



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.06.2023 Bulletin 2023/23

(51) International Patent Classification (IPC):
A47K 13/12 ^(2006.01) **A47K 13/26** ^(2006.01)

(21) Application number: **22210477.0**

(52) Cooperative Patent Classification (CPC):
A47K 13/12; A47K 13/26

(22) Date of filing: **30.11.2022**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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(30) Priority: **02.12.2021 IT 202100030578**

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(54) **FASTENING DEVICE FOR FASTENING A SEAT ASSEMBLY ONTO A SANITARY BOWL**

(57) A fastening device (1) for fastening a seat assembly (2) onto a sanitary bowl (3) comprises a mounting plate (5), to be fixed to the sanitary bowl (3), and a base body (6), joined or connectable to the seat assembly (2) and cooperating with the mounting plate (5); the mounting plate (5) has at least one pair of housings (30) configured to receive respective adjustment members (31);

each adjustment member (31) being provided with a through central opening (38) for insertion of a bolt or another fastening element, and being configured so as to be inserted in a housing (30) in a position selected from a plurality of positions, so as to change the position of the adjustment member (31) with respect to the mounting plate (5) along two directions perpendicular to each other.

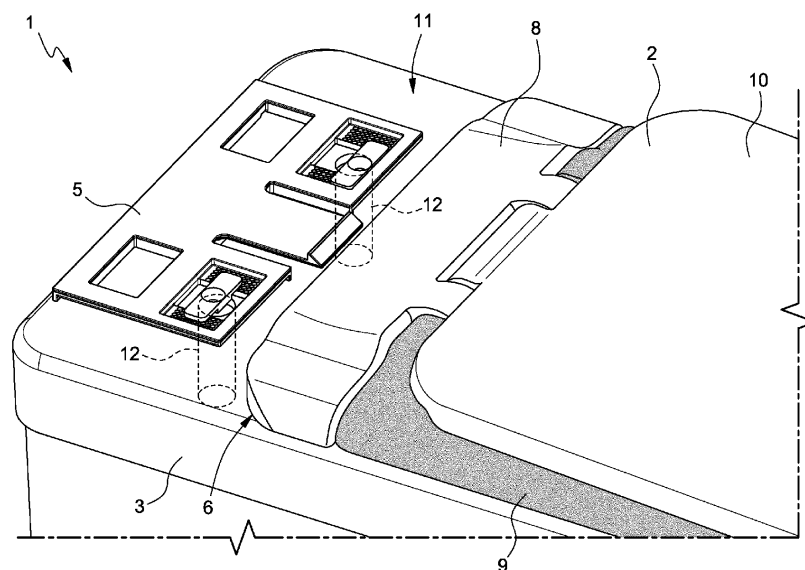


FIG. 1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian Patent Application no. 102021000030578 filed on December 2, 2021, the entire disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to a fastening device for fastening a seat assembly onto a sanitary bowl.

BACKGROUND

[0003] As is known, a sanitary bowl (for toilets and the like) is normally provided with a seat assembly formed by a seat and a cover that are hinged to each other and to the sanitary bowl.

[0004] Each sanitary bowl has a pair of holes which are designed to receive respective fastening elements for fixing the seat assembly to the sanitary bowl.

[0005] The distance between the holes, as well as their position with respect to the front edge of the sanitary bowl, may be different for different models of sanitary bowls.

[0006] Each model of sanitary bowl generally requires a specific seat assembly, especially in the case of so-called smart toilets. Each smart toilet, in fact, is equipped with its own seat assembly, and has the seat assembly fastening holes in a predetermined position on the sanitary bowl. A seat assembly can only be mounted on the sanitary bowl if it is provided with fastening elements in a position corresponding to the holes in the sanitary bowl.

[0007] It is only in some cases that the seat assembly is equipped with an adjustment system that allows adjustment of the position of the fastening elements in order to adapt the seat assembly to several sanitary bowls, but only in one adjustment direction.

[0008] Furthermore, in most cases the system for fastening the seat assembly to the sanitary bowl is relatively complicated and/or not very practical, requiring relatively uncomfortable and complicated operations by the operator, both when assembling and when removing the seat assembly from the sanitary bowl.

[0009] In particular, fastening the seat assembly to the sanitary bowl requires the tightening of bolts: when tightening, the seat assembly might move sideways, despite the friction between the various parts, thus compromising the correct positioning. In some cases, metal washers are used to increase bolt tightening, and/or rubber films to increase friction during assembly, but additional components are required, and the results may not be fully satisfactory.

SUMMARY

[0010] One object of the present invention is to solve

the above-mentioned problems, in particular by providing a device for fastening a seat assembly onto a sanitary bowl, especially for smart toilets, which can be adjusted to the size and tolerances of the sanitary bowl so that it can be used on different sanitary bowls.

[0011] A further object of the invention is to provide a device that allows the seat assembly to be easily assembled/disassembled, in order to facilitate installation and removal, and thus also cleaning, maintenance, etc.

[0012] Therefore, the present invention relates to a fastening device for fastening a seat assembly onto a sanitary bowl, as defined essentially in the appended claim 1 and, in its additional features, in the dependent claims.

[0013] The device of the invention essentially comprises a mounting plate that can be fixed to the sanitary bowl by means of a system of pins and holes. Specifically, the mounting plate is equipped with a grid of holes that allows the relative position of the fastening washers to be changed, depending on which holes are used to insert the pins. This allows the variations in the distance between the holes of the sanitary bowl to be compensated for, while maintaining the correct position of the mounting plate in relation to the sanitary bowl. After the washers have been bolted to the sanitary bowl, the entire mounting plate remains fixed.

[0014] Once the mounting plate is fixed to the sanitary bowl, the seat assembly is then coupled to the mounting plate. In particular, the seat assembly is slid into the special seat obtained on the mounting plate, using a system of grooves. At the end, a snap-on coupling fastens the seat assembly to the mounting plate.

[0015] To disassemble the seat assembly from the sanitary bowl, it is sufficient to release the snap-on coupling and slide the seat assembly along the grooves out of the respective seat.

[0016] The device of the invention is extremely versatile and can be adjusted to the size and tolerances of different sanitary bowls.

[0017] Furthermore, the device of the invention is very simple and quick to use, both when assembling and disassembling the seat assembly, thus also facilitating the cleaning, maintenance, etc.

[0018] The device of the invention prevents the seat assembly from moving vertically and sideways, without requiring pre-tensioning of bolts or other expedients as in the systems of the prior art.

[0019] The device of the invention essentially works by shear stress, by means of the pins which engage the respective holes, and does not require a high pre-tensioning to be fastened; in this way, both the mounting plate and the other components can be made from one simple plastic injection mould.

[0020] Ultimately, the device of the invention makes it possible to fasten the seat assembly to the sanitary bowl quickly and easily, by means of a mounting plate which is pre-fixed to the sanitary bowl and then receives the seat assembly, coupling and locking it.

[0021] The mounting plate has a grid of holes that al-

allows the relative position of the respective fastening elements for fastening to the sanitary bowl to be changed, depending on which holes are used. This allows the variations in the distance between the holes formed on the sanitary bowl to be compensated for, while maintaining the correct position of the mounting plate (hence of the seat assembly) in relation to the sanitary bowl.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Further features and advantages of the present invention will be apparent from the following description of a non-limiting embodiment thereof, with reference to the figures of the accompanying drawings, wherein:

- Figure 1 is a partial and partially exploded perspective view of a sanitary bowl having a seat assembly provided with a fastening device for fastening the seat assembly to the sanitary bowl in accordance with the invention;
- Figure 2 is an exploded top perspective view, with parts removed for clarity, of the fastening device of the invention;
- Figure 3 is an exploded bottom perspective view, with parts removed for clarity, of the fastening device of the invention;
- Figure 4 is a sectional view of the fastening device of the invention;
- Figure 5 is a perspective view of a detail of the fastening device of the invention;
- Figure 6 is a sectional view of the detail in Figure 5.

DESCRIPTION OF EMBODIMENTS

[0023] Number 1 in Figure 1 indicates, as a whole, a fastening device for fastening a seat assembly 2 onto a sanitary bowl 3, in particular a bowl of a toilet or a so-called smart toilet.

[0024] Also referring to Figures 2 and 3, the fastening device 1 comprises a mounting plate 5, to be fixed to the sanitary bowl 3, and a base body 6 joined to the seat assembly 2 and cooperating with the mounting plate 5, and in particular releasably joined to the mounting plate 5 via a snap-on coupling 7.

[0025] The seat assembly 2 comprises a support 8, a seat 9, and a cover 10; the support 8 can be connected to the sanitary bowl 3 via the fastening device 1; the seat 9 and the cover 10 project from the support 8 and are hinged to each other and to the support 8.

[0026] For example, the base body 6 is integrated in the seat assembly 2, particularly in the support 8, or is a part of the seat assembly 2, or is joined or connectable to the seat assembly 2, and in particular to the support 8.

[0027] The sanitary bowl 3 is known per se and has an upper surface 11 provided with a pair of fastening holes 12 to receive respective fastening elements, for example bolts (known and not shown).

[0028] The mounting plate 5 is substantially flat and

has an upper face 13 and a lower face 14 opposite each other; the mounting plate 5 has a bottom edge 15 projecting from the lower face 14 and, in use, rests on the surface 11 of the sanitary bowl 3, keeping the face 14 spaced from the surface 11.

[0029] Also referring to Figure 4, the mounting plate 5 additionally has a pair of lateral edges 16 that can be inserted in respective lateral guides 17 formed in the base body 6.

[0030] The guides 17 are defined, in particular, by respective undercuts facing a lower surface of the base body 6.

[0031] The guides 17 are shaped so that they receive the lateral edges 16 of the mounting plate 5 and thus couple the mounting plate 5 and the base body 6 to each other in a direction perpendicular to the mounting plate 5.

[0032] The mounting plate 5 and the base body 6 can slide relative to each other, with the lateral edges 16 slidably inserted in the respective guides 17, up to an end stop defined by a rear edge 18 of the base body 6 against which a front edge 19 of the mounting plate 5 abuts.

[0033] The mounting plate 5 further comprises a snap-on locking element 21, defined by an elastic arm 22 projecting from the mounting plate 5, and is delimited laterally by a pair of opposite slits 23; the snap-on locking element 21 has a free end provided with a tooth 25 protruding beyond the front edge 19 and beyond the face 13 of the mounting plate 5.

[0034] The snap-on locking element 21 is shaped so as to engage a locking seat 26 formed in the base body 6. In particular, the locking seat 26 is defined by a recess 27 formed in the rear edge 18 of the base body 6.

[0035] The mounting plate 5 and the base body 6 are releasably joined to each other by means of the lateral edges 16 and the respective guides 17 and the snap-on locking element 21 and the respective locking seat 26, together defining the snap-on coupling 7.

[0036] Also referring to Figures 5 and 6, the mounting plate 5 has at least one pair of housings 30 configured to receive respective adjustment members 31.

[0037] The housings 30 are positioned, in particular, in proximity to the front edge 19 of the mounting plate 5; and in proximity to respective opposite lateral edges 16 of the mounting plate 5.

[0038] Each housing 30 comprises a through window 34 which extends between the opposite faces 13, 14 of the mounting plate 5; and two lateral coupling zones 35 positioned on opposite sides of the window 34 and, for example, recessed relative to the face 13; however, it is understood that the coupling zones 35 can also be flush with the face 13, or even project beyond the face 13. Each coupling zone 35 comprises a plurality of holes 36 extending parallel to each other and perpendicular to the mounting plate 5.

[0039] In particular, each coupling zone 35 comprises holes 36 arranged side-by-side along two directions perpendicular to each other.

[0040] In the example shown, the holes 36 are ar-

ranged in rows and columns, but it is understood that the holes 36 can be arranged in different patterns.

[0041] For example, but not necessarily, the holes 36 have a circular cross-section and are substantially cylindrical or truncated-conical in shape (flared downwards, i.e., towards the face 14).

[0042] Each adjustment member 31 has a plate-shaped body longitudinally elongated along a major axis A. In particular, the adjustment member 31 comprises a central portion 37 provided with a central through opening 38 overlapping with the window 34; and a pair of opposite lateral wings 39 extending from the portion 37 along the axis A and provided with respective pins 40 projecting from a lower face of the adjustment member 31 and configured to engage respective holes 36 in the mounting plate 5.

[0043] Therefore, the pins 40 have a shape and size such as to be inserted in respective holes 36, in particular a shape corresponding to that of the holes 36, for example a substantially cylindrical or truncated-conical shape; however, it is understood that both the holes 36 and the pins 40 may have different shapes.

[0044] Preferably, each wing 39 is provided with a plurality of side-by-side pins 40, arranged according to a pattern corresponding to the pattern of the holes 36 so as to engage respective holes 36 in respective coupling zones 35.

[0045] The adjustment member 31 is shaped and dimensioned so as to be housed in a housing 30 with the portion 37 and the central opening 38 above the window 34; and with the wings 39 projecting beyond the window 34 and above respective coupling zones 35.

[0046] In particular, the adjustment member 31 has a length (as measured along the axis A between respective free ends of the wings 39) greater than the window 34; and a width (as measured perpendicularly to the axis A) less than the window 34.

[0047] Since each housing 30 has a plurality of holes 36 on opposite sides of the window 34, the adjustment member 31 can be inserted in different positions in the housing 30 by inserting the pins 40 of the adjustment member 31 in respective different holes 36. It is thus possible to adjust the position of the adjustment member 31 in relation to the mounting plate 5 along two directions perpendicular to each other, and therefore align the central opening 38 of the adjustment member 31 with a fastening hole 12 on the sanitary bowl 3.

[0048] Advantageously, the mounting plate 5, the base body 6, and the adjustment members 31 consist of respective monolithic pieces made of plastic (polymer material), e.g., injection moulded.

[0049] In use, in order to mount the seat assembly 2 onto the sanitary bowl 3, the mounting plate 5 is first mounted onto the sanitary bowl 3 and then fixed by means of the adjustment members 31.

[0050] The adjustment members 31 allow the position of the mounting plate 5 on the sanitary bowl 3 to be adjusted, thus compensating for any possible deviation in

the position of the fastening holes 12 of the sanitary bowl 3.

[0051] Basically, the mounting plate 5 is placed in the correct position on the sanitary bowl 3, regardless of the position of the fastening holes 12; the adjustment members 31 are then placed in the respective housings 30 so that the central openings 38 are aligned with respective fastening holes 12 of the sanitary bowl 3 and with the pins 40 which engage respective holes 36.

[0052] The respective bolts or other fastening elements are then inserted and tightened in the central openings 38 and in the fastening holes 12. The pins 40 that engage the holes 36 prevent the mounting plate 5 from moving sideways when tightening the bolts.

[0053] The seat assembly 2 is then fastened to the mounting plate 5 via the base body 6.

[0054] The base body 6 is placed on the surface 11 of the sanitary bowl 3 in front of the front edge 19 of the mounting plate 5; the base body 6 is then slid over the surface 11 to overlap the mounting plate 6, inserting the lateral edges 16 of the mounting plate 5 in the respective lateral guides 17 of the base body 6.

[0055] The base body 6 slides in relation to the mounting plate 5 until the snap-on locking element 21 engages the respective locking seat 26.

[0056] To disassemble the seat assembly 2 from the sanitary bowl 3, it is sufficient to release the snap-on locking element 21, by pressing the tooth 25, and slide out the seat assembly 2.

[0057] It is understood that numerous modifications and variations that do not depart from the scope of the appended claims can be made to the fastening device as described and illustrated herein.

Claims

1. A fastening device (1) for fastening a seat assembly (2) onto a sanitary bowl (3), comprising a mounting plate (5), to be fixed to the sanitary bowl (3), and a base body (6), joined or connectable to the seat assembly (2) and cooperating with the mounting plate (5); the mounting plate (5) having at least one pair of housings (30) configured to receive respective adjustment members (31); each adjustment member (31) being provided with a through central opening (38) for insertion of a bolt or another fastening element, and being configured so as to be inserted in a housing (30) in a position selected from a plurality of positions, and so as to change the position of the adjustment member (31) with respect to the mounting plate (5) along two directions perpendicular to each other.
2. The fastening device according to claim 1, wherein each housing (30) comprises a through window (34) which extends between two opposite faces (13, 14) of the mounting plate (5); and two lateral coupling

- zones (35), positioned on opposite sides of the window (34) and provided with respective pluralities of holes (36) arranged in a preset pattern; and wherein the adjustment member (31) is provided with pins (40) projecting from a lower face of the adjustment member (31), positioned on opposite sides of the central opening (38), and configured to engage respective holes (36) formed in the housing (30) of the mounting plate (5).
3. The fastening device according to claim 2, wherein the position of the adjustment member (31) in the housing (30) is selected by introducing the pins (40) of the adjustment member (31) in different holes (36).
 4. The fastening device according to claim 2 or 3, wherein the adjustment member (31) comprises a central portion (37), provided with the central opening (38); and a pair of opposite lateral wings (39) extending from the central portion (37) and provided with respective pins (40).
 5. The fastening device according to claim 4, wherein each wing (39) is provided with a plurality of side-by-side pins (40), arranged according to a pattern corresponding to the pattern of the holes (36) so as to engage respective holes (36) in respective coupling zones (35).
 6. The fastening device according to claim 4 or 5, wherein the adjustment member (31) is shaped and dimensioned so as to be housed in a housing (30) with the central portion (37) and the central opening (38) above the window (34); and with the wings (39) projecting beyond the window (34) and above respective coupling zones (35).
 7. The fastening device according to one of claims 2 to 6, wherein the holes (36) extend parallel to one another and perpendicular to the mounting plate (5).
 8. The fastening device according to one of claims 2 to 7, wherein each coupling zone (35) comprises holes (36) arranged side-by-side along two directions perpendicular to each other, for example arranged in rows and columns.
 9. The fastening device according to one of the preceding claims, wherein the adjustment member (31) has a plate-shaped body longitudinally elongated along an axis (A).
 10. The fastening device according to one of the preceding claims, wherein the housings (30) are positioned in proximity to a front edge (19) of the mounting plate (5) and in proximity to respective opposite lateral edges (16) of the mounting plate (5).
 11. The fastening device according to one of the preceding claims, wherein the mounting plate (5) and the base body (6) are releasably joined to each other by a snap-on coupling (7).
 12. The fastening device according to one of the preceding claims, wherein the mounting plate (5) has a pair of lateral edges (16) insertable by sliding in respective lateral guides (17) formed in the base body (6) so as to couple the mounting plate (5) and the base body (6) to each other in a direction perpendicular to the mounting plate (5).
 13. The fastening device according to claim 12, wherein the mounting plate (5) comprises a snap-on locking element (21), shaped so as to engage a locking seat (26) formed in the base body (6) to lock the base body (6) on the mounting plate (5) in a direction parallel to the guides (17).
 14. A seat assembly (2), in particular a toilet seat assembly, comprising a support (8), a seat (9) and a cover (10) which project from the support (7) and are hinged to each other and to the support (8), and a fastening device (1) to fasten the seat assembly (2) onto the sanitary bowl (3); **characterized in that** the fastening device (1) is a fastening device according to one of the preceding claims.

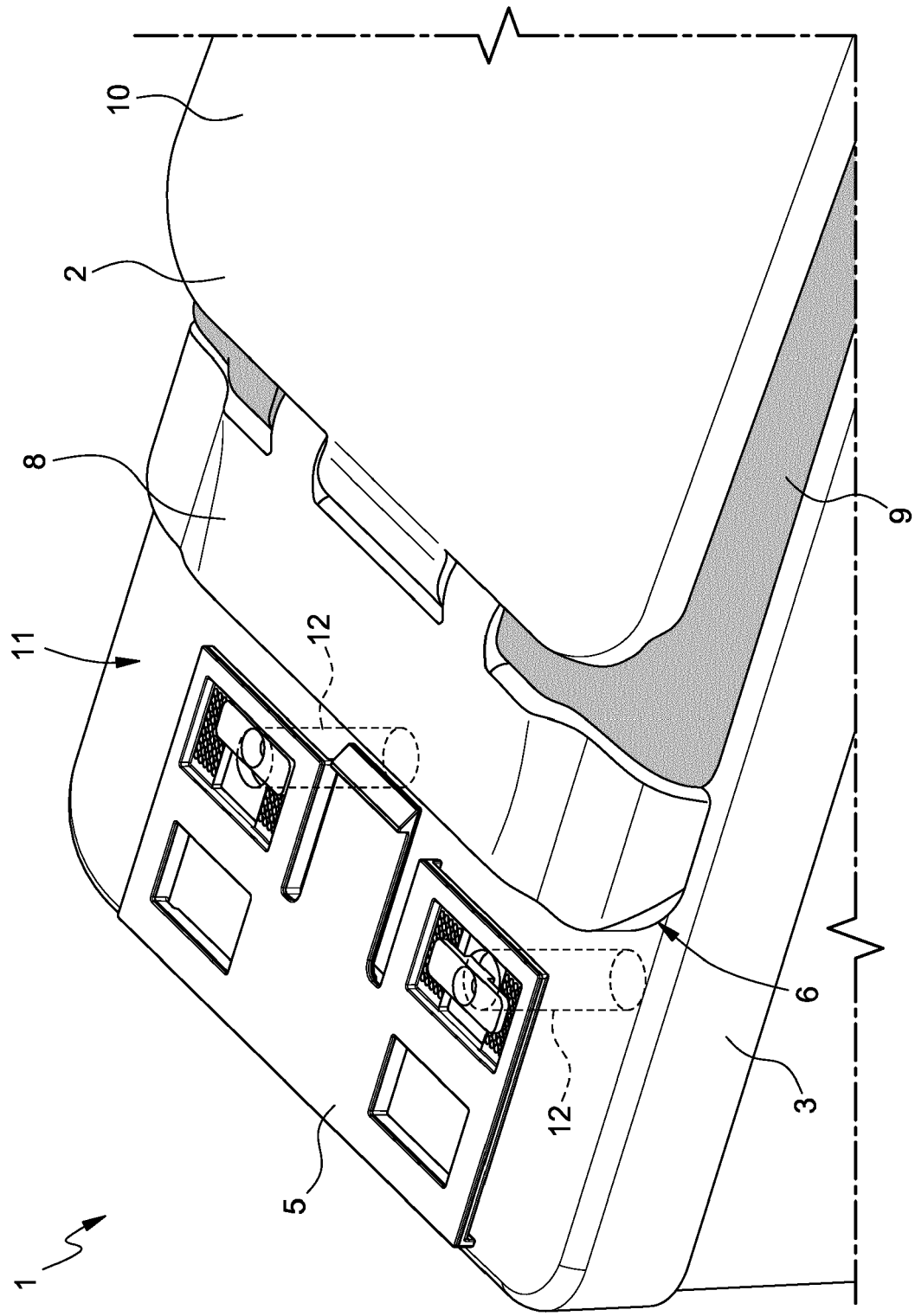


FIG. 1

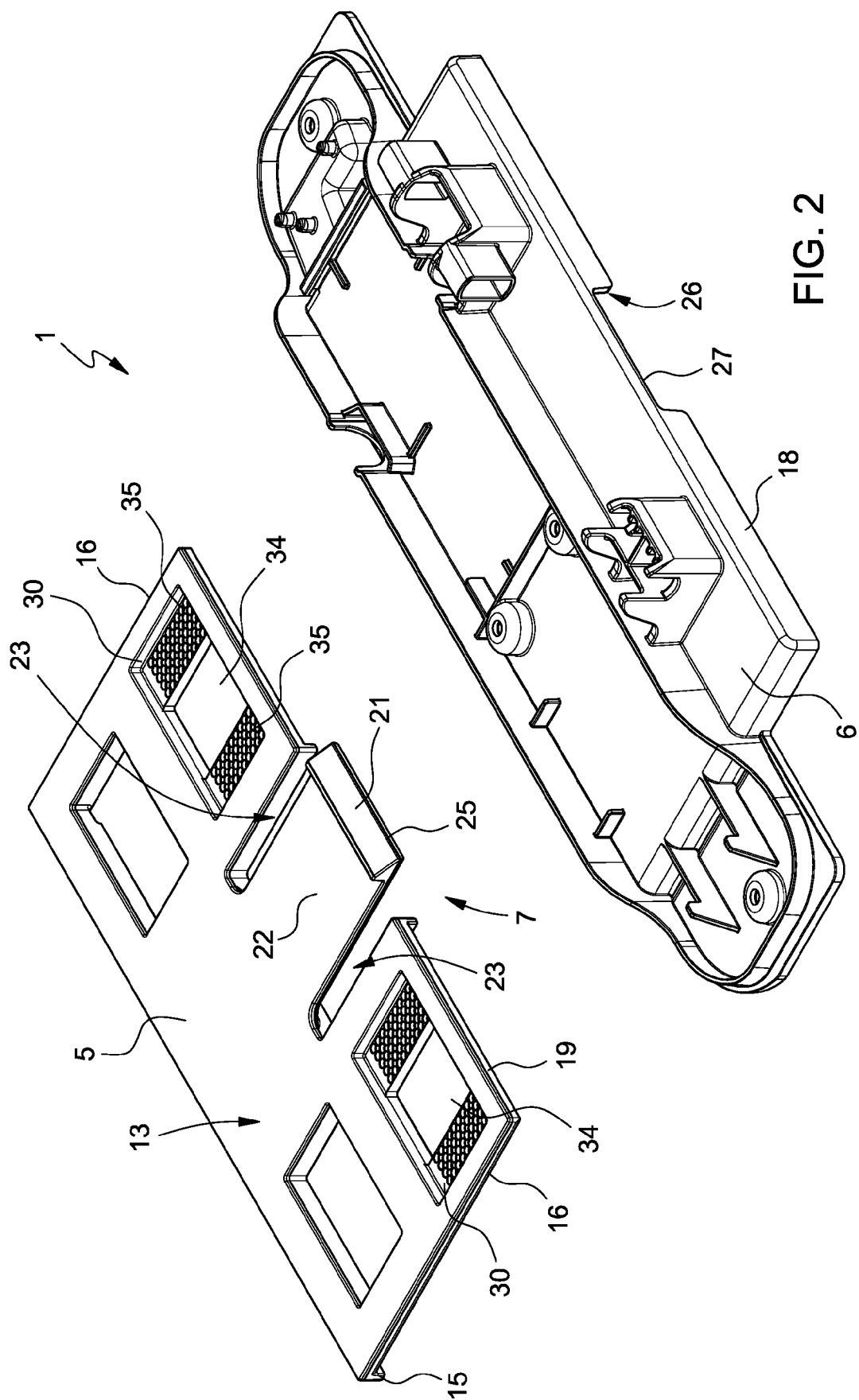


FIG. 2

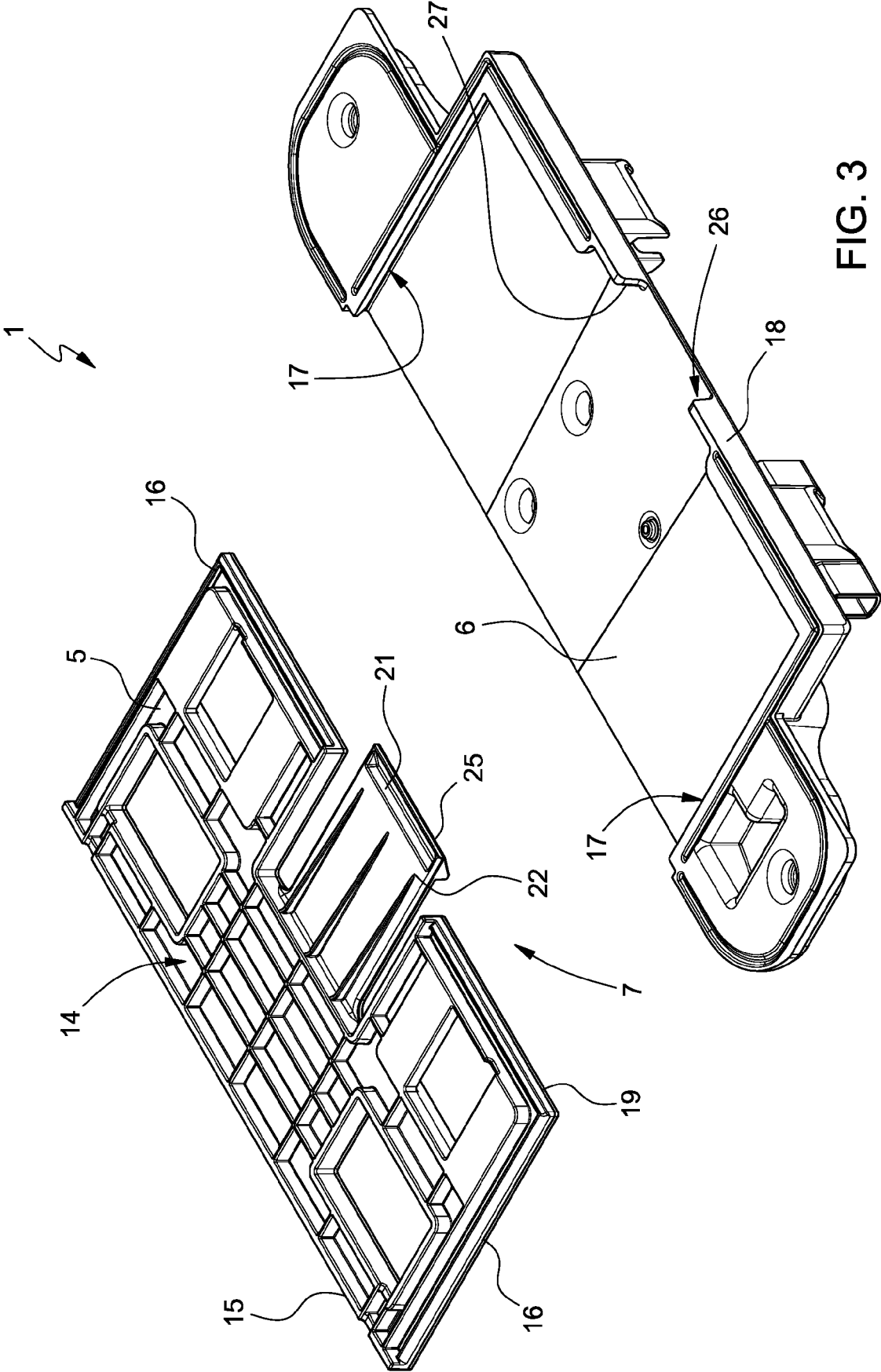


FIG. 3

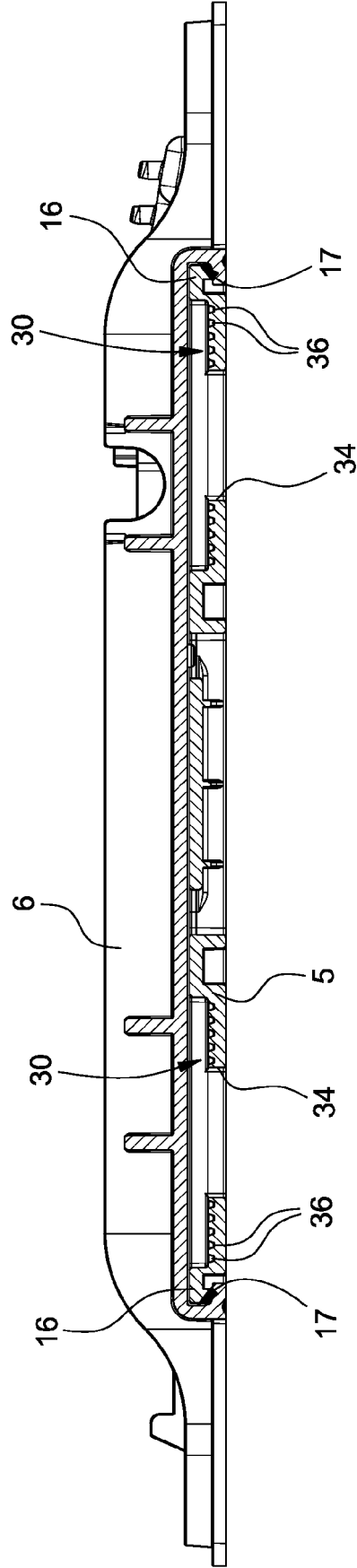


FIG. 4

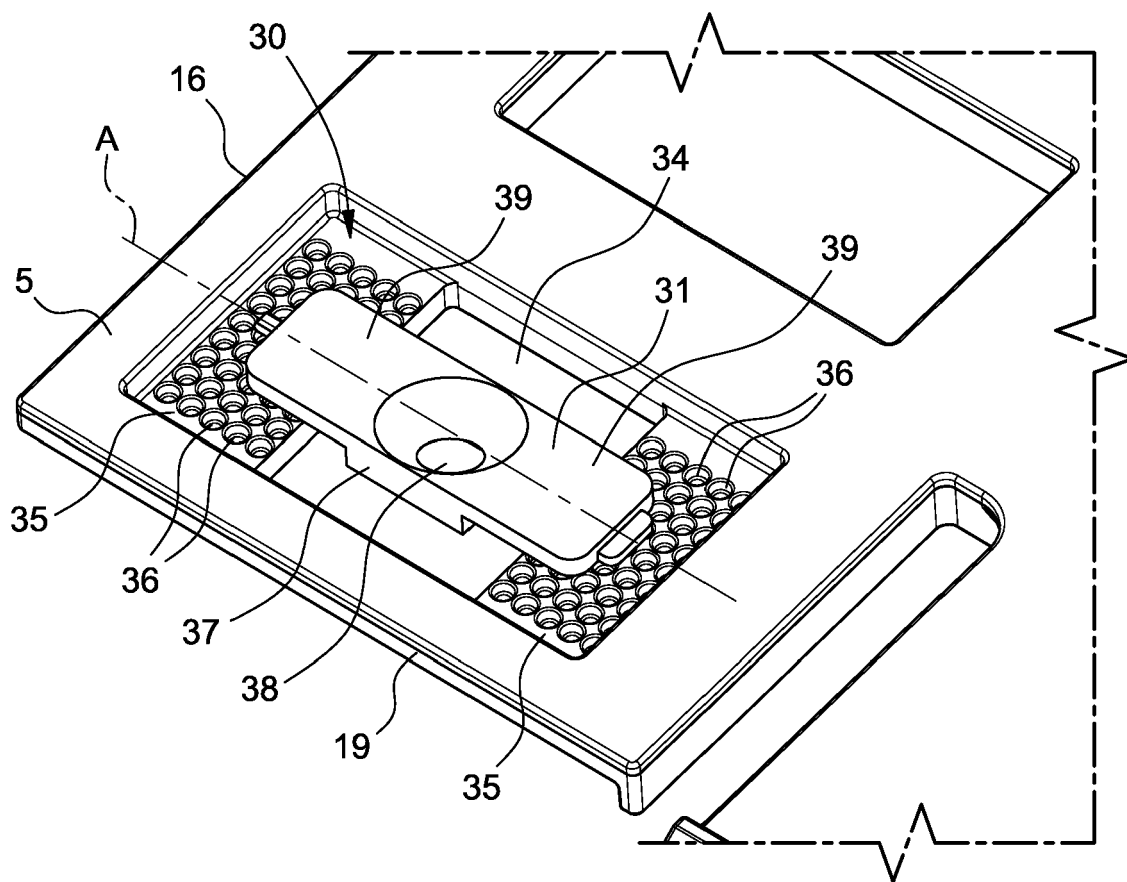


FIG. 5

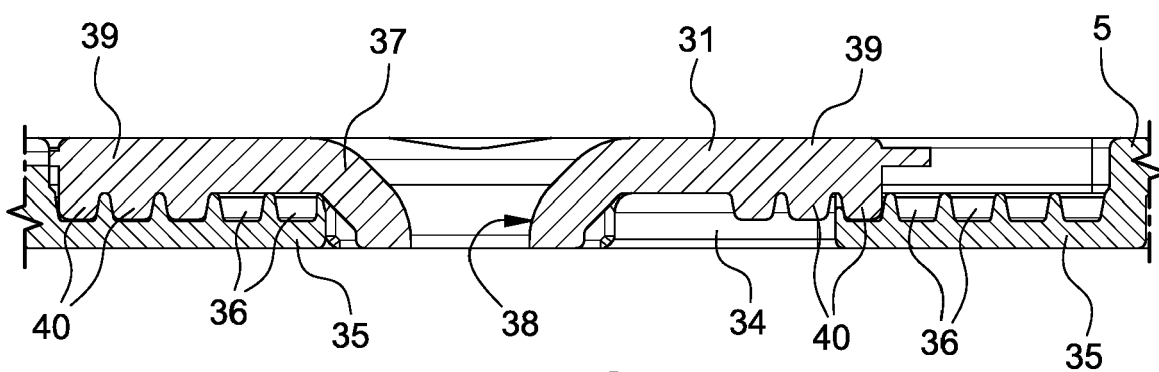


FIG. 6



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Application Number

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Place of search Munich		Date of completion of the search 1 March 2023	Examiner Pieper, Fabian
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