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Description

[1] The invention relates to an apparatus for producing concrete molded parts. Devices for producing concrete molded parts, such as paving bricks, are typically used for machine manufacturing and include a mold machine with a stamping unit and a mold lower part formed as a mold, in which the stamping unit can engage. In the mold lower part, one or a plurality of mold cavities are usually formed which are opened upward and downward. The mold lower part is placed with a lower limiting edge of a brick field on a horizontal base, which closes the lower openings of the mold. Through the upper openings, the mold cavities are filled with a mixture of concrete, which is subsequently pressed by way of pressure plates arranged on the stamping unit by lowering the pressure plates through the upper openings into the mold cavities. Through subsequent shaking, typically of the base, the mixture of concrete hardens into dimensionally stable concrete molded parts. These are demolded through the lower openings of the mold cavities.

[2] The stamping unit is connected to a typically hydraulically operated vertical movement unit of the mold machine and can be displaced vertically by means of this movement unit. The connection may exist in a conventional design, by way of a load unit, which usually forms a mold upper part with the stamping unit as a uniformly manageable assembly. By means of a stop on stamps of the stamping unit, a consistent brick height is attained even in case of different compression of the mixture of concrete.

[3] In the design of such an apparatus for manufacturing concrete molded parts, particularly the fastening of the stamping unit to the mold upper part and to the pressure plates is particularly important, since this fastening must make possible the positioning of the stamps and a stable support of the stamps against tipping and/or torsionally acting forces.

[4] From the prior art, apparatuses are known in which a stamp is connected to a mounting plate by means of a welded connection to a screw-on plate onto which the pressure plate is screwed for easier changing.

[5] Thus, for example, in DE 10302693 B3 the production of compacted concrete molded bricks is described. This typically occurs in mold machines, in which a mold lying on a shaking base is filled with one or several mold cavities with a mass of concrete. Pressure plates are

introduced into the mold cavities from above, which pressure plates are fastened at the lower ends of vertical stamps. The stamps are welded at their upper ends to a stamp carrier, usually a stable plate. The stamp carrier is pressed downward during the shaking process by way of a machine connection.

[6] In WO 2008/055504 A1, a mold machine is shown, in which no concrete can come from the concrete emerging from mold cavities onto the upper side of pressure plates during compaction. For this purpose, several base plates and a bolt plate are placed in an apparatus between pressure stamp and pressure plate according to the preamble of claim 1, so that, upon insertion of the pressure plate into a mold cavity, a part of the base plate always extends beyond the upper edge of the mold cavity.

[7] In GB 2 012 202 A, a mold machine is shown whose pressure plate assembly is provided for quick changing. For this purpose, the pressure plate is connected by way of a screw to the stamp plate, the screw being guided within a hollow cylinder. The hollow cylinder serves as a pressure stamp.

[8] Therefore, the object of the invention is to create an apparatus for producing concrete molded parts, which apparatus comprises pressure stamps which can be produced in a simple and advantageous manner and which also can be exchanged without material-processing interventions.

[9] This object is achieved through the features of claim 1. Further advantageous embodiments are the subject matter of each of the dependent claims. These can be combined with one another in a technologically reasonable manner. The description, in particular in connection with the drawings, additionally characterizes and specifies the invention.

[10] According to the invention, an apparatus for producing concrete molded parts is created in a molding machine, which comprises a mold upper part having a pressure plate arrangement which has a plurality of pressure plates each facing an opening of a mold cavity, each pressure plate being screwed to an intermediate plate, the intermediate plate being connected, on the side facing the mold upper part, to a stamp plate on the mold upper part via at least one pressure stamp, characterized in that the intermediate plate is fixed to the stamp plate by at least one bolt that can be screwed being guided through a receptacle on the intermediate plate, which bolt

detachably engages in the stamp plate, the pressure stamp comprising a hollow body which encloses the bolt between the intermediate plate and the stamp plate.

[11] A basic idea of the invention is thus to design the pressure stamp as a hollow body in whose interior a bolt is guided. On the one hand, the bolt is detachably connected to the intermediate plate, for example, via a screw connection. On the other hand, the bolt is guided through a receptacle in the intermediate plate, such that there is a tension between the intermediate plate and the stamp plate creating a mechanical connection, in which case the hollow body is provided for the transfer of force between the stamp plate and the intermediate plate. Accordingly, the welding of pressure plates prevalent in the prior art was avoided so as to create a detachable fastening between the individual components of a mold machine. This makes possible a cost-efficient production of mold machines and, moreover, allows worn parts or the necessary upgrades subsequent to retrofitting to other brick molds to take place in a straightforward manner through the exchange of the corresponding components.

[12] According to an embodiment of the invention, the receptacle is formed as a depression having a stepped cross section in a direction that is perpendicular with respect to the surface of the intermediate plate.

[13] In particular, the stepped cross section can be provided to create a fastening option for the bolt, such that the bolt can be supported in an axial direction from the side of the pressure plate against the intermediate plate. This makes it possible to provide a corresponding counter-element on the opposite side in the region of the stamp plate, such that the tension between the intermediate plate and the stamp plate is achieved, the distance between the two plates being determined by the hollow body.

[14] According to another embodiment of the invention, the stepped cross section has, on the side of the intermediate plate facing the stamp plate, a first internal dimension which corresponds to an external dimension of the bolt.

[15] In order to be able to guide the bolt through the intermediate plate, it is accordingly provided to select the stepped cross section of the receptacle such that the bolt can be guided through the intermediate plate.

[16] According to another embodiment of the invention, the stepped cross section has, on the side of the intermediate plate facing the pressure plate, a second internal dimension which is selected to be larger than the first internal dimension.

[17] The stepped cross section continues in the direction of the pressure plate, such that a widening of the cross section occurs which is characterized by a second internal dimension.

[18] According to another embodiment of the invention, a screwhead which is attached to a bolt and is arranged on the side facing the pressure plate below the surface of the intermediate plate can be introduced in the region of the second internal dimension in the intermediate plate.

[19] The stepped cross section is thus suited to accommodate a screwhead attached to the end of a bolt, which screwhead can be designed, for example, as a hex head, a slotted screwhead or the like, in such a way that the pressure plate above it completely covers the screwhead and rests on the surface of the intermediate plate. The use of a screwhead at the end of the bolt represents the simple option of creating the desired tension between the intermediate plate and the stamp plate.

[20] According to another embodiment of the invention, a nut which engages in an external thread of the bolt and is arranged on the side facing the pressure plate below the surface of the intermediate plate can be introduced in the region of the second internal dimension in the intermediate plate.

[21] Contrary to the previous exemplary embodiment, the bolt is not equipped with a screwhead, but rather can be provided, for example, as a threaded rod, into which a nut is brought into engagement with in the region of the second internal dimension. According to this procedure, tension is also possible between the stamp plate and the intermediate plate.

[22] According to another embodiment of the invention, the hollow body is designed as a hollow cylinder, the upper edge and the lower edge of which are aligned plane-parallel with respect to one another in the axial direction.

[23] In order to enable a maximally uniform and tension-free force transfer of the load unit to the pressure plates, it is advantageous if the side surfaces of the hollow cylinder are aligned

plane-parallel to one another, in which context it can also be provided as part of the invention that the side surfaces are merely aligned parallel to each other in sections on the upper edge or the lower edge, so that, for example, individual projections are formed whose gaps do not necessarily have to be formed to be parallel.

[24] According to another embodiment of the invention, the bolt has a circular cross section.

[25] The simplest possible construction of the apparatus is achieved if the bolt is provided with a circular cross section. But it is also possible as part of the invention to equip the bolt at least in sections with individual segments deviating from this circular cross section, which segments can be used, for example, as a guide in the hollow body.

[26] According to another embodiment of the invention, the bolt is provided with an external thread in the region of its end nearest the stamp plate.

[27] This approach is particularly advantageous if the bolt is designed with a screwhead on intermediate plate. Accordingly, on the side of the stamp plate, a nut can be fastened to the external thread, such that the intermediate plate, supported by way of the hollowed body, is fastened to the stamp plate by means of a screw connection. But, as already mentioned, it is also possible to provide a nut on the side of the intermediate plate and to insert the screwhead, for example, from the side of the stamp plate, provided the load unit should make sufficient space available in this region for a screw to be able to pass through.

[28] According to another embodiment of the invention, a plurality of bolts and hollow bodies are provided for each intermediate plate.

[29] This approach makes possible a stable fastening of the intermediate plate to the stamp plate, in which case the number of bolts and hollow bodies is chosen according to the mechanical load to be expected. In this way, it may be provided that the intermediate plate is designed with a substantially rectangular basic area, in which case two or more bolts and hollow bodies each are arranged on both sides.

[30] According to another embodiment of the invention, the intermediate plate comprises openings, through which a fastening element can be guided in order to implement a screw

connection to the pressure plate.

[31] To fasten the pressure plate to the intermediate plate, a fastening element is guided through corresponding openings according to this approach in order to be able to implemented a screw connection. In this case, the fastening element may be designed, for example, as a threaded rod with an associated nut.

[32] According to another embodiment of the invention, the intermediate plate is formed as one piece.

[33] Advantageously, the intermediate plate is manufactured together in one piece with the openings or the receptacles for the bolts, so that, on one hand, manufacturing costs can be reduced, but, on the other hand, a stable construction can also be achieved.

[34] According to the invention, the outer circumference of the intermediate plate forms, together with inner areas of the receptacles and the openings, a closed curve.

[35] Accordingly, it is provided that the receptacles or the openings in the intermediate plate are not formed as isolated holes, but rather can be run over along a single, closed curve. This makes it possible to produce the intermediate plate according to the invention in a single processing step from a plate-shaped base body, for example through a laser-cutting method. After completion of the formation of the outer contour of the intermediate plate, re-processing to form the stepped cross section must subsequently be performed. However, this processing step presents no great demands on the manufacturing tolerances to be complied with, since the distance between the intermediate plate and the stamp plate is defined by the hollow body and room must merely be created for a screwhead or a nut in the region of the second internal dimensions.

[36] According to the invention, the receptacles and the openings in the intermediate plates are offset from the outer edge of the intermediate plate inward, the receptacles and the openings comprising recesses pointing in the direction of the outer edge.

[37] The receptacles or openings provided in the form of boreholes can, in one respect, directly on the outer edge of the intermediate plate, in which context the laser-cutting method

just described provides that the holes for the receptacles and openings are formed further removed from the outer edge of the intermediate plate, in which outer edge corresponding recesses are formed from the outer edge to the openings or receptacles. This makes it possible to enlarge the cross section area of the hollow bodies, so that the pressure stamp formed by way of the hollow bodies and bolts exhibits a high degree of stability.

[38] In the following, several exemplary embodiments are explained in more detail in reference to the drawings:

Fig. 1 an apparatus for manufacturing concrete molded parts according to an embodiment of the invention in a perspective view,
Fig. 2 the apparatus from Fig. 1 in another perspective side view,
Fig. 3 parts of the apparatus from Fig. 1 in a perspective side view,
Fig. 4 parts of the apparatus from Fig. 1 in another perspective side view,
Fig. 5 parts of the apparatus from Fig. 1 in another perspective side view,
Fig. 6 parts of the apparatus from Fig. 1 in another perspective side view,
Fig. 7 a pressure stamp for use in an apparatus for manufacturing concrete molded parts according to the prior art in a perspective side view,
Fig. 8 the pressure stamp from Fig. 7 in a perspective side view with the pressure plate screwed on.

[39] In the drawings, the same components or components with the same functional effect are assigned the same reference numeral.

[40] Fig. 1 shows an apparatus VO which is suitable for producing concrete molded parts in a mold machine. The apparatus VO comprises an exchangeably arranged mold, which is formed by a mold lower part and a mold upper part FB (not shown in Fig. 1). The mold lower part comprises in the conventional way a mold cavity, which has a correspondingly selected number of openings, such that concrete molded parts can be manufactured in the desired number and size using the apparatus VO. The mold upper part FB comprises a plurality of pressure plates DP, each pressure plate DP corresponding with one of the openings. The pressure plates DP are each connected to a stamp plate ST by way of a plurality of pressure stamps DS.

[41] Above the stamp plate ST a load unit AE is provided, which can correspondingly

compress a mixture of concrete placed in the openings of the mold cavity as a fill material by way of the pressure stamps DS. Between the pressure plate DP and the pressure stamps DS, an intermediate plate ZW is arranged on which the pressure plates DP are detachably fastened, such that the corresponding pressure plate can easily be changed as needed.

[42] Fig. 2 shows the apparatus VO again, in another perspective side view, from another point of view, wherein the apparatus is no longer shown from the lower side with the pressure plates DP arranged there, as in Fig. 1, but rather the view is diagonal from above onto the intermediate plates ZW. To fasten the pressure plates DP to the intermediate plates ZW, fastening elements BE are provided which are detachably screwed, for example by means of a nut and a threaded rod, which is guided through the intermediate plate ZW and is connected at its other end to the pressure plate. As will explained further below, in this case several fastening elements BE are provided for an individual pressure plate DP. The load unit AE, on its upper side, comprises fastening rails BS, which, together with other elements (which are not, however, subject matter of the present invention) make it possible to receive the load unit in a mold machine.

[43] Between the stamp plate ST and the intermediate plate ZW, pressure plates DS are arranged, whose construction is described in more detail below, with reference to Fig. 3.

[44] Fig. 3 shows in a perspective side view the fastening of the pressure stamps DS with the intermediate plate ZW. The intermediate plate ZW is provided with four pressure stamps DS in the exemplary embodiment shown, which pressure stamps are formed from a bolt BO and a hollow body HO surrounding the bolt. In the example shown, the hollow bodies HO are designed as hollow cylinders, whose inner diameter is adapted to the circular cross section of the bolt BO such that the hollow bodies HO can be guided over the bolts BO.

[45] In an axial direction, the hollow body HO is designed between its upper edge OK and its lower edge UK with a length that is chosen to be shorter than that of the bolt BO. Accordingly, it is possible that the bolt projects both beyond the upper edge OK and the lower edge UK, such that an external thread AG attached there for a threaded connection to the stamp plate can be used for screwing to the stamp plate ST or the intermediate plate ZW.

[46] Accordingly, the pressure stamps DS in the embodiment of Fig. 3 are formed by the

hollow bodies HO, which, together with the bolt BO, create a fastening connection both in the direction of the mold upper part FB and downward in the direction of the pressure plates DP.

[47] To be able to make the transfer of the pressure forces on the pressure plates DP as even as possible when lowering the mold upper part FB, it is particularly provided that the side areas of the hollow bodies HO are designed to be plane-parallel to each other in the region of the upper edge OK and the lower edge UK, such that the vertical force applied via the load unit AE from above is transferred without tension onto the pressure plates DP.

[48] Fig. 4 shows the embodiment in Fig. 3 again, in which case a hollow body HO is removed for the sake of clarification. It is evident that the external thread AG does not necessarily have to continue along the entire outer side on the bolt BO. Furthermore, it can be seen in Fig. 4 that the intermediate plate ZW comprises a receptacle AN on the side facing the pressure stamps DS, which receptacle is designed with an internal diameter IA1 which is adapted to the external thread of the bolt BO, such that the bolt BO can be introduced through the receptacle AN into the intermediate plate ZW. As described below, supporting the bolt BO in the receptacle AN occurs from the side facing the pressure plate DP.

[49] Fig. 5 shows the apparatus according to the invention, in which case the pressure plate DP is connected to the intermediate plate ZW via the fastening device BE. The parts of the external thread AG of a bolt BO protruding in the region of the upper edge OK can engage in corresponding fastenings on the stamp plate ST, such that a tensioning of the intermediate plate ZW against the stamp plate ST can be performed using the bolt BO. The distance between the stamp plate ST and the intermediate plate ZW and subsequently also to the pressure plate DP can be established via the hollow bodies HO, so that the apparatus according to the invention can be retrofitted non-laboriously both in case of wear and also in case of retrofitting a mold machine. Furthermore, it can be seen in Fig. 5 that the fastening of the pressure plate DP is performed by way of the fastening element BE which, in the example shown, is formed by a threaded rod GS and a nut MU.

[50] Fig. 6 is a view of the intermediate plate ZW from the side facing the pressure plate DP. It is evident that both the receptacle for the fastening of the intermediate plate ZW to the receptacles AN provided for the bolt BO and the opening OE which serves to pass the threaded rod through are fitted with recesses AU. Accordingly, the intermediate plate ZW is formed with

an outer circumference, which, together with the inner areas of the receptacles AN and the openings OE forms a closed curve. It is thus possible to produce the intermediate plate ZW shown in Fig. 6 out of a planar block with a single cutting line.

[51] In particular, a correspondingly pre-processed metallic body can be used for this purpose which possesses corresponding plane-parallel main surfaces and which is given the corresponding receptacles AN or openings OE in one single work step by means of a laser-cutting method. In a post-processing step, the stepped cross section of the receptacle AN in the intermediate plate ZW is then formed such that a second internal dimension IA2 is created on the side of the intermediate plate ZW facing the pressure plate DP, which internal dimension is selected to be greater than the first internal dimension IA1. Thus, in the region of this stepped depression, a screwhead or a nut can be inserted to which the bolt BO is screwed on its external thread AG, in order to tension the intermediate plate ZW against the hollow body HO.

[52] In comparison to the latter, Fig. 7 again shows a pressure stamp according to the prior art. Here, the pressure stamp DS is usually inserted as a pipe-shaped connected between the upper screw-on plate AP1 and a lower screw-on plate AP2 into an opening provided there and connected permanently to the screw-on plates AP1 and AP2 by means of a weld SW. The upper screw-on plate AP1 in turn comprises corresponding openings, via which the screws SC can engage in the stamp plate ST. The threaded connection of the pressure plates DP occurs in a manner similar to that envisaged in the context of the invention via fastening elements BE, as shown in Fig. 8.

[53] To the extent that the hole pattern in the upper screw-on plate AP1 (through which the screw SC is guided) matches the location of the bolt BO according to the invention, an existing mold machine can be retrofitted with the invented solution.

Patentkrav

1. Anordning til fremstilling af betonformdele i en formemaskine, hvilken anordning omfatter en formoverdel (FB) med en trykpladeindretning med en flerhed af trykplader (DP), der hver vender mod en åbning i en formfordybning, idet hver af trykpladerne (DP) er skruet sammen med en mellemplade (ZW), idet mellempladen (ZW) på den side, der vender mod formoverdelen (FB) er forbundet med en stempelplade (ST) på formoverdelen (FB) ved hjælp af mindst et trykstempel (DS), idet mellempladen (ZW) er spændt fast til stempelpladen (ST) med mindst en skruebolt (BO) ført gennem et optag (AN) på mellempladen (ZW), hvilken bolt griber udtageligt ind i mellempladen (ZW) og har et hult legeme (HO) mellem mellempladen (ZW) og stempelpladen (ST), som omslutter bolten (BO), **kendetegnet ved, at** mellempladen (ZW) omfatter åbninger (OE), og mellempladens (ZW) ydre omkreds danner en lukket kurve sammen med optagenes (AN) og åbningernes (OE) inderflader i mellempladen (ZW), og optagene (AN) og åbningerne (OE) i mellempladen er forskudt indad fra mellempladens (ZW) yderkant, idet optagene (AN) og åbningerne (OE) har udsparinger (AU) i retning mod yderkanten.

2. Anordning ifølge krav 1, hvor optaget (AN) er udført som et hul, der i en retning vinkelret på mellempladens (ZW) overflade har et trindelt tværsnit.

3. Anordning ifølge krav 2, hvor det trindelte tværsnit på den side af mellempladen (ZW), der vender mod stempelpladen (ST), har en første inderdiameter (IA1), som svarer til boltens (BO) yderdiameter.

4. Anordning ifølge krav 3, hvor det trindelte tværsnit på den side af mellempladen (ZW), der vender mod trykpladen (DP), har en anden inderdiameter (IA2), som er større end den første inderdiameter (IA1).

5. Anordning ifølge krav 4, hvor der i området med den anden inderdiameter (IA2) i mellempladen (ZW) kan indføres et skruehoved, som er fastgjort på bolten (BO), hvilket skruehoved er anbragt på den side, der vender mod trykpladen (DP) under mellempladens (ZW) overflade.

6. Anordning ifølge krav 4, hvor der i området med den anden inderdiameter (IA2) i mellempladen (ZW) kan indføres en møtrik, som griber ind i boltens (BO) ydergevind og er

anbragt på den side, der vender mod trykpladen (DP) under mellempladens (ZW) overflade.

7. Anordning ifølge et af kravene 1 til 6, hvor det hule legeme (HO) er udformet som en hul cylinder, hvis overkant og underkant i aksial retning er justeret planparallelt i forhold til hinanden.

8. Indretning (2) ifølge et af kravene 1 til 7, hvor bolten (BO) er forsynet med et cirkelrundt tværsnit.

9. Anordning ifølge krav 8, hvor bolten (BO) i området af den ende, der vender mod stempelpladen (ST), er forsynet med et ydergevind (AG).

10. Anordning ifølge et af kravene 1 til 9, hvor der for hver mellemplade (ZW) er tilvejebragt en flerhed af bolte (BO) og hule legemer (HO).

11. Anordning ifølge et af kravene 1 til 10, hvor der gennem åbningerne (OE) i mellempladen (ZW) kan føres et fastgørelseselement (BE) med henblik på at gennemføre en skrueforbindelse med trykpladen (DP).

12. Anordning ifølge et af kravene 1 til 11, hvor mellempladen (ZW) er udført i ét stykke.

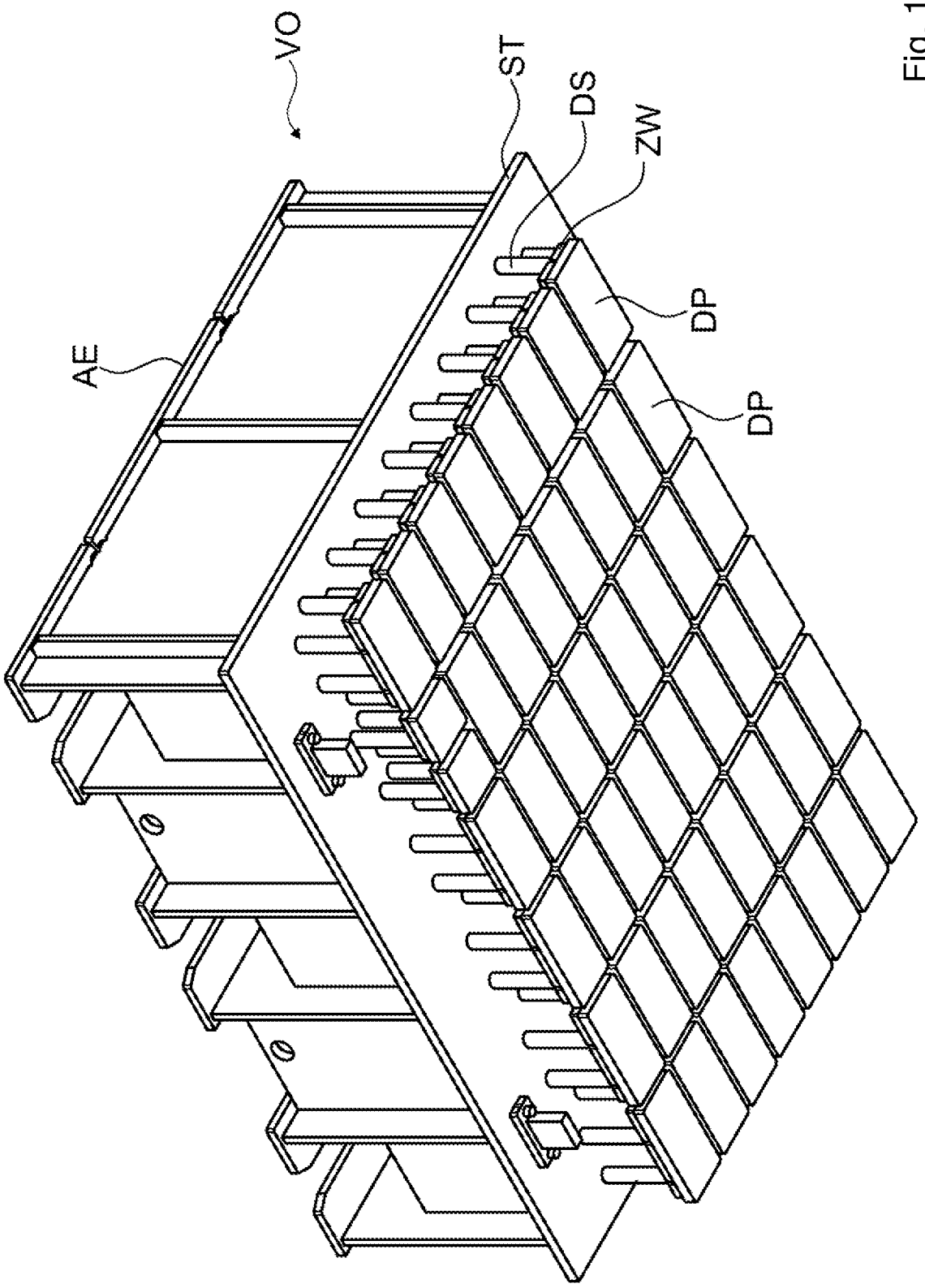


Fig. 1

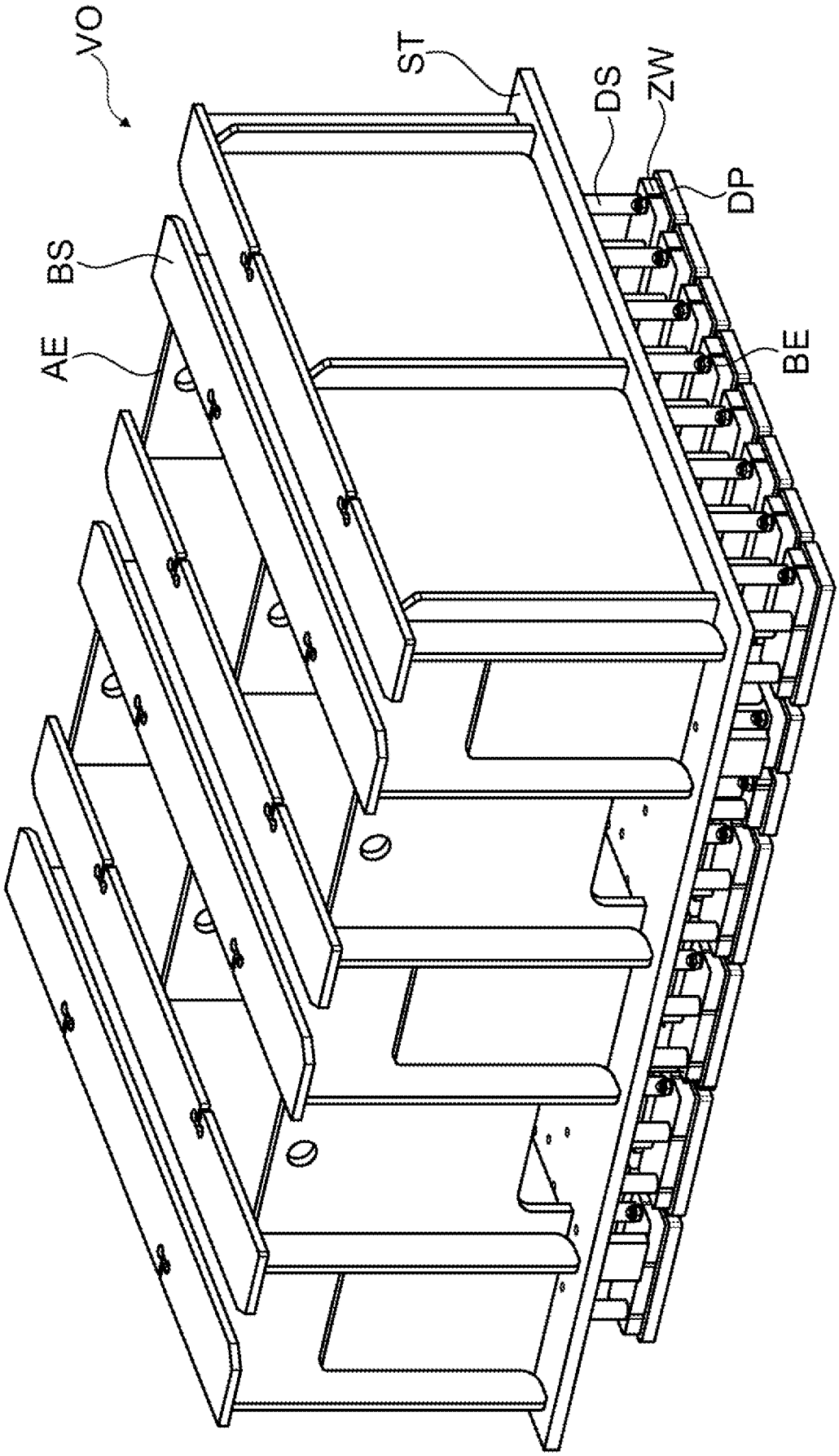


Fig. 2

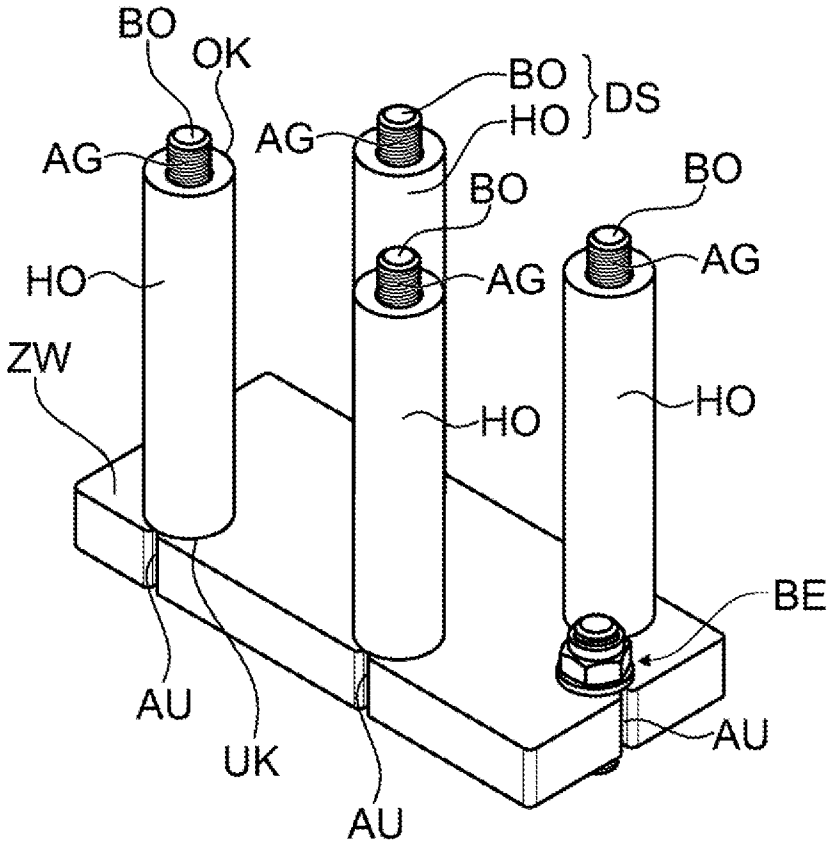
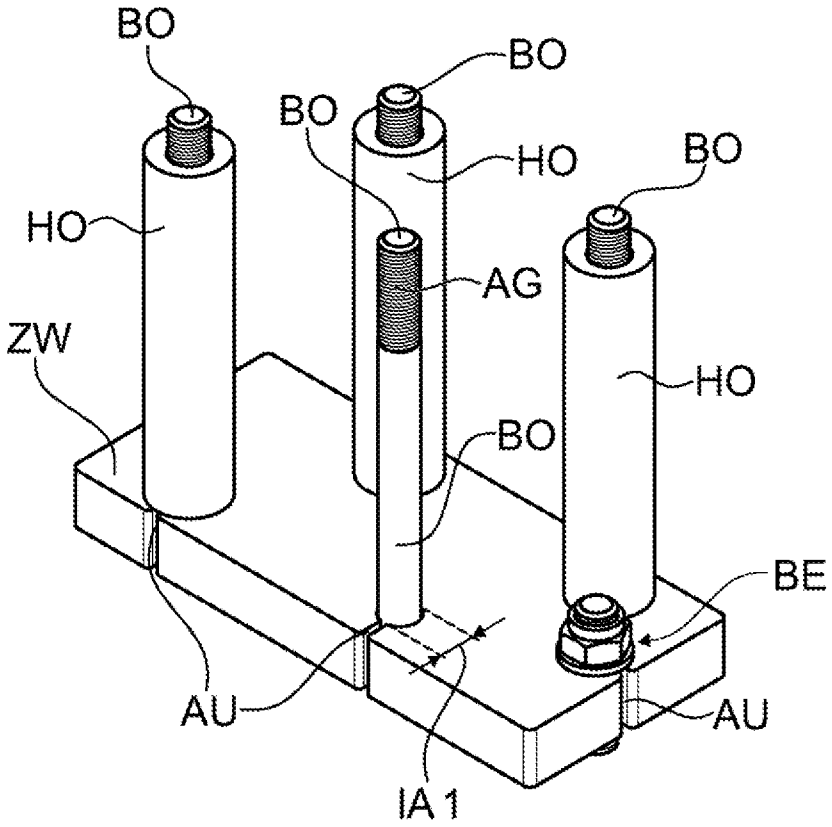

BO
OK
BO
DS
HO
AG
AG
BO
BO
AG
AG
HO
ZW
HO
HO
BE
AU
UK
AU
AU

Fig. 3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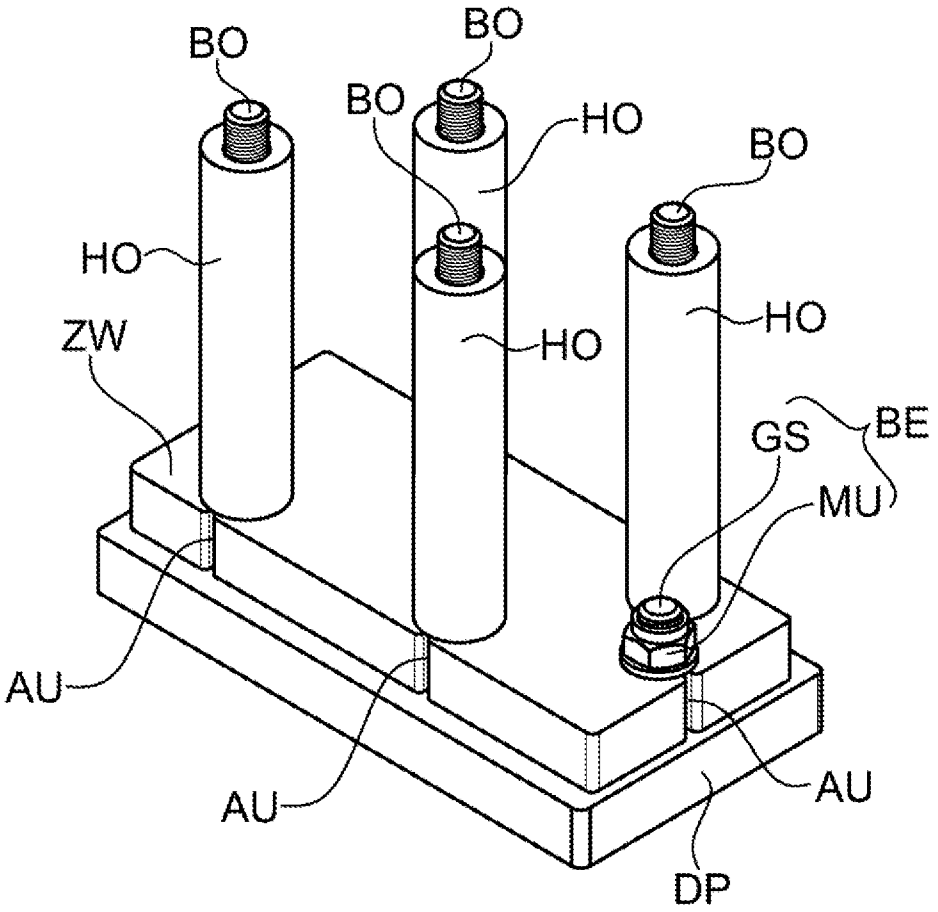
BO
BO
HO
BO
HO
AG
ZW
HO
BO
BE
AU
AU
IA 1

Fig. 4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BO
BO
HO
BO
HO
ZW
HO
HO
GS
BE
MU
AU
AU
AU
DP

Fig. 5

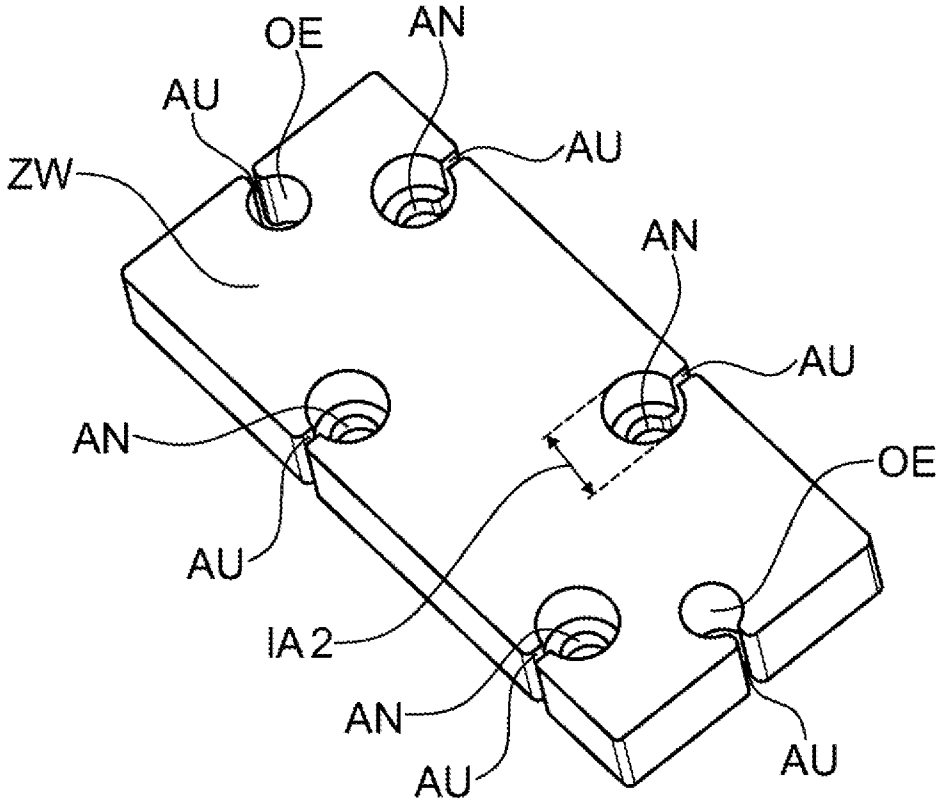
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Fig. 6

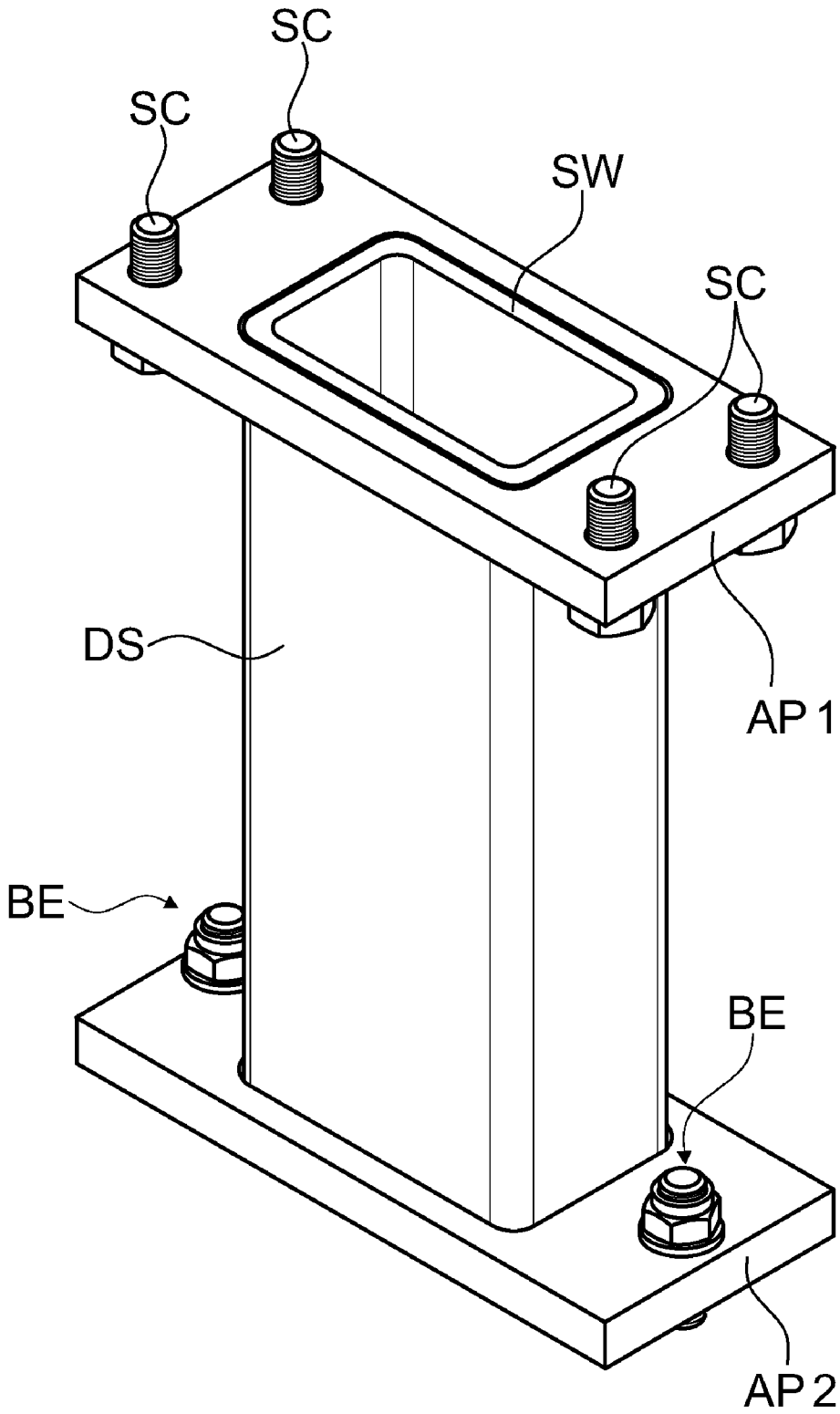

Fig. 7

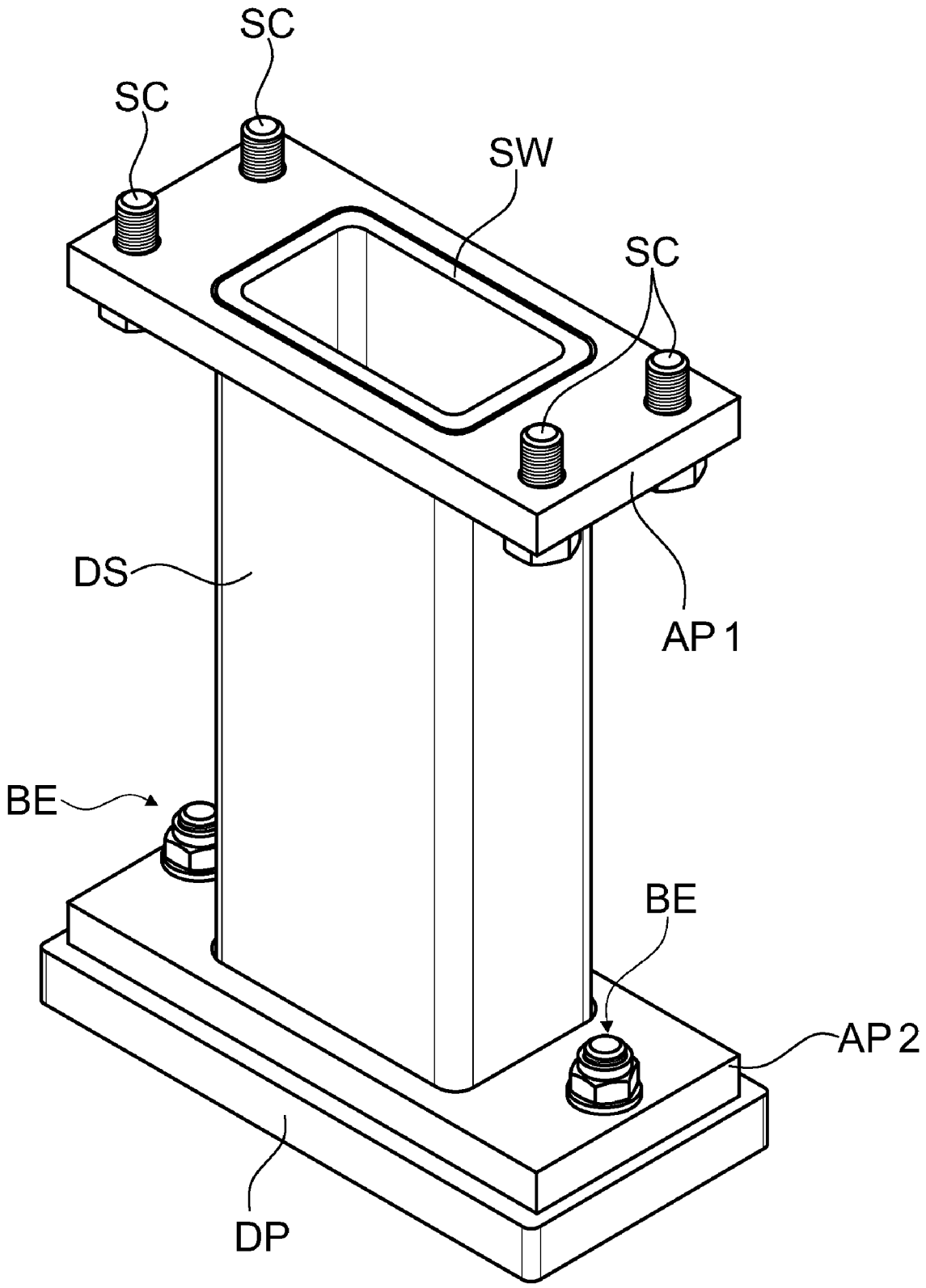

Fig. 8