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(71) Applicant: **Signify Holding B.V.**
5656 AE Eindhoven (NL)

(72) Inventor: **The designation of the inventor has not yet been filed**

(74) Representative: **Verweij, Petronella Daniëlle et al**
Signify Netherlands B.V.
Intellectual Property
High Tech Campus 7
5656 AE Eindhoven (NL)

(54) **ELECTRICAL CONNECTOR**

(57) A mechanism for connecting electrical devices together. A pin of an electrical connector is formed of a distal portion and a flexible portion, which is more flexible

than the distal portion. When the distal portion connects to a socket of a complementary electrical connector, the flexible portion is separated from the socket.

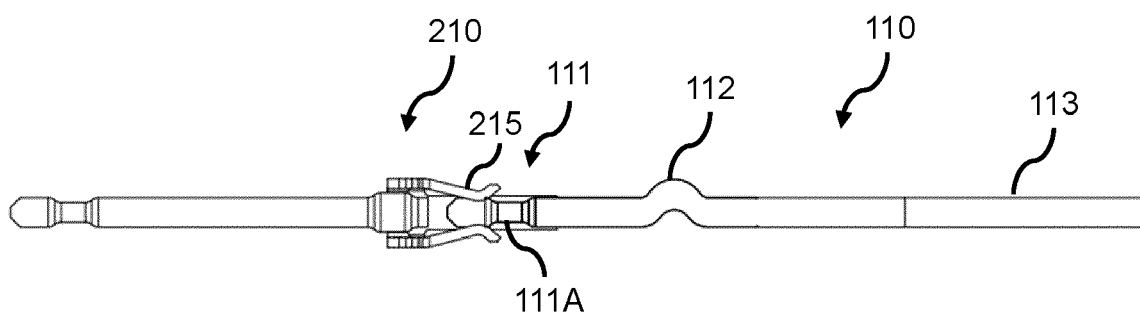


FIG. 3

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of electrical connectors.

BACKGROUND OF THE INVENTION

[0002] Electrical connectors are used in a wide variety of applications to connect one electrical device to another, or to connect an electrical device to a power supply/source. One example use-case scenario is in exposed environments, e.g., to connect a light strip to another light strip and/or a power supply/source in an outdoors environment.

[0003] A typical electrical connection arrangement is formed of two electrical connectors that complement one another. A first electrical connector comprises one or more pins (each of which could be alternatively labeled a male pin), and a second electrical connector comprises one or more sockets (each of which could be alternatively labelled a female pin). Each pin of the first electrical connector mechanically and electrically engages with a socket of the second electrical connector to make an electrical connection between the first and second electrical connectors.

[0004] There is an increasing desire to improve the robustness of a connection and an ease of connecting two electrical connectors together. It would be particularly advantageous if these effects could be achieved whilst forming an electrical connection arrangement having ingress protection for use in exposed environments.

SUMMARY OF THE INVENTION

[0005] The invention is defined by the claims.

[0006] According to examples in accordance with an aspect of the invention, there is provided an electrical connector comprising one or more pins for engaging with a respective one or more sockets of a complementary electrical connector. Each pin comprises: a distal portion configured to be mechanically and electrically engageable with a respective socket of the complementary electrical connector; and a flexible portion configured to, when the distal portion is mechanically and electrically engaged with the respective socket of the complementary electrical connector, be spatially distanced from the respective socket, wherein a flexibility of the flexible portion is greater than a flexibility of the distal portion.

[0007] Thus, each (male) pin is formed of at least a distal portion and a flexible and more preferably, elastic, portion. The distal portion is located more distally (i.e., closer to the tip) of the pin than the flexible portion. The distal portion is the part of the pin that, during a connection process, comes into contact with the respective socket of the complementary electrical connector. The flexible portion does not come into direct contact with the socket.

[0008] Each pin is engageable (i.e., is able to be engaged) with a respective socket. In particular, each pin is receivable within a respective socket of the complementary electrical connector. This may be achieved by the pin(s) and the socket(s) having suitable complementary geometric shapes.

[0009] Providing a flexible portion on each pins provides a pin that can bend and flex both during and after connection of the electrical connector to the complementary electrical connector. The use of the flexible portion in each pin provides a number of advantageous effects.

[0010] One advantage is an improved ease of connecting the electrical connector to the complementary electrical connector, as the pin(s) can bend and flex during a connection process to increase an ease of aligning the electrical connectors together. By forming the distal portion to have a greater stiffness than the flexible portion, this provides a more secure connection between the distal portion and the socket as well as increasing an ease of insertion (as the distal portion will not itself bend away from the socket during insertion).

[0011] Moreover, positioning the flexible portion to be spatially separated from the socket with which the pin is engaged allows the pin to bend and flex, e.g. with twisting and/or bending of the electrical connector. In particular, the pin is made more resilient, i.e., without breaking, to bending or flexing when the electrical connectors are engaged with one another. If the flexible portion were located inside the socket, then bending of the connector would be more likely to snap the pins(s), as the socket(s) would restrict the bending and flexing of each pin responsive to the bending/flexing of the electrical connector.

[0012] The proposed approach therefore provides a more robust electrical connector, especially to a twisting, bending and/or flexing force.

[0013] Each pin is formed of an electrically conductive material, such as a metal. Suitable examples include copper, aluminum, steel and/or alloys including the same.

[0014] The flexible portion may be or comprise a spring. In some examples, the flexible portion comprises a bent or curved portion. In some examples, the flexible portion has a half-ellipse shape. In this way, the flexible portion may be U-shaped or C-shaped, so that it at least partially bends back on itself. This shape increases a flexibility of the flexible portion, e.g., compared to if the same portion was straight.

[0015] The flexible portion may be formed of a first material and the distal portion may be formed of a second, different material, wherein the elastic modulus of the first material is less than the elastic modulus of the second material. An elastic modulus defines the intrinsic stiffness of a material, with increasing values indicating a larger intrinsic stiffness (i.e., less elasticity).

[0016] A combination of these approaches may be used. Thus, the flexible portion may differ from the distal portion in shape, structure, thickness and/or material in order to provide a greater flexibility than the distal portion.

[0017] The electrical connector may further comprise

a connector body surrounding the one or more pins, wherein: the connector body is configured to be engageable with a complementary connector body of the complementary electrical connector; and when engaged together, the connector body and the complementary connector body together encapsulate the one or more pins of the electrical connector and the respective one or more sockets of the complementary connector.

[0018] The connector body and the complementary connector body, when engaged or connected together, thereby define a space in which the pin(s) and socket(s) are held. The encapsulation of the pin(s) and the socket(s) aids to prevent or reduce ingress of foreign material toward the pin(s) and/or socket(s), thereby improving the ingress protection of the electrical connector.

[0019] The electrical connector may further comprise a securing mechanism configured to secure the connector body to the complementary connector body of the complementary electrical connector.

[0020] The electrical connector may further comprise a sealing element configured to, when the connector body is engaged with the complementary connector body, provide a seal to prevent or reduce the ingress of foreign material towards the one or more pins and the respective one or more sockets encapsulated by the connector body and the complementary connector body.

[0021] The sealing element thereby acts as a gasket to prevent or reduce leakage into the space enclosed by the connector body and the complementary connector body, in which the pin(s) and the socket(s) are housed or encapsulated. The sealing element may be an O-ring, although other examples would be apparent to the skilled person.

[0022] The electrical connector may comprise a mount configured to mount the one or more pins, wherein the mount is formed of a material having a lower elastic modulus than the material of the one or more pins. The mount may be formed of rubber.

[0023] Use of such a mount improves a resilience of the electrical connector(s) to twisting and/or bending, by providing a cushioning effect that attenuates any externally applied force.

[0024] In some examples, the one or more pins comprises an array of pins. The one or more pins may therefore comprise a plurality of pins.

[0025] The electrical connector may be configured for a light strip.

[0026] There is also proposed a light strip comprising: one or more light emitting elements; and the electrical connector herein described.

[0027] There is also proposed an electrical connector arrangement comprising: the electrical connector herein described; and the complementary electrical connector comprising one or more sockets configured to be engageable with a respective pin of the electrical connector.

[0028] There is also proposed a lighting system comprising: a first light strip comprising one or more light emitting elements; a second light strip comprising one or more

light emitting elements; and the electrical connector arrangement herein described, wherein the electrical connector arrangement connects the first light strip to the second light strip.

[0029] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] For a better understanding of the invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, in which:

Fig. 1 provides an exploded view of an electrical connector arrangement;

Fig. 2 provides a close-up view of a plurality of pins of an electrical connector;

Fig. 3 provides a side view of a pin of an electrical connector;

Fig. 4 provides a perspective view of a plurality of pins and respective sockets for a first socket configuration;

Fig. 5 provides a perspective view of a plurality of pins and respective sockets for a second socket configuration;

Fig. 6 provides a cross-sectional view of an electrical connector arrangement;

Fig. 7 provides a perspective view of an electrical connector arrangement;

Fig. 8 provides a top-down view of an electrical connector arrangement; and

Fig. 9 illustrates a lighting system.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0031] The invention will be described with reference to the Figures.

[0032] It should be understood that the detailed description and specific examples, while indicating exemplary embodiments of the apparatus, systems and methods, are intended for purposes of illustration only and are not intended to limit the scope of the invention. These and other features, aspects, and advantages of the apparatus, systems and methods of the present invention will become better understood from the following description, appended claims, and accompanying drawings. It should be understood that the Figures are merely schematic and are not drawn to scale. It should also be understood that the same reference numerals are used throughout the Figures to indicate the same or similar parts.

[0033] The invention provides a mechanism for connecting electrical devices together. A pin of an electrical connector is formed of a distal portion and a flexible portion, which is more flexible than the distal portion. When the distal portion connects to a socket of a complemen-

tary electrical connector, the flexible portion is separated from the socket.

[0034] The present invention is based on the recognition that making part of a pin flexible increases the robustness of an electrical connection arrangement formed using an electrical connector having such a pin, in particular, making the electrical connection arrangement more resilient to bending, flexing or twisting.

[0035] Embodiments may be employed to connect any two electrical devices together, but find particular use in connecting two light strips or lighting devices together as such devices are commonly found and used in environments where they are subject to mechanical stresses (e.g., in lighting installations).

[0036] Figure 1 illustrates an electrical connector arrangement 10 comprising an electrical connector 100 and a complementary electrical connector 200 that are configured to connect to one another. The electrical connector 100 and electrical connector arrangement 10 both represent embodiments of the invention.

[0037] The electrical connector 100 comprises one or more pins 110, here: a plurality of pins, for connecting to a respective one or more sockets (not visible in Figure 1) of the complementary electrical connector.

[0038] Each pin 110 and each respective socket is configured to carry electricity, e.g., be electrically conductive. They may therefore be formed from an electrically conductive material, such as a metal. Suitable examples include copper, aluminum, steel and/or alloys including the same.

[0039] When a pin 110 and a socket are electrically connected to one another, electricity is able to conduct from the pin to the socket and vice versa. When a pin and a socket are mechanically engaged to one another, they may make physical/mechanical contact and provide a frictional force to oppose attempted detachment in at least one direction of attempted pulling.

[0040] Figures 2 and 3 provide a more complete view of a pin 110, with Figure 3 further illustrating a connection between a pin 110 and a socket 210.

[0041] The pin 110 comprises a distal portion 111 and a flexible portion 112. The distal portion 111 is located towards a distal end of the pin, being the end of the pin 110 that is furthest from a point of attachment 115 for the pin 110 to remainder of the electrical connector. The flexible portion 112 is located away from a distal end, and is therefore adjacent to the point of attachment 115 than the distal portion.

[0042] The flexible portion 112 is configured to have a greater flexibility than the distal portion 111, i.e., the flexible portion 112 may have a lesser stiffness than the distal portion 111. Thus, the flexible portion 112 may, by itself, be able to bend/flex, and be able to return to its original shape, to a greater extent than the distal portion 111. A flexibility is a measure of the ability of each portion to deform under a load applied thereto, which may be inversely proportional to a stiffness measurement.

[0043] In this way, when a perpendicular force is ap-

plied to the pin 110, the flexible portion 112 of the pin 110 will begin to bend before the distal portion 111. Thus, the flexible portion 112 defines the location at which the pin 110 will at least begin to bend/flex when a perpendicular force is applied to the pin (e.g., to a tip of the pin 110).

[0044] Defining the flexible portion 112 to have a greater flexibility than the distal portion 111 is therefore functionally equivalent to defining or controlling a location at which the pin 110 will at least begin to bend/flex when a perpendicular force (a force perpendicular to a length of the pin or an axis in which the pin lies) is applied to the free tip of the pin 110.

[0045] In the illustrated example, increased flexibility of the flexible portion 112 is achieved by forming the flexible portion 112 in the form of a spring, specifically a half-ellipse spring. This means that the flexible portion 112 is readily able to bend and flex and return to its original (non-bent/non-flexed) state. The flexible portion may therefore comprise a bent or curved portion, the bent/curved shape of the portion facilitating or allowing bending or flexing of the flexible portion. This approach brings the advantage of easy manufacturing, because making a single bent piece is much easier, and the bent portion makes the pin much more elastic than a straight needle-shaped pin.

[0046] Approaches for determining a flexibility of an element structure or shape are well known in the art, and may be performed using a (computer) modelling procedure or the three-point flexural test.

[0047] An alternative approach is to form the distal portion 111 and the flexible portion 112 from different materials. In particular, the flexible portion 112 may be formed of a first material and the distal portion 111 may be formed of a second, different material, wherein the elastic modulus of the first material is less than the elastic modulus of the second material. A lower elastic modulus means that the material for the flexible portion will be less intrinsically stiff than the material for the distal portion. Approaches for determining an elastic modulus of a material are well known in the art.

[0048] Yet another approach could be to form the distal portion 111 and the flexible portion 112 from material of different thicknesses. A thinner portion would be more flexible than a thick portion. This approach, by itself, is less preferred as it introduces additional weakness and reduces a mechanical strength of the pin 110.

[0049] Of course, a combination of these approaches could be employed. Thus, the shape, structure, thickness and/or material of the flexible portion 112 may be different to the distal portion 111 in order to provide the difference in flexibility of the two portions.

[0050] The distal portion 111 is configured to be mechanically and electrically engageable with a socket 210 of the complementary electrical connector. The flexible portion 112 is configured such that, when the distal portion is mechanically and electrically engaged with the socket, the flexible portion is spatially distanced from the socket.

[0051] By way of example, a clip 215 of the socket may clip to a securing region 111A (here a clipping region) of the distal portion 111 of the socket. The securing region may define a notch or gap into which the clip 215 engages, e.g., to restrict movement of the pin out of the socket. In particular, when the clip 215 engages with the securing region 111A, the sides of a notch defined by the clipping region 111A may restrict a movement of the pin 110 in and out of the socket.

[0052] The clip 215 may also be electrically conductive, to provide the electrical connection between the pin 110 and the socket 210.

[0053] Thus, the socket may be secured to the pin at a securing region 111A of the distal portion 111.

[0054] Other suitable alternatives to a clipping mechanism for mechanically and electrically coupling a pin to a socket (and vice versa) will be apparent to the skilled person. For instance, the pin and the socket may each comprise ridges that facilitate mechanical coupling using friction or the like.

[0055] To improve the reliability of an electrical connection between the pin and the socket, the length of the part of the distal portion 111 of the pin 110 extending into the socket from the securing region 111A may be no less than 5mm, e.g., no less than 10mm. Thus, the length from the tip of the pin to the securing region 111A may be no less than 5mm, e.g., no less than 10mm.

[0056] In this way, the distal portion 111 is the part of the pin 110 that, during a connection process, comes into contact with the respective socket 210 of the complementary electrical connector. The flexible portion 112 does not come into direct contact with the socket 210.

[0057] Use of the flexible portion 112 improves an ease of connecting the electrical connector to the complementary electrical connector. In particular, the pin(s) are able to bend and flex during a connection or engagement process, e.g., to reduce a need to accurately align the pin(s) with the respective socket(s) as the bending and flexing will encourage automatic movement or directing of the pin(s) towards a socket(s). However, by maintaining the distal end to have a greater stiffness (i.e., reduced flexibility), a secure connection can still be achieved, e.g., there is reduced change of slippage of the pin(s) from the socket(s), which might otherwise happen with a fully flexible pin.

[0058] Furthermore, spatially separating the flexible portion from the socket (when it is connected to the distal portion) advantageously allows the pin to bend and flex even when the pin(s) is/are connected to the socket(s). This makes the pin(s), and therefore the overall electrical connector, more resilient to potential breakage or disconnection which might otherwise result from an attempting twisting or bending of the electrical connector.

[0059] For instance, if attempted twisting of the connector arrangement takes place (e.g., twisting the electrical connector 100 clockwise and the complementary electrical connector 200 anti-clockwise), the flexibility of the spatially separate flexible portion will allow the re-

mainder of the electrical connector to at least partially rotate about the socket(s) of the complementary electrical connector 200.

[0060] In this way, the flexible portion 112 reduces the chances of losing electrical connection between the electrical connector 100 and the complementary electrical connector 200 during a mechanical twist.

[0061] By way of further explanation, in a scenario in which the flexible portion, e.g., the entire exposed part of the pin 110, is located inside the socket, then bending of the connector would be more likely to break or disconnect the pins(s), as the socket(s) would restrict the bending and flexing of each pin responsive to the bending/flexing of the electrical connector.

[0062] When the distal portion 111 of a pin is mechanically and electrically engaged with the respective socket 210 of the complementary electrical connector, the flexible portion 112 is spatially distanced from the respective socket, e.g., not in direct contact with the respective socket so that it is able to bend and flex without significant restriction by the socket.

[0063] The pin 110 is coupled to, e.g., mounted/embedded in, the remainder of the electrical connector. In the illustrated example, the pin 110 is coupled to or mounted in a mount 140 of the electrical connector. An interface between the pin 110 and the mount 140 defines a point of attachment 115 of the pin 110 to the remainder of the electrical connector.

[0064] The pin may be electrically connected to other components of the electrical connector, e.g., one or more output terminals for connecting to an external device and/or internal circuits or electrical components. The use of one or more pins within an electrical connector is well known in the art, and embodiments may be exploited in a wide range of use-case scenarios for which an electrical connector is desired.

[0065] Figure 3 illustrates a side view of the pin 110 and the socket 210 during an engagement process. The socket 210 is configured to grip, clip or clamp the pin 110 at the distal portion. Thus, the distal portion 111 of the pin 110 and the socket 210 may have a complimentary shape or complementary geometry to facilitate connection of the distal portion 111 to the socket 210.

[0066] Figure 3 also illustrates a mounting portion 113 of the pin. The mounting portion forms a part of the pin that is mounted, embedded or otherwise attached to the remainder of the electrical connector, e.g., is mounted within a mount of the electrical connector.

[0067] Figure 3 clearly demonstrates how, when the pin and the socket are engaged with one another, the flexible portion can be spatially separated from the socket.

[0068] Figures 4 and 5 provide a greater understanding of the engagement process, and provide perspective views of a plurality of pins and respective sockets for different socket configurations.

[0069] Figure 4 illustrates a plurality of pins and sockets for a first socket configuration. The first socket con-

figuration corresponds to the previously described socket, i.e. is a "one-layer clipper" arrangement.

[0070] Thus, a clip 215 of the socket 210 is configured to couple to a securing region 111A of the distal portion 111 of the pin 110, to prevent or restrict movement of the pin 110 from the socket 210.

[0071] Figure 5 illustrates a plurality of pins and sockets for a second socket configuration.

[0072] The second socket configuration differs in that it comprises a pair of clips 216, 217 for clipping the socket 210 to the pin 110. In this example, two separate securing areas 111B, 111C are defined on the distal portion 111 of the pin 110. A first clip 216 of the socket 210 clips to a first securing area 111B of the distal portion 111 of the pin 110. A second clip 217 of the socket 210 clips to a second securing area 111C of the distal portion 111 of the pin 110.

[0073] The first and second securing areas are positioned either side of a notch 111D or indentation in the distal portion 111 of the pin 110. This means that forward or rearward movement of the pin 110 (e.g., due to a manipulation of the electrical connector) would result in one of the two clips entering the notch 111D, which would act as a safety securing area. In particular, side walls of the notch 111D would provide an abutting surface to prevent or restrict further forward/rearward movement of the pin 110 with respect to the socket. This improves the robustness and reliability of the electrical connection between the pin 110 and the socket 210.

[0074] Thus, the socket has a "two-layer clipper" arrangement. This approach provides more robust electrical connection, at the expense of increased size and material costs.

[0075] It is emphasized that it is not essential for the electrical connector to comprise a plurality of pins. Rather, the electrical connector may comprise only a single pin. However, it will be appreciated that the electrical connector may comprise any suitable number of pins, e.g., four pins, six pins, eight pins and so on. The precise number of pins may depend upon the use-case scenario for the electrical connector.

[0076] In some embodiments, the electrical connector 100 may comprise an array of pins 110, e.g., a linear array of pins. The complementary electrical connector 200 may comprise a corresponding array of sockets 210, e.g., a linear array of sockets.

[0077] Turning back to Figure 1, additional optional features of the electrical connector 100 and/or the complementary electrical connector 200 are hereafter described. These same elements are also illustrated in Figures 6 to 8 for improved understanding.

[0078] Figure 6 provides a cross-sectional view of the electrical connector arrangement. Figure 7 illustrates a perspective view of the electrical connector arrangement. Figure 8 illustrates a top-down view of the electrical connector arrangement.

[0079] The electrical connector 100 also comprises a connector body 120. The connector body 120 surrounds

and/or supports the pin(s) 110 of the electrical connector 100.

[0080] The complimentary electrical connector 200 comprises a complementary connector body 220. When the electrical connector 100 and the complementary electrical connector 200 are connected to one another, the connector body 120 and the complementary connector body 220 engage with one another. When these two elements 120, 220 are engaged together, they together encapsulate the pin(s) 110 and the socket(s) of the two connectors 100, 200.

[0081] The connector body 120 and the complementary connector body 220 may have complimentary geometry, so that they are able to engage with one another. When engaged with one another, separation of the two connector bodies 120, 220 (and therefore electrical connectors 100, 200) may be restricted or require a force greater than a predetermined force, e.g., greater than at least a gravitational force, e.g., greater than at least two times the gravitational force.

[0082] Figure 6 provides perhaps the clearest view of the connection between the electrical connector and the complementary electrical connector, and particularly the complementary geometry of the connector bodies of the electrical connectors.

[0083] In some examples the connector body 120 and complementary connector body 220 may comprise a hooking arrangement 127. The hooking arrangement is configured to engage the two connector bodies 120, 220 to one another. The hooking arrangement may be replaced by another form of securing or fixing mechanism for connecting or clipping the connector body 120 to the complementary connector body, or vice versa.

[0084] The connector body 120 and the complementary connector body 220 may be made of any suitable material, which is preferably watertight, waterproof and/or impermeable. Suitable example materials include plastic and/or rubber.

[0085] In some examples, to provide a secure connection between the two connectors 100, 200, the electrical connector 100 may comprise a securing mechanism 125 configured to secure the connector body 120 to the complementary connector body 220. The complementary electrical connector 200 may comprise a corresponding or complementary securing mechanism.

[0086] This may, for instance, take the form of a screw and screw receiving mechanism, so that the complementary connector body 220 can be screwed into the connector body 120 or vice versa.

[0087] By way of example, the complementary securing mechanism 225 may comprise a hole sized to admit passage of a thread of a screw, but not the head of a screw. The securing mechanism 115 may comprise a screw receiving mechanism configured to be securable against the thread of the screw. The thread may pass through the complementary securing mechanism 225 and be secured in the securing mechanism 115. The complementary electrical connector 200 is effectively

clamped between the head of the screw and the electrical connector 100.

[0088] The electrical connector 100 also comprises a support 150. The support 150 is configured to (structurally) support the other elements of the electrical connector, and may house additional components such as electrical components.

[0089] The complementary connector 200 may comprise a corresponding complementary support 250.

[0090] The electrical connector may further comprise a sealing element 130. The sealing element 130 is configured to when the connector body 120 is engaged with the complementary connector body 220, provide a seal to prevent or reduce the ingress of foreign material towards the one or more pins and the respective one or more sockets encapsulated by the connector body and the complementary connector body.

[0091] Thus, the sealing element acts to prevent or reduce the ingress of material towards the area/volume enclosed by the engaged connector body 120 and complementary connector body 220.

[0092] Suitable examples of sealing elements will be apparent to the skilled person, such as an O-ring or similar sealing mechanism.

[0093] Figures 7 and 8 demonstrates how the proposed electrical connector can form a tight seal against the ingress of foreign matter towards the pin(s) and/or socket(s).

[0094] It has previously been mentioned how the electrical connector may comprise a mount 140 for mounting the pin(s) 110. This mount may be formed from a flexible material, such as rubber.

[0095] In some examples, the mount 140 is formed of rubber and the connector body is formed of plastic.

[0096] The use of rubber for the mount can further improve the robustness of the connection between the two electrical connectors, particularly a resilience to twisting or bending. A plastic connector body provides a hard shell for providing a more mechanically and robust secure connection between the two electrical connectors, as well as providing a good barrier to the ingress of foreign material. The two materials thereby complement one another to improve the overall robustness and ingress protection of the electrical connector.

[0097] Of course, the mount and complementary connector body for the complementary electrical connector may be made of corresponding materials to achieve further advantages for the overall electrical connector arrangement.

[0098] Figure 9 illustrates a lighting system 900.

[0099] The lighting system 900 comprises a first light strip 910 and a second light strip 920 that are connected together by an electrical connector 10, such as those previously described. The electrical connector 10 connects the first light strip to the second light strip. The first light strip comprises a first light emitting element 911.

[0100] The first light strip 910 may, for instance, comprise one or more first light emitting elements 911 and

the electrical connector. The second light strip 920 may comprise one or more second light emitting elements 921 and the complementary electrical connector. A light emitting element may comprise any suitable element that emits lights, such as a tubular LED, an array of LEDs, a halogen bulb and/or fluorescent lamp.

[0101] Variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

[0102] The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0103] If the term "adapted to" is used in the claims or description, it is noted the term "adapted to" is intended to be equivalent to the term "configured to". If the term "arrangement" is used in the claims or description, it is noted the term "arrangement" is intended to be equivalent to the term "system", and vice versa. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. An electrical connector (100) comprising one or more pins (110) for engaging with a respective one or more sockets (210) of a complementary electrical connector (200), each pin comprising:
 - a distal portion (111) configured to be mechanically and electrically engageable with a respective socket (210) of the complementary electrical connector; and
 - a flexible portion (112) configured to, when the distal portion is mechanically and electrically engaged with the respective socket of the complementary electrical connector, be spatially distanced from the respective socket, wherein a flexibility of the flexible portion is greater than a flexibility of the distal portion.
2. The electrical connector (100) of claim 1, wherein the flexible portion (112) is a spring.
3. The electrical connector (100) of any of claims 1 or 2, wherein the flexible portion (112) comprises a bent or curved portion.
4. The electrical connector (100) of any of claims 1 to 3, wherein the flexible portion (112) has a half-ellipse shape.
5. The electrical connector (100) of any of claims 1 to

- 4, wherein the flexible portion (112) is formed of a first material and the distal portion (111) is formed of a second, different material, wherein the elastic modulus of the first material is less than the elastic modulus of the second material.
6. The electrical connector (100) of any of claims 1 to 5, further comprising a connector body (120) surrounding the one or more pins, wherein:
- the connector body is configured to be engageable with a complementary connector body of the complementary electrical connector; and when engaged together, the connector body and the complementary connector body together encapsulate the one or more pins of the electrical connector and the respective one or more sockets of the complementary connector.
7. The electrical connector (100) of claim 6, further comprising a securing mechanism (125) configured to secure the connector body to the complementary connector body of the complementary electrical connector.
8. The electrical connector (100) of claim 6 or 7, further comprising a sealing element (130) configured to, when the connector body is engaged with the complementary connector body, provide a seal to prevent or reduce the ingress of foreign material towards the one or more pins and the respective one or more sockets encapsulated by the connector body and the complementary connector body.
9. The electrical connector (100) of any of claims 1 to 8, further comprising a mount (140) configured to mount the one or more pins, wherein the mount is formed of a material having a lower elastic modulus than the material of the one or more pins.
10. The electrical connector (100) of claim 9, wherein the mount (140) is formed of rubber.
11. The electrical connector (100) of any of claims 1 to 10, wherein the one or more pins (110) comprises an array of pins.
12. The electrical connector (100) of any of claims 1 to 11, wherein the electrical connector is configured for a light strip (910, 920).
13. A light strip (910, 920) comprising:
- one or more light emitting elements (911, 921); and
the electrical connector (100) of any of claims 1 to 12.
14. An electrical connector arrangement (10) comprising:
- the electrical connector (100) of any of claims 1 to 12; and
the complementary electrical connector (200) comprising one or more sockets (210) configured to be engageable with a respective pin (110) of the electrical connector.
15. A lighting system (900) comprising:
- a first light strip (910) comprising one or more light emitting elements (911);
a second light strip (920) comprising one or more light emitting elements (921); and
the electrical connector arrangement (10) of claim 14, wherein the electrical connector arrangement connects the first light strip to the second light strip.

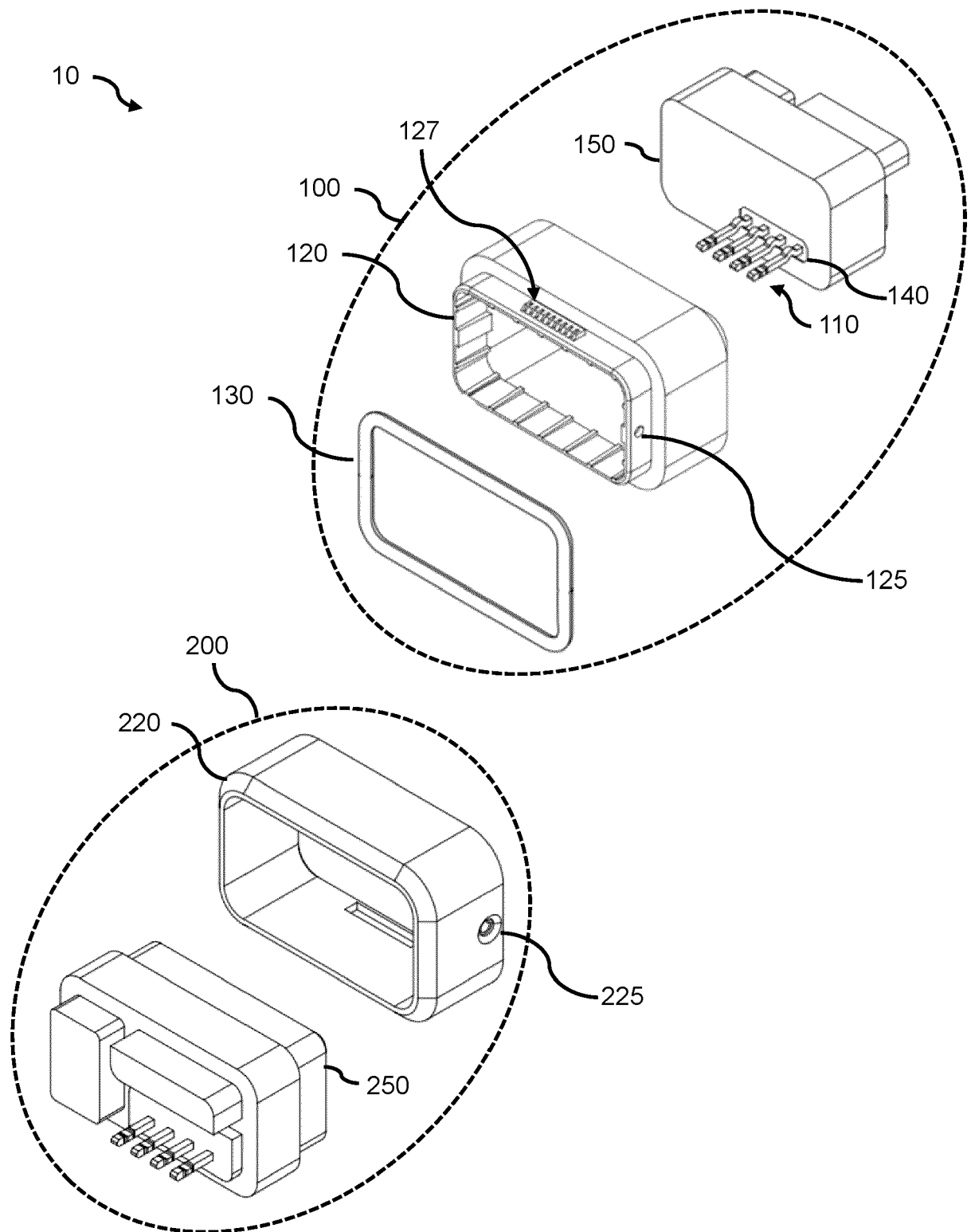


FIG. 1

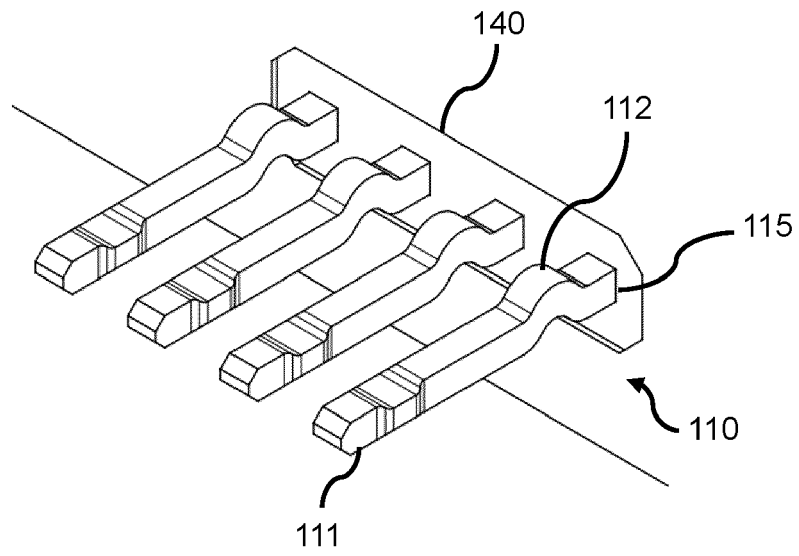


FIG. 2

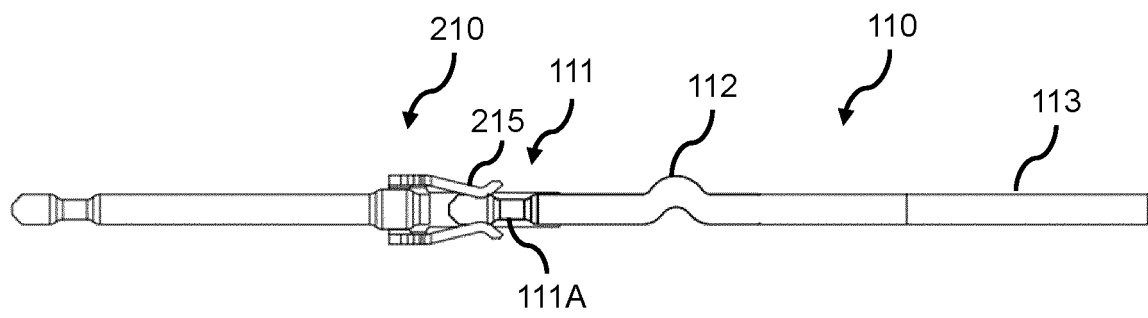


FIG. 3

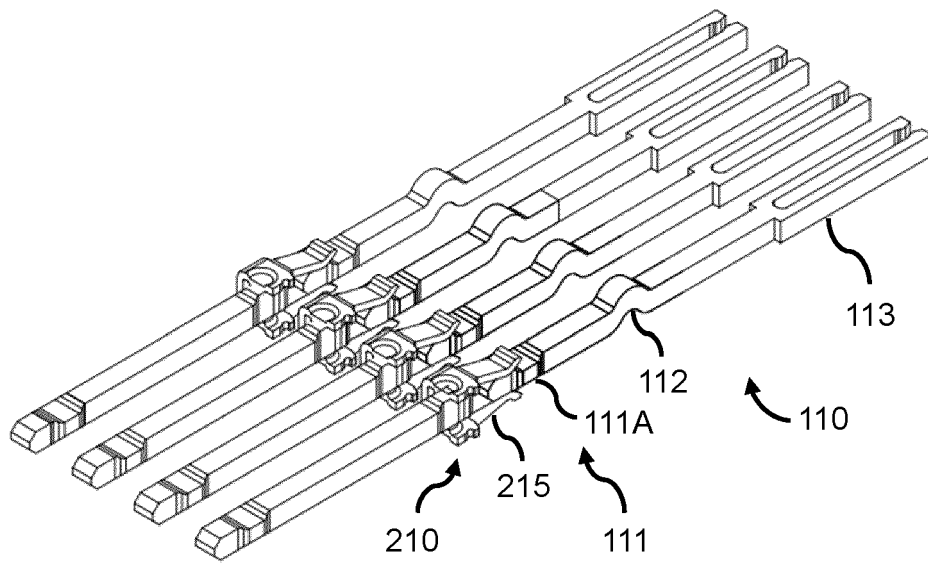


FIG. 4

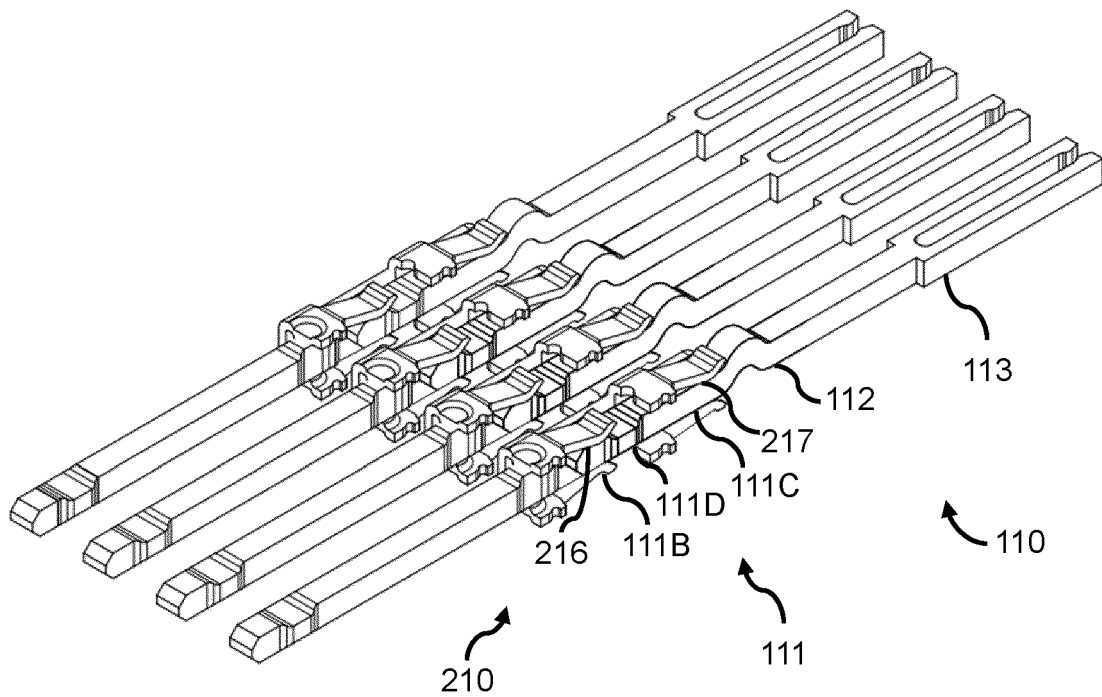


FIG. 5

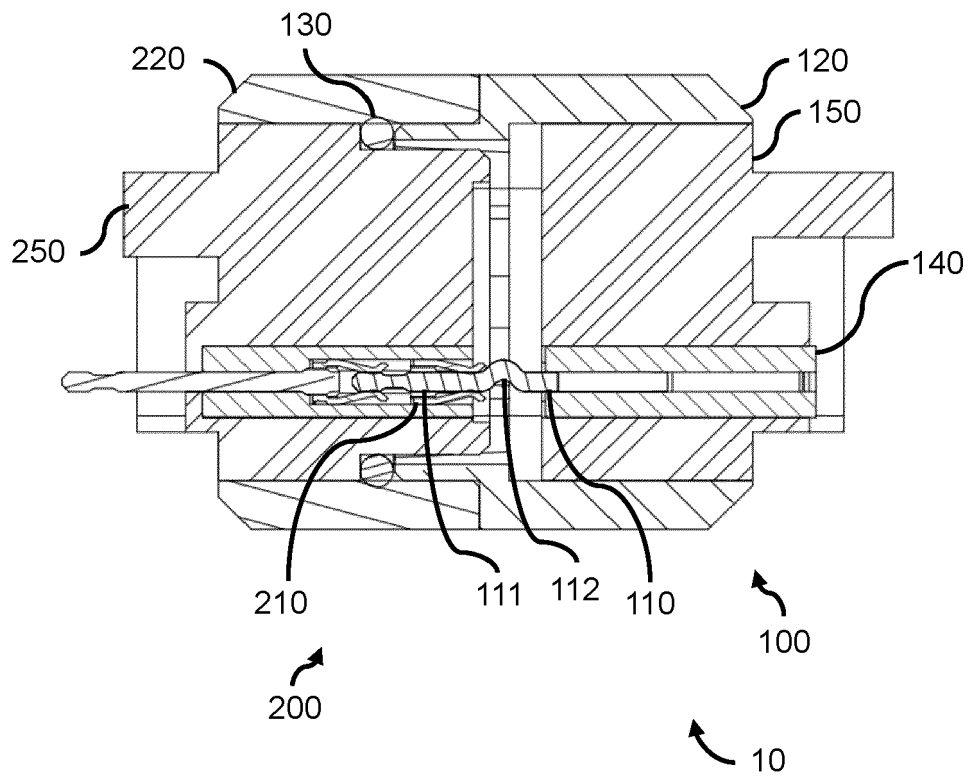


FIG. 6

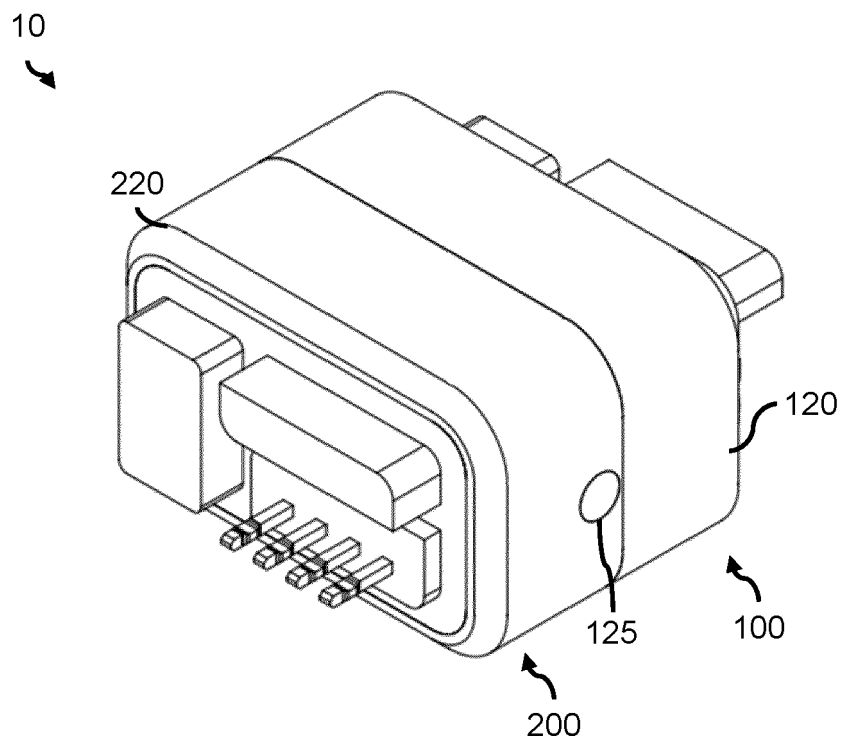


FIG. 7

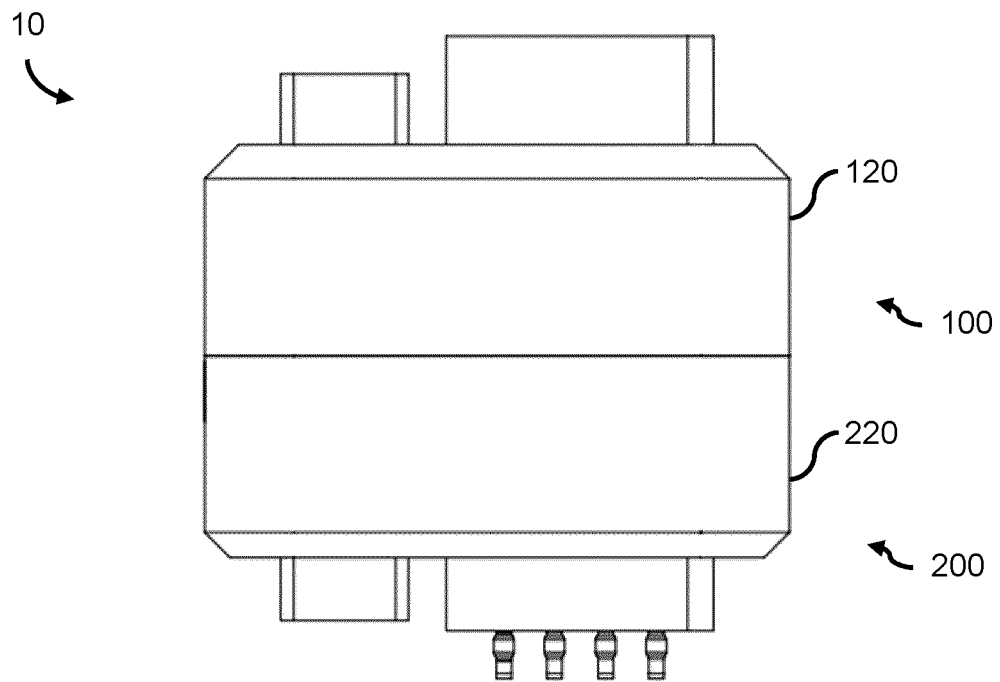


FIG. 8

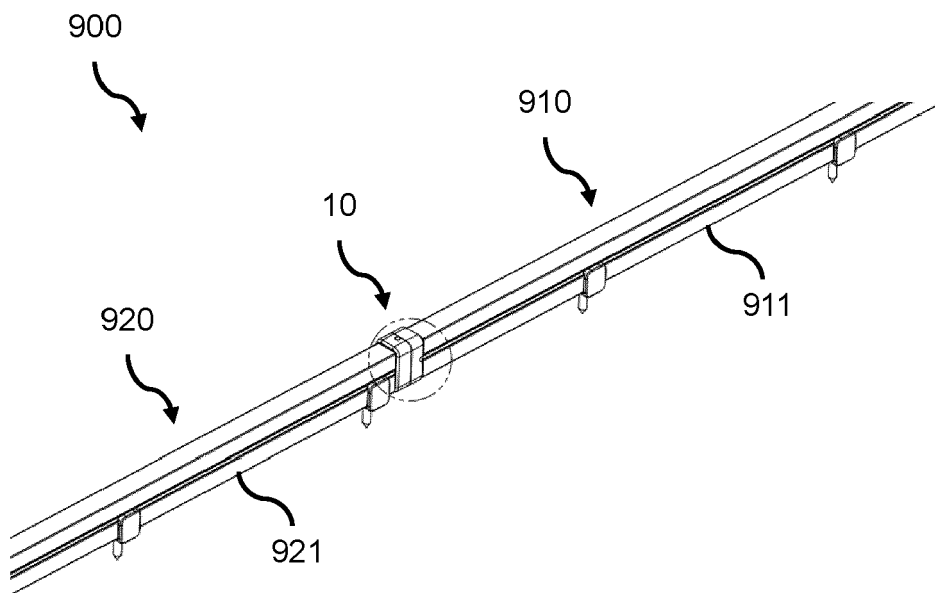


FIG. 9



EUROPEAN SEARCH REPORT

Application Number

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The Hague	27 September 2022	Esmiol, Marc-Olivier
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