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(54) **MODULAR OIL TRENCH, POWER GENERATION ASSEMBLY FOR A POWER PLANT AND METHOD FOR ASSEMBLING SAME**

(57) The invention relates to a modular oil trench (15) for a power generation unit (1) of a power plant, comprising at least one trench module (16) having an essentially U-shaped cross-section defined by two side walls (26, 27) and a bottom wall (28) adapted for forming at least a part of the a trench (18, 19) and providing a front face (29) and/or a rear face (30) for connecting the at least one trench module (16) to another trench module (16) in an oil-proof and fire-proof manner. Furthermore, the invention relates to a Power generation assembly (0, 0')

for a power plant, comprising at least one trench supporting element (17) adapted to support at least one trench module (16). Finally, the present invention relates to method of assembling a power generation assembly (0) a power plant with a table (2) for supporting a power generation unit (1) of the power generation assembly (0), wherein a trench system (14) for the power generation unit is formed of at least one pre-fabricated trench module (16) mounted to the table (2).

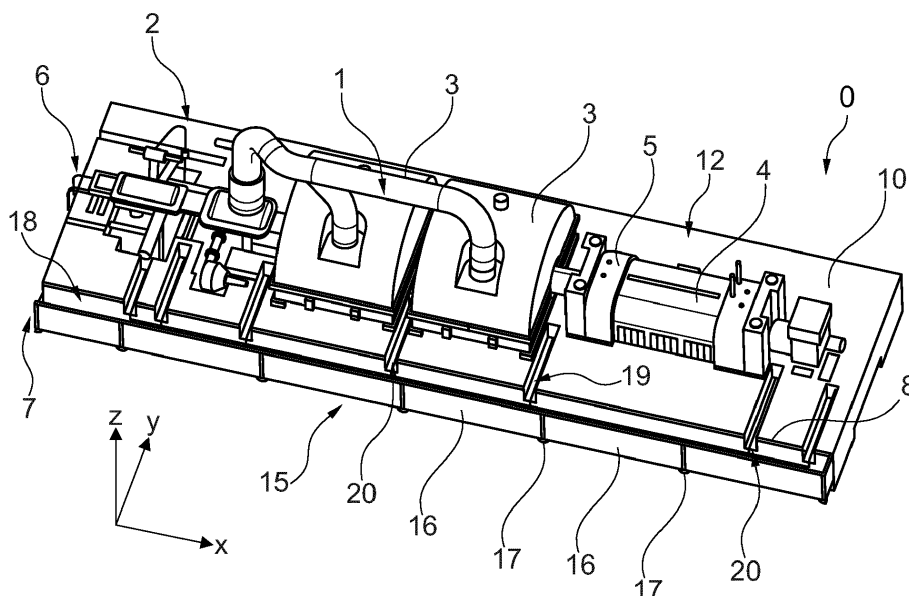


Fig. 2

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a modular oil trench for a power generation unit of a power plant. In particular, the present invention refers to a modular oil trench according to claim 1. It further refers to a table for supporting a power generation unit of a power plant, in particular a table according to claim 11. Moreover, the present invention relates to a method for assembling a power generation assembly of a power plant, in particular a method according to claim 15.

[0002] Power generation units of electrical power plants are commonly mounted on a so-called table of a concrete construction carrying the units. The units comprise turbines, such as steam turbines for example, which are connected to an electrical power generator via a shaft. In order to lubricate any bearings supporting rotating parts of the turbines, the generator and the shaft on the table, lubricating oil is provided to these bearings via oil pipes.

[0003] In case of any leakage of oil from the pipes, this oil has to be contained. A containment is usually achieved by leading the oil into a reservoir, such as a so-called oil room located next to the table. Moreover, in order to meet fire-safety requirements, any structures leading and/or containing the oil have to be fire-prove, i.e. they have to maintain their stability and function within a certain time frame when exposed to fire, e.g. for 60 minutes.

PRIOR ART

[0004] According to the prior art, there are two general ways of containing oil from potential leakages from pipes. One way is to guide all pipes through so-called oil trenches leading from the bearings to the oil room. Another way would be to encapsulate the pipes within another piping system which is also being referred to as double-piping.

[0005] Oil trenches according to the prior art are formed within the table carrying the power generation unit. In a usual design, a plurality of transversal trenches lead into a single longitudinal trench. The longitudinal trench extends in a longitudinal direction of the table which commonly runs in parallel to the shaft of the power generation unit. The transversal trenches commonly extend perpendicularly to the longitudinal trench.

[0006] The respective ends of the transversal trenches facing the power generation unit are placed beneath or at least in the vicinity of the bearings. The pipes are lead from the bearings into the transversal trenches and then into the longitudinal trench. Within the longitudinal trench, the pipes are lead towards the oil room. In other words, the transversal trenches branch off the longitudinal trench in order to take up pipes from the power generation unit and lead them towards the oil room.

[0007] A disadvantage arising from the above-described oil trench systems according to the prior art is

that the trenches are embedded within the table top which on the one hand complicates manufacturing the table and on the other hand weakens the structure of the table. This is because any reinforcement of the concrete forming the table has to be adapted to the shapes of the trenches. Constructing and fixing such an adapted reinforcement is cumbersome and time consuming. Also the manufacturing and mounting of a boarding for forming the trenches within the table top costs material and time.

[0008] Moreover, since the trenches themselves diminish the thickness of the table top, they weaken the table itself and commonly require adaptation of pillars or lateral walls of the table supporting the table top. In case that a pillar or lateral wall of the trench is not thick enough, this can lead to dynamic issues due to an undesired amplification of vibrations. Structural and non-structural elements connected to the table could go into resonance with a harmonic excitation caused by the power generation unit. As power generation units are commonly operated with a rotating frequency of the generator of either 50 Hz or 60 Hz, the critical double-frequency or so-called 2f excitations have about 100 Hz or 120 Hz, respectively.

[0009] As to the double piping, the installation and maintenance of such piping is extremely cumbersome and costly. When initially installing the piping, after once the actual oil pipes have been installed, they have to be encapsulated with the second piping all the way from the bearings of the power generation unit to the oil room. In case of any leakage, the mere suspicion thereof, or for maintenance reasons, the second piping has to be at least partly removed. The removal may not only be cumbersome for itself (e.g. installation of temporary platforms, scaffolding, etc.) but can also impair the desired containment and fire safety.

SUMMARY OF THE INVENTION

[0010] In view of the above disadvantages of the prior art it is an object of the present invention to provide a way of achieving an oil containment and a certain fire safety in a way that the drawbacks of the oil trench and double-piping systems are at least partly avoided.

[0011] These and other objects are achieved by a modular oil trench according to claim 1, a power generation assembly according to claim 11 and a method according to claim 15.

[0012] A modular oil trench according to the present invention for a power generation unit of a power plant comprises at least one trench module having an essentially U-shaped cross-section defined by two side walls and a bottom wall adapted for forming at least a part of the oil trench and providing a front face and/or a rear face for connecting the at least one trench module to another trench module in an oil-proof and fire-proof manner.

[0013] A power generation assembly according to the invention for a power plant comprises at least one supporting element adapted to support at least one trench module according to the present invention.

[0014] In a method of assembling a power generation assembly of a power plant with a table for supporting a power generation unit of the power plant, a trench system for the power generation unit is formed of at least one pre-fabricated trench module.

[0015] These inventive solutions have the advantage that the table and the oil trench can be formed separately. Thereby, the table and the trench can be constructed in parallel to each other. Furthermore, the design of the table can be simplified. A table according to the present invention can be smaller, in particular less wide than a table according to the prior art. A potential reduction of order 25% to 30% of the width of the table is assessed. Excavations for foundations of a table according to the present invention can be smaller than those known from the prior art. Hence, the present invention helps to spare energy, time and material. Thus, the present invention enables to reduce the production costs of a power plant.

[0016] The inventive solutions may be combined with the following further embodiments of the present invention as required. These further embodiments may be combined independently of each other as desired.

[0017] According to a first further embodiment of the invention, at least one of the front face and/or the rear face of the at least one trench module are or is provided with a connection section. The connection section can be used for connecting trench modules to each other at their respective front or rear faces. Preferably, the connection is carried out in an oil-proof and fireproof manner.

[0018] According to further embodiment of the invention, the connection section is at least partly made of metal. Preferably, the connection section comprises a weldable metal, such as a steel or steel alloy. Hence, trench modules may be welded together at their connection sections. For welding the trench modules together, connection elements may be used. These connection elements may be formed as metal plates for example.

[0019] According to a further embodiment of the invention, the connection section is at least partly embedded within at least one of the two side walls and/or the bottom wall of the at least one trench module. For example, the connection section may be formed as or be provided with a reinforcement or an armour embedded within the trench module. A main body portion of the trench module may be formed of concrete or alike.

[0020] According to a further embodiment of the invention, the connection section comprises at least one U-shaped metal profile. The bottom or yoke of such a profile may at least partly form the respective front face or rear face of the trench module. The legs of the U-shaped metal profile may extend along the side walls or bottom walls, respectively, so that they may serve for connecting and mounting purposes as well as for protecting edges of the trench module.

[0021] According to another embodiment of the invention, the two side walls of the trench module have different heights measured in a height direction of the modular oil trench. The first one of the two side walls maybe lower

than a second one of the two side walls. The first sidewall may be attached to a table supposed to carry the power generation unit. Transversal oil trenches provided in or at the table may be led into the modular oil trench via the first sidewall. In order to assure that any oil or other liquids are securely lead from the transversal oil trenches or other ducts or pipes in to the modular oil trench, a grommet or alike may be used for bridging a distance between an edge of the table and the modular oil trench which distance may include a thickness of the first sidewall.

[0022] According to another embodiment of the present invention, the bottom wall provides an essentially plane support surface for supporting the at least one trench module on a trench support element. The trench support element may be mounted to the power generation unit of the table carrying it. The essentially plane support surface allows for a simple placement of the at least one trench module on the trench support element. The trench support element may be formed as a beam or bracket for example. The support surface maybe supported on the support element in a displaceable manner, so that any thermal expansion and/or dynamic displacements, for example due to vibrations, maybe compensated.

[0023] According to another embodiment of the present invention, at least one of the side walls provides a cover support element for supporting a trench covering element on the at least one trench module. For example, metal plates, such as checkered plates may be used for covering the oil trench, such that operators of the power generation unit may walk over the oil trench or are protected from falling into the trench. Furthermore, trench covering elements help to keep the trench clean. In case of an emergency, such as a fire, they help to protect the inside of the trench. The trench covering elements may keep air and therefore oxygen from entering the trench when a fire is burning inside of the trench in order to help quenching the fire.

[0024] According to a further embodiment of the invention, at least one of the side walls and/or the bottom wall are or is, respectively, provided with at least one lining element facing towards an inside of the U-shaped. The lining element may help in protecting the walls of the oil trench from the inside. Furthermore, the lining element may help in sealing the trench.

[0025] According to another embodiment of the invention, the modular oil trench may comprise at least one of a trench front termination module and/or a trench back termination module providing a front wall and/or back wall, respectively for the oil trench. In other words, the modular oil trench may comprise up to three different kinds of modules. Front and back termination modules may be provided for terminating the oil trench at the front and at the back, respectively. Between those front and back termination modules, a desired number of standardised trench modules may be used in order to provide an oil trench of a certain length required by a respective application.

[0026] For a power generation assembly according to the present invention for a power plant, the above-mentioned solution may be further improved in that the oil trench comprises at least two trench modules which are connected to each other in the region of their front faces facing each other. The region of the front faces and/or back faces may not only comprise the faces themselves but also adjacent sections of the side walls and/or bottom walls of each trench module. The actual front and/or back faces facing each other may be located at a certain distance from each other. The distance may be bridged by connection elements connecting the at least two trench modules to one another.

[0027] According to a further embodiment of the invention, the at least one trench supporting element is mounted to a side face of a table for supporting a power generation unit of the power plant. The at least one trench supporting element may protrude laterally from the table in order to place the modular oil trench on top of the at least one trench supporting element. Thereby, a modular oil trench according to the present invention may be mounted to the table. The table may be provided with the at least one trench supporting element during or after manufacturing the table. For example, when constructing the table of concrete, the at least one trench support element may be placed or shaped such that it is integrally formed with the table. In particular, the at least one trench support element may be located at a table top of the table.

[0028] According to another embodiment of the invention, at least one trench supporting element is mounted to a supporting structure. The supporting structure may be part of or mounted to any platforms or other structural elements located adjacent to the table. Hence, the modular oil trench would not be supported by the table or a supporting element mounted to the table. The modular oil trench could thereby at least partially mechanically decoupled from the table.

[0029] According to a further embodiment of the invention, at least one elastic damping element is located between the at least one trench supporting element and the at least one trench module. The damping element helps to damp excitations of the oil trench, in particular vibrational movements of the oil trench with respect to the table, which may be caused by the power generation unit. The at least one elastic damping element may be formed as a pad or alike. For example, the at least one elastic damping element may be formed of rubber or other vibration absorbing and/or damping materials, such as Sylomer, Sylodyn, Sylodamp or alike.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The present invention is now to be explained more closely by means of a possible embodiment thereof and with reference to the attached drawings.

Fig. 1 shows a schematic perspective view of a power generation assembly with an oil trench ac-

cording to the prior art.

Fig. 2 shows a schematic perspective view of an embodiment of a power generation assembly with a modular oil trench according to an embodiment of the invention.

Fig. 3 shows a schematic top-view of a power generation assembly comprising a table and a modular oil trench according to an embodiment of the present invention.

Fig. 4 shows a schematic cross-sectional view of the table and the modular oil trench depicted in fig. 3 along the cross-sectional line D-D illustrated therein.

Fig. 5 shows a detail IV of fig. 4.

Fig. 6 shows a schematic cross-sectional view of the table and the modular oil trench depicted in figs. 3 to 5 along the cross-sectional line A-A illustrated in figs. 3 and 4.

Fig. 7 shows a detail VI of fig. 6.

Fig. 8 shows a schematic cross-sectional view of the table and the modular oil trench depicted in figs. 3 to 5 along the cross-sectional line B-B illustrated in figs. 3 and 4.

Fig. 9 shows a detail III of fig. 3.

Fig. 10 shows a detail IX of fig. 9.

Fig. 11 shows a schematic cross-sectional view of the table and the modular oil trench depicted in figs. 3 to 8 provided with a grommet illustrated in Fig. 9 according to an embodiment of the present invention along the cross-sectional line E-E illustrated in fig 9.

Fig. 12 shows a detail XI of fig. 11.

Fig. 13 shows a detail VIII of fig. 8 along the view-direction F-F indicated therein.

Fig. 14 shows a schematic cross-sectional view of a trench support element according to an embodiment of the present invention along the cross-sectional line G-G illustrated in fig 13.

Fig. 15 shows a detail XIV of fig. 14.

Fig. 16 shows another embodiment of a power generation assembly according to the present invention in a schematic cross-sectional view along the cross-sectional line B-B similar to the view

shown in fig. 8.

DETAILED DESCRIPTION OF DIFFERENT EMBODIMENTS OF THE INVENTION

[0031] As shown in fig. 1, a power generation assembly 100 of a power plant according to the prior art comprises a power generation unit 101 and a table 102. The power generation assembly 100 extends along a longitudinal direction X, a transversal direction Y, and a height direction Z which extend perpendicularly to each other and hence together constitute a Cartesian coordinate system. In the following, all mentions of in front or behind, and front or back in general refer to the longitudinal direction X. Mentions of left or right in general refer to the transversal direction Y. Mentions of up or down, and above or below in general refer to the height direction Z.

[0032] The power generation unit 101 is mounted onto the table 102 and comprises turbines 103, in particular steam turbines, such as low pressure, intermediate pressure and high pressure steam turbines, which are connected to a power generator 104 via a shaft 105. The turbines 103 and the generator 104 extend essentially radially around the shaft 105 which extends along the longitudinal direction X. Rotating parts of the turbines 103, and the generator 104, as well as the shaft 105 are supported at bearings (not shown) mounted onto the table 102.

[0033] A lubrication system 106 comprises oil pipes 107 leading to and away from an oil room (not shown), where a lubricant, such as an oil, for lubricating the bearings is stored. The oil pipes 107 comprise longitudinal pipes 108 and transversal pipes 109. The longitudinal pipes 108 extend along the longitudinal direction X to and away from the oil room. The transversal pipes 109 extend along the transversal direction Y, branch off the longitudinal pipes 108, and finally end at the bearings. In other words, the transversal pipes 109 extend between the bearings and the longitudinal pipes 108.

[0034] The table 102 has a table top 110 supported by pillars 111 in the height direction Z. The pillars 111 extend along the height direction Z and the transversal direction Y and are based on a foundation 112 of the table 102. Between the table top 110, the pillars 111, and the foundation 112, rooms 113 are formed.

[0035] A trench system 114 is formed in the table top 110. In the region of the table 102, the oil pipes 107 extend through the trench system 114, so that any oil leaking from the oil pipes 107 can be contained. The containment does not only prevent leaking oil from flowing to undesired places, but also provides fire-safety. Large amounts of oil leaking from the oil pipes 107 are lead to the oil room by the trench system 114.

[0036] Therefore, the trench system 114 comprises longitudinal trenches 118 and transversal trenches 119. The longitudinal pipes 108 are lead through the longitudinal trenches 118. The transversal pipes 109 are lead through the transversal trenches 119. The longitudinal

trenches 118 meet the transversal trenches 119 at junctions 120.

[0037] Fig. 2 shows a schematic perspective view of a power generation assembly 0 of a power plant according to an embodiment of the present invention. The power generation assembly 0 comprises a power generation unit 1 and a table 2. The power generation assembly 0 also extends along the longitudinal direction X, the transversal direction Y, and the height direction Z which extend perpendicularly to each other and hence together constitute a Cartesian coordinate system. Again in the following, all mentions of in front or behind, and front or back in general refer to the longitudinal direction X. Mentions of left or right in general refer to the transversal direction Y. Mentions of up or down, and above or below in general refer to the height direction Z.

[0038] The power generation unit 1 is mounted onto the table 2 and comprises turbines 3, in particular steam turbines, such as low pressure, intermediate pressure and high pressure steam turbines which are connected to a power generator 4 via a shaft 5. The turbines 3 and the generator 4 extend essentially radially around the shaft 5 which extends along the longitudinal direction X. Rotating parts of the turbines 3, and the generator 4, as well as the shaft 5 are supported at bearings (not shown) mounted onto the table 2.

[0039] A lubrication system 6 comprises oil pipes 7 leading to and away from an oil room (not shown), where a lubricant, such as an oil, for lubricating the bearings is stored. The oil pipes 7 comprise longitudinal pipes 8 and transversal pipes 9. The longitudinal pipes 8 extend along the longitudinal direction X to and away from the oil room. The transversal pipes 9 extend along the transversal direction Y, branch off the longitudinal pipes 8, and finally end at the bearings. In other words, the transversal pipes 9 extend between the bearings and the longitudinal pipes 8. The table 2 has a table top 10 supported by pillars 11 (not shown) in the height direction Z. The pillars 11 extend along the height direction Z and the transversal direction Y and are based on a foundation 12 (not shown) of the table 2. Between the table top 10, the pillars 11, and the foundation 12, rooms 13 (not shown) are formed in a manner similar to the power generation assembly 100 according to the prior art shown in fig. 1.

[0040] A trench system 14 according to the present invention is provided to the power generation assembly 1. In the region of the table 2, the oil pipes 7 extend through the trench system 14, so that any oil leaking from the oil pipes 7 can be contained. The containment does not only prevent leaking oil from flowing to undesired places, but also provides fire-safety. Large amounts of oil leaking from the oil pipes 7 are lead to the oil room by the trench system 14.

[0041] The trench system 14 according to the present invention comprises a modular oil trench 15. The modular oil trench 15 is at least in parts formed of trench modules 16. The trench modules 16 are supported on support element 17. The support elements 17 are mounted to the

table 2, in particular to the table top 10.

[0042] The modular oil trench 15 provides longitudinal trenches 18 and transversal trenches 19. The longitudinal pipes 08 are lead through the longitudinal trenches 18. The transversal pipes 9 are lead through the transversal trenches 19. The longitudinal trenches 18 meet the transversal trenches 19 at junctions 20.

[0043] Fig. 3 shows a schematic top-view of the table 2 and the modular oil trench 15 illustrated in fig. 2. Fig. 4 shows a schematic cross-sectional view of the table 2 and the modular oil trench 15 depicted in fig. 3 along the cross-sectional line D-D illustrated therein. In Figs. 3 and 4 it becomes apparent, that each of the trench modules 16 is supported and its ends facing into and against the longitudinal direction X on one of the support element 17. The trench modules 16 can be further distinguished into front termination modules 21, back termination modules 23 and middle modules 22.

[0044] The front termination module 21 provides a front wall 24 of the modular oil trench 15. The back termination module 22 provides a back wall 25 of the modular oil trench 15. In particular, the front wall 24 terminates the longitudinal trench 18 at its front end. The back wall 25 terminates the longitudinal trench 18 at its back end.

[0045] All modules 16, 21, 22, 23 have a first sidewall 26, a second side wall 27 and a bottom wall 28. The side walls 26, 27 and the bottom wall 28 together define an essentially U-shaped cross-section of the modular oil trench 15. In other words, the two side walls 26, 27 protrude upwardly from the bottom wall 28 in the height direction that. Hence, in a cross-sectional view along the longitudinal direction X, the side walls 26, 27 are formed as legs which are connected to each other by the bottom wall 28 constituting a yoke between the legs.

[0046] Fig. 5 shows a detail IV of fig. 4, in particular one of the support elements 17 and how two trench modules 16 are supported thereon. The trench modules each have a front face 29 facing into the longitudinal direction X and a rear face 30 facing against the longitudinal direction X. The front face 29 and the rear face 30 are arranged at a certain distance from each other measured in parallel to the longitudinal direction X so that a gap 31 is formed between the trench modules 16.

[0047] At the front face 29 and the rear face 30, the trench modules 16 are provided with connection sections 32. The connection sections 32 are formed as metal U-profiles encompassing an end region 33 each of the side walls 26, 27 and the bottom wall 28. Connecting elements 34 are used for connecting the trench modules 16 to each other at their respective connection sections 32. The connecting elements 34 are formed as metal plates welded to both connection sections 32 opposing each other at the gap 31. Thereby, on the one hand, the connecting elements 34 serve for affixing the trench modules 16 to each other. On the other hand, the connecting elements 34 serve for bridging the gap 31 and thus sealing-up the longitudinal trench 18.

[0048] Moreover, since connecting elements 34 con-

necting the bottom walls 28 of the trench modules 16 to each other slightly protrude from the bottom wall 28 in the height direction Z, these connecting elements 34 may serve as a kind of barrier between two adjacent trench modules 16. As such, the connecting elements 34 may help to limit an area within which oil leaking from the oil pipes seven extends, to a certain trench module 16 or a number of trench modules 16. Such a limitation may help to localise leaks in the oil pipes 7.

[0049] The bottom walls 28 provide vertical support surfaces 35 which are essentially plane and face against the height direction Z. The support elements 17 provide vertical counter support surfaces 36 which are also essentially plane and face into the height direction Z. The respective end regions 33 of the two trench modules 16 are arranged above the support element 17, such that the respective end regions 33 over lap with the vertical counter support surface 36 in the height direction Z.

[0050] A vertical damping element 37 is placed between the vertical support surfaces 35 in the respective end regions 33 and the vertical counter support surface 36. Thereby, the trench modules 16 rest on the vertical damping element 37. In other words, the trench modules 16 are supported at the support element 17 via the vertical damping element 37.

[0051] Furthermore, stopping elements 38 protrude downwards from the bottom walls 28 against the height direction Z. The stopping elements 38 provide lateral stopping surfaces 39 facing into and against the longitudinal direction X, respectively. The support element 17 provides lateral counter stopping surfaces 40 also facing into and against the longitudinal direction X, respectively.

[0052] Horizontal damping elements 41 are placed between the stopping surfaces 39 and counter stopping surfaces 40, such that movements of the modular trench 15 with respect to the support element 17 are inhibited. Through the horizontal damping elements 41, the inhibition is softened and a transfer of vibrations between the modular trench 15 and the support elements 17 is prevented.

[0053] In addition, cover support elements 42 are provided at the trench modules 16, here in particular the first sidewall 26 thereof. The cover support elements 42 support trench covering elements 43 which are placed on top of the trench 18 in order to close the trench 18 from above. Cover sealing elements 44 overlap with two adjacent trench covering elements 43, so that a gap between the trench covering element 43 is sealed.

[0054] Fig. 6 shows a schematic cross-sectional view of the table 2 and the modular oil trench 16 depicted in figs. 3 to 5 along the cross-sectional line A-A illustrated in figs. 3 and 4. Here it becomes apparent that the first sidewall 26 is lower than the second side wall 27 measured along the height direction Z. Thereby, a free space is left above the first sidewall 26 so that the transversal trench 19 can enter the longitudinal trench 18 sidewise.

[0055] In order to secure the modular trench 15 in the longitudinal direction X as well as the transversal direc-

tion Y at the table 2, the trench module 16 is provided with a fixing element 45. The fixing element 45 is on one side mounted to a side face 46 of the table 2, in particular the table top 10. On the other side, the fixing element 45 is mounted to a top surface 47 of the first side wall 26. A further damping element 48 is placed between the fixing element 45 and the top surface 47 and provides for damping vibrations between the table 2 and the modular trench 15.

[0056] The modular trench 15 according to the present invention is designed such that a single fixing element 45 located essentially in the middle of the longitudinal trench 18 measured along the longitudinal direction X can be sufficient for inhibiting any undesired displacements of the modular trench 15 along the longitudinal direction X and the transversal direction Y. By placing the fixing element 45 essentially in the middle of the modular oil trench 15 along the longitudinal direction X, the sections of the modular oil trench 16 in front and behind of said fixing element 45 may be regarded as being installed essentially in a floating manner. The support elements 17 constitute floating bearings while the fixing element 45 constitutes a locating bearing of the modular oil trench 15.

[0057] Furthermore, the cover support element 42 protrudes from the first sidewall 26 upwardly in order to support the trench covering element 43 while bridging the free space between the top surface 47 of the first sidewall 26 and the level at which the trench covering element 43 is placed on top of the trench 18. On the inside, the trench 18 is provided with a lining 49 which is attached to the side walls 26, 27 and extends along the bottom wall 28.

[0058] Fig. 7 shows a detail VI of fig. 6. On the second side wall 27, and edge protection element 50 is provided. The trench covering element 43 is supported at the edge protection element 50. In that the top of the edge protection element 50 is located slightly below the top surface 47 of the second side wall 27, the top surface 47 of the second side wall 27 and the top of the trench covering element 43 are essentially aligned with each other in a plane in parallel with the longitudinal direction X and the transversal direction Y.

[0059] A element 51 in the form of a steel plate is provided between a side face of a cut out in the second side wall 27 wherein the edge protection element 50 is placed and an edge of the trench covering element 43 facing said side face of the cut out, so that the trench covering element 43 is safely blocked in its correct position on the second side wall 27 along the transversal direction Y. A thin damping strip is placed between the trench covering element 43 and the edge protection element 50 in order to inhibit any potential vibration.

[0060] Fig. 8 shows a schematic cross-sectional view of the table 2 and the modular oil trench 15 along the cross-sectional line B-B illustrated in figs. 3 and 4. At the support element 17, a transversal stopping element 52 is provided. The transversal stopping element 52 is mounted to a front face of the support element 17 which

extends from the side face of the table top 10 in a beam-like manner.

[0061] The transversal stopping element 52 juts above the vertical counter support surface 36 of the support element 17 so that it provides a transversal counter support face 53 for transversally supporting an outer side face 54 of the trench modules 16, in particular the second side wall 27 thereof. A transversal damping element 55 is located between the transversal counter support surface 53 and the outer side face 54. The transversal damping element 55 prevents a transfer of vibrations between the table 2 and the modular oil trench 15 via the support element 17, in particular the transversal stopping element 52.

[0062] Fig. 9 shows a detail III of fig. 3. A grommet 56 is arranged at the junction 20 between the transversal trench 19 and the longitudinal trench 18. The grommet 56 bridges a gap extending along the transversal direction Y between the longitudinal trench 18 and the transversal trench 19, the width of which gap is essentially defined by a width of a free space 57 between the side face 46 of the table 2 and the first sidewall 26 as well as the width of the first sidewall 26 measured essentially in parallel with the transversal direction Y.

[0063] Fig. 10 shows a detail IX of fig. 9. A mounting plate 58 is provided at the side face 46. Preferably, the mounting plate 58 is embedded within the table top 10, such that it is aligned with the side face 46 in a plane extending in parallel with the longitudinal direction X and a height direction Z. The grommet 56 is mounted to the mounting plate 58. For example, as shown herein, the grommet 56 is welded to the mounting plate 58.

[0064] Fig. 11 shows a schematic cross-sectional view of the table 2 and the modular oil trench 15 as provided with the grommet 56. The grommet 56 extends from the table 2 along the transversal direction Y beyond the first sidewall 26 of the modular oil trench 15 such that it ends above the longitudinal trench 18. The grommet 56 can therefore be regarded as an extension of the transversal trench 19 and on its own constitute a sort of trench module of a trench system 14 according to the present invention. A nose-like or lip-like spout 59 is formed at the grommet 56 enhancing a smooth and safe flow of any oil leakage from the transversal trench 19 via the grommet 56 into the longitudinal trench 18.

[0065] Fig. 12 shows a detail XI of fig. 11. Here it becomes apparent that the grommet 56, in particular a bottom thereof laterally abuts the mounting plate 58. Thereby, the grommet 56 forms an oil-proof and fire-proof transversal extension of the transversal oil trench 19. Furthermore, the bottom of the grommet 56 is located slightly below a bottom of the transversal oil trench 19, so that any oil gathering in the transversal oil trench 19 will naturally flow from the transversal oil trench 19 into the grommet 56 and from there into the longitudinal trench 18. In other words, the grommet 56 is arranged with respect to the transversal oil trench 19 in such a way that the grommet 56 would not form a barrier for any oil or other liquids

flowing from the transversal trench 19 into the longitudinal trench 18.

[0066] Fig. 13 shows a detail VIII of fig. 8 along the view-direction F-F indicated therein. Here it becomes apparent that two trench modules 16 are supported on each support elements 17 at least in case of the middle modules 23 of the modular oil trench 15. The connection elements 34 connect the two trench modules 16 to each other and seal up the bottom and the sides of the trench 18 in that they are connected to the connection sections 32 provided at the side walls 26, 27 and the bottom wall 28, respectively.

[0067] Fig. 14 shows a schematic cross-sectional view of the trench support element 17 along the cross-sectional line G-G illustrated in fig. 13. Here it becomes apparent how the support elements 17 protrudes from the site face 46 of the table 2, in particular the table top 10 along the transversal direction Y in a beam-like manner. The stopping elements 38 mounted to the trench modules 16 about the support element 17 via the horizontal damping elements 41 or are placed at least in the vicinity thereof so that large movements of the modular oil trench 15 along the horizontal direction X are inhibited. Only thermal expansion of the modular oil trench 15 is allowed by gaps 31, free spaces 57 and a deformation of damping elements 37, 41, 48, 55. Furthermore, the transversal stopping elements 52 extend at the supporting element 17 so that they shot above the vertical counter support surface 35 in order to inhibit movements of the modular oil trench 15 along the transversal direction Y.

[0068] Fig. 15 shows a detail XIV of fig. 14. The transversal stopping elements 52 are mounted to a transversal end 60 of the beam-like section of the support element 17 with the help of fixation means 61. Preferably, the fixation means 61 art chosen such that the transversal stopping elements 52 are detachable from the supporting element 17. For example, an appropriate nut and bolt combination may be chosen as the fixation means 61. This allows for first placing the trench modules 16 at the desired position on the supporting element 17, connected to trench modules 16 to each other afterwards, and then finally mount the transversal stopping elements 52.

[0069] Fig. 16 shows another embodiment of a power generation assembly 0' according the present invention in a schematic cross-sectional view along the cross-sectional line B-B similar to the view shown in fig. 8. The power generation assembly 0' differs from the power generation assembly 0 shown in figs. 2 to 15, in that the support elements 17 are fixed to a supporting structure 62 instead of being connected to the table 2. The supporting structure 62 may be formed for example as a steel structure.

[0070] The supporting structure 62 may be part of or mounted to any platforms or other structural elements located adjacent to the table. For instance an adjacent platform may constitute the supporting structure 62 and may comprise a platform top 63 and at least one pillar or pole 64.. The at least one supporting element 17 could

then be mounted to the pole 64 and/or the platform top 63.

[0071] The modular oil trench 15 may be arranged with respect to the platform top 63 in a manner similar to the way the modular oil trench 15 is arranged with respect to the table top 10 as described with reference to figs. 2 to 15 above. However, the modular oil trench 15 of the power generation assembly 0' could be arranged such that it is not or at least not directly connected to the table 2, i.e. separated therefrom by the gap 57.

[0072] Deviations from the above-described embodiments are possible within the scope of the present invention without departing from the inventive idea.

LIST OF REFERENCE NUMERALS

[0073]

0, 0'	power generation assembly
1	power generation unit
2	table
3	turbine
4	power generator
5	shaft
6	lubrication system
7	oil pipes
8	longitudinal pipes
9	transversal pipes
10	table top
11	pillar
12	foundation
13	room
14	trench system
15	modular oil trench
16	trench module
17	support element
18	longitudinal trench
19	transversal trench
20	junction
21	front termination module
22	back termination module
23	middle module
24	front wall
25	back wall
26	first sidewall
27	second side wall
28	bottom wall
29	front face
30	rear face
31	gap
32	connection section
33	and region
34	connecting element
35	vertical support surface
36	vertical counter support surface
37	vertical damping element
38	stopping element
39	stopping surfaces
40	counter stopping surfaces

41 horizontal damping element
 42 cover support element
 43 trench covering element
 44 cover ceiling element
 45 fixing element
 46 side face
 47 top surface
 48 further damping element
 49 lining
 50 edge protection element
 51 blocking element
 52 transversal stopping element
 53 transversal counter support face
 54 outer side face of trench module
 55 transversal damping element
 56 grommet
 57 free space
 58 mounting plate
 59 spout
 60 transversal end
 61 fixation means
 62 supporting structure
 63 platform top
 64 pole

 100 power generation assembly (prior art)
 101 power generation unit (prior art)
 102 table (prior art)
 103 turbine (prior art)
 104 power generator (prior art)
 105 shaft (prior art)
 106 lubrication system (prior art)
 107 oil pipe (prior art)
 108 longitudinal pipe (prior art)
 109 transversal pipe (prior art)
 110 table top (prior art)
 111 pillar (prior art)
 112 foundation (prior art)
 113 room (prior art)
 114 trench system (prior art)
 118 longitudinal trench (prior art)
 119 transversal trench

 X longitudinal direction
 Y transversal direction
 Z height direction

Claims

1. Modular oil trench (15) for a power generation unit (1) of a power plant, comprising at least one trench module (16) having an essentially U-shaped cross-section defined by two side walls (26, 27) and a bottom wall (28) adapted for forming at least a part of the a trench (18, 19) and providing a front face (29) and/or a rear face (30) for connecting the at least one trench module (16) to another trench module

(16) in an oil-proof and fire-proof manner.

2. Modular oil trench (15) according to claim 1, **characterized in that** at least one of the front face (29) and/or the rear face (30) are or is provided with a connection section (32).
3. Modular oil trench (15) according to claim 2, **characterized in that** the connection section (32) is at least partly made of metal.
4. Modular oil trench (15) according to claim 2 or 3, **characterized in that** the connection section (32) is at least partially embedded within at least one of the two side walls (26, 27) and/or the bottom wall (28).
5. Modular oil trench (15) according to at least one of claims 2 to 4, **characterized in that** the connection section (32) comprises at least one U-shaped metal profile.
6. Modular oil trench (15) according to at least one of claims 1 to 5, **characterized in that** the two side walls (26, 27) have a different height measured in a height direction (Z) of the modular oil trench (15).
7. Modular oil trench (15) according to at least one of claims 1 to 6, **characterised in that** the bottom wall (28) provides an essentially plane support surface (35) for supporting the at least one trench module (16) on a trench support element (17).
8. Modular oil trench (15) according to at least one of claims 1 to 7, **characterised in that** at least one of the side walls (26, 27) provides a cover support element (42) for supporting a trench covering element (43) on the at least one trench module (16).
9. Modular oil trench (15) according to at least one of claims 1 to 8, **characterised in that** at least one of the side walls (26, 27) and/or the bottom wall (28) are or is, respectively, provided with at least one lining element (49) facing towards an inside of the U-shape.
10. Modular oil trench (15) according to at least one of claims 1 to 8, **characterised by** at least one of a trench front termination module (21) and/or a trench back termination module (22) providing a front wall (24) and/or a back wall (25), respectively, for the trench (18, 19).
11. Power generation assembly (0, 0') for a power plant, comprising at least one trench supporting element (17) adapted to support at least one trench module (16) according to at least one of claims 1 to 10 above.
12. Power generation assembly (0, 0') according to claim

11, **characterised in that** the modular oil trench (15) comprises at least two trench modules (16) which are connected to each other in the region of their front faces (29) and/or back faces (30) facing each other.

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13. Power generation assembly (0, 0') according to claim 11 or 12, **characterised in that** the at least one trench supporting element (17) is mounted to a side face (46) of a table (2) for supporting a power generation unit (1) of the power plant.

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14. Power generation assembly (0, 0') according to at least one of claims 11 to 13, **characterised in that** the at least one trench supporting element is mounted to a supporting structure (62).

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15. Method of assembling a power generation assembly (0) of a power plant with a table (2) for supporting a power generation unit (1) of the power generation assembly (0), wherein a trench system (14) for the power generation unit is formed of at least one pre-fabricated trench module (16).

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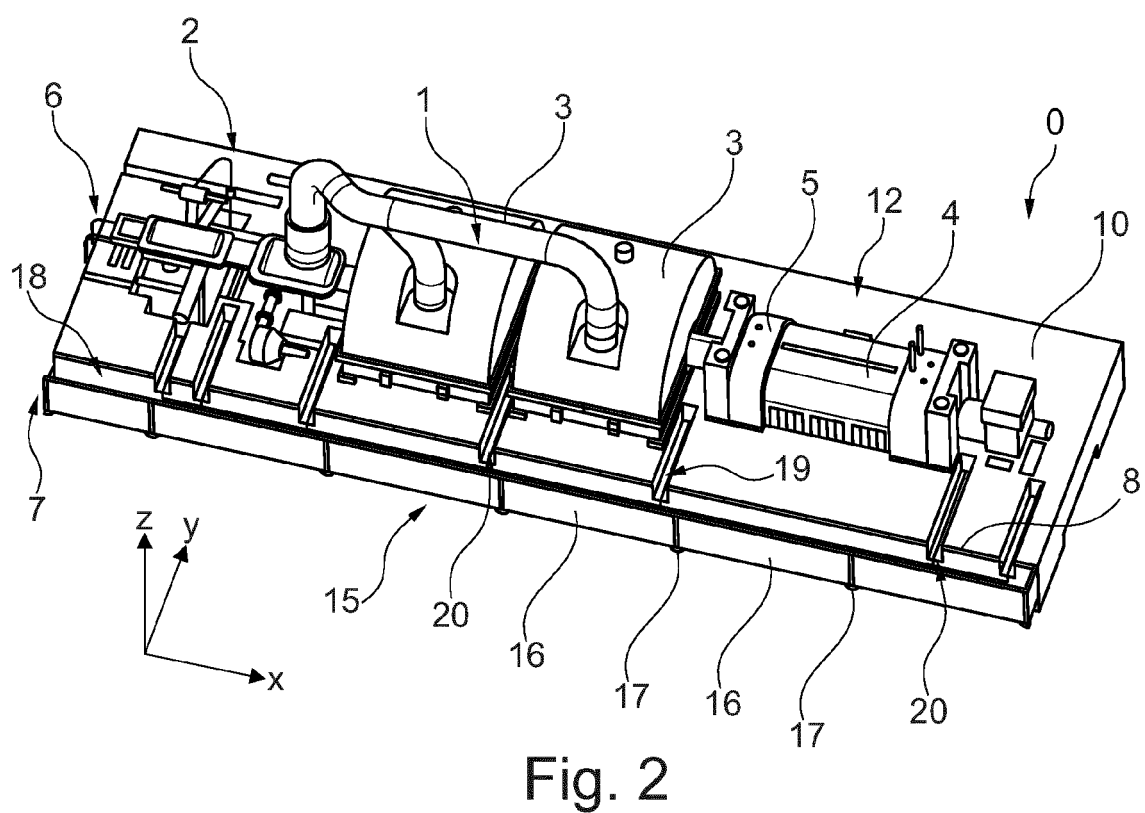
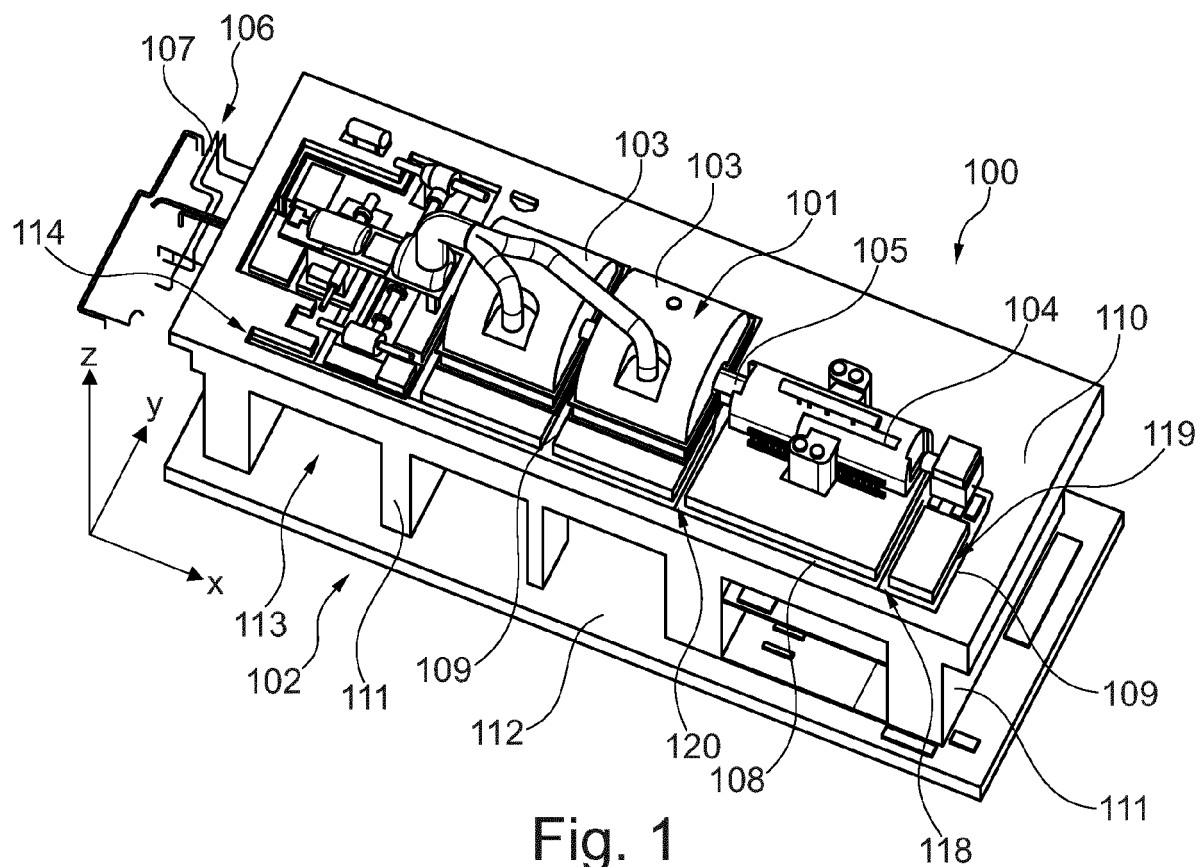
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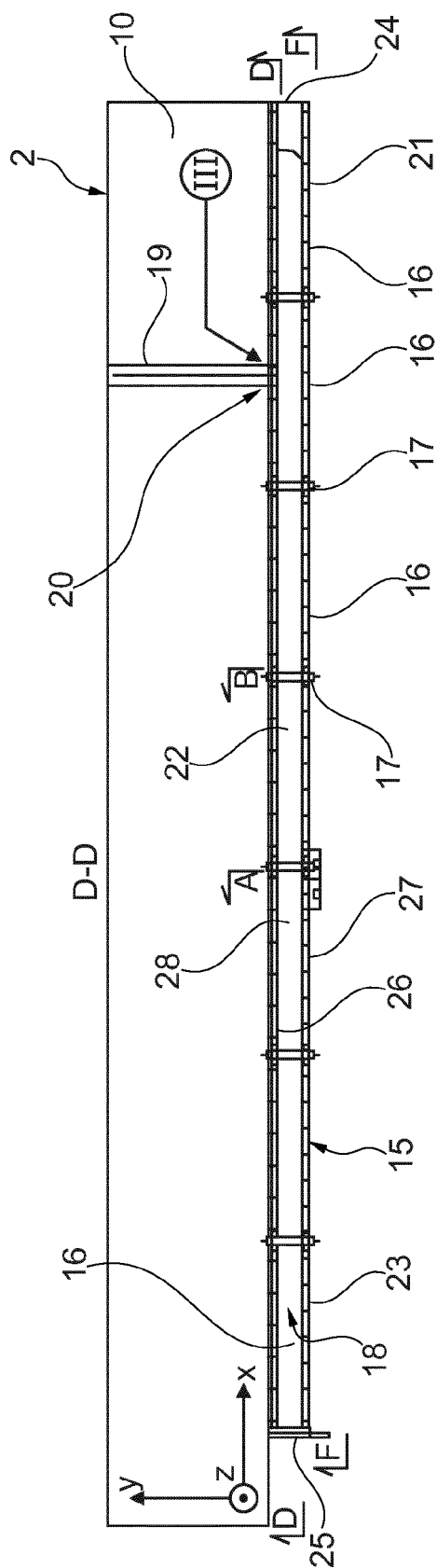


Fig. 3

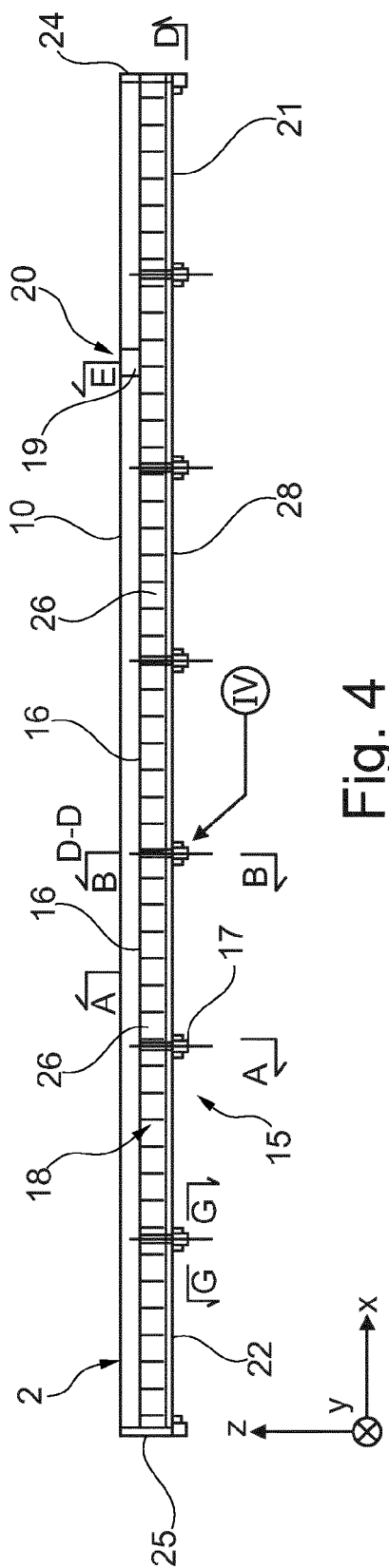


Fig. 4

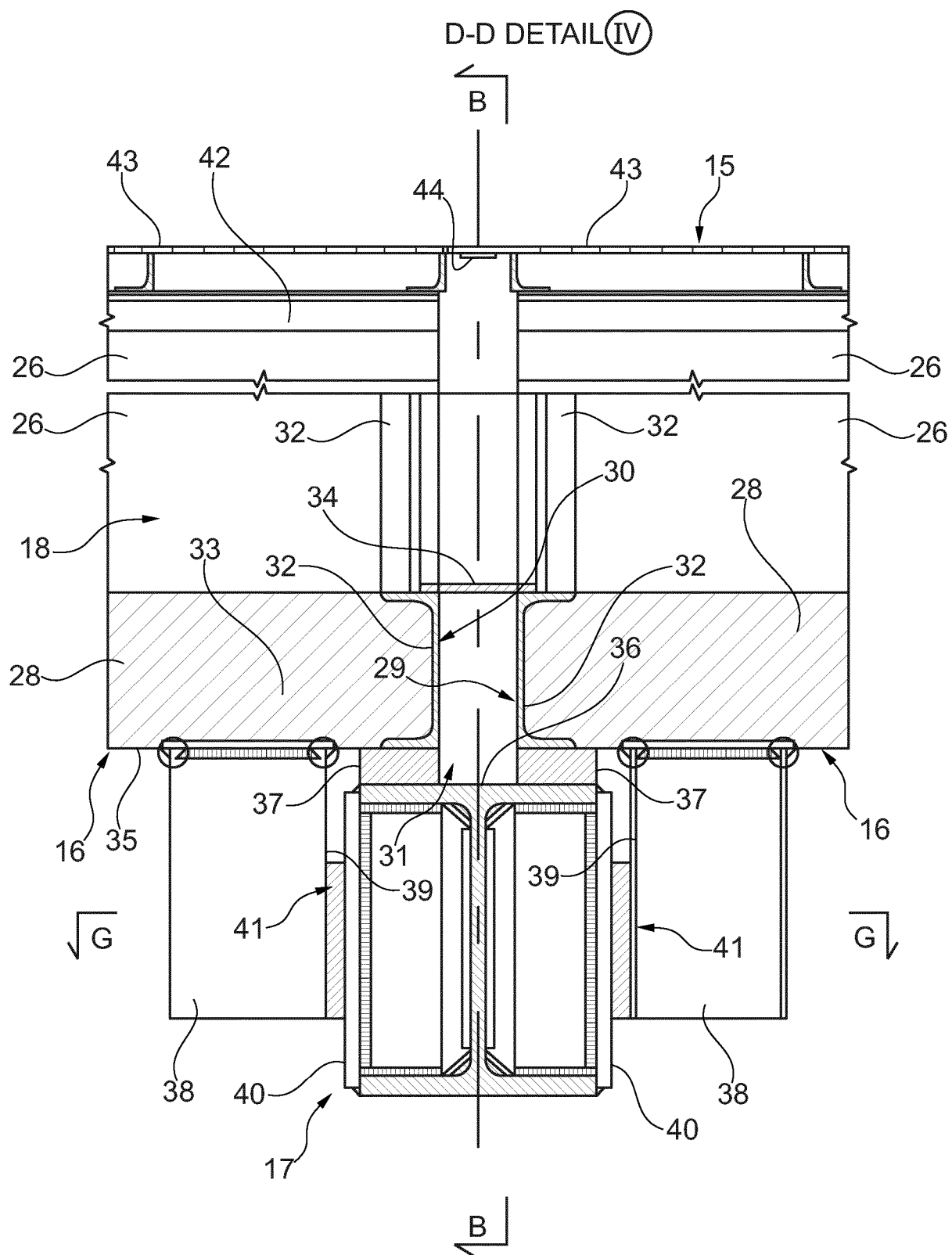
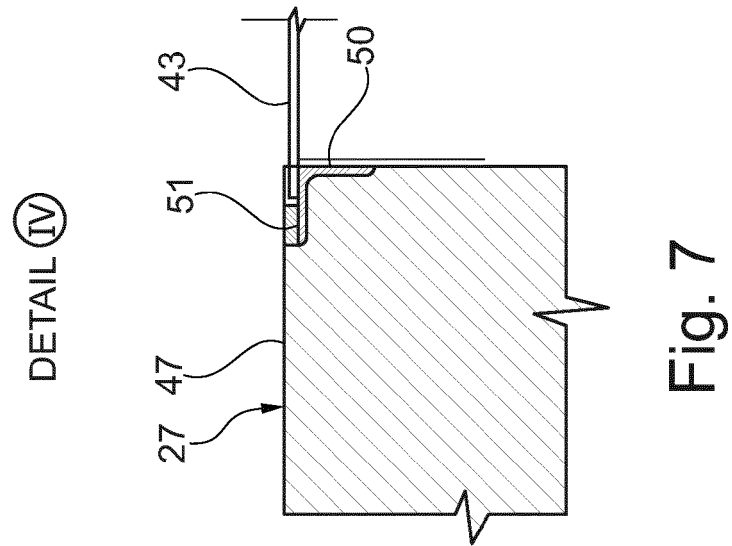
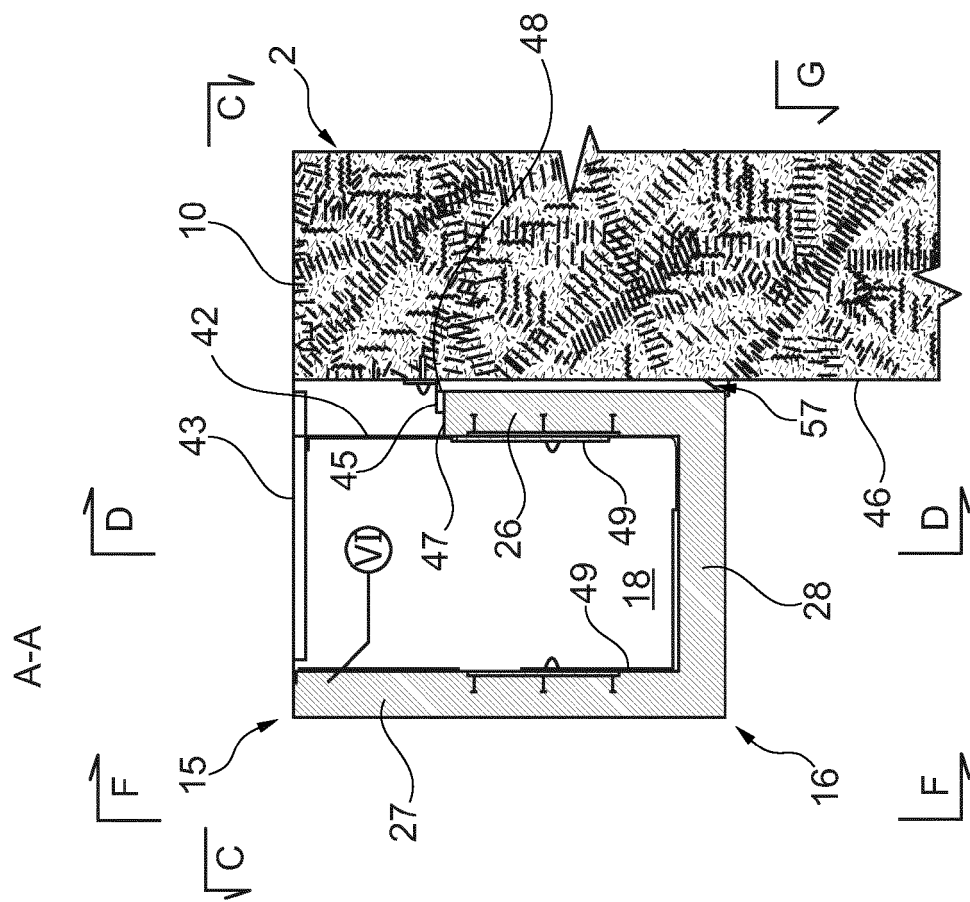


Fig. 5



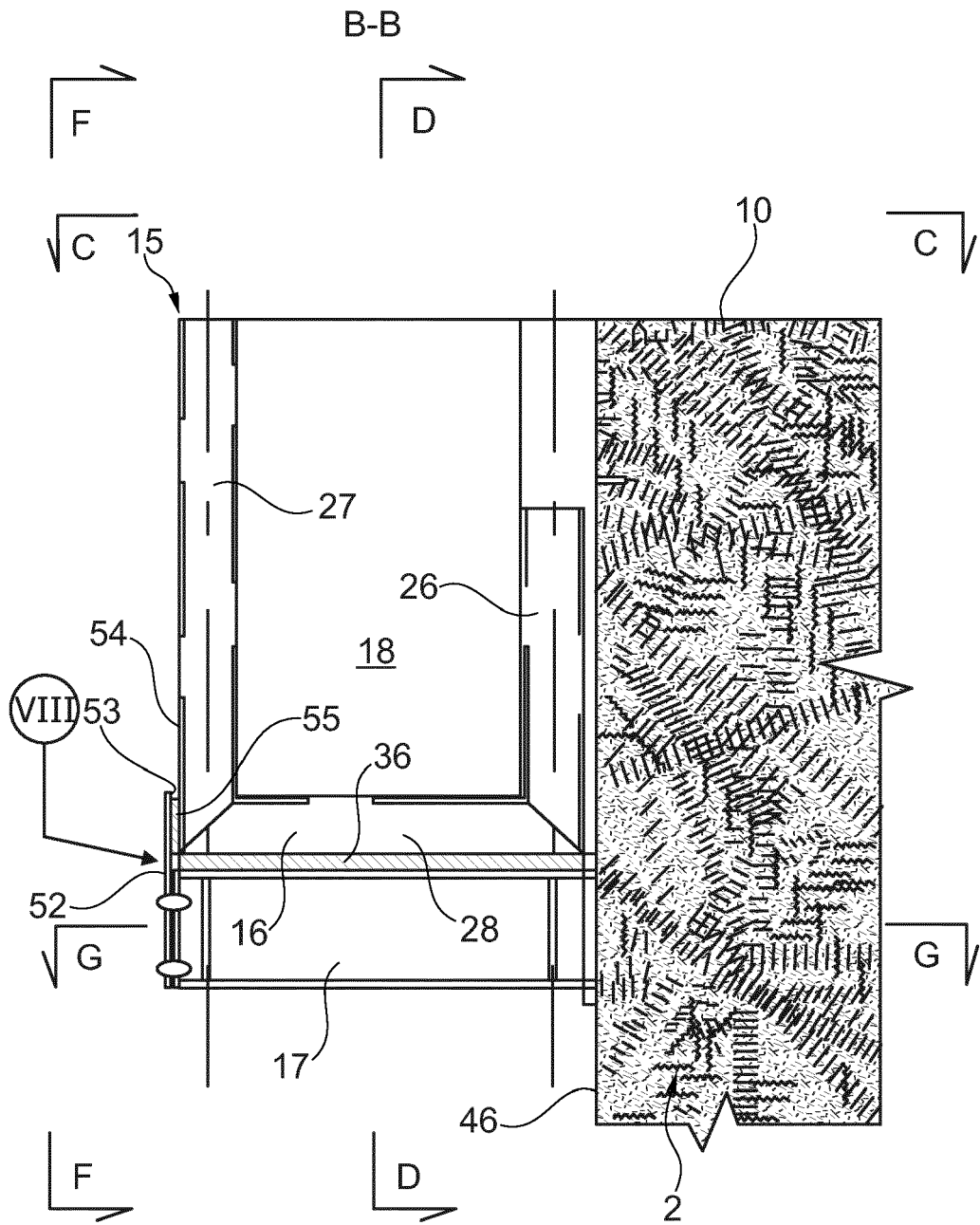


Fig. 8

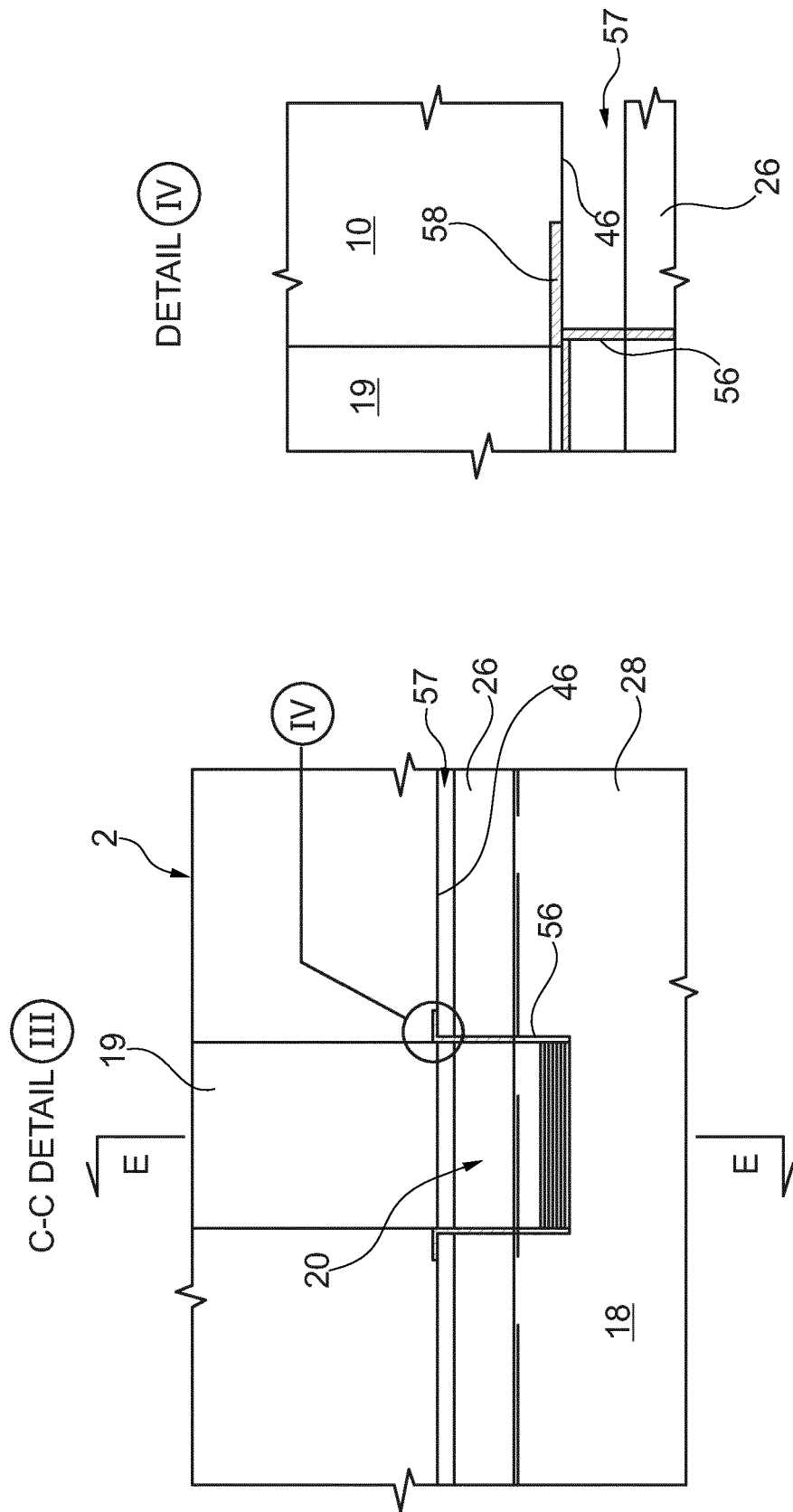


Fig. 9

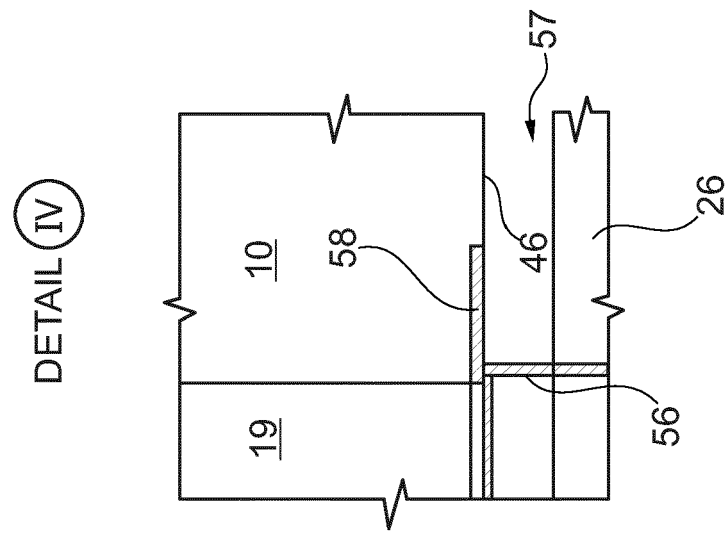


Fig. 10

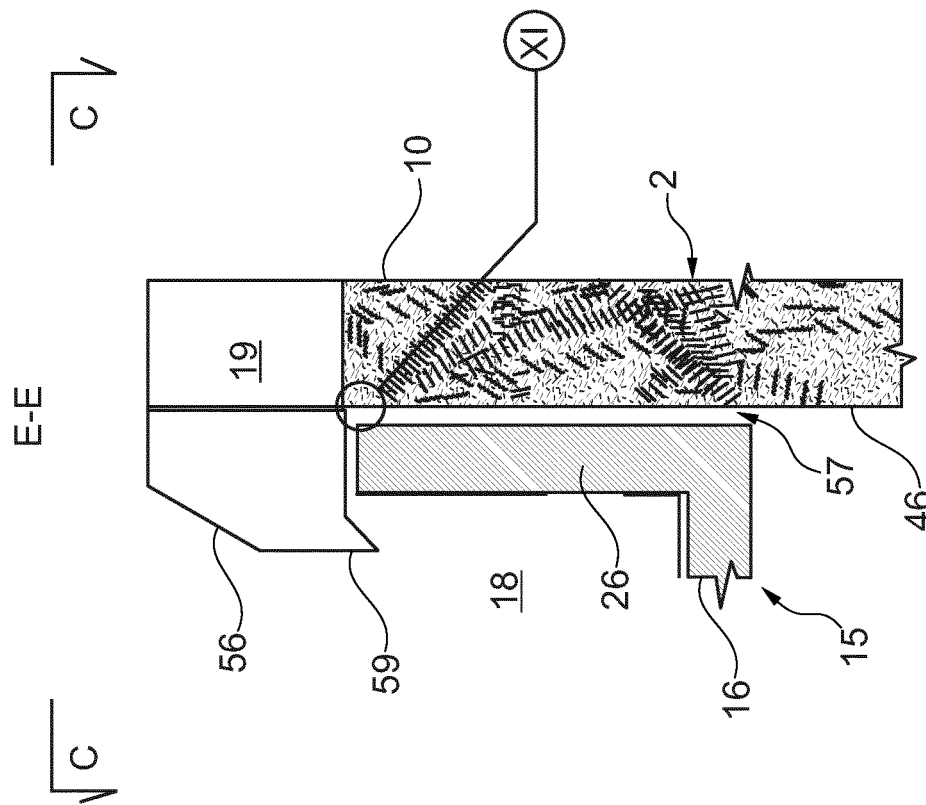


Fig. 11

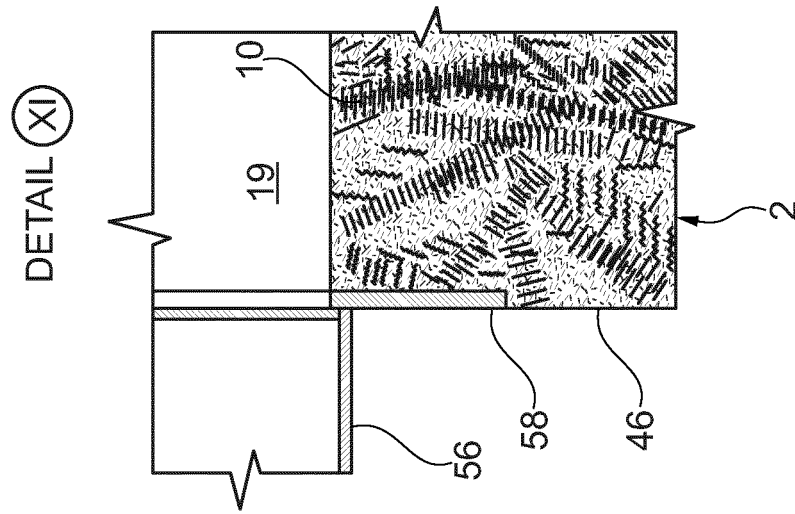


Fig. 12

F-F DETAIL VIII

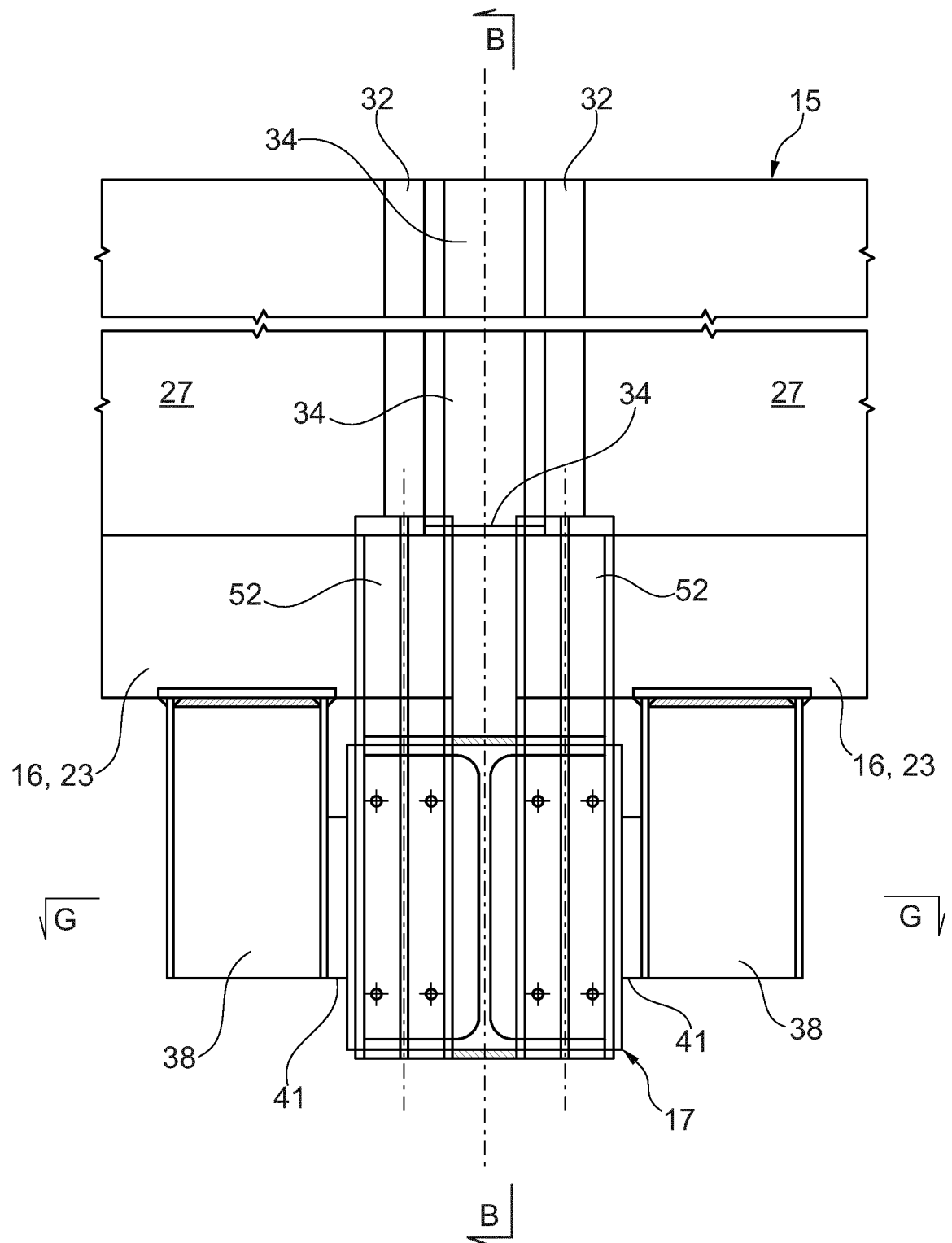


Fig. 13

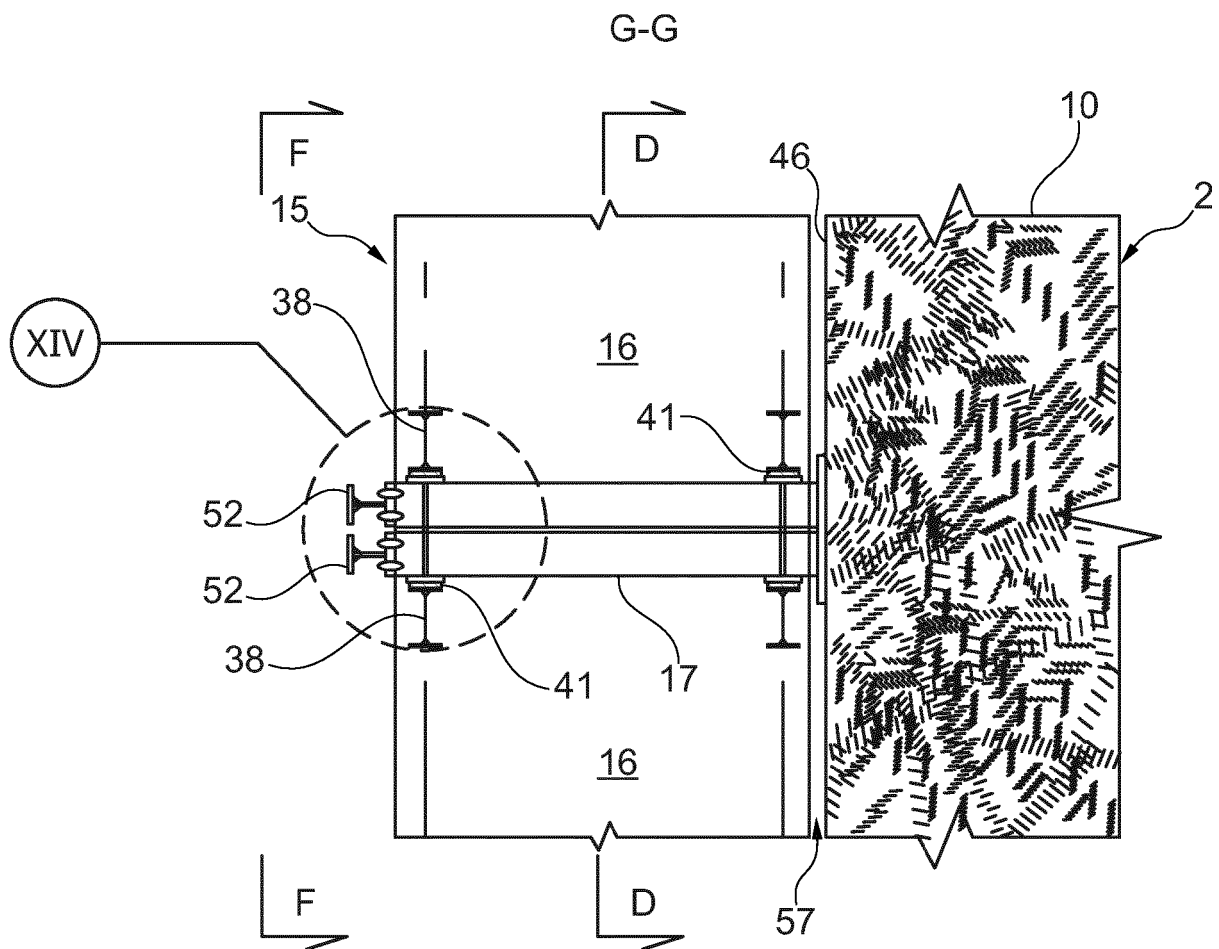


Fig. 14

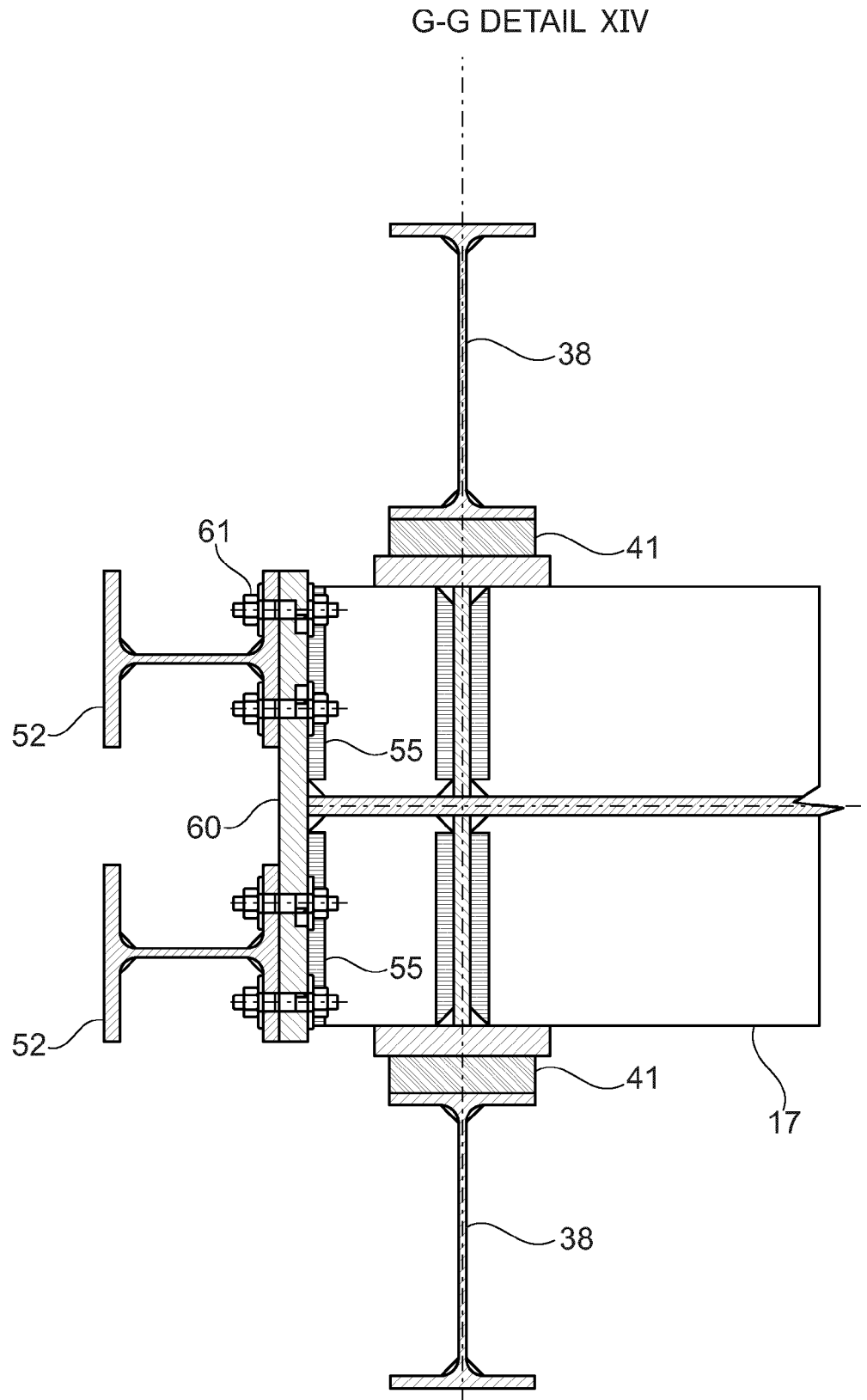


Fig. 15

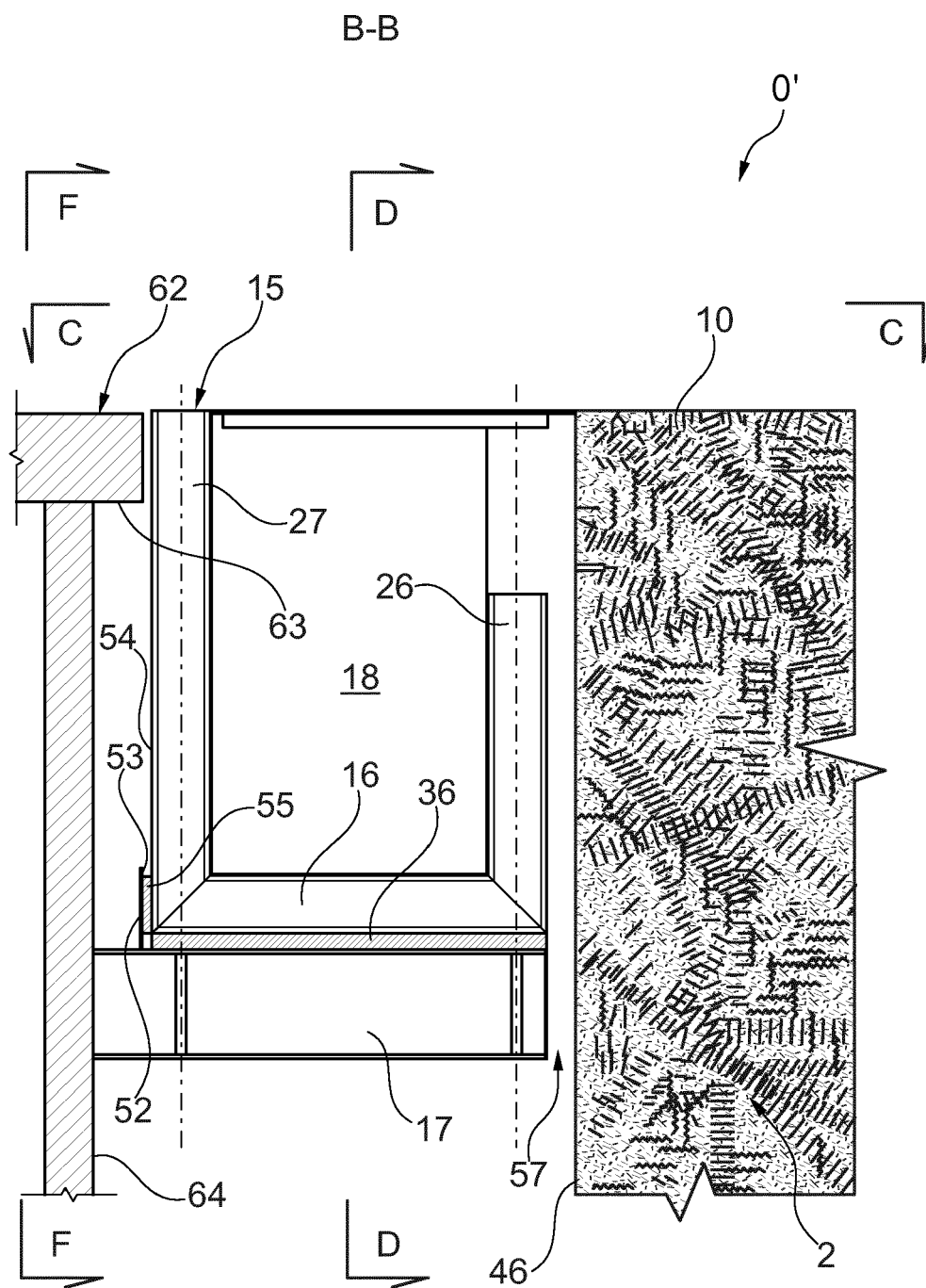


Fig. 16



EUROPEAN SEARCH REPORT

Application Number
EP 16 16 5635

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			TECHNICAL FIELDS SEARCHED (IPC)
			E02D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 September 2016	Examiner Geiger, Harald
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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