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(54) **ASSEMBLY FOR MOUNTING TILES MADE OF A BRITTLE MATERIAL, SUCH AS FERRITE**

ANORDNUNG ZUR MONTAGE VON FLIESEN AUS SPRÖDEM MATERIAL WIE ETWA FERRIT

ENSEMBLE DE MONTAGE DE TUILES EN MATÉRIAU FRAGILE, TEL QUE DE LA FERRITE

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Description

Technical field

[0001] The present invention is related to an assembly for mounting tiles, in particular tiles made of a brittle material, such as ferrite. Present assemblies are particularly useful for arranging ferrite tiles on top of coils for inductive transfer of electrical energy.

Background art

[0002] Ferrite is commonly used to improve magnetic coupling between inductive coils for transferring electrical energy, e.g. for battery charging applications. Typically, ferrite is provided as tiles mounted to cover the inductive coil. However, ferrite tiles are very brittle and therefore require careful and firm support in environments where vibrations and/or deformations may occur. It is known that rubber may offer such a support, by clamping the tiles firmly and absorbing the mechanical loads. Typically, tiles would be pressed between oppositely arranged rubber mounts until the tile tightly fits between the mounts.

[0003] A disadvantage of the above arrangement occurs when brittle tiles are mounted between rubber mounts, because there is a high friction force between ferrite and rubber. Therefore considerable force is required to press the tiles between the mounts, which results in a high risk of breaking the tile. This makes the mounting of the tiles difficult and laborious.

[0004] US 2017/215586 A1 discloses a connection member for connecting a wall-attachable body to a wall-mounted bracket, wherein the wall attachable body has an elongated hole for receiving the connection member.

Summary of the invention

[0005] It is an aim of the present invention to overcome the above drawbacks. In particular, it is an aim to provide an easy yet effective mounting assembly for tiles made of brittle material, in particular for ferrite tiles.

[0006] According to aspects of the invention, there is therefore provided an assembly as set out in the appended claims.

[0007] Assemblies according to aspects described herein comprise a base support and a plurality of mounting members. The base support comprises a plurality of pins protruding from the base support towards respective tip ends. The mounting members comprise a tile support surface, a body protruding from the tile support surface, and a hole configured to receive a respective one of the plurality of pins.

[0008] According to a first aspect, the pins and the respective mounting members are configured to co-operate to make the body expand upon sliding the mounting member along the respective pin so as to laterally engage and clamp the tile. According to another aspect, the mounting member and the respective pin comprise corresponding surface features which are configured to enter into engagement upon sliding the mounting member along the respective pin. As the surface features engage one another, the body is configured to expand. The surface features may refer to the external surface itself, e.g. the shape thereof, or to elements provided on the surface, e.g. protrusions or recesses. By way of example, the pins are tapered becoming smaller towards the tip ends.

[0009] With the above aspects, it is advantageously obtained that any friction force lies between the pin and the mounting member, and no friction forces are applied on the tile during clamping and/or securing of the tile. The tile can therefore be secured without risk of breaking and possibly by exerting substantially less forces tending to breaking the tile. Furthermore, many more options are available to reduce friction between pin and mounting member without affecting a material choice of the tile itself.

[0010] Further advantageous aspects are set out in the dependent claims.

Brief description of the figures

[0011] Aspects of the invention will now be described in more detail with reference to the appended drawings, wherein same reference numerals illustrate same features and wherein:

Figure 1 represents an exploded perspective view of an assembly according to aspects described herein;

Figure 2 represents a cross sectional view of the assembly of Fig. 1 in an initial mounting configuration;

Figure 3 represents a perspective view of the assembly of Fig. 1 in a final mounting configuration.

Description of embodiments

[0012] Referring to Fig. 1, an assembly 10 according to aspects described herein comprises a base support 11 from which a plurality of pins 12 protrude. Pins 12 can be fixed to the base support 11, e.g. they can be made integral with support 11, or fastened thereto. Pins 12 protrude from a first surface 111 of the base support 11 (e.g., a top surface) toward their respective tip ends 121. The pins 12 advantageously extend parallel to one another.

[0013] Referring to Fig. 2, pins 12 are configured to receive mounting members 13 on their external surfaces. Mounting members 13 comprise a plate-like or disc-like part 131 defining a tile support surface 132. A body 133 protrudes from the tile support surface 132. The mounting members 13 are further provided with a hole 134, advantageously a through-hole, e.g. extending through the part 131 and at least part of the body 133. Holes 134 are configured to receive the pins 12, and holes 134 advantageously have dimensions corresponding to those of

pins 12, e.g. to provide for a snug fit of mounting members 13 on pins 12.

[0014] To mount the tiles 14, mounting members 13 are put on pins 12 so that tile support surface 132 faces upwards and body 133 protrudes upwards from surface 132. Tiles 14 can now be arranged on the tile support surfaces 132. In the initial configuration as depicted in Fig. 2, it will be appreciated that the tiles 14 rest loosely on support surfaces 132.

[0015] The arrangement of pins 12 obviously depends on the shape of the tiles 14, with support surfaces 132 advantageously supporting the tiles only at peripheral locations. Advantageously, recesses 141 (see Fig. 1) are provided on tiles 14 at locations corresponding to pins 12 in order to minimize a spacing between adjacent tiles.

[0016] According to an aspect, pins 12 are tapered with decreasing size from the base support 12 towards the tip ends 121. By way of example, the circumference of cross-sections in a plane perpendicular to the longitudinal axis of the pin may decrease from the base support 12 towards the tip end 121. Advantageously, the holes 134 fit an upper portion of the pins 12, so that when mounting members 13 are placed on the pins 12, they remain at an elevated position with respect to the base support 11 in an initial mounting position as shown in Fig. 2. The tapering may be constant along the height of the pin, or non-uniform. By way of example, only a central portion of the pin may be tapered, whereas a bottom and/or a top portion of the pin 12 may have straight walls.

[0017] To obtain a final mounting position as depicted in Fig. 3, the mounting members 13 are slid down along pins 12. The (outer surfaces of the) bodies 133 of mounting members 13 are advantageously expanded when the mounting members 13 are pushed down the pins 12, e.g. due to the tapered pins 12. As the bodies 133 expand, they will engage the tiles 14 laterally. By so doing, the tiles 14 will get clamped between the bodies 133 of opposite mounting members 13. Advantageously, since there is no relative movement between the mounting members 13 and the tiles 14 problems of friction between tiles 14 and mounting members 13 are avoided. Furthermore, the friction of the sliding contact between pins 12 and mounting members 13 (e.g., in holes 134) can easily be reduced by appropriate choice of materials and/or by providing lubrication in the contact region. By way of example, pins 12 may be made of polyamide, e.g. nylon 6. Advantageously, the outer member is at least in part made from a material that is resilient and allows an easy expansion of the outer surfaces of the bodies 133 thereby limiting the forces required to obtain the final mounting position and limiting the compressive forces exerted by the expanding outer surfaces of the bodies 133 on the tiles 14. Advantageously, the materials used for pins 12 and mounting members 13 will not affect any material choice for the tiles 14. Present aspects therefore provide a tight clamping of tiles with much less risk of tile rupture.

[0018] There are various ways in which bodies 133 of mounting members 13 can be made expandable. One possibility is to make the body 133, and possibly the entire mounting member 13 of a resiliently elastic material, such as an elastomeric material. Useful examples of elastomeric materials are natural and synthetic rubber. As the mounting member is pushed down the pin, the elastic material will dilate and the body 133 will expand (or deploy) substantially proportionally to the tapering of the pin.

[0019] In addition, or alternatively, the body may comprise weaker sections and stronger sections alternating circumferentially around the pin. Each of these sections may extend along the height of the body 133 (i.e. parallel to the pin 12). When the mounting member 13 is pushed down the pin, the weaker sections may dilate and increase the spacing between the stronger sections. As a result, the hole 134 is dilated, and the entire body expands. The weaker sections may be obtained by a difference in material (mechanical) properties as compared to the stronger sections, or by a difference in material thickness between weaker and stronger sections. By way of example, referring to Fig. 1, the bodies 133 comprise a pair of thicker segments 135 which are spaced apart by a pair of thinner segments 136. Typically the thicker segments 135 will be arranged so that they face and engage the tiles 14. The thinner segments 136 may be formed as grooves or notches aligned with an axis of hole 134. The segments 135 engaging the tiles may be shaped as cylinder segments.

[0020] It will be convenient to note that it is not required that the tapering of pins 12 should extend completely along the circumference of the pins. Only some segments of the pin surface may have a tapered shape, whereas other segments on the same circumference may not be tapered. By way of example, only the surface segments facing the tiles 14 may be tapered.

[0021] Other alternatives to tapering the pin 12 for making the body 133 expandable exist. One alternative is to make hole 134 tapered becoming smaller in circumference towards the top end (i.e. an end opposite surface 132). In this case, pin 12 may have straight (non-tapered) walls, e.g. cylindrical walls. Another alternative is to provide a protruding member inside hole 134 on the mounting member 13. The protrusion, such as a ridge, extends towards the centre axis of hole 134 so as to partially overlap with the tip 121 of pin 12. The protrusion therefore may be used, in the initial mounting position, to maintain mounting members 13 at the elevated position of Fig. 2. By further pressing down the mounting members 13 along the pins 12, the ridge engages the side wall of the pin and will press the body 133 laterally outwards so that it expands towards the tile 14. In the present alternative, pin 12 may have straight walls, such as cylindrical. Yet alternatively, the protrusion may be provided on pin 12 instead of in hole 134. Also in this case, pin 12 may be cylindrical except for the protrusion, which may take the form of an annular protruding member on the external wall of pin 12. It will be evident from the above that many more co-operating configurations between pin and

mounting member may be easily thought of.

[0022] No special tools are required for pressing the tiles and mounting members down the pins. A simple pressing force, advantageously at locations corresponding to the support surfaces may suffice.

[0023] It will be beneficial to shape the pins 12 such that they prevent rotation of the mounting members 13 during mounting. By way of example, pins 12 may have an oval or polygonal cross section, or a cross section of any shape departing from circular, e.g. star-shaped. Alternatively, or in addition, pins 12 may be provided with surface features, such as ridges, grooves or notches on an external surface thereof, and the holes 134 of mounting members 13 may be provided with mating surface features.

[0024] To prevent the mounting members to lift up during use, e.g. due to vibration, the mounting member can be secured by a retaining member, e.g. a circlip.

[0025] Rubber rings 15 may be placed on pins 12, on top of the tiles 14 in order to support further objects on top with minimal loading of the tiles 14 at unsupported locations, e.g. in the middle.

[0026] Assemblies of present aspects allow for an easy mounting of tiles with minimal risk of breaking. With an appropriate arrangement of the pins, tiles of any shape can be accommodated. Even on deformation of the base support 11, the tiles can be maintained in place with minimal risk of breaking, because the resilient material used for the bodies 13 and 15 minimizes the mechanical loads exerted on the tiles 14.

[0027] One possible application is mounting of ferrite tiles on top of or underneath the electrical wires of a coil for inductive transfer of electrical energy. In such case, as shown in Figs. 1 and 3, the base support 11 may comprise paths or tracks 112 for guiding the wires 16 of an induction coil and the ferrite tiles can easily be mounted on the pins 12. The wire 16 may be accommodated in the tacks 112 which provide a pathway that winds the wire 16 to obtain the induction coil, e.g. for (contactless) inductive transfer of electrical energy. The tracks 112 may run parallel to the first surface 111 of the base support, and the pins 12 protrude from the paths. The base support 11 may be housed in, or form part of, a housing of a contactless power transfer device. The ferrite tiles and the coil for inductive transfer may be arranged within the housing, in particular the ferrite tiles and the inductive coil may be stacked.

[0028] It will be convenient to note that aspects described herein are not limited to use for ferrite tiles only, but may be useful for mounting any type of tile made of a brittle material, e.g. ceramic tiles.

Claims

1. Assembly (10) for mounting tiles (14), comprising:

a base support (11) comprising a plurality of pins (12) protruding from the base support towards respective tip ends (121),

a mounting member (13) for each of the plurality of pins, the mounting member comprising a tile support surface (132), a body (133) protruding from the tile support surface, and a hole (134) configured to receive a respective one of the plurality of pins, and

a plurality of tiles (14), wherein the mounting member and the respective pin are configured to co-operate such that the body expands upon sliding the mounting member along the respective pin so as to laterally engage and clamp the tile

characterised in that the plurality of tiles have dimensions allowing mounting the tiles between oppositely arranged pins (12).

2. Assembly of claim 1, wherein the mounting member (13) and the respective pin (12) comprise corresponding surface features configured to enter into engagement upon sliding the mounting member along the respective pin, thereby expanding the body.

3. Assembly of claim 2, wherein the respective pin and/or the hole (134) are tapered becoming smaller in circumference towards the tip ends (121).

4. Assembly of any one of the preceding claims, wherein the body (133) comprises a resilient or elastomeric material.

5. Assembly of any one of the preceding claims, wherein the body (133) comprises first sections (135) spaced apart by second sections (136), wherein the first sections have a larger thickness than the second sections, wherein the first sections and second sections are arranged circumferential around the body, preferably wherein the second sections (136) are formed by grooves or notches aligned with the respective pin.

6. Assembly of claim 5, wherein the second sections (136) form points of weakness making the body expandable by increasing a spacing between the first sections (135).

7. Assembly of any one of the preceding claims, wherein the plurality of pins (12) have a cross section different from circular.

8. Assembly of any one of the preceding claims, wherein the body (133) comprises an external surface having at least two first segments (135) separated by grooves aligned with the respective pin.

9. Assembly of any one of the preceding claims, where-

in the hole (134) has a shape mating with a shape of a tip portion of the respective pin (12), so that the mounting member (13) is arranged to remain at an elevated position from the base support (11) in an initial mounting phase, preferably wherein the tiles (14) have a loose fit when mounted on the mounting members (13) in the initial mounting phase, the tiles having a tight fit between the bodies (133) of the mounting members when the mounting members have been slid towards the base support (11).

10. Assembly of any one of the preceding claims, wherein the tiles (14) comprise recesses (141) at mounting locations corresponding to the plurality of pins.

11. Assembly of any one of the preceding claims, wherein the body (133) is made of an elastomeric material.

12. Assembly of any one of the preceding claims, comprising rubber support rings (15) arranged for placement on the plurality of pins, on top of the tiles.

13. Assembly of any one of the preceding claims, wherein the tiles (14) are made of ferrite.

14. Assembly of any one of the preceding claims, wherein the base support (11) comprises tracks (112) forming a pathway for winding an electrical conductor (16) to obtain an induction coil, preferably wherein the tracks run parallel to a first surface (111) of the base support (11), and the pins (12) protrude from the first surface (112).

15. Contactless power transfer device, comprising an induction coil (16) for contactless power transfer and the assembly of any one of the claims 13 to 15, preferably wherein the induction coil (16) and the assembly are stacked.

Patentansprüche

1. Anordnung (10) zur Montage von Fliesen (14), umfassend:

einen Basisträger (11), der eine Vielzahl von Stiften (12) umfasst, die aus dem Basisträger hin zu entsprechenden Spitzenenden (121) vorspringen,
ein Montageelement (13) für jeden der Vielzahl von Stiften, wobei das Montageelement eine Fliesenstützfläche (132), einen Körper (133), der von der Fliesenstützfläche vorspringt, und ein Loch (134), das konfiguriert ist, um einen entsprechenden der Vielzahl von Stiften aufzunehmen umfasst, und
eine Vielzahl von Fliesen (14), wobei das Montageelement und der entsprechende Stift konfiguriert sind, um derart zusammenzuarbeiten, dass sich der Körper erweitert, wenn das Montageelement entlang dem entsprechenden Stift gleitet, um die Fliese seitlich einzugreifen und zu klemmen,
dadurch gekennzeichnet, dass die Vielzahl von Fliesen Abmessungen aufweist, die ermöglichen, die Fliesen zwischen gegenüberliegend angeordneten Stiften (12) zu montieren.

2. Anordnung nach Anspruch 1, wobei das Montageelement (13) und der jeweilige Stift (12) entsprechende Oberflächenmerkmale aufweisen, die konfiguriert sind, um in Eingriff zu kommen, wenn das Montageelement entlang dem jeweiligen Stift gleitet, wodurch der Körper erweitert wird.

3. Anordnung nach Anspruch 2, wobei der/das entsprechende Stift und/oder Loch (134) konisch ist/sind und hin zu den Spitzenenden (121) einen kleineren Umfang aufweist/aufweisen.

4. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei der Körper (133) ein elastisches oder elastomeres Material umfasst.

5. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei der Körper (133) erste Abschnitte (135) umfasst, die durch zweite Abschnitte (136) beabstandet sind, wobei die ersten Abschnitte eine größere Dicke als die zweiten Abschnitte aufweisen, wobei die ersten Abschnitte und zweiten Abschnitte umlaufend um den Körper angeordnet sind, vorzugsweise wobei die zweiten Abschnitte (136) durch Nuten oder Kerben, die mit dem entsprechenden Stift ausgefluchtet sind, gebildet sind.

6. Anordnung nach Anspruch 5, wobei die zweiten Abschnitte (136) Schwachpunkte bilden, die den Körper durch Erhöhen eines Abstands zwischen den ersten Abschnitten (135) erweiterbar machen.

7. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei die Vielzahl von Stiften (12) einen anderen Querschnitt als den kreisförmigen aufweist.

8. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei der Körper (133) eine äußere Oberfläche umfasst, die mindestens zwei erste Segmente (135) aufweist, die durch Nuten, ausgefluchtet mit dem entsprechenden Stift, getrennt sind.

9. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei das Loch (134) ein Form aufweist, die zu einer Form eines Spitzenabschnitts des jeweiligen Stifts (12) passt, so dass das Montageelement (13) angeordnet ist, um auf einer erhöhten Position vom Basisträger (11) in einer anfänglichen

Montagephase zu bleiben, vorzugsweise wobei die Fliesen (14) eine lockere Passform aufweisen, wenn sie auf den Montageelementen (13) in der anfänglichen Montagephase montiert sind, wobei die Fliesen eine enge Passform zwischen den Körpern (133) der Montageelemente aufweisen, wenn die Montageelemente hin zum Basisträger geglitten (11) wurden.

10. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei die Fliesen (14) Aussparungen (141) an Montagestellen umfassen, die der Vielzahl von Stiften entsprechen.

11. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei der Körper (133) aus einem elastomeren Material hergestellt ist.

12. Anordnung nach irgendeinem der vorhergehenden Ansprüche, umfassend Gummitrageringe (15), die zur Platzierung auf der Vielzahl von Stiften angeordnet sind, auf den Fliesen.

13. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei die Fliesen (14) aus Ferrit hergestellt sind.

14. Anordnung nach irgendeinem der vorhergehenden Ansprüche, wobei der Basisträger (11) Schienen (112) umfasst, der einen Weg zum Aufwickeln eines elektrischen Leiters (16) um eine Induktionsspule zu erhalten, bilden, vorzugsweise wobei die Schienen parallel zu einer ersten Oberfläche (111) des Basisträgers (11) laufen und die Stifte (12) aus der ersten Oberfläche (112) vorspringen.

15. Kontaktlose Leistungsübertragungsvorrichtung, umfassend eine Induktionsspule (16) zur kontaktlosen Leistungsübertragung und die Anordnung nach einem der Ansprüche 13 bis 15, vorzugsweise wobei die Induktionsspule (16) und die Anordnung gestapelt sind.

Revendications

1. Ensemble (10) pour monter des carreaux (14) comprenant :

un support de base (11) comprenant une pluralité de broches (12) faisant saillie du support de base vers des extrémités de pointe (121) respectives,
un élément de montage (13) pour chacune de la pluralité de broches, l'élément de montage comprenant une surface de support de carreau (132), un corps (133) faisant saillie de la surface de support de carreau, et un trou (134) configuré pour recevoir une broche respective de la pluralité de broches, et
une pluralité de carreaux (14), dans lequel l'élément de montage et la broche respective sont configurés pour coopérer de sorte que le corps subit une expansion suite au coulissement de l'élément de montage le long de la broche respective afin de mettre en prise latéralement et serrer le carreau,
caractérisé en ce que la pluralité de carreaux a des dimensions permettant le montage des carreaux entre des broches (12) agencées de manière opposée.

2. Ensemble selon la revendication 1, dans lequel l'élément de montage (13) et la broche (12) respective comprennent des caractéristiques de surface correspondantes configurées pour entrer en mise en prise suite au coulissement de l'élément de montage le long de la broche respective, faisant ainsi subir une expansion au corps.

3. Ensemble selon la revendication 2, dans lequel la broche respective et/ou le trou (134) sont progressivement rétrécis, devenant plus petits en circonférence vers les extrémités de pointe (121).

4. Ensemble selon l'une quelconque des revendications précédentes, dans lequel le corps (133) comprend un matériau résilient ou élastomère.

5. Ensemble selon l'une quelconque des revendications précédentes, dans lequel le corps (133) comprend des premières sections (135) espacées par des secondes sections (136), dans lequel les premières sections ont une plus grande épaisseur que les secondes sections, dans lequel les premières sections et les secondes sections sont agencées de manière circonférentielle autour du corps, de préférence dans lequel les secondes sections (136) sont formées par des rainures ou des encoches alignées avec la broche respective.

6. Ensemble selon la revendication 5, dans lequel les secondes sections (136) forment des points de faiblesse, provoquant l'expansion du corps en augmentant un espacement entre les premières sections (135).

7. Ensemble selon l'une quelconque des revendications précédentes, dans lequel la pluralité de broches (12) a une section transversale différente d'une section circulaire.

8. Ensemble selon l'une quelconque des revendications précédentes, dans lequel le corps (133) comprend une surface externe ayant au moins deux premiers segments (135) séparés par des rainures alignées avec la broche respective.

9. Ensemble selon l'une quelconque des revendications précédentes, dans lequel le trou (134) a une forme correspondant à une forme d'une partie de pointe de la broche (12) respective, de sorte que l'élément de montage (13) est agencé pour rester dans une position élevée à partir du support de base (11) dans une phase de montage initiale, de préférence dans lequel les carreaux (14) ont un ajustement sans serrage lorsqu'elles sont montées sur les éléments de montage (13) dans la phase de montage initiale, les carreaux ayant un ajustement avec serrage entre les corps (133) des éléments de montage lorsque les éléments de montage ont été coulissés vers le support de base (11).

10. Ensemble selon l'une quelconque des revendications précédentes, dans lequel les carreaux (14) comprennent des évidements (141) à des emplacements de montage correspondant à la pluralité de broches.

11. Ensemble selon l'une quelconque des revendications précédentes, dans lequel le corps (133) est réalisé avec un matériau élastomère.

12. Ensemble selon l'une quelconque des revendications précédentes, comprenant des bagues de support en caoutchouc (15) agencées pour la mise en place sur la pluralité de broches, sur le dessus des carreaux.

13. Ensemble selon l'une quelconque des revendications précédentes, dans lequel les carreaux (14) sont réalisées à partir de ferrite.

14. Ensemble selon l'une quelconque des revendications précédentes, dans lequel le support de base (11) comprend des rails (112) formant une voie de passage pour l'enroulement d'un conducteur électrique (16) afin d'obtenir une bobine à induction, de préférence dans lequel les rails s'étendent parallèlement à une première surface (111) du support de base (11), et les broches (12) font saillie de la première surface (112).

15. Dispositif de transfert d'énergie sans contact, comprenant une bobine à induction (16) pour transférer l'énergie sans contact et l'ensemble selon l'une quelconque des revendications 13 à 15, de préférence dans lequel la bobine à induction (16) et l'ensemble sont empilés.

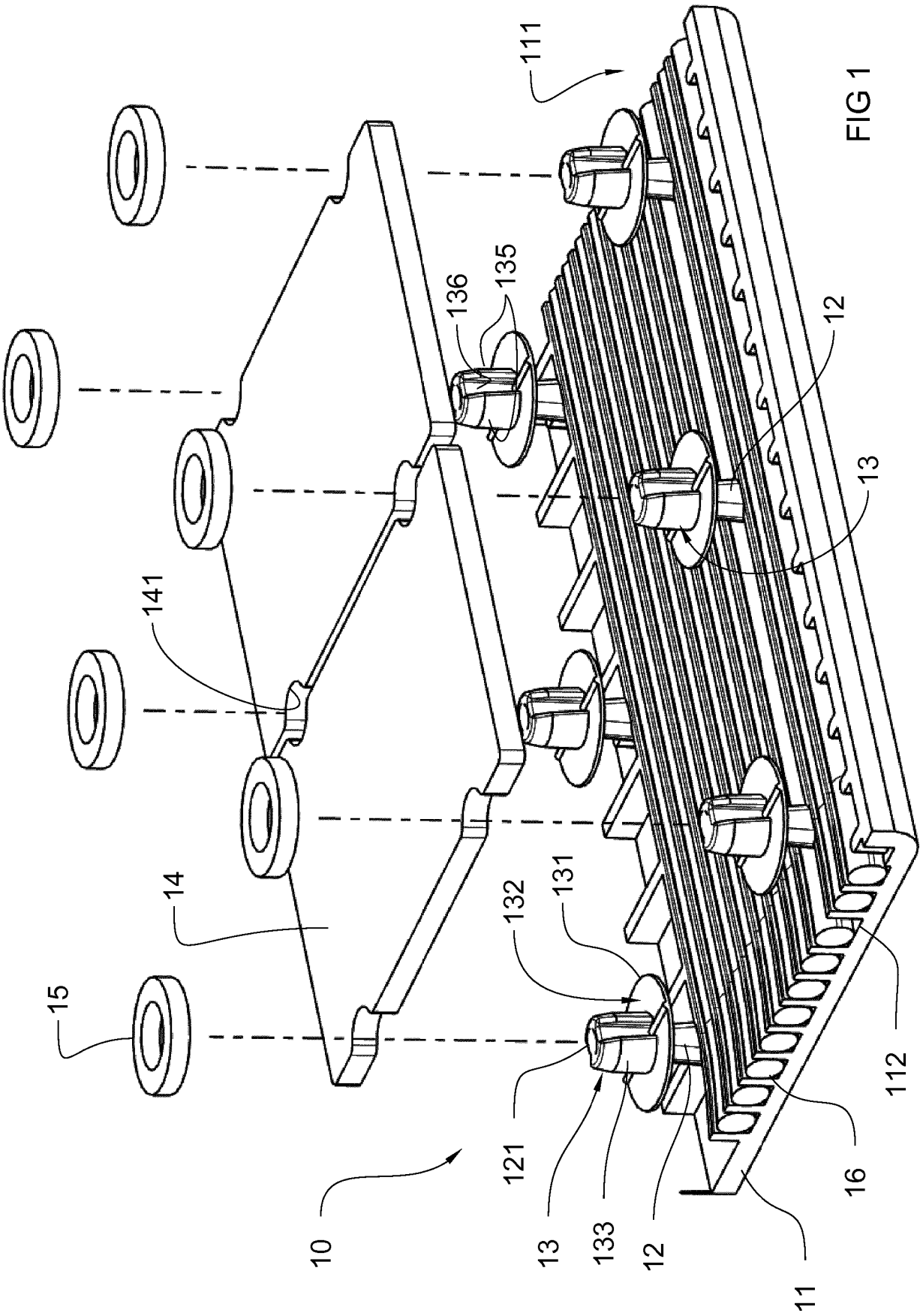

FIG 1

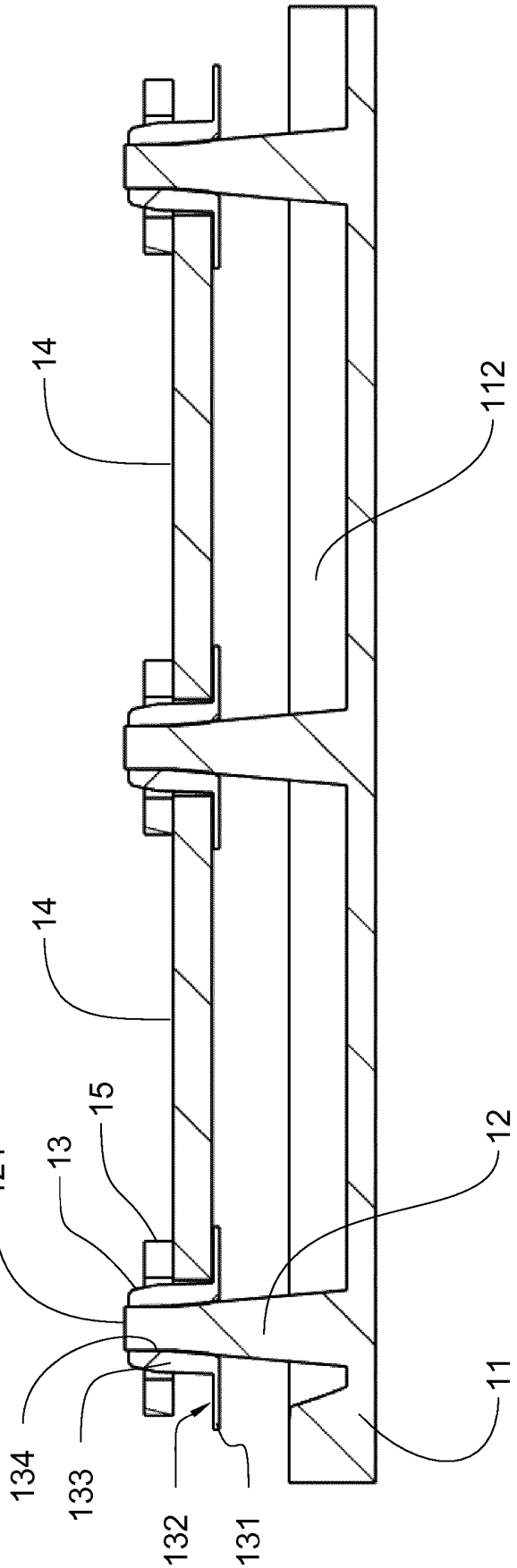

FIG 2

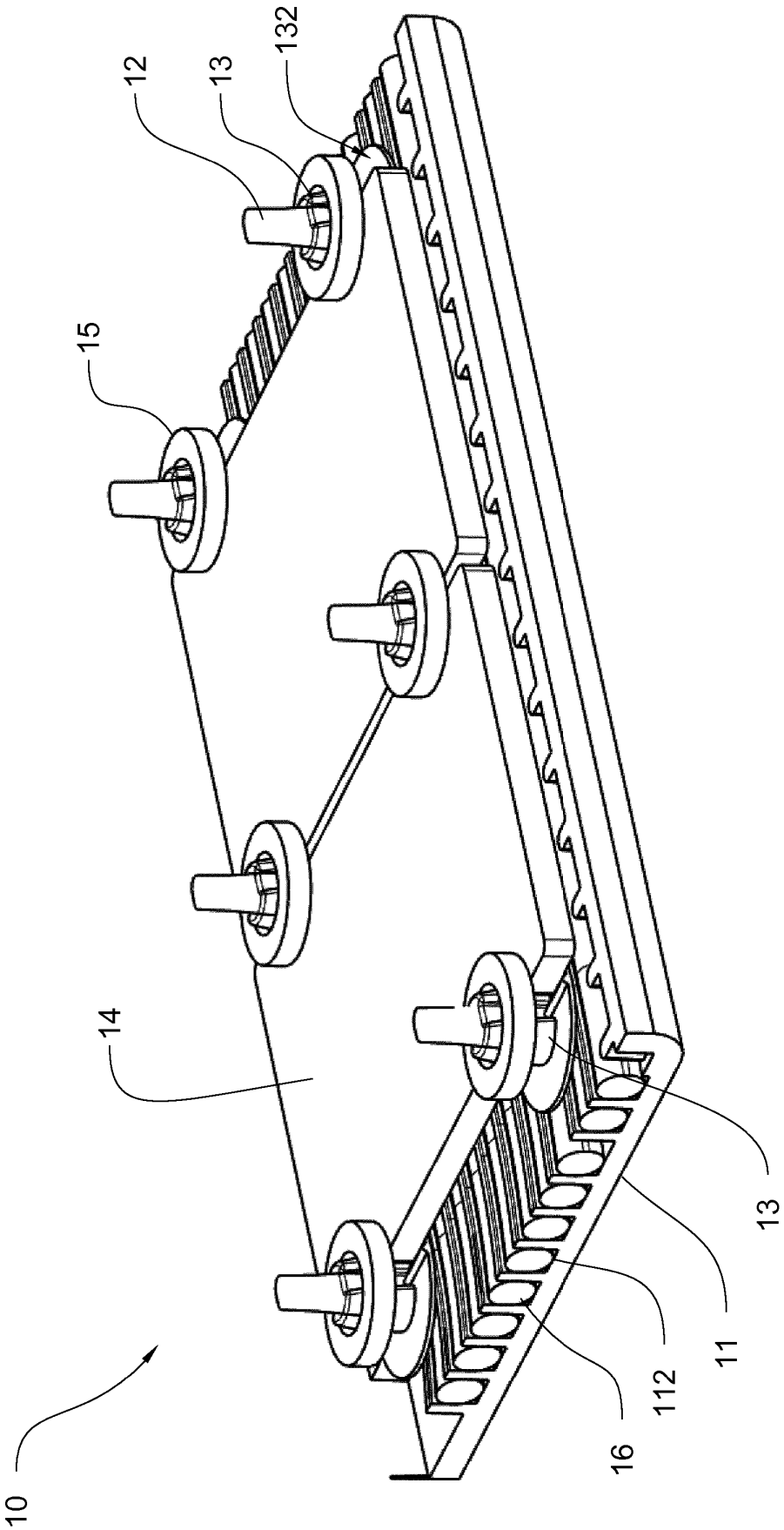

FIG 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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