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(54) **Pressure casting line for sanitary articles, and relative mould**

(57) A line for pressure casting sanitary articles in moulds, comprising a structure (2-5) from which there are slidingly suspended blocks consisting of two mould parts (120,121) arranged in opposing positions such that one mould part (120) becomes associated with that other mould part (121) forming part of the adjacent block, and means (108) for bringing the blocks one against the other at one end of the structure and main-

taining them locked together in an axial direction, each block supporting at least one further mould part (122) which can be brought into association with the block in a direction perpendicular to the axis of the structure, means (103) being provided between each block and the respective further mould part (122) to lock said at least one further mould (122) part in its closure position.

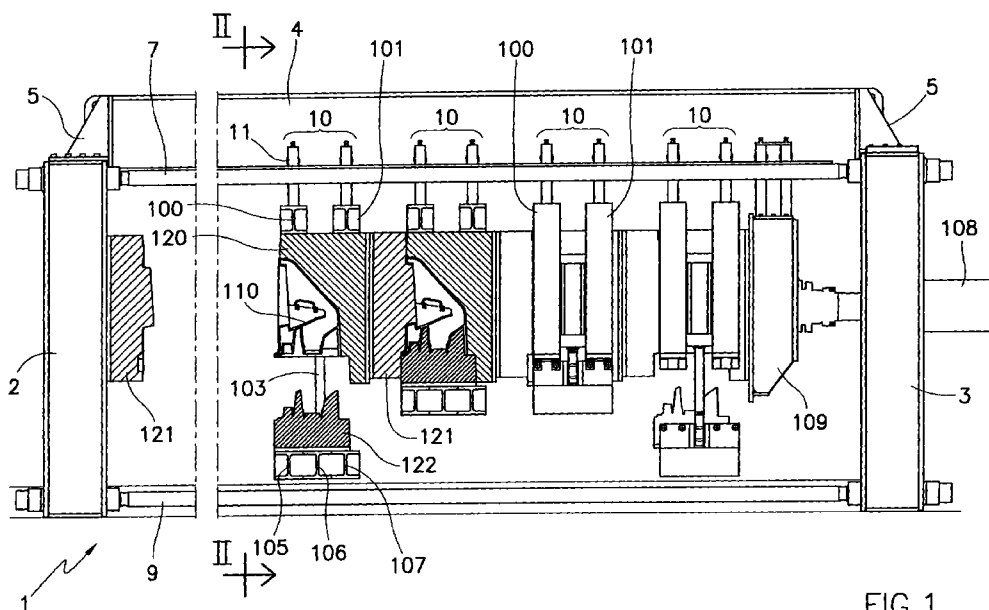


FIG. 1

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Description

[0001] The invention concerns those machines used in the forming of sanitary articles, in particular water closet pans of wall-mounted type.

[0002] Sanitary articles are formed by casting slip in hygroscopic and/or permeable moulds, which can comprise two or more parts depending on the complexity of the article to be formed.

[0003] Plaster moulds have been traditionally used, but recently porous resins have become available enabling articles to be cast in resin moulds.

[0004] Resin moulds have much better mechanical characteristics than plaster moulds, with the result that improved casting techniques have enabled the slip to be fed generally at a pressure of between 3 and 15 bar.

[0005] The mechanical stresses to which those parts of the plant carrying the moulds are subjected have therefore reached levels such as to considerably affect their cost and to influence their configuration.

[0006] For casting slip in moulds composed of two parts to form articles of simple configuration such as wash basins or pillars, machines or so-called casting lines are known in which the mould parts comprising a female part and a male part are mounted in line and mutually slidable.

[0007] When all the male and female parts have been brought into mutual contact, the moulds are closed and are ready to receive the slip.

[0008] This series arrangement of the various mould parts limits the force induced by the slip pressure, which tends to open the moulds, to that of a single mould, said force being compensated between one mould and the next in the case of the intermediate moulds of the line.

[0009] In machines which use moulds in two parts it is also known to stiffen the larger of said two parts, generally the female part, by means of an outer closed frame of steel construction.

[0010] This arrangement has not however up to the present time been able to be applied to those moulds composed of more than two parts, such as moulds for forming water closet pans.

[0011] In this respect, these moulds are formed of at least three parts, at least one of which is brought into contact with the others in a direction perpendicular to that in which these latter are brought into mutual contact.

[0012] Casting lines are in fact known comprising a number of individual moulds arranged side by side in parallel.

[0013] However in these lines the closure direction of the individual moulds is perpendicular to their direction of alignment, from which it follows that the line structure must be such as to resist the sum of the closure forces of the individual moulds of the line.

[0014] In other words there is no force compensation between the various parts of the intermediate

moulds.

[0015] Machines for series-casting wall-mounted pans are also known using moulds in four parts which open and close in three mutually perpendicular directions.

[0016] The closure forces between the mould parts can be compensated only partly, namely only in one direction.

[0017] The object of this patent is to enable a forming line for sanitary articles, in particular wall-mounted water closet pans, to be implemented with moulds comprising at least three parts in which the mould closure forces are compensated along the line, to allow light and economical line construction, practically without limit on the number of articles formed simultaneously by it.

[0018] According to the invention the line is arranged to receive moulds comprising at least three parts.

[0019] Reference will be made hereinafter to moulds comprising two parts, plus a third part which is brought into contact with the other two in a direction perpendicular to that in which these latter are brought into mutual contact.

[0020] For the sole purpose of illustrating the invention and without this limiting its scope, reference will be made in particular to a forming line for wall-mounted water closet pans.

[0021] The object of the invention is attained by virtue of the characteristics defined in the claims.

[0022] In brief, the object of the invention is attained in that during casting, the third mould part is securely fixed to the other two by suitable means, such that the closure forces which arise in a direction perpendicular to the line direction are absorbed in each individual mould, whereas the closure forces in the line direction are compensated for all the intermediate moulds.

[0023] The invention will be more apparent from the ensuing description of a preferred embodiment thereof illustrated with the aid of the accompanying drawings.

Figure 1 is a partly sectional side view of the invention.

Figure 2 is a section on the line II-II of Figure 1.

Figure 3 is a perspective view of one of the moulds used by the invention.

[0024] With reference to Figure 3 it can be seen that the mould 12 is composed of three parts, indicated by the reference numerals 120, 121, 122 respectively, of which two parts, namely the parts 120 and 121, come into mutual contact in the axial direction of the casting line, the third part 122 coming into contact with the other two in a direction perpendicular thereto.

[0025] The part 120 is intended to form the lower part of the wall-mounted pan, the part 121 is intended to form the upper part or rim, and the part 122 is intended

to form the lower stench trap and the pan rear to be fixed to the wall.

[0026] It should be noted that the mould 12 is arranged to form two wall-mounted pans, but can be structured to enable a different number of wall-mounted pans to be formed simultaneously, depending on the line production requirements.

[0027] A movable core 110, manually inserted as described hereinafter, cooperates with the part 121.

[0028] Figures 1 and 2 show the machine 1 of the invention, comprising two opposing endpieces 2 and 3 upperly supporting, in a central position, a beam 4 of I cross-section. At its ends the beam 4 comprises a flange 5 for fixing to the endpieces 2 and 3 by usual means, such as bolts or the like.

[0029] The two endpieces 2 and 3 are also connected together by four identical tie rods 6, 7, 8, 9, arranged in two parallel rows, as shown in Figure 2.

[0030] The beam 4 is arranged to slidably support mould blocks each composed of one of the said parts 120 carrying on its rear, ie in the opposite position to that shown in Figure 3, one of the said parts 121.

[0031] Each block 10 is contained within a lowerly open perimetral reinforcement frame, which can be either a single structure or comprise a pair of upperly open frames 100 and 101 respectively. The frames 100 and 101 are suspended from the beam 4 slidably via wheels 11 which enable them to traverse in the direction of the longitudinal axis of the beam 4.

[0032] The third mould part 122 is coupled to a platform composed of three lower beams 105, 106, 107 welded together and arranged to lock onto the frames 100 and 101 when the mould is closed. The beams 105, 106, 107 form a single unit and are suspended from the frames 100 and 101 by two identical cylinder-piston units 103 arranged to move these beams together with the respective mould part 122 into a lowered open position distant from the parts 120 and 121, shown to the right of Figure 2, and into a raised closed position, shown to the left of Figure 2.

[0033] When in this latter position, suitable adjustable supports 102 cooperate with the cylinder-piston units 103 to lock the beams 105, 106, 107 to the frames 100, 101 to close them in such a manner as to prevent their opening when subjected to the pressure of the slip.

[0034] The endpiece 2 carries a mould part 121 aligned with the suspended mould parts, a large cylinder-piston unit 108 provided with a thrust head 109 being fixed to the endpiece 3 to slide the suspended blocks 10 and press them against that mould part 121 suspended from the endpiece 2.

[0035] Before closing each mould, the movable core 110 is inserted manually above the mould part 121 to form the stench trap of said water closet pan.

[0036] The invention operates in the following manner.

[0037] Starting from the configuration shown in Figure 1 in which however, in contrast to that illustrated, all

the mould parts 122 are lowered as in the case of the first block 10 on the left, the two cylinder-piston units 103 are operated to raise the mould part 122 and close the first mould, its closure being consolidated by the adjustable supports 102.

[0038] Said first block 10 is then moved manually against that mould part 121 fixed to the endpiece 2, after inserting the movable core 110.

[0039] This procedure is repeated for the remaining blocks 10 including the last block 10, ie that to the right in Figure 1, so that all the blocks are in mutual contact.

[0040] At this point by operating the cylinder-piston unit 108 all the blocks 10 are locked axially against the endpiece 2, after which the slip is poured into the moulds.

[0041] On termination of this operation the articles are removed from the moulds by operating in the reverse sense, the formed articles being extracted from the mould part 120 either individually or in pairs, by appropriate usual extractor devices after removing the core 110.

[0042] After all the articles have been withdrawn, the blocks 10 will lie all bunched against the thrust head 109 of the cylinder-piston unit 108, which has already been retracted to lie close to the endpiece 3 of the line.

[0043] Numerous modifications can be made to the described embodiment without leaving the scope of the invention.

[0044] For example in place of a single beam 4 and tie rods 6, 7, 8, 9, the machine structure can comprise four beams, namely two lower and two upper, for the said purpose of guiding and supporting the blocks 10.

[0045] Mould opening and closure can also be mechanized.

[0046] The core 110 could be handled mechanically or be made formed integral with the mould piece 121.

Claims

1. A line for pressure casting sanitary articles in moulds, comprising a structure from which there are slidably suspended blocks consisting of two mould parts arranged in opposing positions such that one mould part becomes associated with that other mould part forming part of the adjacent block, and means for bringing the blocks one against the other at one end of the structure and maintaining them locked together in the axial direction, characterised in that each block supports at least one further mould part which can be brought into association with the block in a direction perpendicular to the axis of the structure, means being provided between each block and the respective further mould part to lock said at least one further mould part in its closure position.
2. A line as claimed in claim 1, characterised in that each block is contained within a lowerly open

frame.

3. A line as claimed in claim 1, characterised in that each block is contained within at least two lowerly open parallel frames. 5
4. A line as claimed in claims 2 and 3, characterised in that said frame or said at least two frames support the respective block and are slidingly suspended from the upper frame of the structure. 10
5. A line as claimed in the preceding claims, characterised in that the at least one further mould part is associated with a support platform. 15
6. A line as claimed in claim 5, characterised in that said platform comprises at least two support beams. 20
7. A line as claimed in the preceding claims, characterised in that said support platform is complementary to said open frames, which when in combination with said support platform form closed frames. 25
8. A line as claimed in the preceding claims, characterised in that said support platform is engaged by means arranged to bring it into a lowered position in which the mould is open and into a raised position in which the mould is closed. 30
9. A line as claimed in claim 8, characterised in that said means are at least one cylinder-piston unit acting between each open frame and the underlying support platform. 35
10. A line as claimed in the preceding claims, characterised in that adjustable supports are provided to cooperate with said at least one cylinder-piston unit to lock each frame to the underlying support platform when the mould is in its closed position. 40
11. A mould for pressure casting sanitary articles, comprising three parts, of which the third is brought into contact with the other two in a direction perpendicular to that in which these latter are brought into mutual contact, characterised in that one of said two parts is enclosed within a lowerly open outer frame, said third part comprising a support platform arranged to lowerly close said frame, means being provided to raise and lower said platform with respect to said frame and to maintain it in the raised position in which the mould is closed. 50
12. A mould as claimed in claim 11, characterised in that said means consist of at least one cylinder-piston unit positioned between said frame and said platform. 55
13. A mould as claimed in claim 11, characterised by being constructed with more than one cavity to simultaneously form more than one sanitary article.

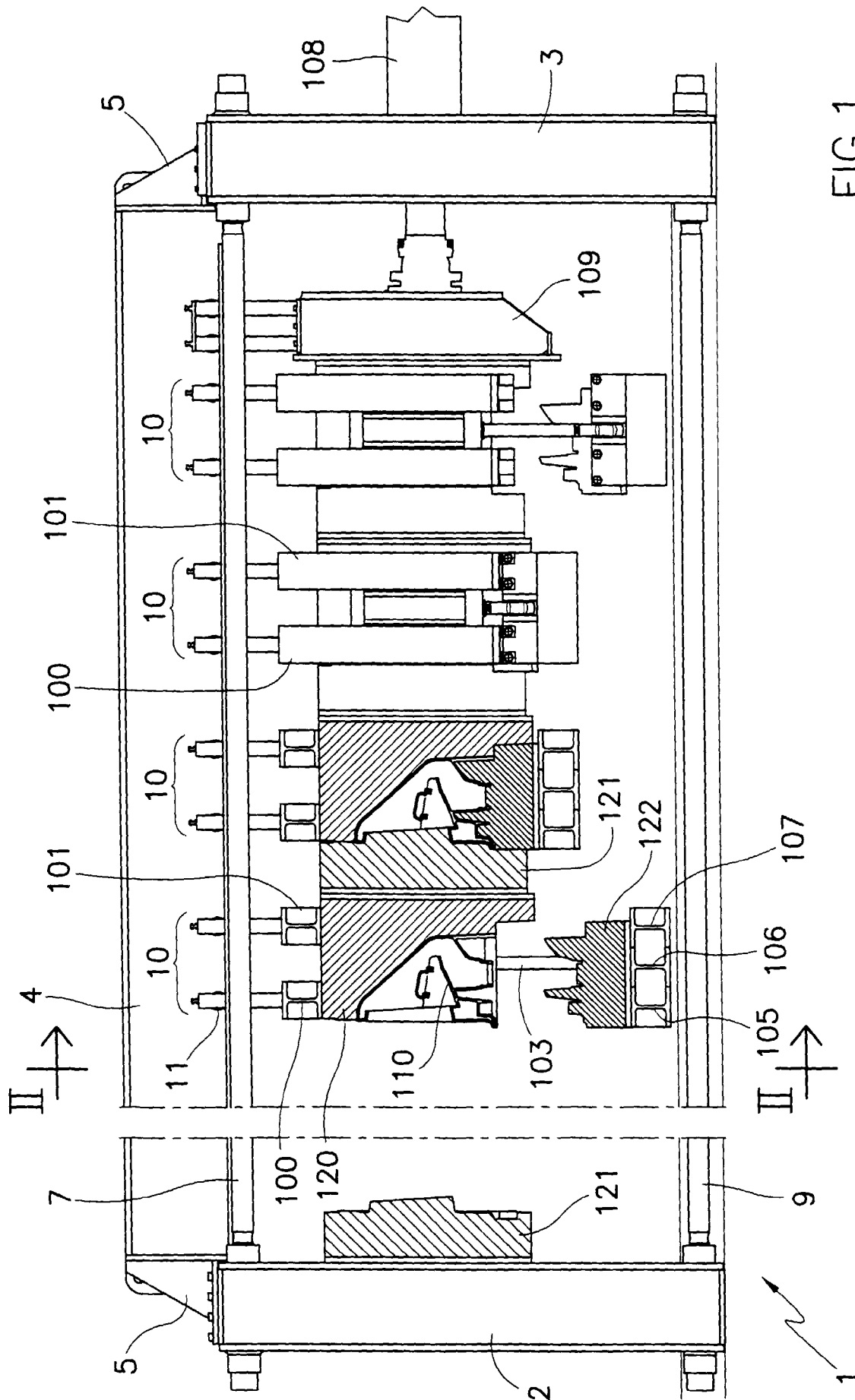
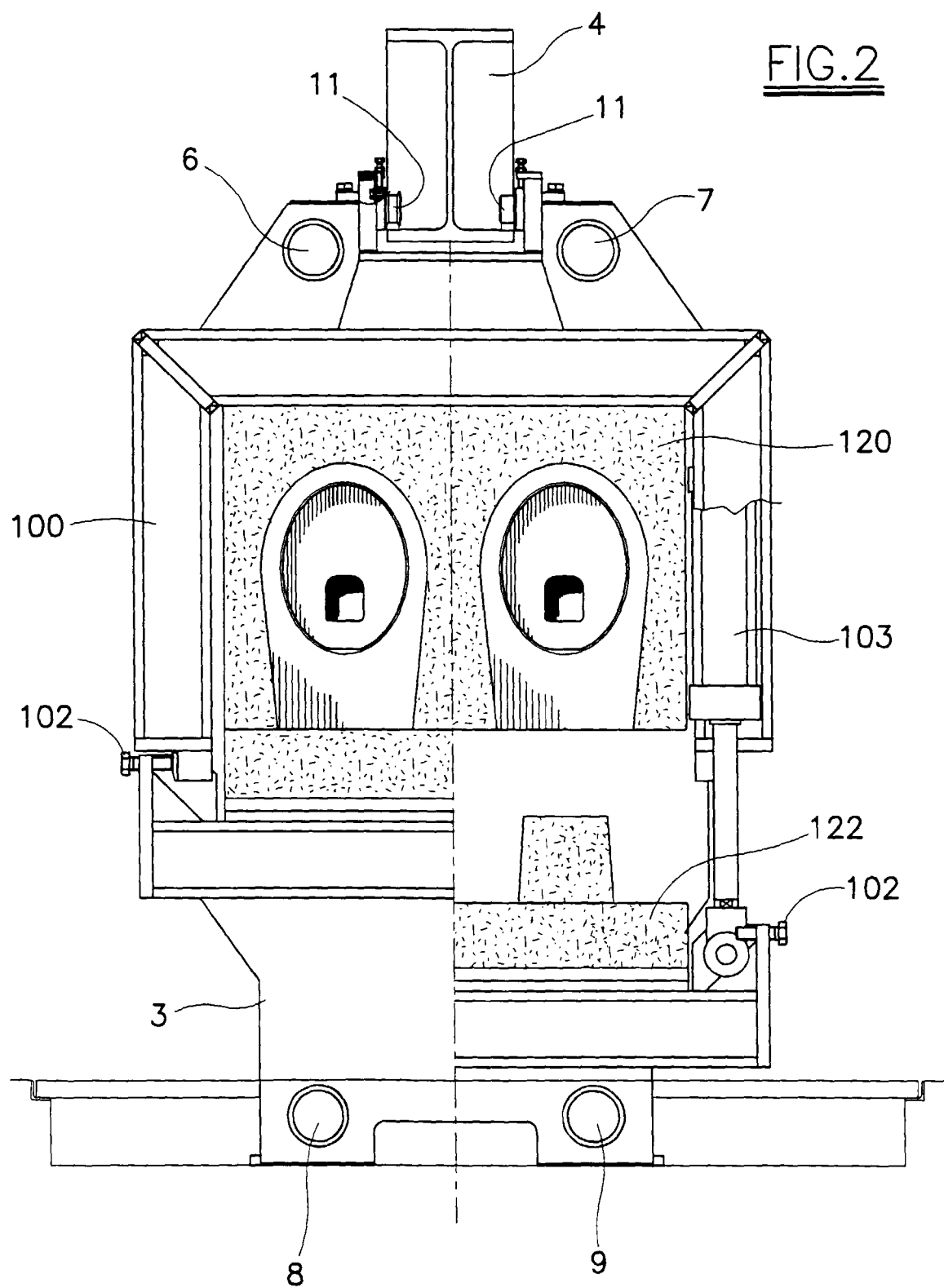


FIG. 1



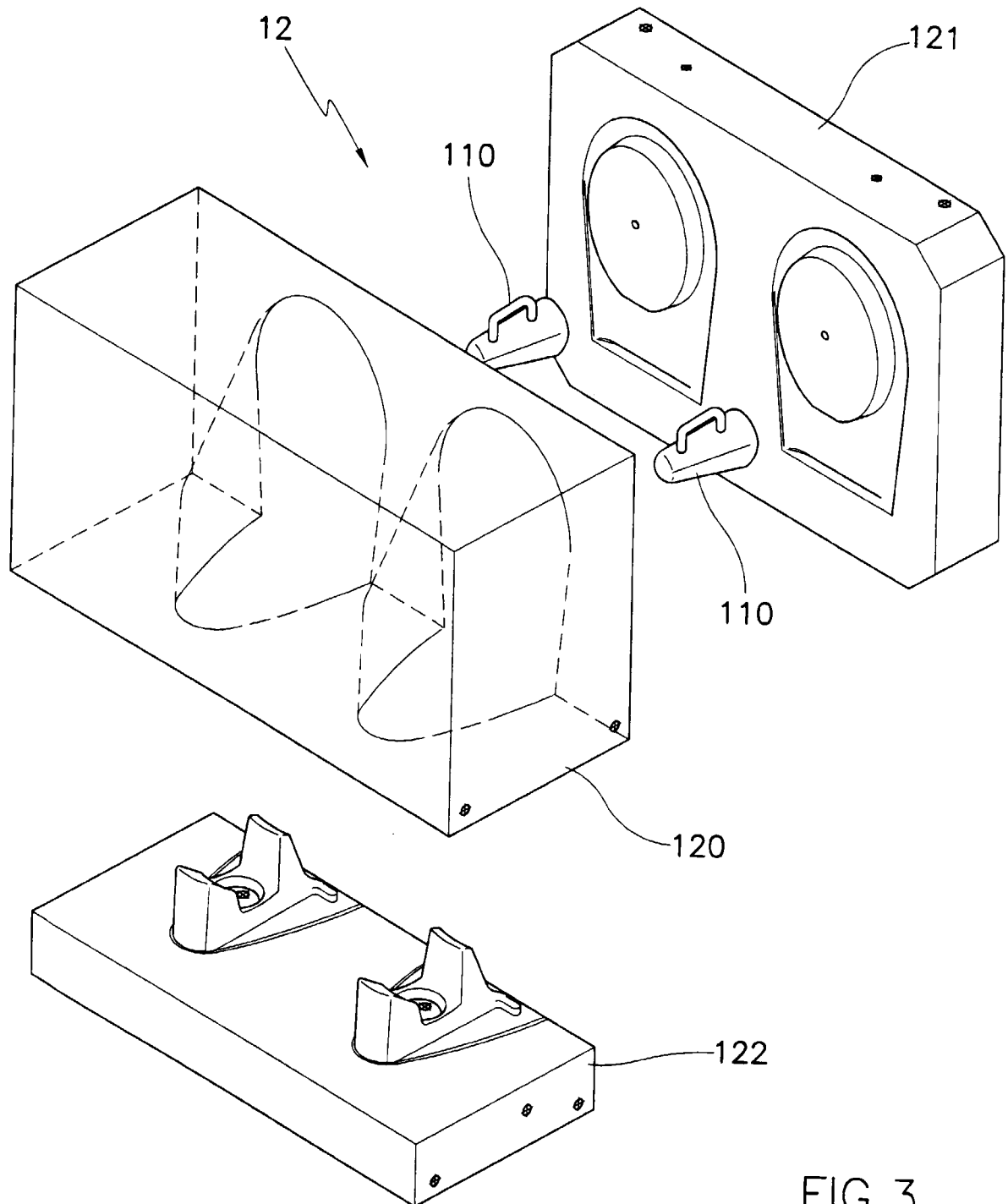


FIG.3