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(54) **Mechanical reclosable fastener component**

(57) The invention relates to a mechanical reclosable fastener component for mechanically and electrically connecting electrical and/or electronic components to each other and comprises at least two segments 1 each segment with a body portion 2 and fixing elements 3 protruding from at least one side of the body portion 2, the segments 1 providing at least one conductive area 7,

wherein the segments 1 are arranged such that the body portions 2 are parallel to each other and the fixing elements 3 on a side of the body portion 2 of the at least two segments 1 are oriented in the same direction. The invention further relates to a method of making a mechanical reclosable fastener component as well as to a connector comprising a mechanical reclosable fastener component.

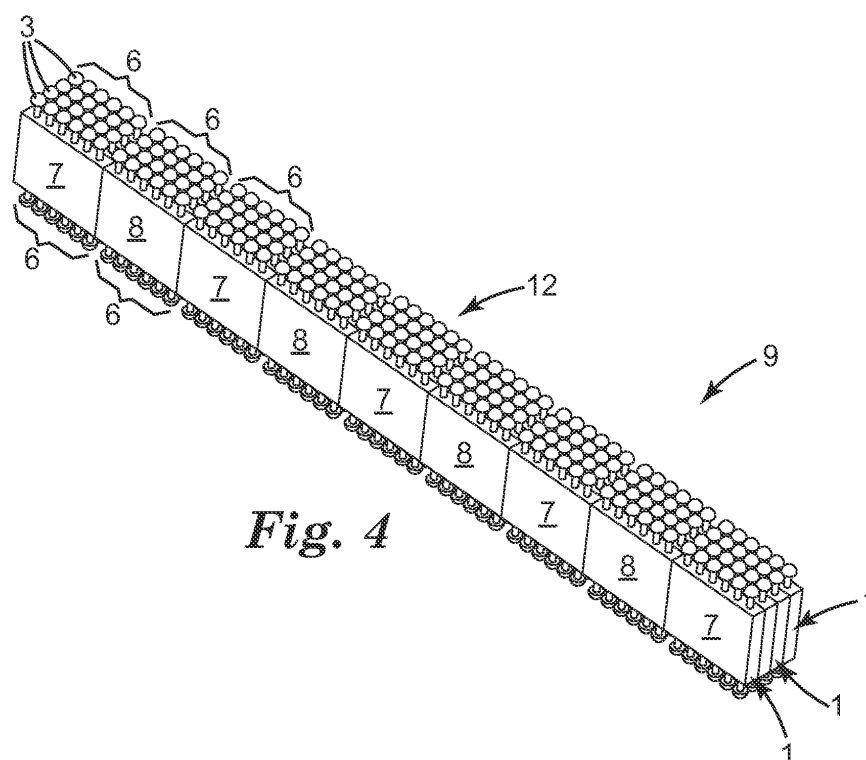


Fig. 4

Description

Technical Field

[0001] The invention relates to a mechanical reclosable fastener component for mechanically and electrically connecting electric and/or electronic components to each other.

Background Art

[0002] DD 262 316 A1 discloses an arrangement for electrically connecting electronic components to each other, such as printed circuit boards or the like, using electrically conductive mechanical fastener in the shape of a wire meshes as a connector. A first wire mesh comprises hooks and a second wire mesh comprises loops. The wire meshes are used as a mechanical reclosable fastener that mechanically and electrically connect the electronic components to each other. The wire meshes may comprise conductive and non conductive areas. The wire meshes may be attached to the electronic components by soldering or gluing with conductive adhesive.

[0003] EP 1 245 933 A2 describes an electro-mechanical device for mounting an electronic component group on a support, especially for mounting an instrument display in an instrument panel or dashboard. The support described in this document does not have any electric or electronic features. The device comprises a connector that is made out of an electrically conducting material in the shape of a mechanical reclosable fastener, here a hook-and-loop-fastener, which serves for a mechanical fastening and an electrical connection. The fastener may be made out of a conductive material or a material that is coated with a conductive material. It is also disclosed to use several fasteners for several conductive paths.

[0004] US 5,774,341 describes a solderless electrical interconnection for electronic components with a substrate and electrically conductive pathways on the substrate. Electrically conductive hooks are embedded in the substrate. The upper part of the hooks are exposed in the top side of the substrate, the central parts are embedded within the substrate itself and the lower portions of the hooks protrude from the bottom side of the substrate. The electrically conductive pathways defined on the top side of the substrate make contact with the exposed upper part of the hooks. The hooks are engaged to electrically conductive loop fasteners on a second substrate in order to create a solderless interconnection and mechanical interlocking between two substrates. Provision for the loop fasteners is made either by selectively depositing discrete portions of the loop material on the desired pads of the substrate or a larger piece of the loop fastener material may be disposed over a plurality of contact pads on the printed circuit board and desired areas selectively metallised in order to add conductivity to selected portions of the loop fasteners.

[0005] A conductive hook-and-loop fastener is also de-

scribed in JP 2003-299 506 A.

[0006] WO 2005/025362 A1 describes a connector for electrically connecting electronic components to each other comprising a hook-and-loop type of a mechanical reclosable fastener made out of electrically conductive polymers or non conductive polymers coated with an electrically conductive material.

[0007] US 4,848,351 discloses a medical electrode assembly. The electrode comprises a conductive loop fastener that interacts with an electrically conductive hook fastener for electrically and mechanically connecting the electrode with a monitoring system.

[0008] There is a need for a mechanical reclosable fastener component for electrically and mechanically connecting electric and/or electronic components to each other that provides a simplified connection and is therefore cheap and easy to handle. There is further a need for a simplified connector that although frequently used - that means frequently mated and unmated - provides a reliable connection. Such a connector should further be easily adaptable to versatile applications, such as for example miniaturized in small applications or with big dimensions for high current applications. Moreover there is a need for a mechanical reclosable fastener component that is easy to produce and therefore affordable.

Summary of the Invention

[0009] The present invention provides a mechanical reclosable fastener component for mechanically and electrically connecting electric and/or electronic components to each other comprising at least two segments, each segment with body portion and fixing elements protruding from at least one side of the body portion. The segments provide at least one conductive area and they are arranged such that the body portions are parallel to each other and that the fixing elements on each side of the body portion of the at least two segments are oriented in the same direction.

[0010] A mechanical reclosable fastener is a fastener that provides a reclosable mechanical bond. Usually a mechanical reclosable fastener has a base and or body portion and fastening or fixing elements protruding from the body portion. The reclosable fastener components according to the invention may be of all kind of shapes, such as hook-and-loop type of reclosable fasteners, hook-and-hook type of reclosable fasteners, that means that the fixing elements of two cooperating mechanical reclosable fastener components may have different or the same shape. The mechanical reclosable fastener components may have small or big dimensions.

[0011] According to the invention mechanical reclosable fastener components can be used for mechanically and electrically connecting electric and/or electronic components to each other. Therefore the mechanical reclosable fastener component has at least one conductive area. It may also have more than one conductive area, for example two, three, four or more. And the mechanical

reclosable fastener component may have non conductive areas besides the conductive areas as well. The non conductive areas may be arranged next to the conductive areas, around conductive areas or they may be arranged between two conductive areas. It is possible to arrange conductive and non conductive areas in an alternating manner. By a configuration with several conductive areas and non conductive areas it is possible to transmit more than one signal with one mechanical reclosable fastener component or a pair of mechanical reclosable fastener components.

[0012] Examples for electric or electronic components according to the invention are printed circuit boards, three dimensional moulded interconnect devices or cables. The mechanical reclosable fastener components according to the invention may be used as connectors. For securely and reliably connecting electric and/or electronic components to each other two mechanical reclosable fastener components according to the invention may be used and may be attached to the electric and/or electronic part that are to be connected. Over the fixing elements of the mechanical reclosable fastener components the electric and/or electronic parts may be mechanically connected. Over the conductive areas of the mechanical reclosable fasteners the electric and/or electronic parts may be electrically connected.

[0013] According to the invention the mechanical reclosable fastener components comprise at least two segments, each segment with a body portions and fixing elements protruding from at least one side of the body portion. Within in the mechanical reclosable fastener component the segments are arranged such that the body portions of the segments are parallel to each other and the fixing elements on each side are orientated in the same direction, at least substantially in the same direction. By arranging the segments in a substantially parallel manner it may be easy to fix the segments to each other since equal geometric forms have to be attached to each other e.g. flat areas that may easily be attached to each other for example by gluing, soldering, press-fitting, friction fitting or the like. By orienting the fixing elements of one side of the body portion in the same direction a field of fixing elements is established and it is achieved that in use the mechanical reclosable fastener component can cooperate with a second field of fixing elements for example of a second mechanical reclosable fastener component according to the invention or of another type.

[0014] The body portion of the mechanical reclosable fastener component may be made out of a solid material or it may have cut outs thereby saving material and therefore with costs as well as weight. The cut outs may be assigned to one conductive area or to one non conductive area; it may be as well arranged on the boarder or edge of a conductive area and a non conductive area. The cut outs may go through the whole body portion so that an opening is created. But it is also possible to have a partially cut out so that the body portion provides one or several cavities or depressions.

[0015] An example for a mechanical reclosable fastener component with smaller dimensions has a height of 0,25 mm and can be used for example for connecting printed circuit boards or the like. With such an application it is possible to replace soldering processes for example for mounting backplanes. In such cases no excessive heat would be needed to make the electrical connection and therefore standard engineering plastics can replace high temperature resistant materials. This may make the assembly of printed circuit boards less complicated and the total costs will decrease. Other possible applications for mechanical reclosable fastener components with smaller dimensions may be high frequency applications, automotive and aerospace applications, consumer electronics as well as electronics integrated into clothing.

[0016] An example for a mechanical reclosable fastener with bigger dimensions has a height of 2,67 mm and can be used for example for power contacts. In these applications the contact areas conducting the current through the arrangement and especially the surface conducting the current is larger and therefore higher currents can be transmitted through the electrical interface.

[0017] Combining the mechanical properties of a mechanical reclosable fastener with electrical properties of adequate conductive areas within the fastener component opens a wide range of applications. For example assemblies can be simplified by directly achieving the electrical interconnection during the mechanical fixing process. Furthermore the mechanical reclosable fastener may be flexible thereby providing the possibility of electrical interconnections on three dimensional structures for example for three dimensional moulded interconnect devices applications, applications in automobiles or aeroplanes. Assembling a mechanical reclosable fastener of several module like segments has the advantage that the segments may have a simple geometrical shape and therefore may be easy to manufacture. Further more it is possible to build up all kinds of and different electrical interfaces out of the module like segments. In other words one basic segment can be used to build up a lot of different products.

[0018] The mechanical reclosable fastener according to one aspect of the invention may have fixing elements in the shape of a mushroom with a shank and a head. Those mushroom shaped fixing elements or fasteners have the advantage that they can easily be manufactured for example by continuous mould injection or continuous casting and that they provide strong tensile and shear strength. For connecting two electric or electronic parts to each other it is possible to use mechanical reclosable fasteners with fixing elements that have the same geometrical shape. Such mechanical reclosable fasteners are called self fastening or hermaphroditic mechanical reclosable fasteners. Mushroom shaped fixing elements can be used for such self fastening fasteners. The fixing elements may also have all other know shapes for mechanical reclosable fasteners such as for example hooks etc.

[0019] The fastening elements of two cooperating mechanical reclosable fastener components may all have the same height or they may have different heights. Having for example an arrangement with a first fastening component with fastening elements with the same height and a second fastening component with fastening elements with at least two different heights would have the advantage of reducing the mating and unmating forces because mating and unmating would be done in more than one step. This is because during the mating or unmating operation the highest pins would first mate with the corresponding fastener component and then the lower pins would engage. In an embodiment where the highest pins would transmit power and the lower pins would transmit signal it would be possible to mate and unmate individual connectors without shutting down the system where the connectors are a part of. It would also be possible to first mate ground pins and later signal pins.

[0020] Instead of having several individual fixing elements e.g. in the shape of mushrooms, it is also possible to have lines of fastening elements each line having a shank portion and a head portion and the shank portion and/or the head portion being partially coated with electrically conductive material. For a mechanical and electrical connection usually two mechanical reclosable fastener according to the invention are used. In such an assembly it is possible to have these alternatives fastening elements only on one fastener component or on both fastener components.

[0021] According to another aspect of the invention the fixing elements may be arranged on opposite sides of the body portion of the segments. By this configuration it is possible to create, after attaching the segments to each other, two fields with fixing elements those fields lying on opposite sides of the mechanical reclosable fastener component. In such an embodiment one side of the mechanical reclosable fastener may be directly mechanically and electrically connected to an electric or electronic component. Therefore the electric or electronic component may have corresponding receptacles. The opposite side of the mechanical reclosable fastener may be used for connecting to a mating part such as for example a corresponding connector with a mechanical reclosable fastener structure. A mechanical reclosable fastener component with fixing elements on opposing sides may also be cut into two identical mechanical reclosable fastener components, each of them with fixing elements on one side of the body portion.

[0022] It is also possible to arrange the fixing elements on adjacent sides of the body portion. Such an embodiment may for example be used to connect two printed circuit boards or modules of printed circuit boards or the like in an angled manner. Such a connection is a space saving one.

[0023] The fixing elements according to another aspect of the invention may be arranged in at least one row on the body portion of the segments. Because of its relatively simple geometrical shape and structure such a

segment is easy to manufacture and can be produced for example by continuous mould injection or continuous stamping. By attaching at least two or several segments to each other a field of fixing elements with several rows of fixing elements can be established.

[0024] The body portions of the segments may have a cuboidal shape. Such a shape makes it easy to arrange the segments in the manner according to the invention, e.g. parallel to each other.

[0025] The segments may further provide groups of fixing elements that are spaced apart from each other. For example each group of fixing elements may have six fixing elements. All fixing elements within one group have the same distance from each other. Between the outer fixing elements of each group a space is provided that is bigger than the distance between the fixing elements of one group. It is also possible to arrange the fixing elements in such a way that they all have the same distance from each other and no groups are defined. Furthermore the body portions of the segments may have such a width or in other words the short side in the cross-sectional view of the body portions may have such a length that after attaching the segments to each other the distance between two fixing elements of two segments is the same as the distance between the fixing elements on one segment. It is also possible that the two distances differ from each other.

[0026] According to another aspect of the invention the segments are at least partially or selectively coated with an electrically conductive material to create the conductive areas. The segments may be made out of an insulating material. The non conductive areas may automatically be generated between the conductive areas by partially or selectively coating the insulating material. The insulating material may be for example plastic e.g. polypropylene, polyester, nylon etc.. Using plastic has the advantage that the mechanical reclosable fastener can be produced easily by for example injection moulding or casting. As an electrically conductive material may be used for example steel, nickel, silver, gold, tin, palladium, copper and various alloys of these materials.

[0027] The conductive areas or the coating of the segments may be adapted to the groups of fixing elements. That means that the conductive area covers exactly one group of fixing elements e.g. all fixing elements of one group and the according body portion are coated with electrical conductive material. The fixing elements of adjacent groups may not be coated and may therefore create non conductive areas. It is also possible to coat several groups of one segment with electrical conductive material. With such an embodiment one group of fixing elements can be used to transmit one signal. Using several fixing elements for transmitting one signal has the advantage that the transmitting surface is larger and that the mechanical connection is better. It is also possible to have only one fixing element within one conductive area and to use only one fixing element for transmitting a signal. It is also possible to coat one group of fixing elements

and to leave the adjacent groups uncoated thereby creating alternating groups of fixing elements that are conductive and that are non conductive. Instead of having uncoated fixing elements between the conductive areas it is also possible to have non conductive areas without fixing elements.

[0028] According to yet another embodiment of the invention the segments are coated in the conductive areas in such a way that two sides of the segments are electrically connected with each other. This can for example be achieved by coating the segments in a defined area around their entire circumference. When - according to the invention - the segments are arranged such that the body portions are parallel to each other and the fixing elements of each side of the body portion of the segments are oriented in the same direction, it is ensured that a signals or current that is received from the fixing elements at one side can be transmitted to the other side of the segment and therewith to the other side of the mechanical reclosable fastener component. In other words this embodiment provides a conductive path within the mechanical reclosable fastener component from one side to another side of the mechanical reclosable fastener component. Thereby the fastener component provides the possibility of leading signals from the fixing elements to another side or part of the fastener component and vice versa. The other side or part of the fastener component may be attached to another electric and/or electronic component, a wire, a printed circuit board or the like as described above and is used for further transmitting the signal received by the fixing elements of the mechanical reclosable fastener component.

[0029] The invention further provides a method of making a mechanical reclosable fastener component for mechanically and electrically connecting electric and/or electronic components to each other comprising the following steps

- producing cuboidal segments with a body portion and fixing elements,
- selectively coating the segments with an electrically conductive material,
- cutting the segments into a predetermined length, and
- attaching the segments to each other so that the segments are arranged in such a way that the body portions are placed in a parallel manner and the fixing elements of the at least two segments are orientated in the same direction.

[0030] This method provides the possibility of assembling a mechanical reclosable fastener component of several segments. The segments may have such a shape that they are easy to manufacture. Therefore the whole mechanical reclosable fastener is easy to manufacture. Furthermore the method according to the invention provides the possibility of assembling all kind of different components out of segments by only changing for

example the coating of the segments or the materials of the segments etc. In other words the method uses similar modules for building up a mechanical reclosable fastener component.

[0031] The segments may be made by moulding and/or stamping them out of insulating material. It is also possible to make them by insert moulding. The latter has the advantage that each segment may be made out of at least two different materials. The body portion may for example consist out of highly flexible plastic and the fixing elements out of standard plastic. Another example is to make the body portion out of a metal frame and the fixing elements out of standard plastic. Yet another example is to have a body portion out of standard plastic and fixing elements out of highly durable plastic. With insert moulding it is also possible to use different materials for each group. Having for example groups of fixing elements that are made out of rubber it is possible to build up a mechanical reclosable fastener with sealing parts.

[0032] The segments may be attached and fixed to each other by all known procedures such as for example by soldering, mechanical engagement and/or adhesive or hot-melt. An example for an mechanical engagement is a groove and tongue or a dovetail configuration.

[0033] It is possible to at least partially coat the segments with an electrically conductive material for example by spraying, by a galvanic process or laser direct structuring (LDS). When the segments have a simple geometrical shape the two coating processes are very useful to reach all areas that should be coated. Furthermore the two processes are state of the art and therefore reliable coating results may be achieved.

[0034] The segments may be attached to each other such that a connector field with predetermined conductive areas and non conductive areas is established. As described above such a connector field may have several conductive areas and non conductive areas. Usually the non conductive areas are arranged around the conductive areas. Each conductive area may have one or more fixing elements. The non conductive areas may have fixing elements as well. It is also possible to have non conductive areas without any fixing elements.

[0035] The invention also refers to a connector for mechanically and electrically connecting electric and/or electronic components to each other comprising mechanical reclosable fastener components as described above. Such connectors may for example be used to establish electrical connections for transmitting signal, ground and/or power. Furthermore such a connector may be used for example for coaxial, twin axial, single ended, twisted pair and/or differential pair interconnections.

Brief Description of the Drawings

[0036] The invention will now be described in more detail with reference to the following Figures exemplifying particular embodiments of the invention:

- Fig. 1 a two dimensional view of a segment of a mechanical reclosable fastener component according to one aspect of the invention;
- Fig. 2 a three dimensional view of the segment of the mechanical reclosable fastener components shown in Fig. 1;
- Fig. 3 a two dimensional view of a segment of a mechanical reclosable fastener component according to another aspect of the invention;
- Fig. 4 a three dimensional view of a mechanical reclosable fastener component with segments shown in Fig. 3;
- Fig. 5 a two dimensional view of an embodiment of a connector with mechanical reclosable fastener components shown in Fig. 4;
- Fig. 6 a two dimensional view of another embodiment of a connector with mechanical reclosable fastener components shown in Fig. 4;
- Fig. 7 a two dimensional view of a segment of a mechanical reclosable fastener component according to a further aspect of the invention;
- Fig. 8 a three dimensional view of an embodiment of a connector with segments shown in Fig. 7;
- Fig. 9a a two dimensional side view of a mechanical reclosable fastener component according to another aspect of the invention;
- Fig. 9b a two dimensional side view of a segment of a mechanical reclosable fastener component according to another aspect of the invention;
- Fig. 10 a three dimensional view of a segment of another embodiment of a mechanical reclosable fastener;
- Fig. 11 a three dimensional view of a segment of a further embodiment of a mechanical reclosable fastener and
- Fig. 12 a three dimensional view of a segment of yet another embodiment of a mechanical reclosable fastener.

Description of Embodiments

[0037] Herein below various embodiments of the present invention are described and shown in the drawings wherein like elements are provided with the same reference numbers.

[0038] Fig. 1 shows a two dimensional view of a segment 1 of a mechanical reclosable fastener component according to the invention. The segment 1 has a body portion 2 and fixing elements 3 protruding from two sides of the body portion 2. The body portion 2 has a cuboidal shape. It has a long extension in the direction of the arrow

A. It has a shorter extension in the direction of the arrow B and it has a short extension in the direction of the arrow C. This can better be seen in fig. 2 which is a three dimensional view of the segment 1 shown in fig. 1. The fixing elements 3 have the shape of mushrooms with a shank 4 and a head 5. The fixing

elements 3 are arranged on the two opposite sides of the body portion 2, an upper side and a lower side, the two sides that extend in the direction of the arrow C. The fixing elements 3 are arranged in a row on each of the opposing sides of the body portions 2. Furthermore the fixing elements 3 are arranged in groups 6, each group providing six fixing elements 3. Within one group 6 the fixing elements 3 have the same distance from each other. Between the outer fixing elements 3 of each group 6 a space is provided that is bigger than the distance between the fixing elements 3 within one group 6. It is also possible to have the fixing elements 3 arranged such that they have all the same distance from each other and that they do not form groups. The segment 1 may be made out of insulating material. It may be produced by continuous moulding, continuous stamping or even by insert moulding.

[0039] Fig. 3 shows a two dimensional view of a segment 1 of a mechanical reclosable fastener component. The segment 1 has the same shape as the segment 1 shown in fig. 1, it has a body portion 2 and fixing elements 3 in the shape of mushrooms with a shank 4 and a head 5. Furthermore the segment 1 is selectively coated with an electrically conductive material so that it provides conductive areas 7 and non conductive areas 8. Due to the fact that the mechanical reclosable fastener according to the invention consists of several the segments 1 with easy accessible surfaces the coating process and coating accessibilities are simple. Each area covers exactly the body portion 2 and the fixing elements 3 of one group 6. The electrically conductive material is placed all around the circumference of the segment 1. By that it is provided that the upper side and the lower side - that are the two sides where the fixing elements 3 are located - are electrically connected with each other. It would also be sufficient for the invention to coat only parts of the circumference of the segment 1 as long as it is sure that the two sides where the fixing elements 3 are located are somehow electrically connected over a conductive path.

[0040] Fig. 4 shows a three dimensional view of a mechanical reclosable fastener component 9 with segments 1 according to the segment 1 shown in fig. 3. The segments 1 of the mechanical reclosable fastener component 9 are arranged such that the body portions 2 of the segment 1 are parallel and that the fixing elements 3 of each of the two opposing sides are oriented in one direction. In other words the fixing elements 3 of one side are oriented in one direction and the fixing elements 3 of the other side are oriented in the opposite direction. Furthermore the conductive areas of one segment 1 are arranged next to the conductive areas of the adjacent segment 1 so that the conductive areas of the segments are electrically connected with each other. In fig. 4 four segments 1 are attached to each other. By that several conductive fields 12 with twenty four fixing elements 3 are established, the conductive fields 12 are arranged in a

row. By using selectively coated segments 1 as described in connection with fig. 3 the mechanical reclosable fastener component 9 provides conductive areas 7 and non conductive areas 8. A conductive path is provided in each conductive area 7 that electrically connects the upper side with fixing elements 3 with the lower side with fixing elements 3.

[0041] Fig. 5 shows a two dimensional view of an embodiment of a connector 11 with mechanical reclosable fastener components 9 shown in fig. 4. It can be seen the upper side of a connector field with fixing elements 3. The connector 11 shown in fig. 5 comprises several segments 1 of mechanical reclosable fastener components. Some of the segments 1 are not coated with an electrically conductive material at all and therefore provide only non conductive area. Some of the segments 1 are selectively coated with an electrically conductive material as described above and therefore provide conductive areas 7 and non conductive areas 8. In the embodiment shown in fig. 5 the segments 1 are attached to each other in the following manner: first two segments 1 that are not coated, four segments 1 that are selectively coated, two segments 1 that are not coated, four segments 1 that are selectively coated and finally two segments 1 that are not coated. The two packages with four segments 1 that are selectively coated are assembled as described in connection with fig. 4, e.g. the conductive areas 7 are situated in a row. The connector field that is achieved has eight conductive areas 7, each area with twenty four fixing elements 3. Each conductive area 7 is surrounded by non conductive areas 8. With the invention a very flexible solution is created with which it is possible to design all kind of configurations such as for example the two row connector shown in fig. 5.

[0042] Fig. 6 shows a two dimensional view of another embodiment of a connector 11 with mechanical reclosable fastener components 9 shown in fig. 4. The segments 1 of this embodiment are assembled in the same manner as described in connection with fig. 5. The only difference is that the conductive areas 7 of the two mechanical reclosable fastener components 9 are attached displaced from each other. By this a staggered connector 11 is achieved.

[0043] Fig. 7 shows a two dimensional view of a segment 1 of a mechanical reclosable fastener component. The segment 1 has the same shape as the segment 1 shown in fig. 1, it has a base portion 2 and fixing elements 3 in the shape of mushrooms with a shank 4 and a head 5. Furthermore the segment 1 is selectively coated with two different electrically conductive materials so that it provides two different conductive areas 7' and 7'' and non conductive areas 8. Due to the fact that the mechanical reclosable fastener according to the invention consists of several segments 1 with easy accessible surfaces the coating process and coating accessibilities are simple. Each area covers exactly one group 6 with six fixing elements 3. In both conductive areas 7' and 7'' the electrically conductive material is placed all around the cir-

cumference of the segment 1. By that it is provided that the upper side and the lower side - that are the two sides where the fixing elements 3 are located - are electrically connected with each other. It would also be sufficient for the invention to coat only parts of the circumference of the segment 1 as long as it is sure that the two sides where the fixing elements 3 are located are somehow connected over a conductive path. Such a segment 1 may be called dual coated or plated segment 1.

[0044] With dual coated segments 1 it is for example possible to build connectors 11 with coaxial structures as it can be seen in fig. 8. In the embodiment shown the segments 1 are attached in the following manner: first four segments 1 that are completely coated with a first conductive material, four segments 1 that are selectively coated with the first conductive material, five segments 1 that are dual coated with a first conductive material and a second conductive material as described above, four segments 1 that are selectively coated with the first conductive material, three segments 1 that are completely coated with a first conductive material, four segments 1 that are selectively coated with the first conductive material, five segments 1 that are dual coated as described above, four segments 1 that are selectively coated with the first conductive material and finally first four segments 1 that are completely coated with a first conductive material. As an example the inner conductive area 7'' may be used for the electrical interconnection for a signal and the outer conductive area 7' may be used for the electrical interconnection of shielding/grounding. In that embodiment the inner conductive area 7'' may be coated with for example gold and the outer conductive area 7' may be coated with for example nickel.

[0045] Fig. 9a shows a two dimensional view of a section of an angled version of a mechanical reclosable fastener component 13. The fig. shows a side view of a mechanical reclosable fastener component 13. The mechanical reclosable fastener component 13 according to this embodiment comprises segments 1 with a body portion 2 and fixing elements 3. The segments 1 are fixed to each other over their body portion 2. The fixing elements 3 have the shape of a mushroom with a shank 4 and a head 5. The body portions 2 of the segments 1 have different heights H in order to create the angled version of a mechanical reclosable fastener component 13. The segment 1 that is arranged on the right side has a lower height H than the segments 1 left of it. The mechanical reclosable fastener component 13 shown in fig. 9a has a right angle, in other words the fixing elements 3 of the mechanical reclosable fastener component 13 show in directions that are perpendicular to each other. It is also possible to have mechanical reclosable fastener components 13 with other angles. In that case the heights H of the segments 1 would differ from what is shown in fig. 9a.

[0046] Fig. 9b shows a two dimensional side view of a segment 1 of a mechanical reclosable fastener component. The segment 1 has a body portion 2 and fixing

elements 3. The fixing elements 3 have the shape of a mushroom with a shank 4 and a head 5. The fixing elements 3 are arranged on two opposing sides of the body portion 2. The body portion 2 has an angled cuboidal shape so that the fixing elements 3 show in directions that are perpendicular to each other. In order to create a mechanical reclosable fastener component several segments 1 as shown in fig. 9b have to be attached to each other over the side of their body portions 2, that can be seen in fig. 9b. The mechanical reclosable fastener component that is created by such segments 1 resembles to the mechanical reclosable fastener component 13 of fig. 9a. The only difference is that the segments 1 have another shape and therefore are oriented in another way within the mechanical reclosable fastener components.

[0047] Fig. 10 is a three dimensional view of a segment 1 of another embodiment of a mechanical reclosable fastener. The segment 1 has a cuboidal shaped body portion 2 and fixing elements 3 on two opposing sides. The fixing elements 3 are line shaped and have a shank 4 and a hexagonal shaped head 5. In that embodiment the shank 4 of the fixing elements is partially coated with electrically conductive material 14 in order to create distinctive conductive zones that can interact with corresponding fixing elements (not shown in fig. 10). The advantage of the line shaped fixing elements 3 is that their production is very easy and therefore cheap.

[0048] Fig. 11 is three dimensional view of a segment 1 of further another embodiment of a mechanical reclosable fastener component. The segment 1 has a cuboidal shaped body portion 2 and fixing elements 3. The fixing elements 3 have a mushroom shape with a shank 4 and a head 5. The fixing elements 3 are arranged on two adjacent sides of the body portion 2. Such an embodiment may for example be used to connect two printed circuit boards or modules of printed circuit boards or the like in an angled manner. Such a connection is a space saving one. For electrically connecting the above mentioned electronic components it is possible to install conductive paths 15 on the body portion 2. The conductive paths 15 as shown in fig. 11 connect two fixing elements 3 with each other and thereby establish an electrical connection between the two fixing elements 3.

[0049] With such conductive paths 15 it is also possible to create twisted pair elements as shown in fig. 12. Fig. 12 shows a three dimensional view of a segment 1 with a cuboidal shaped body portion 2 and fixing elements 3. The fixing elements 3 have the shape of mushrooms with a shank 4 and a head 5. They are arranged on opposing sides of the body portion 2 of the segment 1. The fixing elements 3 are positioned in groups 6', 6" of five fixing elements 3 per group 6', 6". For realising the twisted pair element the upper fixing elements 3 of the first group 6' are electrically connected via conductive paths 15 with the lower fixing elements 3 of the second group 6". These conductive paths are arranged on the front side of the segment 1. The lower fixing elements 3 of the first group 6' are electrically connected via conductive paths 15' with

the upper fixing elements of the second group 6", which are arranged on the rear side of the segment 1.

REFERENCE SIGNS LIST

[0050]

1	segment
2	body portion
3	fixing element
4	shank
5	head
6	group of fixing elements
6'	first group of fixing elements
6"	second group of fixing elements
7	conductive area
8	non conductive area
9	mechanical reclosable fastener component
11	connector
12	conductive field
13	mechanical reclosable fastener component
14	electrically conductive material
15	conductive path
15'	conductive path on the rear side
A	arrow extension of body portion
B	arrow extension of body portion
C	arrow extension of body portion
H	height

Claims

1. A mechanical reclosable fastener component for mechanically and electrically connecting electrical and/or electronic components to each other comprising
 - at least two segments (1) each segment with a body portion (2) and fixing elements (3) protruding from at least one side of the body portion (2),
 - the segments (1) providing at least one conductive area (7), wherein
 - the segments (1) are arranged such that the body portions (2) are parallel to each other and
 - the fixing elements (3) on a side of the body portion (2) of the at least two segments 1 are oriented in the same direction.
2. The fastener according to claim 1, wherein the fixing elements (3) have the shape of mushrooms with a shank (4) and a head (5).
3. The fastener according to claim 1 or 2, wherein the fixing elements (3) are arranged on opposite sides of the body portion (2) of the segments (1).

4. The fastener according to any of the preceding claims, wherein the fixing elements (3) are arranged in at least one row on the body portion (2) of the segments (1).
5. The fastener according to any of the preceding claims, wherein the body portions (2) of the segments (1) have a cuboidal shape.
6. The fastener according to any of the preceding claims, wherein the segments provide groups (6) of fixing elements (3) that are spaced apart from each other.
7. The fastener according to any of the preceding claims, wherein the segments (1) are at least partially coated with an electrically conductive material to create conductive areas (7).
8. The fastener according to claim 7, wherein the conductive areas (7) and non conductive areas (8) are adapted to the groups (6) of fixing elements (3).
9. The fastener according to claim 7 or 8, wherein the segments (1) are coated in such a way that two sides of the segments (1) are electrically connected with each other.
10. The fastener according to any of the preceding claims, wherein the segments (1) provide at least one conductive path (15, 15').
11. A method of making a mechanical reclosable fastener component for mechanically and electrically connecting electric and/or electronic components to each other comprising the following steps:
- producing cuboidal segments with a body portion and fixing elements,
 - selectively coating the segments with an electrically conductive material,
 - cutting the segments into a predetermined length, and
 - attaching the segments to each other so that the segments are arranged in such a way that the body portions are placed in a parallel manner and the fixing elements on a side of the at least two segments are oriented in the same direction.
12. The method according to claim 10, wherein the segments are moulded and/or stamped out of insulating material.
13. The method according to claim 10 or 11, wherein the segments with a body portion and fixing elements are made by insert moulding.
14. The method according to any of the claims 10 to 11, wherein the segments are attached to each other by soldering, mechanical engagement and/or adhesive or hot-melt.
15. The method according to any of the claims 10 to 13, wherein the segments are at least partially coated with an electrically conductive material by spraying, with a galvanic process and/or by laser direct structuring (LDS).
16. The method according to any of the claims 10 to 14, wherein the segments are attached to each other so that a connector field with predetermined conductive areas and non conductive areas is established.
17. A connector for mechanically and electrically connecting electronic components to each other comprising a mechanical reclosable fastener component as set out in claims 1 to 9.
18. The connector according to claim 16, wherein it can be used to establish electrical connections for transmitting signal, ground and/or power.
19. The connector according to claim 16 or 17, wherein it can be used for coaxial, twin axial, single ended, twisted pair and/or differential pair interconnections.

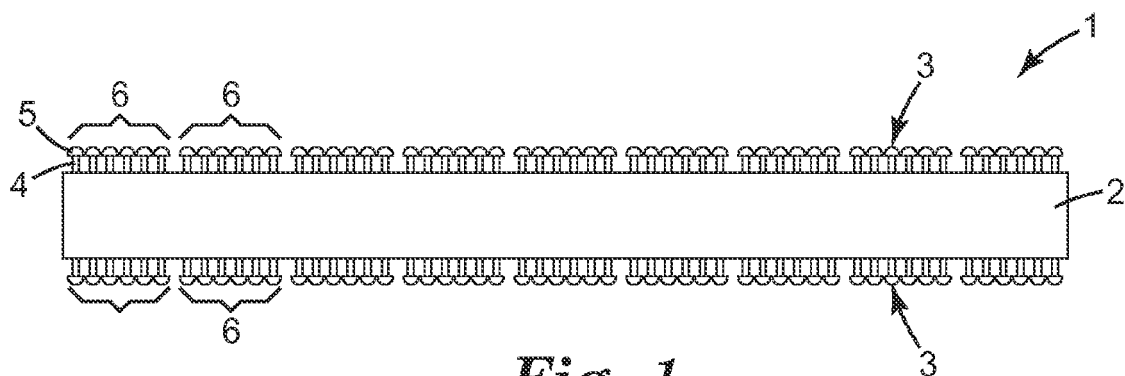


Fig. 1

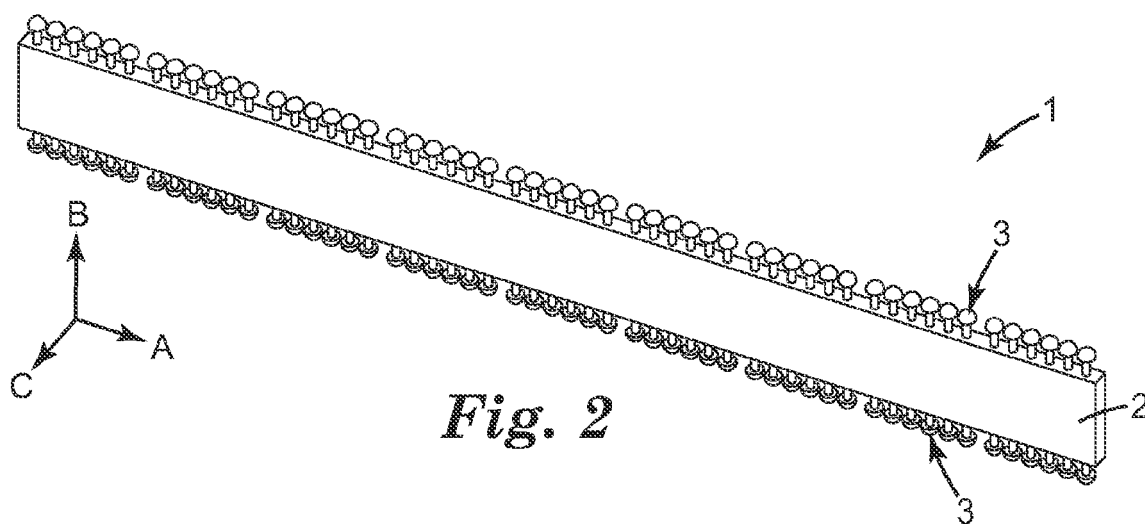


Fig. 2

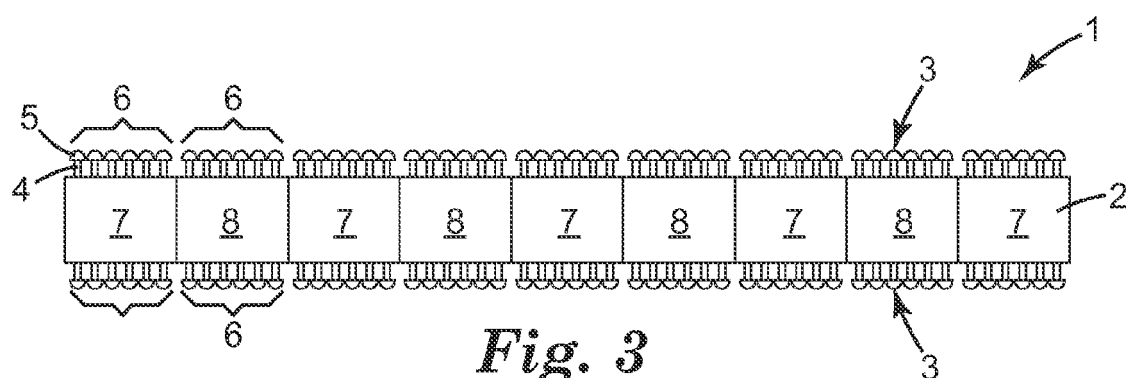


Fig. 3

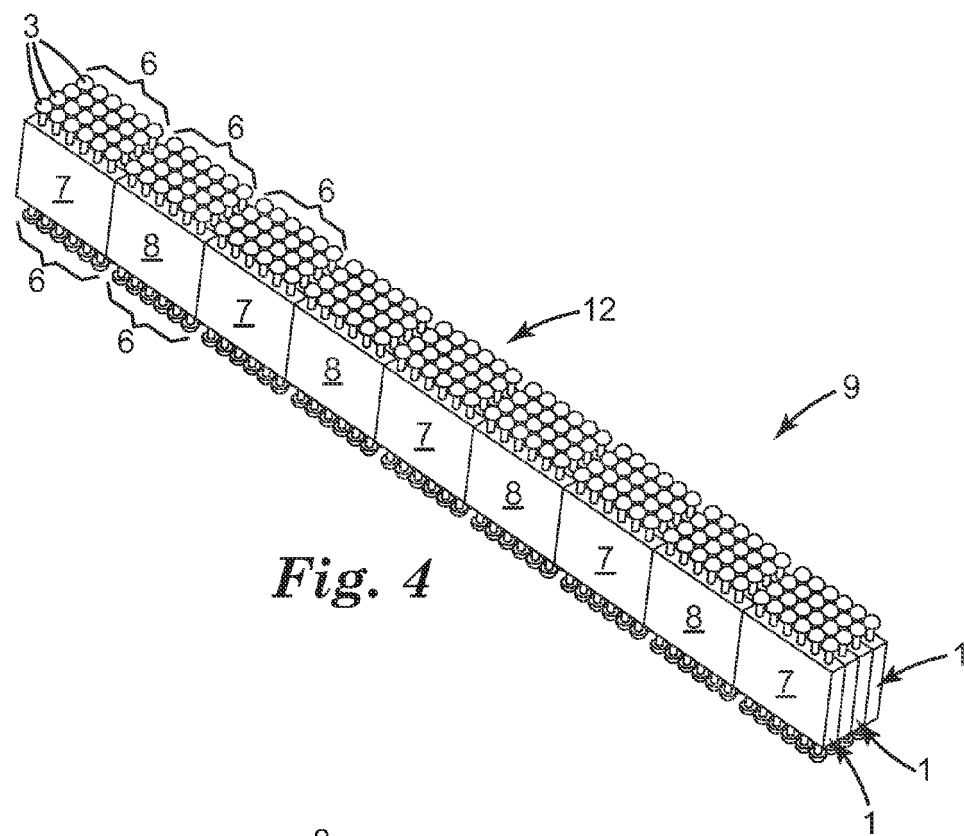


Fig. 4

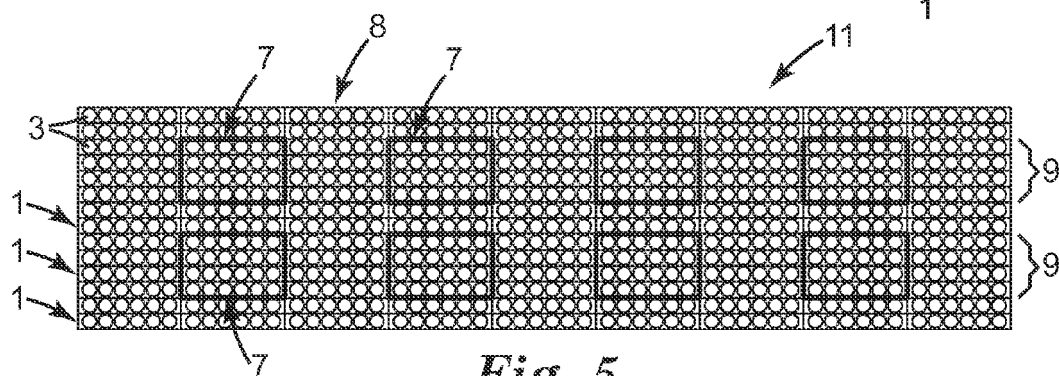


Fig. 5

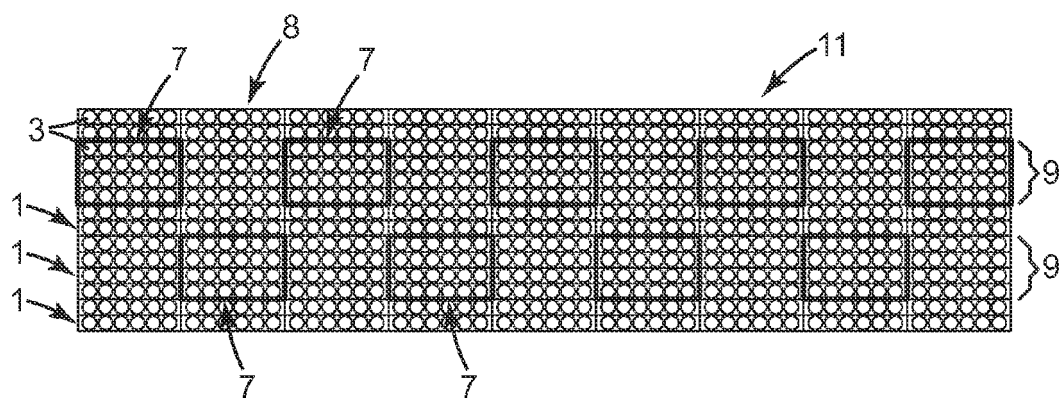
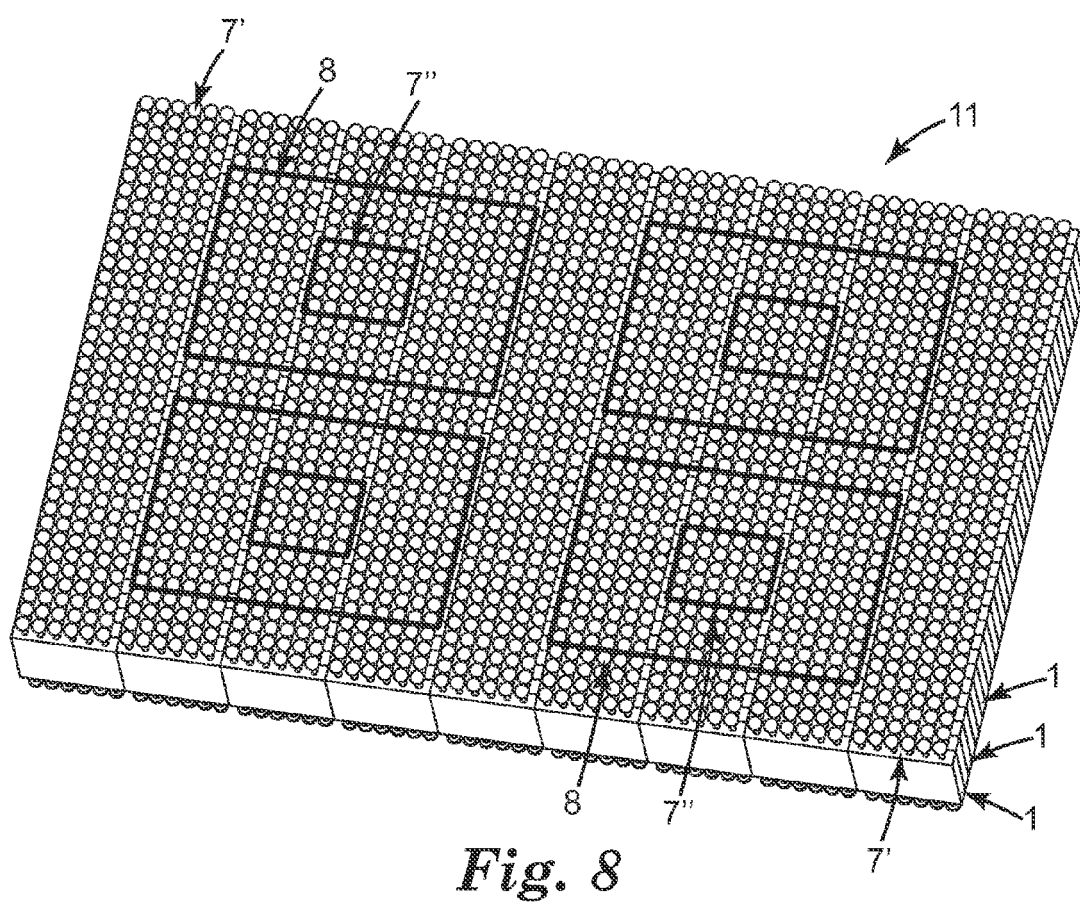
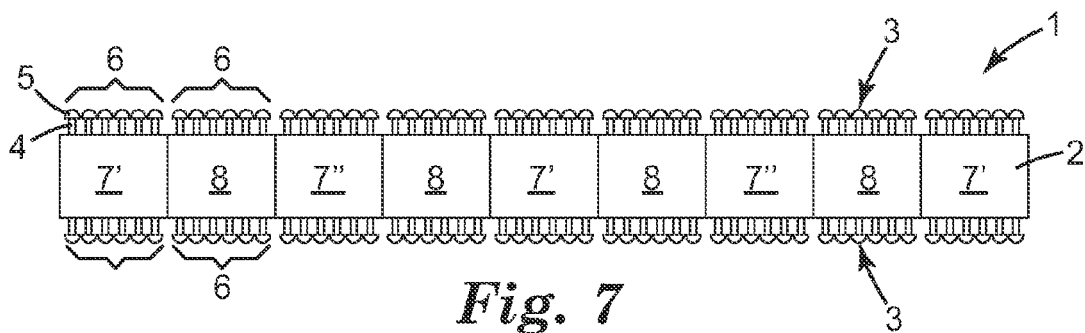


Fig. 6



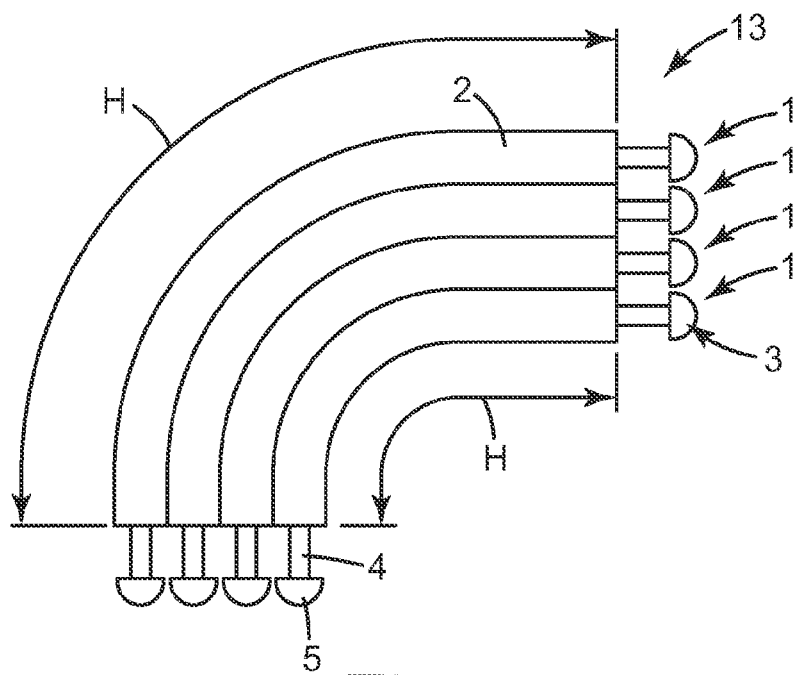


Fig. 9a

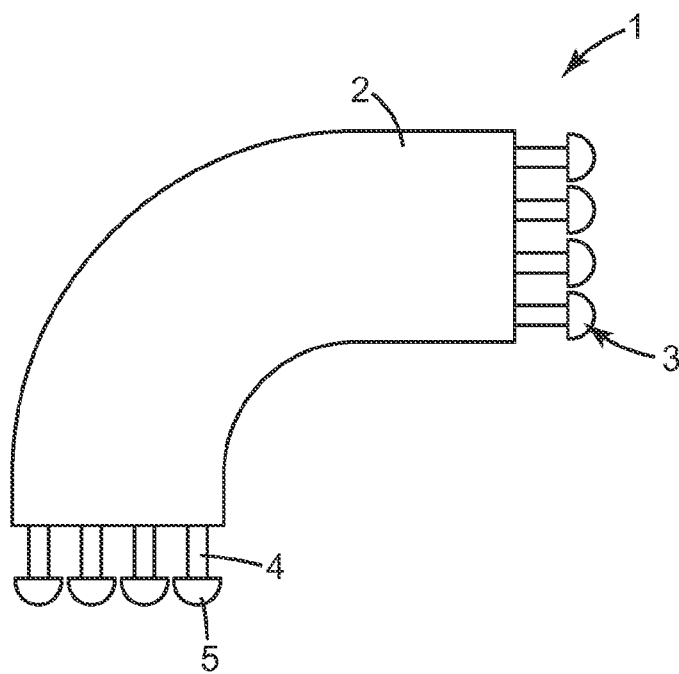
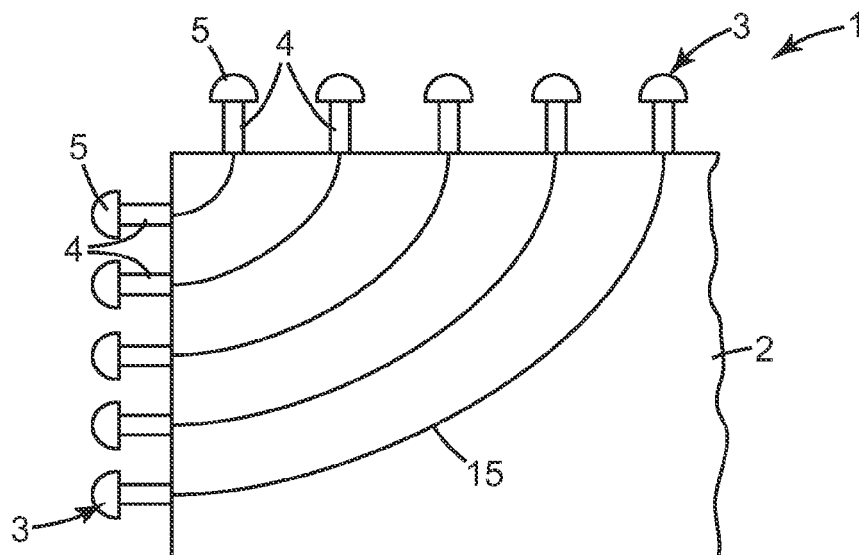
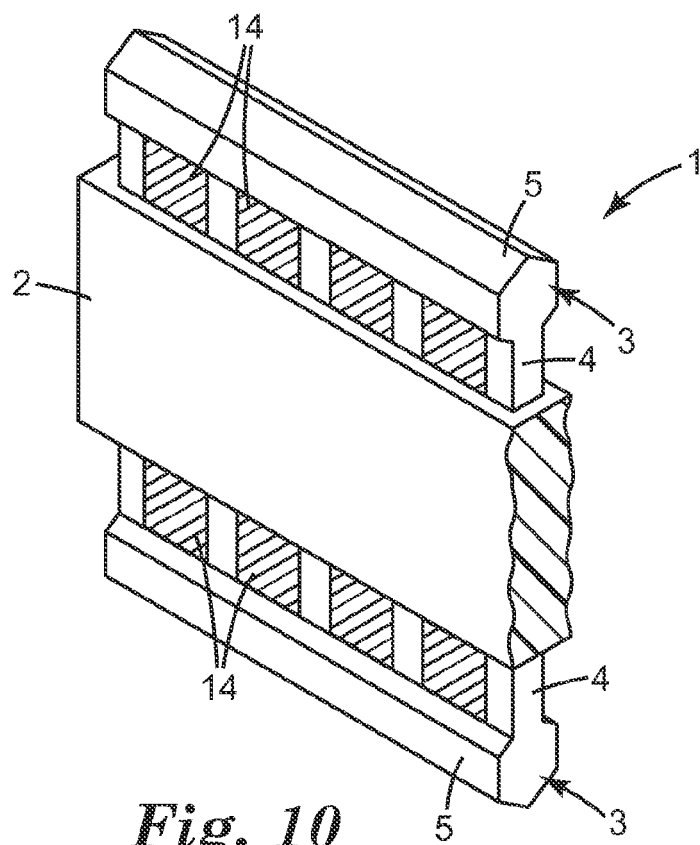


Fig. 9b



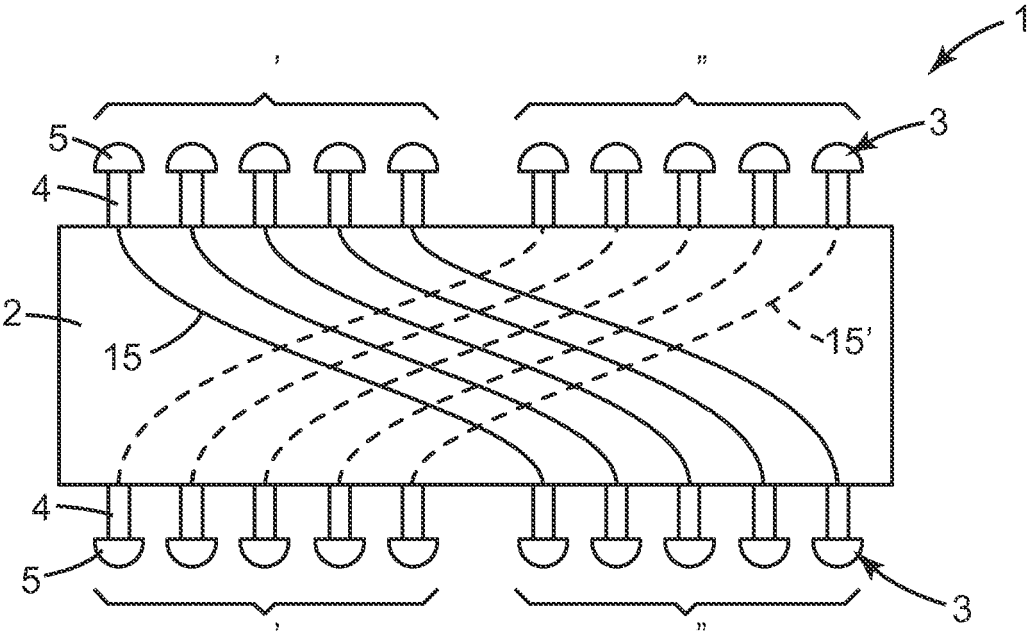


Fig. 12



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 6211

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X	US 2008/233768 A1 (JOSHI PRAKASH B [US] ET AL) 25 September 2008 (2008-09-25)	1,2,5, 17-19	INV. H01R12/28
Y	* paragraph [0005] - paragraph [0008] *	3,4,6-8	H05K3/32
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Y	US 3 266 113 A (FLANAGAN JR WILLIAM C) 16 August 1966 (1966-08-16)	6-8	
Y	* column 7, line 44 - line 72 *	11-16	
	* column 11, line 11 - line 45 *		
	* column 12, line 35 - line 45 *		
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			A44B H01R H05K
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 February 2009	Examiner Criqui, Jean-Jacques
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The members are as contained in the European Patent Office EDP file on
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20-02-2009

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