

(19)



(11)

EP 4 741 608 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

13.05.2026 Bulletin 2026/20

(51) International Patent Classification (IPC):

E04H 15/38^(2006.01) E04H 15/48^(2006.01)

(21) Application number: **25213094.3**

(52) Cooperative Patent Classification (CPC):

E04H 15/48; E04H 15/38

(22) Date of filing: **03.11.2025**

(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:

GE KH LA MA MD TN

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(30) Priority: **06.11.2024 GB 202416335**

(54) **TENT FRAME**

(57) A tent frame comprising a hub from which a plurality of limbs are configured to extend is disclosed herein. The limbs are rotatable between a stowed configuration and an erect configuration. The limbs comprise: a first set of limbs having a first set of pivots, the first set of limbs configured to rotate about a first set of parallel pivot axes; and a second set of limbs having a second set of pivots, the second set of limbs configured to

rotate about a second set of pivot axes generally transverse to the first set of pivot axes. The hub comprises a first retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration, and a second retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration.

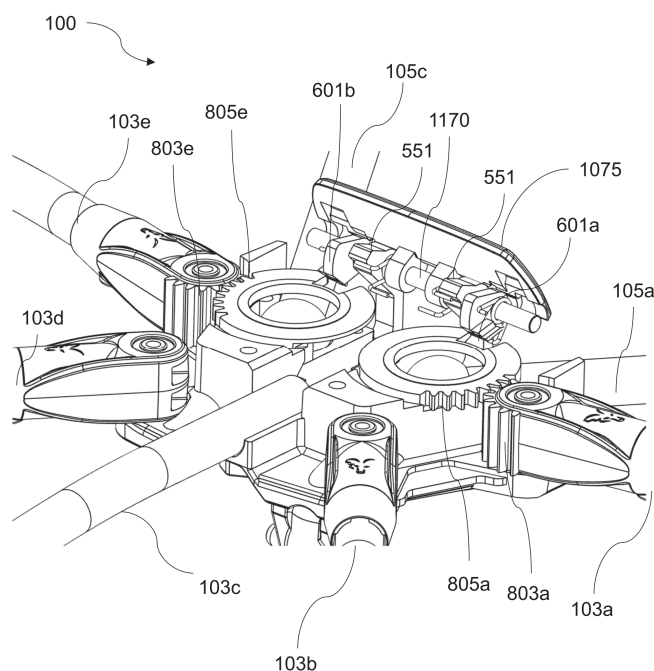


Figure 14

Description

Field of the invention

[0001] The present disclosure relates to a tent frame, and a portable shelter including such a tent frame. In particular, the present disclosure relates to a hub from which extends a plurality of limbs for providing a portable shelter.

Background

[0002] An example of a tent frame for use with a portable shelter is described in EP 3 064 676. Such a tent frame may be used with portable shelters, such as the Fox™ Frontier™ bivvy. Such a tent frame has a hub that comprises a first set of limbs having a first set of pivots, the first set of limbs configured to rotate about a first set of parallel pivot axes; and a second set of limbs having a second set of pivots, the second set of limbs configured to rotate about a second set of pivot axes generally transverse to the first set of pivot axes.

[0003] However, it has been found that when erecting such shelters, unless the first set of limbs are rotated to the erect configuration before the second set of limbs are rotated to the erect configuration, damage of the portable shelter, such as to the fabric and/or the limbs, may sometimes occur.

[0004] Aspects of the disclosure seek to resolve such problems.

[0005] Other portable shelters are described, for example, in EP 3 943 692, EP 1 445 400 and EP 4 148 208.

Summary of the invention

[0006] Aspects of the invention are as set out in the independent claims and optional features are set out in the dependent claims. Aspects of the invention may be provided in conjunction with each other and features of one aspect may be applied to other aspects.

[0007] In a first aspect there is provided a tent frame comprising a hub from which a plurality of limbs are configured to extend. The limbs are rotatable between a stowed configuration and an erect configuration. The limbs comprise a first set of limbs having a first set of pivots, the first set of limbs configured to rotate about a first set of parallel pivot axes; and a second set of limbs having a second set of pivots, the second set of limbs configured to rotate about a second set of pivot axes generally transverse to the first set of pivot axes. The hub comprises a first retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration, and a second retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration.

[0008] The tent frame may further comprise an operating means to control operation of both the first retaining means and the second retaining means. The operating

means may be a lever on top of the hub. The operating means may be configured to be operated in a first direction to control operation of the first retaining means, and operated in a second direction to control operation of the second retaining means.

[0009] The first retaining means may be a stop configured to prevent rotation of at least one of the limbs of the first set of limbs about its respective pivot axis, and wherein the second retaining means is configured to provide a latch prevent rotation of at least one of the limbs of the second set of limbs about its respective pivot axis. For example, the second retaining means may be a hook.

[0010] The pivots of the first set of pivot axes may be arranged such that the first set of limbs are configured to be splayed laterally when the tent frame is erected.

[0011] The first retaining means may be configured to retain at least one of the limbs of the first set of limbs in position once it has travelled through more than 90 degrees from the stowed configuration to the erect configuration. The second retaining means may be configured to retain at least one of the limbs of the second set of limbs in position once it has travelled through approximately 180 degrees from the stowed configuration to the erect configuration.

[0012] The first set of limbs may be arranged to make contact with the ground, and wherein the second set of limbs are arranged to support tent fabric off the ground. In the stowed configuration all of the limbs may be parallel to each other. All of the limbs may be secured to the hub.

[0013] The first set of pivot axes and the second set of pivot axes may be fixed in position relative to one another. The second set of pivot axes may be located together on one side of the hub.

[0014] The second set of limbs may be provided with respective cams for at least two limbs attached to the hub by way of universal pivots being included in the second set of pivots. The cams may be arranged such that when the frame is unfolded from the stowed configuration to the erect configuration, the at least two limbs splay away from one another as the latter are rotated about their respective pivots. The cams may be such as to generate a movement of the respective limbs when the frame is unfolded from the stowed configuration to the erect configuration, which movement is such that the limbs splay away from one another as the latter are rotated about their respective pivots through a first part of such movement at a greater rate than in a second part of that movement.

[0015] In another aspect there is provided a tent frame comprising a hub from which a plurality of limbs are configured to extend. The limbs are rotatable between a stowed configuration and an erect configuration. The limbs comprise: a first set of limbs configured to splay outwards as they are rotated from the stowed configuration to the erect configuration; and a second set of limbs configured to turn through an angle when they are rotated from the stowed configuration to the erect configuration

such that in the stowed configuration the second set of limbs generally extend in a first direction, and in the erect configuration the second set of limbs generally extend in a second direction that is opposite to the first direction. The hub comprises a first retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration, and a second retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration.

[0016] The tent frame may further comprise an operating means to control operation of both the first retaining means and the second retaining means. The operating means may be a lever on top of the hub. The operating means may be configured to be operated in a first direction to control operation of the first retaining means, and operated in a second direction to control operation of the second retaining means.

[0017] The first retaining means may be a stop configured to prevent rotation of at least one of the limbs of the first set of limbs, and wherein the second retaining means is configured to provide a latch to prevent rotation of at least one of the limbs of the second set of limbs. For example, the second retaining means may be a hook. The first retaining means may be configured to retain at least one of the limbs of the first set of limbs in position once it has travelled through more than 90 degrees from the stowed configuration to the erect configuration. The second retaining means may be configured to retain at least one of the limbs of the second set of limbs in position once it has travelled through 180 degrees from the stowed configuration to the erect configuration.

[0018] In some examples, in the stowed configuration all of the limbs are parallel to each other. All of the limbs may be secured to the hub. The first set of limbs may have a first set of pivots and may be configured to rotate about a first set of parallel pivot axes, and the second set of limbs may have a second set of pivots and may be configured to rotate about a second set of pivot axes generally transverse to the first set of pivot axes.

[0019] The pivots of the second set of limbs may be located together on one side of the hub such that the second set of limbs are located together on one side of the hub when in the erect configuration. The second set of limbs may be provided with respective cams for at least two limbs attached to the hub by way of universal pivots being included in the second set of pivots, wherein the cams may be arranged such that when the frame is unfolded from the stowed configuration to the erect configuration, the at least two limbs splay away from one another as the latter are rotated about their respective pivots.

[0020] In another aspect there is provided portable shelter comprising the tent frame of any of the previous claims, the portable shelter having sheet material supported by the tent frame.

Drawings

[0021] Embodiments of the disclosure will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view from the front of an example tent frame comprising a hub from which a plurality of limbs extend in a stowed configuration; Fig. 2 shows a plan view from the top of the tent frame hub of Fig. 1;

Fig. 3 shows a perspective view from the front of the example tent frame hub of Fig. 1 and 2 in an erect configuration;

Fig. 4 shows a plan view from the top of the tent frame hub shown in Fig. 3;

Fig. 5 shows a perspective view from the front of the interaction between two of the second set of limbs and the hub;

Fig. 6 shows a perspective view from the underside of the hub and limbs shown in Fig. 5;

Fig. 7 shows a perspective view from the underside of the hub of Fig. 6 with the limbs removed;

Fig. 8 shows a perspective view from the underside of the hub of Fig. 7 with a bottom cover portion removed;

Fig. 9 shows a perspective view from the underside of the hub of Fig. 8 with a front/brace portion removed;

Fig. 10 shows another perspective view of the tent frame hub from the front with the central limb lowered but the two outer limbs of the second set of limbs raised in the erect configuration;

Fig. 11 shows a close up perspective view of the second retaining means;

Fig. 12 shows a plan view from the top of the tent frame hub in the erect configuration with the top cover portion removed to illustrate the workings inside the hub;

Fig. 13 shows a perspective view from the rear of the hub of Figs. 1 to 11 when the limbs extend from the hub in the erect configuration;

Fig. 14 shows the hub shown in Fig. 13 with the top cover portion removed to illustrate the workings inside the hub.

Specific description

[0022] Fig. 1 shows a perspective view from the front of an example tent frame 100 comprising a hub 101 from which a plurality of limbs 103a-e, 105a-c extend in a stowed configuration. The plurality of limbs 103a-e, 105a-c are secured to the hub 101. In the stowed configuration the plurality of limbs 103a-e, 105a-c extend generally in the same direction and are substantially parallel to each other to enable the tent frame 100 to be easily transported and stored.

[0023] Fig. 2 shows a plan view from the top of the tent

frame hub 101 of Fig. 1. The plan view shows more clearly how, in the stowed configuration, the plurality of limbs 103a-e, 105a-c extend generally in the same direction and are substantially parallel to each other when viewed from above.

[0024] Fig. 3 shows a perspective view from the front of the example tent frame hub 101 of Fig. 1 and 2 in an erect configuration. More generally, it can be seen how the limbs comprise a first set of limbs 103a-e arranged generally to one side of the hub 101, and a second set of limbs 105a-c arranged generally to the other side of the hub 101.

[0025] The first set of limbs 103a-e (in this example, five limbs) are secured to the hub via a first set of pivots 107a-e, and the second set of limbs 105a-c are secured to the hub via a second set of pivots 109a-c. It will be understood that one of the limbs 103c (in this example the central limb 103c) of the first set of limbs 103a-e may be fixedly connected to the hub 101 and therefore may not have a pivot.

[0026] The first set of pivots 107a-e in the example shown have pivot axes that are parallel to each other, that is the first set of limbs 103a-e (with the exclusion of the central limb 103c) are configured to rotate about the first set of parallel pivot axes of the first set of pivots 107a-e. It will be understood that the central limb 103c may remain fixed.

[0027] The second set of limbs 105a-c (in this example, three limbs) are configured to rotate about a second set of pivot axes generally transverse to the first set of pivot axes. The second set of pivot axes are located together on one side of the hub 101.

[0028] The first set of pivot axes and the second set of pivot axes are fixed in position relative to one another.

[0029] Each pivot 107a-e of the first set of pivots 107a-e comprises a bar of the hub 101 which is of circular cross-section and which extends between two portions of the hub 101. A connector of each pivot comprises a tubular portion which receives one end of its associated limb 103a-e in such a fashion as to be fixed relative thereto, with a portion of the limb 103a-e extending beyond the tubular portion within the hub 101 when the frame is in the erected configuration. Each connector further comprises a ring portion which surrounds its associated bar of the hub 101 so as to be rotatable thereabout.

[0030] Fig. 4 shows a plan view from the top of the tent frame hub 101 shown in Fig. 3. As can be seen in both Figs. 3 and 4, the pivots 107a-e of the first set of pivot axes are arranged such that the first set of limbs 103a-e are configured to be splayed laterally when the tent frame is erected.

[0031] By contrast, the pivots 109a-c of the second set of limbs 105a-c are arranged such that the second set of limbs 105a-c are unfolded by rotating the second set of limbs 105a-c about an axis generally perpendicular to the pivot axes of the first set of limbs 103a-e. The second set of limbs 105a-c generally need to be moved such as that

they are generally pointing in the opposite direction when in the erect configuration compared to the stowed configuration.

[0032] The second set of limbs 105a-c are provided with respective cams 301a, 301c (more clearly shown in Figs. 6 and 10) for at least two limbs (the first and third limbs 105a and 105c) attached to the hub 101 by way of universal pivots 109a, 109c (as shown more clearly in Fig. 6) being included in the second set of pivots 109a-c. The cams 301a-c may comprise a biased roller that enables a limb to roll over the cams 301a-c and exert pressure against the cams 301a-c. These cams 301a-c are arranged such that when the frame 100 is unfolded from the stowed configuration to the erect configuration, the at least two limbs 105a, 105c splay away from one another as they are rotated about their respective pivots 109a, 109c. In some examples, the cams 301a, 301c are such as to generate a movement of the respective limbs 105a, 105c when the frame 100 is unfolded from the stowed configuration to the erect configuration, which movement is such that the limbs 105a-c splay away from one another as the latter are rotated about their respective pivots 109a-c through a first part of such movement at a greater rate than in a second part of that movement. In the example shown there is no cam for the middle limb 105b. The use of such biased cams provides haptic feedback to the user that makes it feel like the limbs are locked in position when the frame is unfolded.

[0033] In other words, two of the limbs of the second set of limbs 105a-c are folded out from underneath the hub 101 and then splayed outwards, rather than simply being splayed outwards as is the case for the first set of limbs 103a-e.

[0034] In use, a user must splay the first set of limbs 103a-e before then rotating the second set of limbs 105c to the erect configuration. It will be understood that fabric or sheet material is connected to the tent frame 100, and may remain connected to the tent frame 100 in both the stowed and erect configurations. The unfolding of the tent frame 100 results in the fabric or sheet material being spread out into a canopy supported by the frame during use, and folding up or collapsing of the tent frame 100 results in the fabric or sheet material also being folded up for storage. This therefore provides for efficient and speedy changeover from the folded or stowed configuration of the tent to the unfolded or erect configuration, and vice versa. In use, the first set of limbs 103a-e are longer and arranged to make contact with the ground, and the second set of limbs 105a-c are shorter and arranged to support tent fabric off the ground and provide an entrance to the tent.

[0035] In other words, as the tent frame 100 is unfolded, the limbs 103a-e, 105a-c swing about their respective pivots 107a-e, 109a-c relative to the hub 101. As the first set of limbs 103a-e, 105a-c are fanned out from a position in which they are generally parallel to one another in the folded stowed configuration to a position in which they are spread outwardly from the hub 101 in a

star formation (as shown in Figs. 3 and 4), the limbs 103a-e, 105a-c rotate about their respective pivots 107a-e, 109a-c between a position in which they are generally parallel to each other and pointing in the same direction, to a position in which those portions of the limbs 103a-e, 105a-c which are close to the hub 101 are in the same general imaginary plane as one another. Furthermore, all the limbs 103a-e, 105a-c fan out from the hub 101 and from one another, the spacing between the first set of limbs 103a-e which are now splayed out relative to one another being slightly less than the spacing between the second set of limbs 105a-c, which support an entrance to the tent.

[0036] As the limbs 103a-e, 105a-c are unfolded, so the fabric or sheet material which is attached to these limbs 103a-e, 105a-c is also spread out into a dome formation. It therefore remains attached to the limbs 103a-e, 105a-c throughout the unfolding procedure.

[0037] As will be described in more detail below, to hold the tent frame 100 in the erect configuration, the central limb 105b of the second set of limbs 105a-c comprises a retaining means 550 configured to secure it in the erect configuration.

[0038] To erect the frame, first the first set of limbs 103a-e are splayed apart until they are roughly in place. Once the first set of limbs 103a-e are roughly in place, the second set of limbs 105a-c will hang vertically down (due to gravity), roughly half-way between stowed and erect positions. At this point the user takes either the first limb 105a of the second set of limbs or the third limb 105c of the second set of limbs and puts it into position via the corresponding cam 301a/c and then puts the other limb in place. Once the first limb 105a and the third limb 105c are in place, the central limb 105b of the second set of limbs can be raised up and secured via the second retaining means 550. At this point, the sheet material or fabric of the tent is fully stretched and the canopy over the tent entrance is properly shaped.

[0039] After use, the tent may be folded up in stages in reverse order, with the fabric or sheet material being folded up as a result of the limbs 103a-3, 105a-c being folded together, so that the fabric or sheet material remains attached to the limbs 103a-3, 105a-c in the folded up stowed configuration ready for the next unfolding of the tent when it is next erected.

[0040] However, the inventors have noticed that, occasionally, when the tent frame 100 is erected, if the first set of limbs 103a-e are not splayed fully, and in particular if the first and last limbs 103a, 103b of the first set of limbs 103a-e are not rotated fully (for example, beyond 90 degrees) before the second set of limbs 105a-c are unfolded and rotated, damage can occur to the tent frame and/or fabric of the tent when the tent is erected.

[0041] Accordingly, the hub 101 comprises a first retaining means 601 configured to retain at least one of the limbs of the second set of limbs in the erect configuration, and a second retaining means 550 configured to retain at least one of the limbs of the second set of limbs in the

erect configuration.

[0042] The first retaining means 601 is configured to retain at least one of the limbs of the first set of limbs 103a-e in position once it has travelled through more than a selected range of motion, which in this example is at least approximately 90 degrees from the stowed configuration to the erect configuration. However, it will be understood that the first retaining means 601 may be configured to retain at least one of the limbs of the first set of limbs 103a-e in position once it has travelled through a different range of motion, such as for example at least 80 degree or at least 70 degrees.

[0043] The second retaining means 550 is configured to retain at least one of the limbs of the second set of limbs 105a-c (in the example shown it is the central limb 105b) in position once it has travelled through approximately 180 degrees (when viewed from above) from the stowed configuration to the erect configuration.

[0044] Fig. 5 shows a perspective view from the front of the interaction between two of the second set of limbs 105a-c and the hub 101. In Fig. 5 the interaction between the second retaining means 550 and the central limb 105b of the second set of limbs 105a-c can be clearly seen, although it is noted that in Fig. 5 the second retaining means 550 is pivoted forwards slightly and is not in the engagement position with the central limb 105b. The second retaining means 550 is configured to provide a latch, which engages with a corresponding means on the central limb 105b to prevent rotation of the central limb 105b. In this example the second retaining means 550 is a pair of mutually cooperative hooks 550a, 550b either side of the central limb 105b. The pair of hooks 550a, 550b are configured to engage respective pins 551a, 551b on either side of the central limb 105b. However, it will be appreciated that the second retaining means 550 need not necessarily be hook-shaped to provide a latch to prevent rotation of the central limb 105b. The second retaining means 550 is configured to prevent rotation of the central limb 105b of the second set of limbs 105a-c about its respective pivot axis.

[0045] Fig. 6 shows a perspective view from the underside of the hub 101 and limbs shown in Fig. 5. In Fig. 5 the first retaining means 601 is shown that is configured to prevent rotation of the first and last limbs 103a, 103e of the first set of limbs 103a-e about their respective pivot axes 107a, 107e. The first retaining means 601 in this example is a pair of retaining means 601a, 601b, one for each of the first and last limbs 103a, 103e. Both the first retaining means 601 and the second retaining means 550 are configured to be operated by an operating means 1075 as will be described in more detail below. Fig. 6 also shows the interaction of the cam 301a with one of the limbs 105a and it can be seen how the limb 105a is configured to snap into a corresponding recess in the front side of the hub 101 once the limb 105a has passed over the cam 301a.

[0046] Fig. 7 shows a perspective view from the underside of the hub of Fig. 6 with the limbs removed. Fig. 8

shows a perspective view from the underside of the hub 101 of Fig. 7 with a bottom cover portion removed. Fig. 9 shows a perspective view from the underside of the hub 101 of Fig. 8 with a front/brace portion removed. Fig. 8 more clearly shows how the first retaining means 601 works. In the example shown, both the first and last limbs 103a, 103e have a first set of teeth 803a, 803e arranged around the proximal end of the limb 103a, 103e, circumferentially about the corresponding pivot, arranged to engage a corresponding second set of teeth 805a, 805e. In the example shown, the set of teeth 803a, 803e are arranged around the connector of each pivot (described above with reference to Fig. 3) that comprises a tubular portion that is arranged to receive one end of its associated limb in such a fashion as to be fixed relative thereto. The corresponding second set of teeth 805a, 805e are provided on at least a portion of a respective rotatable circular disc 807a, 807c mounted on the hub 101. In the example shown, the respective rotatable circular discs 807a, 807c are mounted on the hub 101 around the universal pivots 109a, 109c of the first and last limbs 105a, 105c of the second set of limbs 105a-c. The respective rotatable circular discs 807a, 807c each have a notch cut out of them, arranged so that when the rotatable circular discs 807a, 807c rotate past a selected degree of rotation, a biased stop 601a, 601e protrudes past the corresponding circular disc 807a, 807c (and into the notch) to prevent rotation of the rotatable circular disc 807a, 807c (and thereby the corresponding limb 103a, 103e).

[0047] Fig. 10 shows another perspective view of the tent frame hub 101 from the front with the central limb 105b lowered but the two outer limbs 105a, 105c of the second set of limbs 105a-c raised in the erect configuration.

[0048] The biased stops 601a, 601e forming the first retaining means 601 may be coupled to an operating means 1075. Fig. 10 shows the operating means 1075 as being a lever located on top of the hub 101 in use. The operating means 601 are operable to control 601 the first retaining means 601 and the second retaining means 550. In the examples shown, the operating means 1075 are configured to be operated in a first direction to control operation of the first retaining means 601, and operated in a second direction to control operation of the second retaining means 550. However, it will be understood that in some examples the operating means may be operated in one direction to control both the first retaining means 601 and the second retaining means 550.

[0049] Fig. 11 shows a close-up perspective view of the first retaining means 601 and the second retaining means 550. It can be seen how the operating means 1075 (which in this example is a lever) is mounted about a shaft 1170. The shaft 1170 extends along the front face of the hub 101 and is mounted to the top cover portion of the hub 101. Also mounted on the shaft 1170 are the first retaining means 601 and the second retaining means 550, and a biasing means which in this example is a hair spring

mounted about the shaft 1170 to bias the operating means 1075 to a neutral position. As shown more clearly in Fig. 14, there may be a plurality of biasing means, such as hair springs, mounted about the shaft 1170 to bias each of the first retaining means 601 and/or the second retaining means 550 in an engaged position, as well as biasing the operating means 1075 to a neutral (e.g., slightly raised, for example at an incline of between 45 and 70 degrees relative to the top surface of the hub 101) position. In this way, the first retaining means 601 and/or the second retaining means 550 are biased to engage with the limbs but can be moved away from the biased position via operation of the operating means 1075.

[0050] In this example the first retaining means 601 is a curved eccentric member, and the second retaining means 550 is a hook extending from the shaft 1170. The operating means 1075 is shaped such that movement of the lever in a first direction controls operation of the first retaining means 601, and operated in a second direction controls operation of the second retaining means 550. Specifically, movement of the lever in the first direction (i.e., lifting the lever up) engages a portion (in this example an abutment 1076) of the lever against a corresponding portion (in this example a protrusion 602) of the first retaining means 601 to move the first retaining means out of position. As can be seen more clearly in Figs. 13 and 14, movement of the lever in the second direction (i.e., pushing the lever down) engages another portion of the lever (i.e., the back surface of the lever) against a corresponding portion (in this example a protrusion 551) of the second retaining means 550 to move the second retaining means 550 out of position. When the lever is released, due to the presence of the biasing means, the lever is biased to the neutral, slightly raised, position, and the first retaining means 601 and the second retaining means 550 are biased towards the engaged configuration to make contact with the respective limbs they are configured to engage.

[0051] Fig. 12 shows a plan view from the top of the tent frame hub 101 in the erect configuration with the top cover portion of the hub 101 removed to illustrate the workings inside the hub 101. Specifically, a clearer view of the first set of teeth 803a, 803e arranged around the proximal end of the limb, circumferentially about the corresponding pivot, can be seen. The first set of teeth 803a, 803e are arranged to engage a corresponding second set of teeth 805a, 805e mounted on the respective rotatable circular discs 807a, 807c mounted on the hub 101. The corresponding second set of teeth 805a, 805e are provided on at least a portion of a respective rotatable circular disc 807a, 807c mounted on the hub 101. In the example shown, the respective rotatable circular discs 807a, 807c are mounted on the hub 101 around the universal pivots 109a, 109c of the first and last limbs 105a, 105c of the second set of limbs 105a-c.

[0052] Fig. 13 shows a perspective view from the rear of the hub of Figs. 1 to 11 when the limbs extend from the hub 101 in the erect configuration. Fig. 13 shows how,

while most of the limbs 103a-e of the first set of limbs are rotatable, the central limb 103c may remain static or fixed in place and not have a pivot point. It can also be seen how the limbs 103a-e of the first set of limbs 103a-e are located in same imaginary plane, and how the remaining limbs 103a, b, d, e rotate about respective pivot axes that are parallel to each other.

[0053] Fig. 14 shows the hub shown in Fig. 13 with the top cover portion removed to illustrate the workings inside the hub 101. As with the example shown in Fig. 12, a clearer view of the first set of teeth 803a, 803e arranged around the proximal end of the limb, circumferentially about the corresponding pivot, can be seen. The first set of teeth 803a, 803e are arranged to engage a corresponding second set of teeth 805a, 805e in the hub 101. The corresponding second set of teeth 805a, 805e are provided on at least a portion of a respective rotatable circular disc 807a, 807c mounted on the hub 101. In the example shown, the respective rotatable circular discs 807a, 807c are mounted on the hub 101 around the universal pivots 109a, 109c of the first and last limbs 105a, 105c of the second set of limbs 105a-c.

[0054] As noted above, Fig. 14 also shows the operating means 1075 which in this example is a lever extending along the front face of the hub 101 (the same face which the second set of limbs 105a-c are mounted to). The lever is mounted about the shaft 1170. It can be seen how the lever is arranged to engage with and against a corresponding portion (in this example a protrusion 551) of the second retaining means 550 to move the second retaining means 550 out of position when the lever is depressed towards the hub 101. It can also be seen from Fig. 14 how both the first retaining means 601 and the second retaining means 550 are configured to couple to a biasing means, which in this example is a hair spring mounted about the shaft 1170. Each hair spring is configured to engage against both a corresponding portion (for example a notch/ridge/depression) of the respective retaining means 601, 550 and against the hub 101 to bias the respective retaining means 601, 550 into an engaged position.

[0055] It will be understood that the first and/or second retaining means 601, 550 may take other forms. For example, the first retaining means 601 may be a spring-loaded pin, for example configured to engage with a corresponding slot in the corresponding limb once the limb has travelled past a selected range of motion. It will be understood that such a pin may be released via operation of the operating means 1075, in a similar manner to that described above.

[0056] In the current disclosure, reference is made to various embodiments. However, the scope of the present disclosure is not limited to specific described embodiments. Instead, any combination of the described features and elements, whether related to different embodiments or not, is contemplated to implement and practice contemplated embodiments. Additionally, when elements of the embodiments are described in the form of

"at least one of A and B," it will be understood that embodiments including element A exclusively, including element B exclusively, and including element A and B are each contemplated. Furthermore, although some embodiments disclosed herein may achieve advantages over other possible solutions or over the prior art, whether or not a particular advantage is achieved by a given embodiment is not limiting of the scope of the present disclosure. Thus, the aspects, features, embodiments and advantages disclosed herein are merely illustrative and are not considered elements or limitations of the appended claims except where explicitly recited in a claim(s). Likewise, reference to "the invention" shall not be construed as a generalization of any inventive subject matter disclosed herein and shall not be considered to be an element or limitation of the appended claims except where explicitly recited in a claim(s).

[0057] It will be appreciated from the discussion above that the embodiments shown in the Figures are merely exemplary, and include features which may be generalised, removed or replaced as described herein and as set out in the claims. In the context of the present disclosure other examples and variations of the apparatus and methods described herein will be apparent to a person of skill in the art.

Claims

1. A tent frame comprising a hub from which a plurality of limbs are configured to extend;

wherein the limbs are rotatable between a stowed configuration and an erect configuration; wherein the limbs comprise:

a first set of limbs having a first set of pivots, the first set of limbs configured to rotate about a first set of parallel pivot axes; and a second set of limbs having a second set of pivots, the second set of limbs configured to rotate about a second set of pivot axes generally transverse to the first set of pivot axes; and

wherein the hub comprises a first retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration, and a second retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration.

2. The tent frame of claim 1 further comprising an operating means to control operation of both the first retaining means and the second retaining means, and wherein the operating means are configured to be operated in a first direction to control operation of

the first retaining means, and operated in a second direction to control operation of the second retaining means.

3. The tent frame of any of the previous claims, wherein the first retaining means is a stop configured to prevent rotation of at least one of the limbs of the first set of limbs about its respective pivot axis, and wherein the second retaining means is configured to provide a latch to prevent rotation of at least one of the limbs of the second set of limbs about its respective pivot axis. 5 10
4. The tent frame of any of the previous claims wherein the pivots of the first set of pivot axes are arranged such that the first set of limbs are configured to be splayed laterally when the tent frame is erected. 15
5. The tent frame of claim 4 wherein the first retaining means is configured to retain at least one of the limbs of the first set of limbs in position once it has travelled through more than 90 degrees from the stowed configuration to the erect configuration, and wherein the first set of limbs are arranged to make contact with the ground, and wherein the second set of limbs are arranged to support tent fabric off the ground. 20 25
6. The tent frame of any of the previous claims, wherein in the stowed configuration all of the limbs are parallel to each other when viewed from above, and wherein all of the limbs are secured to the hub. 30
7. The tent frame of any of the previous claims wherein the first set of pivot axes and the second set of pivot axes are fixed in position relative to one another, and wherein the second set of pivot axes are located together on one side of the hub. 35
8. The tent frame of any of the previous claims wherein the second set of limbs are provided with respective cams for at least two limbs attached to the hub by way of universal pivots being included in the second set of pivots, and wherein the cams are arranged such that when the frame is unfolded from the stowed configuration to the erect configuration, the at least two limbs splay away from one another as the latter are rotated about their respective pivots. 40 45
9. The tent frame of claim 8 wherein the cams are such as to generate a movement of the respective limbs when the frame is unfolded from the stowed configuration to the erect configuration, which movement is such that the limbs splay away from one another as the latter are rotated about their respective pivots through a first part of such movement at a greater rate than in a second part of that movement. 50 55
10. A tent frame comprising a hub from which a plurality

of limbs are configured to extend;

wherein the limbs are rotatable between a stowed configuration and an erect configuration; wherein the limbs comprise:

a first set of limbs configured to splay outwards as they are rotated from the stowed configuration to the erect configuration; and a second set of limbs configured to turn through an angle when they are rotated from the stowed configuration to the erect configuration such that in the stowed configuration the second set of limbs generally extend in a first direction, and in the erect configuration the second set of limbs generally extend in a second direction that is opposite to the first direction; and

wherein the hub comprises a first retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration, and a second retaining means configured to retain at least one of the limbs of the second set of limbs in the erect configuration.

11. The tent frame of claim 10 further comprising an operating means to control operation of both the first retaining means and the second retaining means, and wherein the operating means are configured to be operated in a first direction to control operation of the first retaining means, and operated in a second direction to control operation of the second retaining means.
12. The tent frame of claim 10 or 11, wherein the first retaining means is a stop configured to prevent rotation of at least one of the limbs of the first set of limbs, and wherein the second retaining means is configured to provide a latch to prevent rotation of at least one of the limbs of the second set of limbs, and wherein the first retaining means is configured to retain at least one of the limbs of the first set of limbs in position once it has travelled through more than 90 degrees from the stowed configuration to the erect configuration.
13. The tent frame of any of claims 10 to 12, wherein in the stowed configuration all of the limbs are parallel to each other when viewed from above, and wherein all of the limbs are secured to the hub, and wherein the first set of limbs have a first set of pivots and are configured to rotate about a first set of parallel pivot axes, wherein the second set of limbs have a second set of pivots and are configured to rotate about a second set of pivot axes generally transverse to the first set of pivot axes, and wherein the second set of

limbs are located together on one side of the hub in the erect configuration.

14. The tent frame of any of the previous claims wherein the second set of limbs are provided with respective 5
cams for at least two limbs attached to the hub by way
of universal pivots being included in the second set of
pivots, wherein the cams are arranged such that
when the frame is unfolded from the stowed config- 10
uration to the erect configuration, the at least two
limbs splay away from one another as the latter are
rotated about their respective pivots.
15. A portable shelter comprising the tent frame of any of 15
the previous claims, the portable shelter having
sheet material supported by the tent frame.

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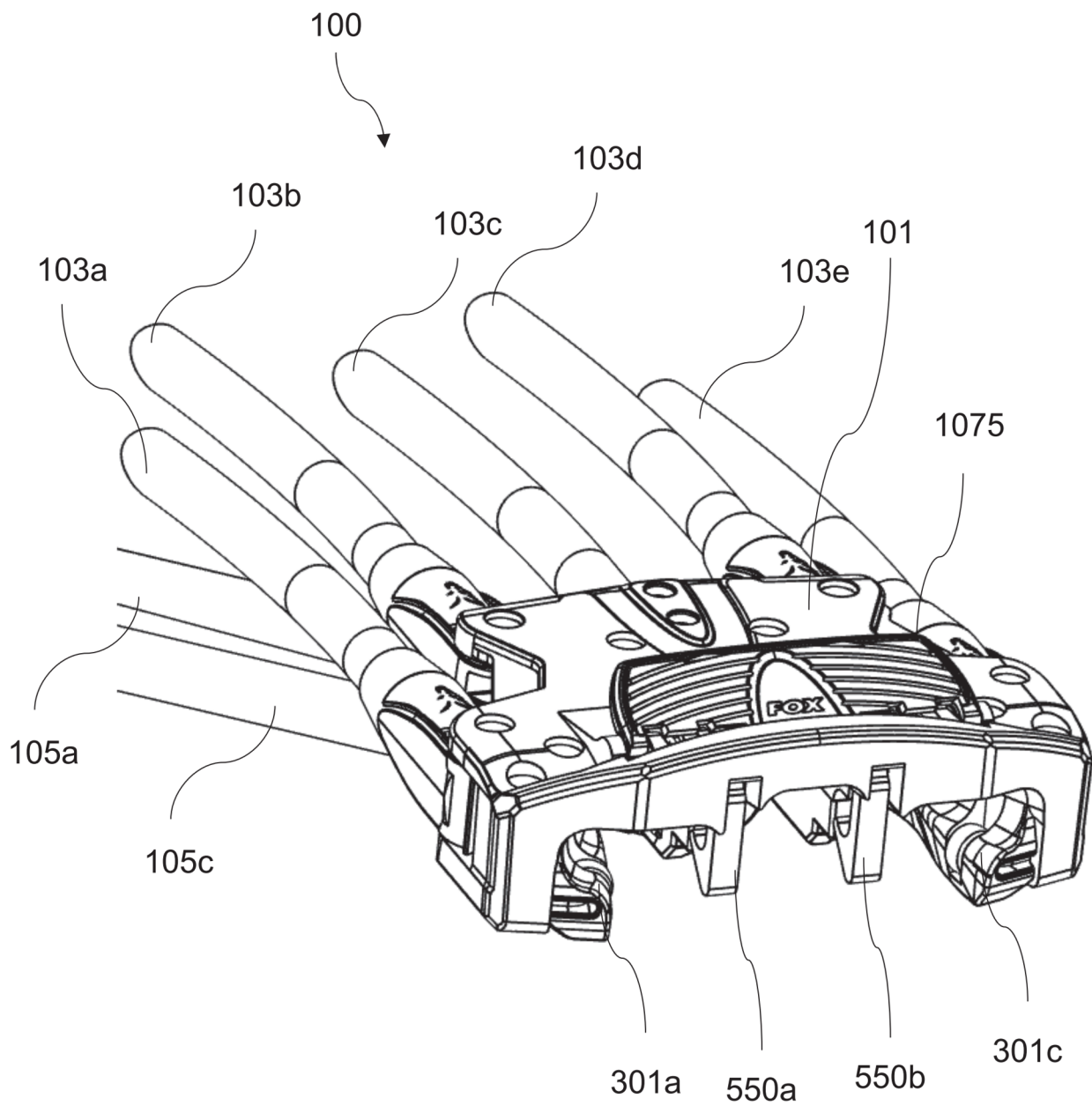


Figure 1

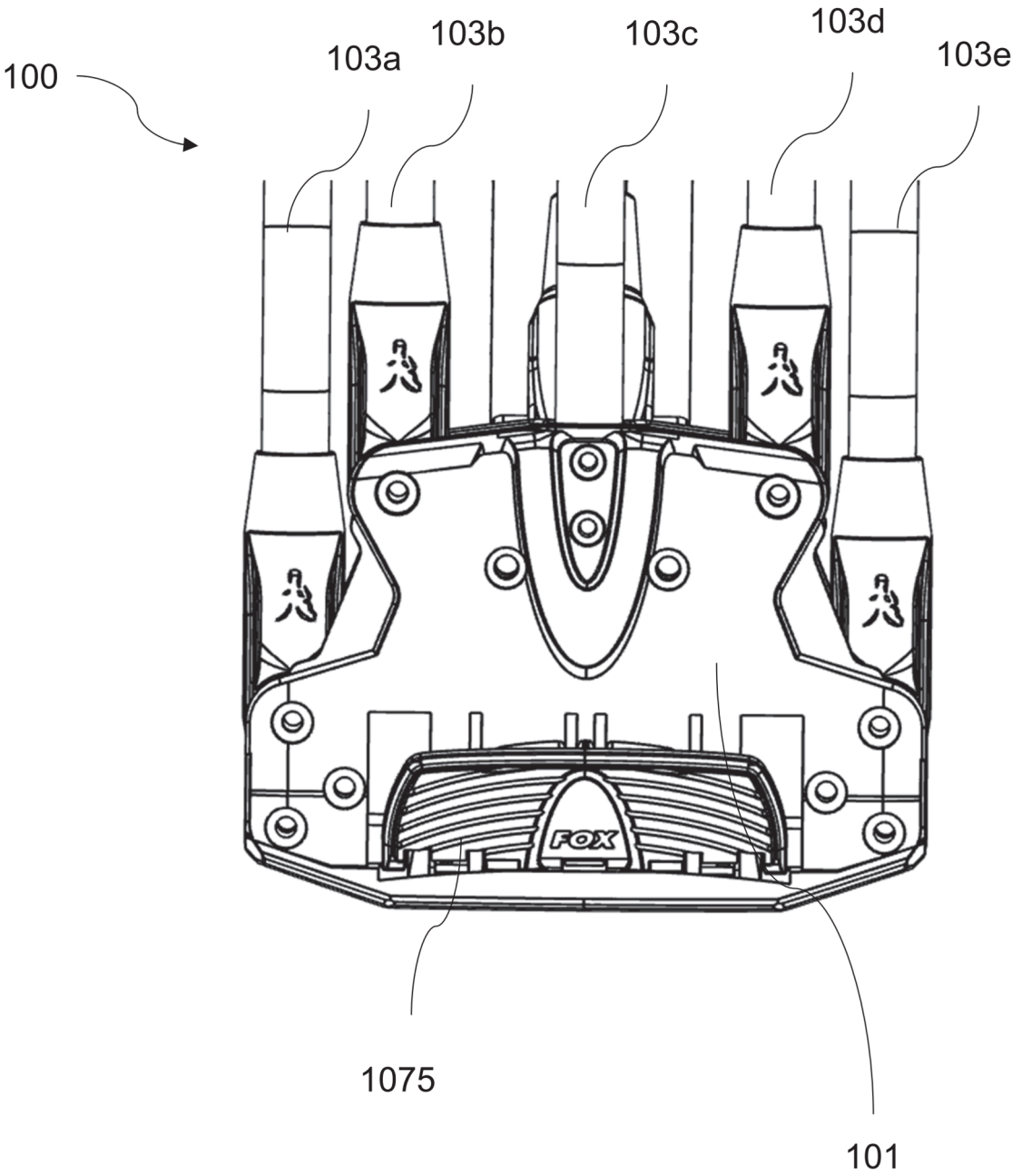


Figure 2

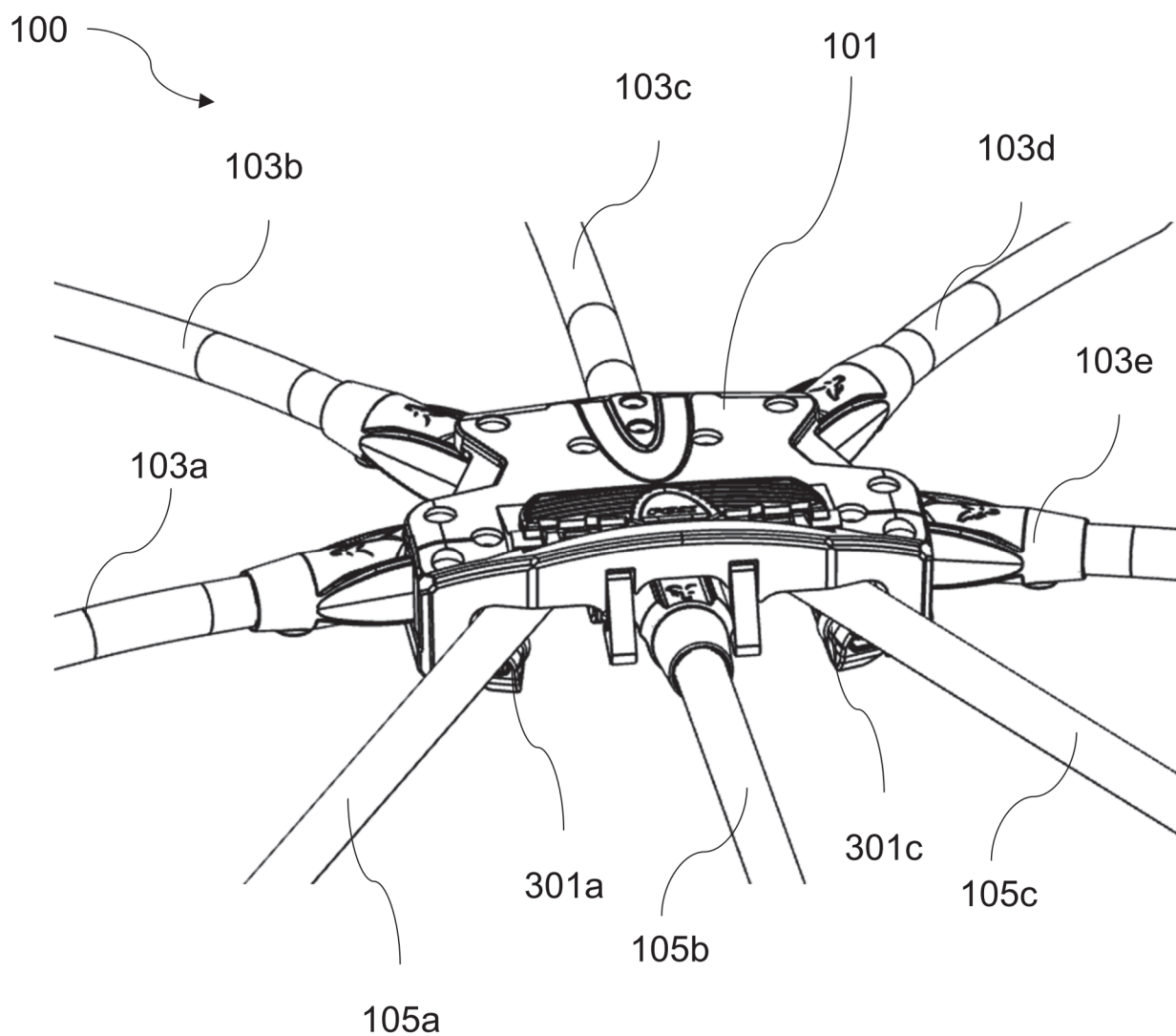


Figure 3

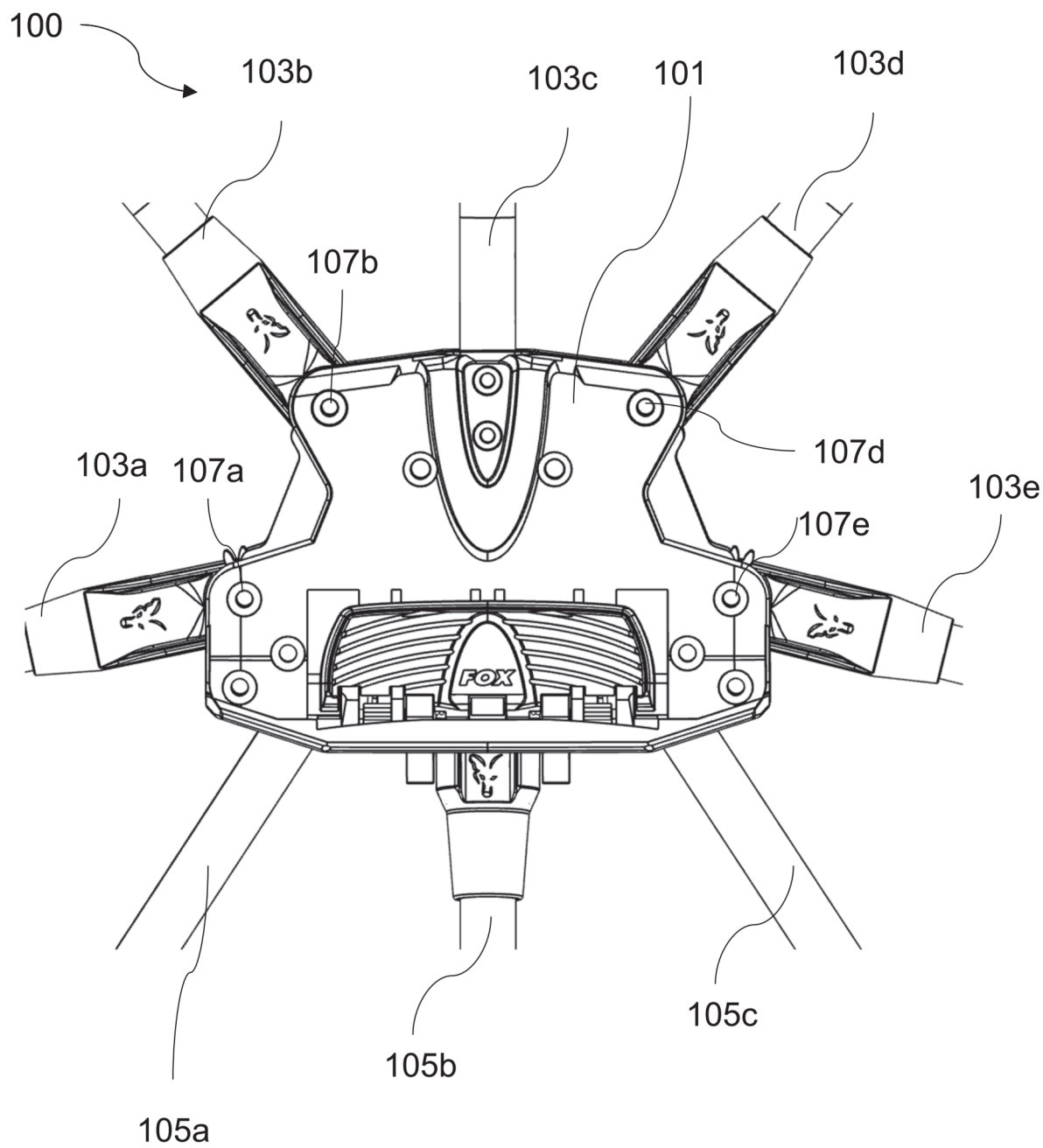


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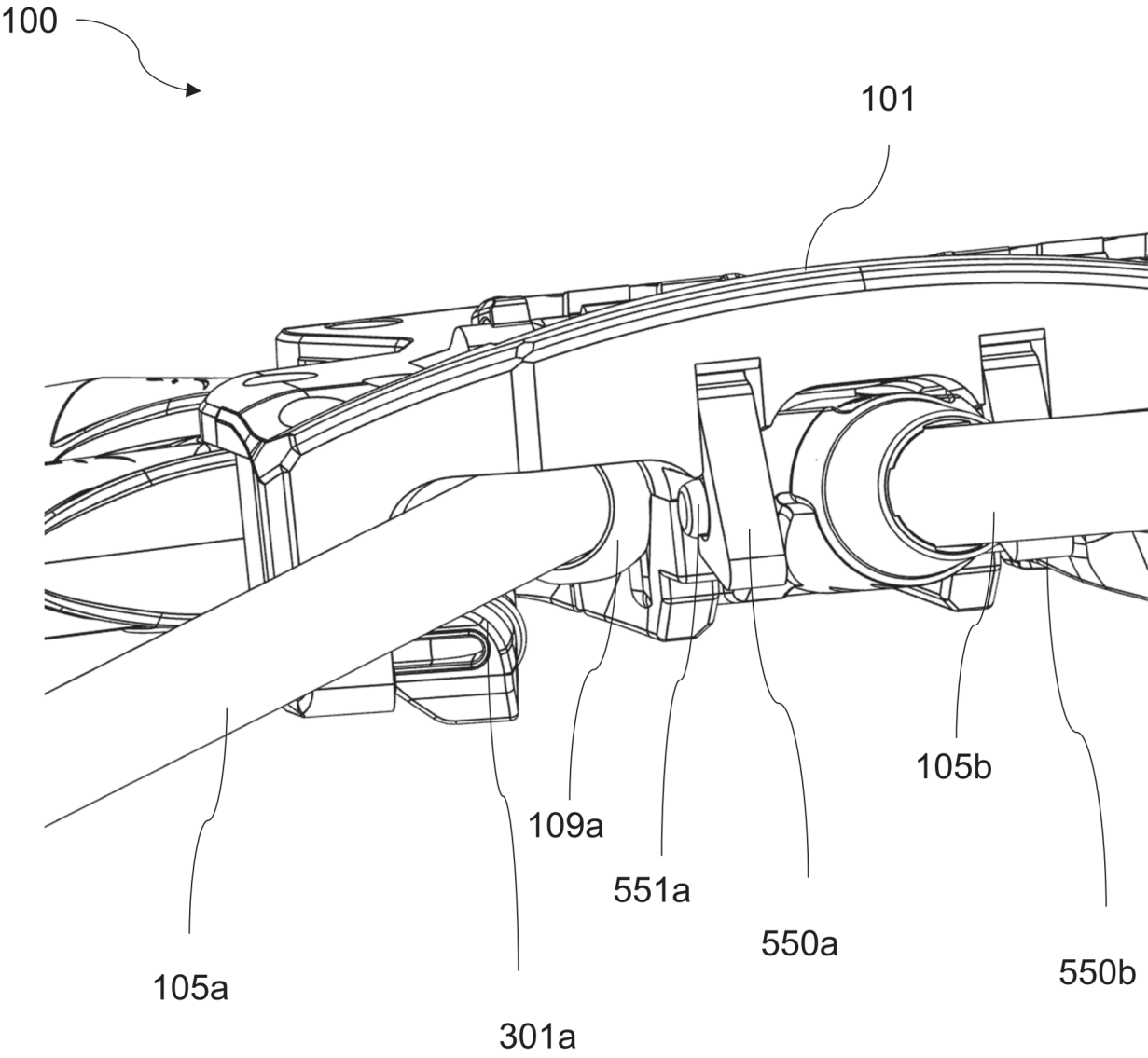


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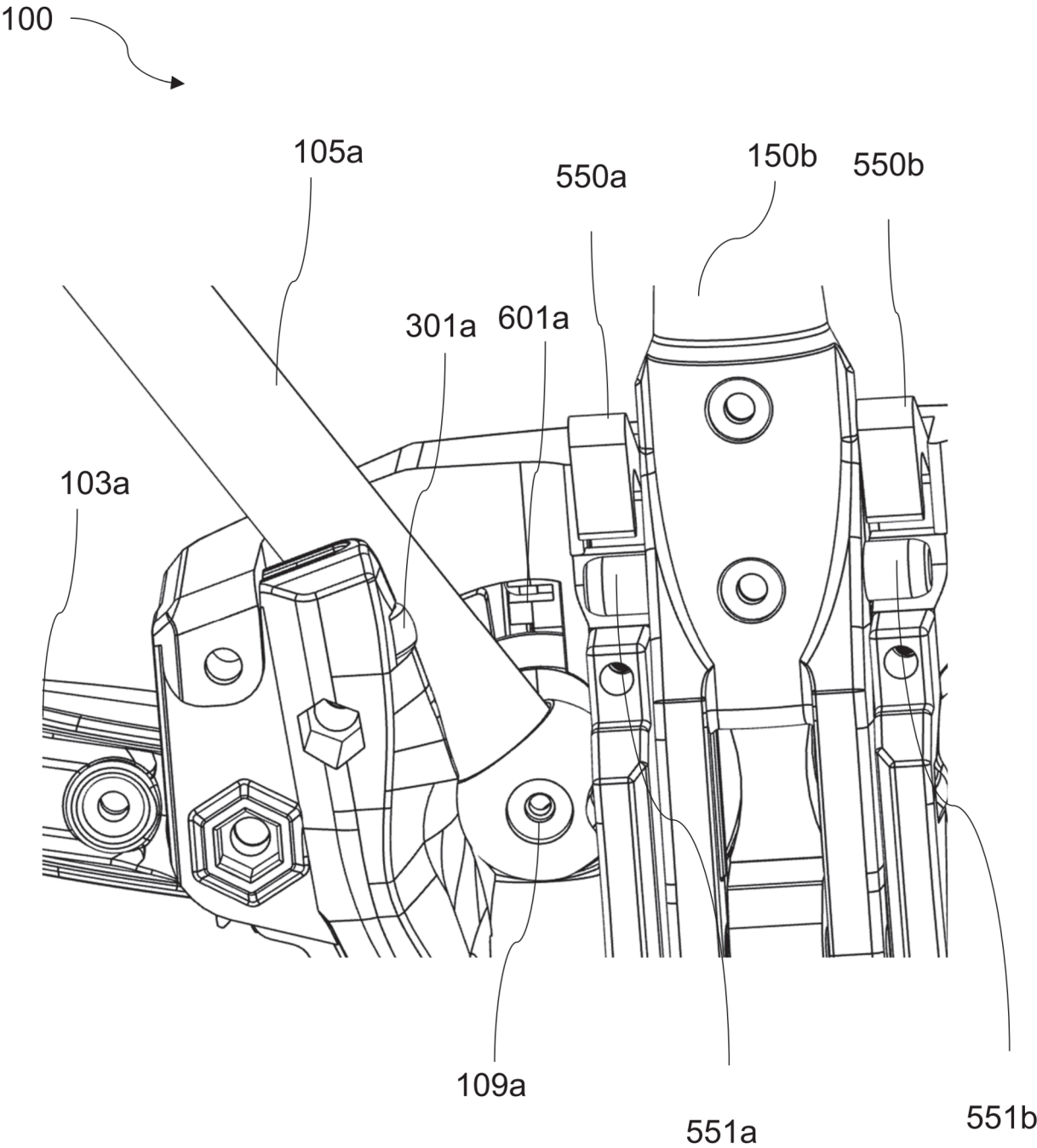


Figure 6

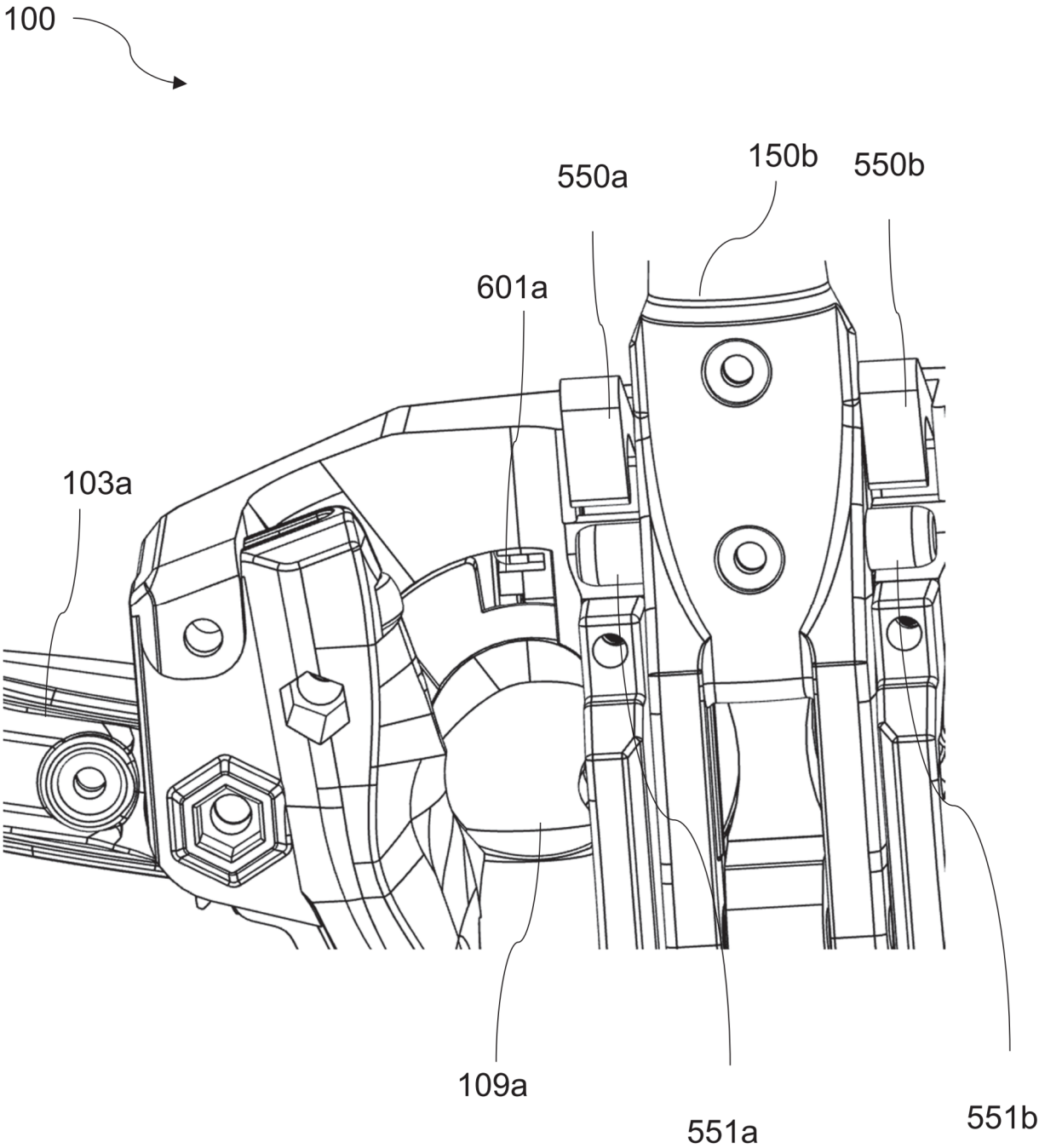


Figure 7

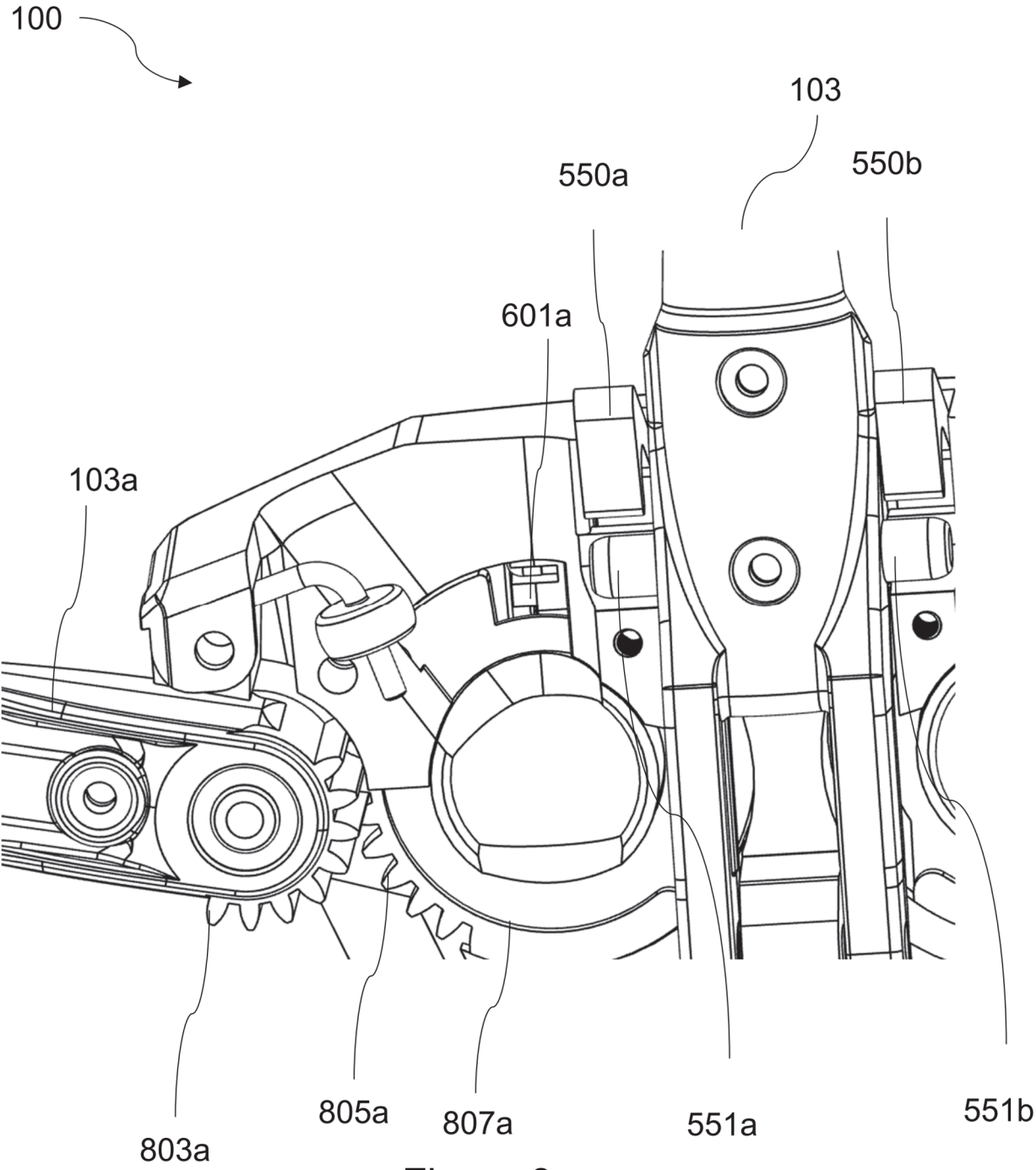


Figure 8

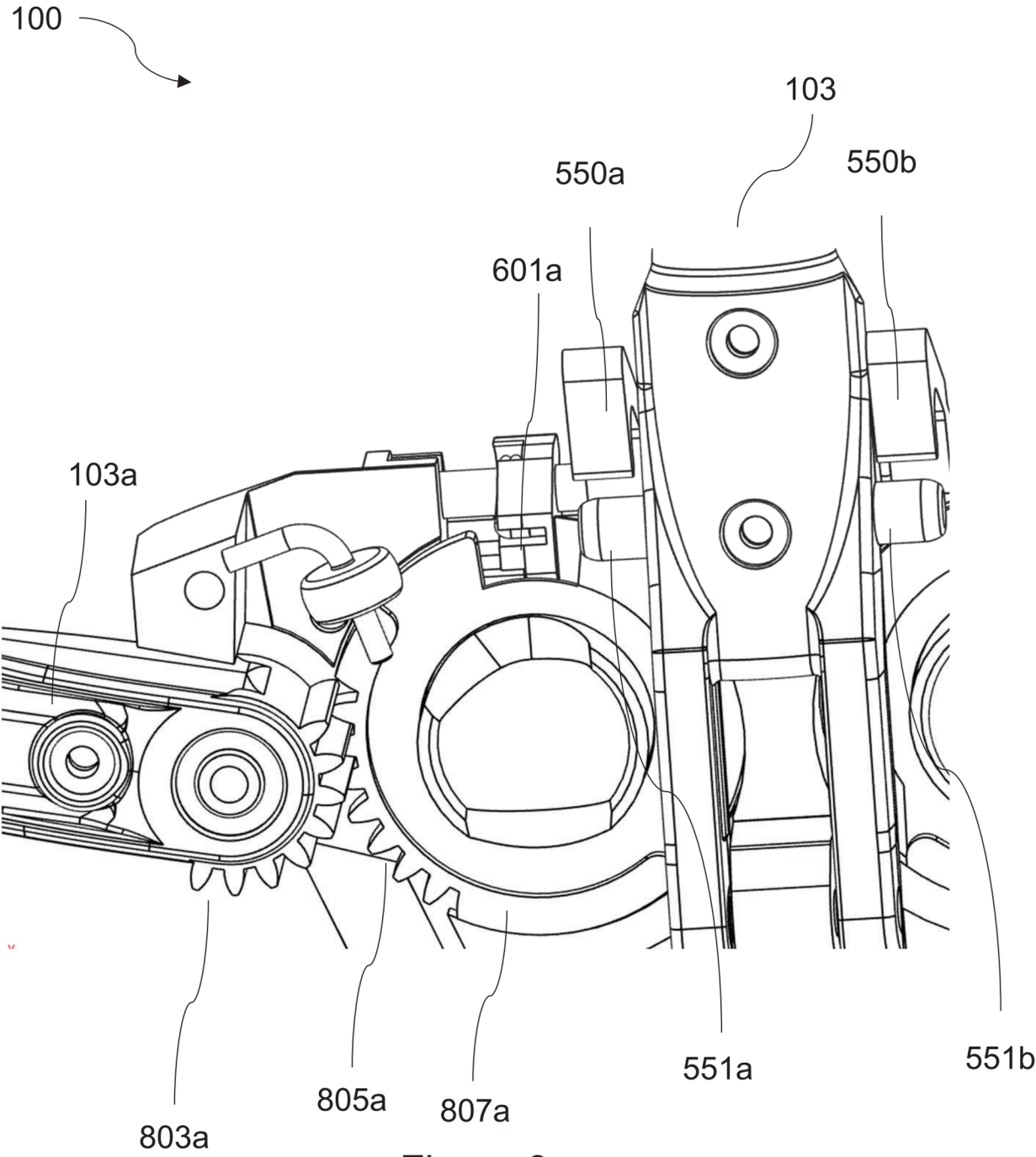


Figure 9

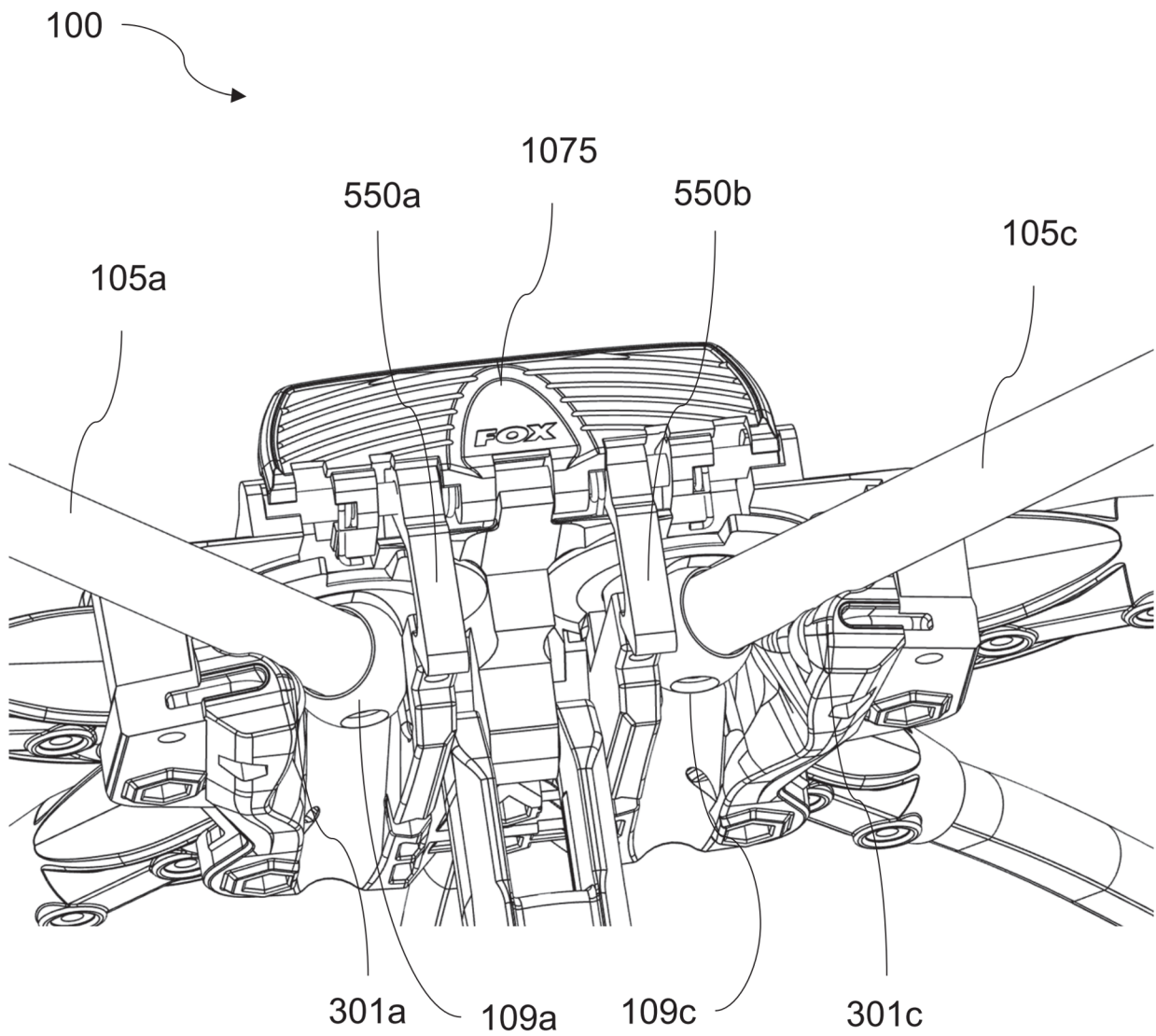


Figure 10

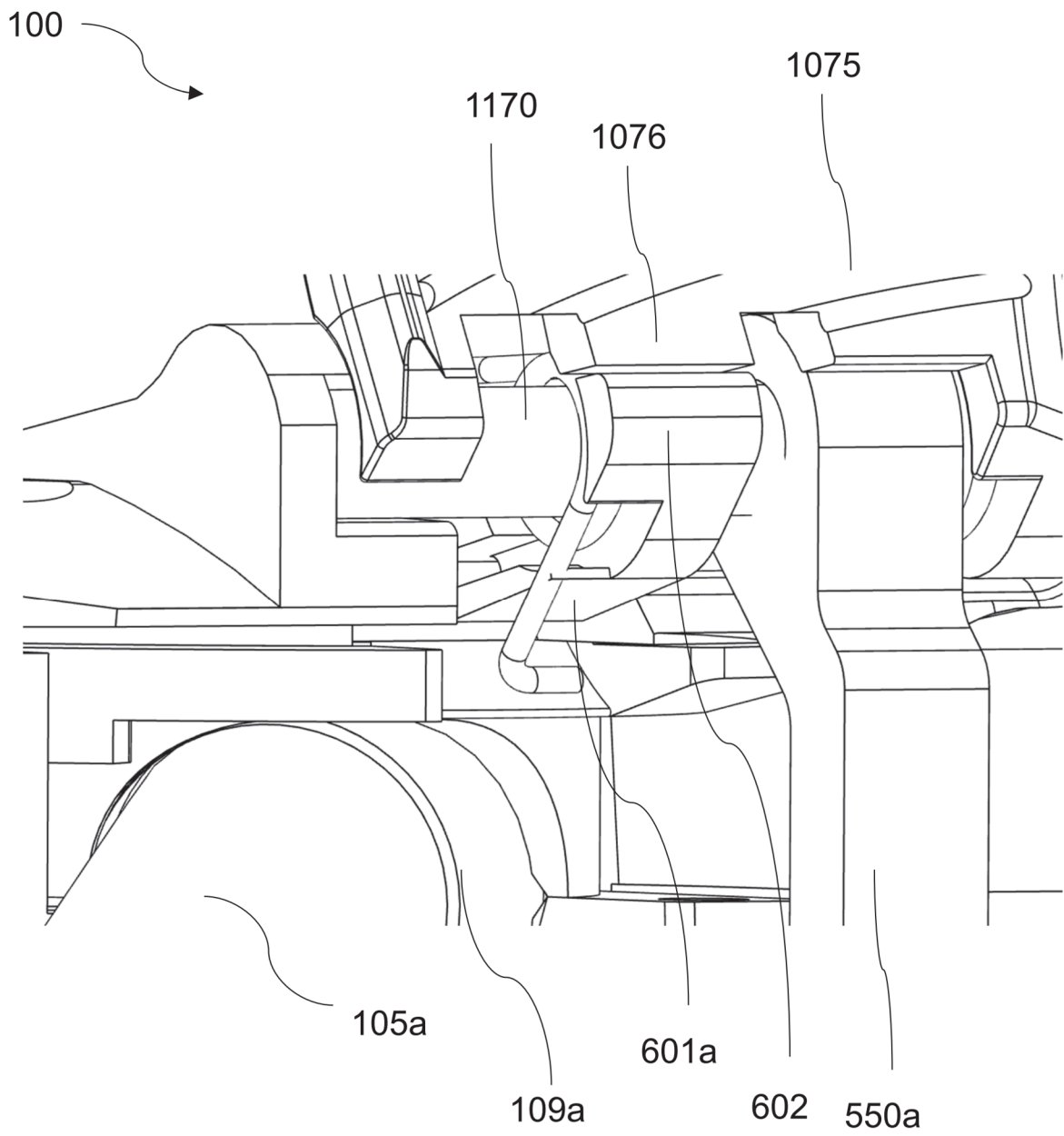


Figure 11

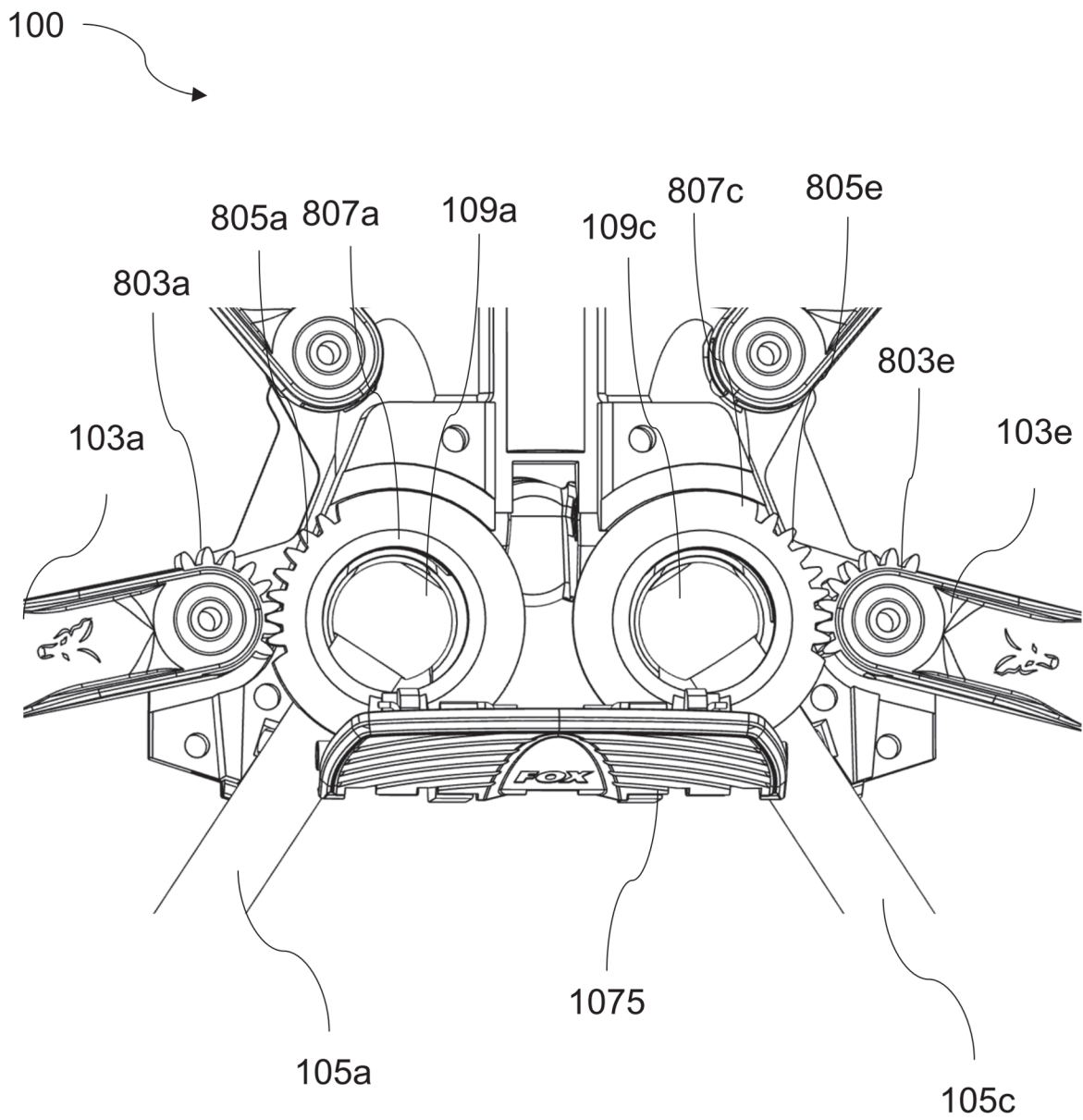


Figure 12

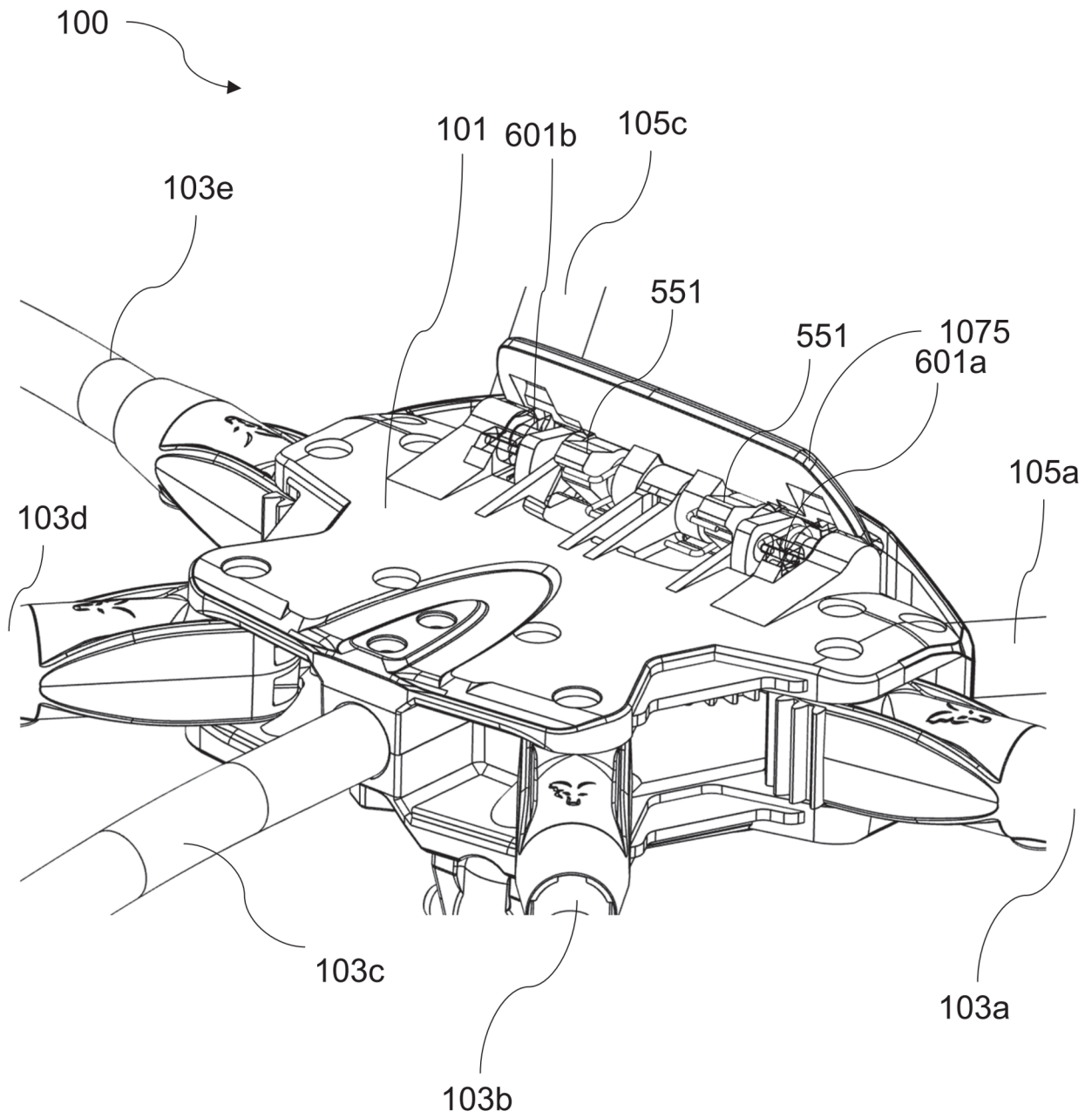


Figure 13

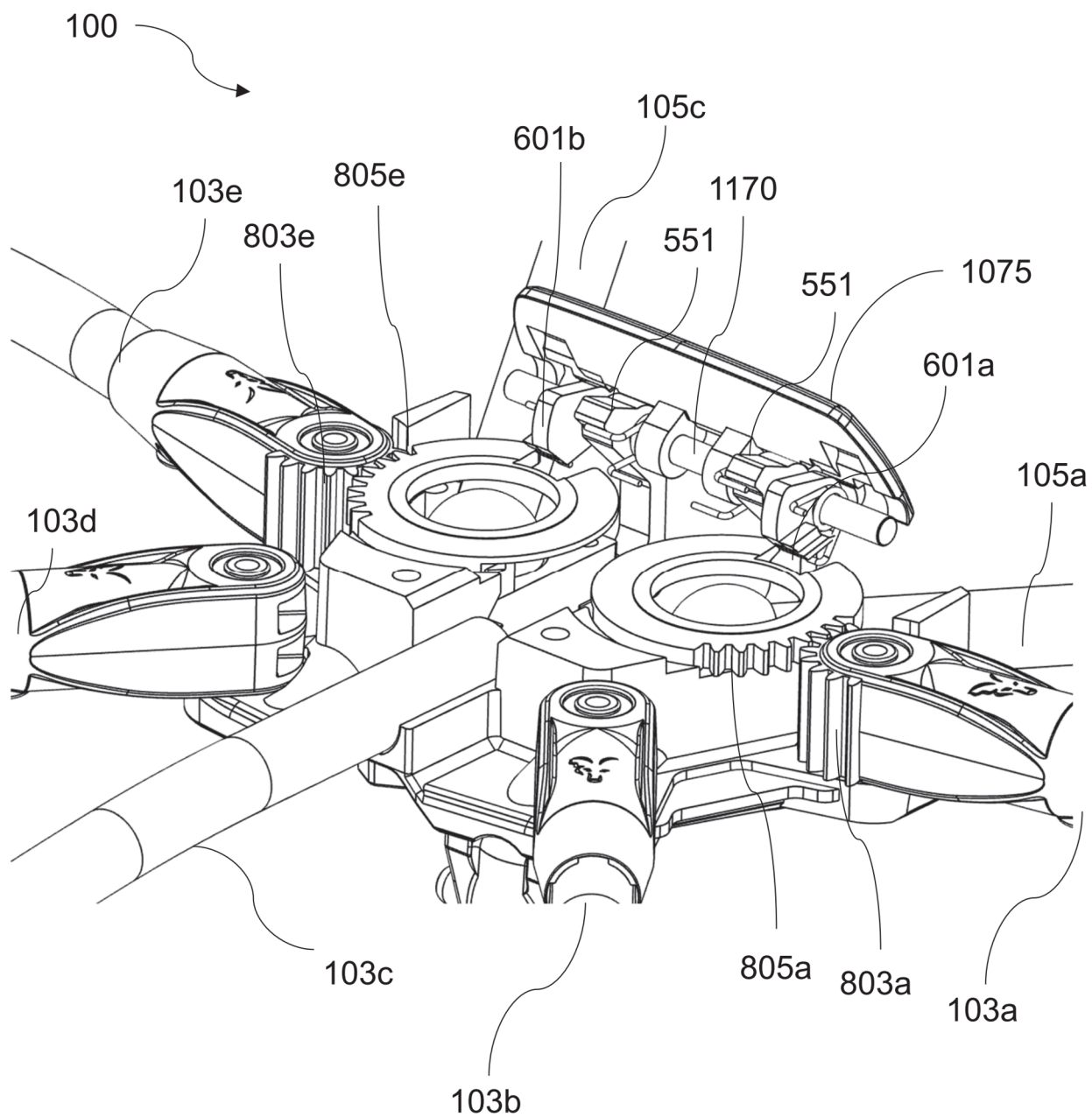


Figure 14

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 3064676 A [0002]
- EP 3943692 A [0005]
- EP 1445400 A [0005]
- EP 4148208 A [0005]