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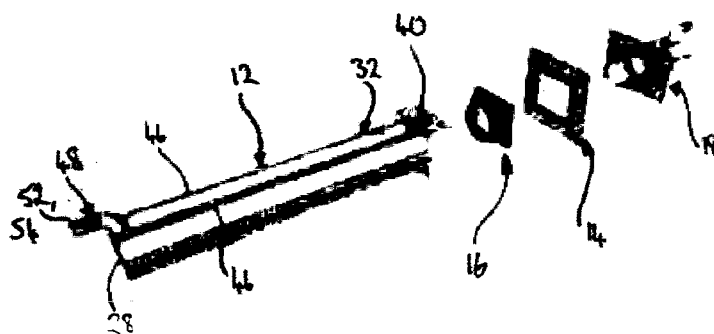


FIGURE 2

(57) Abstract: Connector (10) forming a joint between first (20) and second (22) surfaces. Connector (10) comprises: (i) hollow male member (18) to be embedded in first surface (20), the male member (18) having open ended protrusion (102) extending therefrom; (ii) a hollow female member (12) to be embedded in second surface (22), female member (12) having mating opening (42a) for receiving protrusion (102); and (iii) flexible sealing means (16) for forming a fluid tight seal between the female (12) and male (18) members. When installed, tendon (34) forming part of the first surface (20) extends through protrusion (102) into female member (12). Prior to grouting, movement of tendon (34) during settling of first surface (20) is facilitated by the male and female member (12, 18) without breaking the fluid tight seal formed by flexible sealing means (16). Also claimed is forming a joint between a vertical surface and a horizontal surface.

“CONNECTOR FOR USE IN FORMING JOINTS”

FIELD OF THE INVENTION

[0001] The invention relates to a connector for use in forming joints. The invention is particularly suited for use in connecting portions of a post-tensioned concrete structure, such as floor slabs, in a manner that allows the portions to move relative to each other as occurs during settling of the portions.

BACKGROUND TO THE INVENTION

[0002] The following discussion of the background to the invention is intended to facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or part of the common general knowledge in any jurisdiction as at the priority date of the application.

[0003] Post-tensioning (“PT”) is a technique used in the construction of buildings, particularly those where the floors of the building are intended to have long spans uninterrupted by vertical pillars. PT involves reinforcing (strengthening) concrete or other materials with high strength steel strands or bars. These strands and bars are generally referred to as tendons.

[0004] The problem with this approach is that it is generally not possible to pour an entire floor as a single floor plate due to size restriction, continuity requirements and/or restraint conditions. As a consequence, the floor is commonly formed in sections or individual slabs. These sections or slabs are commonly poured at different time to each other. To ensure that the floor is more or less continuous, each section or slab contains suitable tendons such as PT wire cables or PT strand cables.

[0005] As each section or slab cures and settles, the sections or slabs may move relative to each other. This means that the joint connecting the sections or slabs must be capable of accommodating this relative movement. At the same time, the joint operates to allow temporary release of restraining effects of the various sections relative to one another and thus ensure that the maximum amount of PT pre-compression force is transferred into the floor plates. If insufficient PT pre-compression force is transferred into the floor plates there exists the possibility of

cracking within the sections or slabs – thereby reducing the longevity and the integrity of the resulting floor plate.

[0006] One past method of allowing for such movement and transfer of pre-compression force has been to place temporary movement joints at strategic locations within the building. Each temporary movement joint allows for movement during curing and settling of the structural elements that it joins. Once the joined structural elements have cured and settled, the temporary movement joint is permanently locked so as to provide a more or less continuous floor or other element of the building.

[0007] While this approach works, almost all temporary movement joints of the prior art suffer from one or more of the following problems:

- If the surfaces that the temporary movement joints seek to connect move relative to each other during settling, an air gap may be formed which leaves both the temporary movement joint and at least part of the tendon exposed to the atmosphere and thus subject to corrosion and the like until sealed.
- There is significant difficulty in sealing the temporary movement joint – in particular the underside of the temporary movement joint.

[0008] A consequence of the first problem is that prior art temporary movement joints must be made from corrosion resistant materials, such as stainless steel. When combined with the fact that the materials must also be fire resistant or incorporate other attributes to meet building regulations, the cost of manufacturing such temporary movement joints may be up to ten times higher than the cost of manufacturing from less exotic materials.

[0009] The second problem presents a situation where the temporary movement joint is not adequately strengthened or that sealant may be lost from the joint. In both cases, a workman is then required to caulk the temporary movement joint at a later date and thus ensure that the temporary movement joint is properly sealed and thus locked in place. This requirement for remedial action is time-consuming and expensive in addition to delaying completion of the building.

[0010] It is therefore an object of the present invention to provide a connector for use in forming joints that ameliorates, at least in part, one or more of the aforementioned problems.

SUMMARY OF THE INVENTION

[0011] Throughout this document, unless otherwise indicated to the contrary, the terms “comprising”, “consisting of”, and the like, are to be construed as non-exhaustive, or in other words, as meaning “including, but not limited to”.

[0012] In accordance with a first aspect of the present invention there is a connector for use in forming a joint between a first surface and a second surface comprising:

a hollow male member to be embedded in a first surface, the male member having an open ended protrusion extending therefrom;

a hollow female member to be embedded in the second surface, the female member having a mating opening for receiving the protrusion; and

flexible sealing means for formed a fluid tight seal between the female member and male member,

where, when installed, a tendon forming part of the first surface is able to extend through the protrusion into the female member and where, prior to grouting, movement of the tendon during settling of the first surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

[0013] Preferably, the male member has a locator provided therein, the locator of slightly larger dimensions than those of the tendon, such that the tendon can be installed into the mated male and female member by way of the locator.

[0014] In this manner it is to be appreciated that there is no need for the connector to be made from corrosive resistant or fire resistant material as no part of it remains exposed after formation of the surfaces. Furthermore, no part of the tendon, also referred to hereafter as a dowel, is exposed when properly installed in such a connector.

[0015] In an alternative configuration of this aspect of the invention there is a connector for use in forming a joint between a first surface and a second surface comprising:

a hollow male member to be embedded in a first surface, the male member having an open ended protrusion extending therefrom;

a hollow female member to be embedded in the second surface, the female member having a mating opening for receiving the protrusion; and

flexible sealing means for formed a fluid tight seal between the female member and male member,

where, when installed, a tendon forming part of the second surface is able to extend through the female member and thereafter into the protrusion and where, prior to grouting, movement of the tendon during settling of the second surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

[0016] For this configuration, the female member may have a locator provided therein, the locator of slightly larger dimensions than those of the tendon, such that the tendon can be installed into the mated male and female member by way of the locator.

[0017] The flexible sealing means may form part of the hollow female member. Ideally, the flexible sealing means comprises a first seal and a second seal joined by a rubber extrusion and where the first seal is connected to the female member and the second seal is connected to the male member. The use of a flexible sealing means allows the dowel to move without breaking either seal.

[0018] The first seal may be received within a channel of the female member such that a mechanical seal is formed between the first seal and the channel. Preferably, the first seal has a circular cross section of greater dimension than the dimensions of the channel, such that the first seal deforms when received within the channel to create the mechanical seal. The channel may be formed when a fastening plate is attached to the chamber.

[0019] The open ended protrusion may have an inwardly tapering surface, the inwardly tapering surface operable to facilitate connection of the second seal to the open ended protrusion and, when subjected to telescopic movement during settling, operable to prevent disengagement of the second seal from the open ended protrusion.

[0020] The female member may have a first spigot and second spigot, each configured to receive a grout tube, such that grout pumped through the grout tube connected to the first spigot flows through the connector and exits the connector via the grout tube connected to the second spigot. Alternatively, the female member may have a first and second spigot, each configured to receive a grout tube, such that grout pumped through the grout tube connected to the first spigot flows through the connector and exits the connector via the grout tube connected to the second spigot. In yet a further alternative configuration, the male member may have a first and second spigot, each configured to receive a grout tube, such that grout pumped through the grout tube connected to the first spigot flows through the connector and exits the connector via the grout tube connected to the second spigot. The spigots, regardless of configuration, may have an enlarged head so that the grout tube is connected to the spigot by way of a forcible fit.

[0021] Utilising a configuration where the first and second spigot form part of the same member is advantageous as this allows for visual confirmation that grout tubes have been appropriately configured into the intended single continuous serpentine conduit.

[0022] The mating opening may take the form of a chamber of larger dimension than the remainder of the female member, the protrusion and sealing member being contained within the chamber.

[0023] The female member may have a fastening plate for facilitating attachment of the female member to formwork installed to facilitate formation of the second surface. Preferably, the fastening plate has at least one fastening hole for receiving a fastener and thereby facilitating attachment of the female member to the formwork. Furthermore, the fastening plate has at least one frangible section, the at least one fastening hole provided in at least one of the at least one frangible sections.

[0024] The use of a frangible section allows for retention of the female member to the formwork even when a disengaging force is applied to one of the fasteners (the frangible section incorporating that fastener merely operable to break away).

[0025] The male member may have a face plate, the face plate having a profile identical to the fastening plate, such that alignment of the face plate with the

fastening plate corresponds with alignment of the male member with the female member. Additionally, a compressible material may be being arranged during installation to be positioned between the face plate and the fastening plate. The compressible material may incorporate adhesive means for creating a bond with either the face plate, the fastening plate or both the face plate and the fastening plate. The fastening plate may have spacers positioned proximate the fastening holes.

[0026] The spacers act to compensate for the increase in overall dimensions caused by the inclusion of the compressible material.

[0027] The male and/or female member preferably has at least one lengthwise extending groove provided in its upper surface. When incorporated, best performance is achieved when the first and second spigot are positioned higher than the lengthwise extending groove relative to the upper surface of the male and/or female member, as appropriate.

[0028] The male member and/or the female member may have retaining means provided in its external surface for assisting in securely retaining the male and/or female member within its respective surface. Such retaining means may take one or more of the following forms: irregularities in the external surface; discontinuities in the external surface; ribs; corrugations; troughs; crests.

[0029] Preferably, the internal surface of the male and/or female member is smooth.

[0030] The male and/or female member may incorporate retaining means for releasably retaining a chair during installation.

[0031] In accordance with a second aspect of the invention there is a female member forming part of a connector for use in forming a joint between a first surface and a second surface as described in the first aspect of the invention.

[0032] In accordance with a third aspect of the invention there is a male member forming part of a connector for use in forming a joint between a first surface and a second surface as described in the first aspect of the invention.

[0033] In accordance with a fourth aspect of the invention there is a method of forming a joint between a first surface and a second surface comprising the steps of:

affixing a female member of a connector as described in the first aspect of the invention to formwork for the second surface;

creating the second surface with the female member embedded therein, such that an opening of the female member remains accessible on removal of the formwork;

mating an open ended protrusion of a male member of the connector to the opening of the female member such that a flexible sealing means forms a fluid tight seal between the female member and the male member;

installing a tendon to form part of the first surface through the protrusion into the female member;

creating the first surface with the male member embedded therein; and

grouting the connector

where, movement of the tendon during settling of the first surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

[0034] In an alternative configuration of this aspect of the invention, there is a method of forming a joint between a first surface and a second surface comprising the steps of:

affixing a female member of a connector as described in the first aspect of the invention to formwork for the second surface;

creating the second surface with the female member embedded therein, such that an opening of the female member remains accessible on removal of the formwork;

mating an open ended protrusion of a male member of the connector to the opening of the female member such that a flexible sealing means forms a fluid tight seal between the female member and the male member;

installing a tendon to form part of the first surface through the protrusion into the male member;

creating the first surface with the male member embedded therein; and

grouting the connector

where, movement of the tendon during settling of the first surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

[0035] The method may further include the step of forming a mechanical seal between the first seal and a channel of the female member. Associated with this step, the method may also include the step of creating the channel by attaching a fastening plate to a chamber forming part of the female member.

[0036] The method may further include the step of inserting the open ended protrusion through the second seal, such that an inwardly tapering surface of the open ended protrusion facilitates this insertion while, when the male and female members are subjected to telescopic movement during settling, operable to prevent disengagement of the second seal from the open ended protrusion.

[0037] The method may further include the step of connecting a grout tube to each of a pair of spigots attached to the male member and/or the female member, such that grout pumped through a first spigot flows through the connector and exits the connector via the grout tube connected to a second spigot. Preferably, the method also includes the step of connecting a free end of the grout tube connected to the second spigot of a first connector to the first spigot of a second connector.

[0038] In this manner, the desired continuous serpentine conduit can be formed between connectors.

[0039] The method may further include the step of aligning a fastening plate of the female member to a face plate of the male member. Associated with this step, the method may also comprise the step of installing a compressible material between the face plate and the fastening plate. Ideally, this compressible material creates a bond with the face plate, the fastening plate or both the face plate and the fastening plate.

[0040] The method may further include the step of releasably retaining a chair to maintain the level of the male member and/or female member during installation.

[0041] The method may further include the step of removing a protective cover from the opening of the female cover after creation of the second surface. The use of the protective cover assists in preventing contaminants that may otherwise break the seal from entering the female member during creation of either the first or second surface.

[0042] In accordance with a fifth aspect of the invention there is a connection set for forming a joint between a vertical surface and a horizontal surface, the connection set comprising:

- an anchor head having a threaded portion for embedding in the vertical surface;
- a dowel having a mating threaded portion;
- a hollow male member to be received in the vertical surface, the male member having an open ended protrusion extending therefrom and an open ended body;
- a hollow female member to be embedded in the horizontal surface, the female member having a mating opening for receiving the protrusion; and
- flexible sealing means for formed a fluid tight seal between the female member and male member,

where, when installed, the tendon is matedly connected to the anchor head by way of the threaded portions and unmated end of the tendon extends through the protrusion into the female member such that, prior to grouting, movement of the tendon during settling of the horizontal surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

[0043] The set may include a wall plate, the wall plate having a cylinder having a threaded portion, the cylinder operable to matedly connect to the anchor head by way of the threaded portions, and thereby retain the anchor head in place during creation of the vertical surface.

[0044] The open ended body may include a positioning rim, the positioning rim having a diameter smaller than the diameter of the cylinder.

[0045] By utilising a positioning rim having a diameter smaller than the diameter of the cylinder, when the wall plate is removed and the male member installed in its place, a seal tight fit is formed by the male member to the vertical surface.

[0046] In accordance with a sixth aspect of the invention there is a method of forming a joint between a vertical surface and a horizontal surface comprising the steps of:

- fastening a wall plate to formwork for the creation of the vertical surface;
- connecting an anchor head to a cylinder portion of the wall plate;
- forming the vertical surface with the anchor head and wall plate formed therein;
- removing the wall plate from the vertical surface;
- connecting a dowel to the anchor head embedded in the vertical surface;
- installing a male member into the area formed by the removal of the wall plate from the vertical surface, the male member having an open ended protrusion through which the dowel extends;
- mating the open ended protrusion of the male member to an opening of a female member, such that a flexible sealing means forms a fluid tight seal between the female member and the male member;
- creating the horizontal surface with the female member embedded therein;
- and
- grouting the connector.

[0047] The method may further include the step of forming a mechanical seal between the first seal and a channel of the female member. As a related step, the method may also include the step of creating the channel by attaching a fastening plate to a chamber forming part of the female member.

[0048] The method may further include the step of inserting the open ended protrusion through the second seal, such that an inwardly tapering surface of the open ended protrusion facilitates this insertion while, when the male and female members are subjected to telescopic movement during settling, operable to prevent disengagement of the second seal from the open ended protrusion.

[0049] The method may further include the step of connecting a grout tube to each of a pair of spigots attached to the female member, such that grout pumped through a first spigot flows through the connector and exits the connector via the grout tube connected to a second spigot. As a related issue, the method may further include the step of connecting a free end of the grout tube connected to the second spigot of a first female member to the first spigot of a second female member.

[0050] The method may further include the step of aligning a fastening plate of the female member to a face plate of the male member.

[0051] The method may further include the step of installing a compressible material between the face plate and the fastening plate. This compressible material may be used to create a bond with the face plate, the fastening plate or both the face plate and the fastening plate.

[0052] The method may further include the step of releasably retaining a chair to maintain the level of the female member during installation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0053] The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of one form of a connector according to a first embodiment of the invention in an assembled form and shown in isolation;

Figure 2 is an exploded perspective view of the connector as shown in Figure 1;

Figure 3 is a partial perspective view of a sleeve that forms part of the connector as shown in Figure 1;

Figure 4 is a perspective view of a sealing means that forms part of the connector as shown in Figure 1;

Figure 5 is a perspective view of a fastening plate that forms part of the connector as shown in Figure 1;

Figure 6 is a perspective view of a cap that forms part of the connector as shown in Figure 1;

Figure 7 is a first partial cross-sectional view, taken in perspective, of the connector as shown in Figure 1;

Figure 8 is a second partial cross-sectional view of the connector as shown in Figure 1;

Figures 9-1 to 9-8 are individual schematic perspective views of the various stages of using the connector as shown in Figure 1 to connect two slabs of a floor;

Figure 10 is an exploded perspective view of a connector according to a second embodiment of the invention.

Figure 11 is a partial perspective view of a sleeve that forms part of the connector as shown in Figure 10;

Figure 12 is a perspective view of a fastening plate that forms part of the connector as shown in Figure 10;

Figure 13 is a rear view of the fastening plate shown in Figure 12.

Figure 14 is a perspective view of a cap that forms part of the connector as shown in Figure 10.

Figure 15 is a partial cut-away view, shown in perspective, of a partially assembled connector as shown in Figure 10.

Figure 16 is an exploded perspective view of a connector according to a third embodiment of the invention.

Figure 17 is a side perspective view of a cap that forms part of the connector as shown in Figure 16.

Figure 18 is a side view of the cap as shown in Figure 17 as received within a vertical surface.

Figure 19 is a flowchart illustrating the process of installing the connector as shown in Figure 16 to connect a wall slab to a floor slab.

Figure 20 is a perspective view of a variant of the connector shown in Figure 1 incorporating means for retaining a chair.

Figure 21 is [xx]

PREFERRED EMBODIMENTS OF THE INVENTION

[0054] In accordance with a first embodiment of the invention there is a connector 10 for use in forming joints. The connector 10 comprises:

- a sleeve 12;
- a fastening plate 14;
- a sealing member 16; and
- a cap 18.

[0055] In essence, the invention sees the sleeve 12 used for secure attachment to a first section or slab of flooring 20. The cap 18 is used for secure attachment to a second section or slab of flooring 22. In combination, the sleeve 12 and cap 14 cooperatively engage with one another to form a fluid-tight connection at the interface 24 of the two sections or slabs 20, 22.

[0056] Sleeve 12 has a front end 26, a rear end 28 and sides 30. The majority of the sleeve 12 takes the form of an elongate portion forming a housing 32 for receiving and protecting a first part of a reinforcement dowel 34 forming part of the first section or slab of flooring 20. The length (L) of the housing 32 corresponds with the length of the first part of the reinforcement dowel 34.

[0057] The internal lower surface (not shown) of the housing 32 is substantially smooth so as to assist in the flow of grout (not shown) through the sleeve 12. Utilising a substantially smooth internal lower surface also reduces the formation of air bubbles, air locks, air pockets or the like that may weaken the fastening of the sleeve 12 to the reinforcement dowel 34 when sealed with grout.

[0058] At least one of sides 30 are provided with surface irregularities or discontinuities in the form of ribs 38. The ribs 38 assist in securely retaining the submerged sleeve 12 in the first section or slab of flooring 20 when in its uncured state.

[0059] Positioned at the front end 26 of the sleeve 12 is a chamber 40. Chamber 40 takes the form of a generally rectilinear three dimensional rectangular prism with

open faces 42a, 42b. The role of open face 42a will be described in more detail below.

[0060] Open face 42b allows for fluid communication between the chamber 40 and the housing 32.

[0061] Extending along an upper surface 44 of the sleeve 12 are a pair of lengthwise extending grooves 46. Each groove 46 acts as a flow path for the grout when introduced into the sleeve 12. The grooves 46 also operate to reduce the formation of air bubbles, etc.

[0062] A first port 48 is provided in the upper surface 44 at the rear end 28 of the sleeve 12. In this embodiment, the first port 48 takes the form of a hollow right angle elbow 50 having an enlarged head 52. The hollow nature of the first port 48 allows for fluid communication between the first port 48 and the interior of the sleeve 12.

[0063] The enlarged head 52 has a tapering rim or edge 54 for receiving and retaining a hose (not shown).

[0064] It is important to note that the enlarged head 52 must be at a level higher than the level of the extending grooves 46 to ensure that the entire connector 10 is appropriately grouted when required.

[0065] The fastening plate 14 is generally planar and rectangular in shape. The fastening plate 14 is welded to open face 42a of the chamber 30. The dimensions of the fastening plate 14 are greater than that of open face 42a as shown in Figure 5.

[0066] Positioned centrally within the fastening plate 14 is an aperture 58. The aperture 58 is of size and shape slightly smaller than that of open face 42a. Surrounding the periphery of the aperture 58 is a flange 60. The role of the flange 60 will be described in more detail below.

[0067] Each corner of the fastening plate 14 has a frangible section 62 that can be broken off as and when required. A fastening hole 64 is provided in each frangible section 62. In this manner, the frangible section 62 can break away from the fastening plate 14 should a fastener (not shown) holding the sleeve 12 to the formwork tries to pull the fastening plate 14 off the sleeve 12.

[0068] The sealing member 16 comprises a first seal 68 and a second seal 70. A hollow rubber extrusion 72 extends between the first seal 68 and the second seal 70 as shown in Figure 4. The first and second seal 68, 70 are both circular in cross-section.

[0069] A first opening 74 is located where the rubber extrusion 72 meets the first seal 68. A second opening 76 is located where the rubber extrusion 72 meets the second seal 70.

[0070] The first seal 68 surrounds the periphery of the first opening 74. In this embodiment, the first seal 68 is rectangular in shape so as to match the internal profile of the chamber 40, i.e. open face 42a.

[0071] The second seal 70 surrounds the periphery of the second opening 76. In this embodiment the second seal 70 is circular in shape so as to match the internal profile of the sleeve 12.

[0072] The cap 18 comprises a hollow body 78 having an upper or top surface 80, a front end 82 and a rear end 84 as shown in Figure 6. Extending from the rear end 84 is a locator 86. In this embodiment, the locator 86 takes the form of a circular collar. The locator 86 operates to receive and protect the first part of the reinforcement dowel 34 forming part of the second section of the slab or flooring 22. As such the locator 86 should be of slightly larger dimensions than the reinforcement dowel 34.

[0073] Extending along the upper surface 80 of the cap 18 are a pair of lengthwise extending grooves 88. Each groove 88 acts as a flow path for grout when introduced into the cap 18. The grooves 88 also operate to reduce the formation of air bubbles, etc.

[0074] An upwardly directed second port 90 extends from the upper surface 80 at a position at or towards rear end 84. In this embodiment, the second port 90 again takes the form of a hollow right angle elbow 92 having an enlarged head 94. The hollow nature of the second port 90 allows for fluid communication between the second port 90 and the hollow body (not shown) of cap 18.

[0075] The enlarged head 94 has a tapering rim or edge 96 for receiving and retaining a grout tube or pipe.

[0076] Once again, it is important to note that the enlarged head 94 must be at a level higher than the level of the extending grooves 88 to ensure that the entire connector 10 is appropriately grouted when required.

[0077] A face plate 100 is located towards the front end 82. The face plate 100 is of general size and shape commensurate with fastening plate 14.

[0078] Extending forwardly from the face plate 100 is a hollow cylindrical male member 102. In this embodiment, the cylindrical male member 102 takes the form of an extension tube. Surrounding open end 104 of the cylindrical male member 102 is a rim 106. The rim 106 has an inwardly tapering surface 108.

[0079] The hollow nature of the cylindrical male member 102 means that the interior of the cylindrical male member 102 is in fluid communication with the hollow body 78.

[0080] Positioned above the cylindrical male member 102 is a retaining clip 110. The retaining clip 110 projects from the face plate 100 in a direction substantially parallel to the cylindrical male member 102. A lip 112 extends from free end 114 of the retaining clip 110. Lip 112 projects away from the cylindrical male member 102. In this embodiment, lip 112 has a triangular cross-section as shown in Figure 8.

[0081] The retaining clip 110 has a width (W_1) less than the width of the cylindrical male member 102 (W_2).

[0082] As the connector 10 is ultimately supplied as a combination of male (cap 18) and female (sleeve 12, fastening plate 14 and sealing member 16) members it is important to describe the means by which the female member is assembled.

[0083] To assemble the female member, the sealing member 16 is inserted into open face 42b of chamber 40. Insertion of the sealing member 16 continues until first seal 68 makes contact with abutment 116. This arrangement sees second opening 76 positioned central relative to open face 42a, but spaced therefrom. These requirements are illustrated in Figures 7 and 8.

[0084] With the sealing member 16 properly inserted, the fastening plate 14 is then installed. Installation of the fastening plate 14 sees flange 60 received within open face 42a. More importantly, the installation of the fastening plate 14 defines a

square channel 118. To elaborate, the square channel 118 is defined by fastening plate 14, flange 60, chamber 30 and abutment 116. It is to be noted that the flange 60 and abutment 116 do not meet, such that the square channel 118 has an opening 120.

[0085] The creation of the square channel 118 also operates to retain the first seal 68. It should be noted here that the dimensions (S) of the square channel 118 are smaller than the diameter (D) of the first seal 68. Hence, retention of the first seal 68 within the square chamber 118 causes it to deform and mechanically seal the square chamber 118. The rubber extrusion 72 extends out from the square channel 118 through opening 120.

[0086] To ensure that the square chamber 118 remains mechanically sealed while subjected to the varying forces that occur during settling of the flooring sections 20, 22, the fastening plate 14 is friction welded to the sleeve 12.

[0087] This embodiment will now be described in the context of its intended use. Note that for the remainder of the specification:

- the respective parts of the reinforcing dowels 34 will be referred to by the term “dowel” which is in more common usage as its descriptor in industry; and
- the term sleeve 12 will be used as a reference to a sleeve 12 as assembled with the fastening plate 14 and sealing member 16 (i.e. the female member as described above).

[0088] When it is required to join two concrete slabs 20, 22 across a common join, formwork 122 is prepared in accordance with the location and size and shape of the floor to be formed. This formwork 122 includes mostly horizontal boards 124 for forming the floor. Substantially vertical formwork strips 126 are securely connected to the horizontal boards 124 where a joining edge of the floor is to be formed.

[0089] Nailed into at least one vertical formwork strip 126 is a sleeve 12. Ideally, as is shown in Figures 9-1 through 9-8, the sleeves 12 are nailed to vertical formwork strips 126 at regularly spaced apart locations along the length of the formwork 122.

[0090] A grout tube 128 is then forcibly fitted to the enlarged head 52 of a first port 48 of a sleeve 12 nailed to a peripheral of the vertical formwork strip 126. Grout tubes 128 are then securely forcibly fitted to the enlarged head 52 of the first port of every second sleeve 12 nailed to the vertical formwork strip 126. If the number of sleeves 12 nailed to the vertical formwork strip 126 is not an even number, a final grout tube 128 is securely connected to the enlarged head 52 of the first port 48 of the final sleeve 12 nailed to the vertical formwork strip 126.

[0091] The grout tube 128 securely connected to the peripheral of the vertical formwork strip 126 and the final grout tube 128, if any, remain free and are manipulated to extend primarily upwards to a position above the intended working surface of the first section of flooring 20. However, the unconnected end of each intervening grout tube 128 is manipulated so as to securely connect to the enlarged head 52 of the first port 48 of the next sleeve 12 nailed to the vertical formwork strip 126. This arrangement is shown visually in Figure 9-2.

[0092] Concrete reinforcing in the form of mesh 130 is then placed over the horizontal boards 124 and positioned such as to be embedded in the first section of flooring 20 when poured. With all of the mesh 130 appropriately positioned, the uncured concrete is poured to create the first section of flooring 20. Once the first section 20 has cured, the vertical formwork strip 126 is removed and the joining surface 132 of the poured section 20 is cleaned so as to be free of debris. Open faces 42a of each sleeve 12 are similarly cleaned.

[0093] Once cleaned, caps 18 are attached to each sleeve 12.

[0094] Attaching the cap 18 to the sleeve 12 is achieved by initially inserting the cylindrical male member 102 into open face 42a. At some point during the insertion process, the rim 106 will make contact with the rubber extrusion 72. At this time, further insertion of the cap 18 will encounter resistance, but due to the inwardly tapering surface 108 of the rim 106, the rubber extrusion 72 and second seal 70 will be forced to stretch until the rim 106 passes through the second seal 70.

[0095] When the rim 106 passes through the second seal 70, the rubber extrusion 72 and second seal 70 seek to contract to their original form. The presence of the cylindrical male member 102 prevents this from happening but acts as a clamping

force for the second seal 70. The second seal 70, under influence of this clamping force, thus seals the connection between sealing member 16 and cylindrical male member 102.

[0096] With the rim 106 having passed through the second seal 70, retaining clip 110 is now proximate square channel 118. The proximity to the square channel 118 is such that lip 112 is able to protrude into opening 120 as shown clearly in Figure 8. When so positioned, an audible sound is made as an indicator to the installer that the cap 18 is now attached to the sleeve 12. However, it should be noted that this connection is not permanent or secure and that the lip 112 can easily be removed from the opening 120 with the application of low level force.

[0097] The cap 18 now properly installed in the sleeve 12, a dowel 34 is inserted into the connector 10. Insertion of the dowel 34 is by way of locator 18. The dowel 34 is preferably pushed into the connector 10 until such time as the dowel 34 abuts internal wall (not shown) of rear end 28.

[0098] Starting from the cap 18 connected to the sleeve 12 that was nailed to the peripheral of the vertical formwork strip 126, grout tubes 128 are securely connected to the enlarged head 94 of the second port 90 of every second cap 18.

[0099] The unconnected end of each grout tube 128 is then connected to the enlarged head 94 of the second port 90 of the next cap 18. If there is not an even number of caps 18 connected to sleeves 12, the grout tube 128 connected to the final cap 18 is manipulated to extend primarily upwards to a position above the intended working surface of the second section of flooring 22.

[0100] In this manner, the grout tubes 128 connect the connectors 10 in a manner that creates a single, serpentine conduit for grout to flow through.

[0101] Concrete reinforcing in the form of mesh 130 is then placed over the horizontal boards 124 and positioned such as to be embedded in the second section of flooring 22 when poured along with the portion of dowel 34 not received within the connector 10. With all of the mesh 130 appropriately positioned, the uncured concrete is poured to create the second section of flooring 22.

[0102] As the second section of flooring 22 settles, the connector 10 allows the two flooring sections 20, 22 to move relative to each other in the two horizontal planes,

but restrict all movement of the two flooring sections 20, 22 relative to each other in the vertical plane.

[0103] To elaborate, the movement likely to occur during settling of the second section of flooring 22 is likely to be powerful, but very minor (an extreme allowance of 10mm is provided perpendicular to the line of dowel 34 and 20mm parallel to the line of dowel 34). As the retaining clip 110 has a width (W_1) less than the width of the cylindrical male member 102 (W_2), side to side movement of cap 18 relative to the sleeve 12 is facilitated by movement of the lip 112 relative to the flange 60. Telescopic movement of the cap 18 relative to the sleeve 12 is facilitated by disconnection of the lip 112 from the flange 60 as already been described.

[0104] In both cases, the integrity of the first seal 68 and second seal 70 is maintained throughout the movement as the rubber extrusion 72 deforms to meet the movement. For telescopic movement, the compressive force of the second seal 70, in addition to the inwardly tapered profile 108 or rim 106, ensures that the second seal 70 moves with the cylindrical male member 102 and thereby retains the seal.

[0105] Once the designated cure time has passed, or an appropriately qualified professional believes that the second section of flooring 22 has settled, one or both of the exposed grout tubes 128 are appropriately connected to a pump. Grout is then pumped through the exposed grout tubes 128. Due to the interconnection of the grout tubes 128 and connectors 10 as already described, as the grout enters into each connector 10 it fills up the empty spaces and thereby fills the sealed the connector 10 (i.e. the connector 10 is grouted). As the first and second seals 68, 70 remain intact, grout does not enter into the area defined by rubber extrusion 72, face plate 100 and cylindrical male member 102. If grout were to enter this area, second seal 70 may be broken.

[0106] Once all connectors 10 have been grouted, and the grout has changed from its liquid state to a solid state, the exposed grout tubes 128 are then terminated according to the architectural requirements of the finished slab (i.e. the joined first and second sections of flooring 20, 22). When the grout has cured to the required strength inside of connector 10, the first and second surfaces 20, 22 are then locked together to form a permanent state continuous slab with full structural integrity.

[0107] In accordance with a second embodiment of the invention, where like numerals reference like parts, there is a connector 200 for use in forming joints. The connector 200 comprises a sleeve 202, a fastening plate 204, sealing member 16 and cap 206. Sleeve 202 and fastening plate 204 are minor variations of sleeve 12 and fastening plate 14 and the sealing member 16 is identical to that described in the first embodiment.

[0108] For sleeve 202, first port 48 is replaced with a mounting platform 208 and first spigot 210. The mounting platform 208 replaces the extending grooves 46 at the rear end 28. The mounting platform 208 raises to a height above the upper surface 44 significantly above extending grooves 46.

[0109] First spigot 210 extends from rear side 212 of the mounting platform 208. The first spigot 210 has an enlarged head 214.

[0110] Extending from rear side 214 of the chamber 40 is a second spigot 216. The second spigot 216 is of identical construction to first spigot 210.

[0111] In all other respects, sleeve 202 is of identical construction to that of sleeve 12.

[0112] Fastening plate 204 has first frangible sections 218 and a second frangible sections 220. The first frangible sections 218 occupy each corner 222 of the fastening plate 204. The first frangible section 218 incorporates part of the periphery of the fastening hole 64. The second frangible section 220 includes the first frangible section 218.

[0113] Surrounding the fastening hole 64 at one side of the fastening plate 204 are two spacers 224 as shown in Figure 13. The purpose of the spacers 224 will be explained later.

[0114] Cap 206 comprises a face plate 100 having a mating side 226 and a retaining side 228. Extending from the mating side 226 is a cylindrical male member 102. A locator 86 extends from the retaining side 228.

[0115] Surrounding open end 104 of the cylindrical male member 102 is a rim 106. The rim 106 has an inwardly tapering surface 108.

[0116] Positioned above and below the cylindrical male member 102 are retaining clips 110. Each retaining clip 110 projects from the face plate 100 in a direction substantially parallel to the cylindrical male member 102. Extending from free end 114 of the retaining clip 110 is an angled lip 112. One end 230 of the angled lip 112 is directed towards the cylindrical male member 102. The other end 232 of the angled lip 112 is directed away from the cylindrical male member 102 and towards the mating side 224.

[0117] It should be appreciated by the person skilled in the art that, in use, the only differentiation between this second embodiment and the first embodiment essentially relates to the second spigot 216 and its connection by way of grout tubes 128. The provision of the first and second spigot 214, 216 on the sleeve 202 means that the installer can easily determine which spigot 214, 216 is acting as an outlet port for the grout and which spigot 214, 216 is acting as an inlet port for the grout. It also facilitates visual assessment of the grout path across all connectors 200 to ensure that the grout follows a serpentine conduit and thereby picks up all the connectors 200 as described above. This is not possible in the first embodiment, where reliance is placed on memory or contemporaneous records to determine the location of grout tubes 128 once the first slab 20 has been poured.

[0118] In accordance with a third embodiment of the invention, where like numerals reference like parts, there is a connector 300 for use in forming a joint between a wall section and a floor section. The connector of this embodiment incorporates the sleeve 202, fastening plate 204, sealing means 16 but in addition incorporates an anchor head 302, a screw fixing 304 and a modified cap 306.

[0119] The anchor head 302 comprises a base 308 from which a cylindrical tube 310 extends. The cylindrical tube 310 has an internally threaded portion 312.

[0120] The screw fixing 304 comprises a wall plate 314 and a removable cap 316. The wall plate 314 has fastening holes 318 in each corner. An aperture 320 is provided centrally in the wall plate 314 for receiving the removable cap 316. The shape and size of the wall plate 314 are the same as that of face plate 100.

[0121] The removable cap 316 has a body 322, a head 324 and a threaded portion 326. The body 322 is of shape and dimension to be received within the aperture

320. The head 324 is larger than the body 322 such that the head 324 prevents the removable cap 316 from passing through the aperture 320.

[0122] The threaded portion 326 is of size and dimension so as to allow threaded mating with the internally threaded portion 312 of the cylindrical tube 310.

[0123] The modified cap 306 is identical to cap 206 excepting the addition of positioning rim 328. Positioning rim 328 extends around locator 86 at its free end 330.

[0124] This embodiment will now be described in the context of its intended use in forming a joint between a wall section (not shown) and a floor section (not shown).

[0125] The screw fixing 304 is connected to the anchor head 302 by threadedly mating the internal threaded portion 312 with threaded portion 326. Once connected, the wall plate 314 is fixedly connected to a first piece of formwork (not shown) intended to facilitate the construction of the wall section. This fixed connection is formed by installing the appropriate fastener (not shown) through fastening holes 318. This process is repeated for each desired connector 300 to be installed into the wall section 300.

[0126] Once all of the desired mated anchor heads 302 and screw fixings 304 have been fixedly connected, reinforcing mesh (again not shown) may then be installed into the wall void in which the intended wall section is to be formed. Preparatory work is completed by installing a second piece of formwork which effectively defines this wall void.

[0127] Concrete is then poured into the defined wall void to create the wall section and allowed to cure. Once cured the first and second piece of formwork are removed.

[0128] A third piece of formwork is then installed as would be known to the person skilled in the art to assist in the formation of the floor section. As would be readily understood, the third piece of formwork is positioned below the position of the mated anchor heads 302 and screw fixings 304.

[0129] The screw fixing 304 is then removed from the wall section, leaving the anchor head 302 in place. To do this, the removable cap 316 is unthreaded from the

anchor head 302 and the wall plate 314 pried loose. This leaves a hole leading to the anchor head 302 and an indentation in the wall section having a profile identical to that of the wall plate 314. It is to be noted that the outer rim diameter of the positioning rim 328 is slightly larger than the void created by the body 322 so as to ensure a sealed tight fit.

[0130] Modified cap 306 is then installed into the hole until positioning rim 328 makes contact with the internally threaded portion 312 of the cylindrical tube 310. This should also see face plate 100 neatly received within the indentation left behind by removal of the wall plate 314.

[0131] A dowel having a threaded end as shown in Figure 16 is then inserted through the cylindrical male member 102 and locator 86. Once so inserted, the dowel may be manipulated as required to threadedly mate the threaded end with the internally threaded portion 312 of cylindrical tube 310. Once threadedly mated, the remainder of the dowel extends out from the modified cap 306 in a direction parallel to the third piece of formwork.

[0132] Sleeve 202 is then installed as has already been described in the second embodiment and grout tubes 128 connected as required. Pouring of the floor section and sealing of the sleeve 202 then proceeds as has already been described in the first embodiment.

[0133] While the above embodiments have been described with reference to a general form of assembly for the connectors 10, 200, 300, it should be appreciated by the person skilled in the art that other assembly configurations may be used. The only constraint on these assembly configurations is that the cap, must form a fluid tight connection with the sleeve when assembled.

[0134] While the above invention has been described in the context of post-tensioned concrete floor slabs, it should be appreciated by the person skilled in the art that the invention is not limited to this use. Rather the invention can be used in relation to any structure, or portion(s) thereof, that utilises PT techniques in its construction. For example, the invention can be used to connect a wall or floor section to a ramp or a wall or floor section to a staircase or a floor to floor slab on

ground. In extreme cases the invention can also be used in fibremesh concrete elements as well as reinforced concrete elements..

[0135] It should be appreciated by the person skilled in the art that the above invention is not limited to the embodiments described. In particular, the following modifications and improvements may be made without departing from the scope of the present invention:

- **[0136]** Ideally, the connector 10, 200, 300 should be of sufficient size to ensure that the reinforcement dowel 34 is surrounded by at least 20mm of grout along its length.
- **[0137]** The sleeves 12, 202 may be modified so that a chair 352, as would be readily known to the person skilled in the art, may be releasably attached thereto and provide support for the portion not affixed to formwork 66. An example of such a modification is shown in Figure 20.
- **[0138]** To prevent cement fines from entering in the space between the face plate 100 and the fastening plate 14, 204 a compressible material 350 may be applied to either plate 14, 100 as shown in Figure 21. Ideally, this compressible material has adhesive applied to both of its sides. This facilitates temporary retention of the face plate 100 to the fastening plate 14, 204 until the connector 10, 200 is sealed.
- **[0139]** In the first embodiment, ports 48, 90 may take any configuration for a connector 10, provided that one acts as an inlet port for grout while the other acts as an outlet port. An identical consideration applies in respect of the second and third embodiments with regards to spigots 210, 216.
- **[0140]** Spacers 224 may be used to compensate for the width of the compressible material as it has been found that without such spacers 224 the fastening of the fastening plate 14, 204 to the formwork makes the frangible sections 218 prone to failure.
- **[0141]** Other forms of joining the face plate 100 to the housing 22 are possible. For example, the face plate 100 may be bonded to the housing 22 by use of a suitable adhesive or other bonding agent.
- **[0142]** So as to remove the need for cleaning of the open faces 42a, a protective cover may be used to protect aperture 58 and open face from dirt

or other contaminants. An example of such a protective cover is a removable sticker as shown in Figure 9-5.

- **[0143]** The first and second ports 48, 90 or first and second spigots 210, 216 may be modified as required. Ideally, these components are modified to facilitate quick fit connectors.
- **[0144]** The fastening holes 64 may be modified as required to facilitate retention of any suitable fastener, such as nails or screws.
- **[0145]** The housing 12 can be of any suitable shape. However, it's preferred form sees the cross-section of the housing 12 as a rounded rectangle or as substantially circular.
- **[0146]** The connectors 10, 200, 300 may be made from plastic or other low-cost materials provided that they have sufficient strength to contain the grout and are not prone to damage from installers.
- **[0147]** Ribs 38 may be replaced with corrugations, troughs, crests, projections or depressions.
- **[0148]** Ribs 28 may have any suitable form, shape, size or profile that increases the contact area between the exterior of the housing 22 and the uncured concrete slab and thus assist in securing in place the sleeve 12.
- **[0149]** Other forms of concrete reinforcing may be used such as a grid of rebar.
- **[0150]** Rubber extrusion may be made from other material as long as it is flexible.
- **[0151]** The first seal 68 may be made of a solid material having a circular rubber profile of 5mm which is deformed into a shape having a square profile of 4mm x 4mm when received in square channel 118. In such a configuration, the front ring provides a solid pre-pressurised seal for anchoring the sealing member 16 between the mounting plate 14 and the housing 32.

[0152] It should be further appreciated by the person skilled in the art that the invention is not limited to the embodiments described above. Additions or modifications described, where not mutually exclusive, can be combined to form yet further embodiments that are considered to be within the scope of the present invention.

We Claim:

1. A connector for use in forming a joint between a first surface and a second surface comprising:
 - a hollow male member to be embedded in a first surface, the male member having an open ended protrusion extending therefrom;
 - a hollow female member to be embedded in the second surface, the female member having a mating opening for receiving the protrusion; and
 - flexible sealing means for forming a fluid tight seal between the female member and male member,where, when installed, a tendon forming part of the first surface is able to extend through the protrusion into the female member and where, prior to grouting, movement of the tendon during settling of the first surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.
2. A connector for use in forming a joint between a first surface and a second surface where the male member has a locator provided therein, the locator of slightly larger dimensions than those of the tendon, such that the tendon can be installed into the mated male and female member by way of the locator.
3. A connector for use in forming a joint between a first surface and a second surface comprising:
 - a hollow male member to be embedded in a first surface, the male member having an open ended protrusion extending therefrom;
 - a hollow female member to be embedded in the second surface, the female member having a mating opening for receiving the protrusion; and
 - flexible sealing means for forming a fluid tight seal between the female member and male member,where, when installed, a tendon forming part of the second surface is able to extend through the female member and thereafter into the protrusion and where, prior to grouting, movement of the tendon during settling of the second surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.
4. A connector for use in forming a joint between a first surface and a second surface where the female member has a locator provided therein, the locator of

slightly larger dimensions than those of the tendon, such that the tendon can be installed into the mated male and female member by way of the locator.

5. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the flexible sealing means forms part of the hollow female member.
6. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the flexible sealing means comprises a first seal and a second seal joined by a rubber extrusion and where the first seal is connected to the female member and the second seal is connected to the male member.
7. A connector for use in forming a joint between a first surface and a second surface according to claim 6, where the first seal is received within a channel of the female member such that a mechanical seal is formed between the first seal and the channel.
8. A connector for use in forming a joint between a first surface and a second surface according to claim 7, where the first seal has a circular cross section of greater dimension than the dimensions of the channel, such that the first seal deforms when received within the channel to create the mechanical seal.
9. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the open ended protrusion has an inwardly tapering surface, the inwardly tapering surface operable to facilitate connection of the second seal to the open ended protrusion and, when subjected to telescopic movement during settling, operable to prevent disengagement of the second seal from the open ended protrusion.
10. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the female member has a first spigot and second spigot, each configured to receive a grout tube, such that grout pumped through the grout tube connected to the first spigot flows through the connector and exits the connector via the grout tube connected to the second spigot.
11. A connector for use in forming a joint between a first surface and a second surface according to any one of claims 1 to 9, where the female member has a first and second spigot, each configured to receive a grout tube, such that grout pumped through the grout tube connected to the first spigot flows through the

connector and exits the connector via the grout tube connected to the second spigot.

12. A connector for use in forming a joint between a first surface and a second surface according to any one of claims 1 to 9, where the male member has a first and second spigot, each configured to receive a grout tube, such that grout pumped through the grout tube connected to the first spigot flows through the connector and exits the connector via the grout tube connected to the second spigot.
13. A connector for use in forming a joint between a first surface and a second surface according to any one of claims 10 to 13, where the spigot has an enlarged head so that the grout tube is connected to the spigot by way of a forcible fit.
14. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the mating opening takes the form of a chamber of larger dimension than the remainder of the female member, the protrusion and sealing member being contained within the chamber.
15. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the female member has a fastening plate for facilitating attachment of the female member to formwork installed to facilitate formation of the second surface.
16. A connector for use in forming a joint between a first surface and a second surface according to claim 15, where the fastening plate has at least one fastening hole for receiving a fastener and thereby facilitating attachment of the female member to the formwork.
17. A connector for use in forming a joint between a first surface and a second surface according to claim 16, where the fastening plate has at least one frangible section, the at least one fastening hole provided in at least one of the at least one frangible sections.
18. A connector for use in forming a joint between a first surface and a second surface according to any one of claims 15 to 17, as ultimately dependent on claim 7, where the channel is formed when a fastening plate is attached to the chamber.
19. A connector for use in forming a joint between a first surface and a second surface according to any one of claims 15 to 18, where the male member has a

face plate, the face plate having a profile identical to the fastening plate, such that alignment of the face plate with the fastening plate corresponds with alignment of the male member with the female member.

20. A connector for use in forming a joint between a first surface and a second surface according to claim 19, further comprising a compressible material, the compressible material being arranged during installation to be positioned between the face plate and the fastening plate.
21. A connector for use in forming a joint between a first surface and a second surface according to claim 20, where at least one side of the compressible material has adhesive means for creating a bond with either the face plate, the fastening plate or both the face plate and the fastening plate.
22. A connector for use in forming a joint between a first surface and a second surface according to claim 21, as ultimately dependent on claim 17, where the fastening plate has spacers positioned proximate the fastening holes.
23. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the male and/or female member has at least one lengthwise extending groove provided in its upper surface.
24. A connector for use in forming a joint between a first surface and a second surface according to claim 23, as ultimately dependent on any one of claims 10 to 12, where the first and second spigot are positioned higher than the lengthwise extending groove relative to the upper surface of the male and/or female member, as appropriate.
25. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the male member and/or the female member has retaining means provided in its external surface for assisting in securely retaining the male and/or female member within its respective surface.
26. A connector for use in forming a joint between a first surface and a second surface according to claim 25, where the retaining means is one or more of the following: irregularities in the external surface; discontinuities in the external surface; ribs; corrugations; troughs; crests.
27. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the internal surface of the male and/or female member is smooth.

28. A connector for use in forming a joint between a first surface and a second surface according to any preceding claim, where the male and/or female member has retaining means for releasably retaining a chair during installation.
29. A female member forming part of a connector for use in forming a joint between a first surface and a second surface as claimed in any one of claims 1 to 28.
30. A male member forming part of a connector for use in forming a joint between a first surface and a second surface as claimed in any one of claims 1 to 28.
31. A method of forming a joint between a first surface and a second surface comprising the steps of:

affixing a female member of a connector as claimed in any one of claims 1 to 28 to formwork for the second surface;

creating the second surface with the female member embedded therein, such that an opening of the female member remains accessible on removal of the formwork;

mating an open ended protrusion of a male member of the connector to the opening of the female member such that a flexible sealing means forms a fluid tight seal between the female member and the male member;

installing a tendon to form part of the first surface through the protrusion into the female member;

creating the first surface with the male member embedded therein; and

grouting the connector

where, movement of the tendon during settling of the first surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

32. A method of forming a joint between a first surface and a second surface comprising the steps of:

affixing a female member of a connector as claimed in any one of claims 1 to 28 to formwork for the second surface;

creating the second surface with the female member embedded therein, such that an opening of the female member remains accessible on removal of the formwork;

forming an open ended protrusion of a male member of the connector to the opening of the female member such that a flexible sealing means forms a fluid tight seal between the female member and the male member;

installing a tendon to form part of the first surface through the protrusion into the male member;

creating the first surface with the male member embedded therein; and

grouting the connector

where, movement of the tendon during settling of the first surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

33. A method of forming a joint between a first surface and a second surface according to claim 31 or claim 32, further comprising the step of forming a mechanical seal between the first seal and a channel of the female member.
34. A method of forming a joint between a first surface and a second surface according to claim 33, further comprising the step of creating the channel by attaching a fastening plate to a chamber forming part of the female member.
35. A method of forming a joint between a first surface and a second surface according to any one of claims 31 to 34, further comprising the step of inserting the open ended protrusion through the second seal, such that an inwardly tapering surface of the open ended protrusion facilitates this insertion while, when the male and female members are subjected to telescopic movement during settling, operable to prevent disengagement of the second seal from the open ended protrusion.
36. A method of forming a joint between a first surface and a second surface according to any one of claims 31 to 35, further comprising the step of connecting a grout tube to each of a pair of spigots attached to the male member and/or the female member, such that grout pumped through a first spigot flows through the

connector and exits the connector via the grout tube connected to a second spigot.

37. A method of forming a joint between a first surface and a second surface according to claim 36, further comprising the step of connecting a free end of the grout tube connected to the second spigot of a first connector to the first spigot of a second connector.
38. A method of forming a joint between a first surface and a second surface according to any one of claims 31 to 37, further comprising the step of aligning a fastening plate of the female member to a face plate of the male member.
39. A method of forming a joint between a first surface and a second surface according to claim 38, further comprising the step of installing a compressible material between the face plate and the fastening plate.
40. A method of forming a joint between a first surface and a second surface according to claim 39, further comprising the step of creating a bond between the compressible material and either the face plate, the fastening plate or both the face plate and the fastening plate.
41. A method of forming a joint between a first surface and a second surface according to any one of claims 31 to 40, further comprising the step of releasably retaining a chair to maintain the level of the male member and/or female member during installation.
42. A method of forming a joint between a first surface and a second surface according to any one of claims 31 to 41, further comprising the step of removing a protective cover from the opening of the female cover after creation of the second surface.
43. A connection set for forming a joint between a vertical surface and a horizontal surface, the connection set comprising:
- an anchor head having a threaded portion for embedding in the vertical surface;
 - a dowel having a mating threaded portion;
 - a hollow male member to be received in the vertical surface, the male member having an open ended protrusion extending therefrom and an open ended body;
 - a hollow female member to be embedded in the horizontal surface, the female member having a mating opening for receiving the protrusion; and

flexible sealing means for formed a fluid tight seal between the female member and male member,

where, when installed, the tendon is matedly connected to the anchor head by way of the threaded portions and unmated end of the tendon extends through the protrusion into the female member such that, prior to grouting, movement of the tendon during settling of the horizontal surface is facilitated by the male and female member without breaking the fluid tight seal formed by the flexible sealing means.

44. A connection set for forming a joint between a vertical surface and a horizontal surface according to claim 43, further comprising a wall plate, the wall plate having a cylinder having a threaded portion, the cylinder operable to matedly connect to the anchor head by way of the threaded portions, and thereby retain the anchor head in place during creation of the vertical surface.
45. A connection set for forming a joint between a vertical surface and a horizontal surface according to claim 44, where the open ended body has a positioning rim, the positioning rim having a diameter smaller than the diameter of the cylinder.
46. A method of forming a joint between a vertical surface and a horizontal surface comprising the steps of:
 - fastening a wall plate to formwork for the creation of the vertical surface;
 - connecting an anchor head to a cylinder portion of the wall plate;
 - forming the vertical surface with the anchor head and wall plate formed therein;
 - removing the wall plate from the vertical surface;
 - connecting a dowel to the anchor head embedded in the vertical surface;
 - installing a male member into the area formed by the removal of the wall plate from the vertical surface, the male member having an open ended protrusion through which the dowel extends;
 - mating the open ended protrusion of the male member to an opening of a female member, such that a flexible sealing means forms a fluid tight seal between the female member and the male member;
 - creating the horizontal surface with the female member embedded therein;
 - and
 - grouting the connector.

47. A method of forming a joint between a vertical surface and a horizontal surface according to claim 46, further comprising the step of forming a mechanical seal between the first seal and a channel of the female member.
48. A method of forming a joint between a vertical surface and a horizontal surface according to claim 47, further comprising the step of creating the channel by attaching a fastening plate to a chamber forming part of the female member.
49. A method of forming a joint between a vertical surface and a horizontal surface according to any one of claims 46 to 48, further comprising the step of inserting the open ended protrusion through the second seal, such that an inwardly tapering surface of the open ended protrusion facilitates this insertion while, when the male and female members are subjected to telescopic movement during settling, operable to prevent disengagement of the second seal from the open ended protrusion.
50. A method of forming a joint between a vertical surface and a horizontal surface according to any one of claims 46 to 49, further comprising the step of connecting a grout tube to each of a pair of spigots attached to the female member, such that grout pumped through a first spigot flows through the connector and exits the connector via the grout tube connected to a second spigot.
51. A method of forming a joint between a vertical surface and a horizontal surface according to claim 50, further comprising the step of connecting a free end of the grout tube connected to the second spigot of a first female member to the first spigot of a second female member.
52. A method of forming a joint between a vertical surface and a horizontal surface according to any one of claims 46 to 51, further comprising the step of aligning a fastening plate of the female member to a face plate of the male member.
53. A method of forming a joint between a vertical surface and a horizontal surface according to claim 52, further comprising the step of installing a compressible material between the face plate and the fastening plate.
54. A method of forming a joint between a vertical surface and a horizontal surface according to claim 53, further comprising the step of creating a bond with the face plate, the fastening plate or both the face plate and the fastening plate.
55. A method of forming a joint between a vertical surface and a horizontal surface according to any one of claims 46 to 54, further comprising the step of releasably retaining a chair to maintain the level of the female member during installation.

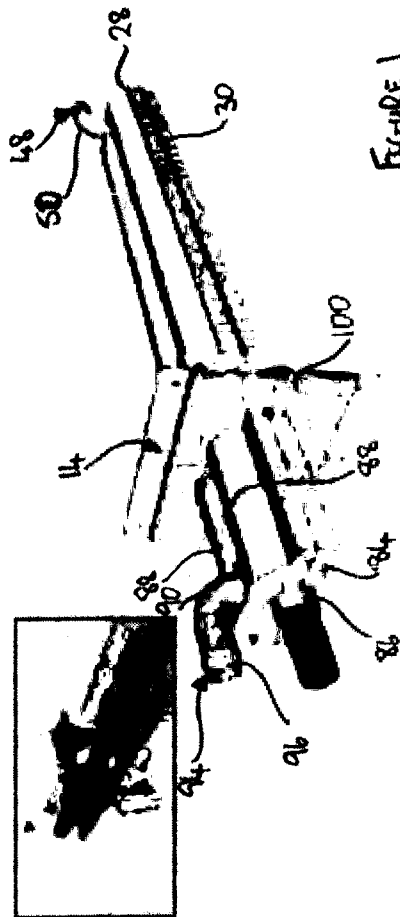


FIGURE 1

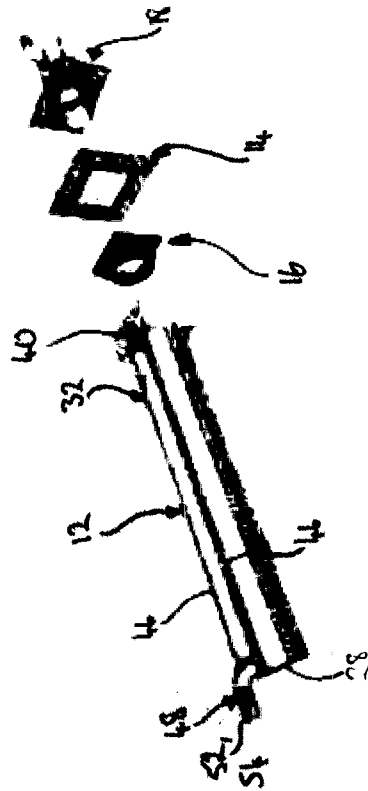


FIGURE 2

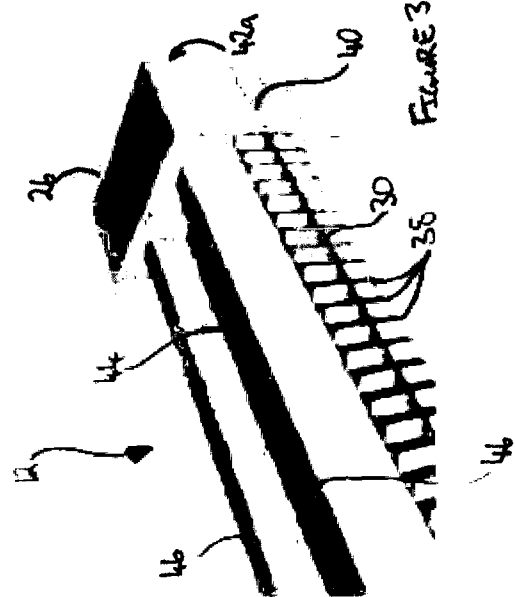


FIGURE 3

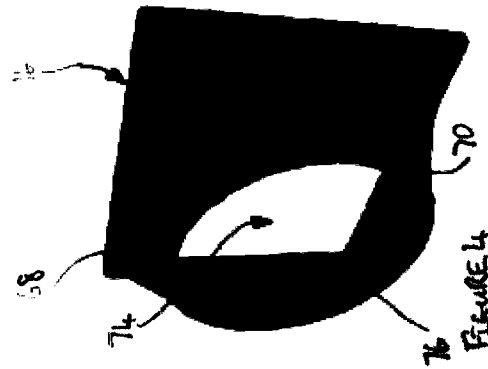


FIGURE 4

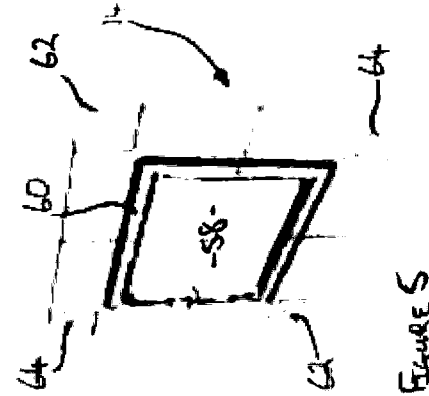


FIGURE 5

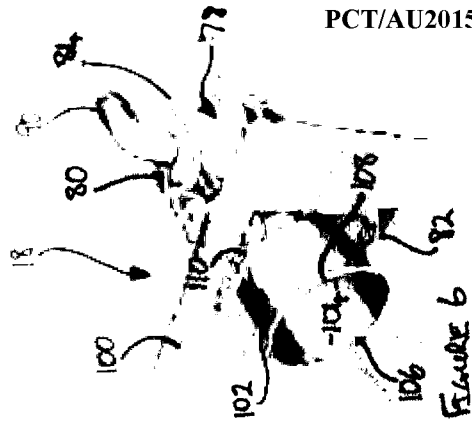
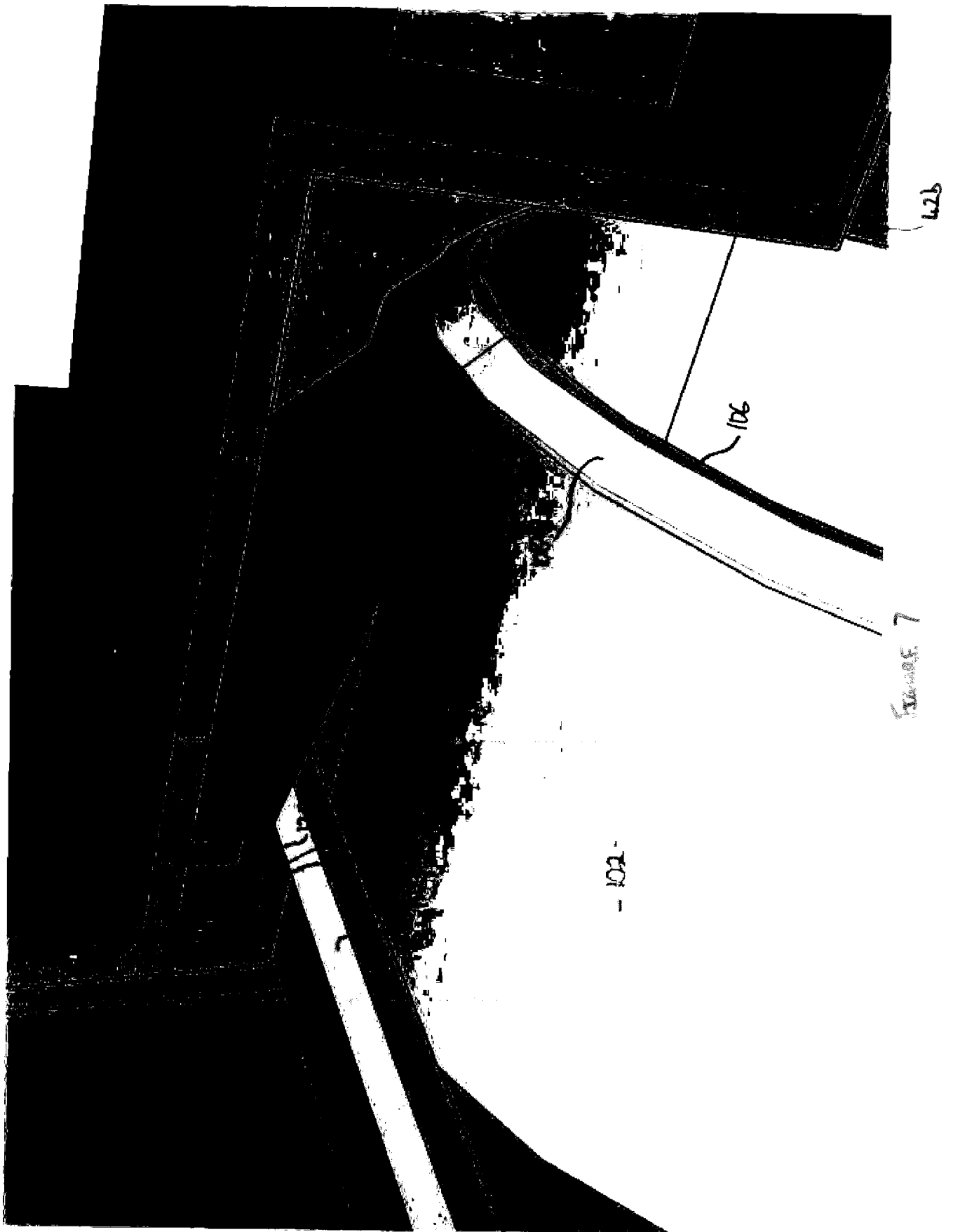
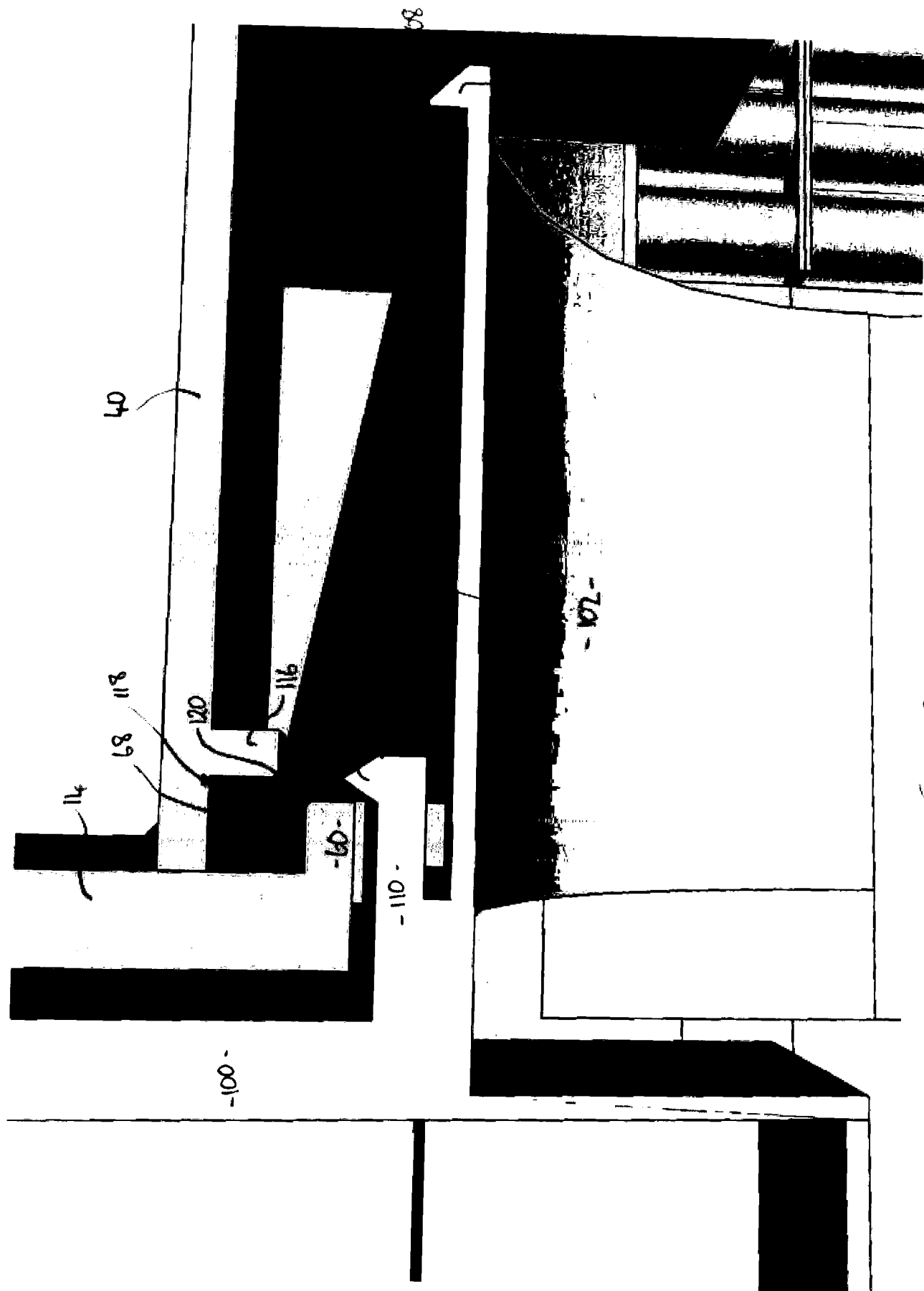


FIGURE 6



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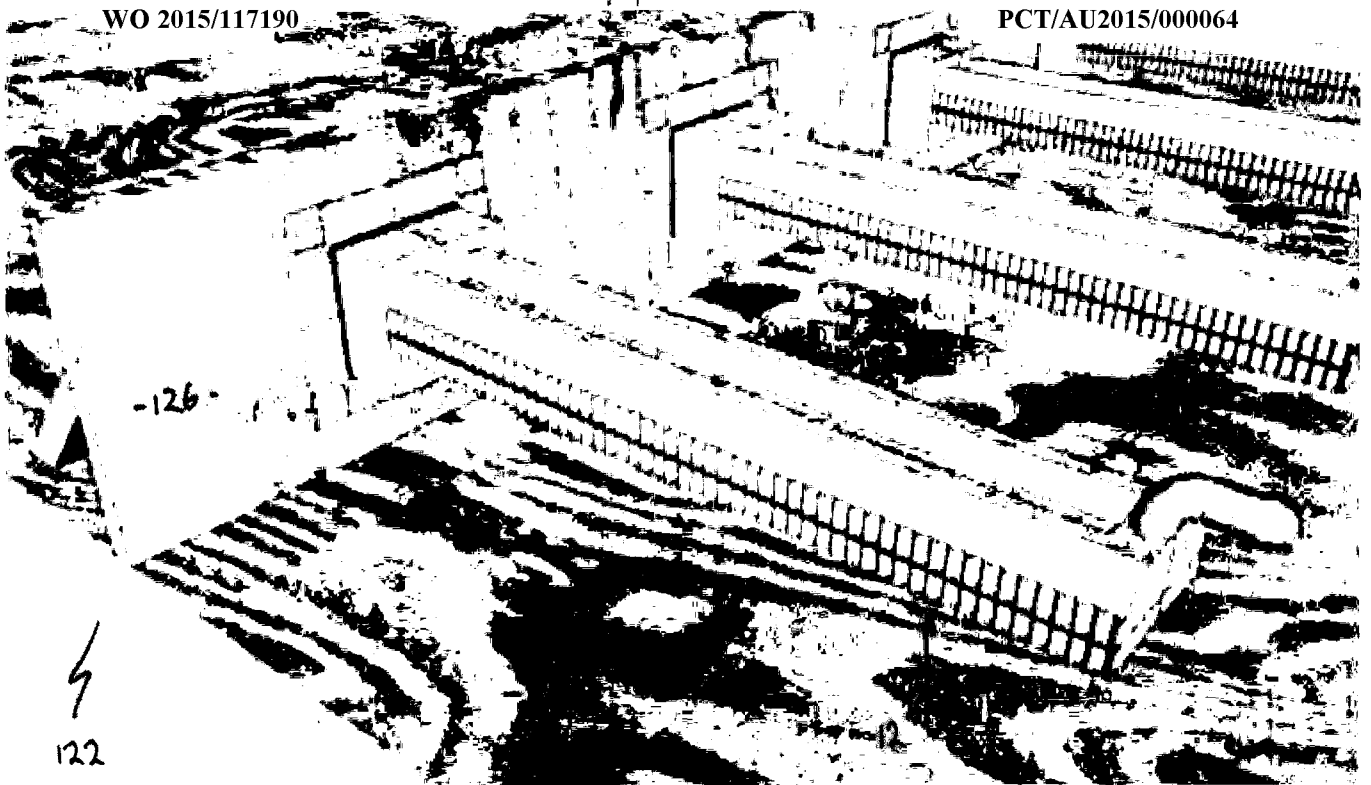


FIGURE 9-1

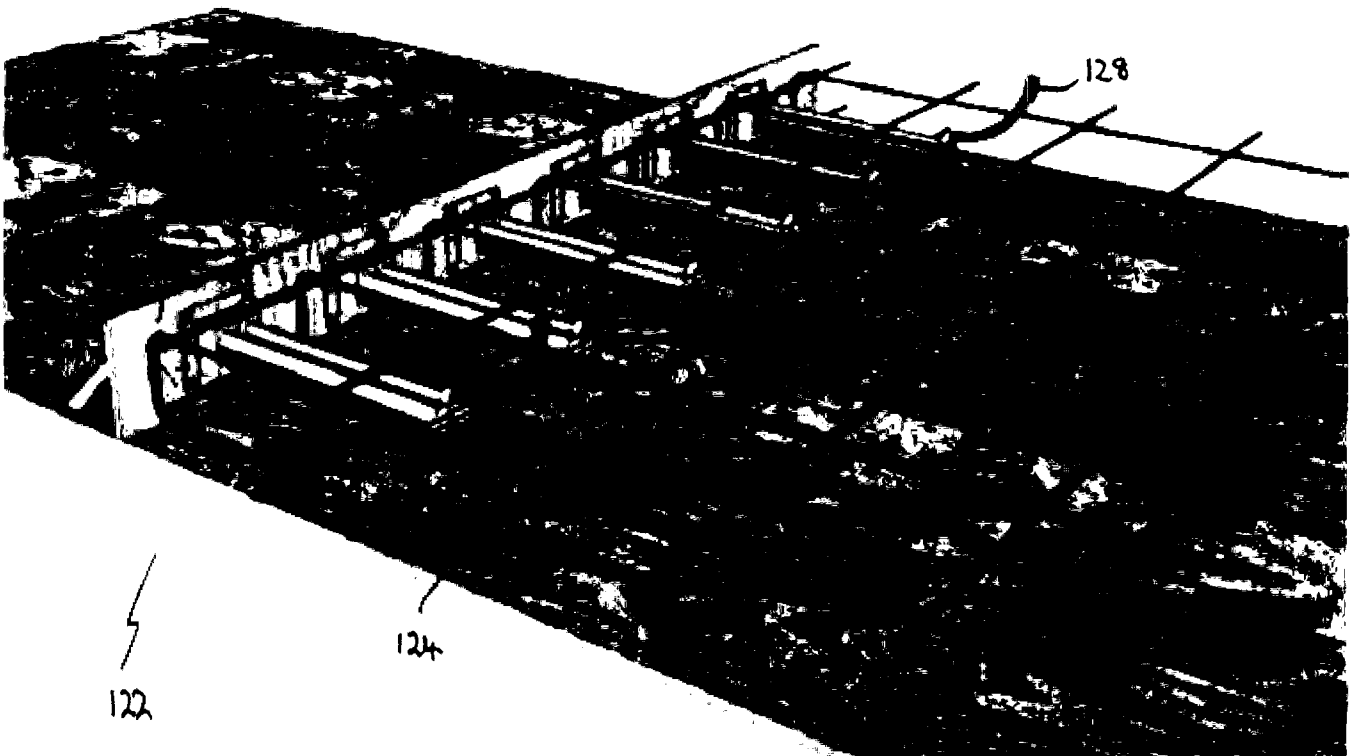


FIGURE 9-2

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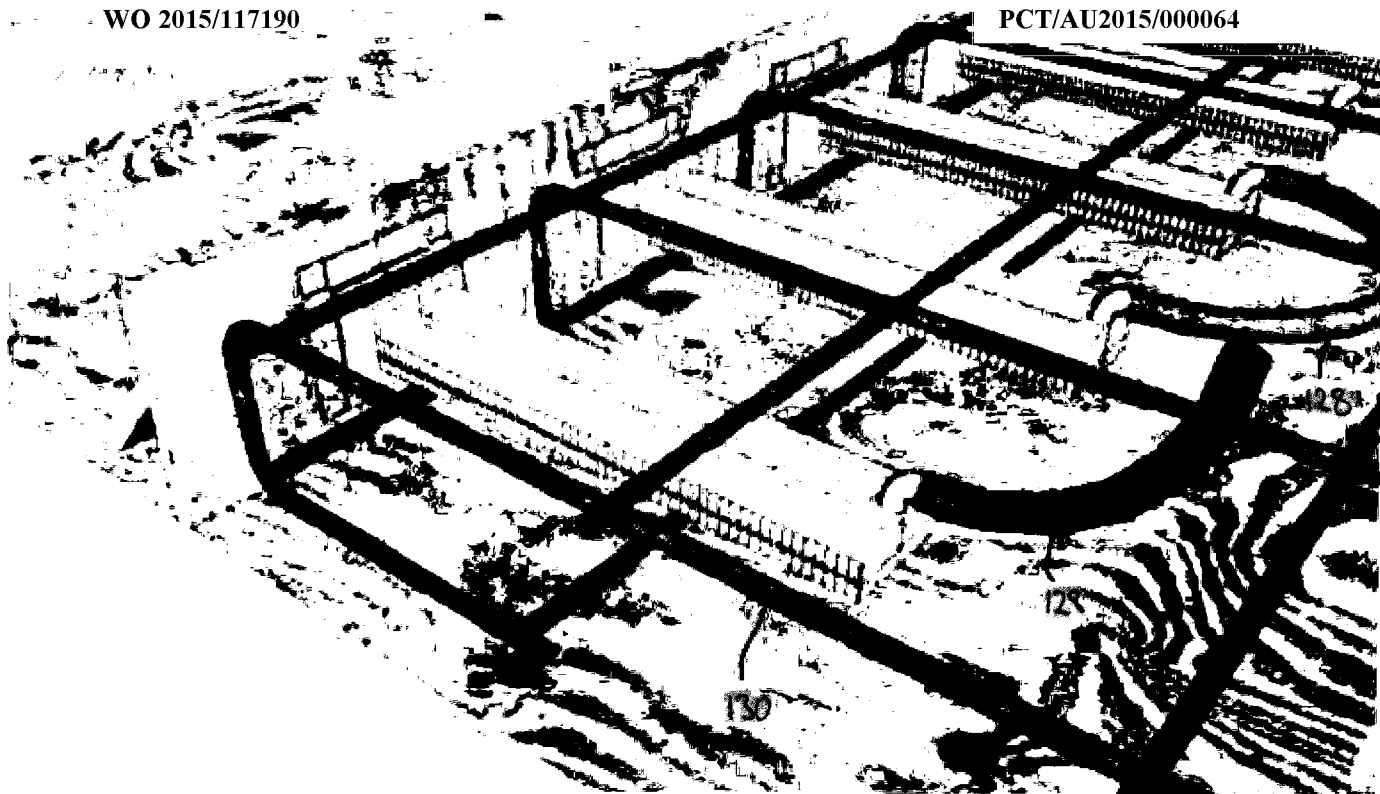


FIGURE 9-3

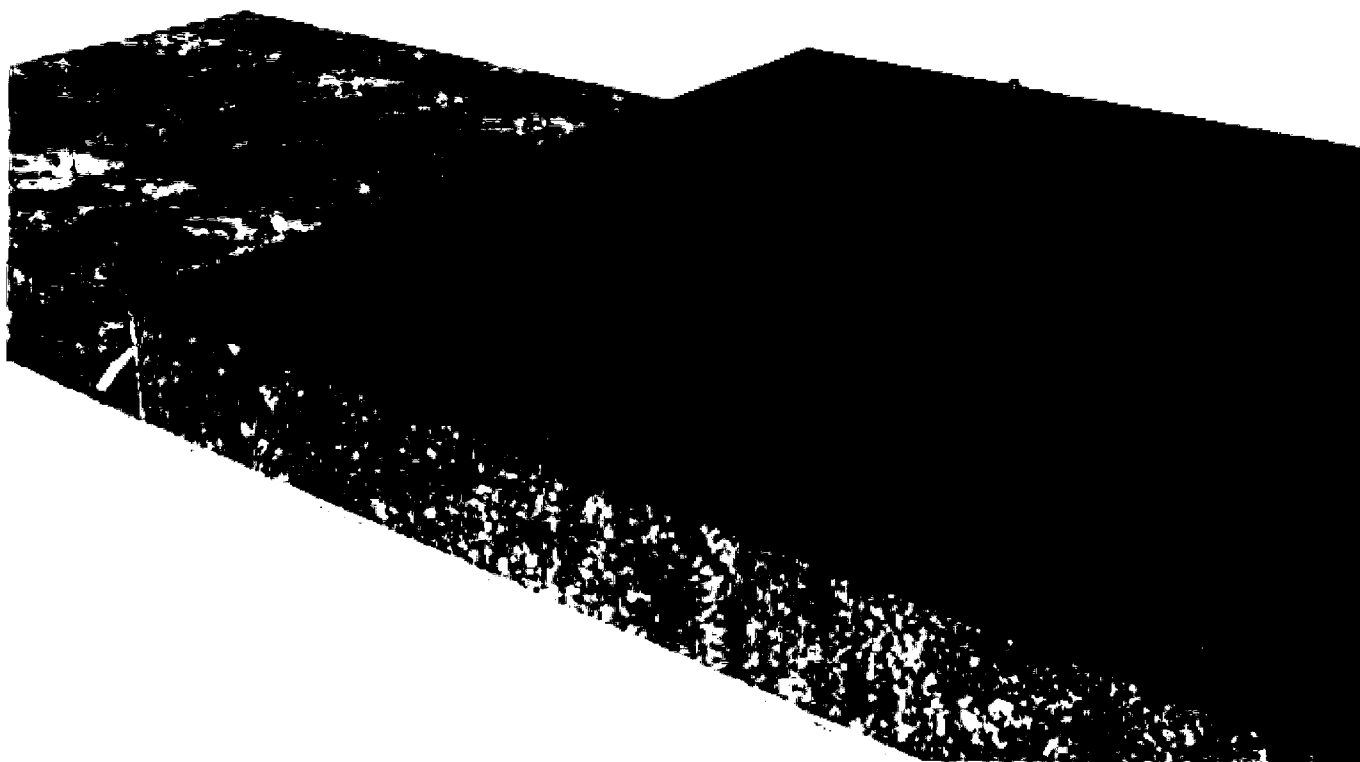


FIGURE 9-4

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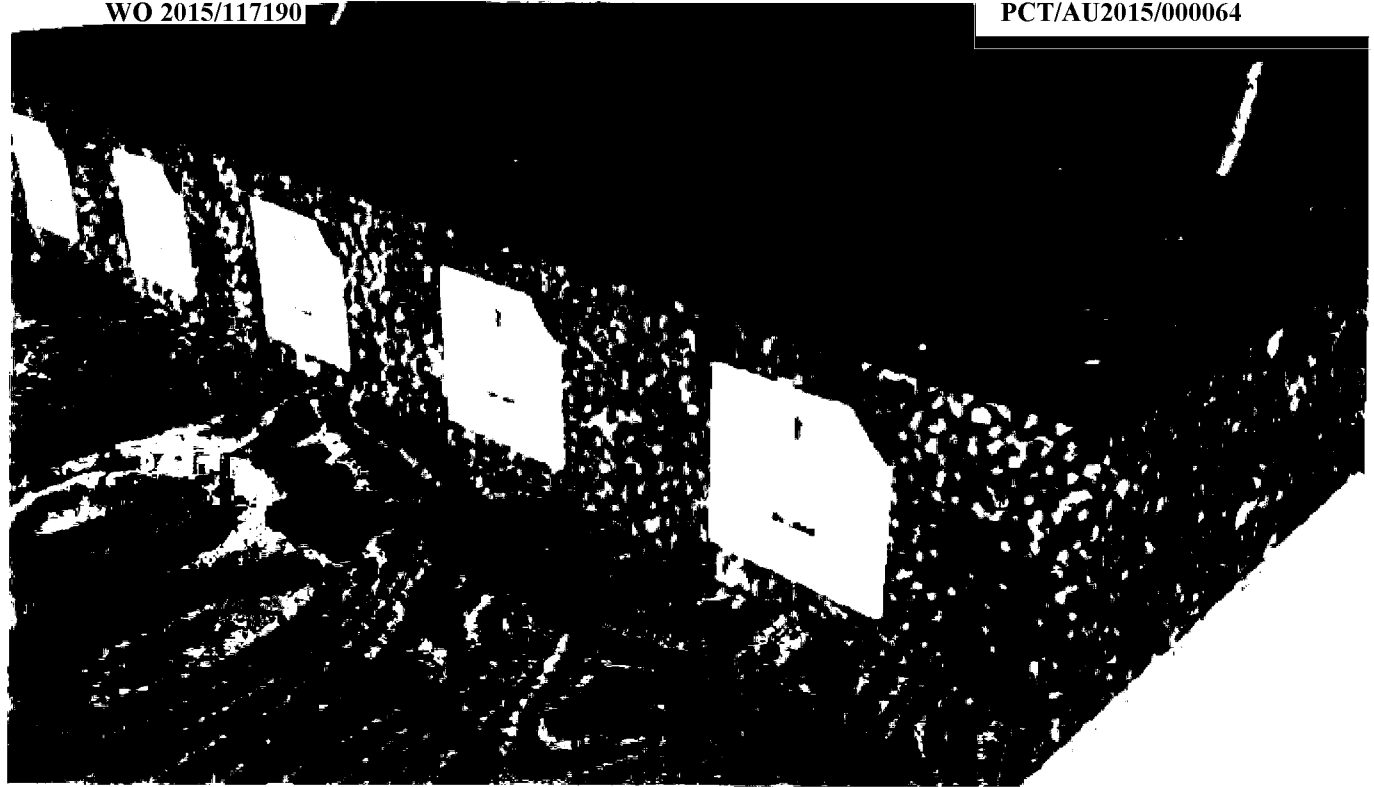


FIGURE 9-5

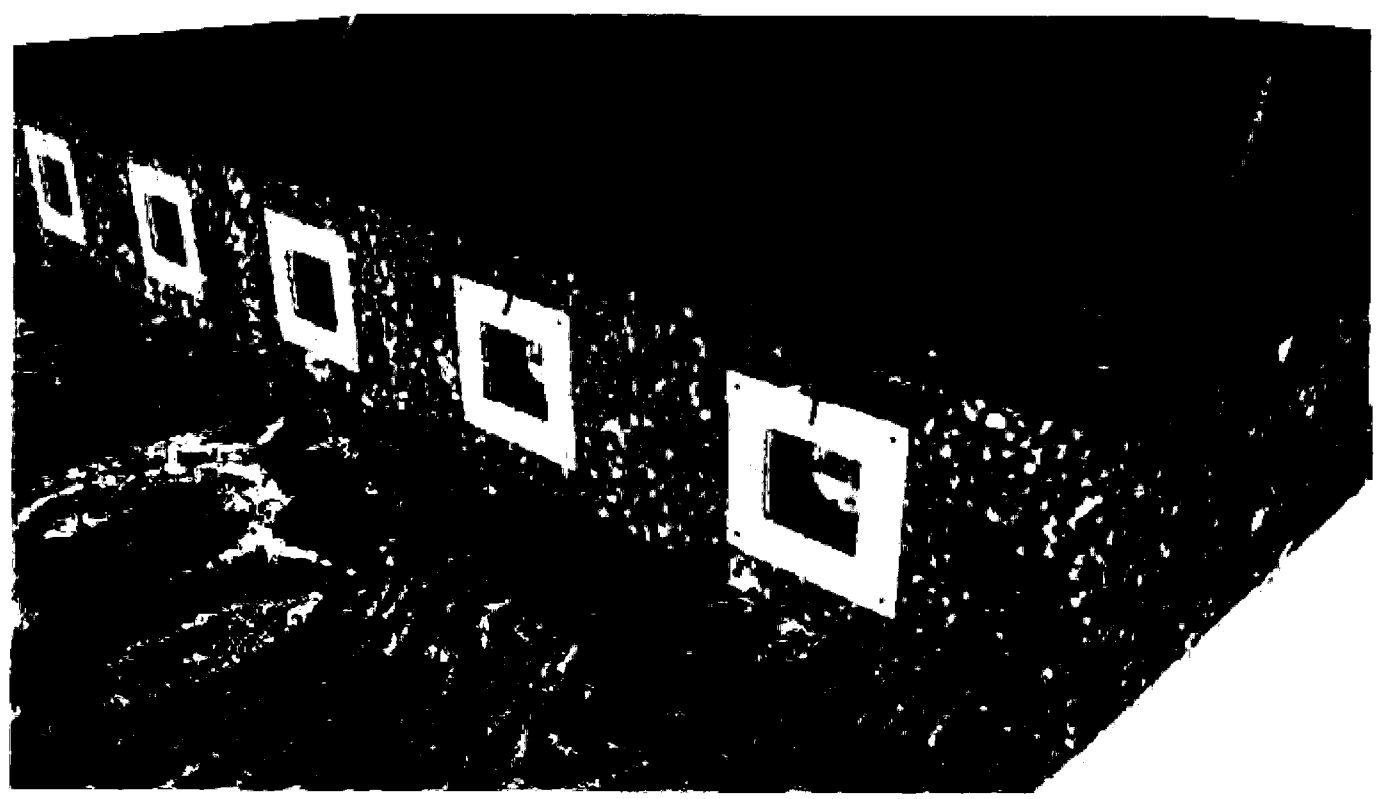


FIGURE 9-6

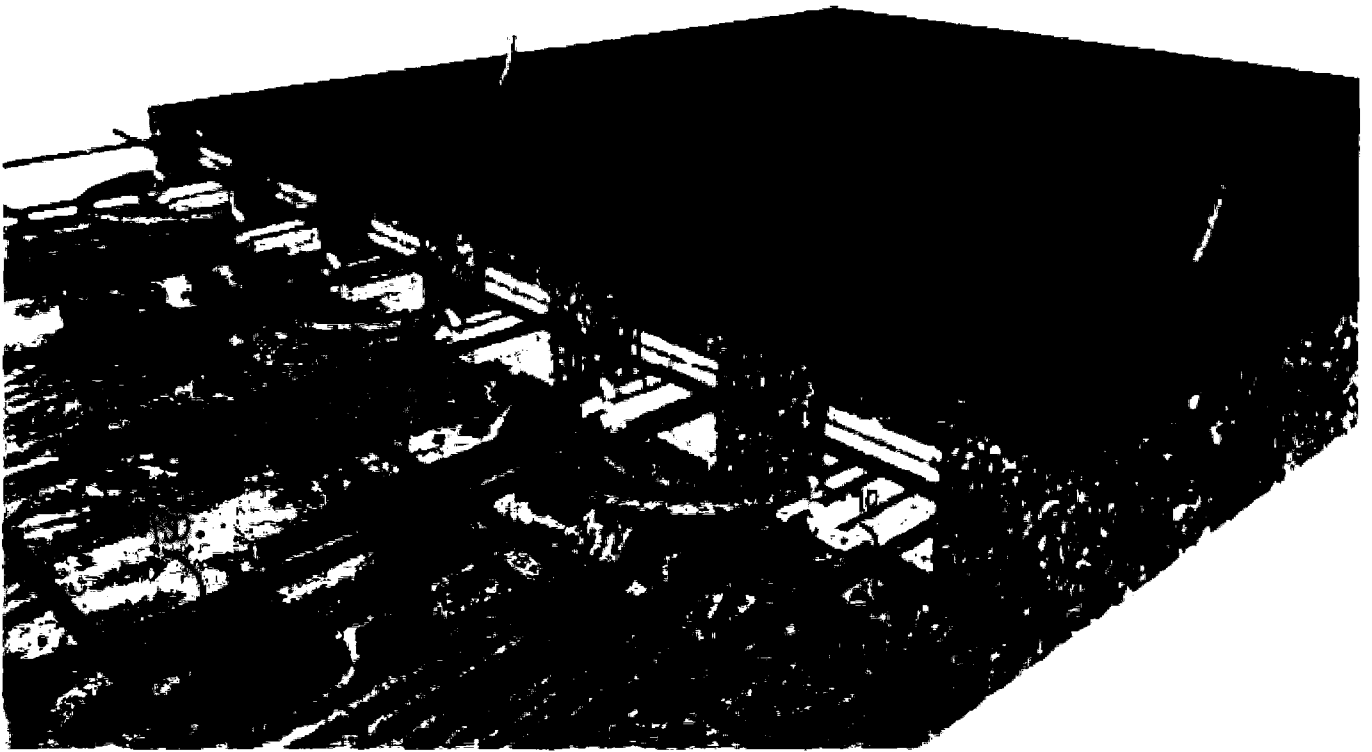


FIGURE 9-7

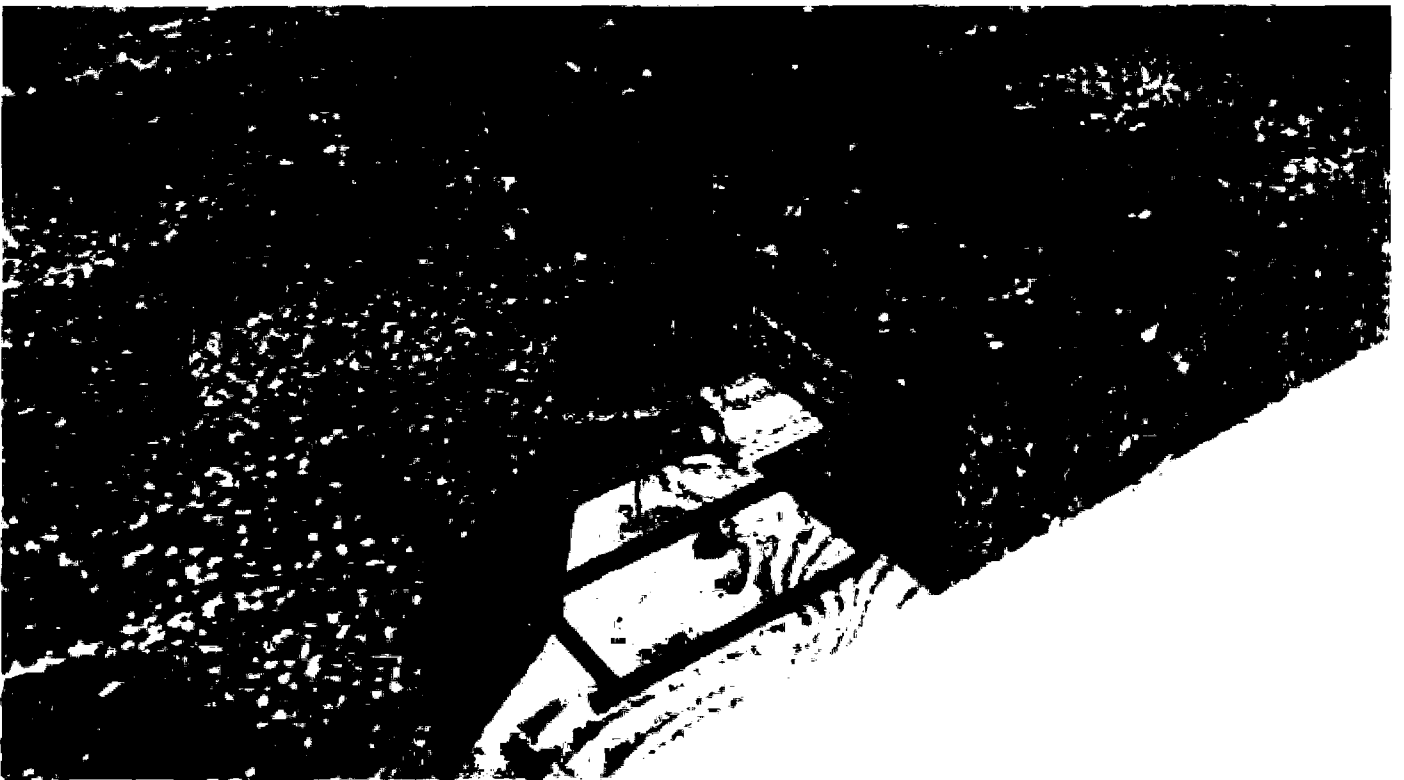
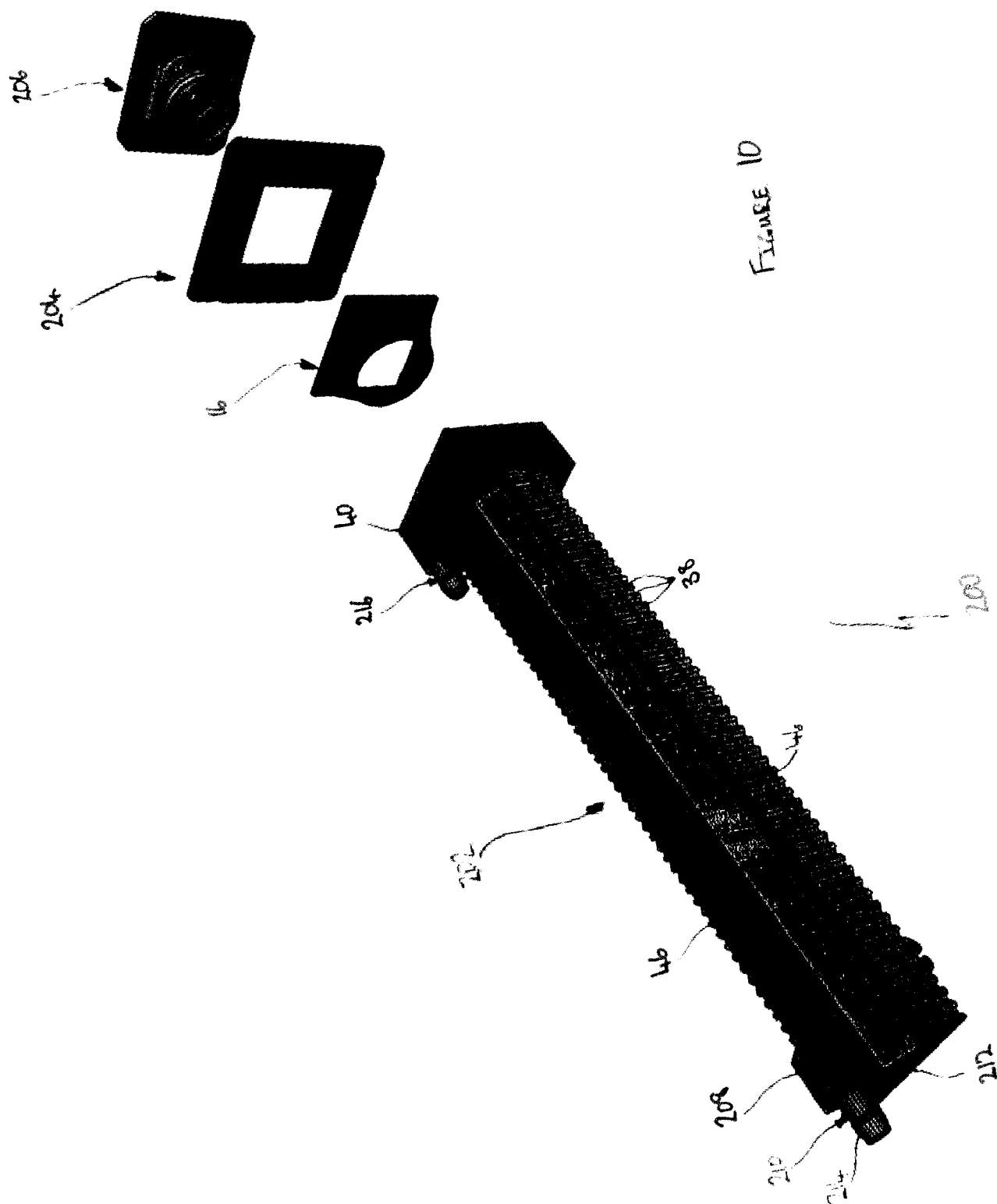
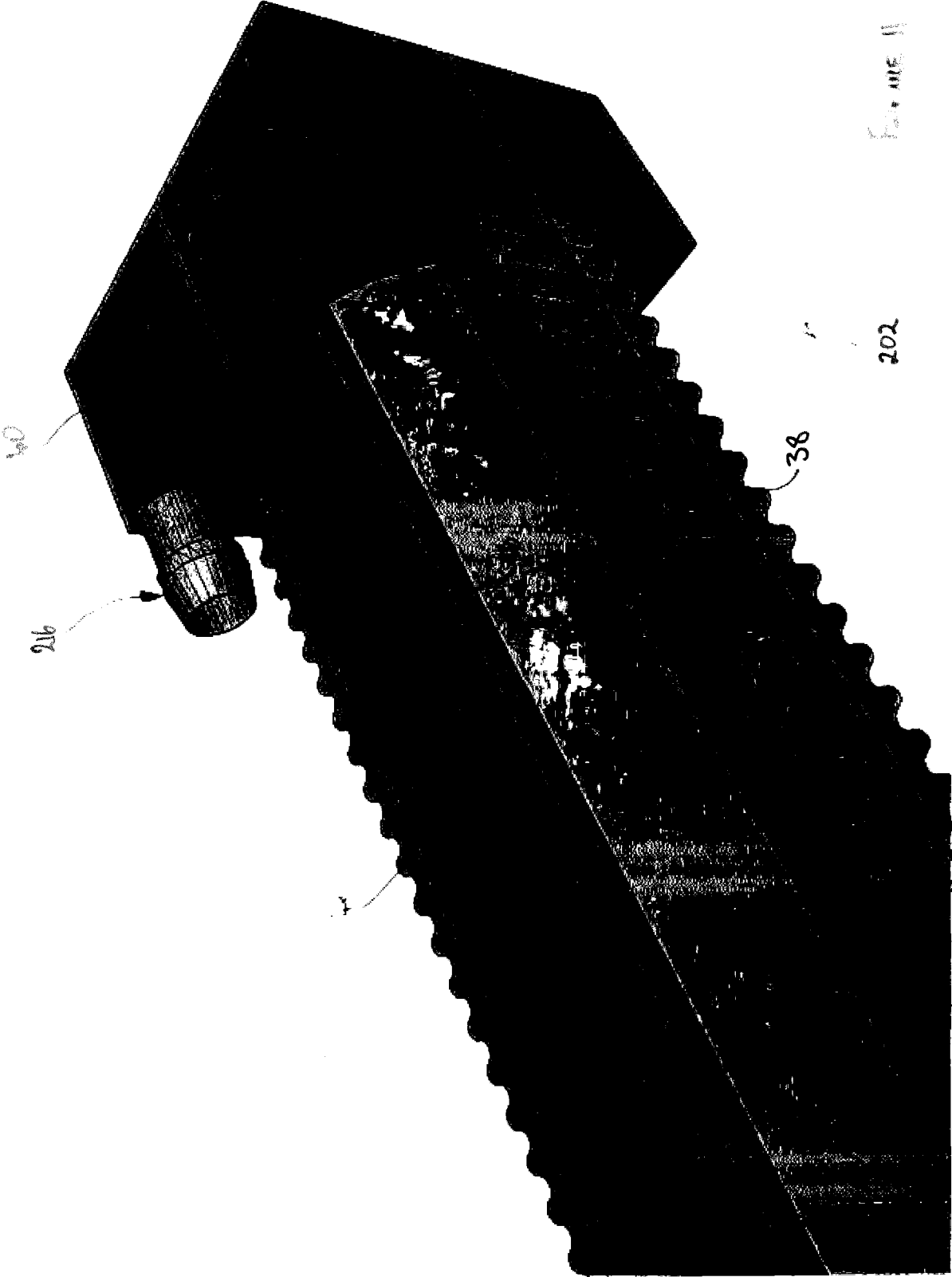


FIGURE 9-8





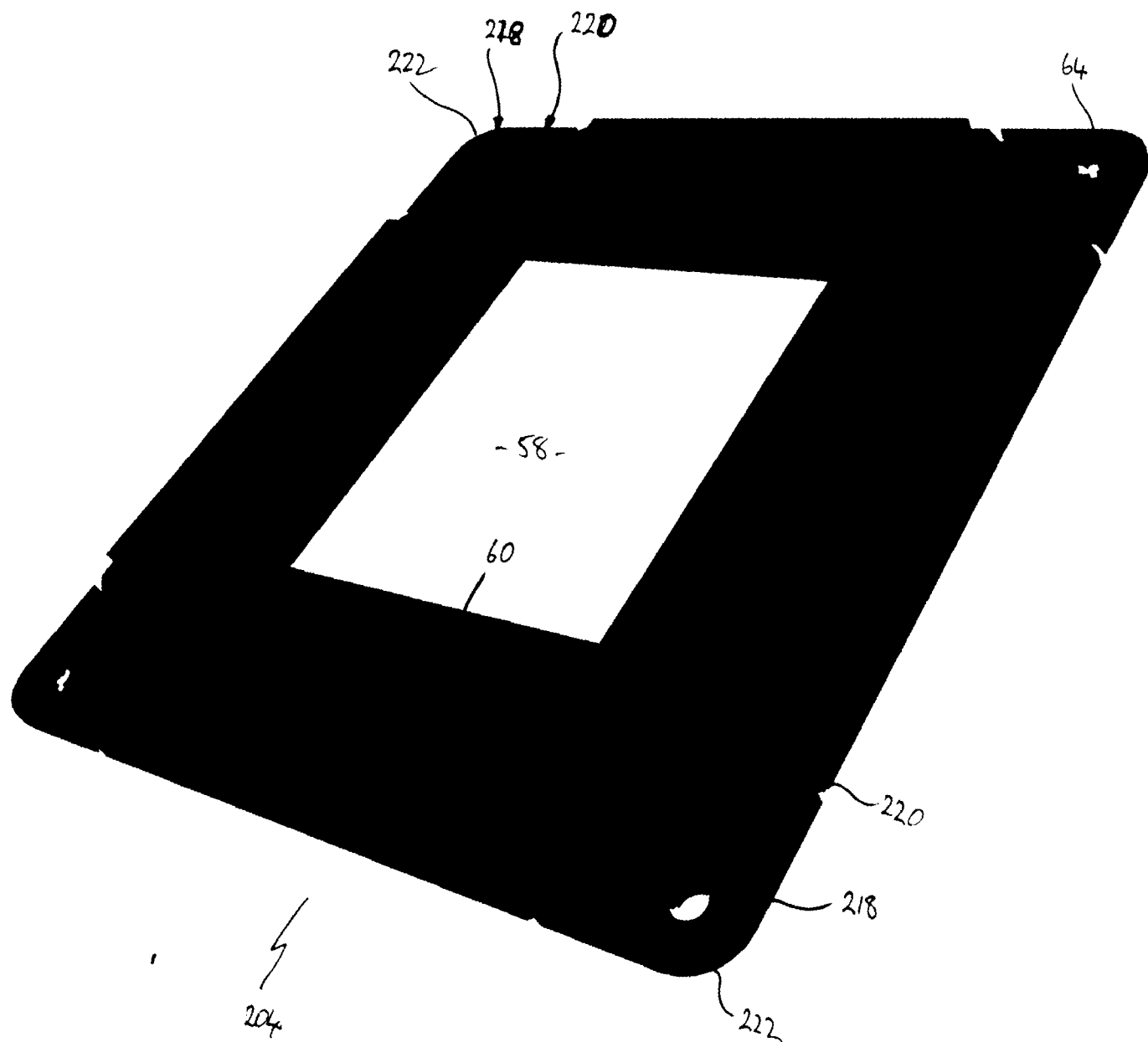


FIGURE 12

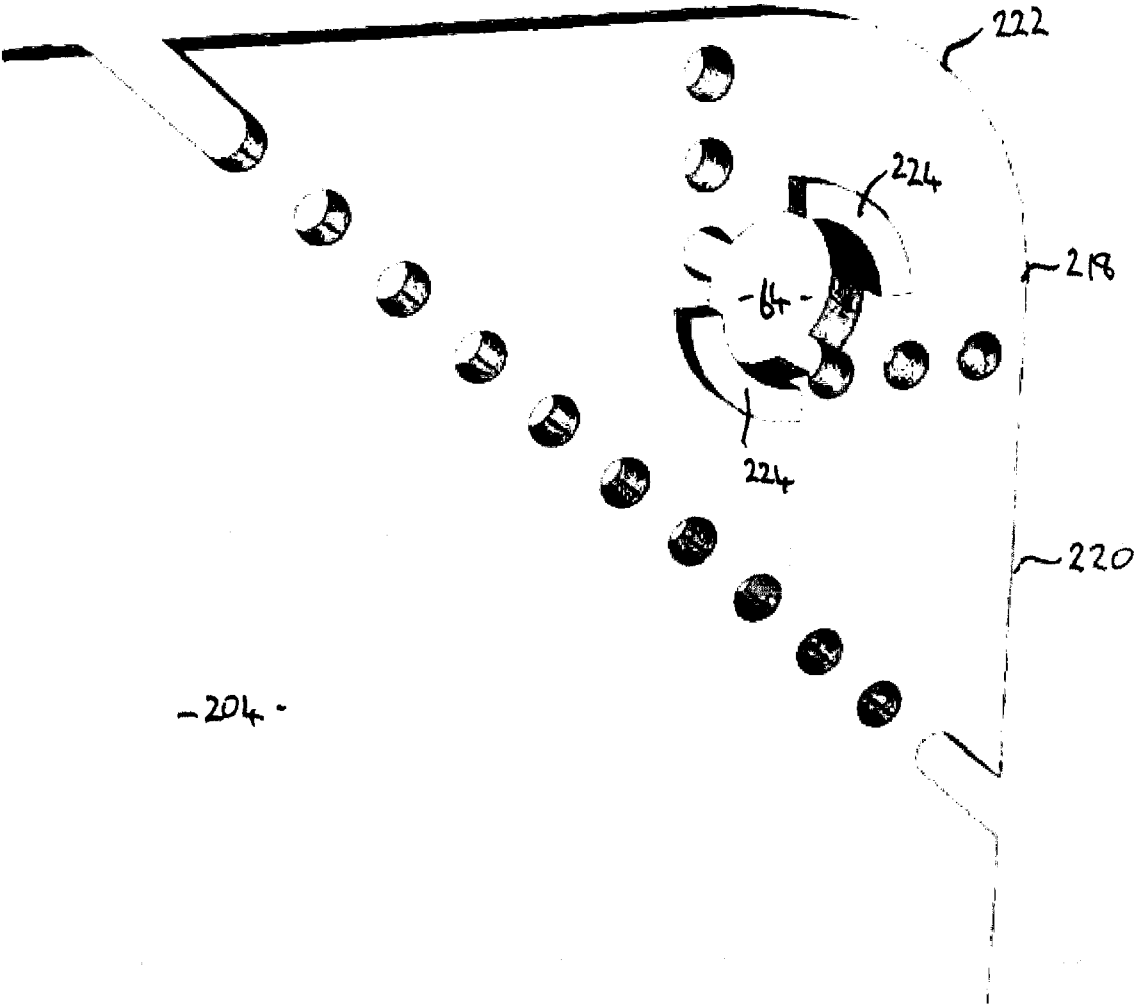
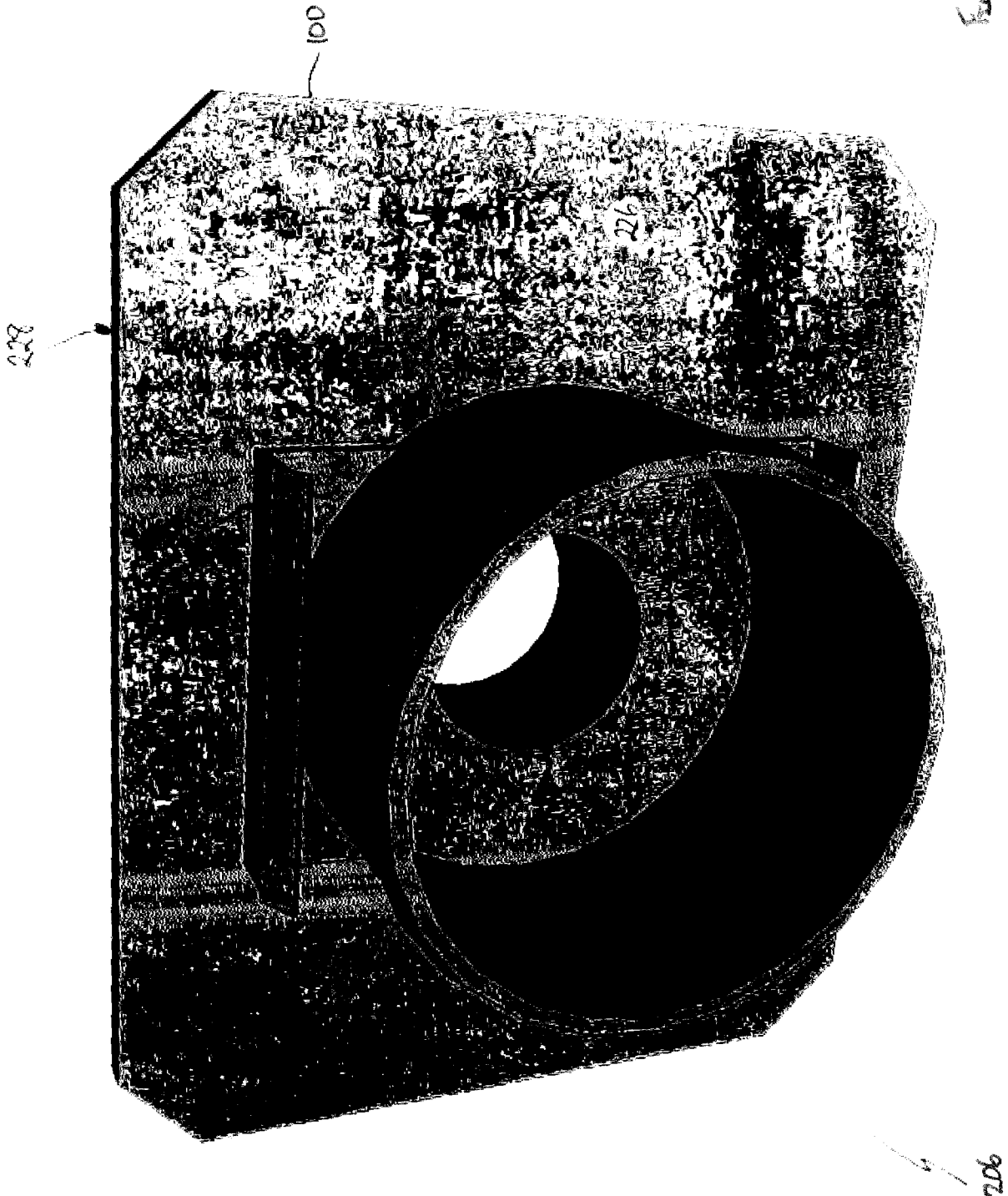
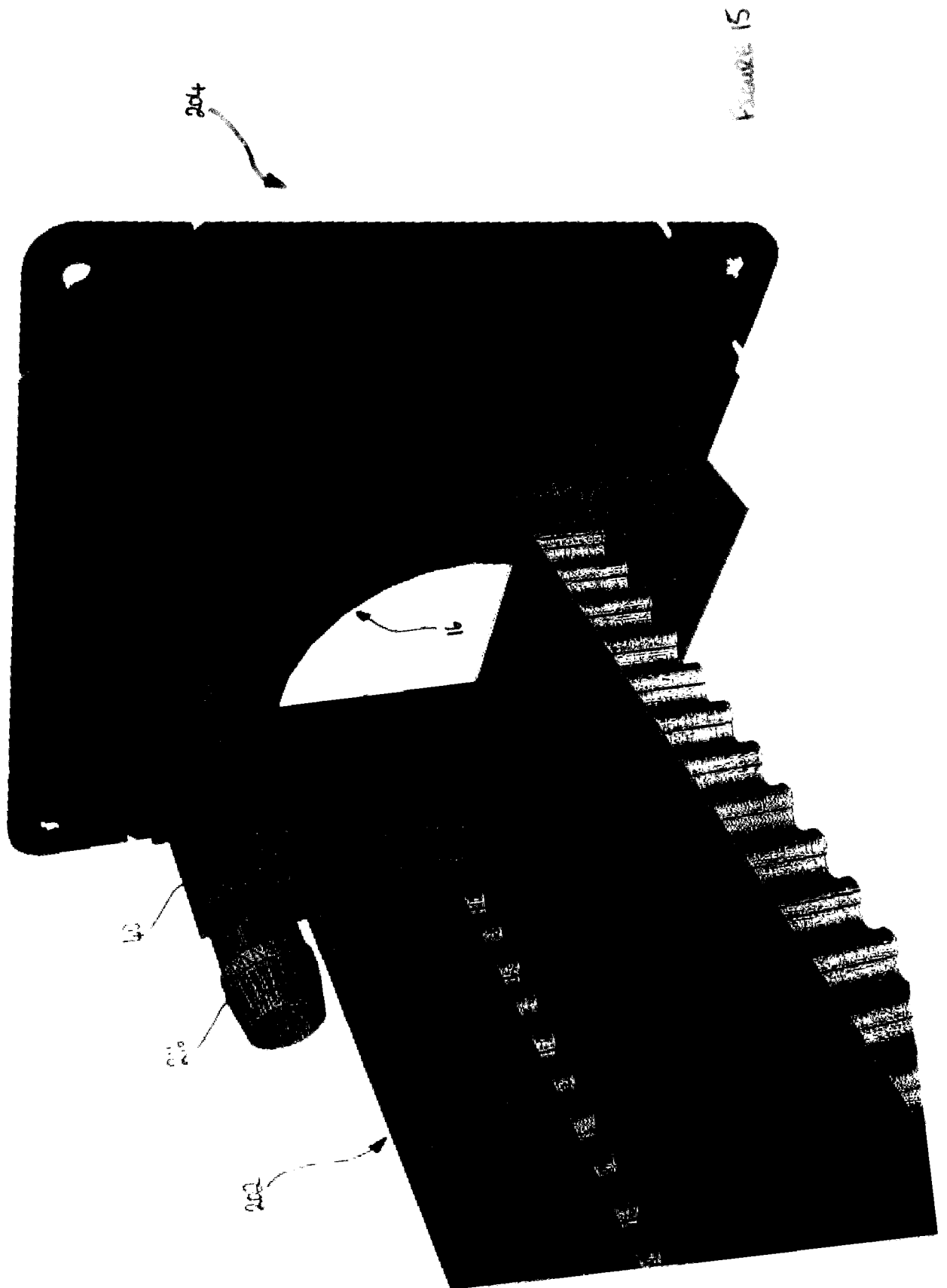


FIGURE 13

FIGURE 14





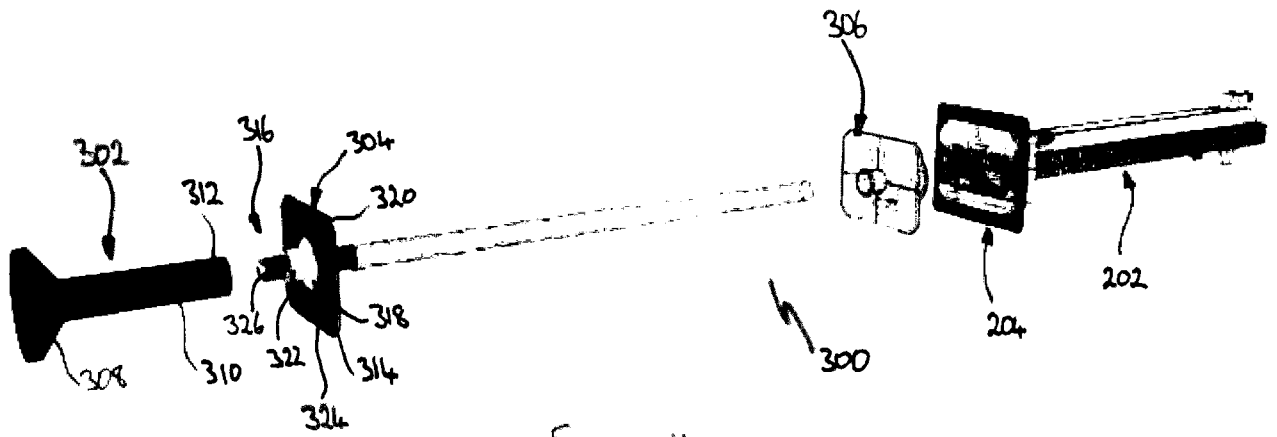


FIGURE 16

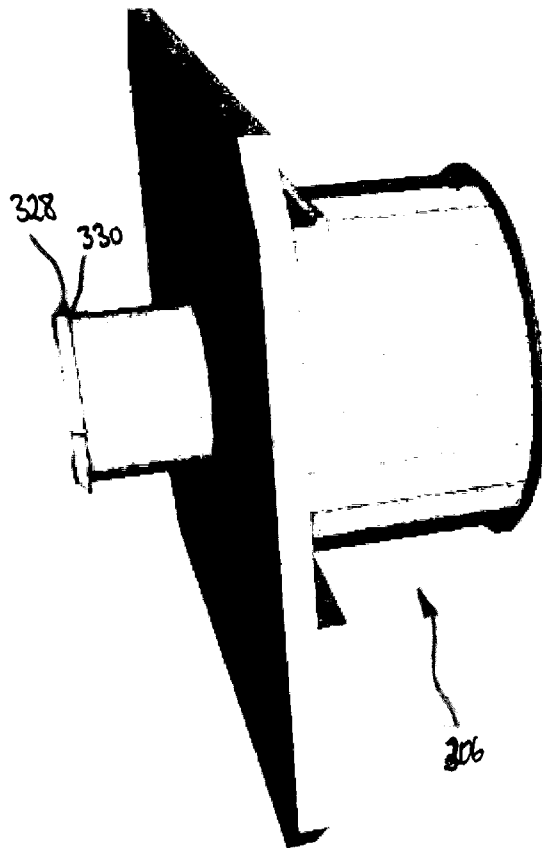


FIGURE 17

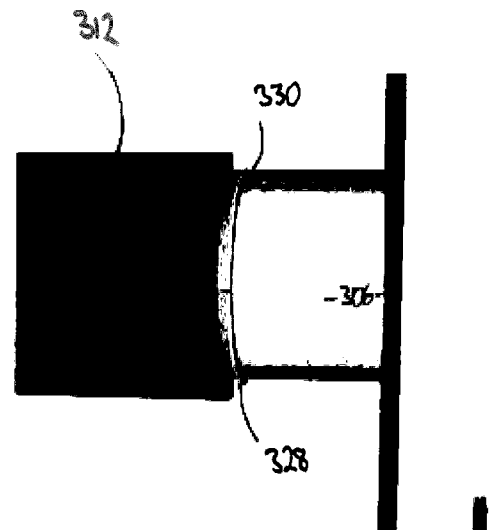


FIGURE 18

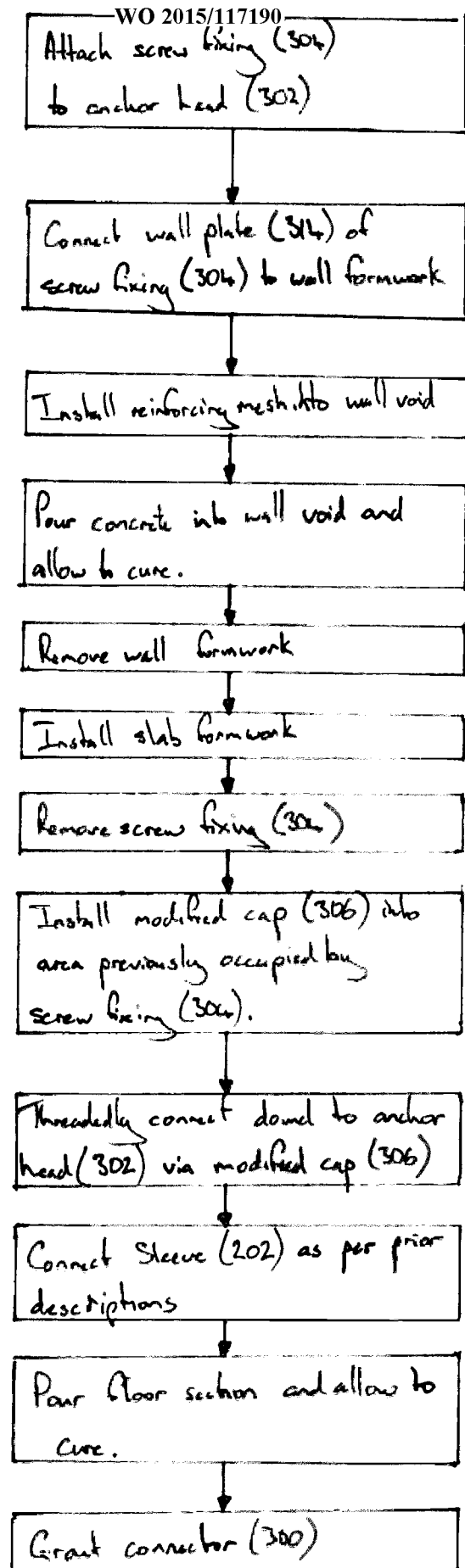


FIGURE 19

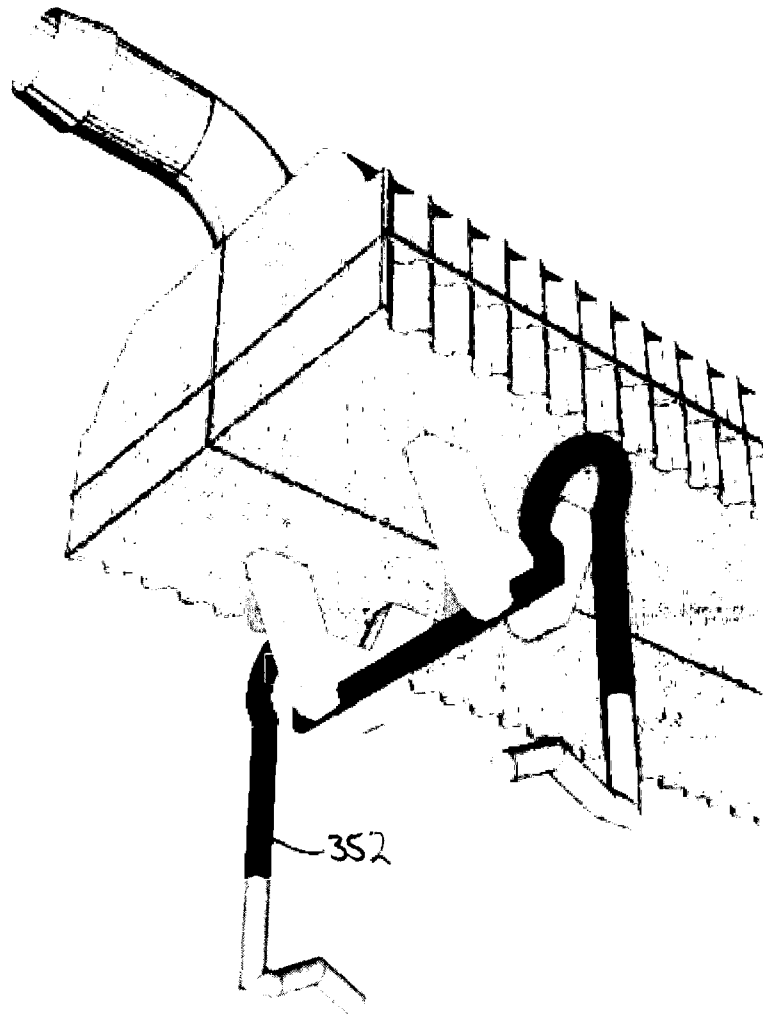


FIGURE 20

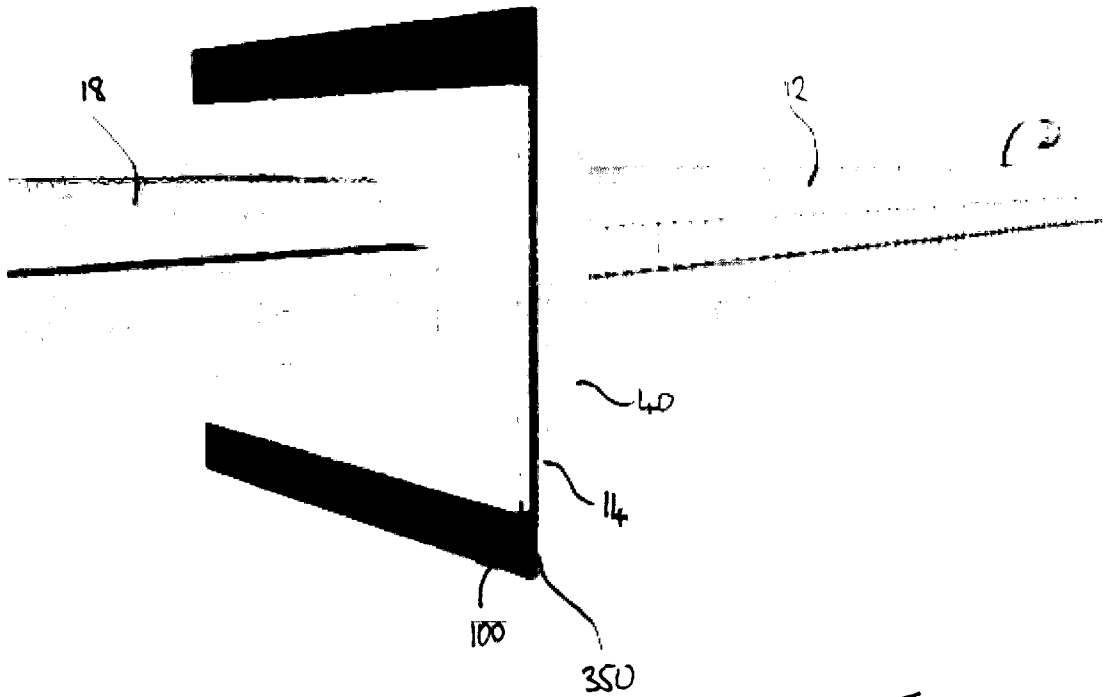


FIGURE 21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2015/000064

A. CLASSIFICATION OF SUBJECT MATTER E04B 1/48 (2006.01) E01C 11/14 (2006.01)		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPIP & EPODOC: Applicant/Inventor name search. WPIP, EPODOC & TXTE (Epoque) IPC/CPC (E04B1/48/LOW, E01C11/14, F16L, E21D21, E21D20/02 and KEYWORDS (TUBE?, TUBU+, TUBING+, CYLIND+, SLE?V+, SPIGOT+, SOCKET+, TELESCOP+, SEAL+, O_RING+, DIAPHRA?M+, MEMBRAN+, GROM?ET+, BELLOW+, RUST+, CORROS+, CORROD+, INJECT+, SETT+, GROUT+, POTT+ and similar keywords).		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	
☒ Further documents are listed in the continuation of Box C ☒ See patent family annex		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
Date of the actual completion of the international search 13 April 2015	Date of mailing of the international search report 13 April 2015	
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au	Authorised officer Simon Ochsenbein AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262833148	

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2015/000064
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6151850 A (SORKIN) 28 November 2000 figs 1-6, column 6 line 60, column 7 line 41	1-4,29,30,
X	US 2577997 A (CARTER) 11 December 1951 figs 1-16, column 5 line 70	1,5-7,14,25,26,28
X	US 4298206 A (KOJIMA) 03 November 1981 figs 19-44, column 12 line 40	1,5-9,15,16,18,27
X	US 2590933 A (CARTER) 01 April 1952 figs 1-6, column 3 line 16	1,43
X	US 4648739 A (THOMSEN) 10 March 1987 figs 1-5	1,15,19,20,21,23
X	US 2010/0239366 A1 (BAHR ET AL.) 23 September 2010 figs 1-4, paragraphs 19, 24, 25, 33 & 35	31-34,38,41,42
Y	JP 2008-38437 A (PS MITSUBISHI CONSTRUCTION CO) 21 February 2008 figs 1-8	10-13,31,32,35,36,38-40
Y	DE 3801121 A1 (EGCO AG) 01 September 1988 figs 1-3	10-13,31,32,35,36,38-40
X	US 6216403 B1 (BELBEOC'H) 17 April 2001 figs 1-2L	1

Form PCT/ISA/210 (fifth sheet) (July 2009)

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2015/000064	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
US 6151850 A	28 November 2000	US 6176051 B1	23 Jan 2001
US 2577997 A	11 December 1951		
US 4298206 A	03 November 1981	AU 496749 B2	26 Oct 1978
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		EP 2233753 A2	29 Sep 2010
		JP 2010222968 A	07 Oct 2010
		JP 5249270 B2	31 Jul 2013
JP 2008-38437 A	21 February 2008	None	
DE 3801121 A1	01 September 1988	AT A320387 A	15 May 1993
		AT 396965 B	25 Jan 1994
US 6216403 B1	17 April 2001	AU 748723 B2	13 Jun 2002
		AU 1318499 A	26 Aug 1999
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		EP 0935034 A1	11 Aug 1999
		EP 0935034 B1	11 Apr 2007
		EP 1559847 A1	03 Aug 2005
		HK 1022007 A1	11 Mar 2005
		JP 2000064434 A	29 Feb 2000
		JP 3215381 B2	02 Oct 2001
		KR 100385237 B1	23 May 2003
		NO 990557 A	10 Aug 1999

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex)(July 2009)



(12)发明专利申请

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代理人 宋鹰武

(51)Int.Cl.

E04B 1/48(2006.01)

E01C 11/14(2006.01)

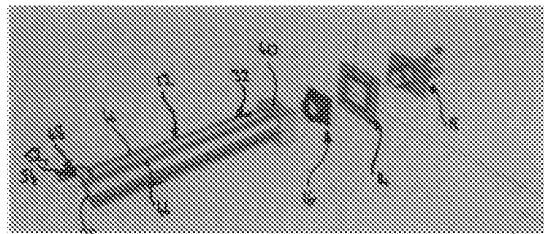
权利要求书6页 说明书13页 附图18页

(54)发明名称

用于形成接缝的连接器

(57)摘要

用于在第一(20)和第二(22)表面之间形成接缝的连接器(10)。连接器(10)包括:嵌入第一表面(20)的中空的公部件(18),公部件(18)具有由其延伸出的端部开口的突起(102);嵌入第二表面(22)的中空的母部件(12),母部件(12)具有用于接纳突起(102)的配合开口(42a);以及用于在母(12)和公(18)部件之间形成流体紧密封的柔性密封装置(16)。在安装时,形成第一表面的一部分的钢筋(34)延伸穿过突起(102)进入到母部件(12)。灌浆之前,公和母部件(12、18)使钢筋(34)的在第一表面(20)的沉降期间的运动在不破坏由柔性密封装置(16)形成的流体紧密封的情况下变得容易。还要求在竖直表面和水平表面之间形成接缝。



1. 一种用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,包括:
嵌入到第一表面的中空 of 的公部件,所述公部件具有由其延伸出的端部开口的突起;
嵌入到第二表面的中空 of 的母部件,所述母部件具有用于接纳所述突起的配合开口;以及

柔性密封装置,用于在所述母部件和公部件之间形成流体紧密封,其中,在安装时,形成所述第一表面的一部分的钢筋延伸穿过所述突起进入到母部件中,在灌浆之前,所述公部件和母部件使钢筋的在第一表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

2. 一种用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述公部件具有定位部件,所述定位部件的尺寸稍大于所述钢筋的尺寸,使得钢筋能够通过所述定位部件安装到配对的公部件和母部件中。

3. 一种用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,包括:
嵌入到第一表面的中空 of 的公部件,所述公部件具有由其延伸出的端部开口的突起;
嵌入到第二表面的中空 of 的母部件,所述母部件具有用于接纳所述突起的配合开口;以及

柔性密封装置,用于在所述母部件和公部件之间形成流体紧密封,其中,在安装时,形成所述第二表面的一部分的钢筋延伸穿过母部件并在之后进入所述突起,在灌浆之前,所述公部件和母部件使钢筋的在第二表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

4. 一种用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述母部件具有定位部件,所述定位部件的尺寸稍大于所述钢筋的尺寸,使得钢筋能够通过所述定位部件安装到配对的公部件和母部件。

5. 根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述柔性密封装置形成所述中空的母部件的一部分。

6. 根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述柔性密封装置包括由橡胶挤出部分连接的第一密封圈和第二密封圈,其中,所述第一密封圈与母部件连接,所述第二密封圈与公部件连接。

7. 根据权利要求6所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述第一密封圈接纳在所述母部件的通道内使得在所述第一密封圈和通道之间形成机械密封。

8. 根据权利要求7所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述第一密封圈具有比所述通道的尺寸更大尺寸的圆形横截面,使得所述第一密封圈在接纳到所述通道中时变形以形成所述机械密封。

9. 根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述端部开口的突起具有向内渐缩的表面,所述向内渐缩的表面起到帮助所述第二密封圈到所述端部开口的突起之间的连接的作用,当在沉降期间承受伸缩运动时,起到阻止所述第二密封圈从所述端部开口的突起脱离的作用。

10. 根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述母部件具有第一插口和第二插口,每个配置成接纳灌浆管道,使得泵

送的水泥浆通过连接到第一插口的灌浆管道流入所述连接器,并经由连接到第二插口的灌浆管道流出所述连接器。

11.根据权利要求1至9任一项所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述母部件具有第一插口和第二插口,每个配置成接纳灌浆管道,使得泵送的水泥浆通过连接到第一插口的灌浆管道流入所述连接器,并经由连接到第二插口的灌浆管道流出所述连接器。

12.根据权利要求1至9任一项所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述公部件具有第一插口和第二插口,每个配置成接纳灌浆管道,使得泵送的水泥浆通过连接到第一插口的灌浆管道流入所述连接器,并经由连接到第二插口的灌浆管道流出所述连接器。

13.根据权利要求10至13任一项所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述插口具有扩大的头部以使所述灌浆管道通过强制配合的方式与所述插口连接。

14.根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述配合开口采用比所述母部件的其余部分更大尺寸的腔体的形式,所述突起和密封部件容纳在所述腔体内。

15.根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述母部件具有用于帮助所述母部件到安装以帮助所述第二表面的形成的模板的连接的紧固板。

16.根据权利要求15所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述紧固板具有至少一用于接纳紧固件的固定孔,并由此帮助所述母部件到模板的连接。

17.根据权利要求16所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述紧固板具有至少一易碎部分,所述至少一固定孔设置在所述至少一易碎部分的至少一个上。

18.根据权利要求15至17任一项所述的用于在第一表面和第二表面之间形成接缝的连接器,最终依附于权利要求7,其特征在于,所述通道在紧固板连接到所述腔体上时形成。

19.根据权利要求15至18任一项所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述公部件具有面板,所述面板具有与所述紧固板相同的轮廓,使得所述面板与所述紧固板的对齐对应于所述公部件与所述母部件的对齐。

20.根据权利要求19所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,还包括可压缩材料,所述可压缩材料在安装过程中设置成位于所述面板和所述紧固板之间。

21.根据权利要求20所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述可压缩材料的至少一侧具有用于与所述面板或紧固板或所述面板和紧固板都形成粘结的粘接剂。

22.根据权利要求21所述的用于在第一表面和第二表面之间形成接缝的连接器,最终依附于权利要求17,其特征在于,所述紧固板具有位于靠近所述紧固孔处的垫片。

23.根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接

器,其特征在于,所述公部件和/或母部件具有设置在其上表面上的至少一纵向延伸槽。

24.根据权利要求23所述的用于在第一表面和第二表面之间形成接缝的连接器的最终依附于权利要求10至12的任一项,其特征在于,所述第一和第二插口位于比所述纵向延伸槽相对所述公部件和/或母部件的上表面适当较高的位置。

25.根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述公部件和/或母部件具有设置在其外表面上的保持装置,用于帮助牢固地保持公部件和/或母部件在其各自表面内。

26.根据权利要求25所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述保持装置为下面的一个或多个:外表面的不规则、外表面的不连续、肋、波纹、槽、波峰。

27.根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述公部件和/或母部件的内表面是光滑的。

28.根据前述任一项权利要求所述的用于在第一表面和第二表面之间形成接缝的连接器,其特征在于,所述公部件和/或母部件具有用于在安装过程中可释放地保持一托架的保持装置。

29.一种用于形成如权利要求1至28任一项所述的用于在第一表面和第二表面之间形成接缝的连接器的一部分的母部件。

30.一种用于形成如权利要求1至28任一项所述的用于在第一表面和第二表面之间形成接缝的连接器的一部分的公部件。

31.一种在第一表面和第二表面之间形成接缝的方法,其特征在于,包括以下步骤:

将如权利要求1至28任一项所述的连接器的母部件固定到用于第二表面的模板上;

形成具有所述母部件嵌入其中的所述第二表面,使得所述母部件的开口在所述模板移除之后保持可进入;

将所述连接器的公部件的端部开口的突起与所述母部件的所述开口配合,使得柔性密封装置在所述母部件和公部件之间形成流体紧密封;

将形成所述第一表面的一部分的钢筋穿过所述突起安装到所述母部件中;

形成具有公部件嵌入其中的所述第一表面;

灌浆所述连接器,其中,所述公部件和母部件使钢筋的在第一表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

32.一种在第一表面和第二表面之间形成接缝的方法,其特征在于,包括以下步骤:

将如权利要求1至28任一项所述的连接器的母部件固定到用于第二表面的模板上;

形成具有所述母部件嵌入其中的所述第二表面,使得所述母部件的开口在所述模板移除之后保持可进入;

将所述连接器的公部件的端部开口的突起与所述母部件的所述开口配合,使得柔性密封装置在所述母部件和公部件之间形成流体紧密封;

将形成所述第一表面的一部分的钢筋穿过所述突起安装到所述公部件中;

形成具有公部件嵌入其中的所述第一表面;

灌浆所述连接器,其中,所述公部件和母部件使钢筋的在第一表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

33. 根据权利要求31或32所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括在第一密封圈和所述母部件的通道之间形成机械密封的步骤。

34. 根据权利要求33所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括通过连接紧固板到形成所述母部件的一部分的腔体上形成所述通道的步骤。

35. 根据权利要求31至34任一项所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括将所述端部开口的突起插入穿过所述第二密封圈的步骤,使得所述端部开口的突起的向内渐缩的表面促进该插入,同时,当所述公部件和母部件在沉降过程中承受伸缩运动时,起到阻止所述第二密封圈由所述端部开口的突起脱离的作用。

36. 根据权利要求31至35任一项所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括连接灌浆管道到固定在所述公部件和/或母部件的一对插口的每一个的步骤,使得泵送的水泥浆通过第一插口流入所述连接器,并经由与第二插口连接的灌浆管道流出所述连接器。

37. 根据权利要求36所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括将与第一连接器的第二插口连接的灌浆管道的自由端连接到第二连接器的第一插口的步骤。

38. 根据权利要求31至37任一项所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括将所述母部件的紧固板与所述公部件的面板对齐的步骤。

39. 根据权利要求38所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括在所述面板和所述紧固板之间安装可压缩材料的步骤。

40. 根据权利要求39所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括在所述可压缩材料与所述面板或紧固板或所述面板和紧固板二者都形成粘结的步骤。

41. 根据权利要求31至40任一项所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括可释放地保持一托架以保持公部件和/或母部件在安装过程中的水平位置的步骤。

42. 根据权利要求31至41任一项所述的在第一表面和第二表面之间形成接缝的方法,其特征还在于,还包括在所述第二表面形成之后从所述母部件的开口移除所述保护盖的步骤。

43. 一种用于在竖直表面和水平表面之间形成接缝的连接装置,其特征还在于,包括:

具有螺纹部分的锚头,用于嵌入所述竖直表面;

具有配合螺纹部分的销子;

接纳在所述竖直表面的中空的公部件,所述公部件具有由其延伸出的端部开口的突起和端部开口的主体;

嵌入到所述水平平面的中空的母部件,所述母部件具有用于接纳所述突起的配合开口;以及

用于在所述母部件和公部件之间形成流体紧密封的柔性密封装置;

其中,在安装时,钢筋通过螺纹部分配对地连接到所述锚头,所述钢筋的未配对的一端延伸穿过所述突起进入到母部件中,使得在灌浆之前,所述公部件和母部件使钢筋在水平表面沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

44. 根据权利要求43所述的用于在竖直表面和水平表面之间形成接缝的连接装置,其特征还在于,还包括壁板,所述壁板具有带有螺纹部分的圆筒,所述圆筒起到通过螺纹部分配地对地连接到所述锚头的作用,并由此在形成所述竖直平面期间保持锚头在合适的位置。

45. 根据权利要求44所述的用于在竖直表面和水平表面之间形成接缝的连接装置,其特征还在于,所述端部开口的主体具有定位边缘,所述定位边缘具有比所述圆筒的直径更小的直径。

46. 一种在竖直表面和水平表面之间形成接缝的方法,其特征还在于,包括以下步骤:

将壁板固定到用于所述竖直表面形成的模板上;

将锚头连接到壁板的圆筒部分;

形成具有锚头和壁板形成在其中的竖直表面;

从所述竖直表面上移除所述壁板;

将销子连接到嵌入到所述竖直表面上的锚头;

将公部件安装到通过所述壁板从所述竖直表面上移除形成的区域,所述公部件具有端部开口的突起,所述销子穿过其延伸;

将所述公部件的端部开口的突起与所述母部件的开口配合,使得柔性密封装置在所述母部件和公部件之间形成流体紧密密封;

形成具有母部件嵌入其中的的竖直表面;以及

灌浆所述连接器。

47. 根据权利要求46所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,还包括在第一密封圈和所述母部件的通道之间形成机械密封的步骤。

48. 根据权利要求47所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,还包括通过将紧固板连接到形成所述母部件的一部分的腔体上以形成所述通道的步骤。

49. 根据权利要求46至48任一项所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,还包括将所述端部开口的突起插入穿过所述第二密封圈的步骤,使得所述端部开口的突起的向内渐缩的表面促进该插入,同时当所述公部件和母部件在沉降期间承受伸缩运动时,起到阻止所述第二密封圈由端部开口的突起脱离的作用。

50. 根据权利要求46至49任一项所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,所述方法还包括将灌浆管道连接到固定在所述母部件上的一对插口的每一个的步骤,使得泵送的水泥浆通过第一插口流入所述连接器,并经由与第二插口连接的灌浆管道流出所述连接器。

51. 根据权利要求50所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于;还包括将与所述第一母部件的第二插口连接的灌浆管道的自由端连接到第二母部件的第一插口上。

52. 根据权利要求46至51任一项所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,还包括将所述母部件的紧固板与公部件的面板对齐的步骤。

53. 根据权利要求52所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,还包括在所述面板和紧固板之间安装可压缩材料的步骤。

54. 根据权利要求53所述的在竖直表面和水平表面之间形成接缝的方法,其特征还在于,还包括与所述面板或紧固板或所述面板和紧固板形成粘结的步骤。

55. 根据权利要求46至54任一项所述的在竖直表面和水平表面之间形成接缝的方法, 其特征在于, 还包括可释放地保持一托架以保持母部件在安装期间的水平位置的步骤。

用于形成接缝的连接器

技术领域

[0001] 本发明涉及一种用于形成接缝的连接器。本发明尤其适于用于后张混凝土结构的连接部分,例如楼板,以一种方式,在这些部分发生沉降期间允许这些部分相对于彼此移动。

背景技术

[0002] 下面关于本发明的背景的讨论是为了便于本发明的理解。然而,应当理解的是该讨论并不是对所涉及的任何材料在本发明的优先权日在任何管辖区已经发表、已知或是公知常识的一部分的一种承认或认可。

[0003] 后张 (Post-tensioning, “PT”) 是一种在建筑施工中使用的技术,尤其在那些旨在具有不被垂直支柱间断的长跨度的建筑物地板中。PT涉及钢筋(加强)混凝土或其他具有高强度钢绞线或棒的其他材料。这些绞线和棒通常称之为钢筋。

[0004] 这种方法的问题是,由于尺寸的限制、连续性要求和/或约束条件,通常灌浆整个地板为单个地板是不可能的。因此,地板通常由分段或单个楼板形成。这些分段和楼板通常相对于彼此在不同的时间灌浆。为了保证地板或多或少是连续的,每个分段或楼板包含有合适的钢筋,例如PT钢缆或PT钢绞线。

[0005] 由于每个分段或楼板固化和沉降,分段或楼板可能会彼此相对移动。这意味着连接分段或楼板的接缝必须能够适应这种相对运动。同时,接缝起允许各分段相对彼此的约束效应临时释放的作用,并由此确保大量的预压缩力转移到地板。如果没有足够的PT预压缩力转移到地板,在分段或楼板内存在破裂的可能性,从而降低所得到地板的寿命和完整性。

[0006] 过去的一种方法在建筑物内的关键位置设置临时伸缩缝,以允许这种移动以及转移预压缩力。每个临时伸缩缝允许其连接的结构单元在固化和沉降期间移动。一旦连接的结构单元已经固化和沉降,临时伸缩缝便永久地锁定以便提供建筑物的或多或少的连续地板或其他元件。

[0007] 虽然这种方法起作用,但几乎所有的现有技术的临时伸缩缝遭受一个或多个下列问题:

[0008] 如果临时伸缩缝试图连接的表面在沉降期间相对彼此移动,会形成离开临时伸缩缝的空气间隙,钢筋的至少一部分会暴露在大气中,从而受到腐蚀等,直到被密封。

[0009] 临时伸缩缝的密封非常困难,尤其是临时伸缩缝的底部。

[0010] 第一个问题的结果是,现有技术的临时伸缩缝必须由耐腐蚀的材料制成,例如不锈钢。当再加上材料还必须防火或其他特性以满足建筑法规的事实,制造临时伸缩缝的成本可能比由较少特殊材料制造的成本高十倍。

[0011] 第二个问题提出了一种情况,临时伸缩缝未充分加强或密封剂会由接缝脱落。在这两种情况下,需要工人在以后的日子堵塞临时伸缩缝,从而确保临时伸缩缝妥善密封并锁定到位。补救行动的要求是费时的,而且除了建筑物的推迟完成之外还是昂贵的。

[0012] 因此本发明的目的在于提供一种用于形成接缝的连接器的,至少能部分改善上述的一个或多个问题。

发明内容

[0013] 在本申请中,除非另有相反的指示,术语“包括”、“由…组成”等,都应当被解释为非穷举,或者换句话说,含义是“包括,但不限于”。

[0014] 根据本发明的第一方面,为一连接器,用于在第一表面和第二表面之间形成接缝,包括:

[0015] 嵌入到第一表面的中空的公部件,该公部件具有由其延伸出的端部开口的突起;

[0016] 嵌入到第二表面的中空的母部件,该母部件具有用于接纳突起的配合开口;以及

[0017] 柔性密封装置,用于在公部件和母部件之间形成流体紧密封;

[0018] 其中,在安装时,形成第一表面的部分的钢筋能够延伸穿过突起进入到母部件,在灌浆之前,公部件和母部件使钢筋的在第一表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

[0019] 优选地,公部件具有设置在其中的定位部件,定位部件具有比钢筋稍大的尺寸,使得钢筋通过定位部件可以安装到配对的公部件和母部件中。

[0020] 以这种方式,可以理解的是,连接器没有必要由抗腐蚀性的或防火的材料制成,因为在表面形成之后其没有任何部分仍然暴露。此外,当正确的装入到这样的连接器中,钢筋没有任何部分露出,在下文中也称之为销子。

[0021] 在本发明的这一方面的一替代结构中,为用于在第一表面和第二表面之间形成接缝的连接器的,包括:

[0022] 嵌入到第一表面的中空的公部件,该公部件具有由此延伸的端部开口的突起;

[0023] 嵌入到第二表面的中空的母部件,该母部件具有用于接纳突起的配合开口;以及

[0024] 柔性密封装置,用于在公部件和母部件之间形成流体紧密封;

[0025] 其中,在安装时,形成第一表面的部分的钢筋能够延伸穿过母部件,此后进入到突起,在灌浆之前,在不破坏由柔性密封装置形成的流体紧密封的情况下,公部件和母部件使在第二表面沉降期间钢筋的运动变得容易。

[0026] 对于这样的结构,母部件可具有设置在其上的定位部件,定位部件的尺寸比钢筋稍大,以使钢筋可以经由定位部件安装到配对的公部件和母部件中。

[0027] 柔性密封装置可以形成中空的母部件的一部分。理想情况下,柔性密封装置包括由一橡胶挤出部分连接的第一密封圈和第二密封圈,其中,第一密封圈与母部件相连接,第二密封圈与公部件相连接。柔性密封装置的使用允许销子在不打破其密封的情况下移动。

[0028] 第一密封圈可以被接纳在母部件的一通道内,以在第一密封圈和通道之间形成机械密封。优选地,第一密封圈具有尺寸大于通道尺寸的圆形截面,以使当被接纳到通道时第一密封圈变形以形成机械密封。当紧固板连接到腔体时,可形成该通道。

[0029] 端部开口的突起可具有向内渐缩的表面,向内渐缩的表面可用于促进第二密封圈到端部开口的突起的连接,以及当在沉降过程中受到伸缩运动时,可用于阻止第二密封圈从端部开口的突起脱离。

[0030] 母部件可具有第一插口和第二插口,每个配置成接纳灌浆管道,使得泵送的水泥

浆通过连接到第一插口的灌浆管道流入连接器,并通过连接到第二插口的灌浆管道流出连接器。可替代地,母部件可具有第一插口和第二插口,每个配置成接纳灌浆管道,使得泵送的水泥浆通过连接到第一插口的灌浆管道流入连接器,并通过连接到第二插口的灌浆管道流出连接器。在又一可替代的配置中,公部件具有第一插口和第二插口,每个配置成接纳灌浆管道,使得泵送的水泥浆通过与第一插口连接的灌浆管道流入连接器,并通过连接到第二插口的灌浆管道流出连接器。插口,无论结构,可具有一扩大的头部以使灌浆管道通过强制配合的方式与插口连接。

[0031] 采用第一和第二插口形成相同部件的一部分的结构是有利的,因为这允许目测确认灌浆管道被适当的配置到预期的单一连续弯管。

[0032] 配合开口可以采用尺寸比母部件的剩余部分更大的腔体形式,突起和密封部件容纳在腔体内。

[0033] 母部件可具有一紧固板,用于帮助母部件固定到安装以帮助第二表面的形成的模板上。优选地,紧固板具有至少一用于接纳紧固件的紧固孔,并由此帮助母部件固定到模板上。此外,紧固板具有至少一易碎部分,至少一紧固孔设置在至少一易碎部分中的至少一个上。

[0034] 易碎部分的使用使得母部件保留在模板上,即使在一个脱开力施加到其中一个紧固件上时(包含该紧固件的易碎部分仅仅可做脱开操作)。

[0035] 公部件可具有一面板,该面板具有与紧固板相同的轮廓,使得面板与紧固板的对齐对应于公部件与母部件的对齐。另外,在安装过程中,可压缩材料可设置在面板和紧固板之间的位置。可压缩材料可结合粘接剂,用于与面板或紧固板,或面板和紧固板都形成粘结。紧固板可具有位于靠近紧固孔的位置的垫片。

[0036] 垫片起到补偿由包含可压缩材料所导致的整体尺寸的增加。

[0037] 公和/或母部件优选具有至少一设置在其上表面的纵向延伸槽。当包含时,当第一和第二插口位于比纵向延伸槽相对于公和/或母部件的上表面适当高的位置时,可以达到最佳性能。

[0038] 公和/或母部件可具有设置在其外表面的保持装置,用于辅助牢固地保持公和/或母部件在其相应的表面上。这种保持装置可以采用以下一种或多种形式:外表面的不规则;外表面的不连续;肋;波纹;槽;波峰。

[0039] 优选地,公和/或母部件的内表面是光滑的。

[0040] 公和/或母部件可包括保持装置,用于在安装过程中可释放地保持一托架。

[0041] 根据本发明的第二方面,为形成连接器的一部分的母部件,该连接器用于在第一表面和第二表面之间形成接缝,如在本发明的第一方面中所描述。

[0042] 根据本发明的第三方面,为形成连接器的一部分的公部件,该连接器用于在第一表面和第二表面之间形成接缝,如在本发明的第一方面中所描述的。

[0043] 根据本发明的第四方面,为在第一表面和第二表面之间形成接缝的方法,包括以下步骤:

[0044] 将在本发明的第一方面中所描述的连接器的母部件固定到用于第二表面的模板上;

[0045] 形成具有母部件嵌入其中的第二表面,使得母部件的开口在模板移除后保持可进

入；

[0046] 连接器的公部件的端部开口的突起与母部件的开口配合，使得柔性密封装置在母部件和公部件之间形成流体紧密封；

[0047] 将形成第一表面的一部分的钢筋穿过突起安装到母部件中；

[0048] 形成具有公部件嵌入其中的第一表面；以及

[0049] 灌浆连接器，公部件和母部件使钢筋的在第一表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

[0050] 在本发明的这一方面的替代性结构中，为在第一表面和第二表面之间形成接缝的方法，包括以下步骤：

[0051] 将在本发明的第一方面中所描述的连接器的母部件固定到用于第二表面的模板上；

[0052] 形成具有母部件嵌入其中的第二表面，使得母部件的开口在模板移除后保持可进入；

[0053] 连接器的公部件的端部开口的突起与母部件的开口配合，使得柔性密封装置在母部件和公部件之间形成流体紧密封；

[0054] 将形成第一表面的一部分的钢筋穿过突起安装到公部件中；

[0055] 形成具有公部件嵌入其中的第一表面；以及

[0056] 灌浆连接器，公部件和母部件使钢筋的在第一表面的沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

[0057] 所述方法还可以包括在第一密封圈和母部件的通道之间形成机械密封的步骤。与该步骤相关联的，所述方法还可以包括通过连接紧固板到形成母部件的一部分的腔体上以形成所述通道的步骤。

[0058] 所述方法还可以包括将端部开口的突起插入穿过第二密封圈的步骤，使得端部开口的突起的向内渐缩的表面促进该插入，当在沉降期间公部件和母部件承受伸缩运动时，可起到阻止第二密封圈从端部开口的突起脱离的作用。

[0059] 所述方法还可以包括将灌浆管道连接到固定在公部件和/母部件上的一对插口的每一个的步骤，使得泵送的灌浆经过第一插口流入连接器并经由与第二插口连接的灌浆管道流出连接器。优选地，所述方法还可以包括将与第一连接器的第二插口相连接的灌浆管道的自由端连接到第二连接器的第一插口。

[0060] 以这种方式，形成连接器之间的期望的连续弯曲管道。

[0061] 所述方法还可以包括将母部件的紧固板与公部件的面板对齐的步骤。与该步骤相关联的，所述方法还可以包括在面板和紧固板之间安装可压缩材料的步骤。理想情况下，该可压缩材料与面板或紧固板或面板和紧固板形成粘结。

[0062] 所述方法还可以包括可释放地保持一托架以维持在安装期间公部件和/或母部件的水平位置的步骤。

[0063] 所述方法还可以包括在形成第二表面之后从母部件的开口移除保护盖的步骤。保护盖的使用有助于阻止污染物在其它情况下可能在形成第一或第二表面的过程中进入母部件破坏密封。

[0064] 根据本发明的第五方面，为用于在竖直表面和水平表面之间形成接缝的连接装

置,连接装置包括:

[0065] 用于嵌入到竖直表面的具有螺纹部的锚头;

[0066] 具有配合螺纹部分的销子;

[0067] 接纳在竖直表面中的中空의公部件,公部件具有由其延伸的端部开口的突起和端部开口的主体;

[0068] 嵌入到水平表面的中空의母部件,母部件具有用于接纳所述突起的配合开口;以及

[0069] 用于在母部件和公部件之间形成流体紧密封的柔性密封装置;

[0070] 其中,在安装时,钢筋通过螺纹部分配对地连接到锚头,钢筋的未配对的一端延伸穿过突起进入到母部件中,使得在灌浆之前,公部件和母部件使钢筋在水平表面沉降期间的运动在不破坏由柔性密封装置形成的流体紧密封的情况下变得容易。

[0071] 所述连接装置可包括壁板,壁板具有带有螺纹部分的圆筒,圆筒可起到通过螺纹部分配对地连接到锚头的作用,并由此在形成竖直表面期间保持锚头在合适的位置。

[0072] 端部开口的主体可包括定位边缘,定位边缘具有比圆筒的直径更小的直径。

[0073] 通过利用具有比圆筒的直径更小的直径的定位边缘,当壁板移除时,公部件安装到其位置,到竖直表面的密封紧配合由公部件形成。

[0074] 根据本发明的第六方面,为在竖直表面和水平表面之间形成接缝的方法,包括以下步骤:

[0075] 将壁板固定在用于竖直表面形成的模板上;

[0076] 连接锚头到壁板的圆筒部分;

[0077] 形成具有锚头和壁板形成在其中的竖直表面;

[0078] 由竖直表面移除壁板;

[0079] 将销子连接到嵌入到竖直表面中的锚头;

[0080] 将公部件安装到由壁板从竖直表面的移除形成的区域,公部件具有端部开口的突起,销子穿过其延伸;

[0081] 将公部件的端部开口的突起与母部件的开口配合,使得柔性密封装置在母部件和公部件之间形成流体紧密封;

[0082] 形成具有母部件嵌入其中的水平表面;以及

[0083] 灌浆连接器。

[0084] 所述方法还可以包括在第一密封圈和母部件的通道之间形成机械密封的步骤。作为一个相关的步骤,所述方法还可以包括通过将紧固板连接到形成母部件的一部分的腔体上以形成所述通道的步骤。

[0085] 所述方法还可以包括将端部开口的突起插入穿过第二密封圈的步骤,使得端部开口的突起的向内渐缩的表面促进该插入,当公部件和母部件在沉降期间承受伸缩运动时,起到阻止第二密封圈由端部开口的突起脱离的作用。

[0086] 所述方法还可以包括将灌浆管道连接到固定在母部件上的一对插口的每一个的步骤,使得经过第一插口的泵送的水泥浆流入连接器并经由与第二插口连接的灌浆管道流出连接器。作为一个相关的问题,所述方法还可以包括将与第一母部件的第二插口连接的灌浆管道的自由端连接到第二母部件的第一插口的步骤。

- [0087] 所述方法还可以包括将母部件的紧固板与公部件的面板对齐的步骤。
- [0088] 所述方法还可以包括在面板和紧固板之间安装可压缩材料的步骤。该可压缩材料可以用于与面板或紧固板或面板和紧固板形成粘结的步骤。
- [0089] 所述方法还可以包括可释放地保持一托架以保持在安装期间母部件的水平位置。

附图说明

- [0090] 下面将结合附图及实施例对本发明作进一步说明,附图中:
- [0091] 图1是根据本发明的第一实施例的连接器的的一种形式的透视图,其处于组装形式并以分离状态示出;
- [0092] 图2是如图1所示的连接器的分解透视图;
- [0093] 图3是构成图1所示的连接器的一部分的套筒的局部透视图;
- [0094] 图4是构成图1所示的连接器的一部分的密封装置的透视图;
- [0095] 图5是构成图1所示的连接器的一部分的紧固板的透视图;
- [0096] 图6是构成图1所示的连接器的一部分的盖子的透视图;
- [0097] 图7是图1所示的连接器的以透视方式的第一局部剖视图;
- [0098] 图8是图1所示的连接器的第二局部剖视图;
- [0099] 图9-1至9-8是用图1所示的连接器连接两块楼板的各个阶段的单个图解视图;
- [0100] 图10是根据本发明的第二实施例的连接器的分解透视图;
- [0101] 图11是构成图10所示的连接器的一部分的套筒的局部透视图;
- [0102] 图12是构成图10所示的连接器的一部分的紧固板的透视图;
- [0103] 图13是图12所示的紧固板的后视图;
- [0104] 图14是构成图10所示的连接器的一部分的盖子的透视图;
- [0105] 图15是图10所示的部分组装的连接器的以透视方式的局部剖视图;
- [0106] 图16是根据本发明的第三实施例的连接器的分解透视图;
- [0107] 图17是构成图16所示的连接器的一部分的盖子的侧边透视图;
- [0108] 图18是在一个垂直表面内接收的图17所示的盖子的侧视图;
- [0109] 图19是安装图16所示的连接器以连接壁板到楼板的过程的流程图;
- [0110] 图20是包括有保持托架的装置的如图1所示的连接器的一个变形的透视图。
- [0111] 图21是面板和紧固板之间设置有可压缩材料的示意图。

具体实施方式

- [0112] 根据本发明的第一实施例,为用于形成接缝的连接器10。连接器10包括套筒12、紧固板14、密封部件16和盖子18。
- [0113] 本质上,本发明认为套筒12用于牢固固定到第一段或楼板20。盖子18用于牢固固定到第二段或楼板22。结合起来,套筒12和盖子18相互配合地连接以在两段或楼板20、22的交界面24形成密封连接。
- [0114] 套筒12具有前端26、后端28和侧壁30。套筒12的大部分采用延长部分的形式形成用于接收和保护加强销34的第一部分的壳体32,加强销34形成第一段或楼板20的一部分。壳体32的长度(L)与加强销34的第一部分的长度相一致。

[0115] 壳体32的内部下表面(未示出)基本上是平滑的,以便灌浆(未示出)通过套筒12。当用灌浆密封时,使用基本平滑的内部下表面还可减少可能削弱套筒12到加强销34的固定的气泡、气窝、气穴等诸如此类的形成。

[0116] 侧壁30的至少一个具有以肋38形式的表面不规则或不连续。在未固化状态,肋38有助于牢固地保持浸没的套筒12在第一段或楼板20中。

[0117] 位于套筒12的前端26是一腔体40。腔体40采用具有开口面42a、42b的大致直线三维长方体的形式。开口面42a的作用将在下面更详细地描述。

[0118] 开口面42b使得腔体40和壳体32之间的流体连通。

[0119] 沿套筒12的上表面44延伸的是一对纵向延伸的槽46。当引入到套筒12时,每个槽46充当灌浆的流动通道。槽46也对减少气泡等的形成起作用。

[0120] 在套筒12的后端28的位置位于上表面44上具有第一接口48。在该实施例中,第一接口48采用具有扩大的头部52的中空直角弯管50。第一接口48的中空的性质使得第一接口48和套筒12的内部之间流体连通。

[0121] 扩大的头部52具有用于接纳并保持一软管(未示出)的锥形圈或边缘54。

[0122] 值得注意的是,扩大的头部52必须位于水平位置高于延伸的槽46的水平位置的位置,以保证在需要时整个连接器10能够适宜地灌浆。

[0123] 紧固板14的形状大致为平面和矩形。紧固板14焊接到腔体40的开口面42a上。如图5中所示,紧固板14的尺寸大于开口面42a。

[0124] 位于紧固板14的中心的是孔58。孔58的尺寸和形状略小于开口面42a。围绕孔58的周边的是一法兰60。法兰60的作用将在下面更详细的描述。

[0125] 紧固板14的每个角具有在需要的时候可以折断的易碎部分62。在每个易碎部分62具有固定孔64。以这种方式,当紧固件(未示出)将套筒12保持在模板上试图拉动紧固板14离开套筒12时,易碎部分62可以脱离紧固板14。

[0126] 密封部件16包括第一密封圈68和第二密封圈70。如图4所示,中空的橡胶挤出部分72在第一密封圈68和第二密封圈70之间延伸。第一和第二密封圈68、70的截面都是圆形。

[0127] 第一开口74位于橡胶挤出部分72与第一密封圈68结合处。第二开口76位于橡胶挤出部分72与第二密封圈70结合处。

[0128] 第一密封圈68围绕第一开口74的周边。在该实施例中,第一密封圈68为矩形,以便匹配腔体40的内轮廓,即开口面42a。

[0129] 第二密封圈70围绕第二开口76的周边。在该实施例中,第二密封圈70为圆形,以便匹配套筒12的内轮廓。

[0130] 如图6所示,盖子18包括具有上部或顶部表面80、前端82和后端84的中空主体78。由后端84延伸出的是一定位部件86。在该实施例中,定位部件86采用圆环的形式。定位部件86起到接纳并保护作为楼板或地板22的第二段的一部分的加强销34的第一部分。因此定位部件86比加强销34具有稍大的尺寸。

[0131] 沿盖子18的上部表面80延伸的是一对纵向延伸的槽88。当引入到盖子18时,每个槽88作为灌浆的流动通道。槽88也起到减少气泡等形成的作用。

[0132] 向上的第二接口90由在或朝向后端84的位置由上部表面80延伸出。在该实施例中,第二接口90再次采用具有扩大的头部94的中空直角弯管92的形式。第二接口90的中空

性质使得第二接口90和盖子18的中空主体(未示出)之间流体连通。

[0133] 扩大的头部94具有用于接纳并保持灌浆管道或管子的锥形圈或边缘96。

[0134] 再次,需要注意的是,扩大的头部94必须位于水平位置高于延伸的槽88的水平位置的位置,以保证在需要时整个连接器10能够适宜地灌浆。

[0135] 面板100位于朝向前端82的位置。面板100的尺寸和形状通常与紧固板14是相适应的。

[0136] 由面板100向前延伸是一中空圆筒形公部件102。在该实施例中,圆筒形公部件102采用延伸管的形式。围绕圆筒形公部件102的开口端104的是边缘106。边缘106具有向内渐缩表面108。

[0137] 圆筒形公部件102的中空的特性意味着圆筒形公部件102的内部与中空主体78流体连通。

[0138] 位于圆筒形公部件102的上方是一个固定夹110。固定夹110由面板100沿大致与圆筒形公部件102平行的方向凸出。唇部112由固定夹110的自由端114延伸出。唇部112向远离圆筒形公部件102的方向凸出。在该实施例中,如图8所示,唇部112具有三角形的横截面。

[0139] 固定夹110具有小于圆筒形公部件102的宽度(W_2)的宽度(W_1)。

[0140] 由于连接器10最终以公部件(盖子18)和母部件(套筒12、紧固板14和密封部件16)的组合的形式提供,描述母部件组装的方法是很重要的。

[0141] 为了组装母部件,密封部件16插入到腔体40的开口面42b。密封部件16的插入继续进行直到第一密封圈68与支座116接触。这样设置保证第二开口76位于相对于开口面42a的中央,但与其间隔。这些要求在图7和图8中示出。

[0142] 随着密封部件16正确插入,紧固板14然后安装。紧固板14的安装保证法兰60接纳入开口面42a。更重要的是,紧固板14的安装限定了方形通道118。为了详细说明,方形通道118由紧固板14、法兰60、腔体40和支座116限定。应当指出的是,法兰60和支座116并不接触,使得方形通道118具有一开口120。

[0143] 方形通道118的形成也起到保持第一密封圈68的作用。这里应当指出的是,方形通道118的尺寸(S)比第一密封圈68的直径(D)小。因此,第一密封圈68在方形腔体118内的保持导致其变形并机械密封方形腔体118。橡胶挤出部分72由方形通道118穿过开口120延伸出来。

[0144] 为了确保当承受发生在地板段20、22的沉降过程中的变化的力时方形腔体118保持机械密封,固板14摩擦焊接到套筒12上。

[0145] 本实施例将在其预期用途的环境中描述。注意,对于说明书的剩余部分:

[0146] 加强销34的各部分将被称为术语“销子”,其和在工业中的描述通用;以及

[0147] 术语套筒12将作为套筒12的参考,与紧固板14和密封部件16(如以上所述的母部件)组装在一起。

[0148] 当其需要穿过共同连接来连接两个混凝土楼板20、22时,模板122根据将要形成的地板的位置和尺寸和形状准备。模板122包括用于成形地板的主要的水平板124。大致垂直的模板条126在地板的连接边缘将要形成的位置牢固地连接到水平板124上。

[0149] 钉到至少一个垂直模板条126上的是套筒12。理想情况下,如图9-1到图9-8所示,套筒12在沿模板122的长度规则地间隔开的位置钉到垂直模板条126上。

[0150] 灌浆管道128然后强制地安装到钉到垂直模板条126的周边的套筒12的第一接口48的扩大的头部52上。灌浆管道128然后牢固地强制安装到钉到垂直模板条126上的每个第二套筒12的第一接口的扩大的头部52上。如果钉到垂直模板条126上的套筒12的数目不是偶数,最后的灌浆管道128牢固地连接到钉到垂直模板条126上的最后的套筒12的第一接口48的扩大的头部52上。

[0151] 灌浆管道128牢固地连接到垂直模板条126的周边,最后的灌浆管道128,如果有的话,保持自由状态并被操作以主要向上延伸到高于地板的第一段20的预期工作表面的位置。然而,每个中间的灌浆管道128的未连接端被操作以便牢固地连接钉到垂直模板条126上的下一套筒12的第一接口48的扩大的头部52上。这种设置如图9-2所示。

[0152] 网格130状的混凝土钢筋然后放置在水平板124上,并位于适当的位置以在灌注时嵌入到地板的第一段20。当所有的网格130位于适当的位置,未固化的混凝土灌注以生成地板的第一段20。一旦第一段20固化,垂直模板条126被移除,灌注段20的接合表面132被清洁以便没有碎屑。每个套筒12的开口面42a被类似地清洁。

[0153] 一旦被清洁,盖子18连接到每个套筒12上。

[0154] 盖子18到套筒12的连接通过首先插入圆筒形公部件102到开口面42a内实现的。在插入过程的某些点,边缘106将与橡胶挤出部分72接触。此时,盖子18的进一步插入将会遇到阻力,但取决于边缘106的向内渐缩表面108,橡胶挤出部分72和第二密封圈70将被强制伸展直到边缘106穿过第二密封圈70。

[0155] 当边缘106穿过第二密封圈70时,橡胶挤出部分72和第二密封圈70试图缩回到其原来的形状。圆筒形公部件102的存在防止这种情况发生,但充当第二密封圈70的夹紧力。第二密封圈70在该夹紧力的影响下,从而密封密封部件16和圆筒形公部件102之间的连接。

[0156] 随着边缘106穿过第二密封圈70,固定夹110接近方形通道118。如图8所示,接近方形通道118使得唇部112能够突出到开口120。当这样定位后,产生一可听见的声音作为盖子18已经连接到套筒12的指示给安装者。然而,应当指出的是,该连接并不是永久或牢固的,随着施加一低水平力,唇部112可以容易地从开口120移开。

[0157] 盖子18现在正确地安装在套筒12上,销子34插入到连接器10中。销子34的插入借助定位部件18。销子34优选推入到连接器10中直到销子34抵接到后端28的内壁(未示出)时。

[0158] 从盖子18连接到被钉到垂直模板条126的周边的套筒12开始,灌浆管道128牢固地连接到每个第二盖子18的第二接口90的扩大的头部94。

[0159] 每个灌浆管道128的未连接端然后连接到下一盖子18的第二接口90的扩大的头部94。如果没有偶数个盖子18连接到套筒12,连接到最后的盖子18的灌浆管道128被操作以主要向上延伸到高于地板22的第二段的预期的工作面的位置。

[0160] 以这种方式,灌浆管道128以形成一个用于灌浆流过的单个弯曲管道的方式连接连接器10。

[0161] 当沿着未接纳到连接器10中的销子34的部分倾倒时,以网格130形式的钢筋混凝土然后放在水平板124上并放置以嵌入地板的第二段。随着所有的网格130正确放置,未固化的混凝土灌浆以形成地板22的第二段。

[0162] 当地板22的第二段沉降时,连接器10允许两地板段20、22在两个水平面内相对彼

此运动,但限制两个地板段20、22在竖直平面上的相对彼此的所有运动。

[0163] 详细阐述,地板22的第二段沉降期间可能产生的运动可能是强大的,但非常微小(垂直于加强销34的方向的极限允许值是10mm,平行于加强销34方向的极限允许值是20mm)。由于保持夹110具有比圆筒形公部件102的宽度(W_2)小的宽度(W_1)。盖子18相对套筒12的左右运动由唇部112相对法兰60的运动促进。盖子18相对套筒12的伸缩运动由如前面所述的唇部112从法兰60的脱离促进。

[0164] 在这两种情况下,第一密封圈68和第二密封圈70的完整性在整个运动中保持,因为橡胶挤出部分72变形以满足运动。对于伸缩运动,第二密封圈70的压缩力,除了向内渐缩表面108或边缘106之外,确保第二密封圈70随着圆筒形公部件102运动并由此保持密封。

[0165] 一旦指定的固化时间已过,或适当资格的专业人士认为地板22的第二段已经沉降,一个或两个露出的灌浆管道128连接泵。灌浆通过露出的灌浆管道128泵送。由于如已经描述的灌浆管道128和连接器10的互相连接,随着灌浆进入到每个连接器10填满空的空间并由此填充密封的连接器10(即被灌浆的连接器)。由于第一和第二密封圈68、70保持不动,灌浆不会进入到由橡胶挤出部分72、面板100和圆筒形公部件102限定的区域。如果灌浆进入到该区域,第二密封圈70可能会断裂。

[0166] 一旦所有的连接器10被灌浆,且灌浆由液体状态转变至固体状态,露出的灌浆管道128根据完工的楼板(即连接的地板20、22的第一和第二段)的建筑要求被终止。当连接器10内部的灌浆固化至所需要的强度,第一和第二表面20、22然后锁定在一起以形成永久状态的具有完整结构的连续楼板。

[0167] 根据本发明的第二实施例,其中相同的标号表示相同的部件,为用于形成接缝的连接器200。连接器200包括套筒202、紧固板204、密封部件16和盖子206。套筒202和紧固板204是套筒12和紧固板14的微小变形,密封部件16与第一实施例中描述的一样。

[0168] 对于套筒202,第一接口48由安装平台208和第一插口210代替。安装平台208代替了位于末端28的延伸槽46。安装平台208上升到显著高于延伸槽46的位于上表面44之上的高度。

[0169] 第一插口210由安装平台208的后侧212延伸出。第一插口210具有扩大的头部214。

[0170] 由腔体40的后侧214延伸出的是第二插口216。第二插口216的结构与第一插口210相同。

[0171] 在所有其他方面,套筒202为和套筒12相同的结构。

[0172] 紧固板204具有第一易碎部分218和第二易碎部分220。第一易碎部分218占据紧固板204的每个角222。第一易碎部分218包括固定孔64的周边的部分。第二易碎部分220包括第一易碎部分218。

[0173] 围绕位于紧固板204的一侧的固定孔64的是两个如图13所示的垫片224。垫片224的目的将在后面说明。

[0174] 盖子206包括具有配合侧226和固定侧228的面板100。由配合侧226延伸出的是圆筒形公部件102。定位部件86由固定侧228延伸出。

[0175] 围绕圆筒形公部件102的开口端104的是边缘106。边缘106具有向内渐缩表面108。

[0176] 位于圆筒形公部件102的上方和下方的是固定夹110。每个固定夹110由面板100沿大体上与圆筒形公部件102平行的方向突出。由固定夹110的自由端114延伸出的是倾斜的

唇缘112。倾斜的唇缘112的一端230朝向圆筒形公部件102,倾斜的唇缘112的另一端232朝远离圆筒形公部件102的方向,并朝向配合侧224。

[0177] 本领域的技术人员应当理解,在使用时,第二实施例和第一实施例之间的唯一区别基本上涉及第二插口216以及其经由灌浆管道128的连接。套筒12上的第一和第二插口214、216的提供意味着,安装工可以很容易的确定插口214、216的哪个作为灌浆的输出接口以及哪个作为灌浆的输入接口。它还有利于目测评估穿过所有连接器200的灌浆通道,以确保灌浆流过弯弯曲曲的管道并由此获得如以上所述的所有连接器200。这在第一实施例中是不可能的,一旦第一楼板20已经倾倒,其依靠放在存储器或同期的记录来确定灌浆管道128的位置。

[0178] 根据本发明的第三实施例,其中相同的标号表示相同的部件,为用于形成墙壁部分和地板段之间的接缝的连接器300。本实施例的连接器300除了包括套筒202、紧固板204、密封部件16以外,还包括锚头302、螺纹固定部件304和改良的盖子306。

[0179] 锚头302包括由圆筒管道310延伸出的基部308。圆筒管道310具有内螺纹部分312。

[0180] 螺纹固定部件304包括壁板314和可拆卸盖子316。壁板314在每个角具有紧固孔318。壁板314的中心设置有孔320以接纳可拆卸盖子316。壁板314的形状和尺寸与面板100相同。

[0181] 可拆卸盖子316具有主体部分322、头部324和螺纹部分326。主体部分322的形状和尺寸可以被接纳到孔320中。头部324比主体部分322大,使得头部324阻止可拆卸盖子316穿过孔320。

[0182] 螺纹部分326的大小和尺寸为了使螺纹与圆筒形管道310的内螺纹部分312匹配。

[0183] 改良的盖子306等同于盖子206延伸出另外的定位边缘328。定位边缘328在自由端330围绕定位部件86在其自由端330延伸。

[0184] 本实施例将在其预期用途形成墙壁部分(未示出)和地板段(未示出)之间的接缝的环境中描述。

[0185] 螺纹固定件304利用螺纹部分326通过螺纹配合内螺纹部分312连接到锚头302。一旦连接,壁板314固定地连接到第一片模板(未示出),为了利用墙壁部分的结构。该固定连接通过安装合适的固定件(未示出)穿过紧固孔318形成的。为每个所需的连接器300安装到墙壁部分重复这一过程。

[0186] 一旦所有所需配合的锚头302和螺纹固定件304固定地连接,钢筋网格(也未示出)然后会安装到壁间腔,预期的墙壁部分在其中形成。通过安装有效限定壁间腔的第二片模板,准备工作已完成。

[0187] 混凝土然后倾倒入所限定的壁间腔以生成墙壁部分并使其固化。一旦固化,第一和第二片模板拆卸掉。

[0188] 如本领域技术人员所知的,然后安装第三片模板以协助地板部分的形成。如很容易被理解,第三片模板位于配合的锚头302和螺纹固定件304的下方。

[0189] 螺纹固定件304然后由墙壁部分拆卸,留下锚头302在合适的位置。这样,可拆卸盖子316从锚头302中抽出,壁板314被撬松。这留下一个通向锚头302的孔和一与壁板部分上的相同轮廓的凹陷在墙壁部分。应当指出的是,定位边缘328的外边缘直径比由主体部分322产生的空隙稍大以确保密封的紧密配合。

[0190] 改良的盖子306然后安装到该孔中直到定位边缘328与圆筒形管道310的内螺纹部分312相接触。也应该看到,面板100被整齐的接纳在拆卸壁板314之后留下的凹陷中。

[0191] 如图16所述,具有螺纹端的销子然后插入穿过圆筒形公部件102和定位部件86。一旦插入后,销子会根据需要操作与圆筒形管道310的内螺纹部分312螺纹配合该螺纹端。一旦螺纹配合,销子的剩余部分由改良的盖子306沿与第三模板片平行的方向延伸出。

[0192] 套筒202然后如已经在第二实施例中描述的那样安装,灌浆管道128根据需要连接。地板段的灌浆和套筒202的密封随后如在第一实施例中描述的那样进行。

[0193] 虽然上述实施例结合连接器10、200、300的一般组合形式进行了描述,本领域技术人员应当认识到其他组合结构也是可以使用的。对于这些组合结构的唯一限制是,装配时盖子与套筒必须形成流体紧密连接。

[0194] 虽然上述实施例在后张混凝土楼板的环境中进行了描述,本领域的技术人员应当认识到,本发明并不局限于该应用。相反,本发明可以用在相关的任何结构,或其部分(多个),在其施工中使用PT技术。例如,本发明可以用于在地面上连接墙壁或地板部分到斜坡,或墙壁或地板部分到楼梯,或地板到楼板。

[0195] 本领域的技术人员应当认识到,以上发明并不局限于已描述的实施例。尤其是,以下修改和改进可以在不脱离本发明的范围内做出。

[0196] 理想情况下,连接器10、200、300应该具有足够的尺寸,以确保加强销34沿其长度至少被20mm的灌浆包围。

[0197] 套筒12、202可以进行修改,以便托架352,如本领域技术人员已知的,可以可释放地连接到其上,以为没有固定到模板66的部分提供支撑。这种修改的示例如图20所示。

[0198] 为阻止水泥细粒进入面板100和紧固板14、204之间的间隙,可压缩材料350可以应用于两块14、100中的任一块上,如图21所示。理想情况下,该可压缩材料粘接施加到其两侧。这有利于暂时保持面板100到紧固板14、204上直到连接器10、200被密封。

[0199] 在第一实施例中,接口48、90可以为连接器10采用任一配置,条件是一个作为灌浆的入口接口,同时另一个作为出口接口。相同的考虑适用于关于第二和第三实施例的插口210、216。

[0200] 垫片224可以用来补偿压缩材料的宽度,因为已经发现,没有垫片224,紧固板14、204到模板的固定使易碎部分210容易失效。

[0201] 面板100到壳体22的其他形式的结合也是可能的。例如,面板100可以通过使用粘接剂或其他粘接介质粘接到壳体22上。

[0202] 为了除去开口面42a的清洁的需求,保护盖可以用于保护孔58以及开口面不受灰尘或其他污染物。保护盖的一个例子是如图9-5所示的可移除标签。

[0203] 第一和第二接口48、90或第一和第二插口210、216可以根据需要进行修改。理想情况下,这些部件修改是为了有利于快速配合连接器。

[0204] 紧固孔64可以根据需要进行修改,以有利于保持任何适合的紧固件,诸如钉子或螺钉。

[0205] 壳体12可以是任何适合的形状。然而,其可以看到的优选形式是壳体12的横截面为圆角矩形或大致圆形的。

[0206] 连接器10、200、300可以由塑料或其他低成本材料制成,条件是它们具有足够的强

度以容纳灌浆且不容易被安装工损坏。

[0207] 肋38可以由波纹、槽、波峰、凸台或凹槽替代。

[0208] 肋38可以具有任何合适的增加壳体22的外部或未凝结的混凝土楼板之间的接触面积的形式、形状、尺寸或轮廓,从而协助将套筒12固定在合适位置。

[0209] 混凝土增强的其他形式也可以使用,例如钢筋栅格。

[0210] 橡胶挤出部件可以由其他材料制成,只要它是柔性的。

[0211] 第一密封圈68可以由具有5mm圆形橡胶轮廓的实心材料制成,当被接纳入方形通道118中时,其变形进入具有4mmX4mm方形轮廓的形状中。在这样的结构中,前面的环提供了坚实的预压缩密封,用于将密封部件16固定在安装板14和壳体32之间。

[0212] 本领域的技术人员还应当意识到,本发明并不局限于以上所描述的实施例。所述的添加或修改,在不互相排斥的情况下,可以组合以形成被认为在本发明的范围内的进一步的实施例。

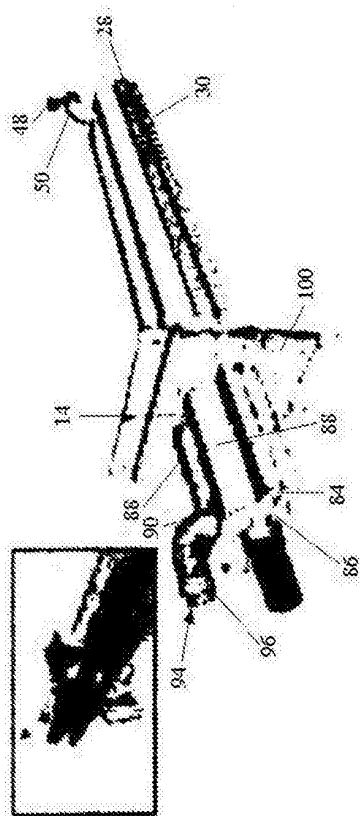


图1

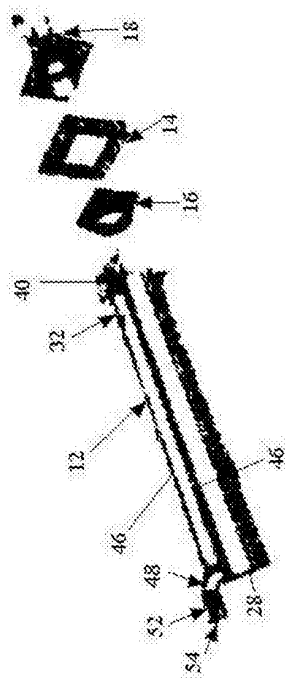


图2

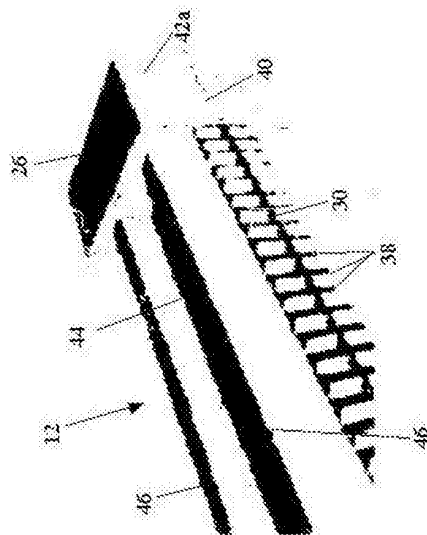


图3

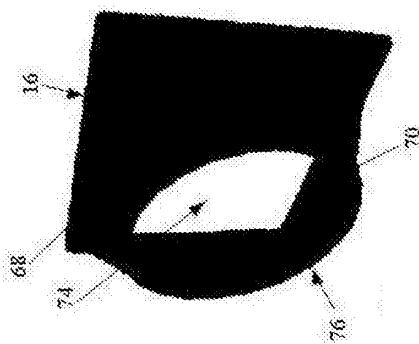


图4

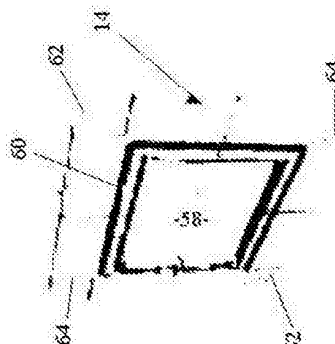


图5

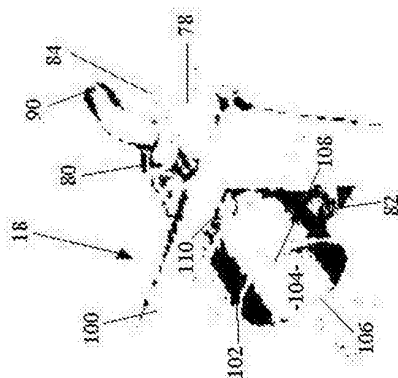


图6

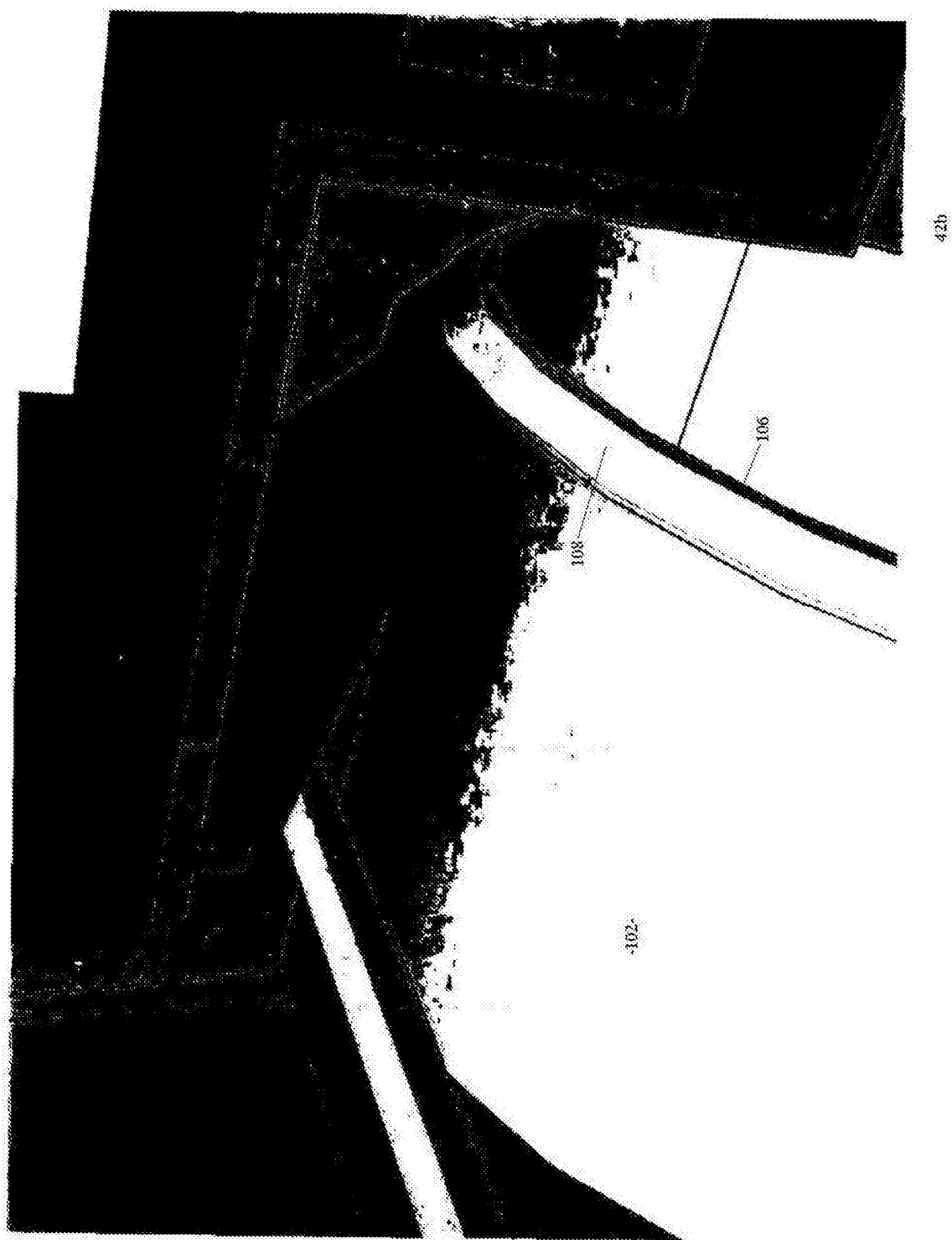


图7

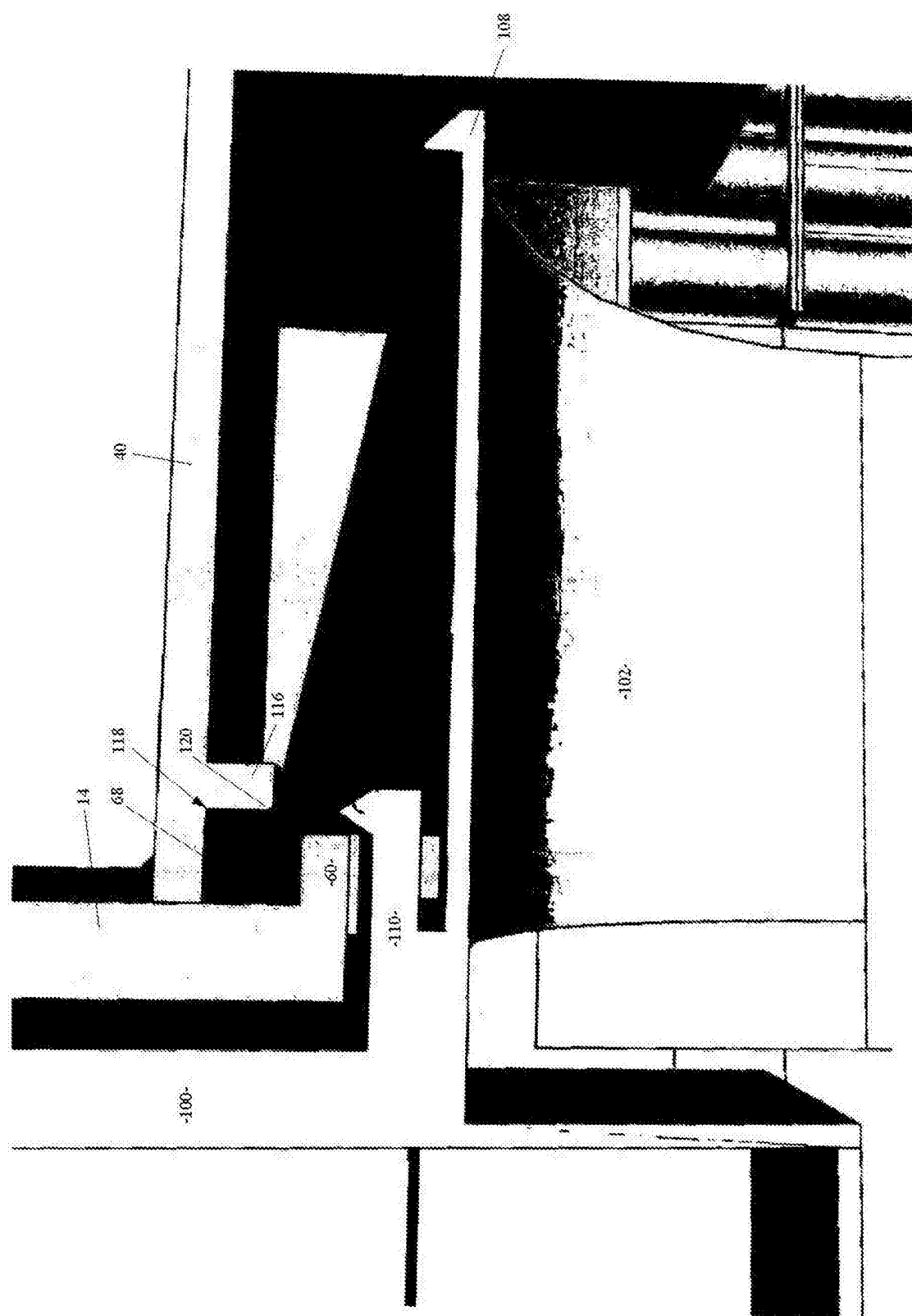


图8

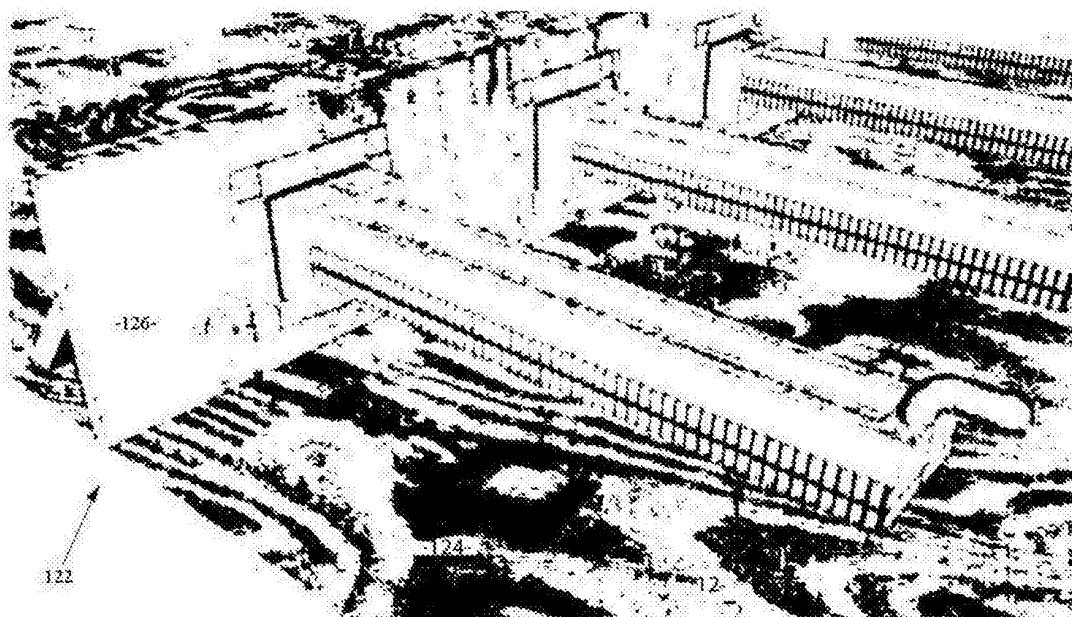


图9-1

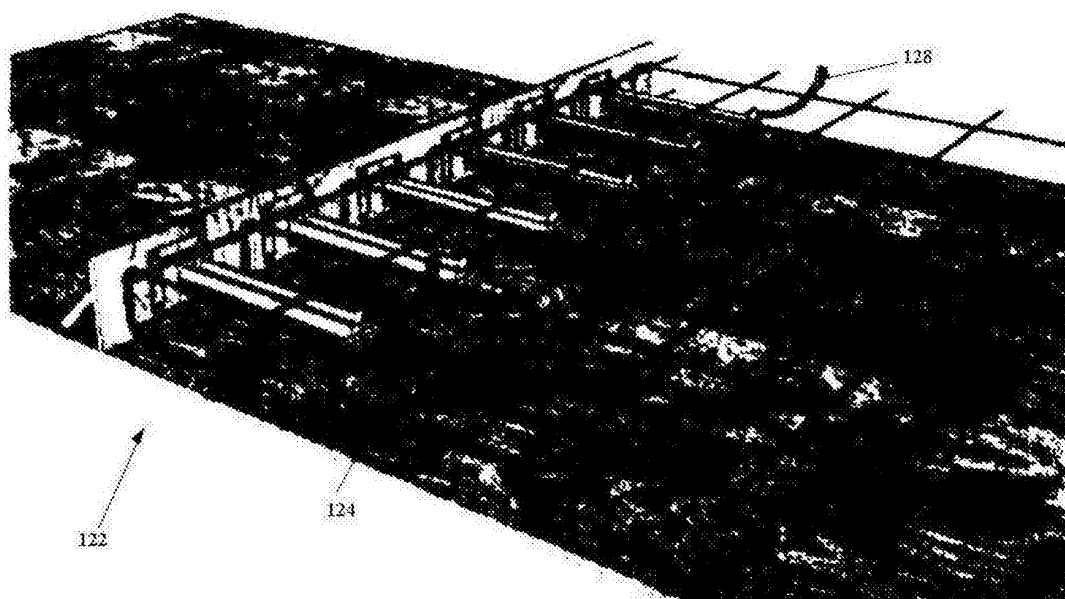


图9-2

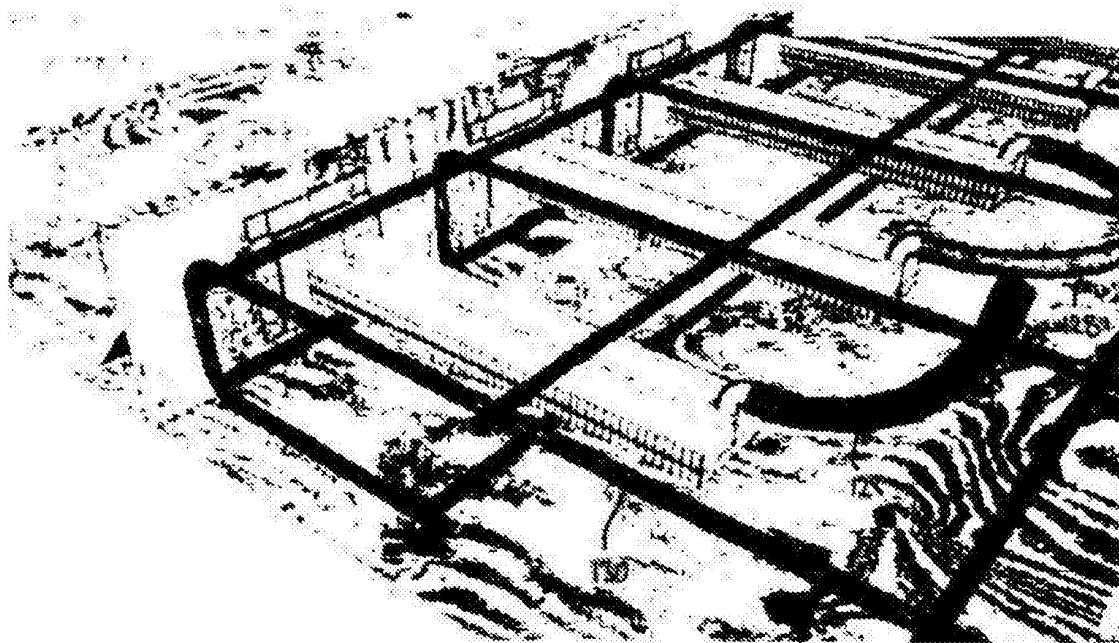


图9-3

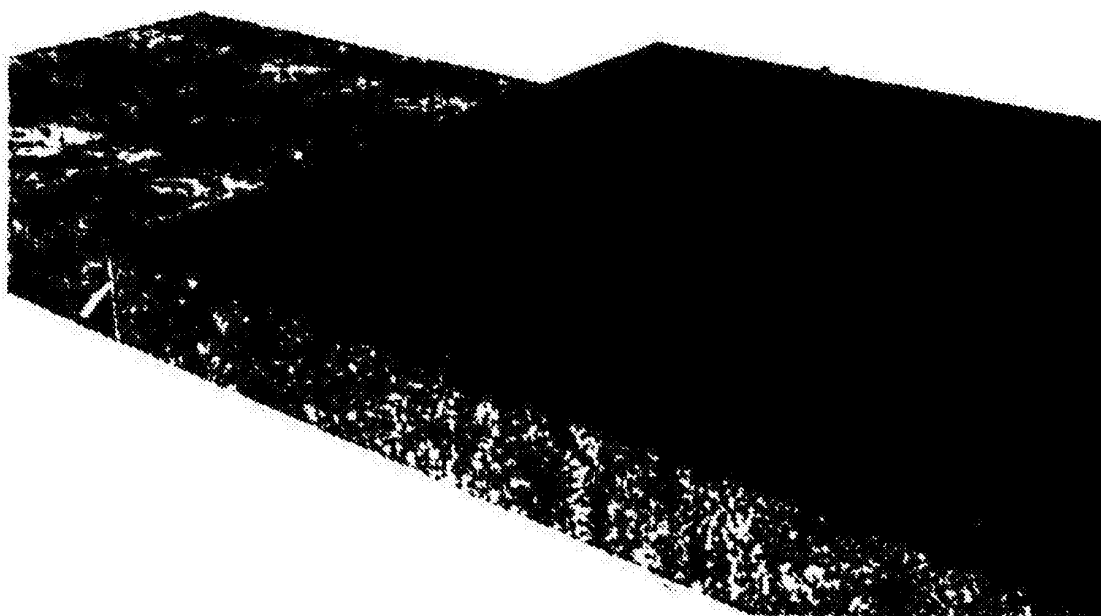


图9-4

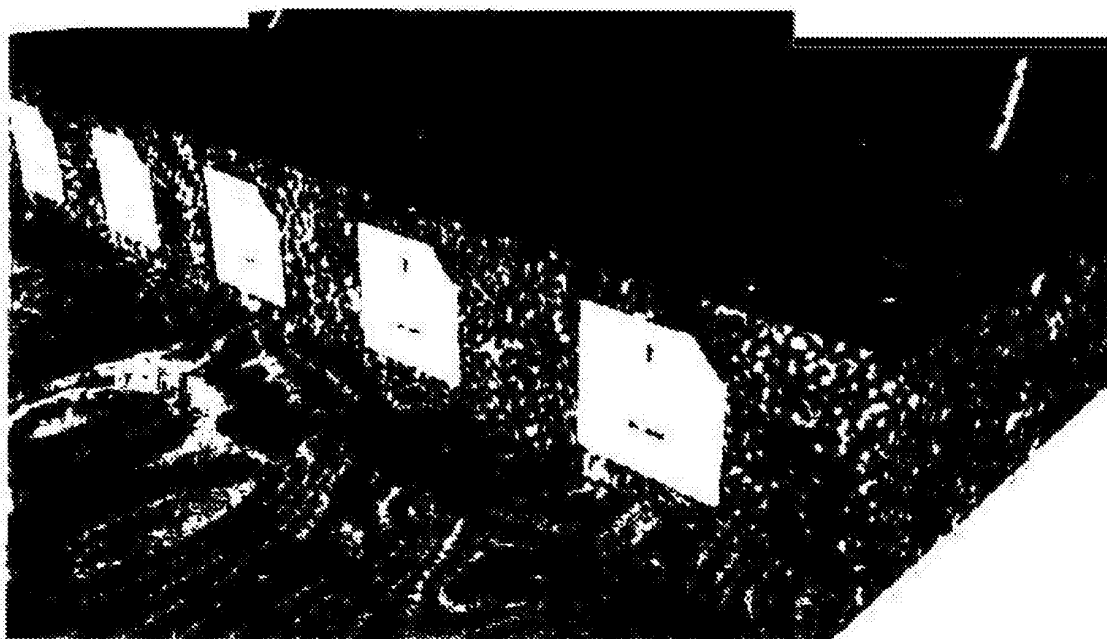


图9-5

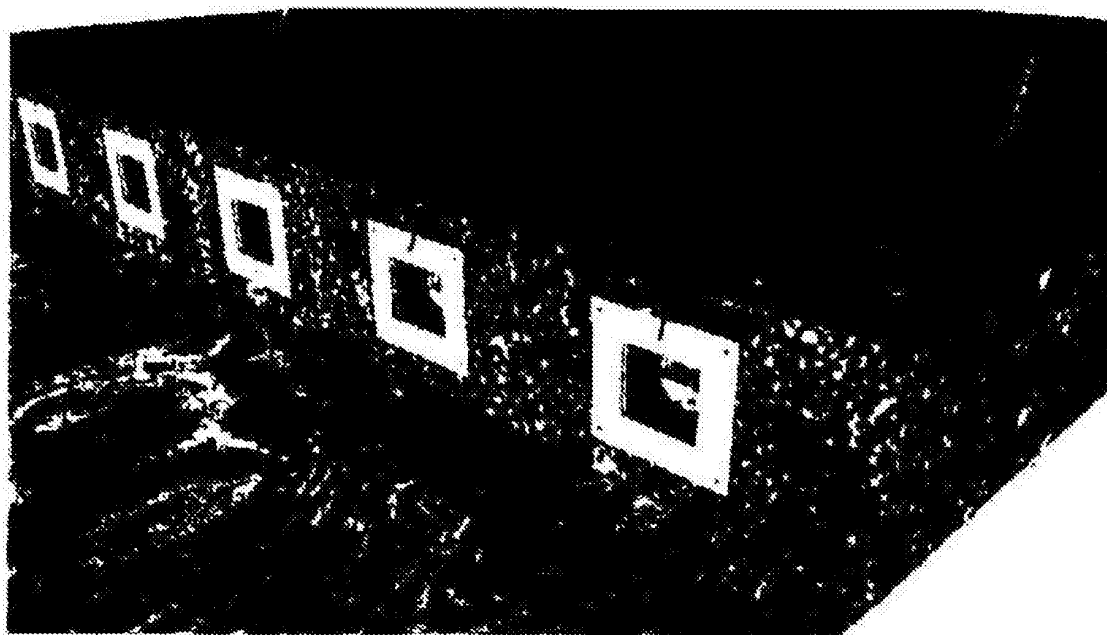


图9-6

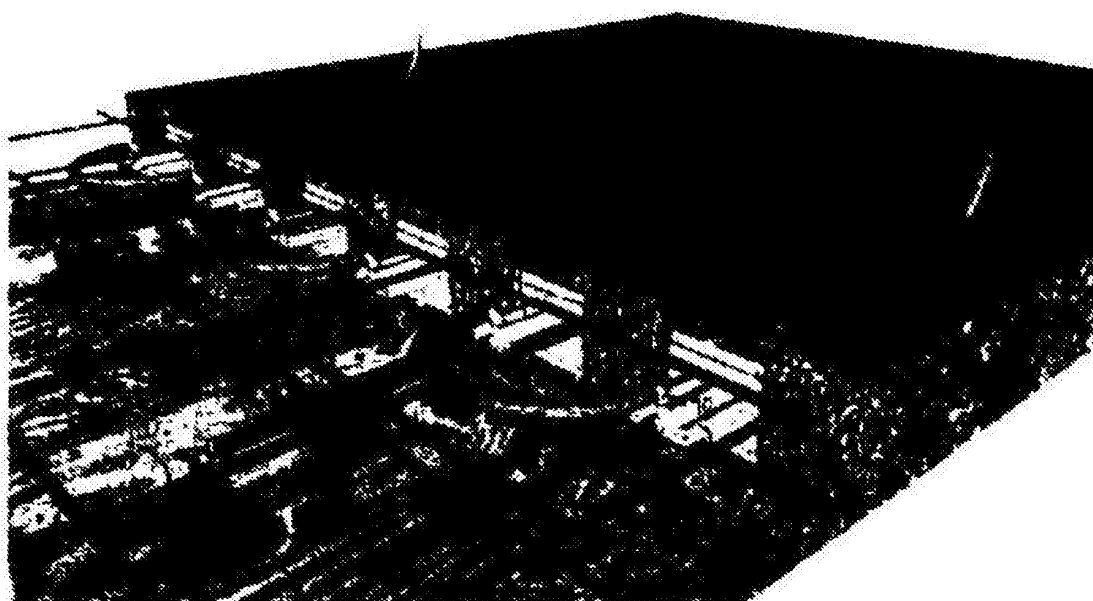


图9-7



图9-8

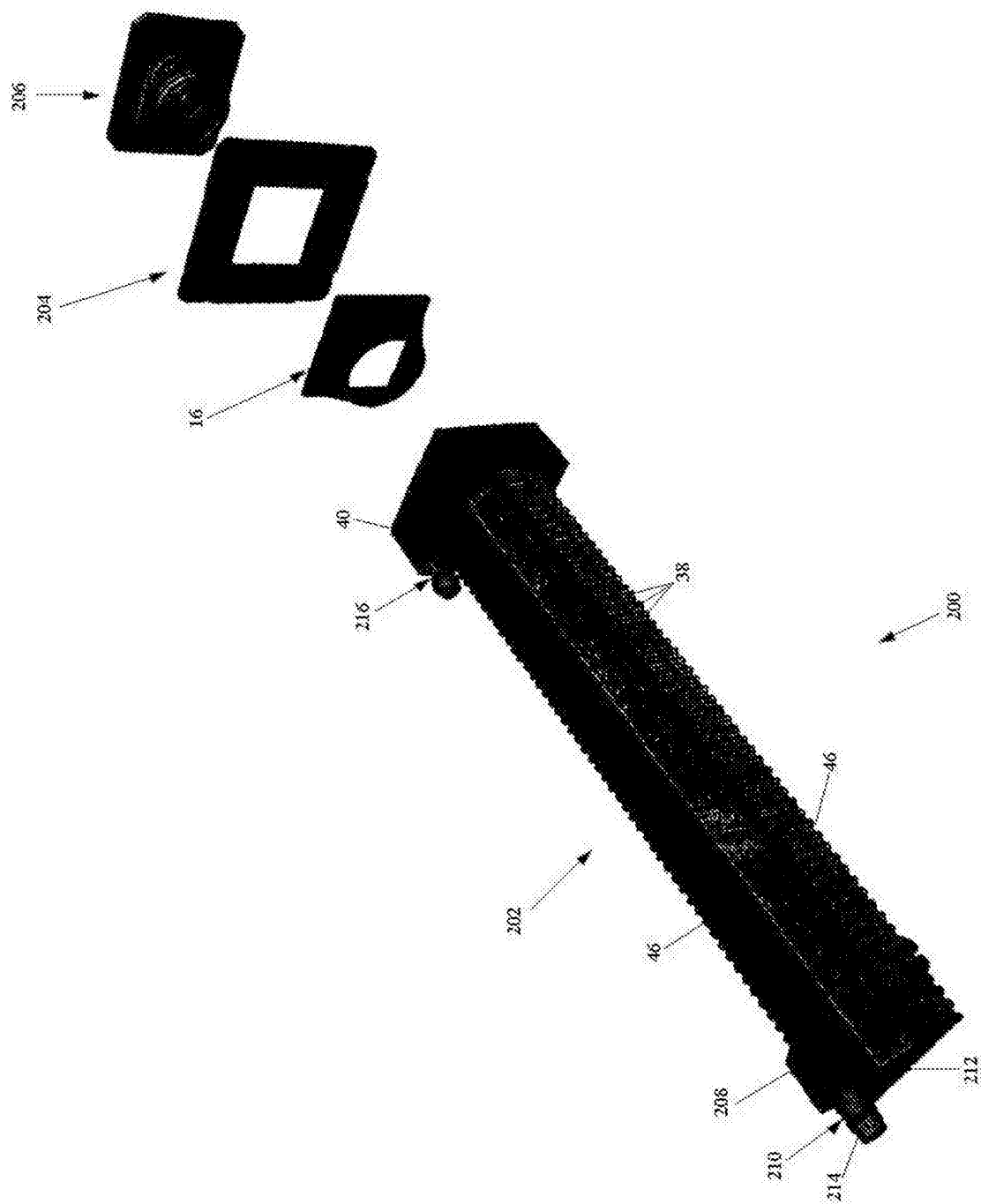


图10

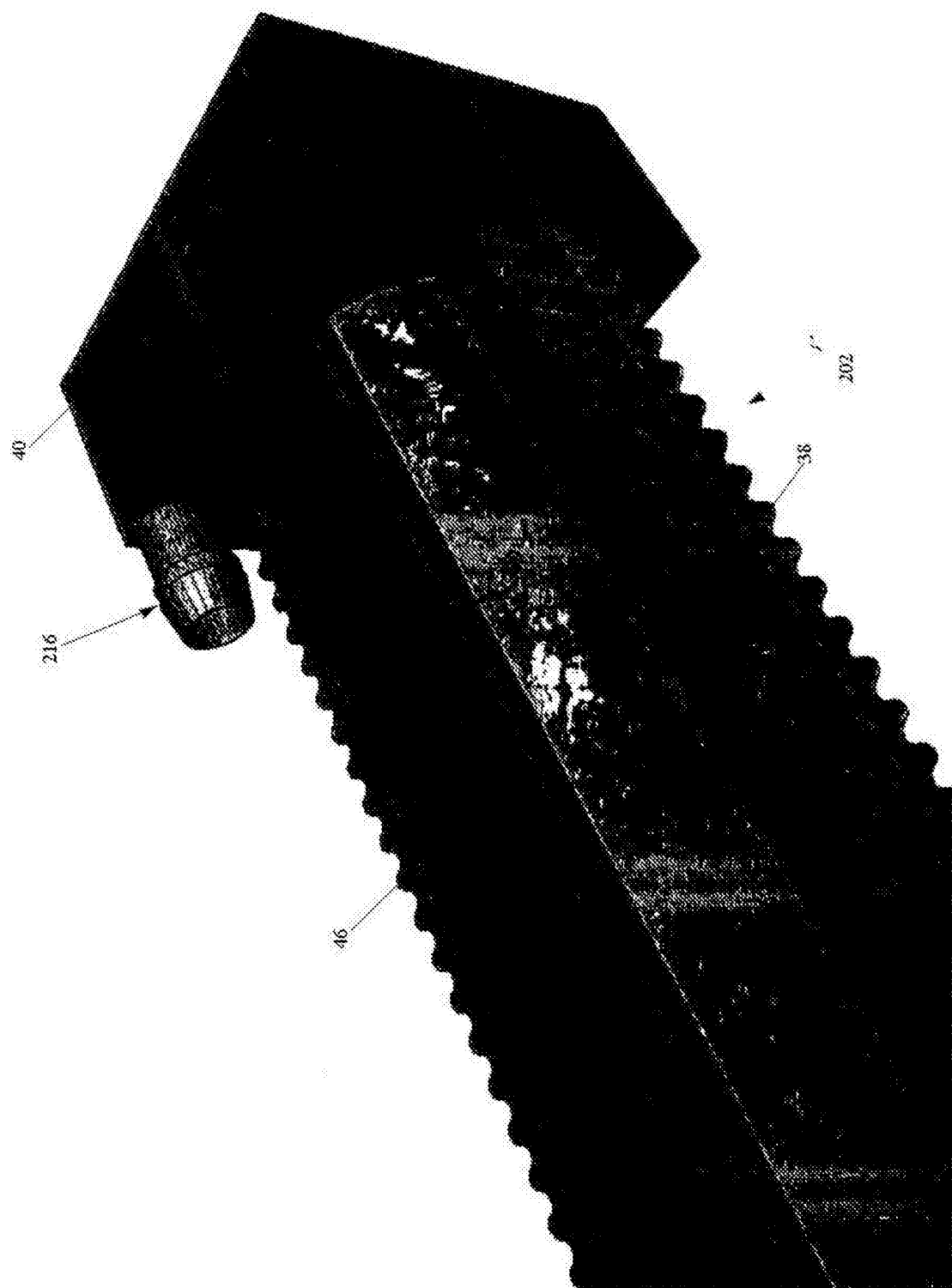


图11

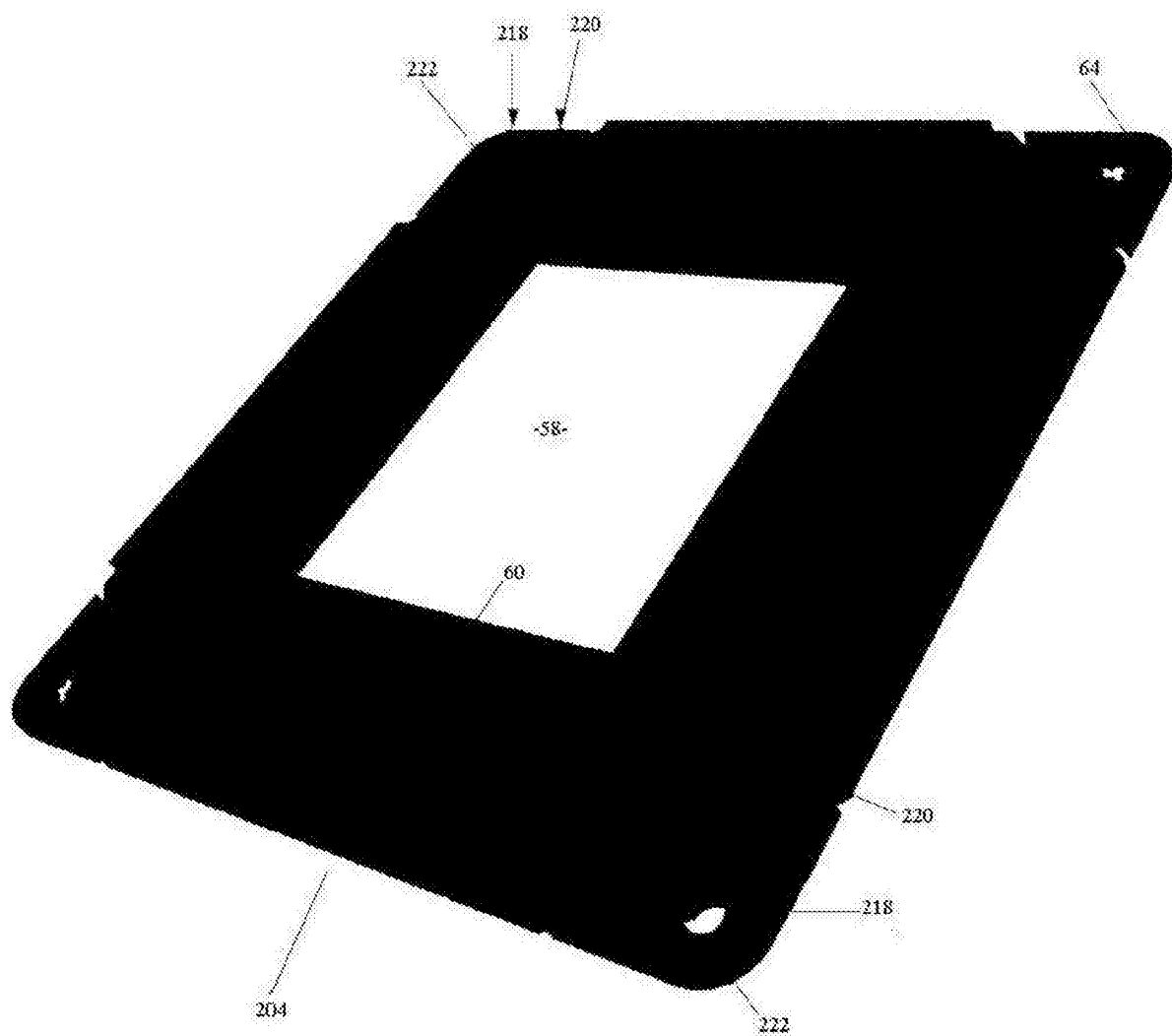


图12

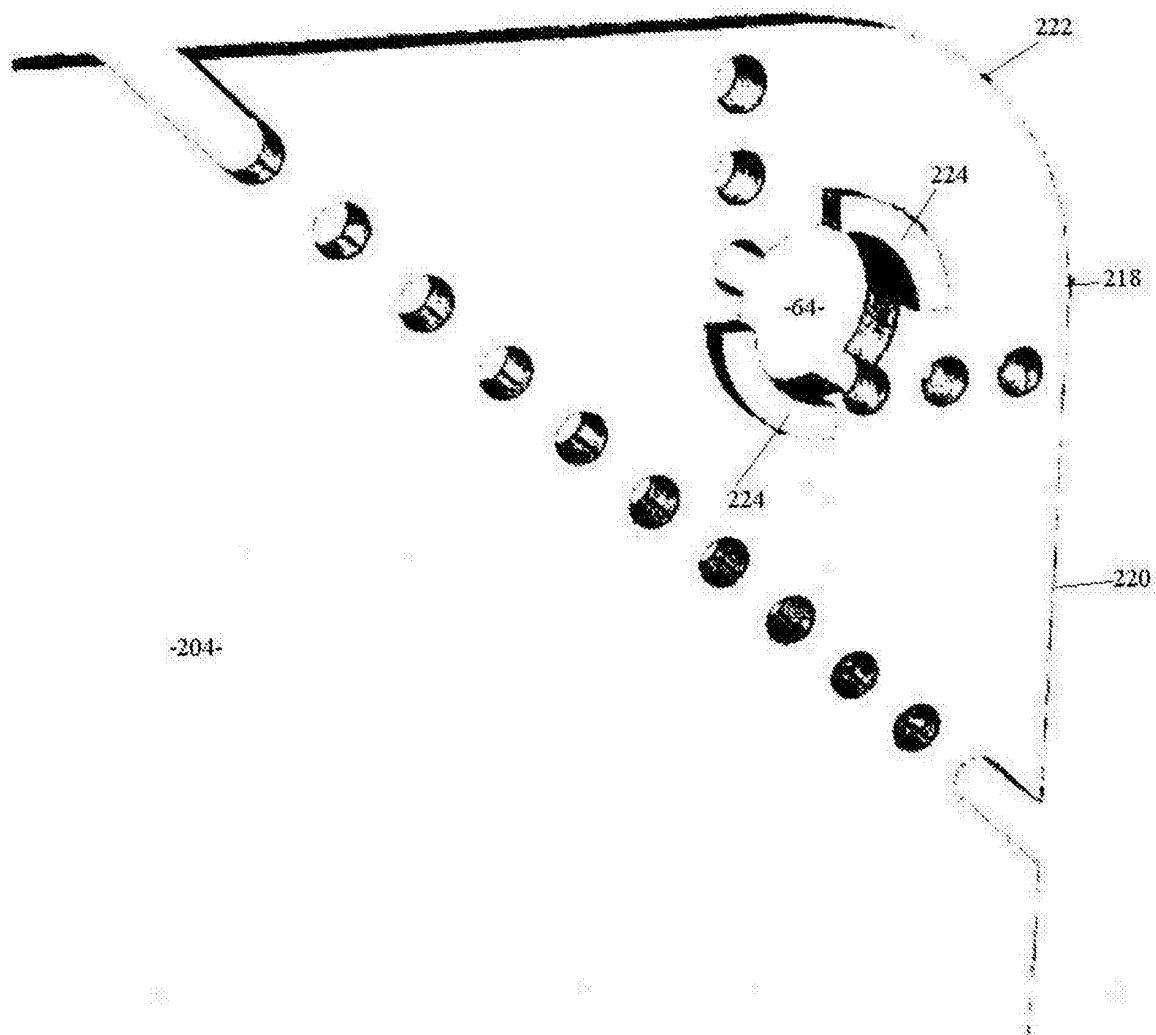


图13

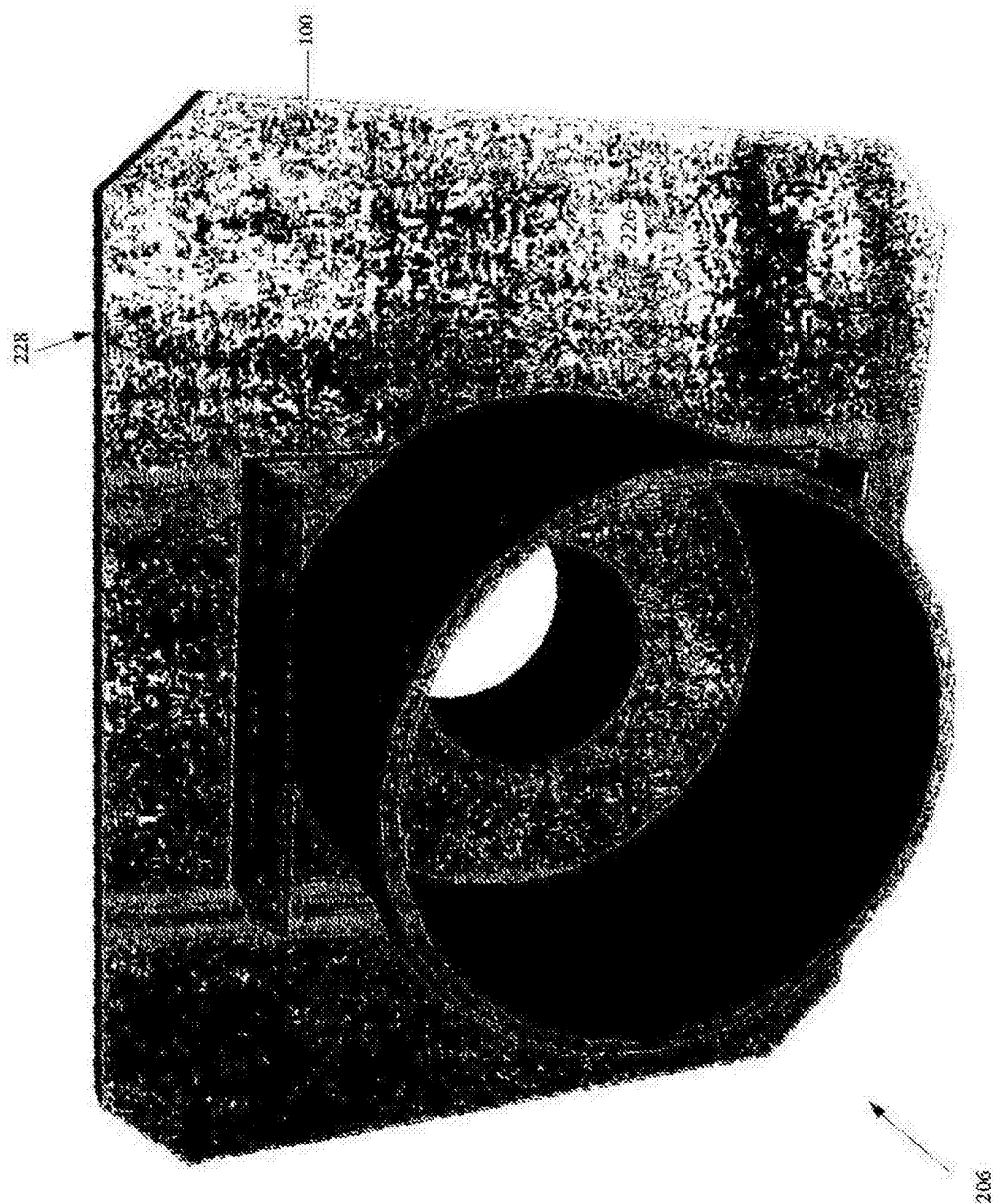


图14

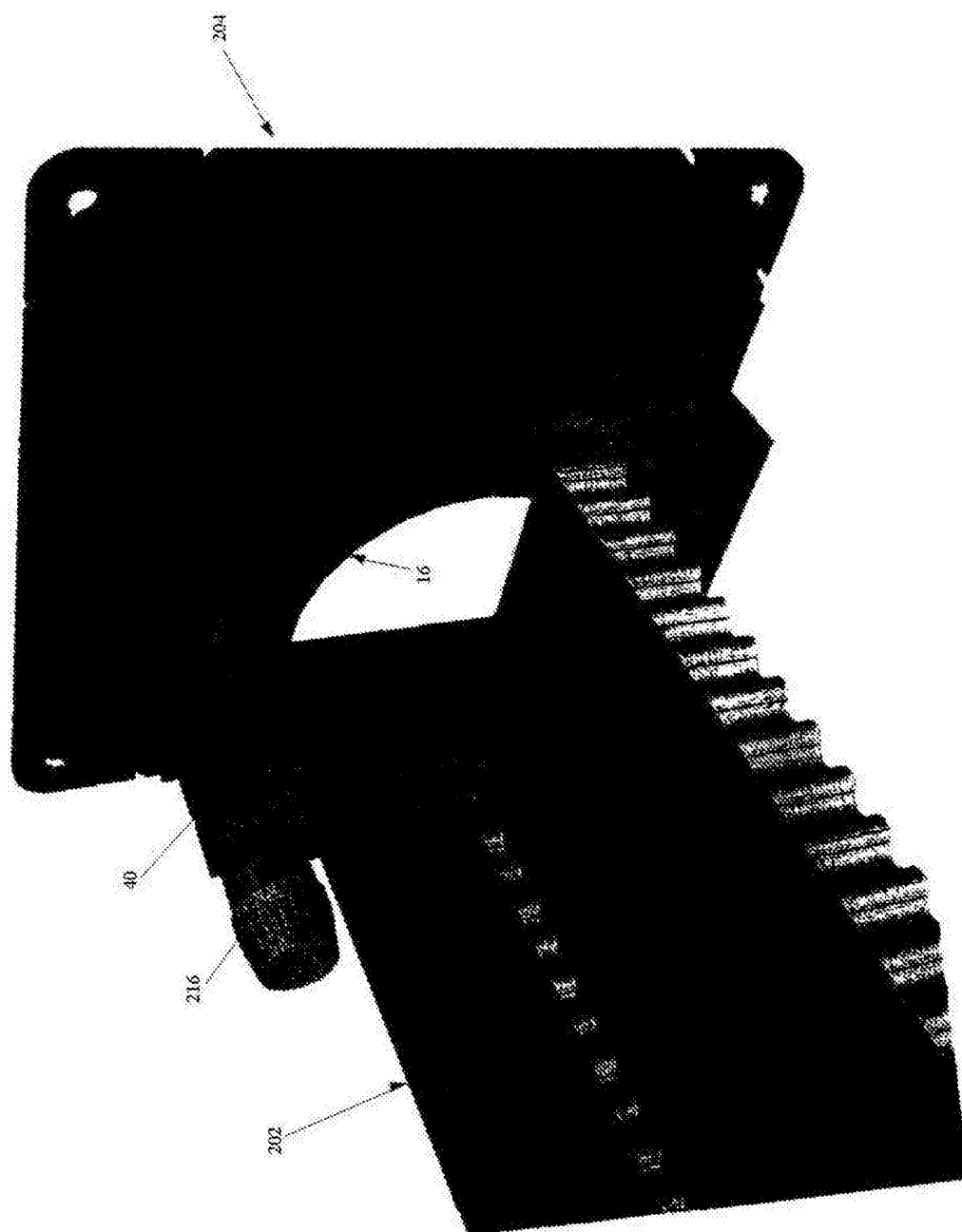


图15

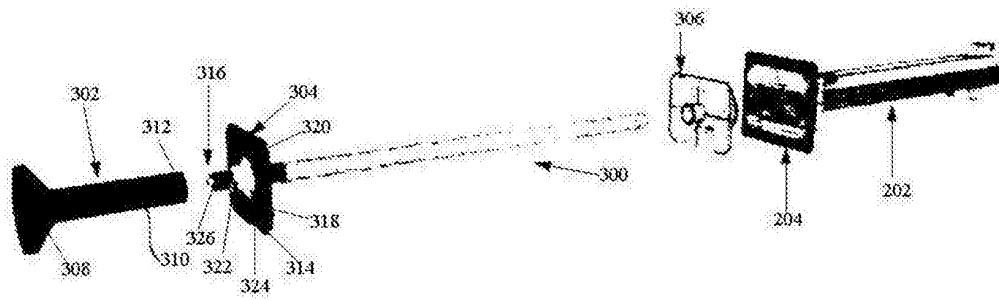


图16

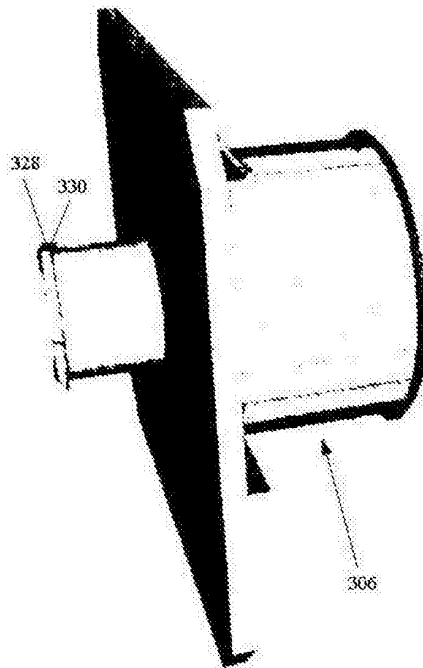


图17

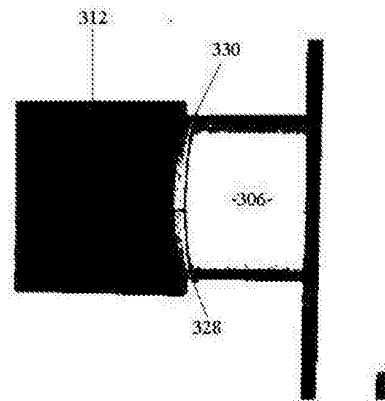


图18

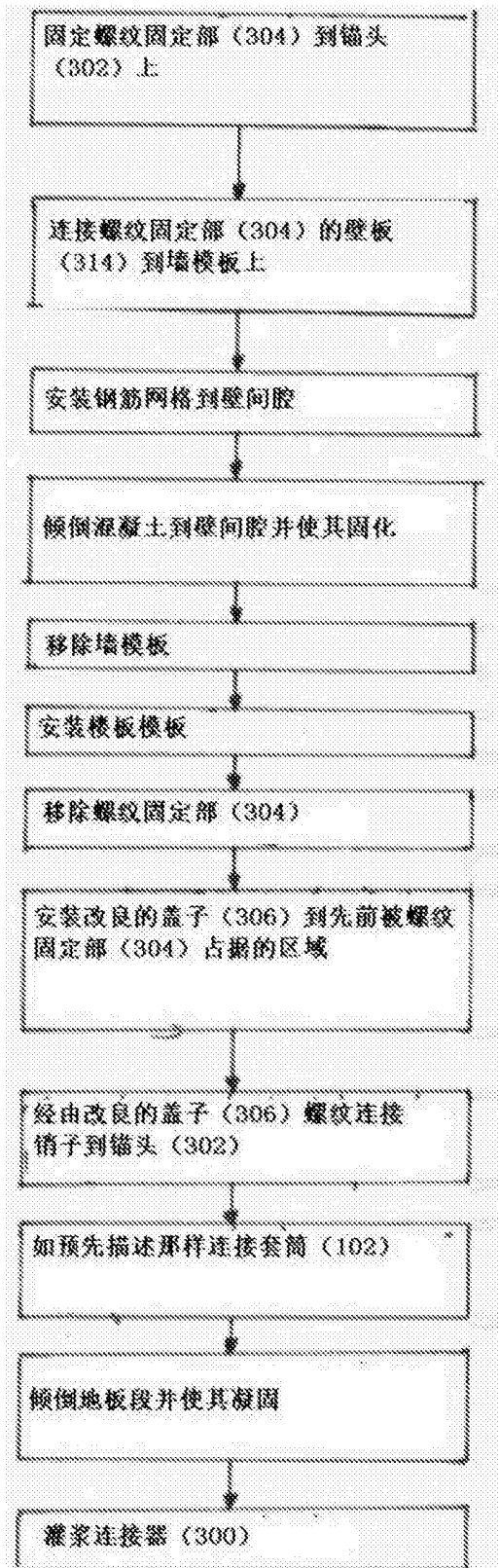


图19

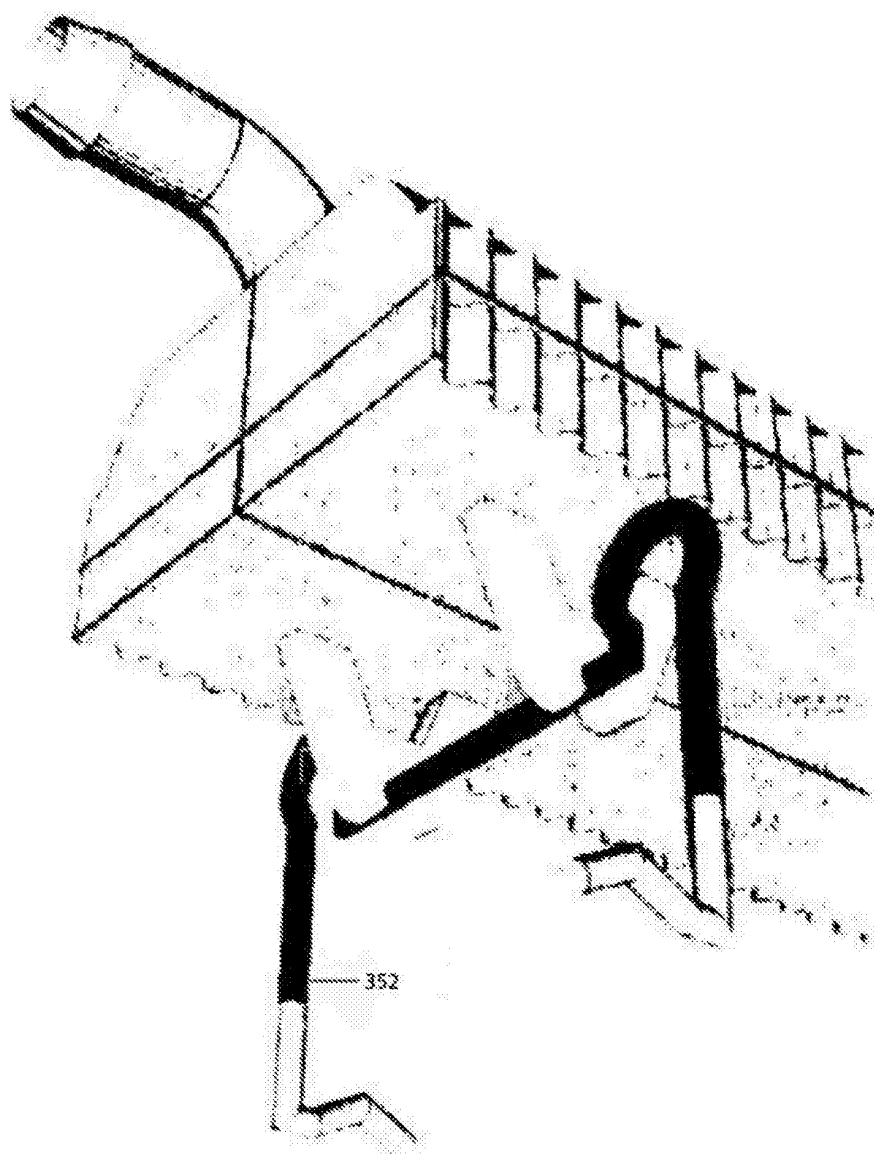


图20

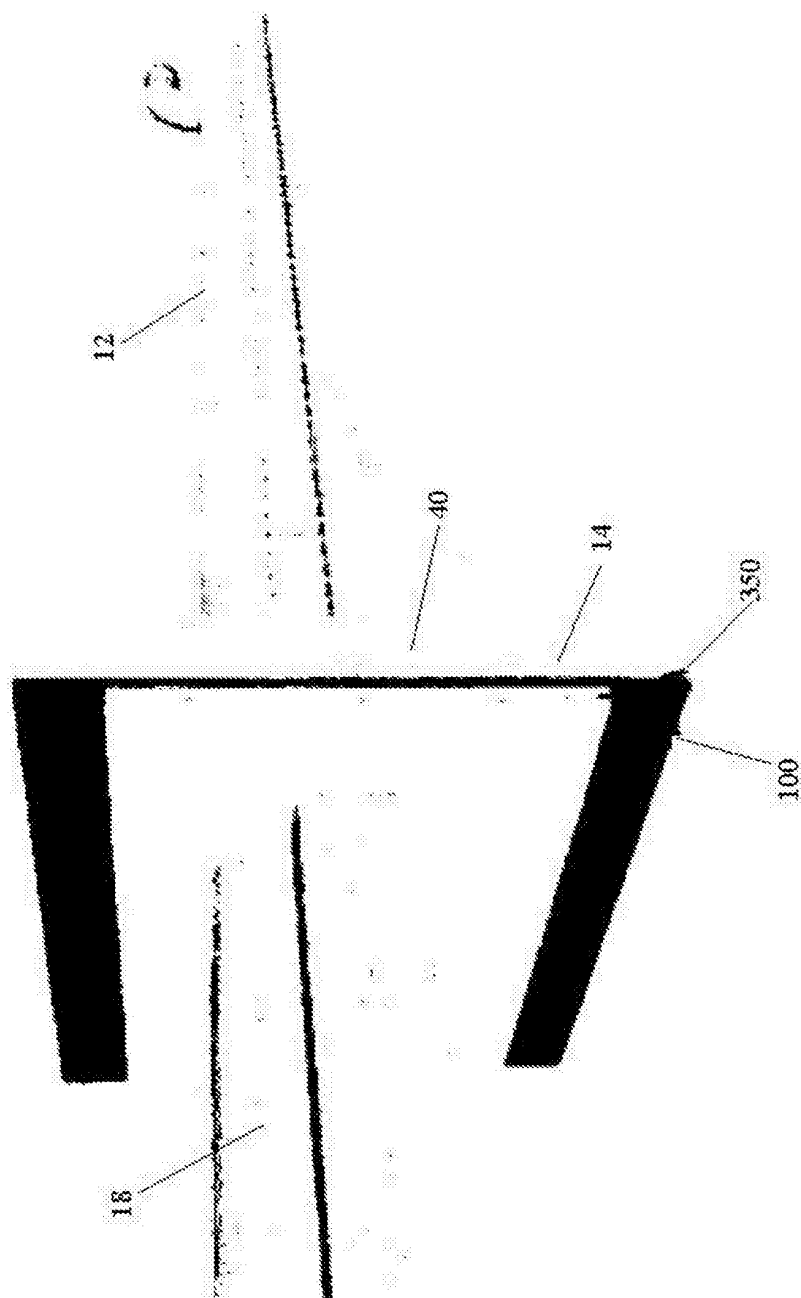


图21