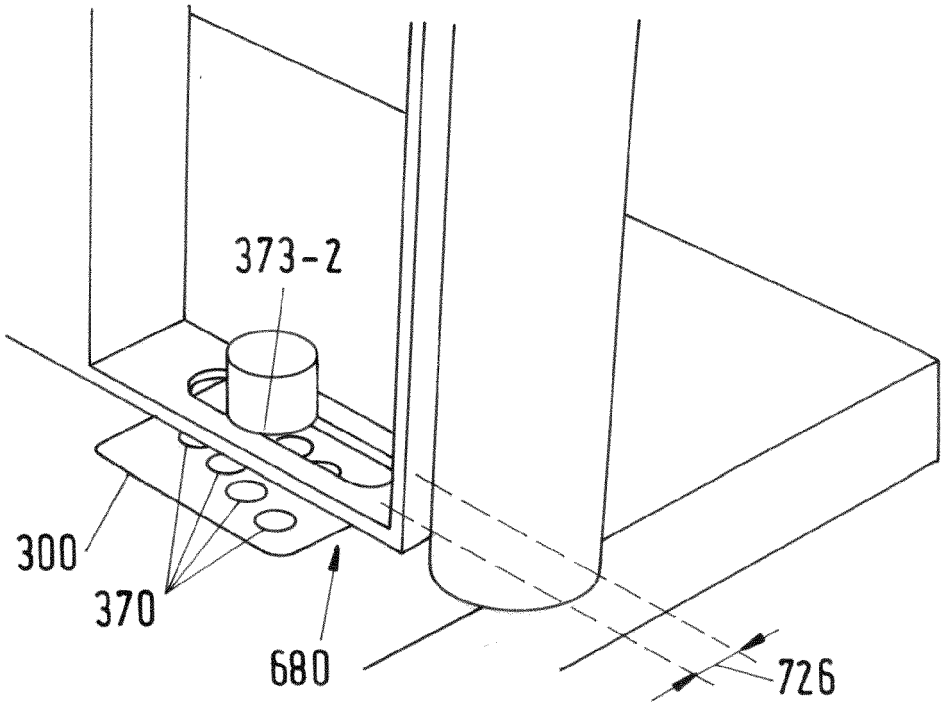
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Fig.4a

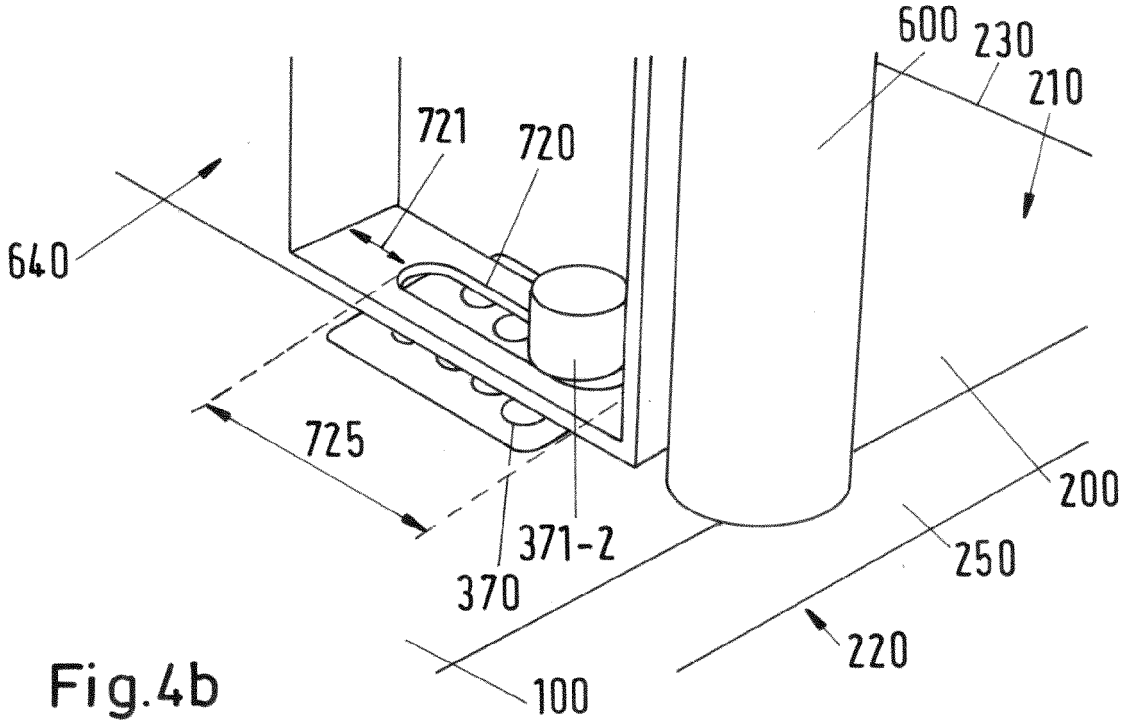
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Fig.4b

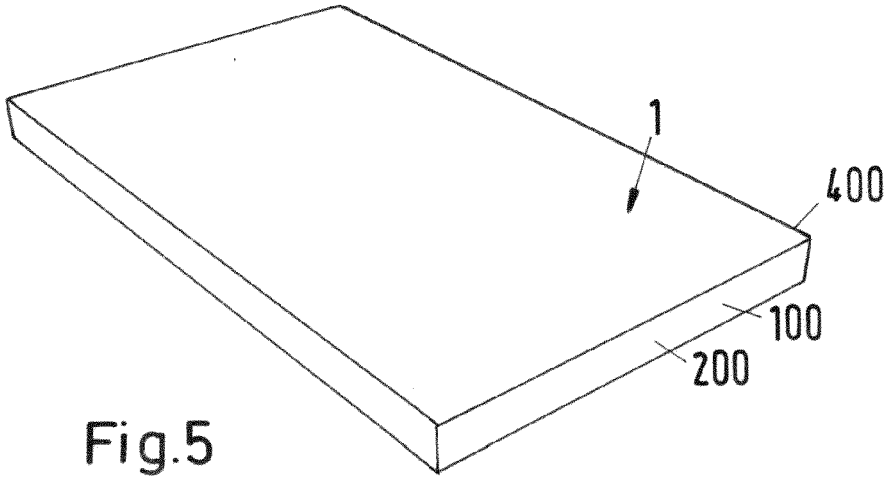

Fig.5

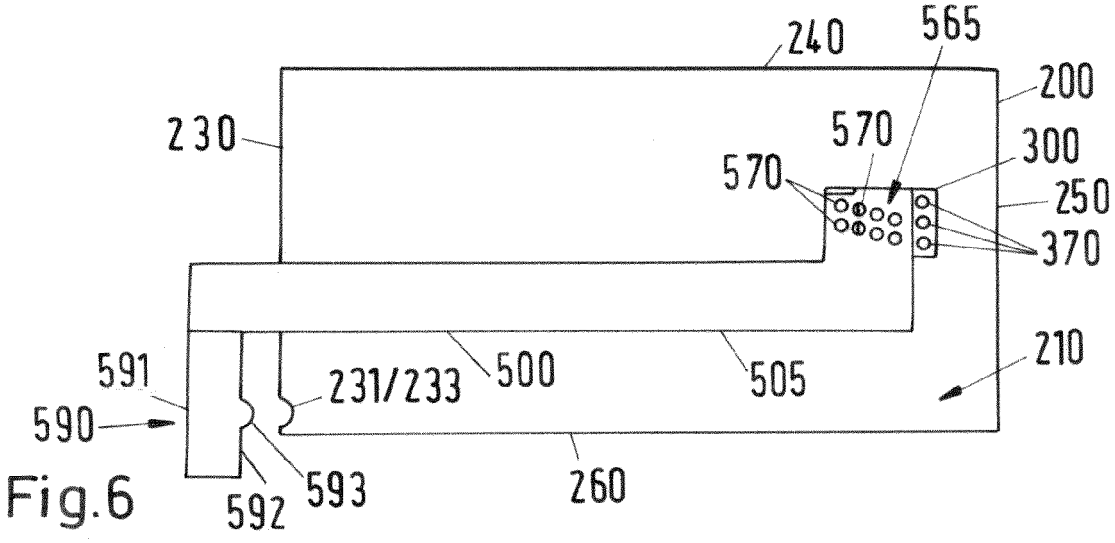

Fig.6

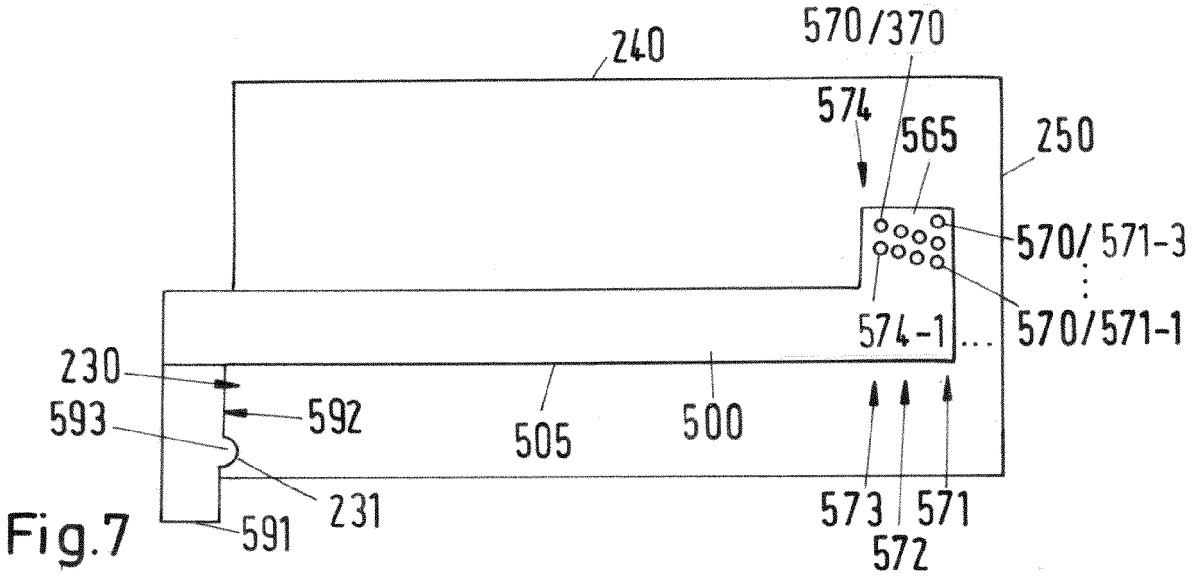

Fig.7

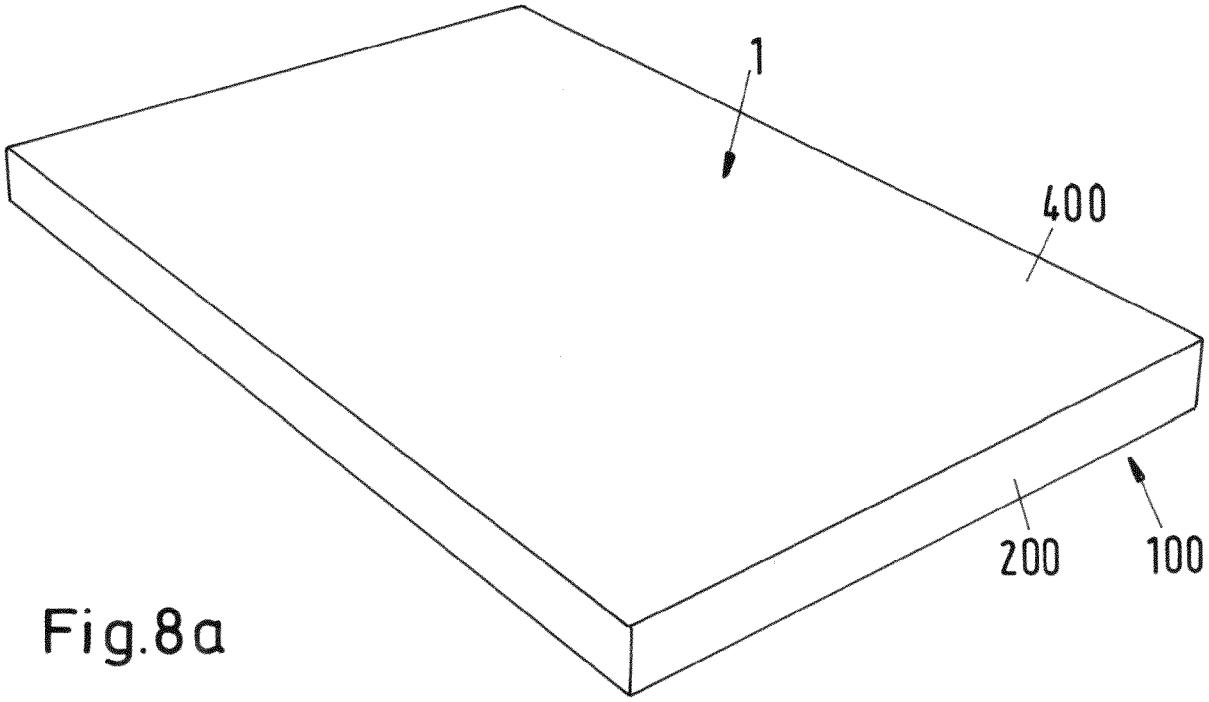

Fig.8a

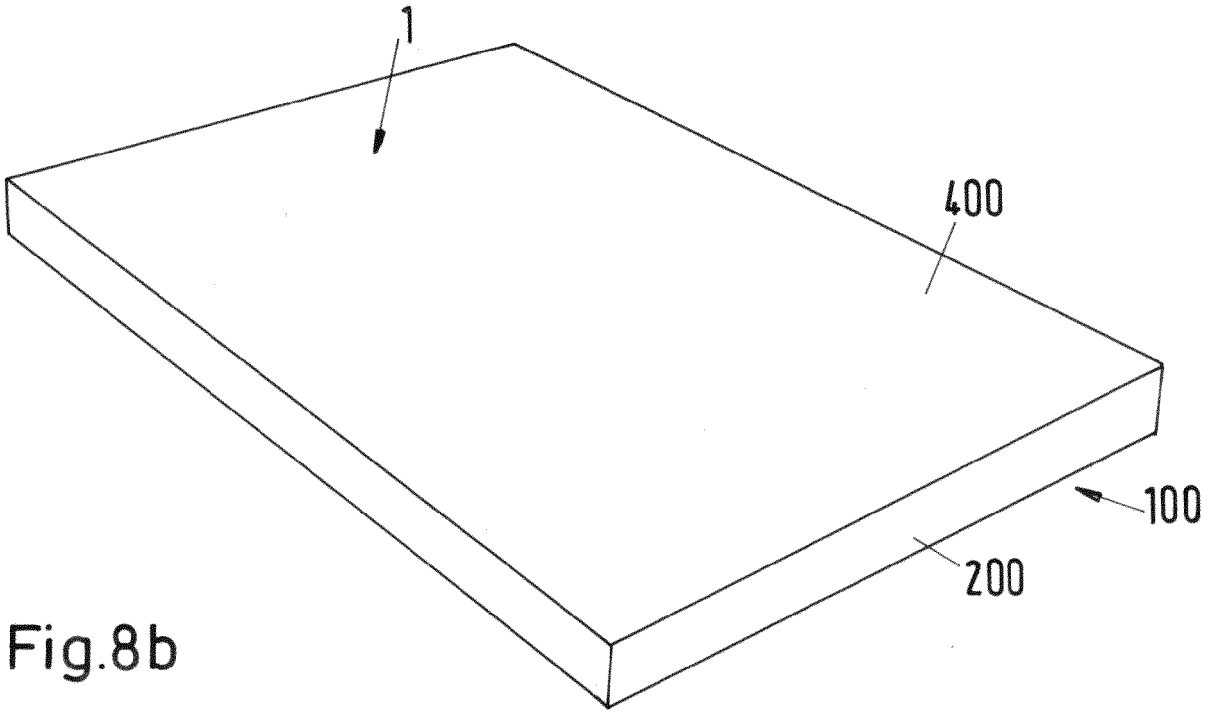

Fig.8b

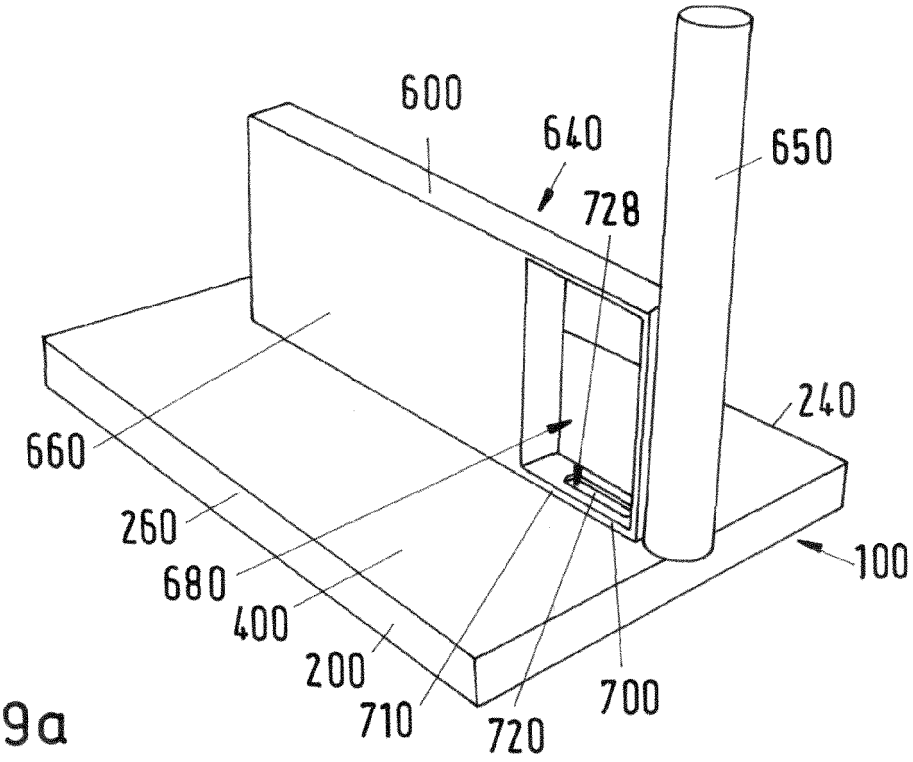
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Fig.9a

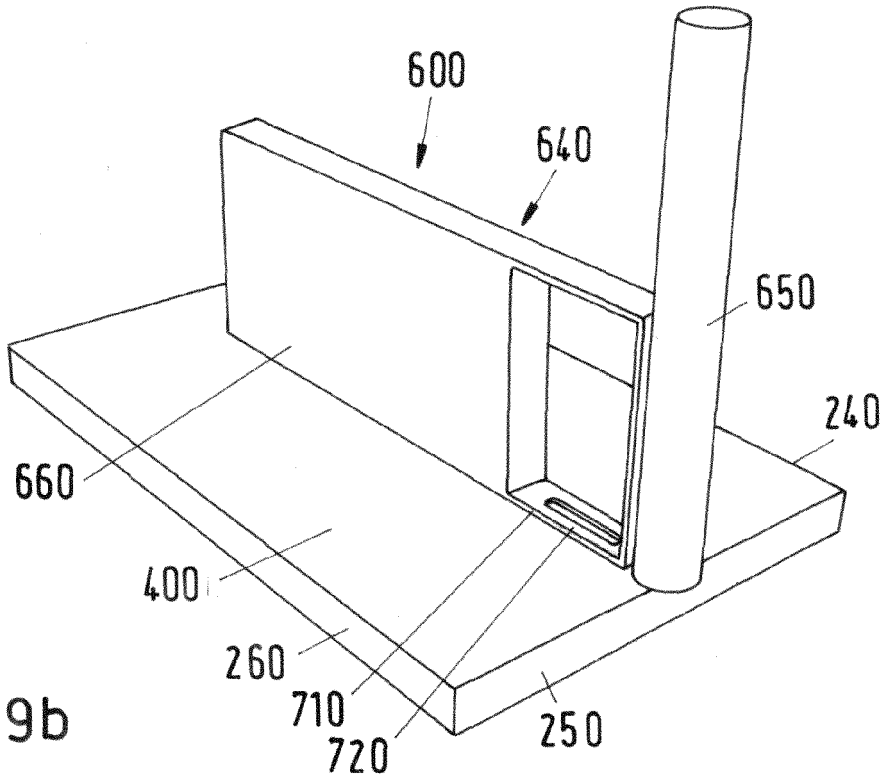
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Fig.9b

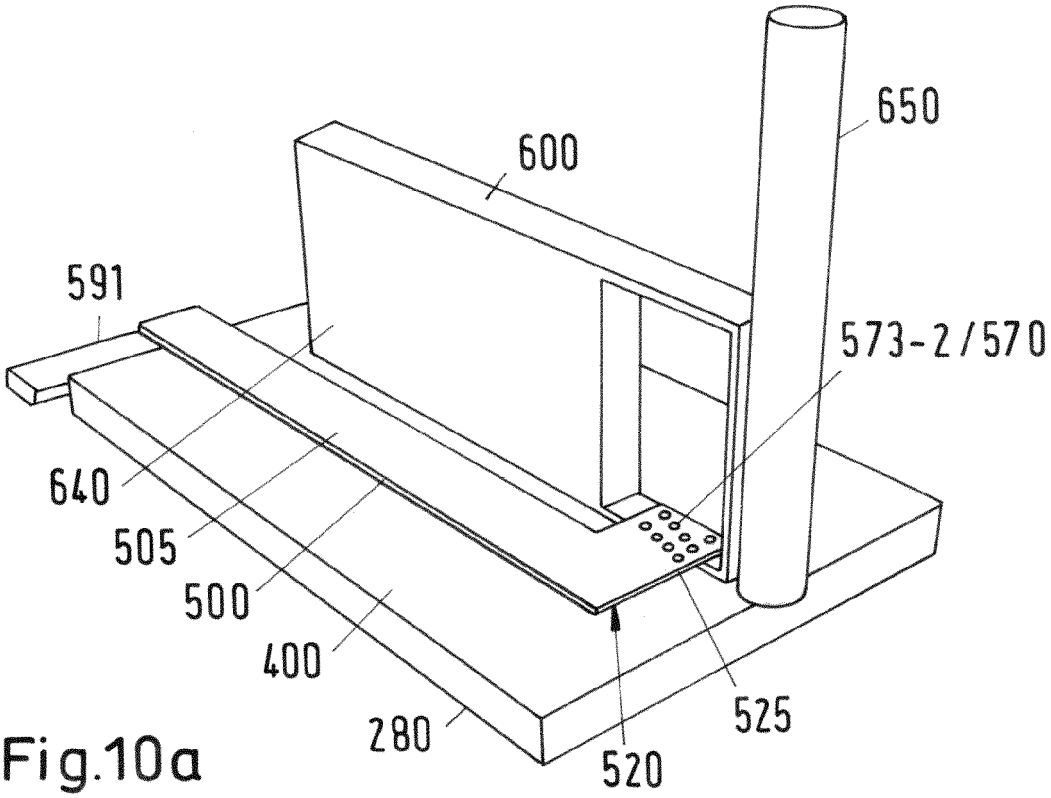

Fig.10a

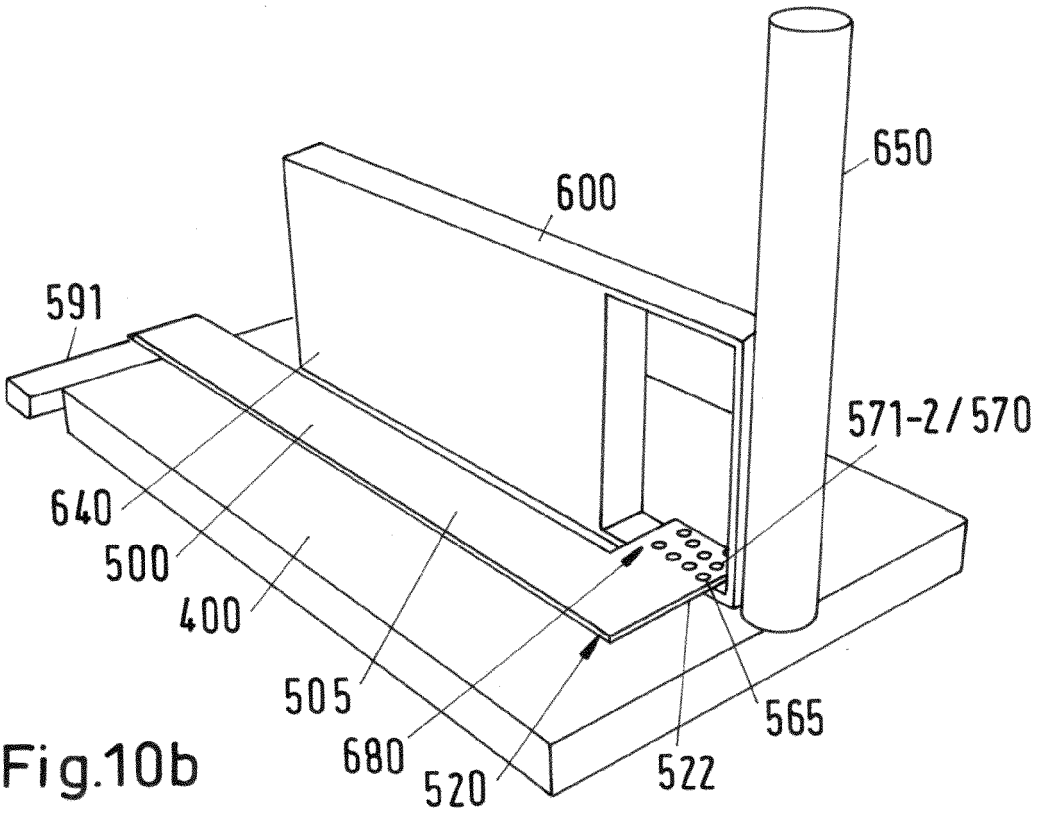

Fig.10b

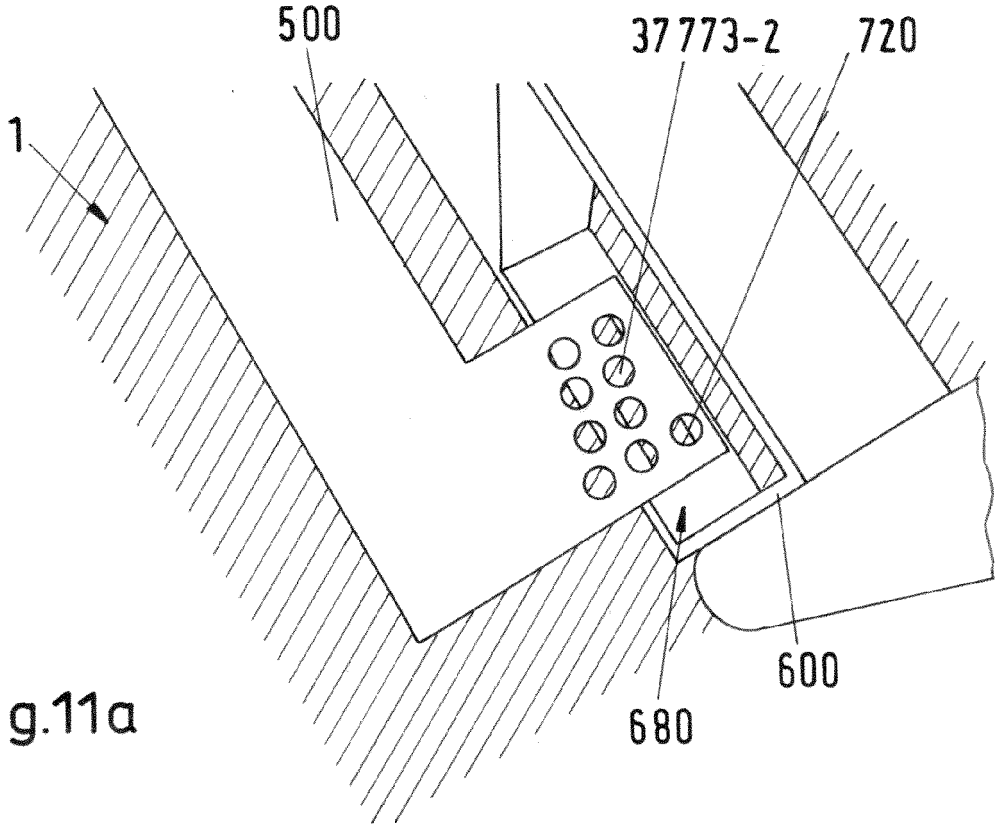

Fig.11a

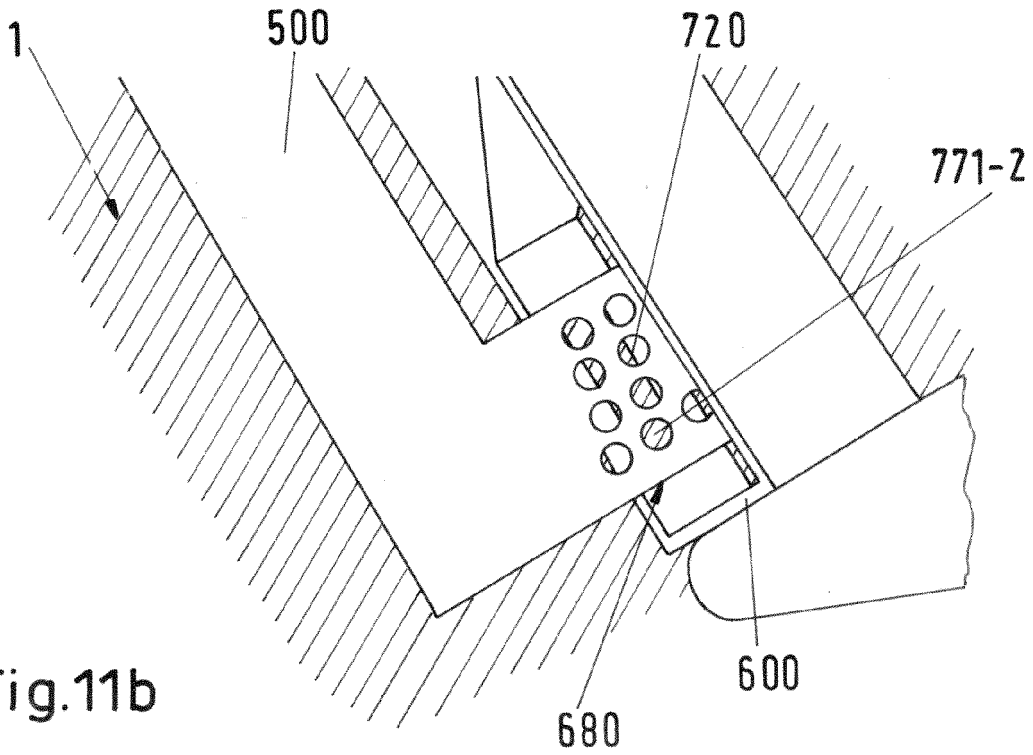

Fig.11b

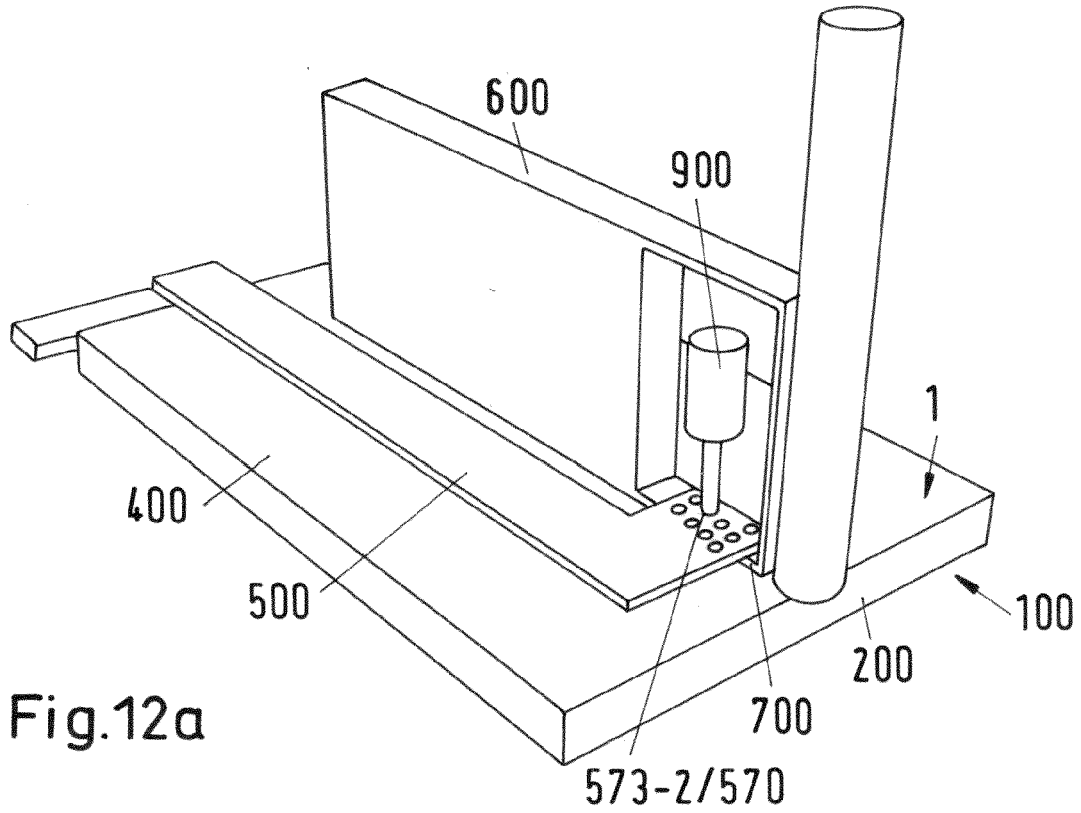

Fig.12a

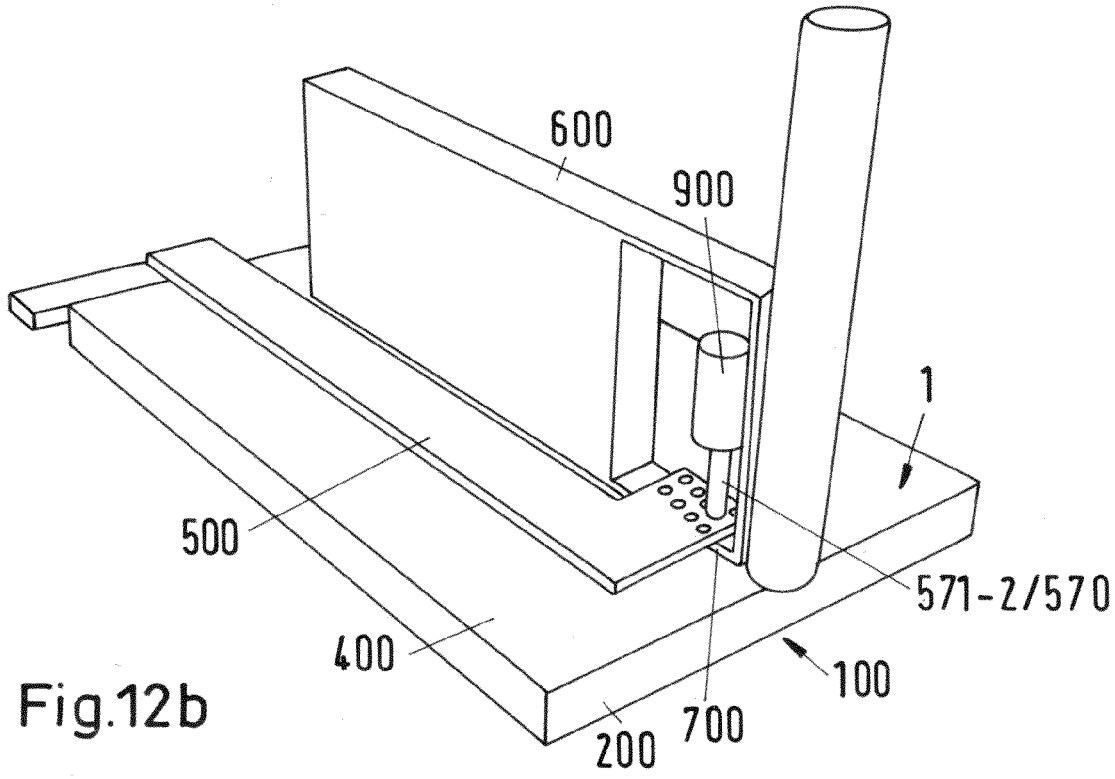

Fig.12b

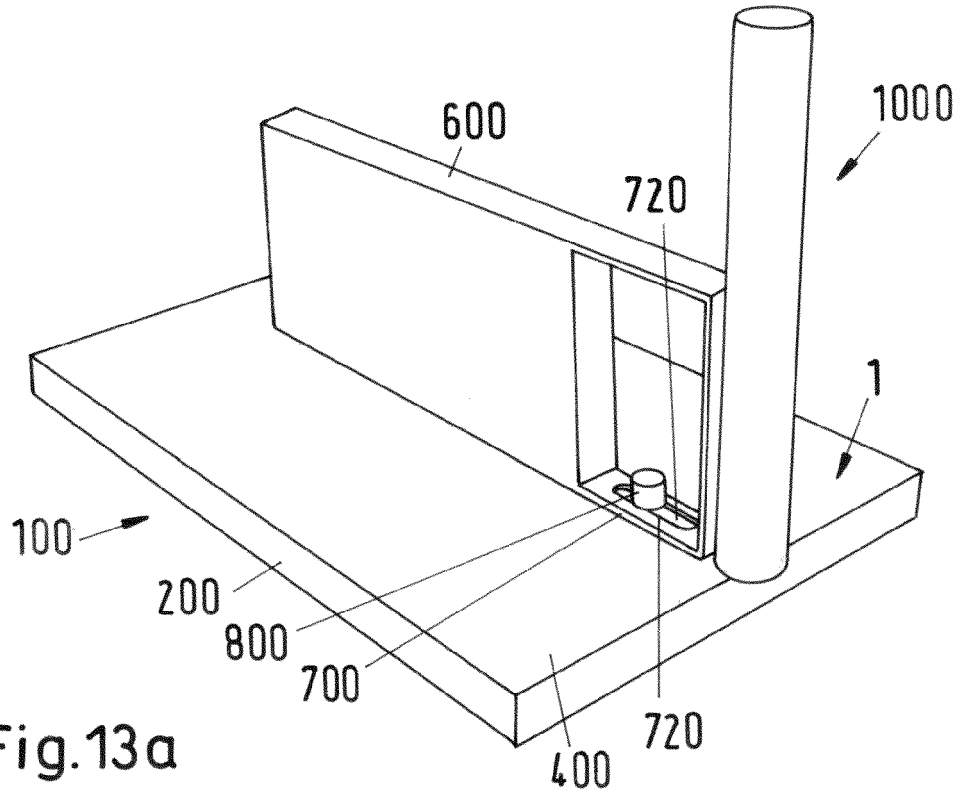

Fig.13a

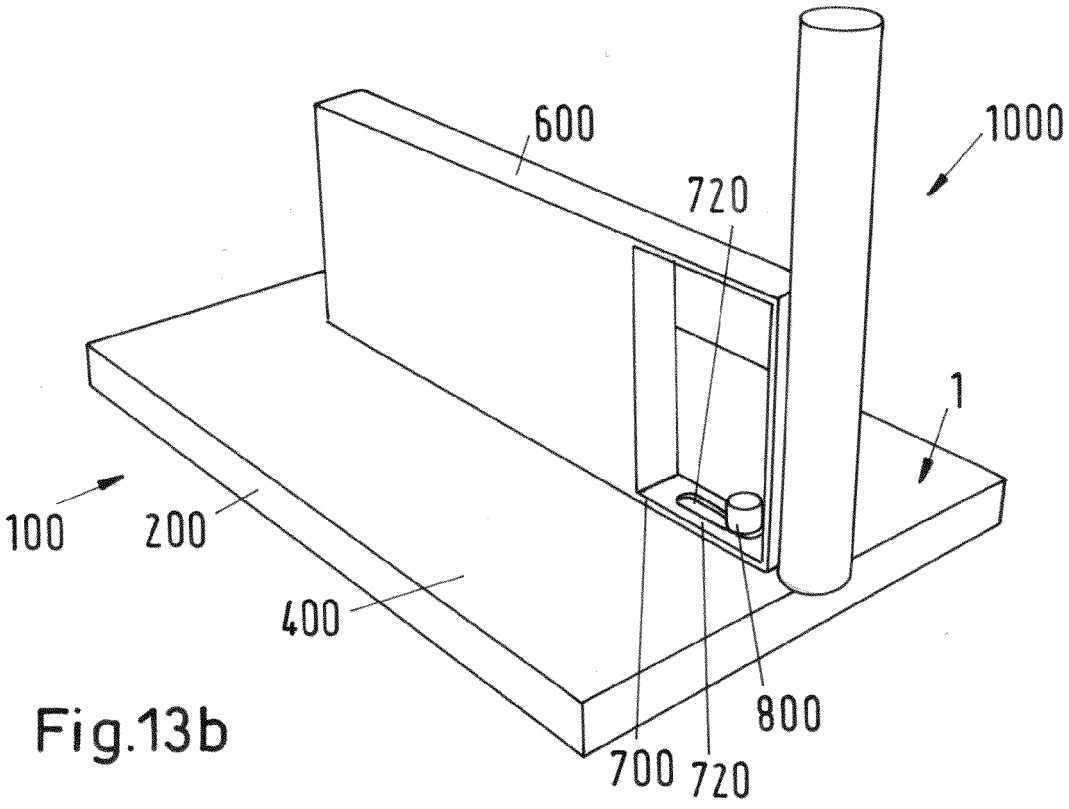

Fig.13b

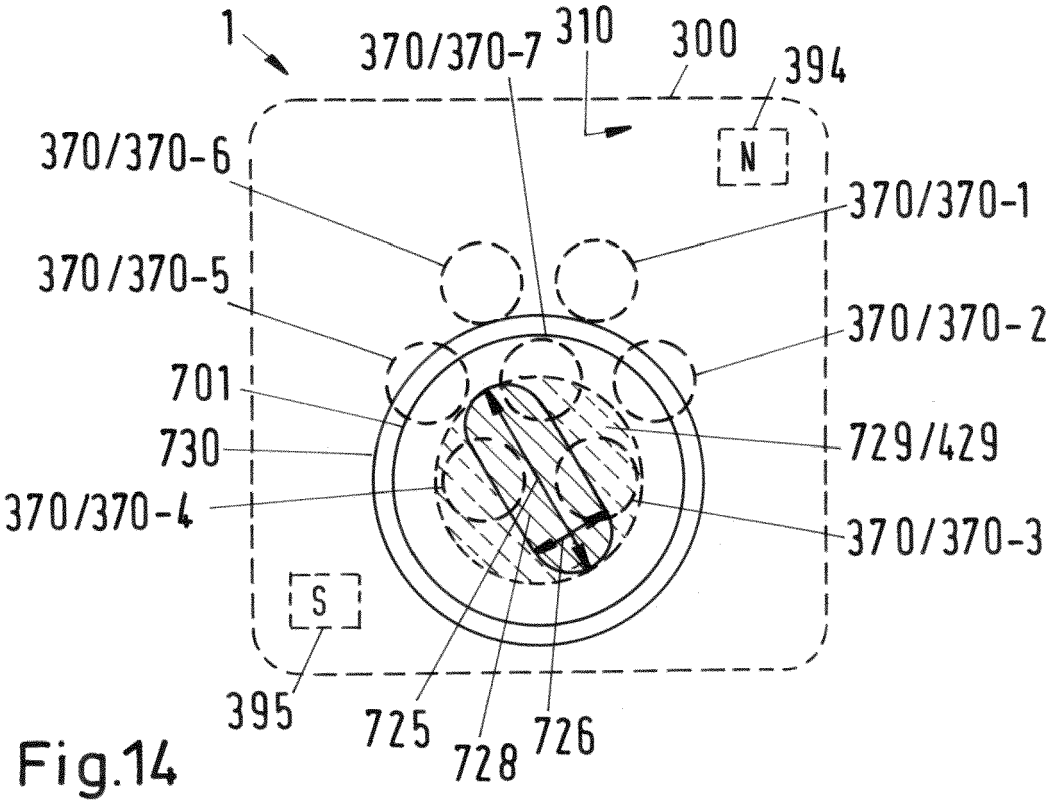
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Fig.14

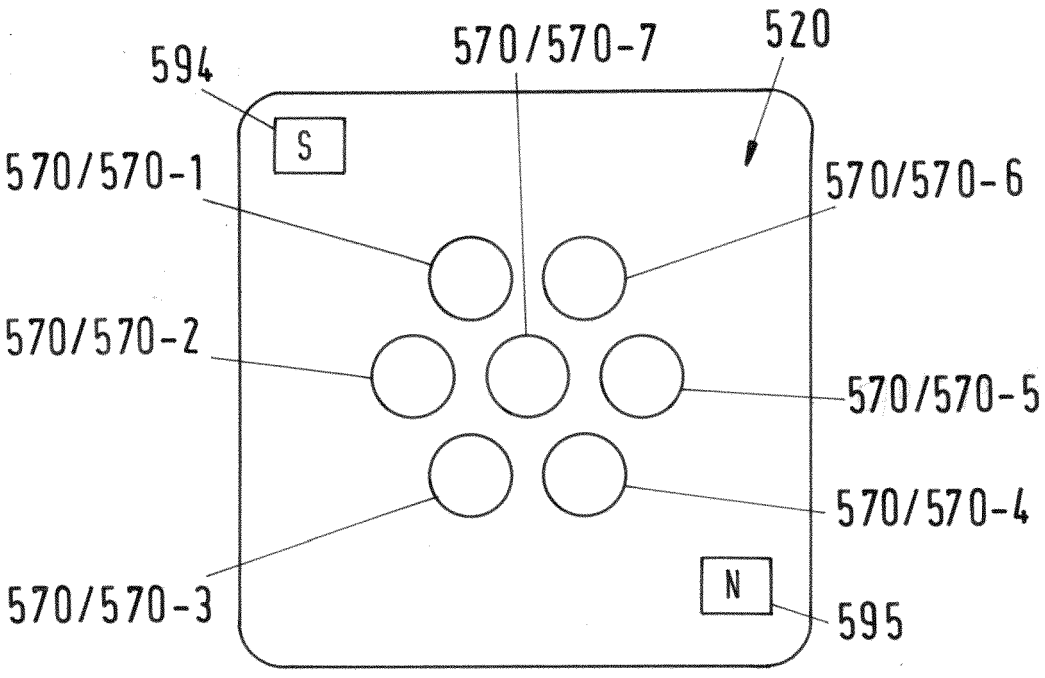
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Fig.15

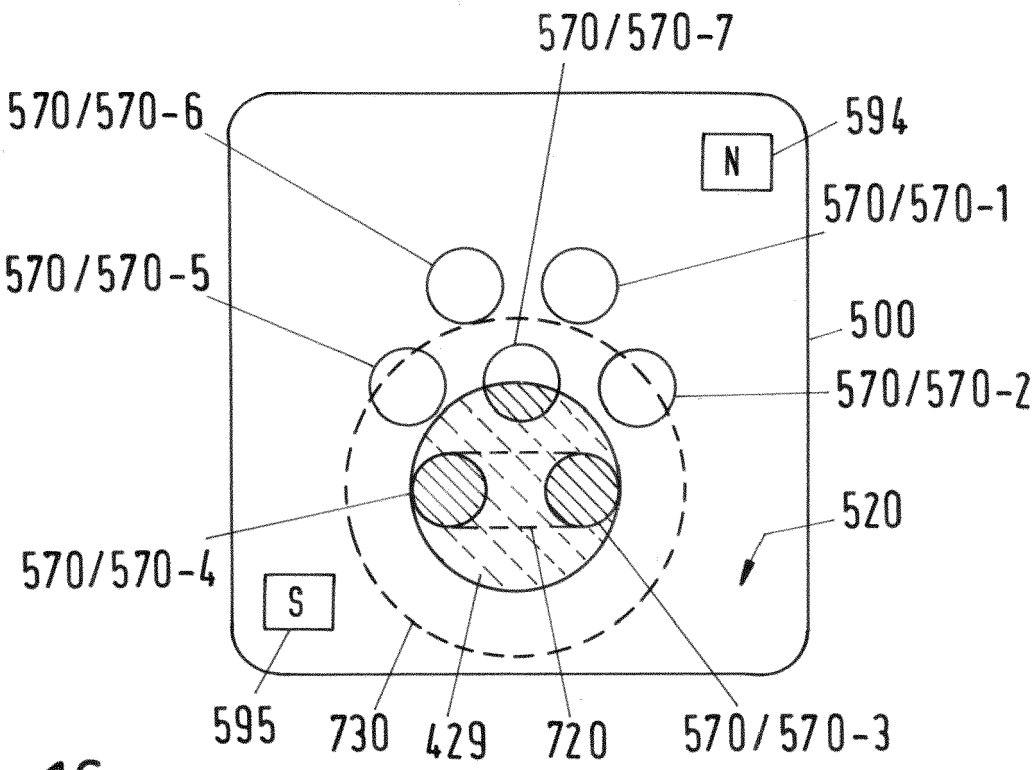
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Fig.16

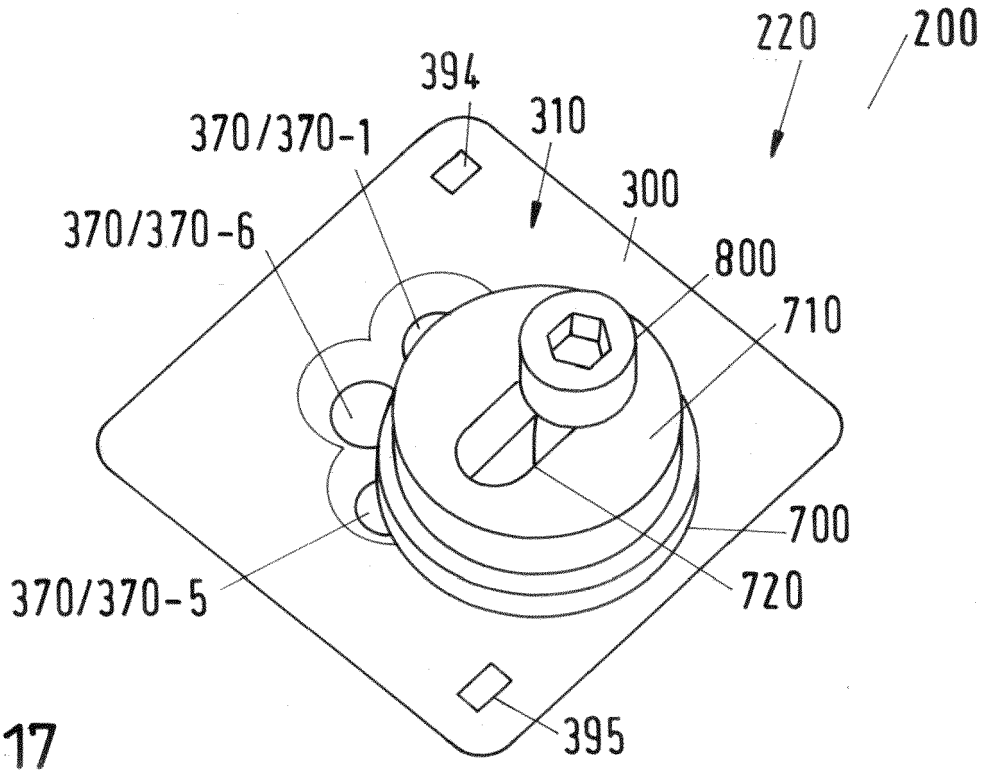
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Fig.17

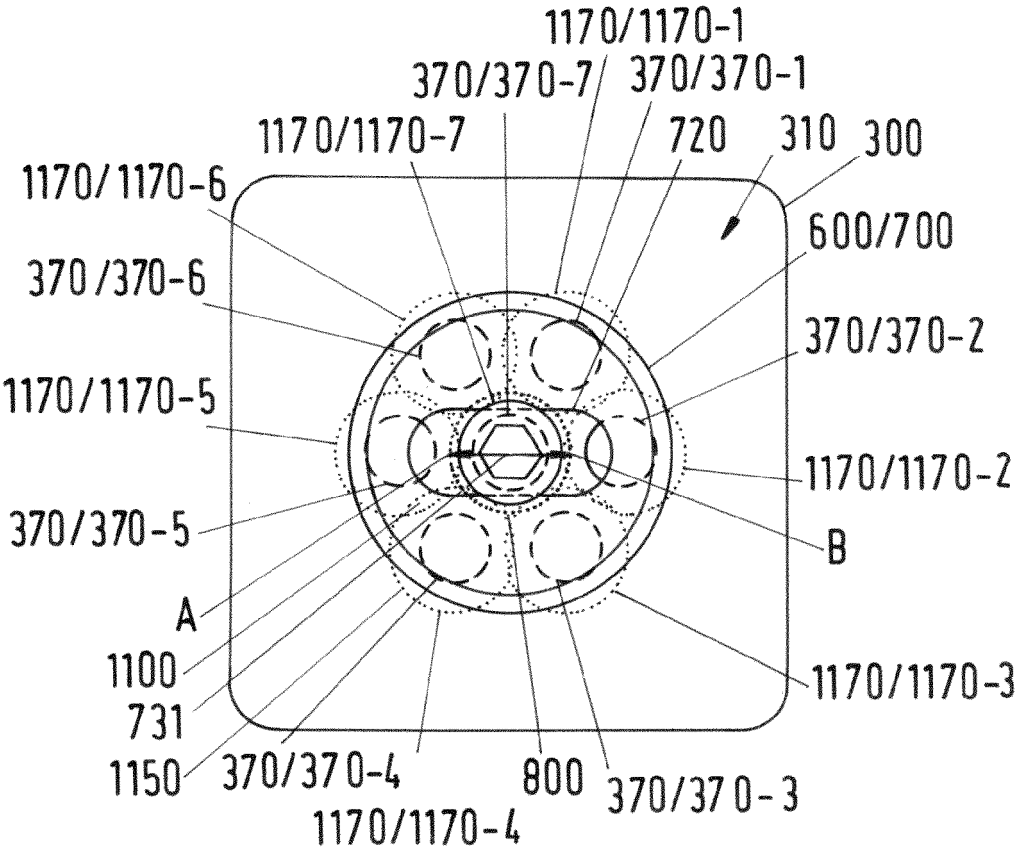
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Fig.18

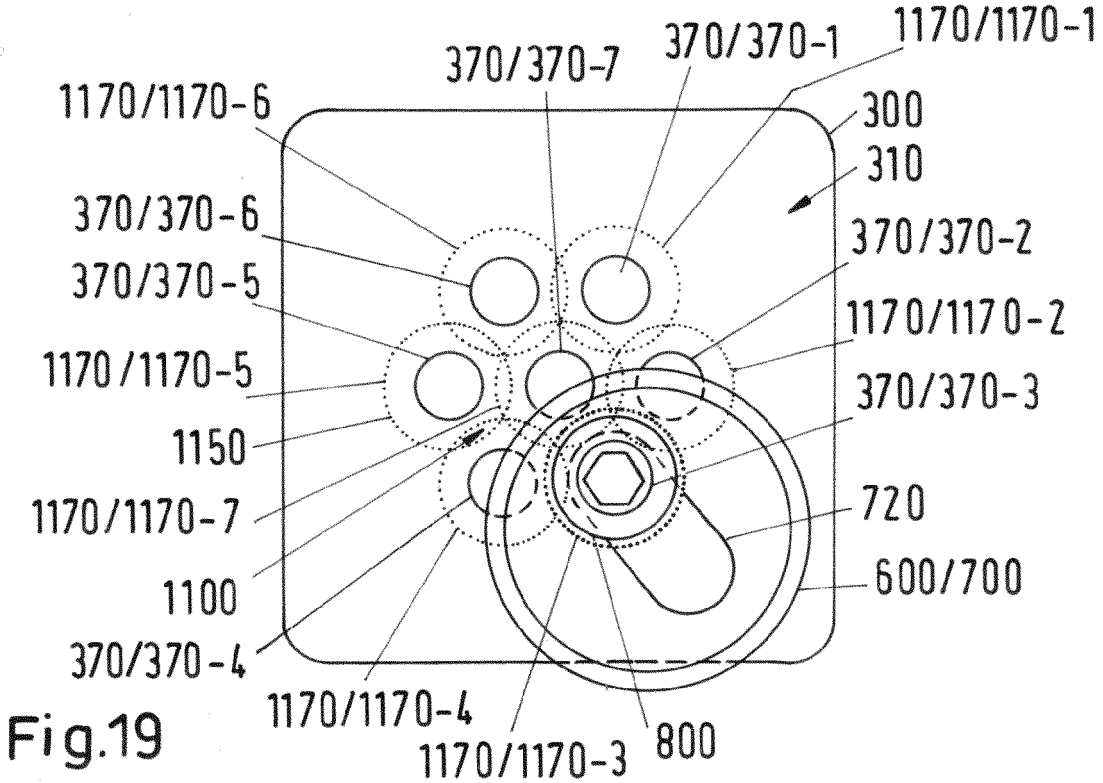
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Fig.19

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 September 2022	Lorandi, Lorenzo

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