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(54) **FLOOR ELEMENT LOCK DEVICE, ASSEMBLY COMPRISING SAID FLOOR ELEMENT LOCK DEVICE AND BUILDING COMPRISING SAID ASSEMBLY**

(57) A floor element lock device arranged for locking a modular load bearing floor element to a further element of a building, said floor element lock device comprising:
- a floor element lock device housing that is arranged for being received inside said modular load bearing floor element and arranged for fixating said floor element lock device relative to said modular load bearing floor element;
- a floor locking arrangement connected to and at least partly provided in said floor element lock device housing and arranged such that said floor locking arrangement is operable from a side of said floor element lock device that is opposite to a side of said floor element lock device that is facing, in use, said further element for locking said modular load bearing floor element to said further element of said building.

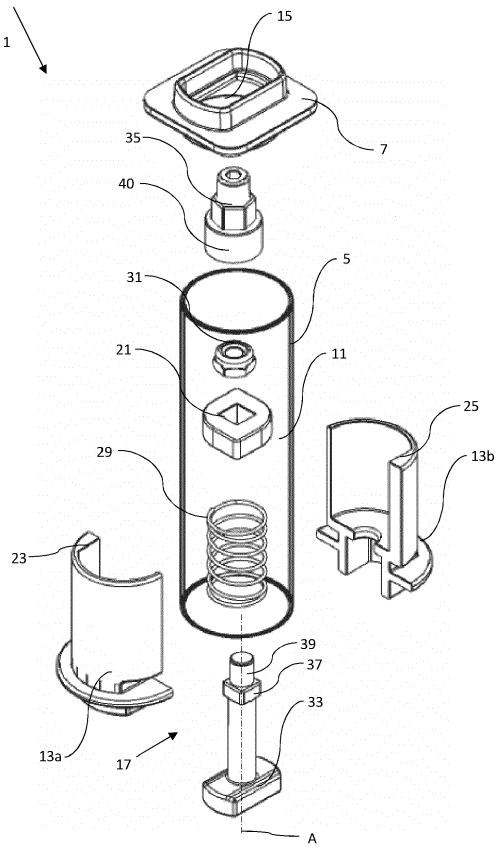

Fig. 6

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Description

[0001] According to a first aspect, the present disclosure relates to a floor element lock device arranged for locking a modular load bearing floor element to a further element of a building.

[0002] According to a second aspect, the present disclosure relates to an assembly comprising the floor element lock device according to the first aspect of the present disclosure.

[0003] According to a third aspect, the present disclosure relates to a building comprising an assembly according to the second aspect of the present disclosure.

[0004] Known load bearing floors may be realised by using concrete elements that may be reinforced by metal. The concrete elements may by coupled to a further element of a building such as a wall of the building using for instance glue or mortar. Alternatively, known concrete elements may be connected to the further elements through anchors or be placed on the further element without the use any additional material. A drawback of these ways of connecting a floor element to the further element is that it may be relatively difficult to achieve a predetermined position of the wall relative to the further element.

[0005] An objective of the present disclosure is to provide a floor element lock device overcoming the drawback indicated.

[0006] The objective is realised by providing a floor element lock device comprising:

- a floor element lock device housing that is arranged for being received inside said modular load bearing floor element and arranged for fixating said floor element lock device relative to said modular load bearing floor element;
- a floor locking arrangement connected to and at least partly provided in said floor element lock device housing and arranged such that said floor locking arrangement is operable from a side of said floor element lock device that is opposite to a side of said floor element lock device that is facing, in use, said further element for locking said modular load bearing floor element to said further element of said building,

wherein said floor locking arrangement comprises a floor lock element that is arranged for cooperating with said further element of said building and movable along a virtual rotation axis of said floor lock element relative to said floor element lock device housing between a first position and a second position, wherein in said first position said floor lock element is allowed to rotate about said virtual rotation axis between a first angular position and a second angular position, wherein said locking of said modular load bearing floor element to said further element, in use, is realised in said first angular position of said floor locking arrangement.

[0007] This is beneficial for allowing a constructor to lock the wall element lock device in a relative practical manner to the further element. By rotating the floor lock element about the virtual rotation axis the floor lock element may be positioned in a predetermined angular position related to the first angular position. The predetermined angular position may for instance correspond to a position wherein the floor lock element may perform a locking action onto the further element, whereas in the second angular position, no such locking action may be realised. Instead, the second angular position may be used for example for allowing to position the floor lock element at least partly in a recess provided in the further element. Once the floor lock element is in the first angular position, said locking may be realised by moving the floor lock element along said virtual rotation axis.

[0008] Providing a floor element lock device housing allows for providing the floor element lock device as an integral part of the modular load bearing floor element. In other words, during manufacturing of the modular load bearing floor element, the floor element lock device may be integrated in the modular load bearing floor element thereby allowing for a relative accurate positioning of the floor element lock device relative to the modular floor element. This is beneficial for allowing to realise a predetermined position of the wall relative to the further element during construction.

[0009] Moreover, by providing the floor element lock device housing as an integral part of the modular load bearing floor element the assembly according to the second aspect may be provided in a relative short time period.

[0010] The floor locking arrangement being operable from a side of said floor element lock device that is opposite to a side of said floor element lock device that is facing, in use, said further element for locking said modular load bearing floor element to said further element of said building is beneficial for allowing a constructor to lock the floor element lock device in a relative practical manner to the further element.

[0011] Preferably, said floor element lock device housing comprises a first support part that is arranged for bearing against a part of said modular load bearing floor element turned away, in use, from said further element of said building for fixating, in use, said floor element lock device housing relative to said modular load bearing floor element. This is beneficial for allowing a relative accurate positioning and fixation of the floor element lock device relative to the modular load bearing floor element. This is beneficial for allowing to realise a predetermined position of the wall relative to the further element during construction.

[0012] It is advantageous if said floor locking arrangement or said floor element lock device housing comprises a second support part that is arranged for bearing against a part of said modular load bearing floor element facing, in use, said further element of said building for fixating, in use, said floor locking arrangement relative to said modular load bearing floor element. This is beneficial for allowing a relative accurate positioning and fixation of

the floor element lock device relative to the modular load bearing floor element. This is beneficial for allowing to realise a predetermined position of the wall relative to the further element during construction.

[0013] Preferably, said floor lock element in said first angular position is at least partly provided outside said floor element lock device housing and said locking is realised, in use, by clamping said further element of said building between said floor element lock device housing and said floor lock element.

[0014] Preferably, said floor element lock device is provided with a rotation limiting arrangement arranged for limiting said rotation of said floor lock element, in said first position, between said first angular position and said second angular position.

[0015] It is advantageous, if said rotation limiting arrangement comprises a cam that is attached to said floor lock element and blocked for rotation relative to said floor lock element and wherein said rotation limiting arrangement further comprises a first end stop for blocking rotation beyond said first angular position.

[0016] Preferably, said floor element lock device comprises an urging element arranged for urging said floor lock element towards said second position.

[0017] In an embodiment of the floor element lock device according to the present disclosure said floor lock element is provided with a screw-thread and said floor locking arrangement further comprises an actuation arrangement arranged for cooperation with said screw-thread for moving said floor lock element relative to said floor element lock device housing upon rotation of said actuation arrangement relative to said floor lock element for realising said locking.

[0018] The actuation arrangement may be deployed for realising said locking by moving the floor lock element along said virtual rotation axis.

[0019] A further advantage of the floor element lock device according to the present disclosure is that the actuation arrangement may be used for unlocking said further element. To this end, the actuation arrangement is rotated about said virtual rotation axis in a direction of rotation opposite to the direction of rotation applied when realising said locking. When bringing the floor element lock device from the locked condition into the unlocked condition the floor lock element is firstly moved along said virtual rotation axis due to a rotation of the actuation arrangement about the virtual rotation axis. Once, a friction force between the floor lock element and the further element is below a predetermined level, the floor lock element is moved from the first angular position to the second angular position due to actuation of the actuation arrangement.

[0020] According to the second aspect, the present disclosure relates to an assembly comprising a floor element lock device according to the first aspect of the present disclosure, said assembly further comprising said modular load bearing floor element and said further element of said building, wherein said floor element lock device is fixated to said modular load bearing floor element and extends through said modular load bearing floor element from a first side to a second side and said further element is locked, by said floor element lock device, to said modular load bearing floor element.

[0021] Embodiments of the assembly correspond to embodiments of the floor element lock device according to the first aspect of the present disclosure. The advantages of the assembly correspond to the advantages of the floor element lock device according to the first aspect of the present disclosure presented previously.

[0022] Preferably, between said first side and said second side a conduit arranged for transporting a fluid is provided, wherein an inflow opening for said fluid of said conduit is provided at said first side or said second side and an outflow opening for said fluid of said conduit is provided at said first side or said second side.

[0023] Known assemblies comprising a load bearing floor may be realised by using concrete elements that may be reinforced by metal. For realising a relative large load bearing floor, these concrete elements may be placed next to each other. These concrete elements may be provided with a surface finishing layer of mortar that extends along an upper surface of the concrete elements to realise a desired surface finish. Before providing such a surface finishing layer, a conduit may be provided on the concrete elements, wherein the conduit may be arranged for transporting a fluid to provide heating via the surface finishing layer to a space provided above or below the load bearing floor.

[0024] The present disclosure relies at least partly on the insight that realising the known assembly requires multiple constructors of different disciplines performing subsequent assembly steps. Moreover, an assembly step, such as providing the surface finishing layer, may require a relative long time period before further construction activities may be performed due to the need for drying of for instance mortar or concrete. In addition, providing the conduit may be relative cumbersome if the conduit needs to be attached to the concrete floor elements before providing the surface finishing layer to avoid displacement of the conduit during an assembly step wherein the surface finishing layer is applied. The assembly according to present disclosure may be realised without the need for applying a surface finishing layer comprising the conduit thereby allowing to realise a load bearing floor provided with a conduit in a relative short time period.

[0025] In this regard, it is beneficial if said assembly comprises a plurality of said modular load bearing floor elements forming a load bearing floor, said assembly further comprising a plurality of said floor element lock device for locking to further elements of said building, wherein said load bearing floor further comprises a coupling arrangement for coupling for fluid flow an outflow opening of a first one of said modular load bearing floor elements to an inflow opening of a second one of said modular load bearing floor elements such that, in use,

flow of said fluid from said outflow opening to said inflow opening via said coupling arrangement is realised. The coupling arrangement avoids the need for providing a single conduit along the assembly. Instead, individual conduits from the modular load bearing floor elements are coupled allowing for a relative short time period for realising the load bearing floor.

[0026] Preferably, said further element comprises a floor lock element receiving space and said floor lock element is at least partly received in said floor lock element receiving space, wherein said further element is locked, by said floor element lock device, to said modular load bearing floor element by clamping said further element between said floor element lock device housing and said part of said floor lock element that is received in said floor lock element receiving space.

[0027] In a very practical embodiment, said further element is a modular wall element for realising a wall of said building.

[0028] According to the third aspect the present disclosure relates to a building comprising an assembly according to the second aspect of the present disclosure.

[0029] Embodiments of the building correspond to embodiments of the floor element lock device according to the first aspect of the present disclosure and/or the embodiments of the assembly according to the second aspect of the present disclosure. The advantages of the building correspond to the advantages of the of the floor element lock device according to the first aspect of the present disclosure and/or the embodiments of the assembly according to the second aspect of the present disclosure presented previously.

[0030] The present disclosure will now be explained by means of a description of a preferred embodiment of a floor element lock device, an assembly comprising the floor element lock device and a building comprising the assembly in which reference is made to the following schematic figures, in which:

Fig. 1: an isometric view of a floor element lock device is shown;
Fig. 2 and 3: a partly cut out view of the floor element lock device from Fig. 1 is shown;
Fig. 4: a cross-section of the floor element lock device from Fig. 1 in a first condition is shown;
Fig. 5: a cross-section of the floor element lock device from Fig. 1 in a second condition is shown;
Fig. 6: in exploded view elements of the floor element lock device from Fig. 1 are shown;
Fig. 7 and 8: a modular load bearing floor element is shown;
Fig. 9: a cross-section of the modular load bearing floor element from Fig. 7 is shown;
Fig. 10: a detail from Fig. 9 is shown;
Fig. 11: a side view, partly in cross-section, of a modular load bearing floor element according the first aspect of the present disclosure is shown;
Fig. 12: an assembly comprising a modular load bearing floor element and a floor element lock device is shown;
Fig. 13 and 14: another assembly comprising a modular load bearing floor element and a floor element lock device is shown;
Fig. 15: a method for realising a load bearing floor is shown.

[0031] Floor element lock device 1 is arranged for locking a modular load bearing floor element 301 to a further element of a building 201. The further element may for instance be a modular wall element 207 or a positioning device 205. The floor element lock device 1 is provided with a floor element lock device housing 3. The floor element lock device housing 3 comprises an elongated profile 5, a first support part 7 and a second support part 13. The elongated profile 5 may be provided inside the modular load bearing floor element 301. The first support part 5 is designed for being at least partly received in a foam 115 that is provided inside the modular load bearing floor element 301. The first support part 7 is arranged for bearing against a part of said modular load bearing floor element 301 that in use is turned away from the further element to which the modular load bearing floor element 301 is to be locked. The second support part 13 is arranged for bearing against a part of said modular load bearing floor element 301 that in use is facing the further element. The second support part 13 may comprises two identical elements 13a and 13b for allowing to replace the second support part 13 for instance in case of damage to the second support part 13.

[0032] The floor element lock device 1 further comprises a floor locking arrangement 9. The floor locking arrangement 9 is connected to and at least partly provided in the elongated profile 5. The floor locking arrangement 9 is operable via an opening 15 in the first support part 7 and an inner space 11 of the elongated profile 5 from a side of said floor element lock device 1 that in use is opposite to a side of said floor element lock device 1 that is facing the further element for locking the modular load bearing floor element 301 to the further element of said building. The second support part 13 extents at least partly in the inner space 11 of the elongated profile 5 for providing stability to the floor locking arrangement 9. The first support part 7, the elongated profile 5 and the second support part 13 are in use fixated to the modular load bearing floor element 301.

[0033] The floor locking arrangement 9 comprises a floor lock element 17 and a rotation limiting arrangement 19. The floor lock element 17 is arranged for cooperating with the further element and is movable along a virtual rotation axis A of the floor lock element 17 relative to the floor element lock device housing 3 between a first position and a second position. An urging element 29 urges the floor lock element 17 towards the second position. At a first end thereof the urging element 29 urges against the second support part 13. At a second end, opposite the first end, of the urging element 29 the urging element

urges 29 against a cam 21. The cam 21 is part of the rotation limiting arrangement 19. Preferably said second support part 13 is provided with a urging element receiving recess (not shown). The urging element receiving recess is preferably dimensioned such that in a locked condition of the floor element lock device, the urging element is completely received in said urging element receiving recess for allowing the cam 21 to be pressed against second support part 13. The floor lock element 17 is provided with a clamping organ 33. The clamping organ 33 has a substantially rectangular shape in a direction perpendicular to the virtual rotation axis A.

[0034] In the first position, shown in Fig. 5, the floor lock element 17 is allowed to rotate about the virtual rotation axis A between a first angular position and a second angular position. The rotation between the first angular position and the second angular position is limited by the rotation limiting arrangement 19, wherein the locking of the modular load bearing floor element 301 to the further element, in use, is realised in said first angular position of the floor lock element 17. The rotation limiting arrangement 19 comprises the cam 21, a first end stop 23 and a second end stop 25. The first end stop 23 and the second end stop 25 are provided as an integral part of the second support part 13. The first end stop 23 and the second end stop 25 are realised by a local reduction of an inner diameter of the second support part 13.

[0035] The cam 21 is attached to the floor lock element 17 and blocked for rotation relative to the floor lock element 17. The cam 21 is blocked for rotation relative to the floor lock element 17 by providing the cam 21 with a surface contour 37 that is arranged to provide a form-locked connection with the floor lock element 17. The cam 21 is arranged such that the cam 21 may slide along the virtual axis A over the surface contour 37. At a side of the cam 21 facing away from the clamping organ 33 movement of the cam along the virtual axis A is limited by an actuation arrangement 27. The actuation arrangement 27 is arranged for operating the floor locking arrangement 9.

[0036] The actuation arrangement 27 comprises an actuation element 35 and optionally a nut 31. The movement of the cam 21 along the surface contour may be realised by screwing the nut 31 and/or the actuation element 35 onto the floor lock element 17. The floor lock element 17 is provided with a screw thread 39 arranged for cooperation with the nut 31 and/or the actuation element 35. In a first embodiment of the floor element lock device 1 a screwing action of the nut 31 causes a change in distance between the nut 31 and the clamping organ 33. The actuation element 35 provides an interface between an operator and the nut 31 for transferring a rotation to the nut 31. In this embodiment the actuation element 35 may be movable relative to the nut 31 in the direction of the virtual axis A. Alternatively or in addition, the actuation element 35 may be provided with screw thread for cooperation with the screw thread 39 provide onto the floor lock element 17. In this alternative embodiment, the actuation element 35 is arranged for driving the cam 21 along said surface contour in the direction of said clamping organ 33 beyond a position that may be achieved with the nut 31. To this end the actuation element 35 is provided with a protruding wall piece 40 that overcomes a distance between the screw thread provided on the actuation element 35 and the cam 21.

[0037] Operation of the floor locking arrangement 9 through actuation of the actuation arrangement 27 may result in the cam 21 to contact the first end stop 23 and/or the second end stop 25. Once the cam 21 is in contact with the first end stop 23 and/or the second end stop 25 a further actuation of the actuation arrangement 27 in a direction of rotation about the virtual rotation axis A that is identical to the direction of rotation about the virtual rotation axis A performed for realising the cam 21 to become in contact with the first end stop 23 will cause a compression of the urging element 29 and a reduction of a distance between the floor element lock device housing 3 and the floor lock element 17. In an embodiment of the floor element lock device 1, the reduction of the distance between the floor element lock device housing 3 and the floor lock element 17 is a result of moving the cam 21 along the surface contour towards the clamping organ 33.

[0038] By providing the floor lock element 17, in said first angular position, at least partly outside the floor element lock device housing 3 a reduction of the distance between the floor element lock device housing 3 and the floor lock element 17 allows clamping of the further element of the building between said floor element lock device housing 3 and said floor lock element 17.

[0039] Modular load bearing floor element 101 is arranged for realising a load bearing floor 203 of a building 201. The load bearing floor 203 may comprise a plurality of modular load bearing floor elements 101 that are placed next to each other. The modular load bearing floor element 101 comprises a first side, being preferably an upper side 103 of the load bearing floor element 101 when forming the load bearing floor 203. A second side, being preferably a lower side 105 of the load bearing floor element 101 when forming the load bearing floor 203, is opposite of said first side 103. The upper side 103 and the lower side 105 are formed by sheet elements, preferably sheet elements provided with wood. Between the upper side 103 and the lower side 105 elongated ribs 113 and a foam 115, preferably a polyurethane foam, are provided. The elongated ribs 113 provide the modular load bearing floor element 101 with a predetermined stiffness. At a third side 117 of the modular load bearing floor element 101, the foam 115 is provided with a protrusion 119 that is arranged for cooperation with a foam recess 121 at a fourth side 123 of the modular load bearing floor element 101.

[0040] Between the upper side 103 and the lower side 105 a conduit 107 is provided. The conduit may for instance be formed from a metal or plastic tube that may be foldable or flexible. The conduit 107 is provided closer

to the first side 103 than to the second side 105 and arranged for transporting a fluid such as water for cooling and/or heating the modular load bearing floor element 101 and thereby heating and/or cooling a part of the building. The conduit 107 is provided with an inflow opening 109 for allowing the fluid to enter the conduit 107 and an outflow opening 111 for allowing the fluid to exit the conduit 107. The inflow opening 109 and the outflow opening 111 are both provided on the upper side 103 for allowing a relative practical coupling of conduits 107 of neighbouring modular load bearing floor elements 101 of the load bearing floor. The inflow opening 109 and the outflow opening 111 are respectively provided in a wall part of a first recess 127 and a wall part of a second recess (not shown). The first recess 127 and the second recess are designed such that a coupling element 129 may be received in the first recess 127 and the second recess. The coupling element 129 is part of a coupling arrangement 131 for coupling for fluid flow the outflow opening 111 of modular load bearing floor element 101 to inflow opening 109 of a neighbouring modular load bearing floor element 101 such that, in use, flow of said fluid from said outflow opening 111 to said inflow opening 109 via said coupling element 129 is realised. The conduit 107 is connected to a heat spreader arrangement 125 for allowing to realise a relative large heat transfer rate between fluid in the conduit and the surrounding of the modular load bearing floor element 101.

[0041] Modular load bearing floor element 301 differs mainly from modular load bearing floor element 101 in that modular load bearing floor element 301 comprises floor element lock devices 1. Elements of modular load bearing floor element 301 that are similar to elements of modular load bearing floor element 101 are provided with reference numerals identical to the reference numerals used to indicate the elements of modular load bearing floor element 101. Modular load bearing floor element 301 is presented in the figures without the conduit, recesses, inflow opening and outflow opening for allowing to present the floor element lock device in a clear manner.

[0042] Assembly 209 of building 201 comprises a modular load bearing floor element 301, part of a load bearing floor 203, and a further element 205. Further element 205 is locked, by the floor element lock devices 1, comprised by the modular load bearing floor element 301, to the modular load bearing floor element 301. The further element 205 comprises a floor lock element receiving space 215. The floor lock element 17 is at least partly received in said floor lock element receiving space 215. The further element 205 is locked, by the floor element lock devices 1, to the modular load bearing floor element 301 by clamping the further element 205 between the floor element lock device housing 3 and the part of the floor lock element 17 such as the clamping organ 33 that is received in the floor lock element receiving space 215.

[0043] The further element 205 is further connected, via wall lock device 213, to an outer wall 211 of building 201, thereby locking modular load bearing floor element 301 to the outer wall 211. A modular wall element 207, forming an inner wall of building 201 is supported by the first support parts 7 of the floor element lock devices 1.

[0044] Assembly 309 of building 201 comprises a modular load bearing floor element 301, part of a load bearing floor 203, and a further element formed by a modular wall element 207 as part of an inner wall of building 201. The modular wall element 207 is connected to outer wall 211 of building 201 via fastening means 217. The modular wall element 207 comprises a floor lock element receiving space 219. The floor lock element 17 is at least partly received in said floor lock element receiving space 219. The modular wall element 207 is locked, by the floor element lock devices 1, to the modular load bearing floor element 301 by clamping the modular wall element 207 between the floor element lock device housing 3 and the part of the floor lock element 17 such as the clamping organ 33 that is received in the floor lock element receiving space 219.

[0045] Load bearing floor 203 comprises modular load bearing floor elements 301. The load bearing floor 203 further comprises coupling arrangement 131 for coupling neighbouring modular load bearing floor elements 301 of the load bearing floor 203. The coupling arrangement 131 comprises the coupling element 129 and fastening elements (not shown) for fastening the coupling element 129 to the neighbouring modular load bearing elements 301. The coupling element 129 is designed such that the coupling element 129 upon coupling to the neighbouring modular load bearing floor elements 301 results in a load bearing floor 203 having a substantially flat floor surface 221. The coupling arrangement 131 couples, via a coupling conduit (not shown) thereof, for fluid flow an outflow opening 111 of one of the modular load bearing floor element 301 to an inflow opening 109 of a neighbouring modular load bearing floor element 301 such that, in use, fluid may flow from said outflow opening 111, via the coupling conduit, to said inflow opening 109.

[0046] Method 401 for realising a load bearing floor such as load bearing floor 203 comprises a step 403 of providing modular load bearing floor elements 101, 301 and a step 405 of providing a coupling arrangement 131 for coupling for fluid flow the outflow opening 111 of the first one of said modular load bearing floor elements 101, 301 to the inflow opening 109 of said second one of said modular load bearing floor elements 101, 301 such that, in use, flow of said fluid from the outflow opening 111 to the inflow opening 109, via the coupling arrangement 131, is realised. In other words, the coupling arrangement 131 couples the conduits 107 of neighbouring modular load bearing floor elements 101, 103 for fluid flow.

[0047] Method 401 further comprises a step 407 of coupling, by the coupling arrangement 131, for fluid flow the outflow opening 111 of the first one of said modular load bearing floor elements 101, 301 to the inflow opening 109 of the second one of the modular load bearing floor elements 101, 301. Preferably, during the step of 407, the outflow opening 111 and the inflow opening 109 of

neighbouring modular floor elements 101, 301 are coupled for fluid flow via the coupling conduit of the coupling element 129.

[0048] Method 401 may further comprise the a step 409 of connecting, by the coupling element 129, the first one of said modular load bearing floor elements 101, 301 to the second one of the modular load bearing floor elements 101, 301 such that the floor surface 221 of the load bearing floor 203 is substantially flat.

CLAUSES:

[0049]

1. A floor element lock device (1) arranged for locking a modular load bearing floor element (301) to a further element (205, 207) of a building (201), said floor element lock device (1) comprising:

- a floor element lock device housing (3) that is arranged for being received inside said modular load bearing floor element (301) and arranged for fixating said floor element lock device (1) relative to said modular load bearing floor element (301) ;
- a floor locking arrangement (9) connected to and at least partly provided in said floor element lock device housing (3) and arranged such that said floor locking arrangement (9) is operable from a side of said floor element lock device (1) that is opposite to a side of said floor element lock device (1) that is facing, in use, said further element (205, 207) for locking said modular load bearing floor element (301) to said further element (205, 207) of said building (201).

2. A floor element lock device (1) according to clause 1, wherein said floor element lock device housing (3) comprises a first support part (7) that is arranged for bearing against a part of said modular load bearing floor element (301) turned away, in use, from said further element (205, 207) of said building (201) for fixating, in use, said floor element lock device housing (3) relative to said modular load bearing floor element (301).

3. A floor element lock device (1) according to clause 1 or 2, wherein said floor locking arrangement (9) or said floor element lock device housing (3) comprises a second support part (13) that is arranged for bearing against a part of said modular load bearing floor element (301) facing, in use, said further element (205, 207) of said building (201) for fixating, in use, said floor locking arrangement (9) relative to said modular load bearing floor element (301).

4. A floor element lock device (1) according to any one of the preceding clauses, wherein said floor locking arrangement (9) comprises a floor lock element (17) that is arranged for cooperating with said further element (205, 207) of said building (201) and movable along a virtual rotation axis (A) of said floor lock element (17) relative to said floor element lock device housing (3) between a first position and a second position, wherein in said first position said floor lock element (17) is allowed to rotate about said virtual rotation axis (A) between a first angular position and a second angular position, wherein said locking of said modular load bearing floor element (301) to said further element (205, 207), in use, is realised in said first angular position of said floor locking arrangement (9).

5. A floor element lock device (1) according to clause 4, wherein said floor lock element (17) in said first angular position is at least partly provided outside said floor element lock device housing (3) and said locking is realised, in use, by clamping said further element (205, 207) of said building (201) between said floor element lock device housing (3) and said floor lock element (17).

6. A floor element lock device (1) according to any one of the preceding clauses, wherein said floor element lock device (1) is provided with a rotation limiting arrangement (19) arranged for limiting said rotation of said floor lock element (17), in said first position, between said first angular position and said second angular position.

7. A floor element lock device (1) according to clause 6, wherein said rotation limiting arrangement (19) comprises a cam (21) that is attached to said floor lock element (17) and blocked for rotation relative to said floor lock element (17) and wherein said rotation limiting arrangement (19) further comprises a first end stop (23) for blocking rotation beyond said first angular position.

8. A floor element lock device (1) according to any one of the preceding clauses, wherein said floor element lock device (1) comprises an urging element (29) arranged for urging said floor lock element (17) towards said second position.

9. A floor element lock device (1) according to any one of the preceding clauses, wherein said floor lock element (17) is provided with a screw-thread and said floor locking arrangement (9) further comprises an actuation arrangement (27) arranged for cooperation with said screw-thread for moving said floor lock element (17) relative to said floor element lock device housing (3) upon rotation of said actuation arrangement (27) relative to said floor lock element (17) for realising said locking.

10. Assembly (209, 309) comprising a floor element lock device (1) according to any one of the preceding clauses, said assembly (209, 309) further comprising said modular load bearing floor element (301) and said further element (205, 207) of said building (201), wherein said floor element lock device (1) is fixated to said modular load bearing floor element (301) and extends through said modular load bearing

floor element (301) from a first side (103) to a second side (105) and said further element (205, 207) is locked, by said floor element lock device (1), to said modular load bearing floor element (301).

11. Assembly (209, 309) according to clause 10, wherein between said first side (103) and said second side (105) a conduit (107) arranged for transporting a fluid is provided, wherein an inflow opening (109) for said fluid of said conduit (107) is provided at said first side (103) or said second side (105) and an outflow opening (111) for said fluid of said conduit (107) is provided at said first side (103) or said second side (105).

12. Assembly (209, 309) according to clause 11, wherein said assembly (209, 309) comprises a plurality of said modular load bearing floor elements (301) forming a load bearing floor (203), said assembly (209, 309) further comprising a plurality of said floor element lock devices (1) for locking to further elements (205, 207) of said building (201), wherein said load bearing floor (203) further comprises a coupling arrangement (131) for coupling for fluid flow an outflow opening (111) of a first one of said modular load bearing floor elements (301) to an inflow opening (109) of a second one of said modular load bearing floor elements (301) such that, in use, flow of said fluid from said outflow opening (111) to said inflow opening (109) via said coupling arrangement (131) is realised.

13. Assembly (209, 309) according to any one of the clauses 10 to 12 comprising a floor element lock device (1) according to clause 5, wherein said further element (205, 207) comprises a floor lock element receiving space (215, 219) and said floor lock element (17) is at least partly received in said floor lock element receiving space (215, 219), wherein said further element (205, 207) is locked, by said floor element lock device (1), to said modular load bearing floor element (301) by clamping said further element (205, 207) between said floor element lock device housing (3) and said part of said floor lock element (17) that is received in said floor lock element receiving space (215, 219).

14. Assembly (309) according to any one of the clauses 10 to 13, wherein said further element is a modular wall element (207) for realising a wall (207) of said building (201).

15. Building (201) comprising an assembly (209, 309) according to any one of the clauses 10 to 14.

Claims

1. A floor element lock device (1) arranged for locking a modular load bearing floor element (301) to a further element (205, 207) of a building (201), said floor element lock device (1) comprising:

- a floor element lock device housing (3) that is arranged for being received inside said modular load bearing floor element (301) and arranged for fixating said floor element lock device (1) relative to said modular load bearing floor element (301) ;
- a floor locking arrangement (9) connected to and at least partly provided in said floor element lock device housing (3) and arranged such that said floor locking arrangement (9) is operable from a side of said floor element lock device (1) that is opposite to a side of said floor element lock device (1) that is facing, in use, said further element (205, 207) for locking said modular load bearing floor element (301) to said further element (205, 207) of said building (201),

wherein said floor locking arrangement (9) comprises a floor lock element (17) that is arranged for co-operating with said further element (205, 207) of said building (201) and movable along a virtual rotation axis (A) of said floor lock element (17) relative to said floor element lock device housing (3) between a first position and a second position, wherein in said first position said floor lock element (17) is allowed to rotate about said virtual rotation axis (A) between a first angular position and a second angular position, wherein said locking of said modular load bearing floor element (301) to said further element (205, 207), in use, is realised in said first angular position of said floor locking arrangement (9).

2. A floor element lock device (1) according to claim 1, wherein said floor element lock device housing (3) comprises a first support part (7) that is arranged for bearing against a part of said modular load bearing floor element (301) turned away, in use, from said further element (205, 207) of said building (201) for fixating, in use, said floor element lock device housing (3) relative to said modular load bearing floor element (301).

3. A floor element lock device (1) according to claim 1 or 2, wherein said floor locking arrangement (9) or said floor element lock device housing (3) comprises a second support part (13) that is arranged for bearing against a part of said modular load bearing floor element (301) facing, in use, said further element (205, 207) of said building (201) for fixating, in use, said floor locking arrangement (9) relative to said modular load bearing floor element (301).

4. A floor element lock device (1) according to any one of the preceding claims, wherein said floor lock element (17) in said first angular position is at least partly provided outside said floor element lock device housing (3) and said locking is realised, in use, by clamping said further element (205, 207) of said building

(201) between said floor element lock device housing (3) and said floor lock element (17).

5. A floor element lock device (1) according to any one of the preceding claims, wherein said floor element lock device (1) is provided with a rotation limiting arrangement (19) arranged for limiting said rotation of said floor lock element (17), in said first position, between said first angular position and said second angular position.

6. A floor element lock device (1) according to claim 5, wherein said rotation limiting arrangement (19) comprises a cam (21) that is attached to said floor lock element (17) and blocked for rotation relative to said floor lock element (17) and wherein said rotation limiting arrangement (19) further comprises a first end stop (23) for blocking rotation beyond said first angular position.

7. A floor element lock device (1) according to any one of the preceding claims, wherein said floor element lock device (1) comprises an urging element (29) arranged for urging said floor lock element (17) towards said second position.

8. A floor element lock device (1) according to any one of the preceding claims, wherein said floor lock element (17) is provided with a screw-thread and said floor locking arrangement (9) further comprises an actuation arrangement (27) arranged for cooperation with said screw-thread for moving said floor lock element (17) relative to said floor element lock device housing (3) upon rotation of said actuation arrangement (27) relative to said floor lock element (17) for realising said locking.

9. Assembly (209, 309) comprising a floor element lock device (1) according to any one of the preceding claims, said assembly (209, 309) further comprising said modular load bearing floor element (301) and said further element (205, 207) of said building (201), wherein said floor element lock device (1) is fixated to said modular load bearing floor element (301) and extends through said modular load bearing floor element (301) from a first side (103) to a second side (105) and said further element (205, 207) is locked, by said floor element lock device (1), to said modular load bearing floor element (301).

10. Assembly (209, 309) according to claim 9, wherein between said first side (103) and said second side (105) a conduit (107) arranged for transporting a fluid is provided, wherein an inflow opening (109) for said fluid of said conduit (107) is provided at said first side (103) or said second side (105) and an outflow opening (111) for said fluid of said conduit (107) is provided at said first side (103) or said second side (105).

11. Assembly (209, 309) according to claim 10, wherein said assembly (209, 309) comprises a plurality of said modular load bearing floor elements (301) forming a load bearing floor (203), said assembly (209, 309) further comprising a plurality of said floor element lock devices (1) for locking to further elements (205, 207) of said building (201), wherein said load bearing floor (203) further comprises a coupling arrangement (131) for coupling for fluid flow an outflow opening (111) of a first one of said modular load bearing floor elements (301) to an inflow opening (109) of a second one of said modular load bearing floor elements (301) such that, in use, flow of said fluid from said outflow opening (111) to said inflow opening (109) via said coupling arrangement (131) is realised.

12. Assembly (209, 309) according to any one of the claims 9 to 11 comprising a floor element lock device (1) according to claim 4, wherein said further element (205, 207) comprises a floor lock element receiving space (215, 219) and said floor lock element (17) is at least partly received in said floor lock element receiving space (215, 219), wherein said further element (205, 207) is locked, by said floor element lock device (1), to said modular load bearing floor element (301) by clamping said further element (205, 207) between said floor element lock device housing (3) and said part of said floor lock element (17) that is received in said floor lock element receiving space (215, 219).

13. Assembly (309) according to any one of the claims 9 to 12, wherein said further element is a modular wall element (207) for realising a wall (207) of said building (201).

14. Building (201) comprising an assembly (209, 309) according to any one of the claims 9 to 13.

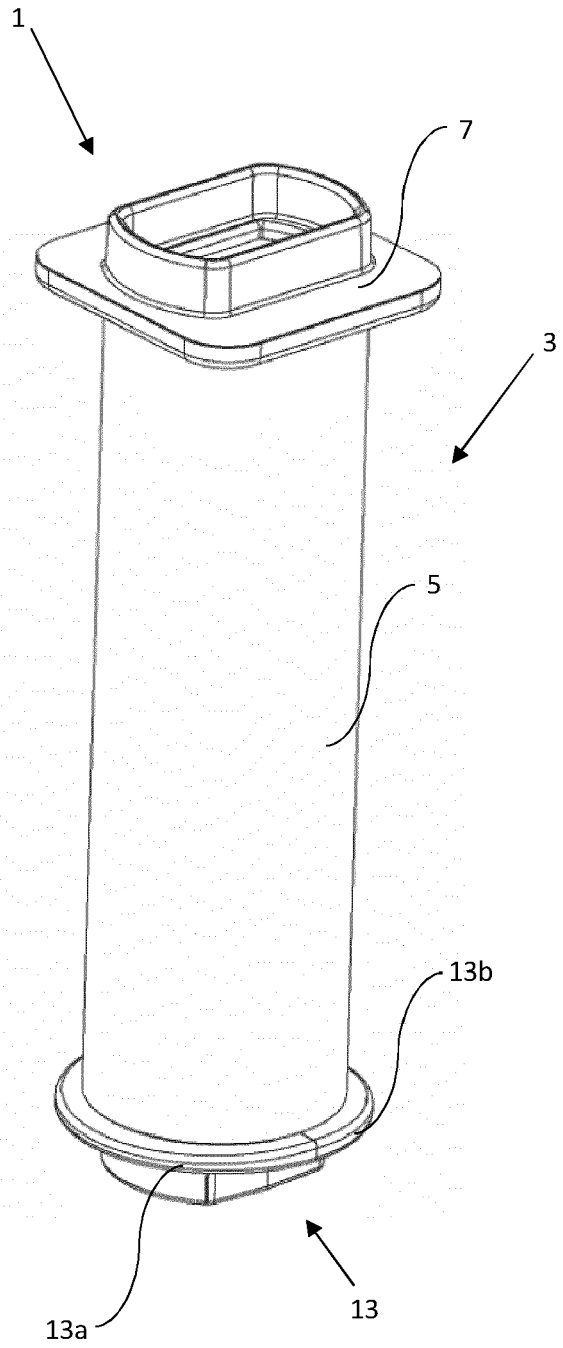

Fig. 1

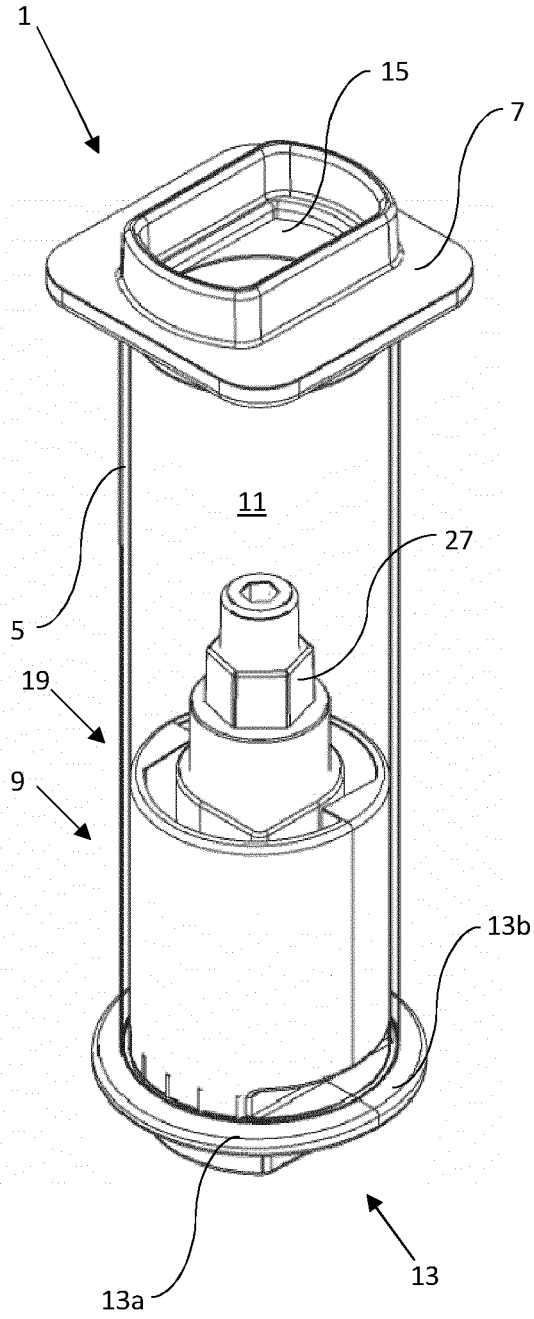

Fig. 2

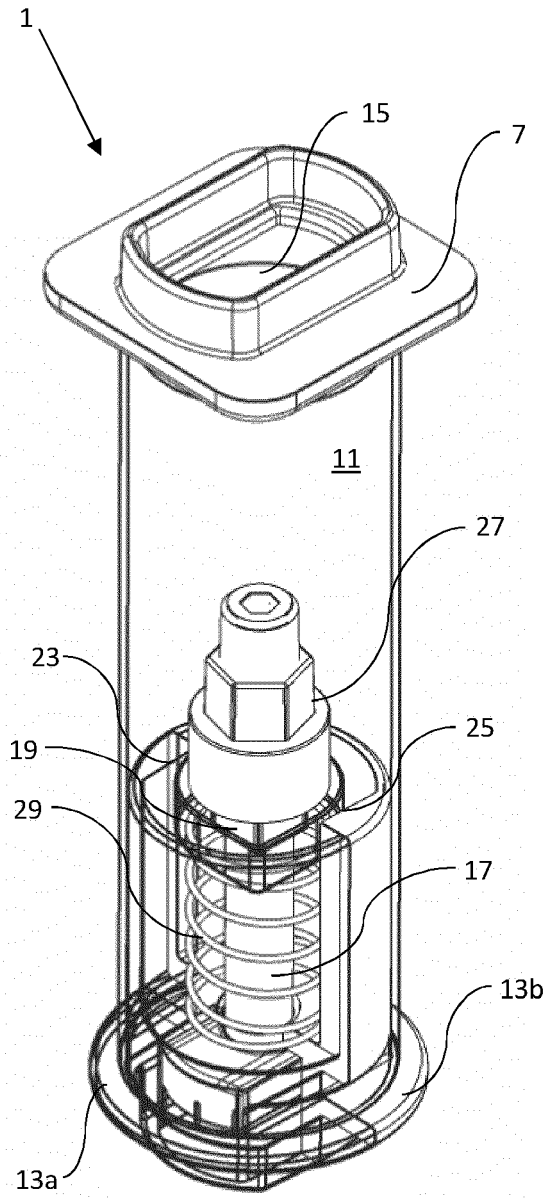

Fig. 3

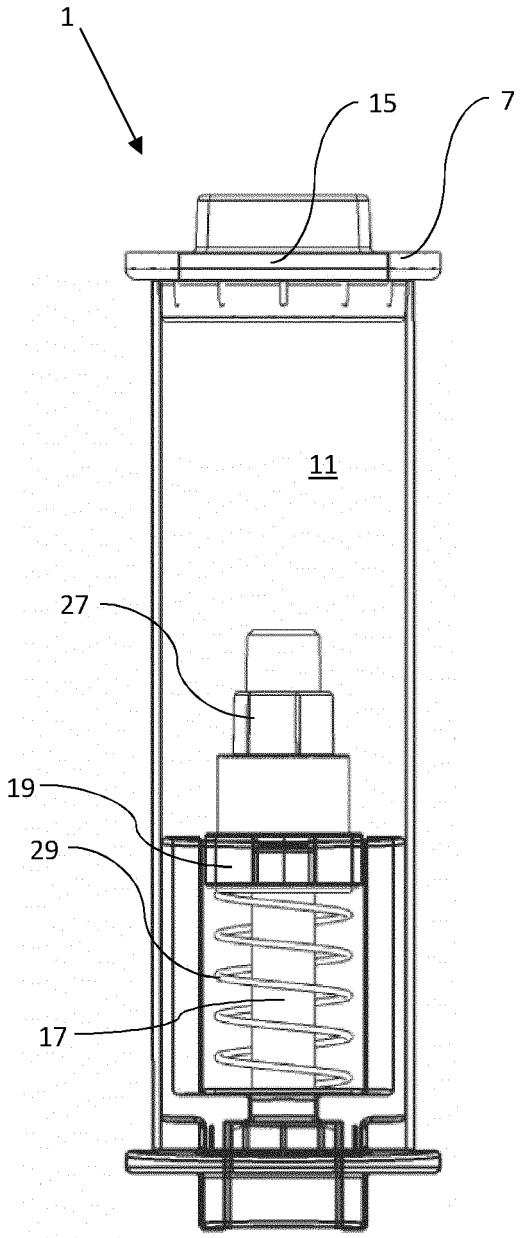

Fig. 4

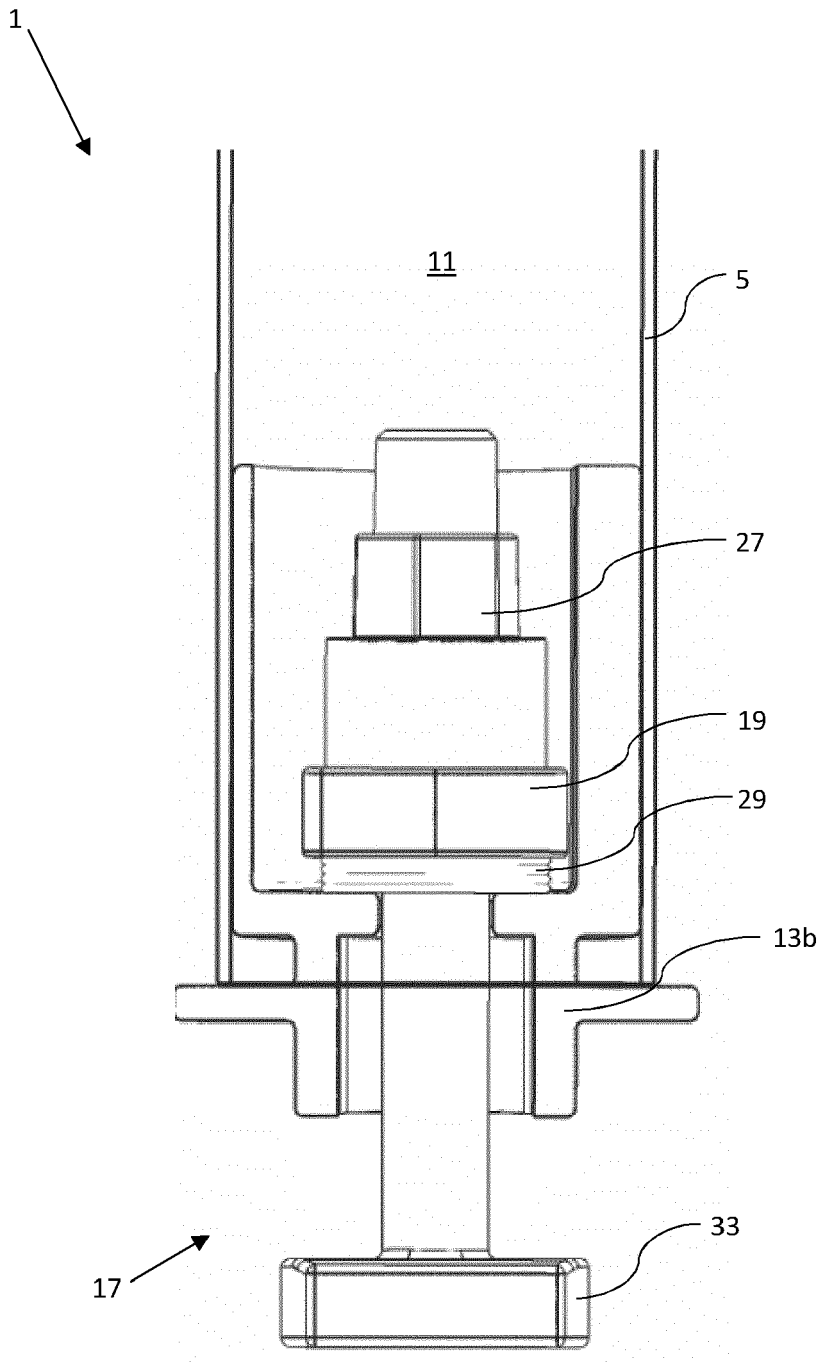

Fig. 5

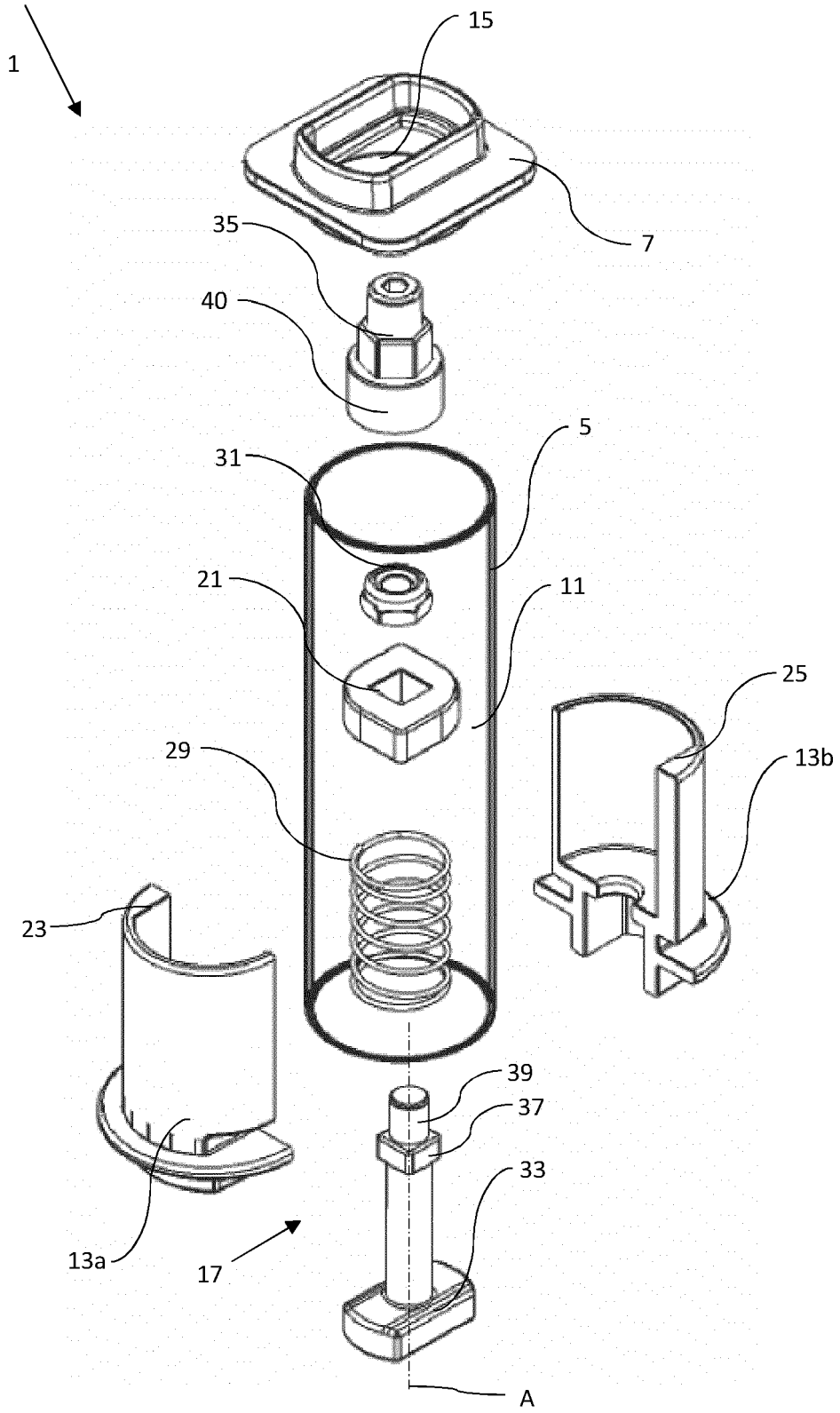

Fig. 6

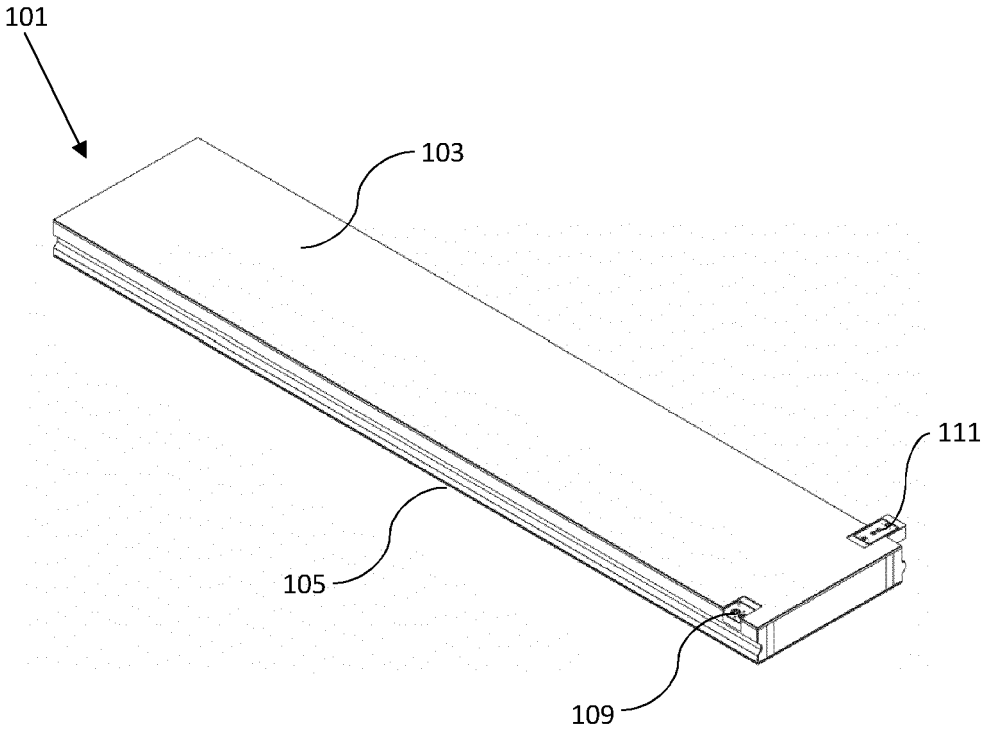

Fig. 7

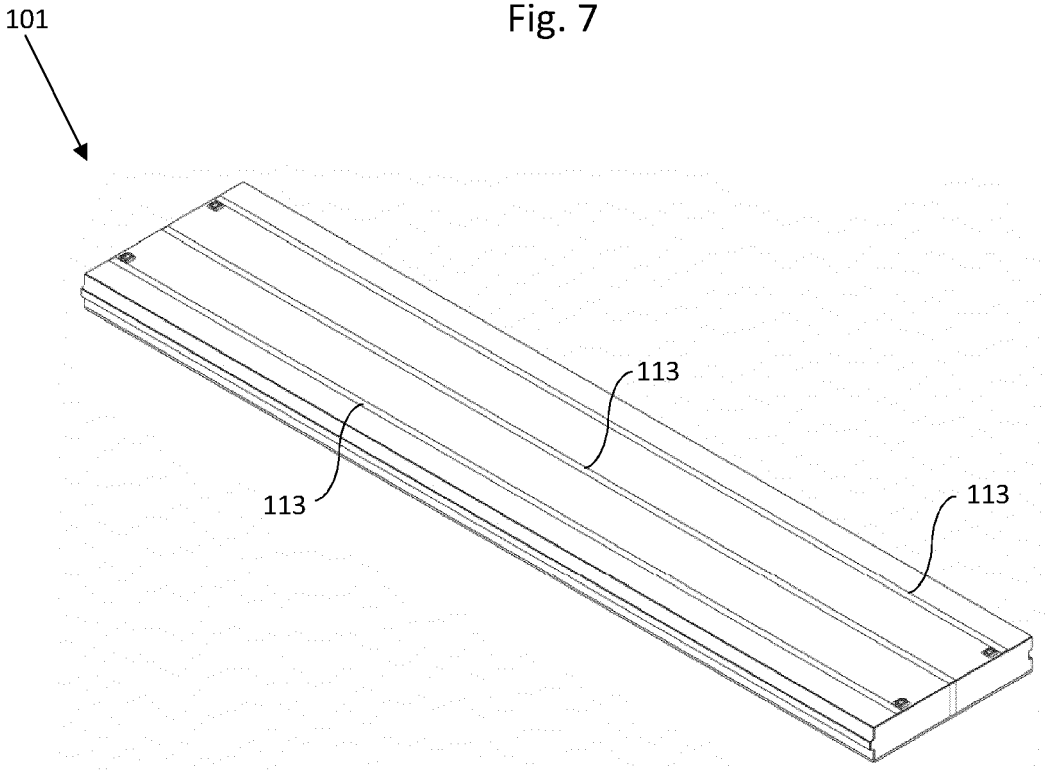

Fig. 8

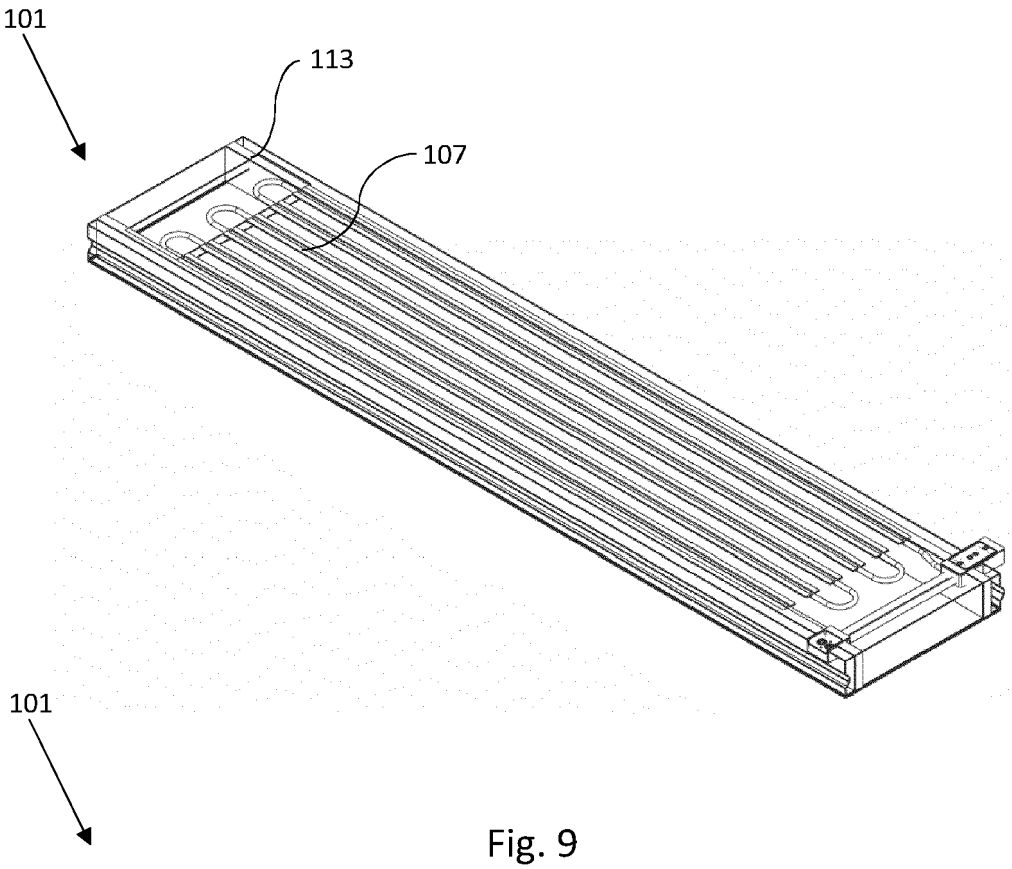
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Fig. 9

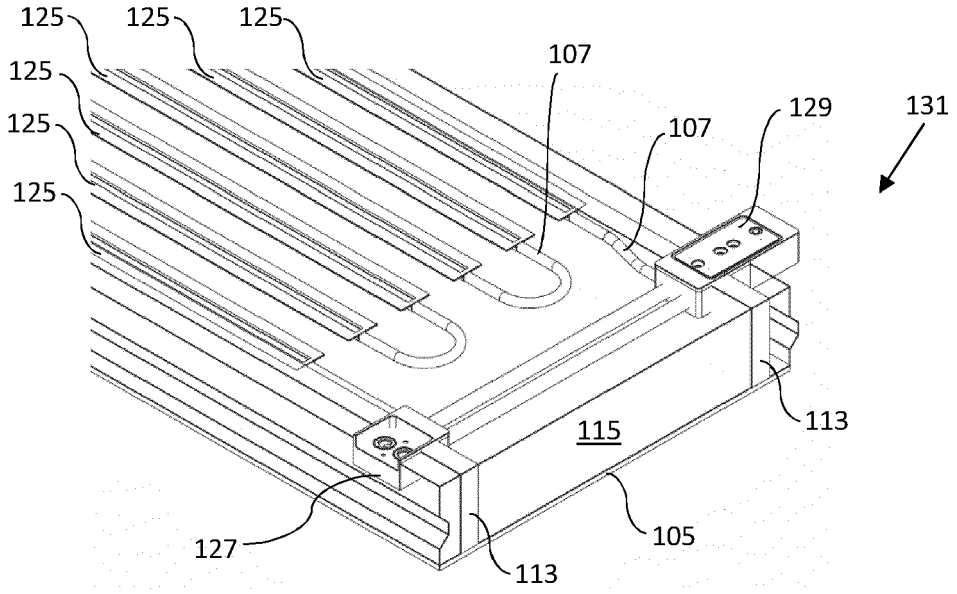
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Fig. 10

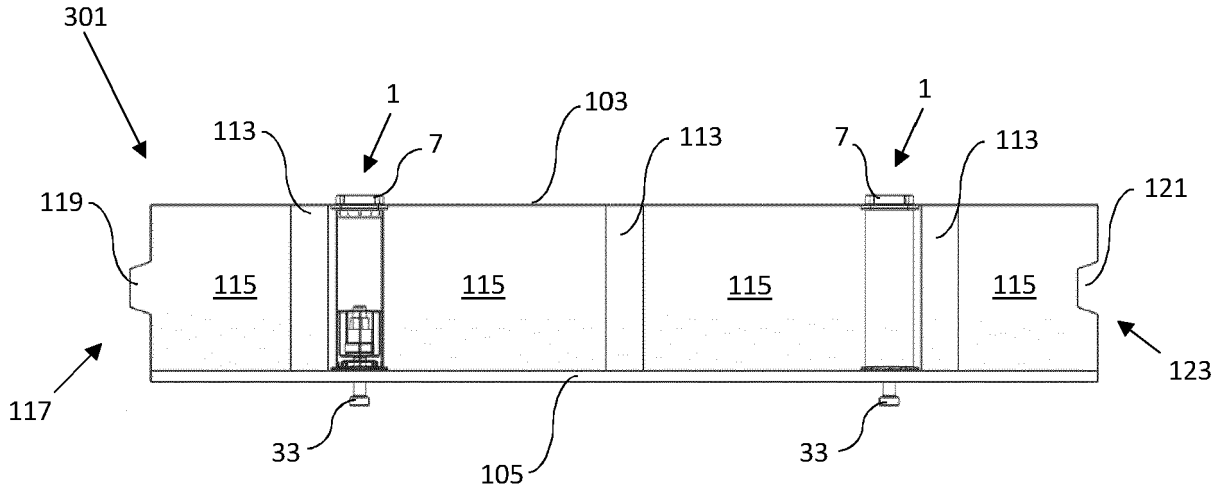
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Fig. 11

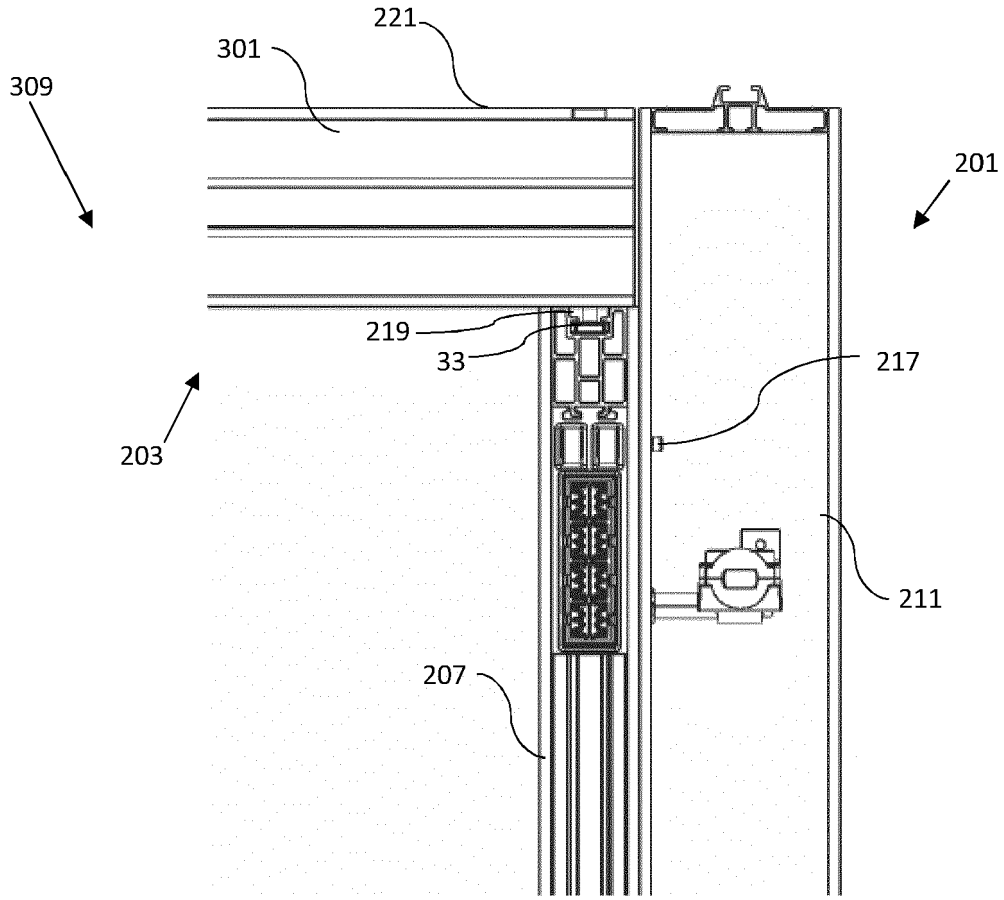
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Fig. 12

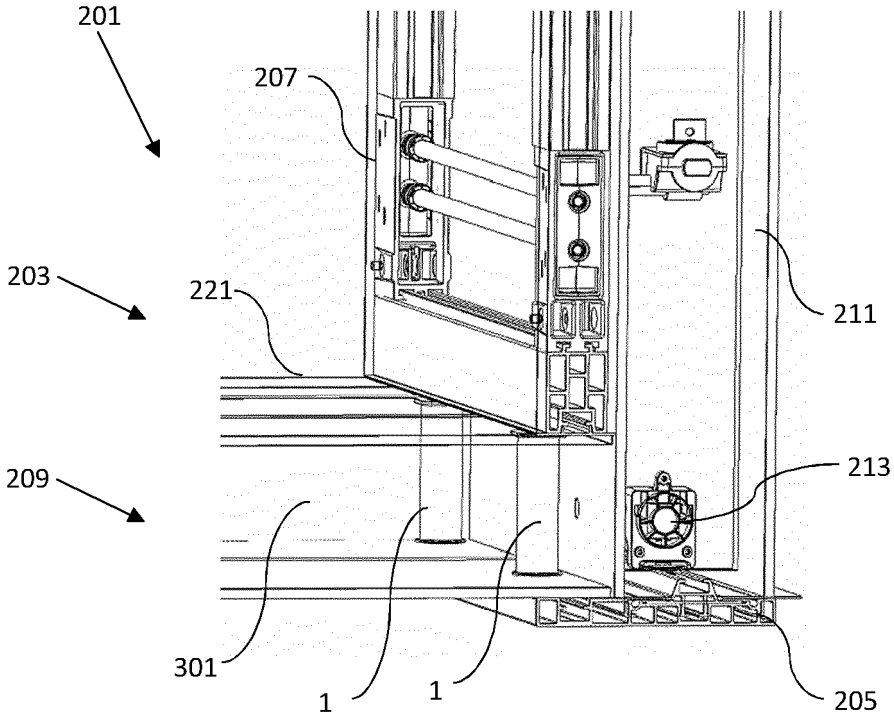
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Fig. 13

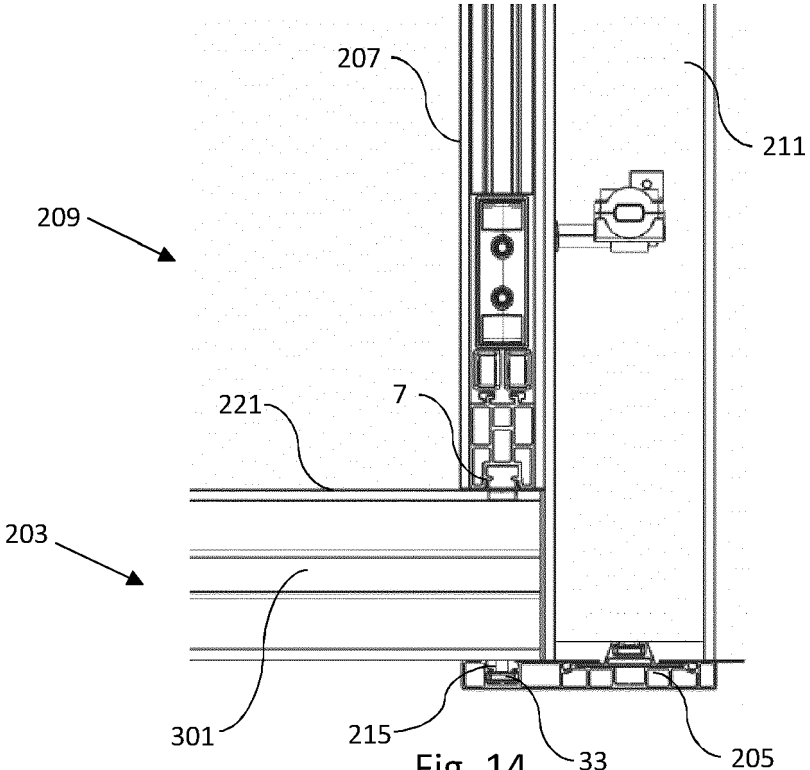
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Fig. 14

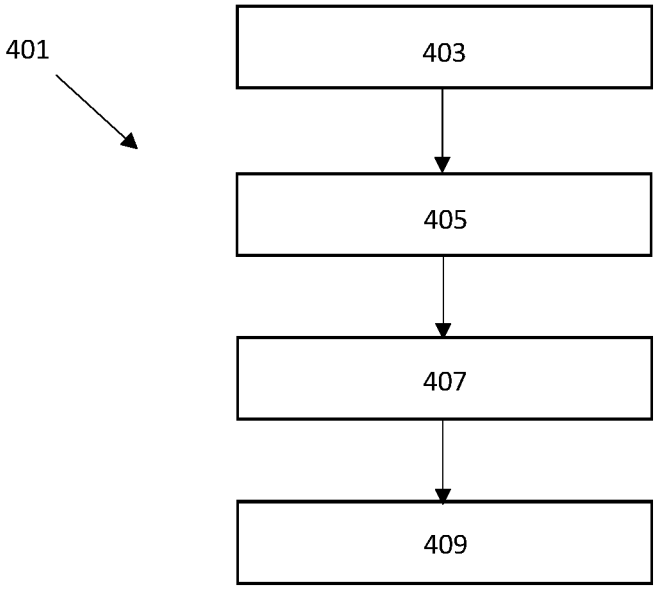

Fig. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 20 19 3455

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2010/162658 A1 (NAGY JOHN R [US] ET AL) 1 July 2010 (2010-07-01) * figures 8,41 * -----	1-10, 12-14 11	INV. E04B5/02 E04B2/82
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X Y	WO 2013/039390 A1 (GENIE BOUWRES B V [NL]; VAN DER LEE GIJSBERTUS ANTONIUS [NL]) 21 March 2013 (2013-03-21) * figures 1-4 * -----	1,2,5, 8-11,13, 14 10,11	

TECHNICAL FIELDS SEARCHED (IPC)

E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 January 2021	Petrinja, Etiel

CATEGORY OF CITED DOCUMENTS

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18-01-2021

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82