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(54) **MOLD FOR THE MANUFACTURE OF SPORTING HELMETS, IN PARTICULAR CYCLING HELMETS AND RELATIVE PROCESS FOR MOLDING SUCH SPORTING HELMETS**

FORM ZUR HERSTELLUNG VON SPORTHELMEN, INSBESONDERE FAHRRADHELMEN, UND ENTSPRECHENDES VERFAHREN ZUM FORMEN SOLCHER SPORTHELME

MOULE POUR LA FABRICATION DE CASQUES DE SPORT, EN PARTICULIER DE CASQUES DE CYCLISME ET PROCÉDÉ DE MOULAGE DE TELS CASQUES DE SPORT

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Description

[0001] The present invention relates to a mold for the manufacture of sporting helmets, in particular cycling helmets.

[0002] The present invention also relates to a process for molding the aforementioned sporting helmets and, in particular, the relative cycling helmets. Injection molded helmets are for example disclosed in Patent application WO2020/021429A1 and patent document US5477563A.

[0003] The present invention is directed to the sector of production of sporting helmets and, in particular, cycling helmets.

[0004] As is known, cycling helmets are manufactured using suitable molds, each being provided with a female half-mold and a male half-mold.

[0005] Each mold is provided with respective supply channels for the polystyrene to be injected for the formation of the helmet, as well as with a plurality of holes for supplying the steam necessary for carrying out the molding cycle.

[0006] During the molding cycle, the polystyrene, in the form of spheres, undergoes a process of softening and expansion inside the mold cavity so that it takes on the shape of the product to be manufactured, i.e. the base body of the helmet designed to absorb shocks.

[0007] Once the base body has been obtained, it is removed from the mold to allow an operator to assemble further components of the helmet, such as the upper shell, the lower ring or under shell and any other components that need to be joined to the base body.

[0008] The base body, together with the additional helmet components, is inserted back into the mold in order to be subjected to a second molding cycle aimed at definitively binding the additional components to the base body.

[0009] Once the second molding cycle has been completed, the helmet obtained is removed from the mold again in order to be subjected to the final finishing operations, application of the padding and quality control.

[0010] In an attempt to improve the above-described molding process by making it quicker and more precise with obvious improvements in terms of the quality of the products obtained, the Applicant has designed and developed a support template which allows the positioning of the additional components of the sporting helmets to be manufactured inside the relative molds according to predetermined positions which must be maintained during the molding cycle.

[0011] The use of the above mentioned support template allows one of the two molding steps of the traditional molding process to be eliminated, ensuring a high percentage of repeatability of the precise positioning of the additional components inside the molds.

[0012] The support template and the relative process for molding by means of such a support template are described in detail in Italian Patent No. 102018000007587.

[0013] Although the aforementioned support template and the relative molding process allow for a considerable improvement of the traditional molding technique for sporting helmets, the Applicant has found that they are not free of certain drawbacks and are improvable in several respects, mainly in relation to the overall production times and to the elimination or maximum reduction of imperfections in the obtained sporting helmets.

[0014] In particular, the Applicant has found that the molding process by means of a support template referred to in Italian patent no. 102018000007587 comprises an operating step which presents some criticalities that can be found both in relation to production times and in relation to some imperfections present on the sporting helmets obtained, as well as to the risk of damage to the molds.

[0015] The Applicant has in fact been able to note that after having positioned all the additional components on a support template according to the relative predetermined positions, this support template is first inserted into the relative female half-mold in order to position the additional supported components in the relative molding positions where they are locked by corresponding locking mechanisms, to be subsequently removed and thus allow the closing of the mold and the start of the relative molding cycle.

[0016] In addition to lengthening the molding times of each molding cycle with undesirable repercussions on overall production times, the step of removing the support template from the relative female half-mold can in some cases result in imperceptible displacements of one or more additional components from their corresponding pre-set positions. In the best of cases, this unexpected event can lead to the onset of minor defects in the obtained sporting helmets. In the worst cases, the displacement of an additional component can also result in the damage to a mold when the latter is closed to start the molding cycle.

[0017] The main object of the present invention is to propose a mold for the manufacture of sporting helmets, in particular cycling helmets, and a relative molding process capable of solving the problems encountered in the prior art.

[0018] It is an object of the present invention to further speed up the process for molding sporting and cycling helmets in such a way as to further reduce the overall production times of such helmets.

[0019] It is also an object of the present invention to ensure that high quality sporting and cycling helmets are obtained.

[0020] It is also an object of the present invention to ensure the structural integrity of the molds for the manufacture of the above-mentioned sporting and cycling helmets.

[0021] The above specified and yet further purposes are substantially achieved by a mold for the manufacture of sporting helmets, in particular cycling helmets, and a relative process for molding such sporting helmets, as

described and claimed in the following claims.

[0022] By way of example, the description of a preferred but not exclusive embodiment of a mold for the manufacture of sporting helmets, in particular cycling helmets, and of a relative process for molding such sporting and cycling helmets is now disclosed, in accordance with the present invention.

[0023] This description will be made hereafter with reference to the accompanying figures, provided for indicative and therefore non-limiting purposes only, wherein:

Figure 1 is a perspective view of a frame of a mold for the manufacture of sporting helmets, in particular cycling helmets, in accordance with the present invention, provided with two molding concavities, one of which is occupied by a respective intermediate support element of the mold for supporting and positioning one or more components of the respective sporting helmet to be manufactured, and an empty molding concavity;

Figure 2 is a rear view of the frame of the mold referred to in Figure 1;

Figure 3 is a front view of the intermediate support element referred to in Figure 1;

Figure 4 is a rear perspective view of the intermediate support element referred to in Figures 1 and 3;

Figure 5 is a front perspective view of the intermediate support element referred to in Figures 1, 3 and 4 shown in exploded view with some components of a sporting helmet to be manufactured;

Figure 6 is a front perspective view of the intermediate support element referred to in Figures 1 and 3 to 5, depicted with some components of the sporting helmet to be manufactured engaged in the corresponding predetermined positions of the intermediate support element and other components in the exploded view;

Figure 7 is a schematic perspective representation of the insertion of the intermediate support element referred to in Figures 1 and 3 to 6, provided with some components of the sporting helmet to be manufactured, into a respective molding concavity of the mold frame referred to in Figures 1 and 2;

Figure 8 is a front schematic perspective view of the intermediate support element referred to in Figures 1 and 3 to 7 provided with some components of the sporting helmet to be manufactured and coupled to a counter frame of the mold designed to close a corresponding molding concavity of the frame thereof referred to in Figures 1 and 2;

Figure 9 is a schematic perspective representation of the removal of the intermediate support element referred to in Figures 1 and 3 to 8, provided with a respective sporting helmet obtained from a respective molding cycle, from a corresponding molding concavity of the mold frame referred to in Figures 1 and 2;

Figure 10 is a schematic representation of the separation of the intermediate support element referred to in Figures 1 and 3 to 9 from the sporting helmet obtained from the respective molding cycle;

Figures 11 and 12 are sections of the intermediate support element referred to in Figures 1 and 3 to 10, carried out along the longitudinal development of a corresponding locking protuberance of the intermediate support element, in a rest position and in a locking position, respectively.

[0024] With reference to the appended figures, three components of a mold for the manufacture of sporting helmets, in particular cycling helmets, in accordance with the present invention are shown separately or in pairs.

[0025] As visible in Figures 1 and 2, the mold comprises at least one frame 1 which defines at least or one molding concavity 2, preferably two or more molding concavities 2, for molding at least one respective sporting helmet A (Figures 9 and 10).

[0026] Advantageously, the presence of two or more molding concavities 2 per each mold allows the simultaneous manufacture of two or more sporting helmets A with a considerable increase in the number of sporting helmets A produced.

[0027] With reference to Figure 8, the mold also comprises a counter frame 3 for each molding concavity 2 engageable to the frame 1 to hermetically close the respective molding concavity 2 and allow the execution of at least one molding cycle for the manufacture of a corresponding sporting helmet A.

[0028] With reference to Figures 1 and 3 to 10, the mold further comprises, for each molding concavity 2 provided in the frame 1, at least one intermediate support element 4 for supporting and positioning one or more components B, for example made of polycarbonate or another similar material, of the sporting helmet A to be made, inside the respective molding concavity 2 of the frame 1.

[0029] In detail, each intermediate support element 4 has a first portion 5 arranged to receive in engagement one or more components B of the sporting helmet A to be manufactured according to respective predetermined positions and a second portion 6, facing away from the first portion 5, having at least one grip handle 7, preferably two opposite grip handles 7, for manual positioning of the intermediate support element 4 in the respective molding concavity 2 of the frame 1 and the consequent positioning of the components B of the sporting helmet A to be manufactured inside said molding concavity 2.

[0030] As can be seen in Figure 1, in order to allow an optimal closure of each molding concavity 2 of the mold frame 1 from the respective counter frame 3, each intermediate support element 4 is advantageously arranged to perfectly couple with the respective counter frame 3, in correspondence with the second portion 6. In this way, when each counter frame 3 hermetically closes the corresponding molding concavity 2 of the frame 1 of the mold, it also abuts against the respective intermediate

support element 4 present inside said molding concavity 2 to maintain the components B of the sporting helmet A to be manufactured in the predetermined positions during the relative molding cycle.

[0031] As can be seen in Figures 1, 3 to 6 and 10, each intermediate support element 4 comprises a substantially annular structure 8 having internally at least one support seat 9 and/or a relief 10 of at least one component B of the sporting helmet A to be manufactured.

[0032] Again with reference to the figures in Figures 1, 3 to 6 and 10, the support seat 9 and/or the relief 10 are accessible from the first portion 5 of each intermediate support element 4, so that the positioning of the aforementioned components B of the sporting helmet A is carried out by keeping the first portion 5 of each intermediate support element 4 facing upwards or towards the Figure of the operator who is carrying out the action of positioning these components B of the sporting helmet A to be manufactured.

[0033] Preferably, the positioning of the components B of the sporting helmet A to be manufactured is performed by resting the second portion 6 of each intermediate support element 4 on a work plane or similar support plane in such a way that the first portion 5 of said intermediate support element 4 is easily reachable by the hands of the operator who has to position the components B of the sporting helmet A to be manufactured.

[0034] Again with reference to Figures 1, 4 to 7, 9 and 10, the aforementioned grip handles 7 are defined by the annular structure 8 of the respective intermediate support element 4.

[0035] In particular, each grip handle 7 comprises a gripping portion 7a designed to be manually gripped by an operator. The gripping portion 7a of each grip handle 7 is defined by a block engaged to the annular structure 8 of the respective intermediate support element 4, for example by means of corresponding threaded engagement elements 7b.

[0036] Each grip handle 7 further comprises at least one gripping opening 7c defined between the annular structure 8 of the respective intermediate support element 4 and the corresponding gripping portion 7a to allow insertion of the fingers of an operator's hand when he has to grasp the grip handle 7.

[0037] Advantageously, the mold comprises at least one engagement member 11 for the stable coupling of each intermediate support element 4 to the frame 1 inside the respective molding concavity 2.

[0038] In particular, the engagement member 11 is operatively interposed between each intermediate support member 4 and the respective molding concavity 2 of the frame 1.

[0039] More and more particularly, the engagement member 11 comprises at least one locking seat 11a (Figures 3 to 12), preferably two opposite locking seats 11a, realized outside the annular structure 8 of each intermediate support element 4.

[0040] The engagement member 11 further comprises at least one locking protuberance 11b (Figures 1, 11 and 12), preferably two opposite locking protuberances 11b, for each molding concavity 2 of the frame 1. Each pair of locking protuberances 2 of each molding concavity 2 is movable within the respective molding concavity 2 of the frame 1 between a rest position (Figures 1 and 11) wherein the respective intermediate support element 4 can be inserted into the corresponding molding concavity 2 or removed therefrom and a locking position (Figure 12) wherein said locking protuberances 11b engage the respective locking seats 11a of the respective intermediate support element 4, holding the latter inside the respective concavity molding 2 of frame 1.

[0041] As can be seen in Figures 1, 11 and 12, the locking protuberances 11b of each molding concavity 2 are operationally located in correspondence with peripheral areas of the respective molding concavity 2, whereby the movement of these locking protuberances 11b from the rest position to the locking position causes a displacement of the same towards the central part of the respective molding concavity 2, that is towards one another. On the contrary, when the locking protuberances 11b of each molding concavity 2 are moved from the locking position to the unlocking position, they move away from the central part of the respective molding concavity 2, moving away from each other. Advantageously, the locking protuberances 11b of each molding concavity 2 can be controlled by means of an actuation device (not visible in the attached figures) located outside the mold. Preferably, the actuation device of the locking protuberances 11b of each molding concavity 2 comprises at least one drive pedal. Even more preferably, the actuation device may comprise two or more drive pedals for the independent control of each pair of locking protuberances 11b of each molding concavity 2 or jointly control of all the locking protuberances 11b of the molding concavities 2 of the mold frame 1.

[0042] As can be seen in Figures 11 and 12, the actuation device of the locking protuberances 11b of each molding concavity 2 of the mold frame 1, activates these locking protuberances 11b by means of corresponding fluid-dynamic actuators 11c (Figures 2, 11 and 12) operationally located on the mold frame 1. Advantageously, the mold comprises at least one engagement constraint 12 (Figures 1 and 3 to 12) for the stable coupling of each intermediate support member 4 to the corresponding counter frame 3. Each engagement constraint 12 is operationally interposed between the respective intermediate support element 4 and the counter frame 3.

[0043] In detail, each engagement constraint 12 comprises at least one coupling lug 12a, preferably two opposite coupling lugs 12a, and at least one coupling seat 12b, preferably two opposite coupling seats 12b, operatively interposed between the respective intermediate support element 4 and the corresponding counter frame 3.

[0044] Preferably, each coupling lug 12a of each engagement constraint 12 protrudes externally from the an-

nular structure 8 of the respective intermediate support element 4 and each coupling seat 12b of each engagement constraint 12 is realized on the respective counter frame 3.

[0045] Preferably, each coupling lug 12a and the respective coupling seat 12b of each engagement constraint 12 are at least partly countershaped to ensure a stable coupling between the respective intermediate support element 4 and the corresponding counter frame 3.

[0046] According to a preferred aspect of the present invention, each locking seat 11a of the locking member 11 is externally realized on a respective coupling lug 12a of a respective engagement constraint 12.

[0047] Advantageously, the mold further comprises, for each molding concavity 2 of the frame 1, at least one auxiliary support element identical to the respective intermediate support element 4. Each auxiliary support element is usable to prepare one or more components B of a sporting helmet A which still has to be manufactured while the respective intermediate support element 4 is engaged in the respective molding concavity 2 during a respective molding cycle of the mold.

[0048] In other words, while each intermediate support element 4 occupies the respective molding concavity 2 during the relative molding cycle of the corresponding sporting helmet A, each auxiliary support element is set up and prepared with respective components B of the sporting helmet to be manufactured subsequently, to be inserted into the respective molding concavity 2 as soon as the latter is freed from the corresponding intermediate support element 4.

[0049] The present invention also relates to a process for molding sporting helmets A, in particular cycling helmets, which will be described below.

[0050] The molding process comprises a step of providing the above-described frame 1 of the mold with the respective molding concavities 2 for molding the respective sporting helmets A and a step of preparing the respective counter frames 3 of the same mold designed to hermetically close the respective molding concavities 2 and allow the execution of the respective molding cycles.

[0051] The process further comprises a step of preparing the respective intermediate support elements 4 of the mold for supporting and positioning the components B of the sporting helmets A to be manufactured inside the respective molding concavities 2 of the frame 1 of the mold.

[0052] Following the provision of the frame 1, the respective counter frames 3 and the respective intermediate support elements 4, the molding process comprises a step of placing one or more components B of the sporting helmets A to be manufactured in the first portion 5 of each intermediate support element 4 (Figures 5 and 6) according to respective predetermined positions.

[0053] In detail, this step of placing is performed by accessing a series of seats 9 and/or reliefs 10 inside the annular structure 8 of each intermediate support element 4 through the respective first portion 5 thereof.

[0054] In order to be able to easily access the first portion 5 of each intermediate support element 4 and fix the components B of the respective sporting helmets A to be manufactured in correspondence with the respective support seats 9 and/or reliefs 10, said first portion 5 is to be kept facing upwards or towards the Figure of the operator who is carrying out the action of placing the components B.

[0055] More specifically, the placing of the components B of the sporting helmets A to be manufactured is carried out by resting the second portion 6 of each intermediate support element 4 on a work plane or a similar support plane in such a way that the first portion 5 of this intermediate support element 4 is easily reachable by the hands of the operator who has to position the components B of the sporting helmet A to be made in the corresponding support seats 9 and/or on the corresponding support reliefs 10 of these intermediate support elements 4.

[0056] Once the step of placing the components B of the sporting helmets A to be manufactured in the corresponding support seats 9 and/or on the corresponding support reliefs 10 of the respective intermediate support elements 4 is completed, the molding process comprises the step of positioning each intermediate support element 4 inside the corresponding molding concavity 2 of the mold frame 1 (Figure 7). This step is performed by first orienting the first portion 5 of each intermediate support element 4 towards the respective molding concavity 2, then inserting said intermediate support element 4 into the respective molding concavity 2 in such a way as to place the components B of the respective sporting helmet A to be manufactured inside the latter according to corresponding predetermined positions.

[0057] The step of positioning each intermediate support element 4 in the respective molding concavity 2 with the respective components B of the corresponding sporting helmet A to be manufactured is performed manually by an operator, preferably by grasping the gripping portion 7a of each grip handle 7 defined in correspondence with the second portion 6 of each intermediate support element 4.

[0058] Preferably, the step of positioning each intermediate support element 4 in the respective molding concavity 2 is performed by inserting this intermediate support element 4 in the corresponding molding concavity 2 along a direction substantially orthogonal with respect to a main lying plane X (Figures 1 and 2) of the frame 1 of the mold.

[0059] When each intermediate support element 4 is positioned inside the corresponding molding concavity 2, each intermediate support element 4 is locked in the respective molding concavity 2 to avoid unwanted displacements and fix the predetermined position for the components B of the respective sporting helmet A to be manufactured.

[0060] As can be seen in Figure 12, the step of locking each intermediate support element 4 in the respective

molding concavity 2 of the frame 1 of the mold is carried out by the interaction between the movable locking protuberances 11b inside the respective concavity 2 and the respective locking seats 11a realized externally on the respective intermediate support element 4.

[0061] The step of locking each intermediate support element 4 in the respective molding concavity 2 of the frame 1 of the mold is carried out by activating the respective locking protuberances 11b from the rest position (Figures 1 and 11) wherein the respective intermediate support element 4 can be inserted into the corresponding molding concavity 2 or removed therefrom to the locking position (Figure 12) wherein the respective locking protuberances 11b engage the respective locking seats 11a of the corresponding intermediate support element 4, holding the latter inside the respective molding concavity 2 of the mold frame 1.

[0062] The locking step is advantageously carried out by movement operating the locking protuberance 11b by operating a control device located externally to the mold, preferably at least one control pedal.

[0063] The locking of each intermediate support element 4 in the respective molding concavity 2 can be activated independently by operating a respective dedicated control pedal or simultaneously on all the molding concavities 2 of the frame 1 of the mold by means of a suitable general control pedal.

[0064] Once the locking is finished, the molding process provides for the subsequent step of engaging each counter frame 3 of the mold to the frame 1 thereof in order to hermetically close the respective molding concavity 2 at the second portion 6 of the respective intermediate support element 4 facing outwards from the respective molding concavity 2.

[0065] The step of engaging each counter frame 3 of the mold to the frame 1 thereof is also carried out by engaging the aforementioned coupling lugs 12a which protrude externally from each intermediate support element 4 in the respective coupling seats 12b realized on the corresponding counter frames 3 of the mold.

[0066] Once each molding concavity 2 of the mold frame 1 has been closed, a respective known molding cycle is started by injecting a corresponding molding material, preferably polystyrene.

[0067] When the molding cycle has reached its end, the molding process comprises the subsequent step of disengaging each counter frame 3 of the mold from the frame 1 of the same in order to access the respective molding concavity 3 and the corresponding intermediate support element 4 contained therein.

[0068] The step of disengaging each counter frame 3 of the mold from the frame 1 of the same is also carried out by disengaging the respective coupling lugs 12a which protrude externally from the respective intermediate support elements 4 from the respective coupling seats 12b realized on the respective counter frames 3 of the mold.

[0069] Each intermediate support element 4 is then released from the respective molding concavity 2, again by the interaction between the respective locking protuberances 11b that are movable inside the corresponding molding concavity 2 and the respective locking seats 11a realized externally on each intermediate support element 4.

[0070] In particular, the unlocking step is carried out by movement operating the respective locking protuberances 11b of each molding concavity 2 from the locking position (Figure 12) to the rest position (Figures 1 and 11). In this way each intermediate support element 4 is freed so that it can be removed from the respective molding concavity 2.

[0071] Similarly to the locking step, the unlocking step is also carried out by operating at least one control device, preferably at least one drive and control pedal operatively connected to the respective locking protuberances 11b.

[0072] Once each support element 4 has been released, it can be removed from the respective molding concavity 2 of the mold frame 1 together with the corresponding formed sporting helmet A (Figure 9).

[0073] The removal step is also carried out manually by an operator grasping the gripping portions 7a of the corresponding grip handles 7 of the respective intermediate support element 4 defined at the second portion 6 of the latter.

[0074] The step of removing each intermediate support element 4 together with the respective sporting helmet manufactured by the respective molding concavity 2 is carried out by extracting said intermediate support element 4 along a direction substantially orthogonal to the main lying plane X of the mold frame 1.

[0075] Subsequently, the molding process provides for a step of separating each intermediate support element 4 from the corresponding sporting helmet A manufactured (Figure 10), to allow the entire molding process to be repeated.

[0076] Advantageously, the above-described molding process may further comprise the use of an auxiliary support element (not illustrated in the attached figures) identical to the intermediate support element 4 for each molding concavity 2 of the mold frame 1.

[0077] The auxiliary support element is advantageously set up with the components B of the sporting helmets A to be manufactured, while the corresponding intermediate support elements 4 are located inside the corresponding molding concavities 2 during a corresponding molding cycle.

[0078] When the intermediate support elements 4 are removed from the corresponding molding concavities 2 at the end of the molding cycle, the corresponding auxiliary support elements are immediately inserted into the corresponding molding concavities 2 to initiate a subsequent molding cycle, thus minimising the interruptions in the production cycle of sporting helmets A.

[0079] Since the auxiliary support elements are identical to the intermediate support elements 4, the process steps that are carried out on the intermediate support

elements 4 are also carried out in a similar manner on the auxiliary support elements. While the intermediate support elements 4 are arranged inside the respective molding concavities 2 of the mold frame 1 during a corresponding molding cycle, the operators prepare the auxiliary support elements with the corresponding components B of the sporting helmets to be manufactured. Conversely, when the auxiliary support elements 4 are arranged inside the respective molding concavities 2 of the mold frame 1 during a corresponding molding cycle, the operators prepare the auxiliary support elements with the corresponding components B of the sporting helmets to be manufactured.

[0080] The alternation of the intermediate support elements 4 with the auxiliary support elements ensures the continuity of the molding cycles of the sporting helmets being manufactured, thus considerably increasing the number of helmets produced in a unit of time.

[0081] The mold and the relative molding process described above solve the problems encountered with the prior arte and allow important advantages to be achieved.

[0082] In detail, the elimination of the step of removing the traditional support template before starting the molding cycle from the respective molding concavity has allowed, on the one hand, speeding up the molding process with significant reductions in the overall production times of the sporting helmets and, on the other hand, to ensure the maintenance of the positions of the components of the sporting helmets to be manufactured before the hermetic closure of the mold and during the execution of each molding cycle.

[0083] It should therefore be noted that keeping the intermediate support elements in the respective molding concavities of the mold frame allows an overall reduction of the process for molding each sporting helmet being manufactured.

[0084] In addition, keeping the intermediate support elements in the respective molding concavities of the mold frame ensures that the positions assigned to each component of the sporting helmet being manufactured are maintained before the mold is closed and throughout the entire molding cycle, so that the quality of the obtained sporting helmet is excellent and the mold is structurally preserved.

Claims

1. Mold for the manufacture of sporting helmets (A), in particular cycling helmets, the mold comprising:

   at least one frame (1) defining at least one molding concavity (2), preferably two or more molding concavities (2), for molding at least one respective sporting helmet (A);
   at least one counter frame (3) engageable to the frame (1) to hermetically close the respective molding concavity (2) and allow the execution of at least one molding cycle;
   characterized in that it comprises at least one intermediate support element (4) for supporting and positioning one or more components (B) of the sporting helmet (A) to be made inside the respective molding concavity (2) of the frame (1), the intermediate support element (4) having:

   a first portion (5) arranged to receive in engagement one or more components (B) of the sporting helmet (A) to be manufactured according to respective predetermined positions;
   a second portion (6) facing away from the first portion (5) and having at least one grip handle (7), preferably two opposite grip handles (7), for manual positioning of the intermediate support element (4) in the respective molding concavity (2) of the frame (1) and the consequent positioning of the components (B) of the sporting helmet (A) to be manufactured inside said molding concavity (2), the second portion (6) of the intermediate support element (4) being arranged to be coupled to the respective counter frame (3);
   at least one engagement member (11) for the stable coupling of the intermediate support element (4) to the frame (1) inside the respective molding concavity (2), the engagement member (11) being operatively interposed between the intermediate support element (4) and the respective molding concavity (2) of the frame (1);
   at least one engagement constraint (12) for the stable coupling of the intermediate support element (4) to the counter frame (3), the engagement constraint (12) being operationally interposed between the intermediate support element (4) and the counter frame (3) .

2. Mold according to claim 1, wherein the intermediate support element (4) comprises a substantially annular structure (8) having internally at least one seat (9) and/or one relief (10) for supporting at least one component (B) of the sporting helmet (A) to be manufactured, the support seat (9) and/or relief (10) being accessible from the first portion (5).

3. Mold according to claim 2, wherein the engagement member (11) comprises:

   at least one locking seat (11a), preferably two opposite locking seats (11a), realized outside the annular structure (8) of the intermediate support element (4);
   at least one locking protuberance (11b), prefer-

ably two opposite locking protuberances (11b), movable within the respective molding concavity (2) of the frame (1) between a rest position wherein the intermediate support element (4) can be inserted into the molding concavity (2) or removed therefrom and a locking position wherein the locking protuberance (11b) engages the respective locking seat (11a) of the intermediate support element (4) to hold the latter inside the respective molding concavity (2) of the frame (1).

4. Mold according to claim 3, wherein the locking protuberance (11b) can be controlled by means of an actuation device located outside the mold, preferably at least one drive pedal.

5. Mold according to any one of claims 2 to 4, wherein the engagement constraint (12) comprises at least one coupling lug (12a) and at least one coupling seat (12b) operatively interposed between the intermediate support element (4) and the counter frame (3).

6. Mold according to claim 5, wherein the engagement constraint (12) comprises:

at least one coupling lug (12a), preferably two opposite coupling lugs (12a), protruding externally from the annular structure (8) of the intermediate support element (4);
at least one coupling seat (12b), preferably two opposite coupling seats (12b), realized on the counter frame (3), the coupling lug (12a) and the respective coupling seat (12b) being at least partly countershaped to ensure a stable coupling between the intermediate support element (4) and the respective counter frame (3).

7. Mold according to claim 6 when claim 5 depends on claim 4, wherein the locking seat (11a) of the locking member (11) is externally realized on a respective coupling lug (12a) of the engagement constraint (12).

8. Mold according to any of claims 2 to 7, wherein the grip handle (7) is defined by the annular structure (8) of the intermediate support element (4), optionally the grip handle (7) comprising:

a gripping portion (7a) defined by a block engaged to the annular structure (8) of the intermediate support element (4), the gripping portion (7a) being designed to be manually gripped by an operator;
a gripping opening (7b) defined between the annular structure (8) of the intermediate support element (4) and the gripping portion (7a) of the gripping handle (7) to allow the insertion of the hand of an operator when he has to grasp said handle.

9. Mold according to any one of the preceding claims, wherein the mold comprises at least one auxiliary support element identical to the intermediate support element (4), the auxiliary support element being usable to prepare one or more components (B) of a sporting helmet (A) to be molded while the intermediate support element (4) is engaged in the respective molding concavity (2) of the frame (1) of the mold during a relative molding cycle.

10. Process for molding sporting helmets (A), in particular cycling helmets, comprising the steps of:

providing at least one frame (1) of a mold defining at least one molding concavity (2), preferably two or more molding concavities (2), for molding at least one respective sporting helmet (A);
preparing at least one counter frame (3) of the mold engageable to the frame (1) to hermetically close the respective molding concavity (2) and allowing the execution of at least one molding cycle;
preparing at least an intermediate support element (4) for supporting and positioning one or more components (B) of the sporting helmet (A) to be manufactured inside the respective molding concavity (2) of the frame (1) of the mold;
placing one or more components (B) of the sporting helmet (A) to be manufactured in a first portion (5) of the intermediate support element (4) according to respective predetermined positions;
positioning the intermediate support element (4) inside the respective molding concavity (2) of the mold frame (1) with the first portion (5) facing said molding concavity (2) to position the components (B) of the sporting helmet (A) to be manufactured in the respective molding concavity (2) according to respective predetermined positions;
blocking the intermediate support element (4) inside the respective molding concavity (2) according to the previously determined position;
engaging the counter frame (3) of the mold to the frame (1) to hermetically close the respective molding concavity (2) at a second portion (6) of the intermediate support element (4), said second portion being opposite to the first portion (5);
starting a molding cycle by injecting a corresponding molding material, preferably polystyrene;
disengaging the counter frame (3) of the mold from the frame (1) of the same to access the respective molding concavity (2) and the respective intermediate support element (4), when the molding cycle is completed;

releasing the intermediate support element (4) from the respective molding concavity (2);
removing the intermediate support element (4) from the respective molding concavity (2) of the frame (1) of the mold together with the respective manufactured sporting helmet (A);
separating the intermediate support element (4) from the respective manufactured sporting helmet (A);
repeating the process again.

11. Method according to claim 10, wherein the step of positioning the intermediate support element (4) in the respective molding concavity (2) and the step of removing the intermediate support element (4) together with the respective sporting helmet (A) manufactured by the respective molding concavity (2) are carried out manually, preferably by gripping at least one grip handle (7) defined in correspondence with the second portion (6) of the intermediate support element (4).

12. Process according to claim 11, wherein:

the step of positioning the intermediate support element (4) in the respective molding concavity (2) is carried out by inserting said intermediate support element (4) in the respective molding concavity (2) along a direction substantially orthogonal with respect to a main lying plane (X) of the frame (1) of the mold;
the step of removing the intermediate support element (4) together with the respective sporting helmet (A) manufactured by the respective molding concavity (2) is carried out by extracting said intermediate support element (4) along a direction substantially orthogonal to the main lying plane (X) of the mold frame (1).

13. Process according to any one of claims 10 to 12, wherein the step of locking the intermediate support element (4) inside the respective molding concavity (2) of the mold frame (1) and the step of unlocking of the intermediate support element (4) from the respective molding concavity (2) of the mold frame (1) are carried out by the interaction between at least one movable locking protuberance (11b), arranged in the molding concavity (2), and at least one locking seat (11a) realized externally on the intermediate support element (4) .

14. Process according to claim 13, wherein:

the step of locking the intermediate support element (4) in the respective molding concavity (2) of the frame (1) of the mold is carried out by activating the locking protuberance (11b) from a rest position wherein the element support intermediate (4) can be inserted into the molding concavity (2) or removed therefrom and a locking position wherein the locking protuberance (11b) engages the respective locking seat (11a) of the intermediate support element (4) holding the latter inside the respective molding concavity (2) of the mold frame (1);
the step of unlocking the intermediate support element (4) from the respective molding concavity (2) is carried out by moving the locking protuberance (11b) from the locking position to the rest position.

15. Process according to claim 14, wherein the locking step and the unlocking step are carried out by movement operating the locking protuberance (11b) by operating a control device located externally to the mold, preferably by operating of a control pedal.

16. Process according to any one of claims 10 to 15, wherein:

the step of engaging the counter frame (3) of the mold to the frame (1) of the same is also carried out by engaging at least one coupling lug (12a) externally projecting from the intermediate support element (4) in at least one coupling seat (12b) realized on the counter frame (3) of the mold;
the step of disengaging the counter frame (3) of the mold from the frame (1) of the same is also performed by disengaging the coupling lug (12a) protruding externally from the intermediate support element (4) from the respective coupling seat (12b) realized on the counter frame (3) of the mold.

17. Process according to any one of the preceding claims, further comprising the steps of:

preparing at least one auxiliary support element identical to the intermediate support element;
positioning one or more components (B) of the sporting helmet (A) to be manufactured on a first portion of the auxiliary support element according to respective predetermined positions, during a molding cycle wherein the intermediate support element (4) is located within the respective molding concavity (2) of the mold frame (1);
positioning the auxiliary support element within the respective molding concavity (2) of the mold frame (1) with the first portion facing said molding concavity (2) to position the components (B) of the sporting helmet (A) to be manufactured in the respective molding concavity (2) according to respective predetermined positions, after the removal of the intermediate support element (4) from said molding concavity (2) of the frame (1)

of the mold;
blocking the auxiliary support element inside the respective molding concavity (2);
engaging the counter frame (3) of the mold on the frame (1) of the same to hermetically close the respective molding concavity (2) at a second portion of the auxiliary support element opposite with respect to the first portion;
starting a molding cycle by injecting a corresponding molding material, preferably polystyrene.

18. Process according to claim 17, wherein the steps of:

separating the intermediate support element (4) from the respective manufactured sporting helmet (A); and,
positioning one or more components (B) of a subsequent sporting helmet (A) to be manufactured in the first portion (5) of the intermediate support element (4) according to respective predetermined positions for a new molding cycle to be carried out,
are carried out while the auxiliary support element is located within the respective molding concavity (2) during the respective molding cycle.

Patentansprüche

1. Form zur Herstellung von Sporthelmen (A), insbesondere von Fahrradhelmen, wobei die Form umfasst:

mindestens einen Rahmen (1), der mindestens einen Formhohlraum (2), vorzugsweise zwei oder mehr Formhohlräume (2), zum Formen mindestens eines jeweiligen Sporthelms (A) definiert;
mindestens einen Gegenrahmen (3), der mit dem Rahmen (1) in Eingriff gebracht werden kann, um den jeweiligen Formhohlraum (2) hermetisch zu verschließen und die Durchführung mindestens eines Formzyklus zu ermöglichen;
dadurch gekennzeichnet, dass sie mindestens ein Zwischenstützelement (4) zum Stützen und Positionieren eines oder mehrerer Bestandteile (B) des Sporthelms (A) umfasst, die innerhalb dem jeweiligen Formhohlraum (2) des Rahmens (1) hergestellt werden sollen, wobei das Zwischenstützelement (4) aufweist:

einen ersten Abschnitt (5), der so angeordnet ist, dass er einen oder mehrere Bestandteile (B) des herzustellenden Sporthelms (A) gemäß den jeweiligen vorbestimmten Positionen in Eingriff empfängt;
einen zweiten Abschnitt (6), der von dem ersten Abschnitt (5) abgewandt ist und mindestens einen Greifsgriff (7), vorzugsweise zwei gegenüberliegende Greifsgriffe (7), zum manuellen Positionieren des Zwischenstützelements (4) in den jeweiligen Formhohlraum (2) des Rahmens (1) und zum anschließenden Positionieren der Bestandteile (B) des herzustellenden Sporthelms (A) innerhalb dem Formhohlraum (2) aufweist, wobei der zweite Abschnitt (6) des Zwischenstützelements (4) so angeordnet ist, dass er mit dem jeweiligen Gegenrahmen (3) gekoppelt ist;
mindestens ein Eingriffselement (11) zur stabilen Verbindung des Zwischenstützelements (4) mit dem Rahmen (1) innerhalb dem jeweiligen Formhohlraum (2), wobei das Eingriffselement (11) operativ zwischen dem Zwischenstützelement (4) und dem jeweiligen Formhohlraum (2) des Rahmens (1) angeordnet ist;
mindestens eine Eingriffsbegrenzung (12) zur stabilen Kopplung des Zwischenstützelements (4) mit dem Gegenrahmen (3), wobei die Eingriffsbegrenzung (12) operativ zwischen dem Zwischenstützelement (4) und dem Gegenrahmen (3) angeordnet ist.

2. Form nach Anspruch 1, wobei das Zwischenstützelement (4) eine im Wesentlichen ringförmige Struktur (8) umfasst, die im Inneren mindestens einen Sitz (9) und/oder einen Vorsprung (10) zum Stützen mindestens eines Bestandteils (B) des herzustellenden Sporthelms (A) aufweist, wobei der Stützsitz (9) und/oder der Vorsprung (10) vom ersten Abschnitt (5) aus zugänglich sind.

3. Form nach Anspruch 2, wobei das Eingriffselement (11) umfasst:

mindestens einen Verriegelungssitz (11a), vorzugsweise zwei gegenüberliegende Verriegelungssitze (11a), die außerhalb der ringförmigen Struktur (8) des Zwischenstützelements (4) realisiert sind;
mindestens einen Verriegelungsvorsprung (11b), vorzugsweise zwei gegenüberliegende Verriegelungsvorsprünge (11b), die innerhalb der jeweiligen Formhohlraum (2) des Rahmens (1) zwischen einer Ruheposition, in der das Zwischenstützelement (4) in den Formhohlraum (2) eingesetzt werden kann oder aus dem entfernt werden kann, und einer Verriegelungsposition, in der der Verriegelungsvorsprung (11b) in den jeweiligen Verriegelungssitz (11a) des Zwischenstützelements (4) eingreift, um letzteres innerhalb dem jeweiligen Formhohlraum (2) des Rah-

mens (1) zu halten, beweglich sind.

4. Form nach Anspruch 3, wobei der Verriegelungsvorsprung (11b) mittels einer außerhalb der Form angeordneten Betätigungsvorrichtung, vorzugsweise mindestens einem Antriebspedal, gesteuert werden kann.

5. Form nach einem der Ansprüche 2 bis 4, wobei die Eingriffsbegrenzung (12) mindestens eine Kupplungsnase (12a) und mindestens einen Kupplungssitz (12b) umfasst, die operativ zwischen dem Zwischenstützelement (4) und dem Gegenrahmen (3) angeordnet sind.

6. Form nach Anspruch 5, wobei die Eingriffsbegrenzung (12) umfasst:

mindestens eine Kupplungsnase (12a), vorzugsweise zwei gegenüberliegende Kupplungsnasen (12a), die von der ringförmigen Struktur (8) des Zwischenstützelements (4) nach außen ragen;
mindestens einen Kupplungssitz (12b), vorzugsweise zwei gegenüberliegende Kupplungssitze (12b), die auf dem Gegenrahmen (3) realisiert sind, wobei die Kupplungsnase (12a) und der jeweilige Kupplungssitz (12b) zumindest teilweise gegengestaltet sind, um eine stabile Kupplung zwischen dem Zwischenstützelement (4) und dem jeweiligen Gegenrahmen (3) zu gewährleisten.

7. Form nach Anspruch 6, wenn Anspruch 5 von Anspruch 4 abhängt, wobei der Verriegelungssitz (11a) des Verriegelungselements (11) außen an einer entsprechenden Kupplungsnase (12a) des Eingriffsbegrenzung (12) realisiert ist.

8. Form nach einem der Ansprüche 2 bis 7, wobei der Greifsgriff (7) durch die ringförmige Struktur (8) des Zwischenstützelements (4) definiert ist, wobei der Greifsgriff (7) optional umfasst:

einen Greifabschnitt (7a), der durch einen Block definiert ist, der mit der ringförmigen Struktur (8) des Zwischenstützelements (4) in Eingriff steht, wobei der Greifabschnitt (7a) dazu bestimmt ist, von einer Bedienungsperson manuell gegriffen zu werden;
eine Greiföffnung (7b), die zwischen der ringförmigen Struktur (8) des Zwischenstützelements (4) und dem Greifabschnitt (7a) des Greifsgriffs (7) definiert ist, um das Einführen der Hand eines Bedieners zu ermöglichen, wenn dieser den Griff ergreifen muss.

9. Form nach einem der vorhergehenden Ansprüche, wobei die Form mindestens ein Hilfsstützelement umfasst, das mit dem Zwischenstützelement (4) identisch ist, wobei das Hilfsstützelement verwendet werden kann, um einen oder mehrere Bestandteile (B) eines zu formenden Sporthelms (A) vorzubereiten, während das Zwischenstützelement (4) in den entsprechenden Formhohlraum (2) des Rahmens (1) der Form während eines relativen Formzyklus eingreift.

10. Verfahren zum Formen von Sporthelmen (A), insbesondere von Fahrradhelmen, das die folgenden Schritte umfasst:

Bereitstellen mindestens eines Rahmens (1) einer Form, die mindestens einen Formhohlraum (2), vorzugsweise zwei oder mehr Formhohlräume (2), zum Formen mindestens eines jeweiligen Sporthelms (A) definiert;
Vorbereiten mindestens eines Gegenrahmens (3) der Form, der mit dem Rahmen (1) in Eingriff gebracht werden kann, um den jeweiligen Formhohlraum (2) hermetisch zu verschließen und die Durchführung mindestens eines Formzyklus zu ermöglichen;
Herstellen mindestens eines Zwischenstützelements (4) zum Stützen und Positionieren eines oder mehrerer Bestandteile (B) des herzustellenden Sporthelms (A) innerhalb dem jeweiligen Formhohlraum (2) des Rahmens (1) der Form;
Platzieren eines oder mehrerer Bestandteile (B) des herzustellenden Sporthelms (A) in einem ersten Abschnitt (5) des Zwischenstützelements (4) entsprechend den jeweiligen vorbestimmten Positionen;
Positionieren des Zwischenstützelements (4) innerhalb dem jeweiligen Formhohlraum (2) des Formrahmens (1), wobei der erste Abschnitt (5) dem Formhohlraums (2) zugewandt ist, um die Bestandteile (B) des herzustellenden Sporthelms (A) in dem jeweiligen Formhohlraum (2) gemäß den jeweiligen vorbestimmten Positionen zu positionieren;
Blockieren des Zwischenstützelements (4) im Inneren des jeweiligen Formhohlraums (2) entsprechend der zuvor bestimmten Position;
Ineinandergreifen des Gegenrahmens (3) der Form mit dem Rahmen (1), um die jeweilige Formhohlraum (2) an einem zweiten Abschnitt (6) des Zwischenstützelements (4) hermetisch zu verschließen, wobei der zweite Abschnitt dem ersten Abschnitt (5) gegenüberliegt;
Starten eines Formzyklus durch Einspritzen eines entsprechenden Formmaterial, vorzugsweise Polystyrol;
Lösen des Gegenrahmens (3) der Form vom Rahmen (1) derselben, um Zugang zu dem jeweiligen Formhohlraum (2) und dem jeweiligen

Zwischenstützelement (4) zu erhalten, wenn der Formzyklus abgeschlossen ist;
Lösen des Zwischenstützelements (4) aus dem jeweiligen Formhohlraum (2);
Entfernen des Zwischenstützelements (4) aus dem jeweiligen Formhohlraum (2) des Rahmens (1) der Form zusammen mit dem jeweiligen hergestellten Sporthelm (A);
Trennen des Zwischenstützelements (4) von dem jeweiligen hergestellten Sporthelm (A);
Wiederholen noch einmal den Vorgang.

11. Verfahren nach Anspruch 10, wobei der Schritt des Positionierens des Zwischenstützelements (4) in dem jeweiligen Formhohlraum (2) und der Schritt des Entfernens des Zwischenstützelements (4) zusammen mit dem jeweiligen Sporthelm (A), der durch die jeweilige Formhohlraum (2) hergestellt wird, manuell durchgeführt werden, vorzugsweise durch Ergreifen mindestens eines Greifsgriffes (7), der in Übereinstimmung mit dem zweiten Abschnitt (6) des Zwischenstützelements (4) definiert ist.

12. Verfahren nach Anspruch 11, wobei:

der Schritt des Positionierens des Zwischenstützelements (4) in dem jeweiligen Formhohlraum (2) durch Einsetzen des Zwischenstützelements (4) in den jeweiligen Formhohlraum (2) entlang einer Richtung im Wesentlichen orthogonal in Bezug auf eine Hauptliegeebene (X) des Rahmens (1) der Form durchgeführt wird;
der Schritt des Entfernens des Zwischenstützelements (4) zusammen mit dem jeweiligen Sporthelm (A), der durch den jeweiligen Formhohlraum (2) hergestellt wird, durch Herausziehen des Zwischenstützelements (4) entlang einer Richtung, die im Wesentlichen orthogonal zur Hauptliegeebene (X) des Formrahmens (1) ist, durchgeführt wird.

13. Verfahren nach einem der Ansprüche 10 bis 12, wobei der Schritt des Verriegelns des Zwischenstützelements (4) in dem jeweiligen Formhohlraum (2) des Formrahmens (1) und der Schritt des Entriegelns des Zwischenstützelements (4) aus dem jeweiligen Formhohlraum (2) des Formrahmens (1) durch das Zusammenwirken zwischen mindestens einem beweglichen Verriegelungsvorsprung (11b), der in dem Formhohlraum (2) angeordnet ist, und mindestens einem Verriegelungssitz (11a), der außen am Zwischenstützelement (4) realisiert ist, durchgeführt werden.

14. Verfahren nach Anspruch 13, wobei:

der Schritt des Verriegelns des Zwischenstützelements (4) in dem jeweiligen Formhohlraum (2) des Rahmens (1) der Form durch Aktivieren des Verriegelungsvorsprungs (11b) aus einer Ruheposition, in der das Zwischenstützelement (4) in den Formhohlraum (2) eingesetzt werden kann oder daraus entfernt werden kann, und einer Verriegelungsposition, in der der Verriegelungsvorsprung (11b) in den jeweiligen Verriegelungssitz (11a) des Zwischenstützelements (4) eingreift und letzteres in dem jeweiligen Formhohlraum (2) des Formrahmens (1) hält, durchgeführt wird;
der Schritt des Entriegelns des Zwischenstützelements (4) aus dem jeweiligen Formhohlraum (2) durch Bewegen des Verriegelungsvorsprungs (11b) von der Verriegelungsposition in die Ruheposition durchgeführt wird.

15. Verfahren nach Anspruch 14, wobei der Verriegelungsschritt und der Entriegelungsschritt durch eine Bewegung durchgeführt werden, die den Verriegelungsvorsprung (11b) durch Betätigung einer außerhalb der Form angeordneten Steuervorrichtung, vorzugsweise durch Betätigung eines Steuerpedals, betätigt.

16. Verfahren nach einem der Ansprüche 10 bis 15, wobei:

der Schritt des Ineinandergreifens des Gegenrahmens (3) der Form mit dem Rahmen (1) derselben ebenfalls durch das Ineinandergreifen mindestens einer Kupplungsnase (12a), die von dem Zwischenstützelement (4) nach außen ragt, mit mindestens einem Kupplungssitz (12b), der an dem Gegenrahmen (3) der Form realisiert ist;
der Schritt des Lösens des Gegenrahmens (3) der Form von dem Rahmen (1) derselben auch durch Lösen der Kupplungsnase (12a), die von dem Zwischenstützelement (4) nach außen ragt, von dem jeweiligen Kupplungssitz (12b), der an dem Gegenrahmen (3) der Form realisiert ist, durchgeführt wird.

17. Verfahren nach einem der vorhergehenden Ansprüche, das ferner die folgenden Schritte umfasst:

Herstellen mindestens eines Hilfsstützelements, das mit dem Zwischenstützelement identisch ist;
Positionieren eines oder mehrerer Bestandteile (B) des herzustellenden Sporthelms (A) auf einem ersten Abschnitt des Hilfsstützelements gemäß jeweiligen vorbestimmten Positionen während eines Formzyklus, wobei sich das Zwischenstützelement (4) innerhalb dem jeweiligen Formhohlraum (2) des Formrahmens (1) befindet;

Positionieren des Hilfsstützelements innerhalb dem jeweiligen Formhohlraum (2) des Formrahmens (1), wobei der erste Abschnitt dem Formhohlraum (2) zugewandt ist, um die Bestandteile (B) des herzustellenden Sporthelms (A) in dem jeweiligen Formhohlraum (2) gemäß den jeweiligen vorbestimmten Positionen zu positionieren, nachdem das Zwischenstützelement (4) aus dem Formhohlraum (2) des Rahmens (1) der Form entfernt wurde;
Blockieren des Hilfsstützelements in dem jeweiligen Formhohlraum (2);
Ineinandergreifen des Gegenrahmens (3) der Form mit dem Rahmen (1) derselben, um den jeweiligen Formhohlraum (2) an einem zweiten Abschnitt des Hilfsstützelements gegenüber dem ersten Abschnitt hermetisch zu verschließen;
Starten eines Formzyklus durch Einspritzen eines entsprechenden Formmaterial, vorzugsweise Polystyrol.

18. Verfahren nach Anspruch 1 7, wobei die folgenden Schritte:

Trennen des Zwischenstützelements (4) von dem jeweiligen hergestellten Sporthelm (A); und,
Positionieren eines oder mehrerer Bestandteile (B) eines später herzustellenden Sporthelms (A) in dem ersten Abschnitt (5) des Zwischenstützelements (4) gemäß den jeweiligen vorbestimmten Positionen für einen neuen durchzuführenden Formzyklus,
durchgeführt werden, während sich das Hilfsstützelement während des jeweiligen Formzyklus innerhalb dem jeweiligen Formhohlraum (2) befindet.

Revendications

1. Moule pour la fabrication de casques de sport (A), en particulier de casques de cyclisme, le moule comprenant:

au moins un cadre (1) définissant au moins une concavité de moulage (2), de préférence deux ou plusieurs concavités de moulage (2), pour mouler au moins un casque de sport respectif (A);
au moins un contre-cadre (3) pouvant être engagé sur le cadre (1) pour fermer hermétiquement la concavité de moulage respective (2) et permettre l'exécution d'au moins un cycle de moulage;
caractérisé en ce qu'il comprend au moins un élément de support intermédiaire (4) pour supporter et positionner un ou plusieurs composants (B) du casque de sport (A) à fabriquer à l'intérieur de la concavité de moulage respective (2) du cadre (1), l'élément de support intermédiaire (4) ayant:

une première partie (5) destinée à recevoir en prise un ou plusieurs composants (B) du casque de sport (A) à fabriquer selon des positions prédéterminées respectives;
une seconde partie (6) opposée à la première partie (5) et ayant au moins une poignée (7), de préférence deux poignées opposées (7), pour le positionnement manuel de l'élément de support intermédiaire (4) dans la cavité de moulage respective (2) du cadre (1) et le positionnement consécutif des composants (B) du casque de sport (A) à fabriquer à l'intérieur de ladite cavité de moulage (2), la seconde partie (6) de l'élément de support intermédiaire (4) étant conçue pour être couplée au contre-cadre respectif (3);
au moins un élément d'engagement (11) pour le couplage stable de l'élément de support intermédiaire (4) au cadre (1) à l'intérieur de la concavité de moulage respective (2), l'élément d'engagement (11) étant interposé de manière opérationnelle entre l'élément de support intermédiaire (4) et la concavité de moulage respective (2) du cadre (1);
au moins une contrainte d'engagement (12) pour le couplage stable de l'élément de support intermédiaire (4) au contre-cadre (3), la contrainte d'engagement (12) étant interposée de manière opérationnelle entre l'élément de support intermédiaire (4) et le contre-cadre (3).

2. Moule selon la revendication 1, dans lequel l'élément de support intermédiaire (4) comprend une structure sensiblement annulaire (8) ayant intérieurement au moins un siège (9) et/ou un relief (10) pour supporter au moins un composant (B) du casque de sport (A) à fabriquer, le siège de support (9) et/ou le relief (10) étant accessible depuis la première partie (5).

3. Moule selon la revendication 2, dans lequel l'élément d'engagement (11) comprend:

au moins un siège de verrouillage (11a), de préférence deux sièges de verrouillage opposés (11a), réalisés à l'extérieur de la structure annulaire (8) de l'élément de support intermédiaire (4);
au moins une protubérance de verrouillage (11b), de préférence deux protubérances de

verrouillage opposées (11b), mobiles à l'intérieur de la concavité de moulage respective (2) du cadre (1) entre une position de repos dans laquelle l'élément de support intermédiaire (4) peut être inséré dans la concavité de moulage (2) ou en être retiré et une position de verrouillage dans laquelle la protubérance de verrouillage (11b) s'engage dans le siège de verrouillage respectif (11a) de l'élément de support intermédiaire (4) pour maintenir ce dernier à l'intérieur de la concavité de moulage (2) respective du cadre (1).

4. Moule selon la revendication 3, dans lequel la protubérance de verrouillage (11b) peut être commandée au moyen d'un dispositif d'actionnement situé à l'extérieur du moule, de préférence au moins une pédale d'entraînement.

5. Moule selon l'une quelconque des revendications 2 à 4, dans lequel la contrainte d'engagement (12) comprend au moins une patte de couplage (12a) et au moins un siège de couplage (12b) interposés de manière opérationnelle entre l'élément de support intermédiaire (4) et le contre-cadre (3).

6. Moule selon la revendication 5, dans lequel la contrainte d'engagement (12) comprend:

au moins une patte de couplage (12a), de préférence deux pattes de couplage opposées (12a), faisant saillie à l'extérieur de la structure annulaire (8) de l'élément de support intermédiaire (4);
au moins un siège de couplage (12b), de préférence deux sièges de couplage opposés (12b), réalisés sur le contre-cadre (3), la patte de couplage (12a) et le siège de couplage respectif (12b) étant au moins partiellement contre-façonnés pour assurer un couplage stable entre l'élément de support intermédiaire (4) et le contre-cadre respectif (3).

7. Moule selon la revendication 6, lorsque la revendication 5 dépend de la revendication 4, dans lequel le siège de verrouillage (11a) de l'élément de verrouillage (11) est réalisé extérieurement sur une patte de couplage respective (12a) de la contrainte d'engagement (12).

8. Moule selon l'une quelconque des revendications 2 à 7, dans lequel la poignée (7) est définie par la structure annulaire (8) de l'élément de support intermédiaire (4), la poignée (7) comprenant éventuellement:

une partie de préhension (7a) définie par un bloc engagé dans la structure annulaire (8) de l'élément de support intermédiaire (4), la partie de préhension (7a) étant conçue pour être saisie manuellement par un opérateur;
une ouverture de préhension (7b) définie entre la structure annulaire (8) de l'élément de support intermédiaire (4) et la partie de préhension (7a) de la poignée de préhension (7) pour permettre l'insertion de la main d'un opérateur lorsqu'il doit saisir ladite poignée.

9. Moule selon l'une quelconque des revendications précédentes, dans lequel le moule comprend au moins un élément de support auxiliaire identique à l'élément de support intermédiaire (4), l'élément de support auxiliaire étant utilisable pour préparer un ou plusieurs composants (B) d'un casque de sport (A) à être moulé pendant que l'élément de support intermédiaire (4) est engagé dans la concavité de moulage respective (2) du cadre (1) du moule au cours d'un cycle de moulage relatif.

10. Procédé de moulage de casques de sport (A), en particulier de casques de cyclisme, comprenant les étapes suivantes:

fournir au moins un cadre (1) d'un moule définissant au moins une concavité de moulage (2), de préférence deux ou plusieurs concavités de moulage (2), pour mouler au moins un casque de sport respectif (A);
préparer au moins un contre-cadre (3) du moule pouvant être engagé dans le cadre (1) pour fermer hermétiquement la concavité de moulage respective (2) et permettre l'exécution d'au moins un cycle de moulage;
préparer au moins un élément de support intermédiaire (4) pour soutenir et positionner un ou plusieurs composants (B) du casque de sport (A) à fabriquer à l'intérieur de la concavité de moulage respective (2) du cadre (1) du moule;
placer un ou plusieurs composants (B) du casque de sport (A) à fabriquer dans une première partie (5) de l'élément de support intermédiaire (4) selon des positions respectives prédéterminées;
positionner l'élément de support intermédiaire (4) à l'intérieur de la concavité de moulage respective (2) du cadre de moulage (1) avec la première partie (5) orientée vers ladite concavité de moulage (2) pour positionner les composants (B) du casque de sport (A) à fabriquer dans la concavité de moulage respective (2) en fonction des positions prédéterminées respectives;
bloquer l'élément de support intermédiaire (4) à l'intérieur de la concavité de moulage respective (2) en fonction de la position déterminée précédemment;
engager le contre-cadre (3) du moule sur le ca-

dre (1) pour fermer hermétiquement la concavité de moulage respective (2) au niveau d'une seconde partie (6) de l'élément de support intermédiaire (4), ladite seconde partie étant opposée à la première partie (5);
démarrer un cycle de moulage en injectant un matériau de moulage correspondant, de préférence du polystyrène;
désengager le contre-cadre (3) du moule du cadre (1) du même moule pour accéder à la concavité de moulage (2) et à l'élément de support intermédiaire (4) respectifs, lorsque le cycle de moulage est terminé;
libérer l'élément de support intermédiaire (4) de la concavité de moulage respective (2);
retirer l'élément de support intermédiaire (4) de la concavité de moulage (2) du cadre (1) du moule en même temps que le casque de sport fabriqué (A);
séparer l'élément de support intermédiaire (4) du casque de sport fabriqué respectif (A);
répéter le processus à nouveau.

11. Procédé selon la revendication 10, dans lequel l'étape de positionnement de l'élément de support intermédiaire (4) dans la concavité de moulage respective (2) et l'étape de retrait de l'élément de support intermédiaire (4) avec le casque de sport respectif (A) fabriqué par la concavité de moulage respective (2) sont effectuées manuellement, de préférence en saisissant au moins une poignée de préhension (7) définie en correspondance avec la seconde partie (6) de l'élément de support intermédiaire (4).

12. Procédé selon la revendication 11, dans lequel:

l'étape de positionnement de l'élément de support intermédiaire (4) dans la concavité de moulage respective (2) est réalisée en insérant ledit élément de support intermédiaire (4) dans la concavité de moulage respective (2) le long d'une direction sensiblement orthogonale par rapport à un plan horizontal principal (X) du cadre (1) du moule;
l'étape consistant à retirer l'élément de support intermédiaire (4) avec le casque de sport respectif (A) fabriqué par la concavité de moulage respective (2) est réalisée en extrayant ledit élément de support intermédiaire (4) le long d'une direction sensiblement orthogonale au plan horizontal principal (X) du cadre de moulage (1).

13. Procédé selon l'une quelconque des revendications 10 à 12, dans lequel l'étape de verrouillage de l'élément de support intermédiaire (4) à l'intérieur de la concavité de moulage respective (2) du cadre de moulage (1) et l'étape de déverrouillage de l'élément de support intermédiaire (4) de la concavité de moulage respective (2) du cadre de moulage (1) sont effectuées par l'interaction entre au moins une protubérance de verrouillage mobile (11b), disposée dans la concavité de moulage (2), et au moins un siège de verrouillage (11a) réalisé à l'extérieur sur l'élément de support intermédiaire (4).

14. Procédé selon la revendication 13, dans lequel:

l'étape de verrouillage de l'élément de support intermédiaire (4) dans la concavité de moulage respective (2) du cadre (1) du moule est effectuée en activant la protubérance de verrouillage (11b) à partir d'une position de repos dans laquelle l'élément de support intermédiaire (4) peut être inséré dans la concavité de moulage (2) ou en être retiré et une position de verrouillage dans laquelle la protubérance de verrouillage (11b) s'engage dans le siège de verrouillage respectif (11a) de l'élément de support intermédiaire (4) en maintenant ce dernier à l'intérieur de la concavité de moulage respective (2) du cadre du moule (1);
l'étape de déverrouillage de l'élément de support intermédiaire (4) de la concavité de moulage respective (2) est effectuée en déplaçant la protubérance de verrouillage (11b) de la position de verrouillage à la position de repos.

15. Procédé selon la revendication 14, dans lequel l'étape de verrouillage et l'étape de déverrouillage sont effectuées par un mouvement actionnant la protubérance de verrouillage (11b) en actionnant un dispositif de commande situé à l'extérieur du moule, de préférence en actionnant une pédale de commande.

16. Procédé selon l'une quelconque des revendications 10 à 15, dans lequel:

l'étape consistant à engager le contre-cadre (3) du moule dans le cadre (1) du même moule est également effectuée en engageant au moins une patte de couplage (12a) faisant saillie à l'extérieur de l'élément de support intermédiaire (4) dans au moins un siège de couplage (12b) réalisé sur le contre-cadre (3) du moule;
l'étape consistant à désengager le contre-cadre (3) du moule du cadre (1) du même moule est également effectuée en désengageant la patte de couplage (12a) faisant saillie à l'extérieur de l'élément de support intermédiaire (4) du siège de couplage respectif (12b) réalisé sur le contre-cadre (3) du moule.

17. Procédé selon l'une quelconque des revendications précédentes, comprenant en outre les étapes suivantes :

préparer au moins un élément de support auxiliaire identique à l'élément de support intermédiaire;
positionner un ou plusieurs composants (B) du casque de sport (A) à fabriquer sur une première partie de l'élément de support auxiliaire selon des positions prédéterminées respectives, au cours d'un cycle de moulage dans lequel l'élément de support intermédiaire (4) est situé à l'intérieur de la concavité de moulage respective (2) du cadre de moulage (1);
positionner l'élément de support auxiliaire dans la concavité de moulage respective (2) du cadre du moule (1), la première partie faisant face à ladite concavité de moulage (2), afin de positionner les composants (B) du casque de sport (A) à fabriquer dans la concavité de moulage respective (2) selon des positions prédéterminées respectives, après le retrait de l'élément de support intermédiaire (4) de ladite concavité de moulage (2) du cadre (1) du moule;
bloquer l'élément de support auxiliaire à l'intérieur de la concavité de moulage correspondante (2);
engager le contre-cadre (3) du moule sur le cadre (1) du même moule pour fermer hermétiquement la concavité de moulage respective (2) à une seconde partie de l'élément de support auxiliaire opposée à la première partie;
démarrer un cycle de moulage en injectant un matériau de moulage correspondant, de préférence du polystyrène.

18. Procédé selon les revendications 1 à 7, dans lequel les étapes de:

séparation de l'élément de support intermédiaire (4) du casque de sport fabriqué respectif (A); et,
positionnement d'un ou plusieurs composants (B) d'un casque de sport supplémentaire (A) à fabriquer dans la première partie (5) de l'élément de support intermédiaire (4) selon des positions prédéterminées respectives pour un nouveau cycle de moulage à effectuer,
sont effectuées alors que l'élément de support auxiliaire se trouve à l'intérieur de la concavité de moulage respective (2) pendant le cycle de moulage respectif.

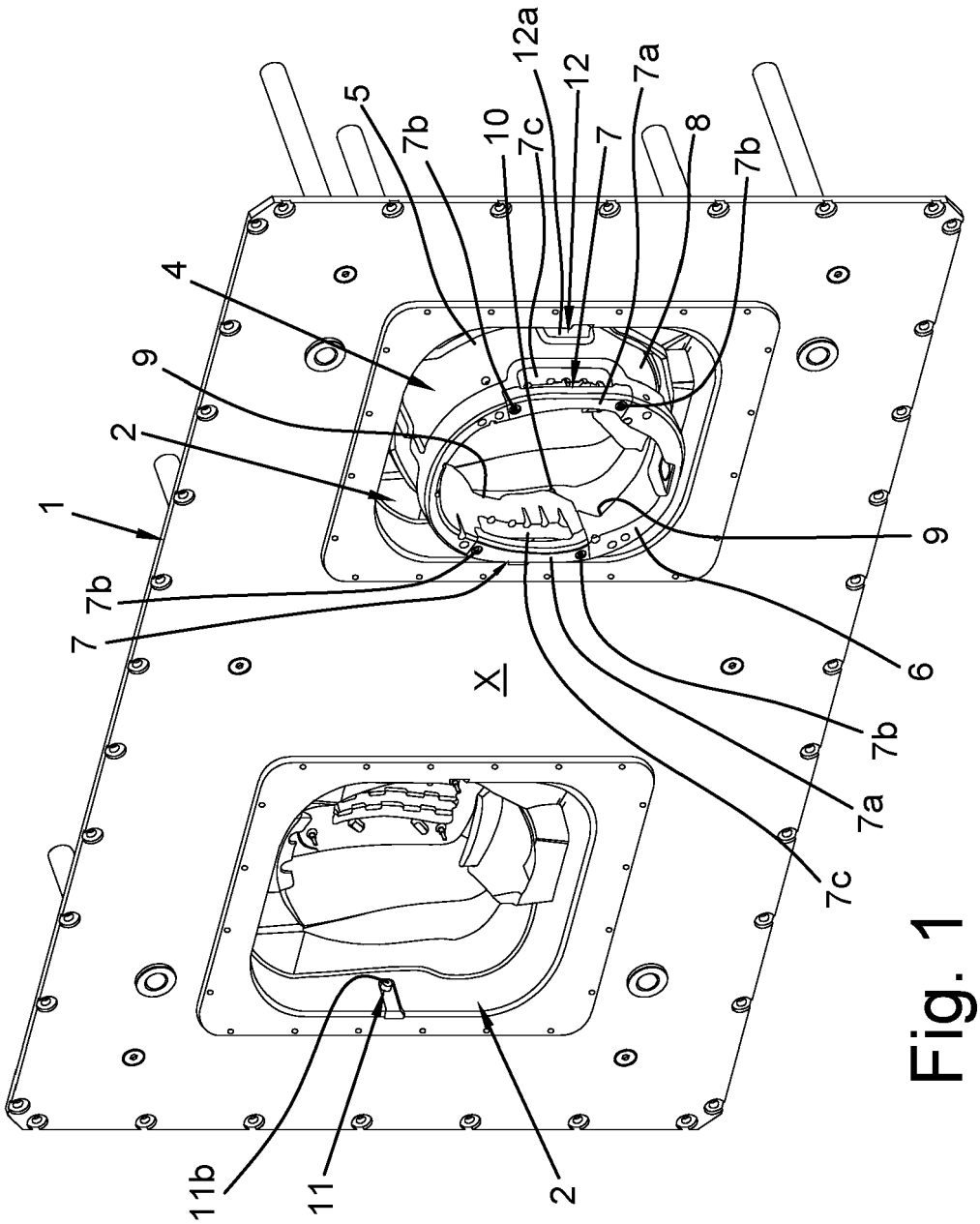

Fig. 1

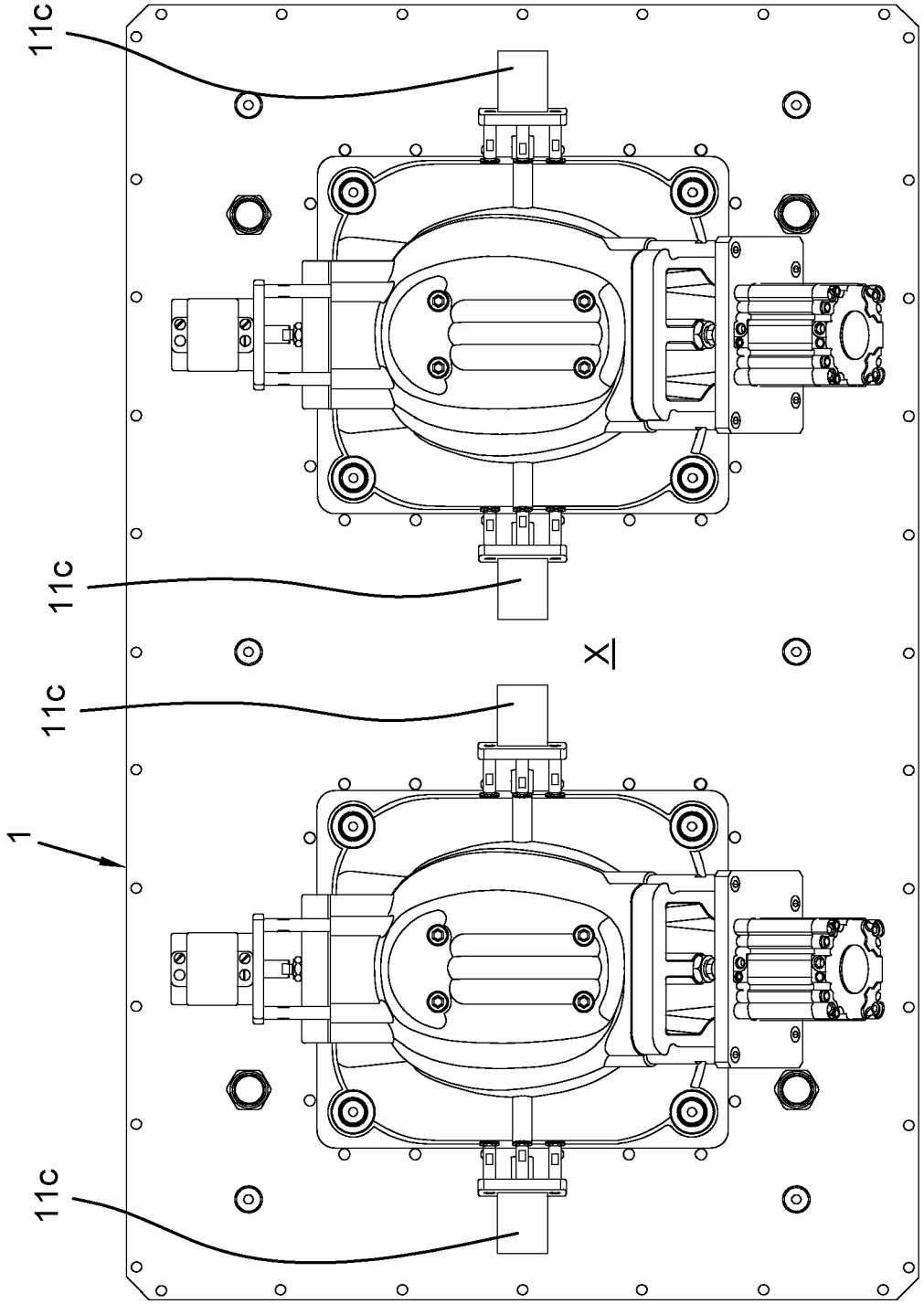

Fig. 2

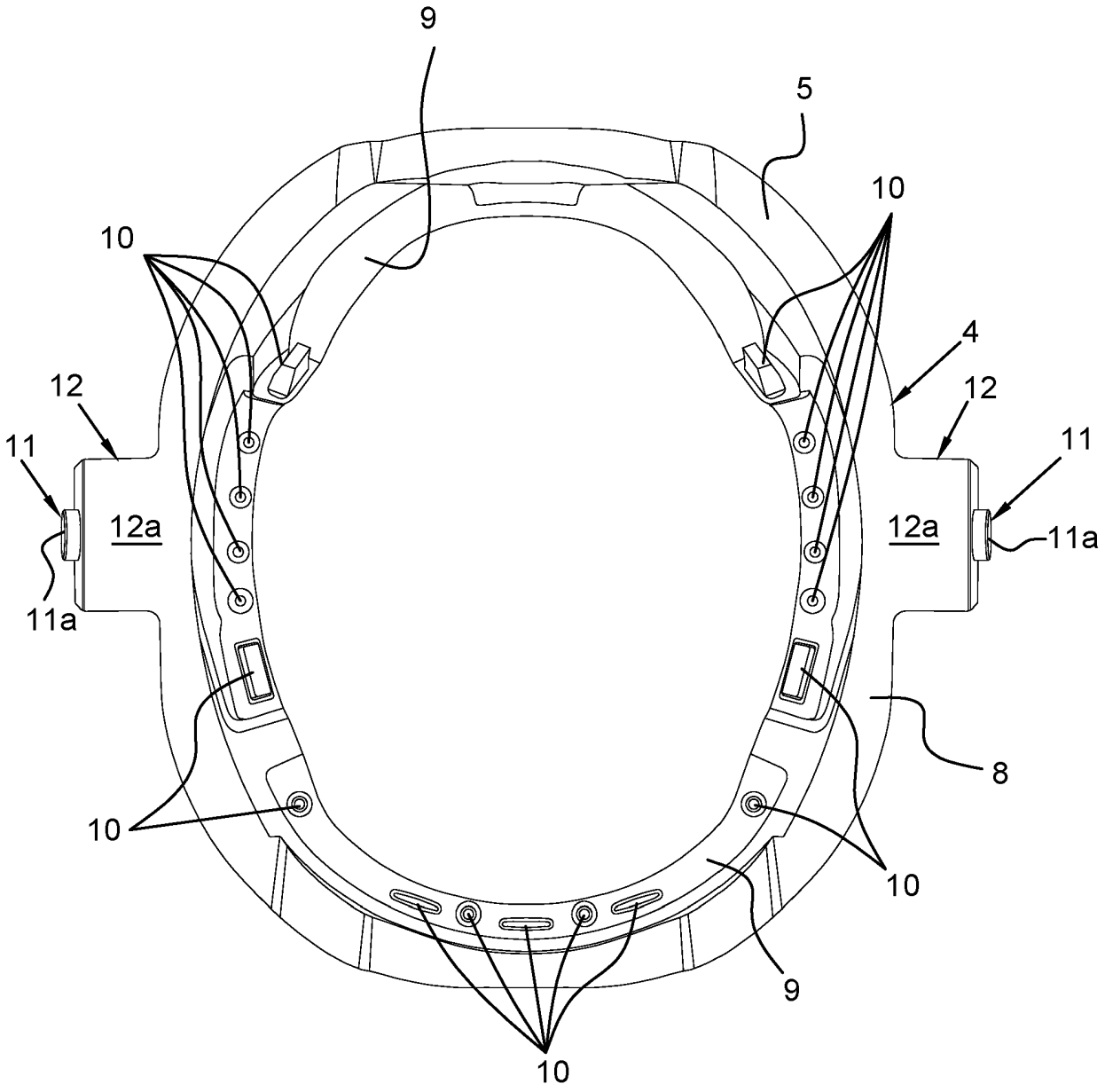

Fig. 3

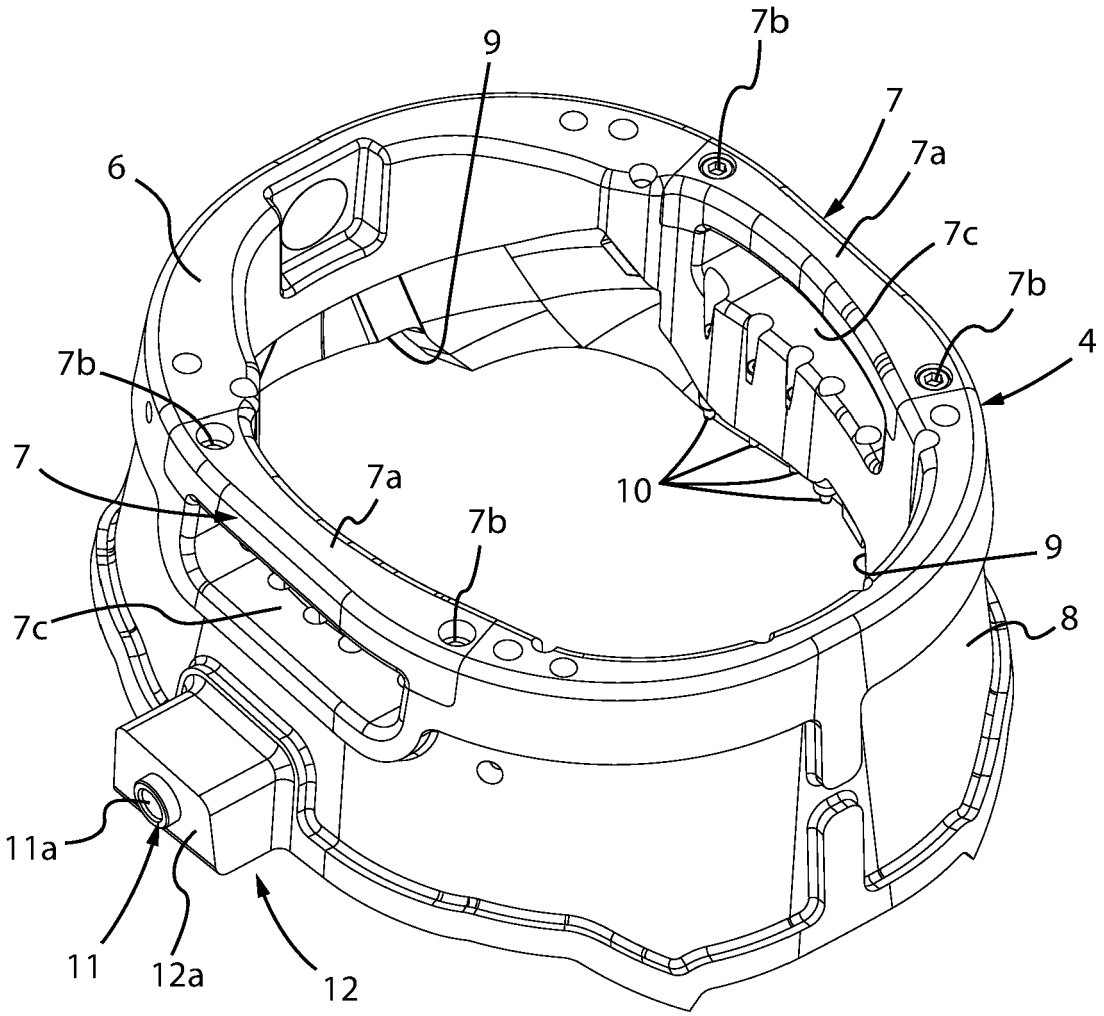

Fig. 4

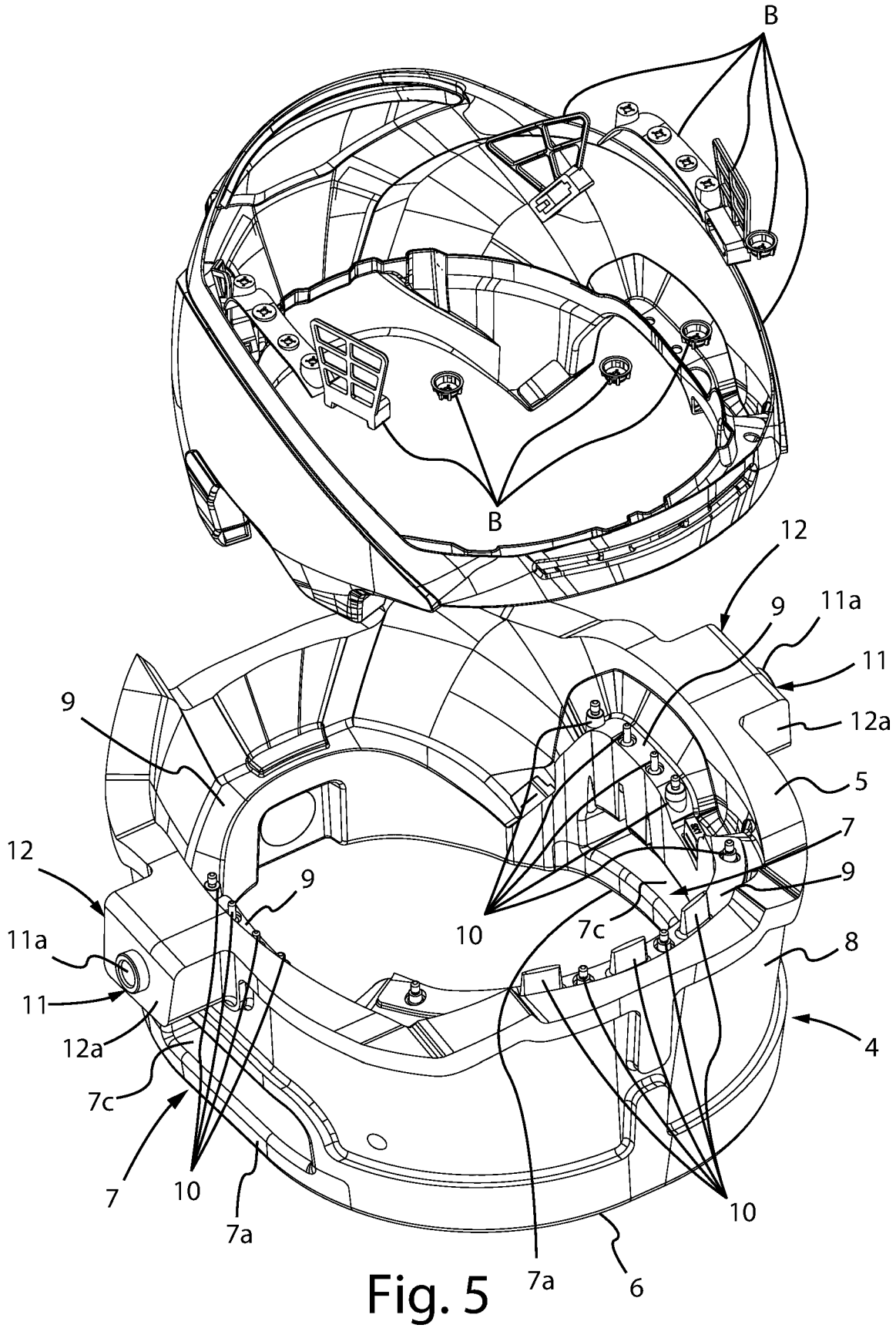

Fig. 5

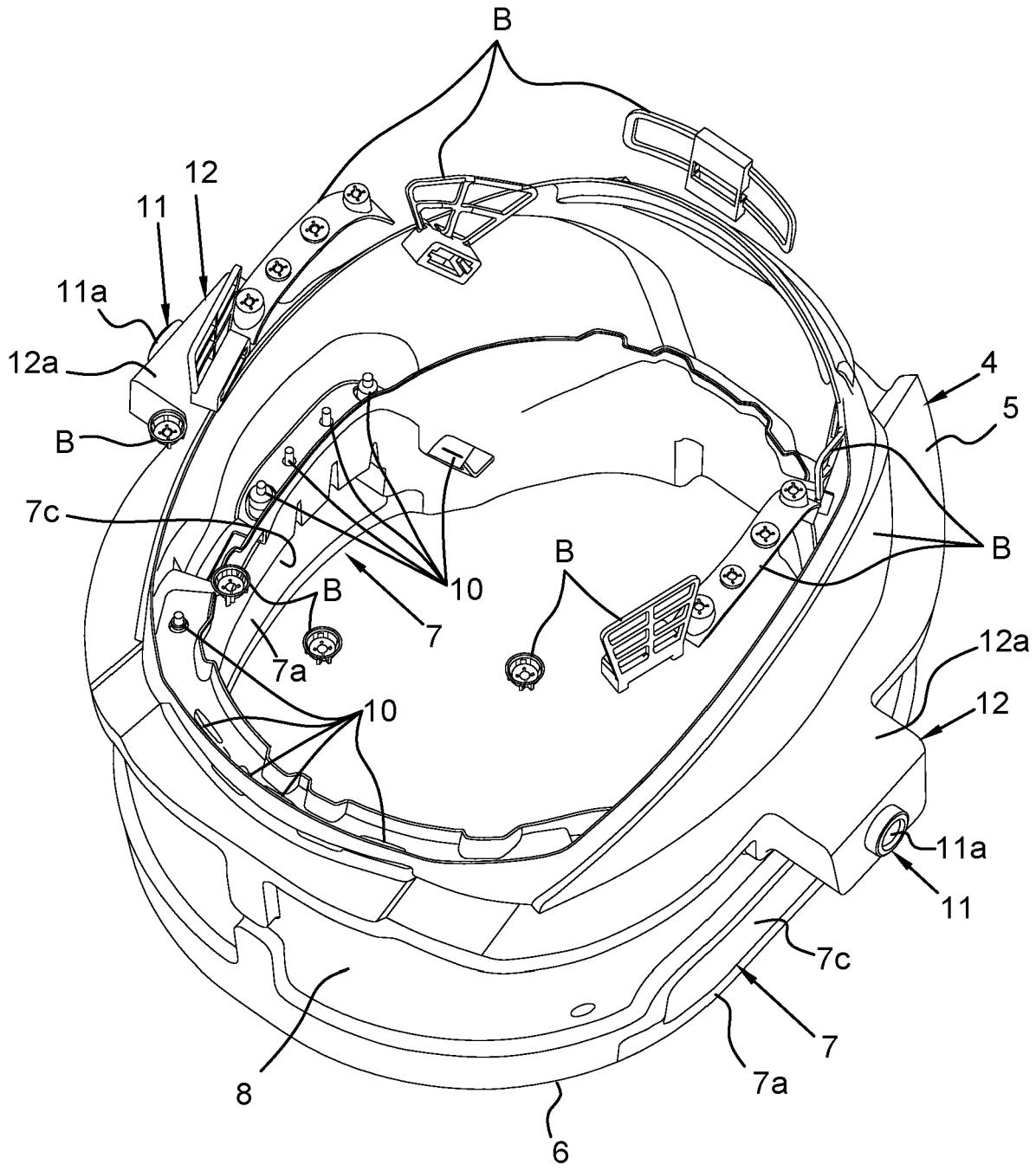

Fig. 6

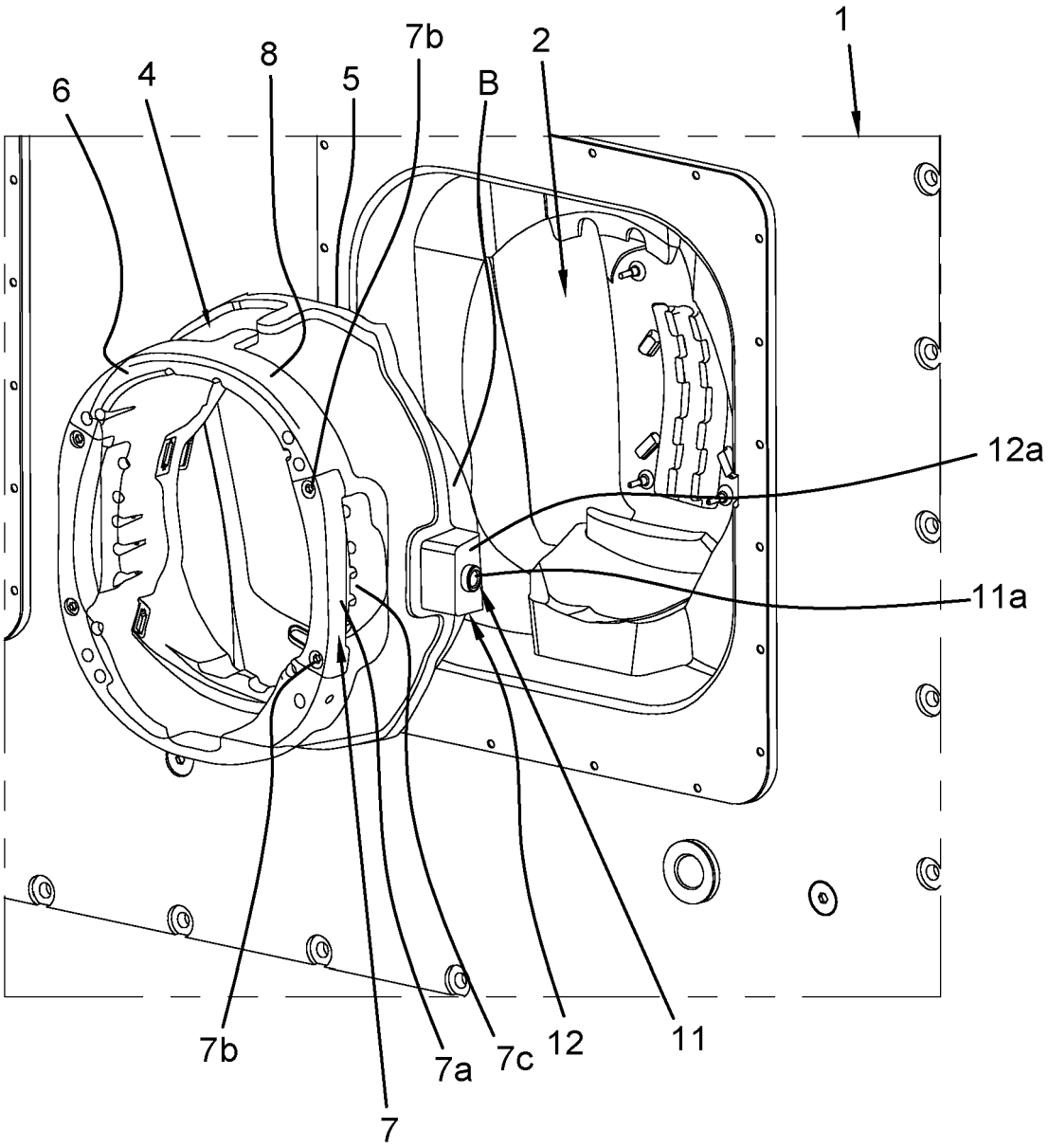

Fig. 7

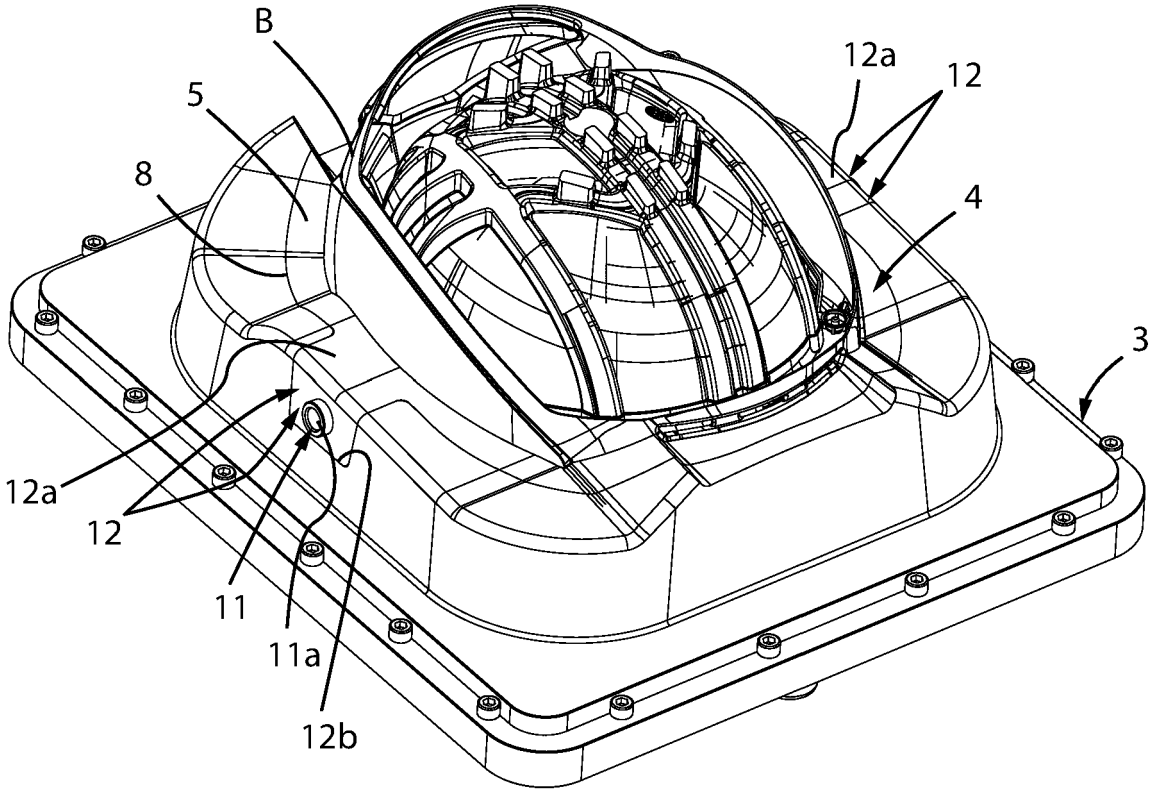

Fig. 8

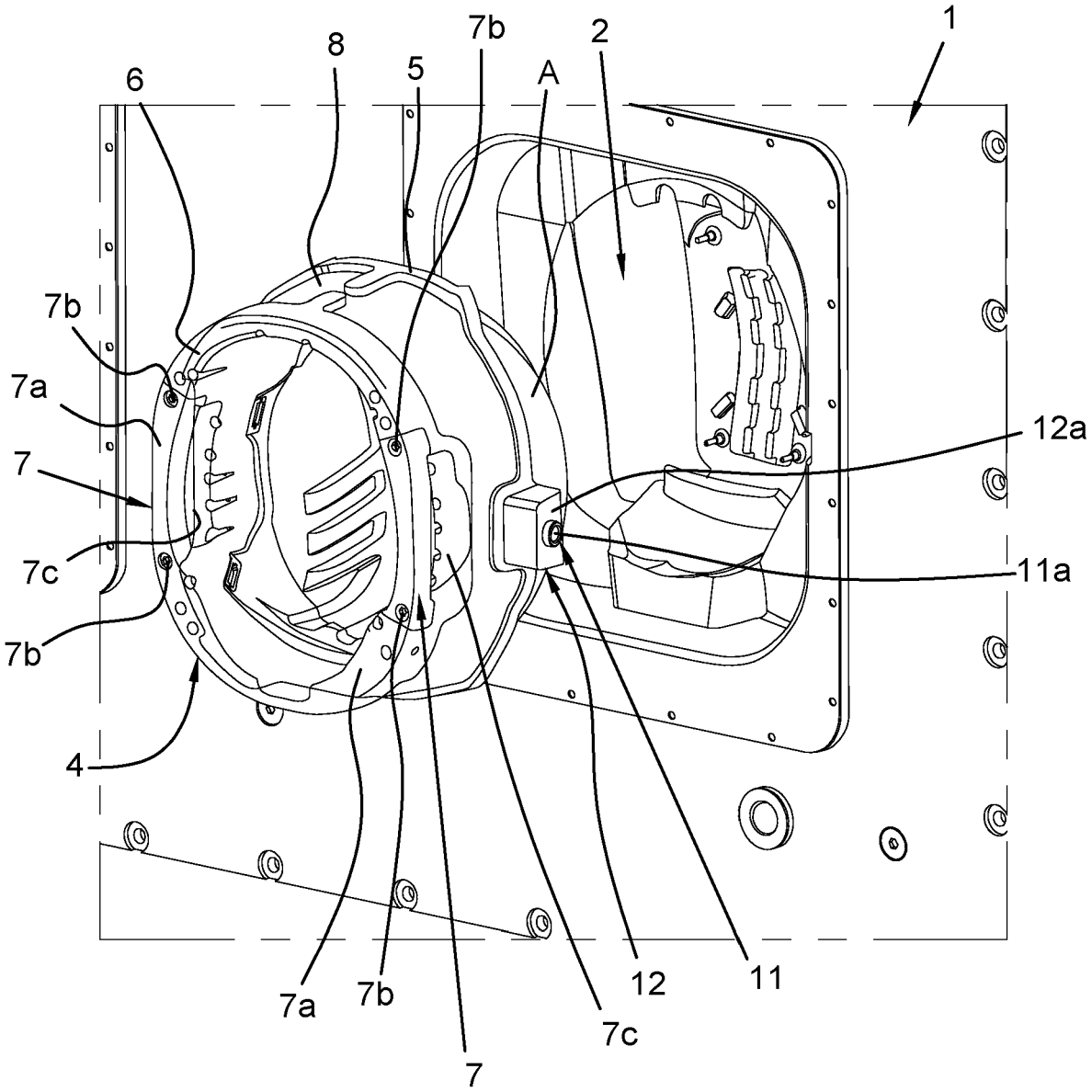

Fig. 9

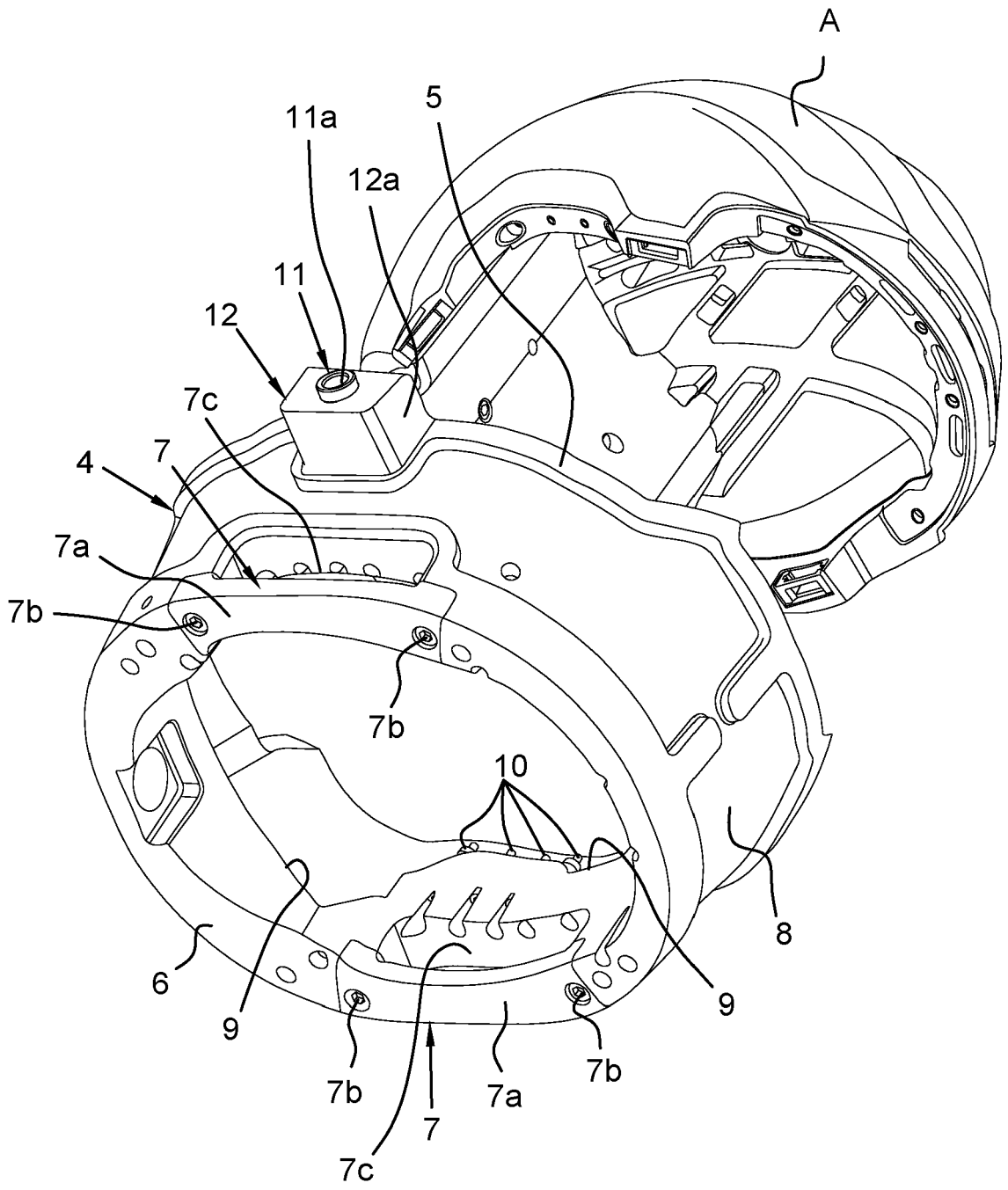

Fig. 10

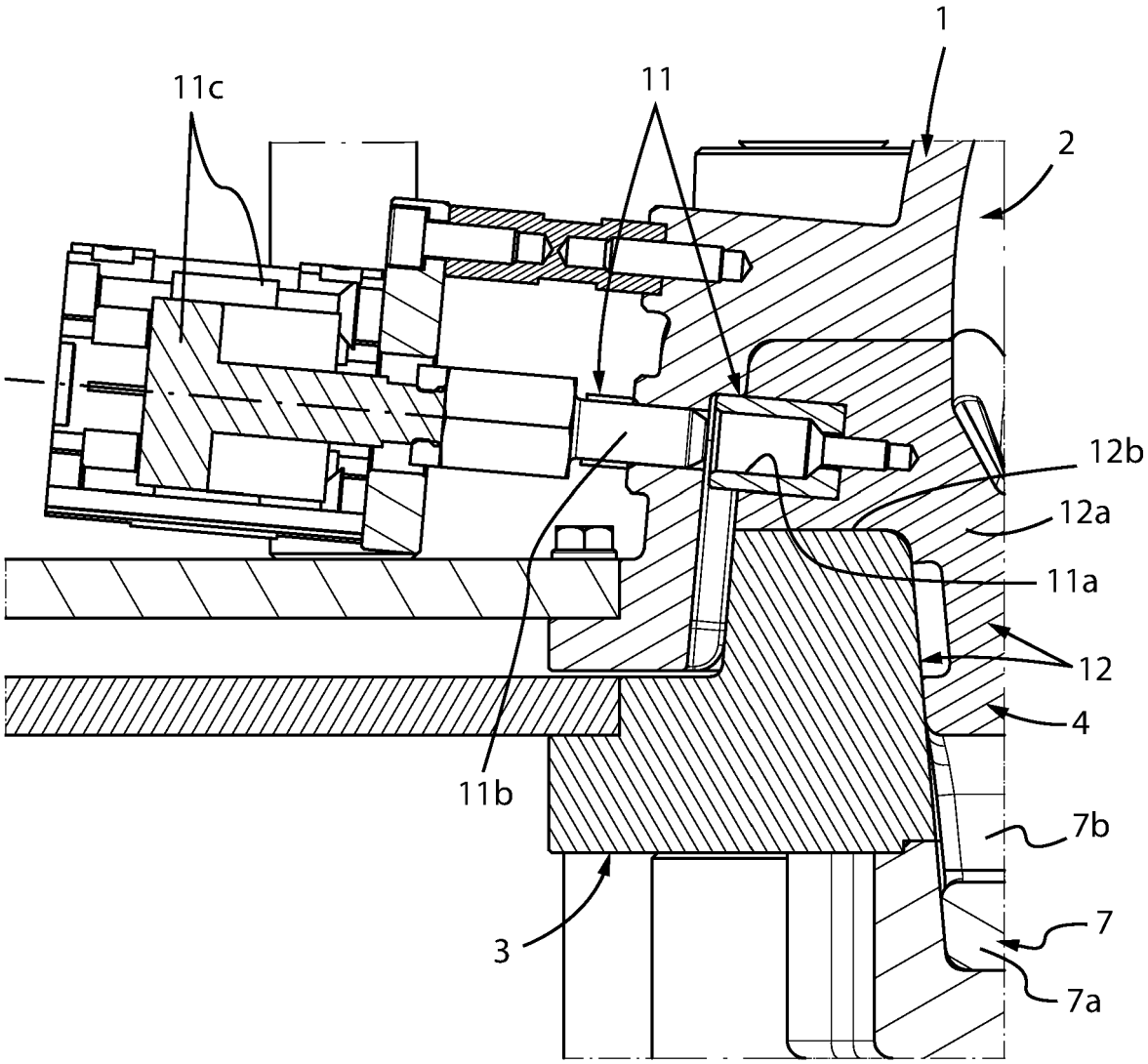

Fig. 11

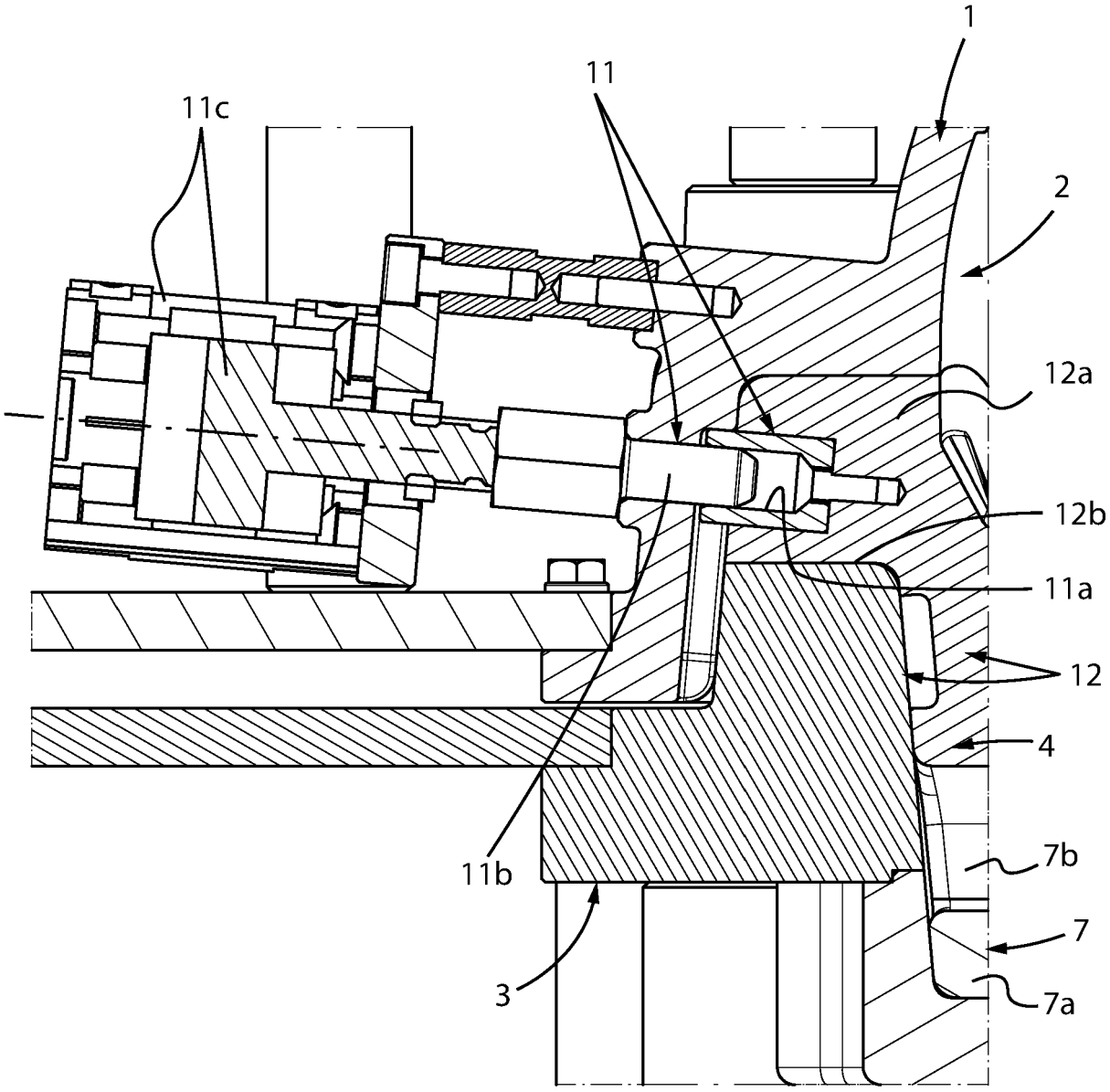

Fig. 12

REFERENCES CITED IN THE DESCRIPTION

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