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(54) **Title:** CONCRETE BASE MOULD

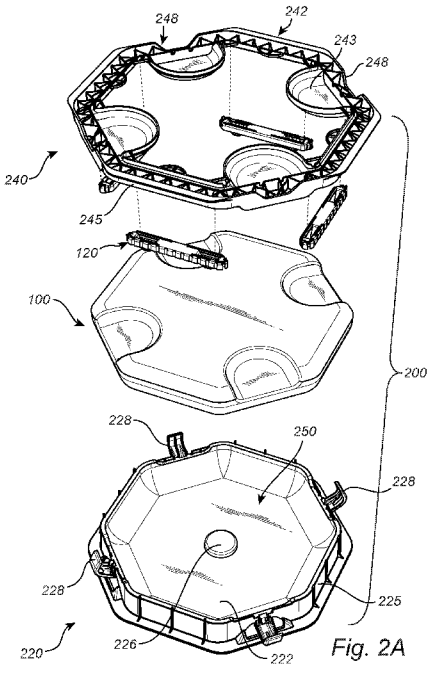

Fig. 2A

(57) **Abstract:** A reusable mould for forming a concrete base (100) is provided. The mould (200) comprises a lower part (220) and an upper part (240) being removably connectable to each other, and wherein at least one base element (117, 120) is releasably connected to the upper part (240) or lower part (220).

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CONCRETE BASE MOULD

TECHNICAL FIELD

The present invention relates to a concrete base mould. The present invention further relates to a method for forming a concrete base using said mould and a concrete base formed using said method and mould.

BACKGROUND

Products formed from concrete are often cast using moulds to obtain a wanted shape. Base elements such as concrete foundations, base and support elements for street lights and parasols are only a few products which may be formed by casting concrete using moulds.

When moulding concrete, the mould requires an opening for the introduction of concrete into the mould, but also for allowing liquid to vaporise such that the concrete can set. A large opening results in a faster setting of the cement. However, the opening will also cause an uneven surface area of the concrete where the opening has been arranged, while the concrete in contact with the internal surfaces of the mould will attain a smooth and even surface. Therefore, the moulds are often designed such that an inner bottom surface of the mould will correspond to an outer upper surface of the finished product, and the opening for filling the mould with concrete is arranged at the upper side of the mould, corresponding to the outer bottom of the finished product.

A parasol base and a method for its manufacturing is disclosed in EP0818594. A mould is filled with concrete through an opening arranged at what corresponds to a bottom surface of the finished parasol base. However, the sharp edge formed at the interface between the ground and the concrete parasol base is fragile and will be damaged easily.

Other parasol bases are formed from a plastic cover, which in turn comprises concrete or cement, such as the parasol base disclosed in DE202005014564. However, the use of such a plastic cover is unattractive, and the mixture of plastic and concrete materials is hard to recycle.

Hence, there is a need for an improved concrete base mould and a method forming a concrete base.

SUMMARY OF THE INVENTION

Accordingly, the present invention preferably seeks to mitigate, alleviate or eliminate one or more of the above-identified deficiencies in the art and disadvantages singly or in any combination and solves at least the above mentioned problems by proposing a solution according to the appended independent claims. Advantageous embodiments are defined in the appended dependent claims.

In a first aspect, there is provided a reusable mould for forming a concrete base. The mould comprises a lower part and an upper part being removably connectable to each other, and at least one base element is releasably connected to the upper part or lower part.

In one embodiment, the upper part and the lower part are releasably connected to each other by one or more coupling means at the lower part configured to engage a respective locking means at the upper part.

In a second embodiment, the at least one base element is configured to be cast into and incorporated in the concrete base and to be detached from the mould upon removal of the mould when concrete forming the concrete base is set.

In another embodiment, the base element is at least one base foot configured to be moulded to the concrete base and the at least one base foot is releasably attached to the upper part.

In yet another embodiment, each base foot is arranged at an internal surface of the upper part through a snap-fit engagement.

In one embodiment, each base foot is released from the upper part when the upper part is removed from the moulded concrete base.

In a further embodiment the upper part comprises a plurality of radial projections extending inwards from a circumference of the upper part.

The mould may have an octagonal shape and four radial projections and four base feet are distributed in an alternating pattern.

In one embodiment, the base element is an insert and the lower part comprises a support member configured to maintain the position of the insert during moulding of the concrete base.

In a second aspect, there is provided a method for manufacturing a concrete base using a reusable mould comprising a lower part and an upper part being removably connectable to each other. The method comprises the steps of releasably connecting at least one base element to the upper part or lower part. The base element is a base foot or an insert. The method further comprises releasably connecting the lower part and the upper part to each other, adding concrete to the mould through an opening of the mould, curing the concrete during a pre-determined time period, and removing the mould from the concrete base, whereby the concrete base is obtained and the mould may be reused for the method.

The step of connecting the at least one base element to the upper or lower part may comprise pressing the at least one base element into engagement with the upper or lower part.

In a second embodiment, the step of releasably connecting the lower part and the upper part to each other comprises aligning upper side walls of the upper part with lower side walls of the lower part.

In another embodiment, the step of releasably connecting the lower part and the upper part comprises releasably locking the lower part and upper part to each other using coupling means at the lower part engaging a locking means on the upper part or vice versa.

The method may further comprise arranging the base element as an insert onto a support member on the lower part of the mould before connecting the base element in the form of at least one base foot to the upper part and/or before connecting the upper part and the lower part to each other.

In yet another embodiment, during the removal step, the at least one base foot are released from the upper part of the mould.

In a third aspect, there is provided a concrete base manufactured from the method disclosed herein using the mould disclosed herein.

Further advantages will be apparent from the detailed description as well as the appended dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects, features and advantages of which the invention is capable, will be apparent and elucidated from the following description of embodiments of the present invention, reference being made to the accompanying drawings, in which

Fig. 1A is an isometric view of a parasol concrete base and an end of a parasol pole;

Fig. 1B is an isometric view of the parasol concrete base of Fig. 1, seen from the bottom;

Fig. 2A is an exploded view of a two-part concrete base mould in a non-assembled state, and a moulded concrete base;

Fig. 2B is an isometric view of the two-part concrete base mould in an assembled state;

Fig. 3 is an isometric view of a lower part of a concrete base mould;

Fig. 4A is an isometric view of an upper part of the concrete base mould;

Fig. 4B is a cross-sectional view of the upper part of the mould shown in Fig. 4A; and

Fig. 5 is a flowchart of a method for manufacturing a concrete base.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Embodiments of the present invention will be described in more detail below with reference to the accompanying drawings in order for those skilled in the art to be able to carry out the invention. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The embodiments do not limit the invention, but the invention is only limited by the appended patent claims. Furthermore, the terminology used in the detailed description

of the particular embodiments illustrated in the accompanying drawings is not intended to be limiting of the invention.

Referring to Fig. 1A, a concrete base 100 is shown, which has an octagonal shape and a main body 105 having an exterior surface being a top surface 110. In addition to the main body 105, the concrete base 100 comprises base elements 117, 120, in the form of an insert 117 and base feet 120 (shown in Fig. 1B).

The main body 105 comprises an aperture 115, provided with the insert 117 having internal threads 116. The main body 105 of the concrete base 100 is formed from concrete. Preferably, the insert 117 is formed from a plastic material.

The concrete base 100 in Fig. 1A is a support base for a parasol. A parasol end 101 of a parasol pole 102 may be inserted into the aperture 115, and external threads 103 at the lower part of the pole 102 engages the mating threads 116 of the concrete base 100. However, the concrete base 100 disclosed herein may be used for other purposes, as will be explained in the following. The pole 102 may be formed of a plastic or metal material.

Further, the concrete base 100 is provided with eight inclined side surfaces 112 around the octagonal shape, providing the main body 105 with an aesthetic appearance. In addition, four of the eight side surfaces 112 comprise bottom recesses 113 (only two recesses 113 are visible in Fig. 1A). The recesses 113 are arranged on every other side surface 112 and may serve as handle portions or grips used to lift the concrete base 100. Since there are four recesses 113 evenly distributed around the concrete base 100, two people can easily help each other to lift the concrete base 100 if needed using four hands in total.

Fig. 1B shows the concrete base 100 as seen from below. The main body 105 has an exterior surface in the form of a main body bottom surface 118 arranged to face the ground surface and which comprises base elements in the form of base feet 120. The base feet 120 extend slightly downwards from the bottom surface 118 such that the bottom surface 118 does not come into direct contact with the ground, thereby preventing damages to the bottom surface 118 caused by the ground surface. Specifically, the bottom surface 118 has bottom edges 119, which may be damaged if the bottom edges 119 are knocked against the ground surface. However, such impact is

prevented with the aid from the base feet 120. Moreover, since the main body 105 is elevated from the ground, it will not absorb water or other liquids from the ground.

Further, the bottom edges 119 of the recesses 113 and the side surfaces 112 are preferably provided with a rounded profile, which also prevents damages on the rounded bottom edges 119. A sharp edge, for instance an edge having a 90 degree profile, is more prone to edge damages than the less sharp and rounded profiles 119.

The base feet 120 are distributed around the bottom edges 119, extending along the circumference of the bottom surface 118 of the main body 105 at a distance radially inwards from the side surfaces 112. Further, the base feet 120 are incorporated in the cast concrete main body 105 and are attached to the concrete during the casting and moulding process, as will be explained more in the following. Preferably, the base feet 120 are made from a plastic material.

Hence, the base elements 117, 120 are preferably plastic base elements incorporated into the concrete base 100. The base elements 117, 120 have been incorporated into the main body 105 during the casting and moulding process of the concrete base 100. During said casting and moulding process, the base elements 117, 120 have been releasably attached to a mould 200 for forming the concrete base 100. Upon removal of said mould 200, the base elements 117, 120 have detached from the mould 200 since the base elements 117, 120 have been firmly connected to the concrete once the concrete has set.

The base element 117, 120 releasably connected to the mould 200 is thus configured to be cast into the concrete base 100 and to be detached from the mould 200 upon removal of the mould 200 once the concrete has set. The removable detachment of the base elements 117, 120 will be explained more in the following with reference to Figs 2A-4B. Further, the base element 117, 120 may have other shapes and functions than being base feet 120 or a threaded insert 117, such as a hollow insert for forming a through hole in the concrete base 100.

The base element 117, 120 provides additional features to the concrete base 100, and is not formed from concrete. The base element 117, 120 may be an internal feature extending inwardly from an exterior surface 110, 118 of the concrete base 100, such as the insert 117, or an external feature extending outwardly from an exterior

surface 110, 118 of the concrete base 100, such as the base feet 120. With reference to Figs. 2A-4B, the mould 200 for forming the concrete base 100 is shown. In Fig. 2A, the mould 200 is shown in an exploded view, and comprises a lower part 220 and an upper part 240.

The lower part 220 has a bottom surface 222 and lower side walls 225 extending upwards from said bottom surface 222. The outline and shape of bottom surface 222 of the lower part 220 of the mould 200 will correspond to that of the top surface 110 of the main body 105 of the base element 100. Hence, the concrete base 100 is preferably moulded in an upside-down configuration.

Further, the lower part 220 is provided with a support member 226, also referred to as a circular elevated portion 226 herein, configured to support and hold the insert 117 in place during the casting process of the concrete base 100. The insert 117 has a diameter slightly larger than the elevated portion 226 such that the insert 117 may be fitted onto the circular elevated portion 226 snugly. The support member 226 of the lower part 220 may also be arranged as a flange, rather than as a solid elevated portion as shown in Fig. 2A, and it may be configured as having another size and shape depending on what type of insert 117 that is to be cast into the concrete base 100.

The insert 117 is thus releasably connected to the circular elevated portion 226 of the lower part 220. The releasable connection between the support member 226 and the insert 117 is strong enough to ensure that the insert 117 is safely attached to the support member 226 during the moulding process, but weaker than binding forces between the set concrete and the insert 117. When to mould 200 is removed from the set concrete base 100, the insert 117 is released from the support member 226 and attached to the concrete base 100.

Further, the lower part 220 comprises four coupling means 228, in the form of pivoting hooks or brackets. The coupling means 228 may also be any other type of suitable coupling means known in the art. The coupling means 228 connect the lower part 220 to an upper part 240 in the assembled state of the mould 200.

Moving on to the upper part 240, upper side walls 245 form a frame 242 with a central opening 241. Hence, the upper part 240 is designed as a frame 242, which fits with and may be attached on top of the lower part 220.

In addition, the frame 242 of the upper part 240 comprises four radial projections 243, which will form the outline of the recesses 113 in the concrete base 100. The projections 243 in Fig. 2A are hemispherical, but may have other geometrical shapes. The four radial projections 243 of the upper part 240 are evenly distributed around a circumference of the upper part 240. Each radial projection 243 extends into the mould cavity 250.

Hence, the outline and design of an internal surface 246 (shown in Fig. 4A) of the upper part 240 will shape the bottom edges 119, the recesses 113 and partly the side surfaces 112 of the concrete base 100.

The upper part 240 further comprises locking means 248, in the form of frame notches 248, configured to receive and engage the coupling means 228 of the lower part 220. In another embodiment, the coupling means 228 may be arranged on the upper part 240 and the locking means 248 may be arranged on the lower part 220. The locking means 248 are arranged on every second side wall 245 of the frame 242, on the same side walls 245 as the four radial projections 243.

As indicated by the dashed lines in Fig. 2A, the base feet 120 are fitted to the frame 242 in areas between the radial projections 243. A releasable connection between the base feet 120 and the upper part 240 is established. The releasable connection mechanism between the upper part 240 and the base feet 120 will be explained more with reference to Fig. 2B.

In Fig. 2B, the mould 200 is shown in its assembled state and the lower part 220 and the upper part 240 are attached to each other, forming the mould cavity 250, configured to receive the liquid concrete to be cast in the mould 250. The coupling means 228 are engaged with the locking means 248 thus sealing the lower part 220 and upper part 240. The base feet 120 are connected to the frame 242 of the upper part 240 and concrete can be poured into the mould cavity 250 through the central opening 241.

Since the central opening 241 has a relatively large diameter, the setting of the concrete will be accelerated compared to if the mould 200 would have a smaller upper opening 241. However, since the upper part 240 shapes the bottom edges 119 of the concrete base 100, the design of the bottom edges 119 may be configured as having the rounded profiles. Hence, the mould 200 allows for a faster setting process, while a more

durable concrete base 100 without sharp bottom edges is formed. The concrete base 100 also has an attractive appearance and can easily be maneuvered using the recesses 113 as handles.

The releasable connection mechanism between the base feet 120 and the upper part 240 will now be explained with reference to the enlarged view of Fig. 2B and Fig. 4A. Each base foot 120 comprises two ends each having an attachment means 25 in the form of a protrusion 25, also referred to as a hatch 25 herein, as shown in Fig. 2B. The protrusion 25 has a hook like shape, which is configured to engage the frame 242.

Between the radial projections 243 of the upper part 240, the internal surface 246 has inner side walls 249 (shown in Fig. 4A). Each inner side wall 249 has a central support element 41, two end support elements 42 and two end connection means 45, in the form of grooves 45. The hatch 25 matches and fits inside a groove 45 and attaches to the groove 45 with a snap-fit mechanism when the base foot 120 is pressed into the space at the inner side walls 249 between the radial projections 243. As shown in the enlarged views in Fig. 2B, the base feet 120 are designed to be fitted and housed between a radial projection rim 244 and an inner frame rim 247.

The central support elements 41 and the end support elements 42 supports the base feet120 when they are releasably attached to the upper part 240 during moulding, and supports the base feet 120 when they are pushed into connection with the frame 242. As also shown in the enlarged views in Fig. 2B, the frame 242 is equipped with reinforcements 251.

The base feet 120 have a substantially basic U-shaped cross-section 123, as shown in the upper enlarged view in Fig. 2B, which contribute to the anchoring of the base feet 120 in the concrete. To increase such anchoring even further, the base feet 120 may be provided with anchoring means 124, having the shape of a truncated pyramid protruding into the concrete. However, such anchoring means 124 may have other suitable shapes. Further, the base feet 120 have contact elements 122, which will face the ground surface when the concrete base element 100 is removed from the mould 200 and placed on the ground.

Fig. 3 shows the lower part 220 and its side walls 225 and coupling means 228. The lower part 220 has a lower part upper surface 229 corresponding to the design of

the upper surface 110 of the finished cast concrete base 100. The coupling means 228 are arranged in their open configuration and can be pivoted downwardly from its current state to engage with the locking means of the upper part 240. The lower part 220 has a circumferential rim 221 extending laterally from the side walls 225, which may facilitate lifting of the lower part 220 and provides a grip portion when removing the mould 200 from the set concrete base 100. In addition, the rim 221 provides a robust support for the mould 200 in an assembled state during casting, as shown in Fig. 2B.

The upper part 240 is shown in perspective in Fig. 4A and a cross-section of the upper part 240 is shown in Fig. 4B. The internal surface 246 will face towards the lower part 220 when the mould 200 is assembled and the locking means 248, here in the form of notches, will hold and be engaged by the coupling means 248.

The mould 200 may have various shapes, for instance the mould 200 may be rectangular, square, circular, elliptical, or hexagonal to mention only a few possibilities. The dimensions of the mould 200 may be adapted depending on requirements of the finished concrete base 100. For instance, the height of the mould 200 as well as the width of the mould 200 may be adjusted according to need.

A method 300 for manufacturing a concrete base element 100 using the mould 200 will now be explained with reference to Figs. 1-5. Firstly, the method 300 comprises releasably connecting 310 one or more base elements 117, 120 to the upper part 240 or lower part 220 of the mould 200. For instance, step 310 may comprise connecting the base feet 120 to the upper part 240 of the mould 200. The base feet 120 are pushed towards the upper part 240 as indicated in Fig. 2A, such that the protrusions 25 engages the end grooves 45 on the inner side walls 249 on the inner surface 246 of the upper part 240 with a snap-fit mechanism.

The snap-fit mechanism achieved through the protrusions 25 and the end grooves 45 is tight enough to ensure that the base feet 120 stay securely attached to the frame 242 during the moulding process, but weaker than the engaging forces between the base feet 120 and the set concrete of the concrete main body 105.

Alternatively or additionally, the step of connecting 310 a base element 117, 120 to the upper part 240 or lower part 220 of the mould 200 comprises arranging the insert 117 onto the support member 226 on the lower part 220 of the mould 200.

However, the arrangement of the insert 117 onto the support member 226 may be conducted before or after attaching 310 the base feet 120 to the upper part 240 and/or before or after the upper part 240 and the lower part 220 are connected 320 to each other.

The releasable connection between the base element 117, 120 and the mould 200 is strong enough to ensure that the base element 117, 120 is safely attached to the lower or upper part 220, 240 during the casting and moulding process, but weaker than binding forces between the set concrete and the base element 117, 120.

Secondly, the method 300 comprises releasably connecting 320 the lower part 220 and the upper part 240 to each other by aligning the upper side walls 245 on top of the lower side walls 225. The locking means 248 are aligned with the coupling means 228 such that the coupling means 228 may be pivoted upwards to enclose and engage the locking means 248, such that the lower part 220 and upper part 240 are releasably attached to each other. The seal between the lower and upper part 220, 240 is non-permeable to liquids, such that the concrete is prevented from leaking from the assembled mould 200.

Subsequently, the method 300 comprises a step of filling 330 the mould 200 with concrete through the central opening 241, and a step of curing 340 the concrete during a pre-determined period. The curing time required will depend on the size of the concrete base 100, as well as the particular materials used for the concrete.

Finally, the method 300 comprises removing 350 the mould 200 from the formed and set concrete base 100. During this removal step 350, the base feet 120 will detach from the upper part 240 of the mould 200 since they have become securely attached to the main body 105 of the concrete once the concrete has set.

The mould 200 disclosed herein may be reused several times. Usually, the upper part 240 and lower part 220 of the mould 200 may be reused between 30 and 80 times, more preferably between 40 and 70 times, most preferred approximately 50 times.

Hence, once the mould 200 has been removed 350 from the formed concrete base 100, the method 300 may be repeated using the same method steps 310-350 as explained above and shown in the flow chart in Fig. 5.

Further, the invention has mainly been described with reference to a few embodiments. However, as is readily understood by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended claims.

In the claims, the term "comprises/comprising" does not exclude the presence of other elements or steps. Furthermore, although individually listed, a plurality of means, elements or method steps may be implemented by e.g. a single unit or processor. Additionally, although individual features may be included in different claims, these may possibly advantageously be combined, and the inclusion in different claims does not imply that a combination of features is not feasible and/or advantageous. In addition, singular references do not exclude a plurality. The terms "a", "an", "first", "second" etc do not preclude a plurality. Reference signs in the claims are provided merely as a clarifying example and shall not be construed as limiting the scope of the claims in any way.

CLAIMS

1. A reusable mould for forming a concrete base (100), said mould (200) comprising a lower part (220) and an upper part (240) being removably connectable to each other, and wherein at least one base element (117, 120) is releasably connected to the upper part (240) or lower part (220).

2. The mould according to claim 1, wherein the upper part (240) and the lower part (220) are releasably connected to each other by one or more coupling means (228) at the lower part (220) configured to engage a respective locking means (248) at the upper part (240).

3. The mould according to claim 1 or 2, wherein the at least one base element (117, 120) is configured to be cast into and incorporated in the concrete base (100) and to be detached from the mould (200) upon removal of the mould (200) when concrete forming the concrete base (100) is set.

4. The mould according to any one of claims 1 to 3, wherein the base element (120) is at least one base foot (120) configured to be moulded to the concrete base (100), wherein the at least one base foot (120) is releasably attached to the upper part (240).

5. The mould according to claim 4, wherein each base foot (120) is arranged at an internal surface (246) of the upper part (240) through a snap-fit engagement.

6. The mould according to claim 4 or 5, wherein each base foot (120) is released from the upper part (240) when the upper part (240) is removed from the moulded concrete base (100).

7. The mould according to any one of the preceding claims, wherein the upper part (240) comprises a plurality of radial projections (243) extending inwards from a circumference of the upper part (240).

8. The mould according to claim 4 and 7, wherein the mould (200) has an octagonal shape and wherein four radial projections (243) and four base feet (120) are distributed in an alternating pattern.

9. The mould according to any one of the preceding claims, wherein the base element (117, 120) is an insert (117) and the lower part (220) comprises a support member (226) configured to maintain the position of the insert (117) during moulding of the concrete base (100).

10. A method for manufacturing a concrete base (100) using a reusable mould (200) comprising a lower part (220) and an upper part (240) being removably connectable to each other, said method (300) comprising the steps of:

- releasably connecting (310) at least one base element (117, 120) to the upper part (240) or lower part (220), said base element (117, 120) being a base foot (120) or an insert (117);
- releasably connecting (320) the lower part (220) and the upper part (240) to each other;
- adding (330) concrete to the mould (200) through an opening (242) of the mould (200);
- curing (340) the concrete during a pre-determined time period; and
- removing (350) the mould (200) from the concrete base (100), whereby the concrete base (100) is obtained and the mould (200) may be reused for the method (300).

11. The method according to claim 10, wherein the step of connecting (310) the at least one base element (117, 120) to the upper or lower part (220, 240) comprises

pressing the at least one base element (117, 120) into engagement with the upper or lower part (220, 240).

12. The method according to claim 10 or 11, wherein the step of releasably connecting (320) the lower part (220) and the upper part (240) to each other comprises aligning upper side walls (245) of the upper part (240) with lower side walls (225) of the lower part (220).

13. The method according to any one of claim 10 to 12, wherein the step of releasably connecting (320) the lower part (220) and the upper part (240) comprises releasably locking the lower part (220) and upper part (240) to each other using coupling means (228) at the lower part (220) engaging a locking means (248) on the upper part (240) or vice versa.

14. The method according to any one of claims 10 to 13, further comprising arranging the base element as an insert (117) onto a support member (226) on the lower part (220) of the mould (200) before connecting (310) the base element in the form of at least one base foot (120) to the upper part (240) and/or before connecting (320) the upper part (240) and the lower part (220) to each other.

15. The method according to any one of claims 10 to 14, wherein during the removal step (350), the at least one base foot (120) or insert (117) is released from the upper part (240) of the mould (200).

16. A concrete base (100) manufactured from the method according to any one of claims 10 to 15 using the mould (200) according to any one of claims 1 to 9.

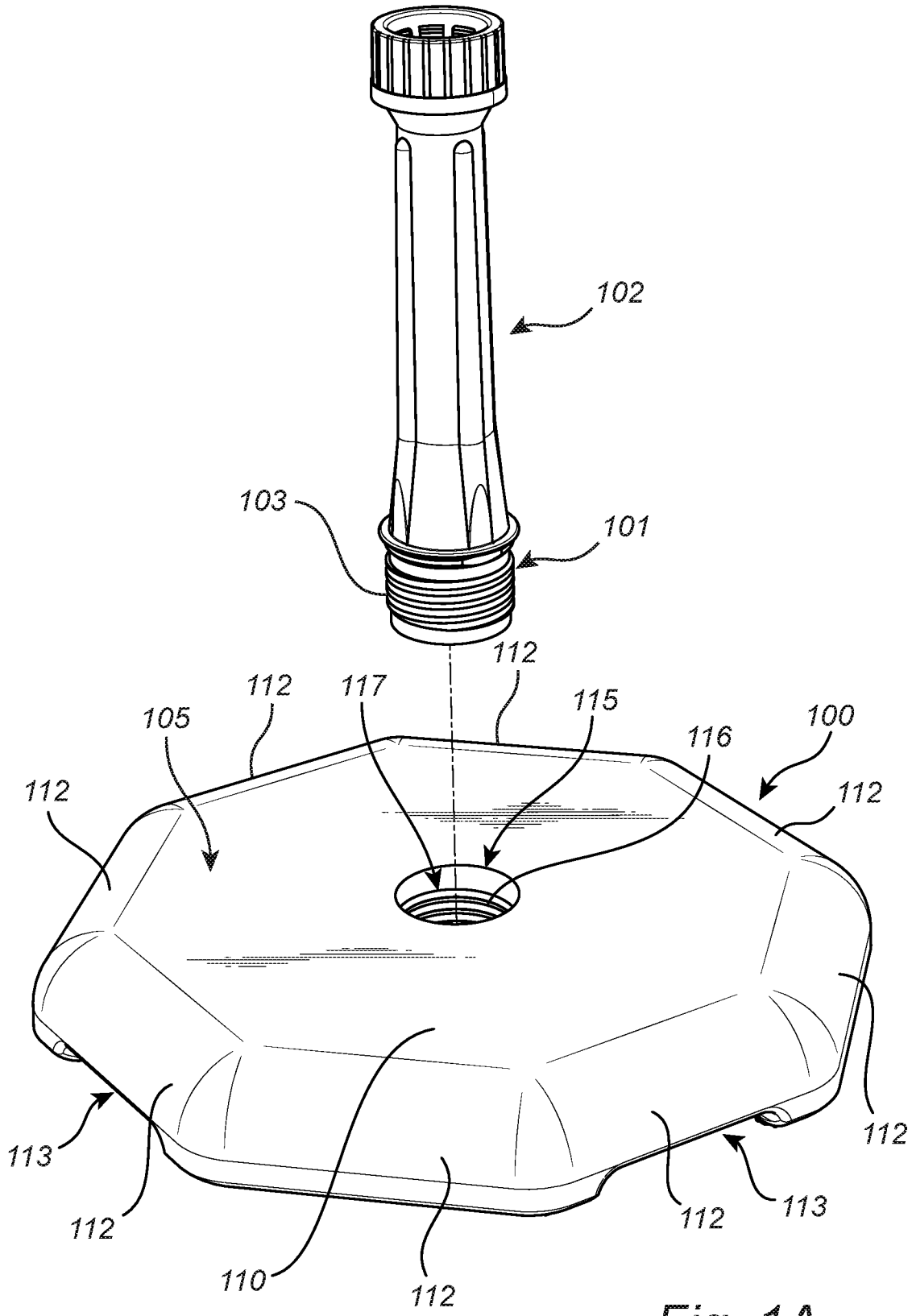
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Fig. 1A

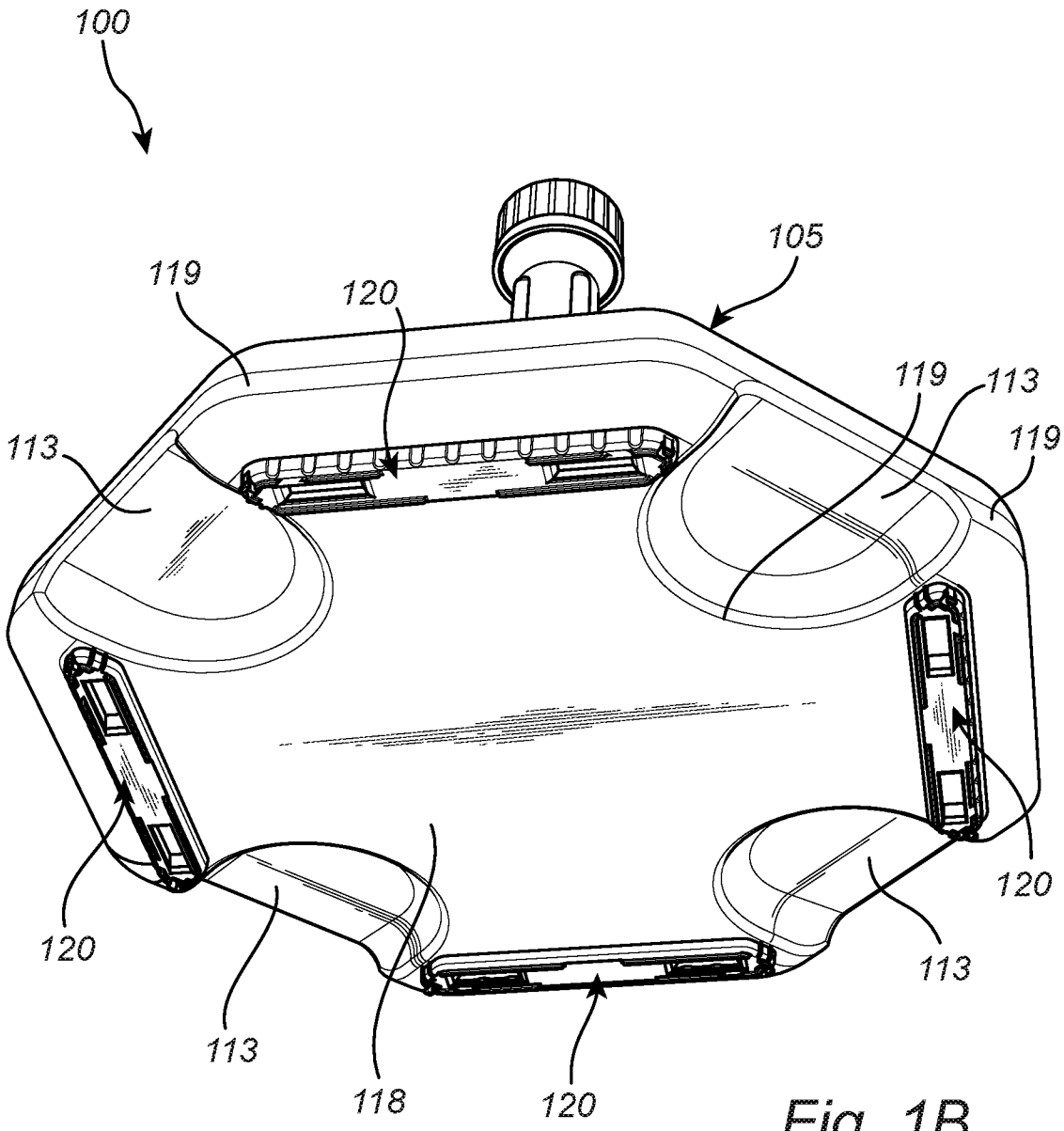
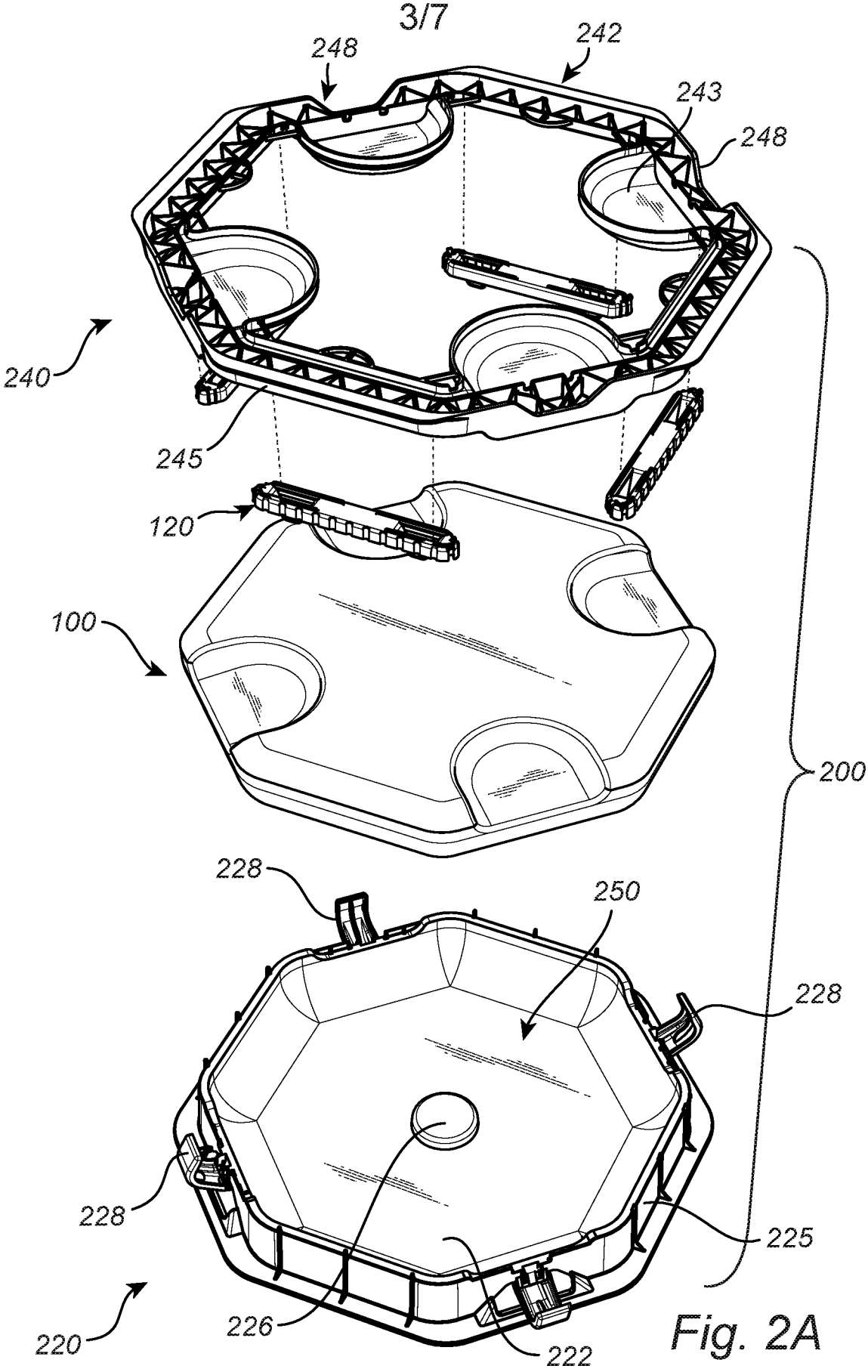


Fig. 1B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226
222
220

Fig. 2A

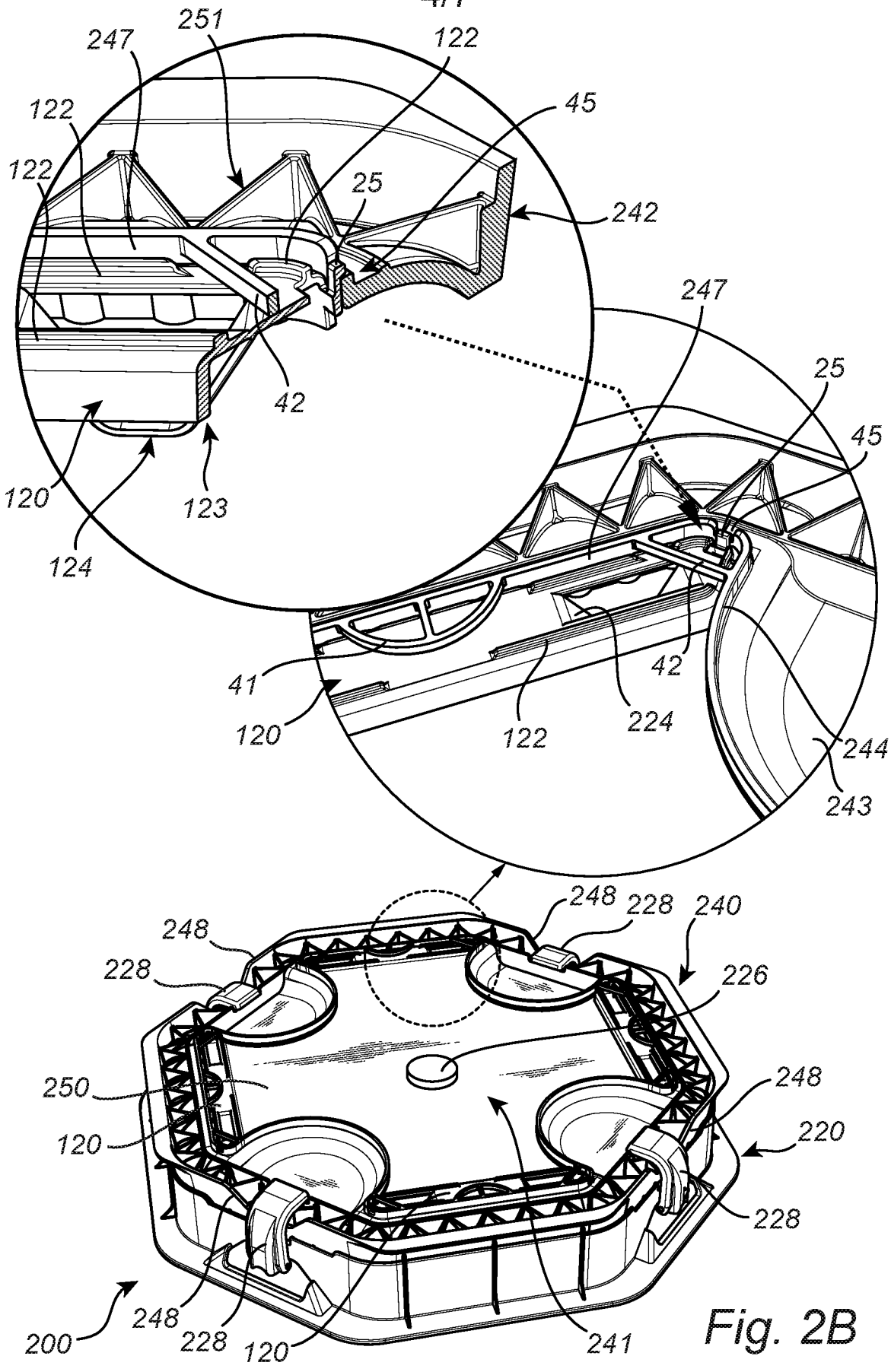
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Fig. 2B

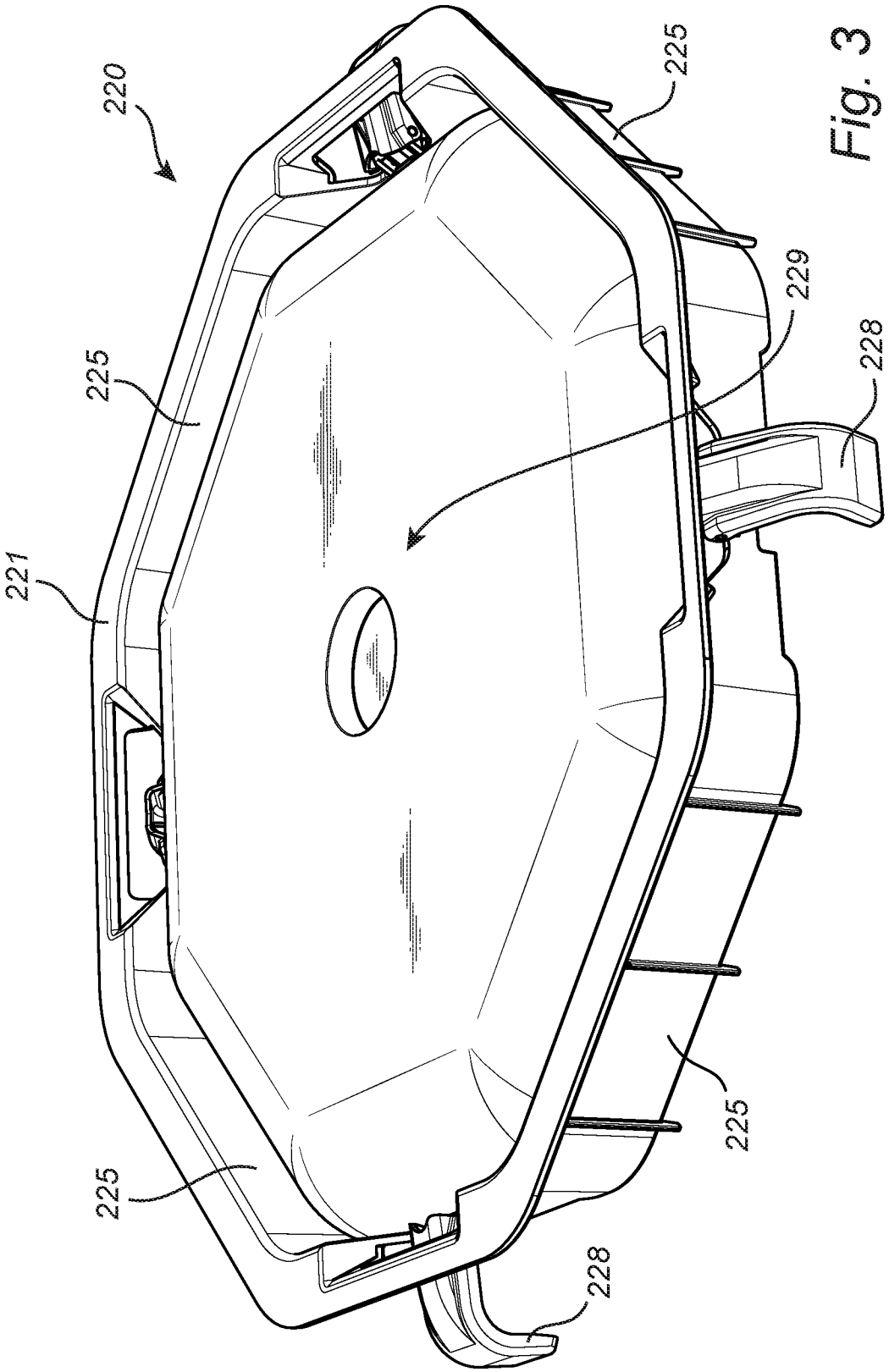


Fig. 3

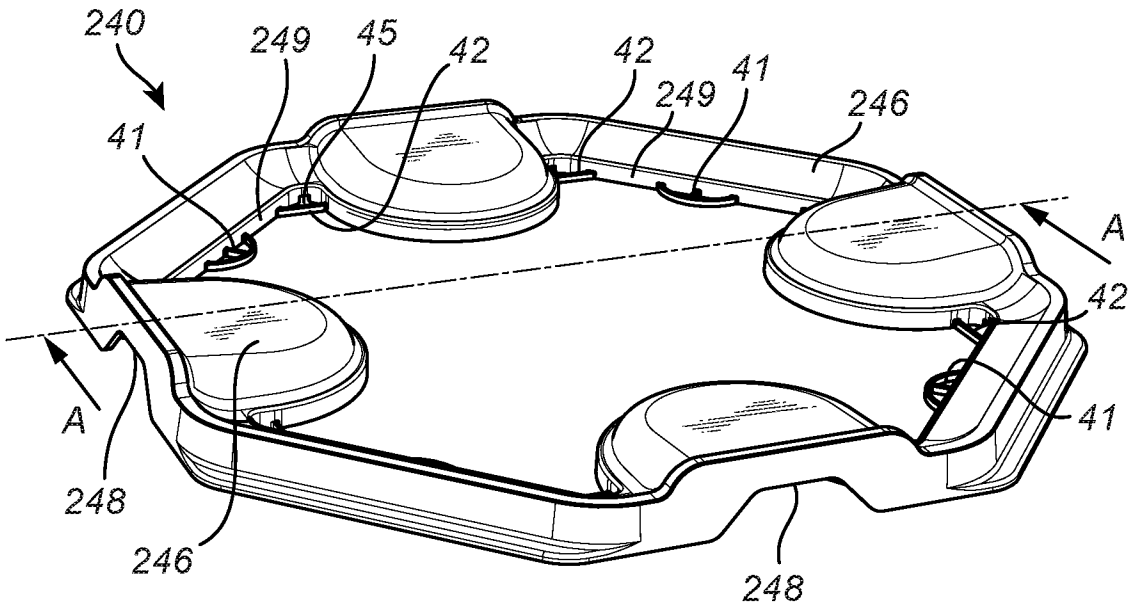
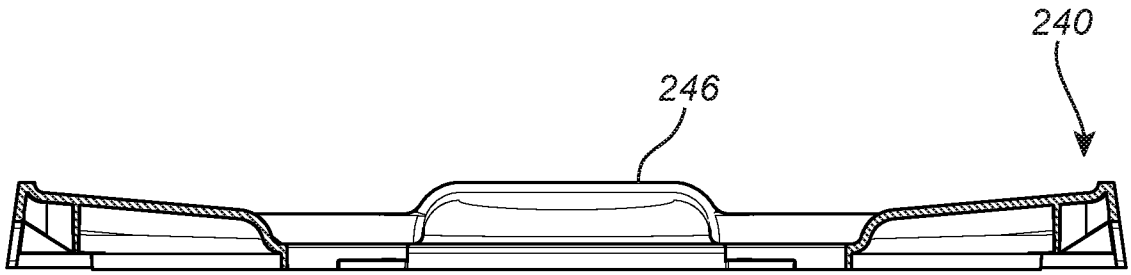


Fig. 4A



A - A

Fig. 4B

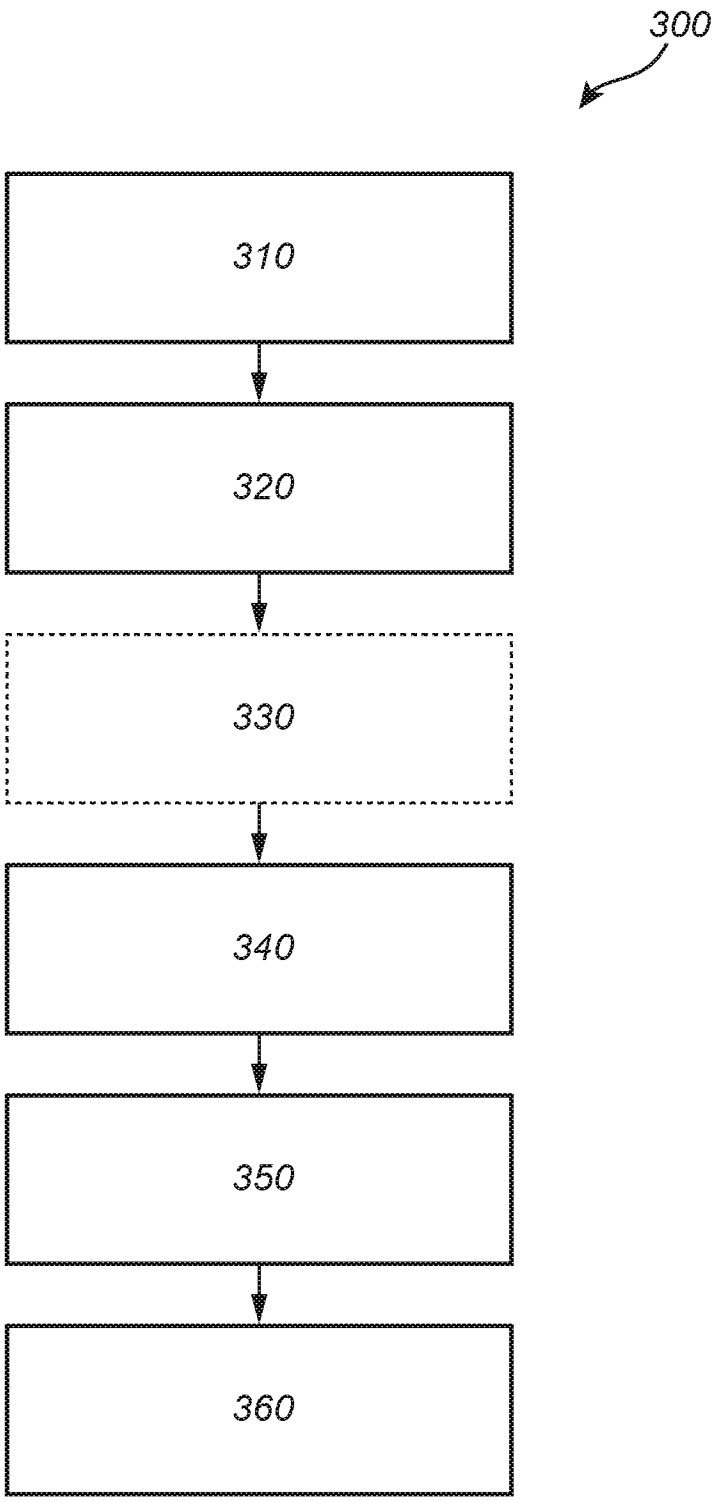


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2021/050961

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A45B, B28B, E04H, F16M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 201050669 Y (CHENG LIN), 23 April 2008 (2008-04-23); figure 2; EPODOC & WPI abstract --	1-16
A	KR 20090001299 U (YOON J), 5 February 2009 (2009-02-05); all figures; WPI abstract --	1-16
A	CN 1861351 A (HUANG YAONING), 15 November 2006 (2006-11-15); EPODOC abstract --	1-16
A	CN 1693747 A (GUO ZHUKUN), 9 November 2005 (2005-11-09); figure 1; EPODOC abstract --	1-16

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"D" document cited by the applicant in the international application

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11-10-2021	14-10-2021

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2021/050961

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 106217638 A (HUNAN ZHUOGONG BUILDING MAT TECH CO LTD), 14 December 2016 (2016-12-14); all figures; figures 1, 2; EPODOC & WPI abstract -- --------	1-16

International application No.
PCT/SE2021/050961

Continuation of: second sheet

International Patent Classification (IPC)

A

International application No.
PCT/SE2021/050961

Continuation of: second sheet

International Patent Classification (IPC)

B28B 7/16 (2006.01)
E04H 12/22 (2006.01)

CN	201050669	Y	23/04/2008	NONE
KR	20090001299	U	05/02/2009	NONE
CN	1861351	A	15/11/2006	NONE
CN	1693747	A	09/11/2005	NONE
CN	106217638	A	14/12/2016	NONE