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(54) EPILATING DEVICE AND METHOD

(57) An epilating head for an epilating device comprising at least a first disc with at least two first disc pincers, the first disc being rotatable around an axis or axle of rotation, further at least a counter element with at least two counterparts, the counter element being rotatable around the axis or axle, wherein the first disc and the counter element are configured that a first pair of tweezers is composed of one of the first disc pincers and one of the counterparts and a second tweezer is composed of another one of the first disc pincers and another one of the counterparts, the first and second tweezers each being in an open condition over at least a first section of rotation around the axis or axle and the first and second tweezers each being in a closed condition over a second section of rotation around the axis or axle, wherein the first tweezer and the second tweezer are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

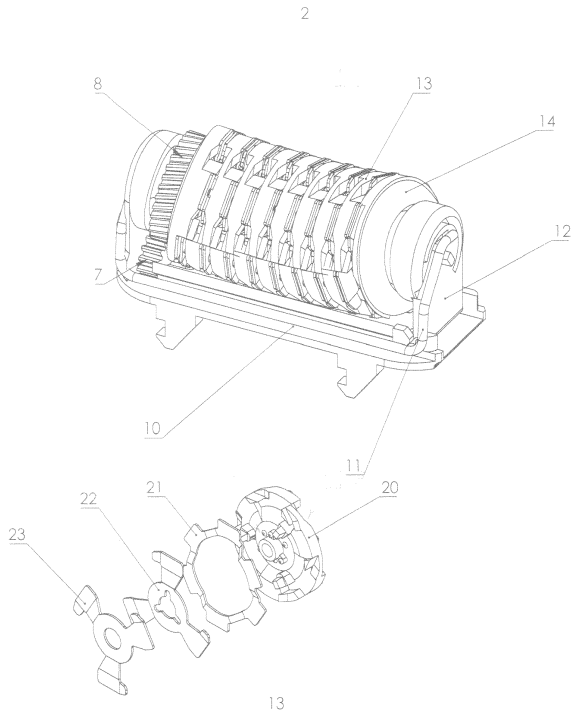

FIG 3

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Description

Field of invention

[0001] The invention is directed to an epilating head for an epilating device especially to an epilating head comprising a group of pincer assemblies.

Background

[0002] Depilating devices use one of two methods for removing hair. In one method, the hair is cut, leaving the roots intact beneath the skin surface. In the other method, hair is removed by pulling it out from its roots.

[0003] There are several mechanisms for removing hair. Disc mechanisms are often used. In general, these mechanisms include discs and associated pincer-like elements. When two pincer-like elements are brought close together, hair is trapped between them. The discs, which rotate and produce a torque, then uproot the hair trapped between their associated pincers. The pincer-like elements and their associated discs move in unison and all pincer-like elements within a fixed distance move close to their adjacent pincer-like elements synchronously. The forces required in such mechanisms are multiples of the number of pincers. In some of these depilatory devices, the disc mechanisms have cylindrical shapes.

[0004] Other depilating devices which use disc mechanisms employ a large spring with bearings connected to its ends. In such devices, the spring presses on the bearings producing a constant force that acts identically over all the discs and their associated pincer-like elements. The magnitude of the force is the same throughout the entire mechanism. The forces required in such mechanisms are relatively small and the energy required is not great.

[0005] Several of the proposed disc hair removal systems involve the use of tilted discs which come together at a point to grasp one or more strands of hair. Other disc mechanisms involve the use of cams to alternately bring the discs together and apart, thereby trapping strands of hair.

[0006] Various disc mechanisms are discussed in US Pat. Nos. 4,935,024 to Dolev; 5,057,115 to Dolev; 5,190,559 to Gabion et al.; 5,797,925 to Heintke; 5,857,903 to Ramspeck et al.; 5,312,419 to Garenfeld et al.; 5,196,021 to Kabla; 5,281,233 to Dolev and 5,462,557 to Jordan et al.

[0007] A depilatory device using a disc mechanism is subject to several constraints. The pincer-like elements associated with each disc must close quickly. The pressure exerted by each contacting pair of pincers must be neither too great nor too little. In the former case, the hair would be cut, while in the latter case, the hair would slide through without being pulled out at its roots. Typically, all the pincers associated with a row of discs must contact their adjacent pincers simultaneously. Lastly, the contacting mechanism must be simple, operate reliably over time, and be easy to maintain.

[0008] Presently, there is a need for an epilator and/or depilatory device that is easy and inexpensive to assemble and to maintain and which can uproot a greater number of hairs over a larger area than is possible using prior art devices. In addition, there is also an ongoing need for a depilating device that reduces discomfort associated with hair removal.

[0009] In WO 2009/010815 A1 an epilator is described comprising a head for trapping hair for removal. The head comprises a rotating body that has as an axis of rotation and is adapted to be rotated by a motor. At least one pair of pincers is arranged at or in the rotating body. The pair of pincers is able to rotate in accordance with the rotation of the rotating body. At least their outermost ends are adapted to move towards each other and away from each other depending on the location of the rotating body. According to an aspect, at least one intermediate member is provided which is arranged such that it is at least linearly moveable between the outermost ends of the pincers. The pair of pincers only extends on one side of the axis of rotation. One spring is located between the pair of pincers and is arranged to bias the pincers either away from each other or towards each other. At least one actuator is provided for the pair of pincers which can be supported to move along or parallel to the axis of rotation and engages a first pincer adjacent an end thereof being distal to the axis of rotation and a second pincer at or adjacent an end thereof being proximal to the axis of rotation.

[0010] The epilating device according to EP 0 950 365 includes a single housing that is shaped to be grasped by the hand of a user and which includes a drive source. The housing can carry a first epilation module provided at its top with a first plucking head that is driven by the drive source to effect the plucking of the body hairs. The first plucking head has a length defining there along a first epilation zone. Also provided is a second epilation module to be carried on the housing that is provided at its top with a second plucking head that is driven commonly by the drive source to effect plucking of the body hairs. The second plucking head has a length defining there along a second epilation zone.

[0011] EP 1 405 701 B1 relates to a linkage mechanism for a hair removal appliance, such as a powered or dry shaver or epilator, having a head rockably mounted on a body, and to such hair depilation apparatus. In order to better conform the head to a user's skin the device and method realizes a rocking about a virtual pivot axis.

[0012] WO 2005/063076 is directed to a depilator assembly for trapping hair for removal. The assembly includes a symmetric disc formed of two lobes and two pincers. At least two pressure-transferring protrusions and at least one rotation transferring protrusion are formed and positioned on a first face of said disc. Further rat least two pressure-transferring protrusions and at least two spacer elements are formed and positioned on a second face of said disc. The spacer elements being

operative to prevent the accumulation of debris between adjacent discs and to allow for periodic tilting of the discs when pressure is provided to the depilator assembly. The second face of the disc further has formed therein at least one recess configured to accommodate said at least one rotation-transferring protrusions of a similar disc of an adjacent depilator assembly in force transferring engagement, such that, in response to a rotational force applied to said assembly at least one rotation-transferring protrusion is operative to transfer rotation to said adjacent assembly.

[0013] WO 2015/121851 relates to an epilator comprising a pair of corresponding and separable epilator heads for trapping hair for removal. Each head has an exposed portion for allowing at least one or more parts of each head to get in touch with a user's skin. Each head has a rotating body having an axis of rotation and being adapted to be rotated by a driving unit, wherein the rotating body is adapted to trap the hair for removal at the exposed portion, and wherein the axis of the rotating body is essentially concave relative to the exposed portion of each head.

[0014] All the above-mentioned documents are herewith incorporated by reference.

Summary

[0015] The present invention is directed to an epilating head, an epilator and a method as set out below.

[0016] The present invention is directed to an epilating head for an epilating device. It can comprise the following features or any subgroup thereof. There is at least a first disc with at least two first disc pincers. The first disc can be configured to be rotatable around an axle of rotation or around an axis of rotation. In the first case the axle does not rotate and the disc can rotate around the axle or can be arranged on an element rotating together with the disc around the axle. In the second case the axle can rotate itself. In the further case it is not curved, it could be made of segments or an elastic material in order to allow it to rotate. Then the disc can be arranged directly on the axle and rotate with axle.

[0017] Thus, also the pincers can rotate around the axle of rotation. There can be arranged at least a counter element or a second disc with at least two counterparts or second disc pincers. Also the counter element or second disc can be configured to be rotatable around the axle or the axis, as described before.

[0018] The term counter element or disc is not limited to a flat piece of material but can have a considerable thickness. Moreover, it can have any topography and not just two planes with protrusions, e.g. the protrusions being cold drawn or formed in a body.

[0019] The first and the counter element or second discs can be configured so that a first pair is composed of one of the first disc pincers and of one of the counterparts or second disc pincer to form a first tweezer. Thus, neighboring pincers of different discs can form a tweezer. A second pair composed of one of the first disc pincers and one of the further counterparts or second disc pincer can form a second tweezer.

[0020] The pincers formed at the discs can be provided in any way, either by providing a flat material, punch it and then deform the parts thereof into different directions or planes.

[0021] The first and second tweezers can each be brought in an open condition over at least a first section of rotation around the axle or axis. The first and second tweezers each can be in a closed condition over a second section of rotation around the axle or axis. The opening of the tweezers is intended to happen when hair of a user is either brought into the tweezers or released from the tweezers once the hairs are plugged out. The closing is intended to primarily take place during the gripping of hair and the remaining in the closed position is intended to primarily take place when plugging or epilating/depilating of hair.

[0022] As the tweezers of cooperating discs are positioned at different locations at the respective discs the first and second tweezers can open and close at different times although they can open at similar or neighboring locations during rotation of the discs. The first tweezer and the second tweezer are at least one of axially offset, their envelopes of rotation are neighboring or their envelopes of rotation are side by side. Thus, they are offset and/or their envelopes of rotation do not coincide but are arranged in an axial neighborhood or side by side. This can ensure that the body or skin of a user will be depilated easier and more effectively as the device will treat a surface of the body or skin more equally and completely.

[0023] The first disc pincers can be formed by first disc protrusions radially extending at least in part from the first disc. The second disc pincers are formed by second disc protrusions radially extending at least in part from the second disc. Neighboring first disc pincers and/or neighboring second disc pincers can be axially offset to each other. This can ensure that the tweezers formed by the pincers become active not at the same location of the skin but at neighboring locations. Thus the surface of a user's skin is more equally and completely treated over a width of the epilating head without making it necessary for the user to considerably move the device during use.

[0024] The epilating device can also comprise a third disc with at least two third disc pincers. Also a further disc could be provided. Anyhow, the third disc can be rotatable around the axis or axle of rotation. In this case the first and the third discs can be configured that a third pair composed of one of the first disc pincers and one of the third disc pincers form a third tweezer and a fourth pair composed of one of the first disc pincers and one of the third disc pincers form a fourth tweezer.

[0025] The third and fourth tweezers can be in an open condition over at least a first section of rotation around the axis or axle. The third and fourth tweezers can each or in groups be in a closed condition over a second sec-

tion of rotation around the axis or axle. The third tweezer and the fourth tweezer can be at least one of axially offset, their envelopes of rotation are neighboring or their envelopes of rotation are side by side, as already further mentioned before.

[0026] The first disc can have from 4 to 8 pincers and each of the second disc and the third disc can have from 2 to 4 pincers so that from 4 to 8 tweezers are formed.

[0027] The first disc can have 6 pincers and each of the second disc and the third disc can have from 3 pincers so that 6 tweezers are formed.

[0028] The epilating head according to the present invention can comprise 4 to 12 sets of first, second and third discs, preferably 6-10 sets of first, second and third discs, more preferably 8 sets of first, second and third discs. Any other number of sets can also be realized. These numbers of sets of discs can ensure a harmonious and equal treatment of the user's skin by a head.

[0029] Moreover, a head drum can be formed by a plurality of hub units each supporting a set of discs rotating around the axis or axle.

[0030] At least one of the second disc and the third disc can have extensions formed at the pincers extending outwardly in the direction of rotation and adapted to assist in guiding hair into the tweezers, the extensions being inclined between 10-40° with respect to the plane of the pincers, preferably between 25-35°.

[0031] The axis or axle of rotation is formed concave with respect to a side of use. It can thus better be adapted to the generally skin of a user that is generally convexly shaped. The tweezers can be adapted to be in an open condition over the first section of circumference of rotation around the axis or axle and in a closed condition over the second section of circumference of rotation around the axis or axle.

[0032] Each of the first disc, the second disc and/or the third disc have an inner opening being adapted to support a coaxial support of the first disc, the second disc and/or the third disc. The opening can be round or can have any shape allowing a positively locking rotation with other elements or the axle. These can be slots, specific shapes of the holes etc. allowing for the engagement of correspondingly shaped elements.

[0033] At least two hub units each can be adapted to be supported on the axis or axle and to rotate on the axis or axle. Further the hub unit can support the first disc, the second disc and/or the third disc, so that they rotate together with the respective hub unit. Each hub unit can further be configured to bring the tweezers each in an open condition over at least a first section of circumference of rotation and in a closed condition over at least a second section of circumference of rotation around the axis or axle. This can cause a periodic movement, deformation and preferably tilting of one, more than one or all of the discs.

[0034] The axis or axle can be formed concave with respect to a side of use. At least two sets of hub units can be arranged on the axis or axle. In view of the concave shape of the axis or axle the hub units can each being configured to cause the tweezers in an open condition over at least a first section of circumference of rotation and in a closed condition over at least a second section of circumference of rotation around the axis or axle, preferably in or close to the side of use.

[0035] A plurality of hub units can be arranged side by side on the axis or axle to form a rotating head drum. The hub units can have pressure-transferring protrusions on the side opposite to the side of the discs transferring pressure to the discs of the neighboring hub unit. This can further assist the tweezers of the neighboring hub unit to be in an open condition over the first section of circumference of rotation around the axis or axle and in a closed condition over the second section of circumference of rotation around the axis or axle.

[0036] The head drum can further comprise at one end a second hub unit driving the head drum and forming an end section of a head drum with pressure-transferring protrusions transferring pressure onto a set of discs of the neighboring hub unit. At the other end a third hub unit can form the opposite end section and comprising a set of discs.

[0037] At least two pressure-transferring protrusions can be formed and positioned on a side of the hub unit. The first to the third discs can be adapted to be positioned on one side of the hub unit. It can be further adapted for periodic tilting where in a first section of 360° rotational movement, the pressure-transferring protrusions from a similar adjacent pincer assembly are configured to press on at least one of the discs thereby to cause the discs to contact each other at their pincer surfaces trapping hair there between. In a second section, the contact between the pincer surfaces is adapted to be ceased releasing the trapped hair.

[0038] The axis or axle can be formed as an arcuate axis or axle. The hub unit can comprise at least one rotation-transferring protrusion formed and positioned on one side. Further, at least one recess can be adapted to accommodate a rotation-transferring protrusion of the similar adjacent pincer assembly for transferring rotational momentum or movement and stacking the similar adjacent pincer assembly to the hub unit.

[0039] The hub unit comprises at least three lower convex surfaces and at least three upper convex surfaces on the side of the hub unit hosting the discs. It can be adapted to elevate the second disc and the third disc from the one side of the hub unit respectively and result in a desired separation of the discs. It can further allow the periodic tilting of the units under the influence of the pressure transferring protrusions.

[0040] The at least three lower convex surfaces can be three lower convex surfaces which are positioned 120° apart and/or wherein the at least three upper convex surfaces can be three upper convex surfaces which are positioned 120° apart.

[0041] The upper convex surfaces can be adapted to be inserted through three slots that are comprised in the

second disc.

[0042] The at least two first pincers can be six first pincers which are positioned 60° apart. Three second pincers can be positioned 120° apart. The at least two third pincers can be three third pincers which are positioned 120° apart. This can also ensure a harmonious but nevertheless effective depilation of hair.

[0043] Six tweezers can be a combination of one of the first pincers and one of the second pincers or a combination of one of the first pincers and one of the third pincers. All of the tweezers are axially offset from each other during the rotation of the pincer assembly around the arcuate axis or axle.

[0044] A group of pincer assemblies can be mounted on the axis or axle and can be adapted to rotate around the axis or axle.

[0045] The axis or axle can be an arcuate axis or axle that is configured to be fixed to a head base and a back base.

[0046] The group of pincer assemblies can be adapted to be situated between a head gear and a backside unit that can be adapted to transfer an applied force to the group of pincer assemblies. The head gear can be further adapted to receive a rotational momentum or movement from an idler gear and transfer it to the group of pincer assemblies.

[0047] The epilating head can further comprise a spring that is adapted to provide pressure to the group of pincer assemblies. A substantial part of the pressure can be applied to the most curved edge of the group of pincer assemblies.

[0048] Further a driving unit can be provided. The driving unit can comprise a gear assembly, motor and/or a power source unit. The power source unit can comprise one or more batteries configured to supply the motor with power.

[0049] The gear assembly can comprise a motor gear receiving a rotational momentum from the motor and/or a face gear transferring the rotational momentum to an idler gear via intermediate gears.

[0050] The present invention is also directed to a method for operating an epilating head, especially an epilating head according to any of the relevant preceding claims. Thus, all features described before and specified in the claims with respect to a device are also embraced by the invention in terms of method steps, even without being explicitly mentioned.

[0051] The present invention particularly comprises the following embodiments:

1. An epilating head for an epilating device comprising:

a. at least a first disc (21) with at least two first disc pincers (21A; 21C; 21E), the first disc being rotatable around an axis or axle (36) of rotation;
b. at least a counter element (20; 22) with at least two counterparts (20A-F; 22A-C), the counter element (20; 22) being rotatable around the axis or axle (36);
c. the first disc (21) and the counter element (20; 22) being configured that a first pair of tweezers (21A, 20A; 21A, 22A) is composed of one of the first disc pincers (21A) and one of the counterparts (20A-F; 22A-C) and a second tweezer (21C, 20C; 21C, 22C) is composed of another one of the first disc pincers (21C) and another one of the counterparts (20A-F; 22A-C);

i. the first and second tweezers (21A, 22A; 21C, 22C) each being in an open condition over at least a first section of rotation around the axis or axle (36) and
ii. the first and second tweezers (21A, 22A; 21C, 22C) each being in a closed condition over a second section of rotation around the axis or axle (36);

d. wherein the first tweezer (21A, 22A) and the second tweezer (21C, 22C) are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

2. An epilating head according to embodiment 1, wherein the counter element (22) is a second disc (22) and the counterparts (22A-C) are second disc pincers (22A, 22B, 22C) the first and the second discs (21, 22) being configured that a first pair composed of one of the first disc pincers (21A) and one of the second disc pincer (22A) form a first tweezer (21A, 22A) and a second pair composed of one of the second disc pincers (21C) and one of the second disc pincer (21C) form a second tweezer (21C, 22C).

3. Epilating head according to embodiment 2 wherein the first disc pincers (21A; 21C; 21E) are formed by first disc protrusions (21A; 21C; 21E) radially extending at least in part from the first disc (21) and the second disc pincers (22A, 22B, 22C) are formed by second disc protrusions (22A, 22B, 22C) radially extending at least in part from the second disc (22), and/or wherein neighboring first disc pincers (21A; 21C; 21E) and/or neighboring second disc pincers (22A, 22B, 22C) are at least one of axially offset to each other, their envelopes of rotation are neighboring or side by side.

4. Epilating head according to any one of the preceding embodiments further comprising:

a. a third disc (23) with at least two third disc pincers (23A; 23B; 23C), the third disc (23) being rotatable around the axis or axle (36) of rotation;
b. the first and the third discs (21, 23) being configured that a third pair composed of one of the first disc pincers (21B) and one of the third disc

pincers (23A) form a third tweezer (21B, 23A) and a fourth pair composed of one of the first disc pincers (21F) and one of the third disc pincers (23B) form a fourth tweezer (21F, 23B);

i. the third and fourth tweezers (21B, 23A; 21F, 23B) each being in an open condition over at least a first section of rotation around the axis or axle (36) and
ii. the third and fourth tweezers (21B, 23A; 21F, 23B) each being in a closed condition over a second section of rotation around the axis or axle (36);

c. wherein the third tweezer (21B, 23A) and the fourth tweezer (21F, 23B) are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

5. Epilating head according to any one of the preceding embodiments wherein the first disc (21) has from 4 to 8 pincers (21A-F) and each of the second disc (22) and the third disc (23) have from 2 to 4 pincers so that from 4 to 8 tweezers are formed.

6. Epilating head according to any one of the preceding embodiments wherein the first disc (21) has 6 pincers (21A-F) and each of the second disc (22) and the third disc (23) have from 3 pincers (22A-C, 23A-C) and so that 6 tweezers are formed.

7. Epilating head according to any one of the preceding embodiments comprising 4 to 12 sets of first, second and third discs (21-23), preferably 6-10 sets of first, second and third discs (21-23), more preferably 8 sets of first, second and third discs (21-23).

8. Epilating head according to any one of the preceding embodiments further comprising a head drum (20, 21-23) being formed by a plurality of hub units (20) each supporting a set of discs (21-23) rotating around the axis or axle (36).

9. Epilating head according to any one of the preceding embodiments wherein at least one of the second disc (22) and the third disc (23) have extensions formed at the pincers (22A-C, 23A-C) extending outwardly in the direction of rotation and adapted to assist in guiding hair into the tweezers, the extensions being inclined between 10-40° with respect to the plane of the pincers (22A-C, 23A-C), preferably between 25-35°.

10. Epilating head according to any one of the preceding embodiments wherein the axis or axle (36) is formed concave with respect to a side of use and adapted to assist the tweezers (21A, 22A; 21C, 22C) to be in an open condition over the first section of circumference of rotation around the axis or axle (36) and in a closed condition over the second section of circumference of rotation around the axis or axle (36).

11. Epilating head according to any one of the preceding embodiments wherein each of the first disc (21), the second disc (22) and/or the third disc (23) have an inner opening being adapted to support a coaxial support of the first disc (21), the second disc (22) and/or the third disc (23).

12. Epilating head according to any one of the preceding embodiments further comprising at least two hub units (20) each adapted to be supported on the axis or axle (36) and to rotate on the axis or axle (36) and to further support the first disc (21), the second disc (22) and the third disc (23), so that they rotate together with the respective hub unit (20), each hub unit (20) further preferably being configured in bringing the tweezers (21A-F; 22A-C, 23A-C) each in an open condition over at least a first section of circumference of rotation and in a closed condition over at least a second section of circumference of rotation around the axis or axle (36) by a periodic tilting of one, more than one or all of the discs (21-23).

13. Epilating head according to the preceding embodiment wherein the axis or axle (36) is formed concave with respect to a side of use, at least two sets of hub units (20) being arranged on the axis or axle (36) and in view of the concave shape of the axis or axle (36) the hub units (20) each being configured to cause the tweezers (21A-F; 22A-C, 23A-C) each in an open condition over at least a first section of circumference of rotation and in a closed condition over at least a second section of circumference of rotation around the axis or axle (36), preferably in or close to the side of use.

14. Epilating head according to any one of the preceding embodiments wherein a plurality of hub units (20) are arranged side by side on the axis or axle (36) to form a rotating head drum, the hub units having pressure-transferring protrusions (32) on the side opposite to the side of the discs (21-23) transferring pressure to the discs (21-23) of the neighboring hub unit (20) to further assist the tweezers (21A, 22A; 21C, 22C) of the neighboring hub unit (20) to be in an open condition over the first section of circumference of rotation around the axis or axle (36) and in a closed condition over the second section of circumference of rotation around the axis or axle (36).

15. Epilating head according to any one of the preceding embodiments, the head drum (8, 20, 21-23, 14) further comprising at one end a second hub unit (8) driving the head drum and forming an end section

of a head drum with pressure-transferring protrusions (32) transferring pressure onto a set of discs (21-23) of the neighboring hub unit (20) and at the other end a third hub unit (14) forming the opposite end section and comprising a set of discs (21-23).

16. Epilating head according to any one of the preceding embodiments further comprising at least two pressure-transferring protrusions (32) formed and positioned on a side (20B) of the hub unit (20) and/or wherein the first to the third discs (20-23) are adapted to be positioned on one side of the hub unit (20) and adapted for periodic tilting where in a first section of 360° rotational movement, the pressure-transferring protrusions (32) from a similar adjacent pincer assembly (13) are configured to press on at least one of the discs (21, 22, 23) thereby to cause the discs (21, 22, 23) to contact each other at their pincer surfaces trapping hair there between and where in a second section, the contact between the pincer surfaces is adapted to be ceased releasing the trapped hair.

17. The pincer assembly (13) according to any of the preceding embodiments, wherein the axis or axle (36) is an arcuate axis or axle (36) and/or wherein the hub unit (20) comprises at least one rotation-transferring protrusion (30) formed and positioned on one side and/or at least one recess (31) adapted to accommodate a rotation-transferring protrusion (30) of the similar adjacent pincer assembly (13) in transferring torque and/or rotational movement and stacking the similar adjacent pincer assembly (13) to the hub unit (20).

18. The pincer assembly (13) according to any of the preceding embodiments wherein the hub unit (20) comprises at least three lower convex surfaces (27) and at least three upper convex surfaces (28) on the side of the hub unit (20) hosting the discs (21-23) adapted to elevate the second disc (22) and the third disc (23) from the one side of the hub unit (20) respectively cause separation (120) between the discs (21, 22, 23) and allowing the periodic tilting of the units (22, 23) under the influence of the pressure transferring protrusions (32).

19. The pincer assembly (13) according to any of the preceding embodiments wherein three lower convex surfaces (27) are positioned 120° apart and/or wherein the three upper convex surfaces (28) are positioned 120° apart.

20. The pincer assembly (13) according to any of the preceding embodiments, wherein the upper convex surfaces (28) are adapted to be inserted through three slots (25) comprised in the second disc (22).

21. The pincer assembly (13) according to any of the preceding embodiments, wherein six first pincers (21A, 21B, 21C, 21D, 21E, 21F) are positioned 60° apart; wherein the at three second pincers (22A, 22B, 22C) are positioned 120° apart; and/or wherein the three third pincers (23A, 23B, 23C) are positioned 120° apart.

22. The pincer assembly (13) according to any of the preceding embodiments wherein six tweezers (100) are formed by a combination of one of the first pincers (21A-F) and one of the second pincers (22A-C) or a combination of one of the first pincers (21A-F) and one of the third pincers (23A-C) and/or wherein all of the tweezers (100) are axially offset from each other during the rotation of the pincer assembly (13) around the arcuate axis or axle (36).

23. An epilating head (2) according to any of the preceding embodiments comprising a group of pincer assemblies (13) mounted on the axis or axle (36) and adapted to rotate around the axis or axle (36).

24. The epilating head (2) according to embodiment 23, wherein the axis or axle (36) is an arcuate axis or axle (36) which is configured to be fixed to a head base (10) and a back base (12).

25. The epilating head (2) according to any of the preceding embodiments wherein the group of pincer assemblies (13) is adapted to be situated between a head gear (8) and a backside unit (14) which are adapted to transfer an applied force to the group of pincer assemblies (13), wherein the head gear (8) is further adapted to receive a torque and/or rotational movement from an idler gear (7) and transfer it to the group of pincer assemblies (13).

26. The epilating head (2) according to any of the preceding embodiments wherein the epilating head (2) further comprises a spring (11), adapted to provide pressure to the group of pincer assemblies (13) and/or wherein a substantial part of the pressure is applied to the most curved edge of the group of pincer assemblies (13).

27. An epilating device (1) with the group of pincer assemblies (13) according to any of the embodiments 1 to 9, and an epilating head (2), according to any of the embodiments 10 to 13, further comprising a driving unit (3).

28. An epilating device (1) according to the preceding embodiment wherein the driving unit (3) comprises a gear assembly, motor (4), and/or a power source unit.

29. An epilating device (1) according to the preceding

embodiment, wherein the power source unit comprises one or more batteries configured to supply the motor (4) with power.

30. An epilating device (1) according to the preceding embodiment wherein the gear assembly comprises a motor gear (5), receiving a torque and/or rotational movement from the motor (4), and/or a face gear (6), transferring the torque and/or rotational movement to an idler gear (7) via intermediate gears.

31. A method for operating an epilating head, especially an epilating head according to any of the relevant preceding embodiments, comprising the steps of:

a. providing at least a first disc (21) with at least two first disc pincers (21A; 21C; 21E), the first disc rotating around an axis or axle (36) of rotation;
b. providing at least a counter element (20; 22) with at least two counterparts (20A-F; 22A-C), the counter element rotating around the axis or axle (36);
c. configuring the first disc (21) and the counter element (20; 22) to form a first pair of tweezers (21A, 20A; 21A, 22A) that is composed of one of the first disc pincers (21A) and one of the counterparts (20A-F; 22A-C) and to form a second tweezer (21C, 20C; 21C, 22C) that is composed of another one of the first disc pincers (21C) and another one of the counterparts (20A-F; 22A-C);

i. the first and second tweezers (21A, 22A; 21C, 22C) each being in an open condition over at least a first section of circumference when rotating them around the axis or axle (36) and
ii. the first and second tweezers (21A, 22A; 21C, 22C) each being in a closed condition over a second section of circumference when rotating them around the axis or axle (36);

d. wherein the first tweezer (21A, 22A) and the second tweezer (21C, 22C) are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

Brief description of the drawings

[0052] The drawings, described below, are for illustration purposes only. The drawings are not intended to limit the scope of the present teaching in any way.

Fig. 1 exemplifies a perspective view of an epilating device according to an embodiment of the invention;

Fig. 2 exemplifies a perspective view of a part of an epilating head and a drive with gear according to an embodiment of the invention;

Fig. 3 exemplifies a perspective view onto an epilating head and a part thereof according to an embodiment of the invention;

Fig. 4 exemplifies a perspective view onto a part of an epilating head and a top view and enlarged view of parts thereof according to an embodiment of the invention;

Fig. 5 exemplifies a top view and cross-sections of a part of an epilating head according to an embodiment of the invention;

Fig. 6 exemplifies different views onto an epilating head according to an embodiment of the invention;

Fig. 7 exemplifies a top view and cross-sections of a part of an epilating head according to an embodiment of the invention;

Fig. 8 exemplifies a side view onto parts of an epilating head and cross-sections thereof according to an embodiment of the invention; and

Fig. 9 shows another embodiment of a subset of elements of an epilating head according to the present invention.

Detailed description

[0053] **Fig. 1** depicts an epilating device **1** comprising an epilating head **2** and driving unit **3**. The epilating head **2** is adapted to be attached to the driving unit **3** and to receive at least one of rotational movement or torque from it.

[0054] Also, the driving unit **3** comprises two buttons for detaching the epilating head **2** and a controlling circuitry. The buttons are placed on the narrow sides of the driving unit **3**. By pushing both buttons and shifting upwards the epilating head **2**, the head can be detached.

[0055] The controlling circuitry can be used to start, stop, and change a torque or speed of rotation of the driving unit and hence the epilating head **2**.

[0056] The epilating head comprises a substantially curved cylinder, arranged to epilate or tweeze user's hairs. The cylinder is situated on the upper part of the epilating head **2**. A plastic cover is used to prevent unwanted user's contact with moving gears covers the left and right sides of the cylinder. The central part of the cylinder is adapted to be open and exposed to a user. This part is a working part arranged to depilate/epilate hairs by contact with user's skin and interaction with the hairs.

[0057] **Fig. 2** depicts an epilating head **2** and a driving

unit **3** without their plastic covers, exposing their internal structure. The epilating head **2** comprises a gear assembly, arranged to transfer torque or a rotational movement from a motor **4** to the epilating head **2**. One or more batteries **9** can drive the motor **4**. Also, the motor **4** meshes with the gear assembly by a motor gear **5**, which in turn drive two small gears meshed with a face gear **6**. The face gear **6** transfers torque and a rotational movement to an idler gear **7**, which in turn meshes with a head gear **8**. The head gear **8** is firmly attached to an epilating cylinder, setting it in motion.

[0058] **Fig. 3** depicts a more detailed view of an epilating head **2**. An epilating cylinder is driven by a head gear **8**, which is meshed with a gear assembly with an idler gear **7** that can be seen in the figure.

[0059] The head gear **8** is attached to the side of the cylinder, where the head gear **8** and cylinder together are adapted to be fixed on a curved axle (not shown), which is connected to mobile back parts **12**. The mobile back parts **12** are arranged to be a part of a head base **10**. They are placed on the side edges of the head base **10**. Also, the head base **10** comprises one or more, preferably four latches situated on the bottom side of the head base **10**.

[0060] The epilating cylinder is made in the form of a group or set of pincer or tweezer assemblies **13** that are packed and held on a curved axle (not shown). A biasing spring **11**, e.g., made of metal, or a frame is adapted to hold the group of the pincer assemblies **13**. Instead also a rigid structure to hold the elements in place can be used.

[0061] On the bottom of the figure, a single pincer assembly **13** is depicted. It comprises a hub unit **20**, a first disc **21**, a second disc **22**, and a third disc **23**. Each pincer assembly **13** is adapted to have six epilating tweezers, uniformly placed along the circumference of the cylinder but all or some of them having a different position to the axis of rotation.

[0062] **Fig. 4** depicts a more detailed view of one pincer assembly **13** comprising a hub unit **20**, the first disc **21**, the second disc **22**, and the third disc **23**.

[0063] The third disc **23** comprises pincers **23A, 23B, 23C**, anvil or a second pincer **23B** being placed on a medium or same level regarding the level of a middle section of the third part, a first pincer **23A** on a level that is lower in the image shown or displaced to one side of the middle section of the third pincer **23**, and a third pincer **23C** on a level that is higher in the image shown or displaced to another side of the middle section of the third pincer **23**. The second disc **22** is shaped similarly with a second pincer **22B** on the same level, a first pincer **22A** on a lower level and a third pincer **22C** on a higher level than the respective middle section. The respective pincers **23A, 23B, 23C, 22A, 22B, 22C** together provide a part of tweezers different in axial displacement to each other.

[0064] The first disc comprises six anvils or pincers **21A, 21B, 21C, 21D, 21E, 21F**, which are displaced or axially offset according to the corresponding pincer of the second or third discs, respectively.

[0065] The hub unit **20** is adapted to regulate the distance of the first to third discs with respect to each other by controlling at least one of their axial displacements or their tilting on the axle.

[0066] The displacement of the third disc **23** is achieved by means of three upper ball-shaped surfaces **28**, which are placed on the top of upper ball-shaped surface supports **26**. Also, the supports **26** prevent the second disc **22** from rotation, going through three slots **25** for the upper ball-shaped surface supports.

[0067] The elevation of the slot unit **22** is achieved by means of three lower convex or ball-shaped surfaces **27**.

[0068] The hub unit **20** comprises topography with protrusions and indentations placed on the side of the hub unit **20** that keep the first disc **21** in the working position and prevent it from unwanted rotation. Moreover, the hub unit **20** comprises three protrusions **30** that engage a neighboring pack of hub unit and first to thirds discs in order to convey the rotational movement and torque. The protrusions **30** are formed at the base thereof additionally in order to prevent the third disc **23** from unwanted rotation. However, the rotation of the assembly comprising the hub unit **20** and the first to third discs **21** to **23** around the axle **36** is allowed.

[0069] The enlarged view in **Fig. 4** shown in the lower right part shows the different convex elements **27** and **28** that are positioned to support the respective discs accordingly. The protrusion **28** is located on a protrusion **26** that is configured to engage the respective cut-outs or recesses **25** in the center hole of the second disc **22** in order to allow a positive engagement of the second disc **22**.

[0070] The bottom view of the hub unit **20** is depicted in the left bottom corner. The protrusions **30** can be inserted into three cavities or recesses **31** of the next hub unit **20** to form a respective assembly. Also, the hub unit **20** comprises six pressing protrusions **32**, adapted to squeeze the pincer assembly **13** from the top when it is desired to activate the tweezers.

[0071] **Fig. 5** depicts an assembled single pincer assembly **13**. In the left top corner, the view from the top of a pincer assembly **13** can be seen. In the left bottom corner, the view from the side of the pincer assembly **13** can be seen.

[0072] The cross-section across line **B-B** is going through the centers of two assembled tweezers, two pressing protrusions **32**, upper ball-shaped surface of protrusion **28**, the center of the assembly, and lower ball-shaped surface **27**. The cross-section can be seen in the second row of drawings in a tilted manner. The left tweezer, which is squeezed, comprises a pincer **22C** of the second disc **22** and a pincer **21E** of the first disc **21**. The right tweezer, which is shown in an opened condition, comprises a lower pincer **21B** of the first disc **21** and an upper pincer of the third disc **23**.

[0073] It is further apparent that the protrusions 30 protrude beyond the rest of the pack of elements in order to

engage the neighboring pack.

[0074] The cross-section **D-D** is going through the centers of two assembled tweezers, two pressing protrusions **32**, upper ball-shaped surface **28**, the center of the assembly, and lower ball-shaped surface **27**. The respective cross-section is depicted to the right in the first row of drawings. The upper tweezer, which is shown open for releasing hair, is composed of the pincer **22B** and pincer **21A**. The tweezer below which is shown in the closed position, is composed of the pincers **23C** and **21D**. The respective support and engagement of the first to the third discs can be further derived from these figures.

[0075] **Fig. 6** depicts an epilating head **2** without covers at the end. A front view is presented on the top of the page and the top view in the center. In the top view the two arrows each marked with a **P** show that a force or pressure is applied from the side onto the epilating head. As mentioned before, this could be realized by a dense packing of the elements in the head or even a biasing arrangement by metallic side supporting structures acting similar to springs.

[0076] The cross-section **A-A** is going through the center of an epilating cylinder. The respective cross-section can be seen on the bottom of the page.

[0077] The epilating cylinder is assembled by a number of hub units and discs or pincer assemblies. The right part of the cylinder is shown without hub units **20**, providing a detailed view of the internal structure, particularly of the arrangement of the discs.

[0078] The group of pincer assemblies is arranged on a curved axle **36**. The ends of the curved axle **36** are fixed in a head base **10** and mobile back part **12**. The curved axle **36** is adapted to be fixed but the group of pincer assemblies **13** to rotate around the curved axle 36 as a whole driven by a head gear **8** which is meshed with a gear assembly **7**.

[0079] The spring **11**, which made in the form of a metal frame, applies a squeezing force to both the head base **10** and mobile back part **12** in the **P** directions. Because of curvature, the upper part of the group of pincer assemblies exercises a maximal squeezing force but the opposite no pressure or less. Hence, the tweezers on the top site are squeezed and ones on the opposite site are opened or released. Therefore, the rotating group of pincer assemblies cause the trapping of hair, the epilating of user's hairs and the release thereof.

[0080] **Fig. 7** depicts an assembled single pincer assembly. The cross-section **B-B** has been made through the centers of two assembled tweezers being shown on top of the figure and the two pressing protrusions **32** and lower ball-shaped surface **27**. The imaginary cut can be seen at the bottom left corner. The left tweezer is closed and/or squeezed, the right tweezer is opened and/or released. The cross-section is passing along a slot unit **22** showing its cutting.

[0081] The cross-section **C-C** is going through the centers of two assembled tweezers, two pressing protrusions **32**, and upper ball-shaped surface **28**. The cross-section can be seen at the bottom right corner of **Fig**. **7**. The left tweezer is shown in the squeezed state, the right tweezer in the released state.

[0082] Line **33** is drawn between two adjacent upper ball-shaped surfaces **28**, showing two-point bending line of a top unit **23**. The line is situated outside the center area occupied by a curved axle **36**, hence its friction is reduced during the squeezing/releasing process.

[0083] The imaginary line **34** is drawn between two adjacent lower ball-shaped surfaces **27**, showing two-point bending line of a slot unit **22**. The line is situated outside the center area occupied by the curved axle **36**, hence its friction is reduced during the squeezing/releasing process.

[0084] **Fig. 8** depicts three adjacent pincer sets or assemblies **13** strung on a curved axle **36** and shown at the top left corner.

[0085] The cross-section **A-A** is going through the curved axle 3**6**. The cross-section can be seen at the bottom of the page, where the top tweezers are squeezed and the bottom ones released because of curvature of the curved axle **36** and squeezing force of a spring **11** (not shown).

[0086] The cross-section **B-B** in **Fig 8** shows the function of a generating protrusion **30** inserted into a recess or cavity **31**. As it can be seen, the generating protrusion **30** and cavity **31** still engage even in the status when neighboring sets are spaced from each other. In the opposite side they engage more clearly or deeply. The elevation of the generating protrusion **31** and the curvature of the curved axle **36** are designed to be high and big enough to allow the pincer assemblies **13** be substantially tightly squeezed on the top side and released on the bottom side.

[0087] **Fig. 9** shows perspective views of an assembly of elements **20** to **23** according to another embodiment of the invention. In this embodiment the hub unit **20** also takes the role of a counter element with counterparts **20A** to **20F**. These counterparts **20A** to **20F** cooperate with the pincers **22A** to **22C** as well as **23A** to **23C** to form tweezers. In such an assembly a third disc is not present but replaced by respective shapes of the hub unit's counterparts.

Claims

1. An epilating head for an epilating device comprising:

a. at least a first disc (21) with at least two first disc pincers (21A; 21C; 21E), the first disc being rotatable around an axis or axle (36) of rotation;
b. at least a counter element (20; 22) with at least two counterparts (20A-F; 22A-C), the counter element (20; 22) being rotatable around the axis or axle (36);
c. the first disc (21) and the counter element (20; 22) being configured that a first pair of tweezers

(21A, 20A; 21A, 22A) is composed of one of the first disc pincers (21A) and one of the counterparts (20A-F; 22A-C) and a second tweezer (21C, 20C; 21C, 22C) is composed of another one of the first disc pincers (21C) and another one of the counterparts (20A-F; 22A-C);

i. the first and second tweezers (21A, 22A; 21C, 22C) each being in an open condition over at least a first section of rotation around the axis or axle (36) and
ii. the first and second tweezers (21A, 22A; 21C, 22C) each being in a closed condition over a second section of rotation around the axis or axle (36);

d. wherein the first tweezer (21A, 22A) and the second tweezer (21C, 22C) are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

2. An epilating head according to claim 1, wherein the counter element (22) is a second disc (22) and the counterparts (22A-C) are second disc pincers (22A, 22B, 22C) the first and the second discs (21, 22) being configured that a first pair composed of one of the first disc pincers (21A) and one of the second disc pincer (22A) form a first tweezer (21A, 22A) and a second pair composed of one of the second disc pincers (21C) and one of the second disc pincer (21C) form a second tweezer (21C, 22C).

3. Epilating head according to claim 2 wherein the first disc pincers (21A; 21C; 21E) are formed by first disc protrusions (21A; 21C; 21E) radially extending at least in part from the first disc (21) and the second disc pincers (22A, 22B, 22C) are formed by second disc protrusions (22A, 22B, 22C) radially extending at least in part from the second disc (22), and/or wherein neighboring first disc pincers (21A; 21C; 21E) and/or neighboring second disc pincers (22A, 22B, 22C) are at least one of axially offset to each other, their envelopes of rotation are neighboring or side by side.

4. Epilating head according to any one of the preceding claims further comprising:

a. a third disc (23) with at least two third disc pincers (23A; 23B; 23C), the third disc (23) being rotatable around the axis or axle (36) of rotation;
b. the first and the third discs (21, 23) being configured that a third pair composed of one of the first disc pincers (21B) and one of the third disc pincers (23A) form a third tweezer (21B, 23A) and a fourth pair composed of one of the first disc pincers (21F) and one of the third disc pincers (23B) form a fourth tweezer (21F, 23B);

i. the third and fourth tweezers (21B, 23A; 21F, 23B) each being in an open condition over at least a first section of rotation around the axis or axle (36) and
ii. the third and fourth tweezers (21B, 23A; 21F, 23B) each being in a closed condition over a second section of rotation around the axis or axle (36);

c. wherein the third tweezer (21B, 23A) and the fourth tweezer (21F, 23B) are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

5. Epilating head according to any one of the preceding claims wherein the first disc (21) has from 4 to 8 pincers (21A-F) and each of the second disc (22) and the third disc (23) have from 2 to 4 pincers, preferably 3 pincers, so that from 4 to 8 tweezers, preferably 6 tweezers, are formed.

6. Epilating head according to any one of the preceding claims comprising 4 to 12 sets of first, second and third discs (21-23), preferably 6-10 sets of first, second and third discs (21-23), more preferably 8 sets of first, second and third discs (21-23).

7. Epilating head according to any one of the preceding claims further comprising a head drum (20, 21-23) being formed by a plurality of hub units (20) each supporting a set of discs (21-23) rotating around the axis or axle (36).

8. Epilating head according to any one of the preceding claims wherein at least one of the second disc (22) and the third disc (23) have extensions formed at the pincers (22A-C, 23A-C) extending outwardly in the direction of rotation and adapted to assist in guiding hair into the tweezers, the extensions being inclined between 10-40° with respect to the plane of the pincers (22A-C, 23A-C), preferably between 25-35°.

9. Epilating head according to any one of the preceding claims wherein the axis or axle (36) is formed concave with respect to a side of use and adapted to assist the tweezers (21A, 22A; 21C, 22C) to be in an open condition over the first section of circumference of rotation around the axis or axle (36) and in a closed condition over the second section of circumference of rotation around the axis or axle (36).

10. Epilating head according to any one of the preceding claims further comprising at least two hub units (20) each adapted to be supported on the axis or axle (36) and to rotate on the axis or axle (36) and to further support the first disc (21), the second disc (22) and the third disc (23), so that they rotate together with the respective hub unit (20), each hub

unit (20) further preferably being configured in bringing the tweezers (21A-F; 22A-C, 23A-C) each in an open condition over at least a first section of circumference of rotation and in a closed condition over at least a second section of circumference of rotation around the axis or axle (36) by a periodic tilting of one, more than one or all of the discs (21-23).

11. Epilating head according to the preceding claim wherein the axis or axle (36) is formed concave with respect to a side of use, at least two sets of hub units (20) being arranged on the axis or axle (36) and in view of the concave shape of the axis or axle (36) the hub units (20) each being configured to cause the tweezers (21A-F; 22A-C, 23A-C) each in an open condition over at least a first section of circumference of rotation and in a closed condition over at least a second section of circumference of rotation around the axis or axle (36), preferably in or close to the side of use.

12. Epilating head according to any one of the preceding claims wherein a plurality of hub units (20) are arranged side by side on the axis or axle (36) to form a rotating head drum, the hub units having pressure-transferring protrusions (32) on the side opposite to the side of the discs (21-23) transferring pressure to the discs (21-23) of the neighboring hub unit (20) to further assist the tweezers (21A, 22A; 21C, 22C) of the neighboring hub unit (20) to be in an open condition over the first section of circumference of rotation around the axis or axle (36) and in a closed condition over the second section of circumference of rotation around the axis or axle (36).

13. Epilating head according to any one of the preceding claims further comprising at least two pressure-transferring protrusions (32) formed and positioned on a side (20B) of the hub unit (20) and/or wherein the first to the third discs (20-23) are adapted to be positioned on one side of the hub unit (20) and adapted for periodic tilting where in a first section of 360° rotational movement, the pressure-transferring protrusions (32) from a similar adjacent pincer assembly (13) are configured to press on at least one of the discs (21, 22, 23) thereby to cause the discs (21, 22, 23) to contact each other at their pincer surfaces trapping hair there between and where in a second section, the contact between the pincer surfaces is adapted to be ceased releasing the trapped hair.

14. The pincer assembly (13) according to any of the preceding claims wherein the hub unit (20) comprises at least three lower convex surfaces (27) and at least three upper convex surfaces (28) on the side of the hub unit (20) hosting the discs (21-23) adapted to elevate the second disc (22) and the third disc (23) from the one side of the hub unit (20) respectively cause separation (120) between the discs (21, 22, 23) and allowing the periodic tilting of the units (22, 23) under the influence of the pressure transferring protrusions (32).

15. A method for operating an epilating head, especially an epilating head according to any of the relevant preceding claims, comprising the steps of:

a. providing at least a first disc (21) with at least two first disc pincers (21A; 21C; 21E), the first disc rotating around an axis or axle (36) of rotation;
b. providing at least a counter element (20; 22) with at least two counterparts (20A-F; 22A-C), the counter element rotating around the axis or axle (36);
c. configuring the first disc (21) and the counter element (20; 22) to form a first pair of tweezers (21A, 20A; 21A, 22A) that is composed of one of the first disc pincers (21A) and one of the counterparts (20A-F; 22A-C) and to form a second tweezer (21C, 20C; 21C, 22C) that is composed of another one of the first disc pincers (21C) and another one of the counterparts (20A-F; 22A-C);

i. the first and second tweezers (21A, 22A; 21C, 22C) each being in an open condition over at least a first section of circumference when rotating them around the axis or axle (36) and
ii. the first and second tweezers (21A, 22A; 21C, 22C) each being in a closed condition over a second section of circumference when rotating them around the axis or axle (36);

d. wherein the first tweezer (21A, 22A) and the second tweezer (21C, 22C) are at least one of axially offset, their envelopes of rotation are neighboring or side by side.

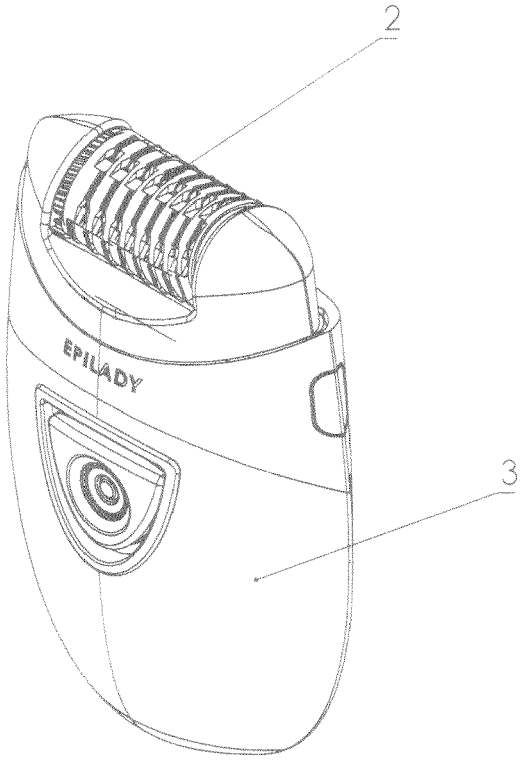

FIG 1

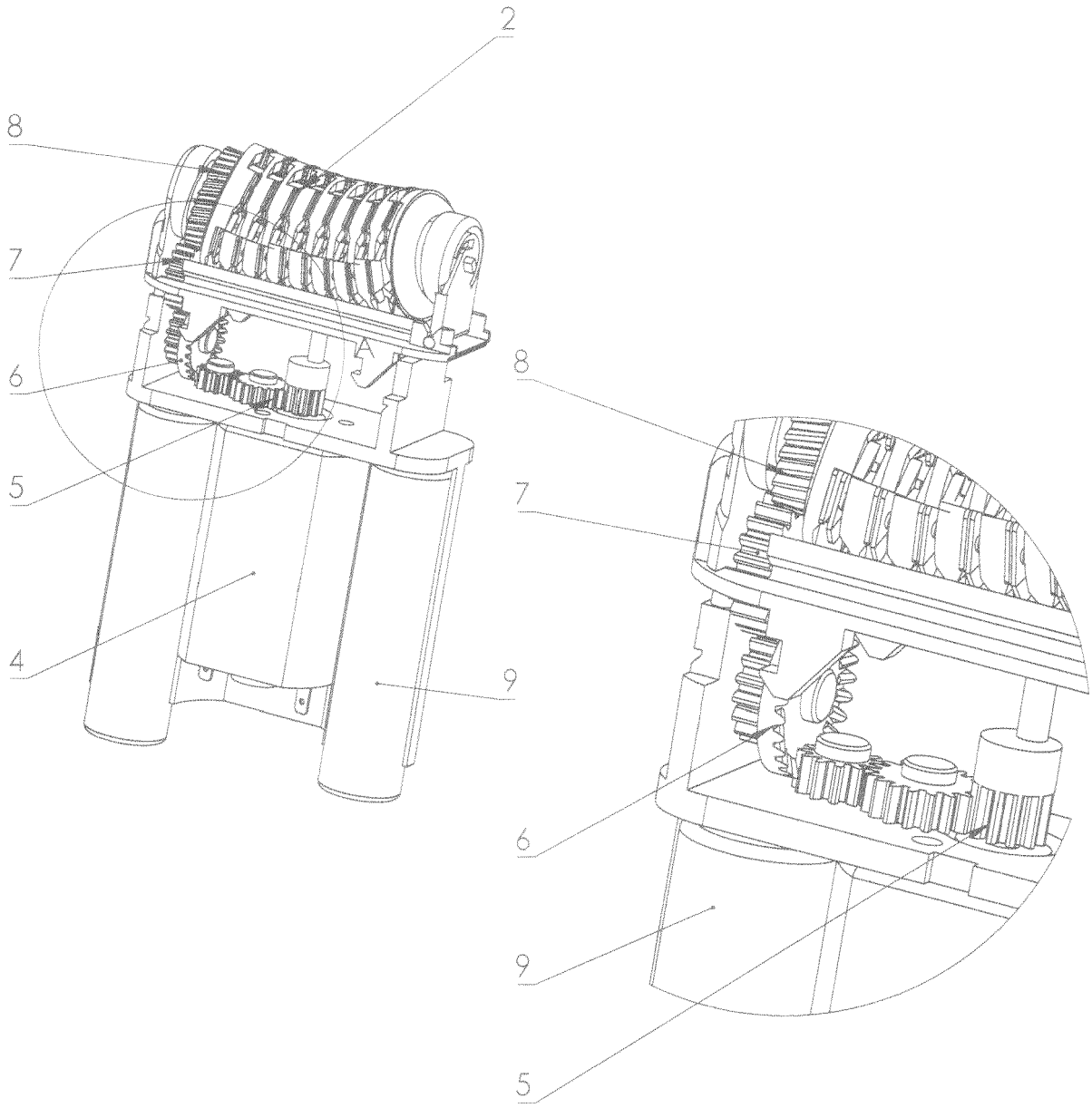

FIG 2

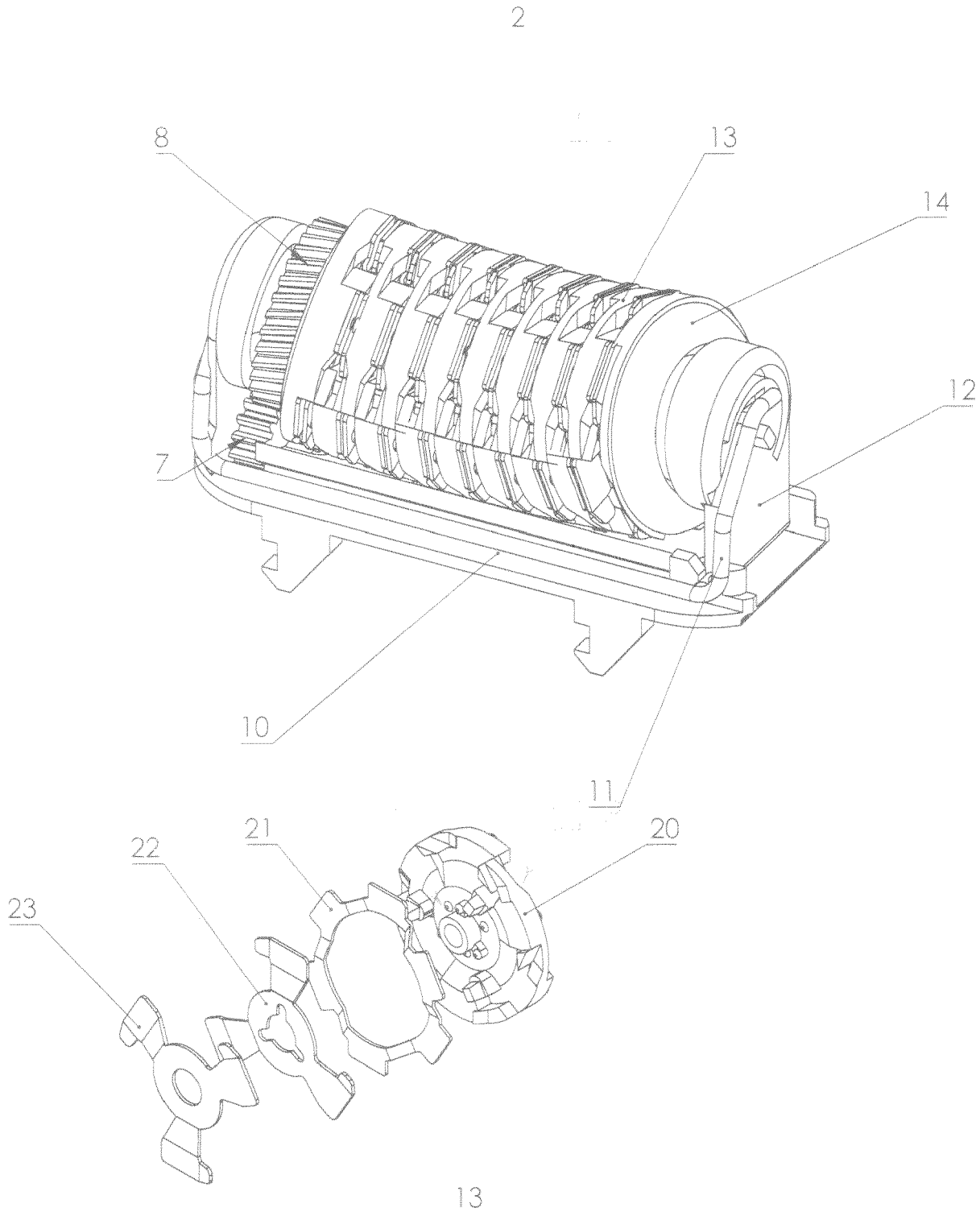

FIG 3

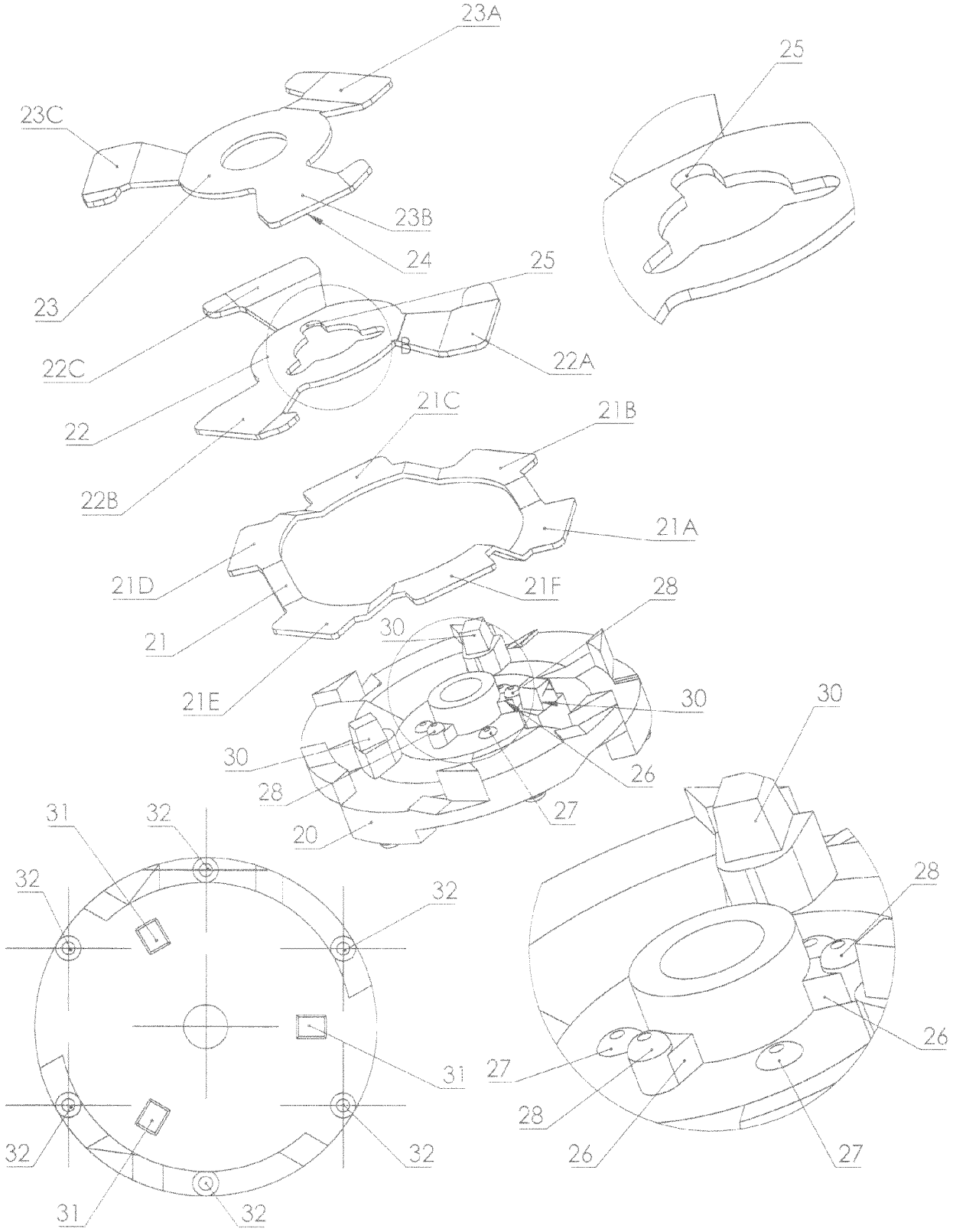
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FIG 4

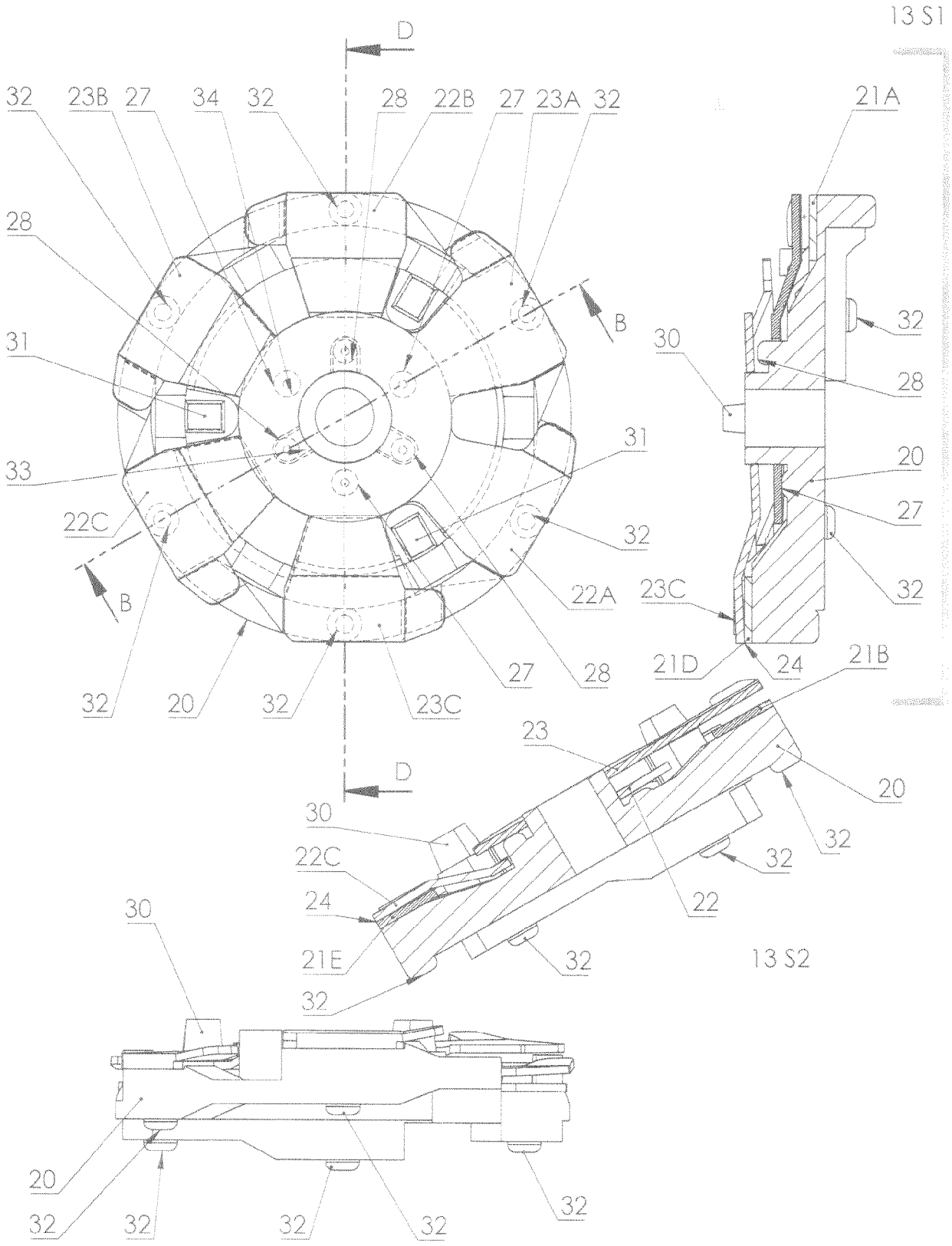
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FIG 5

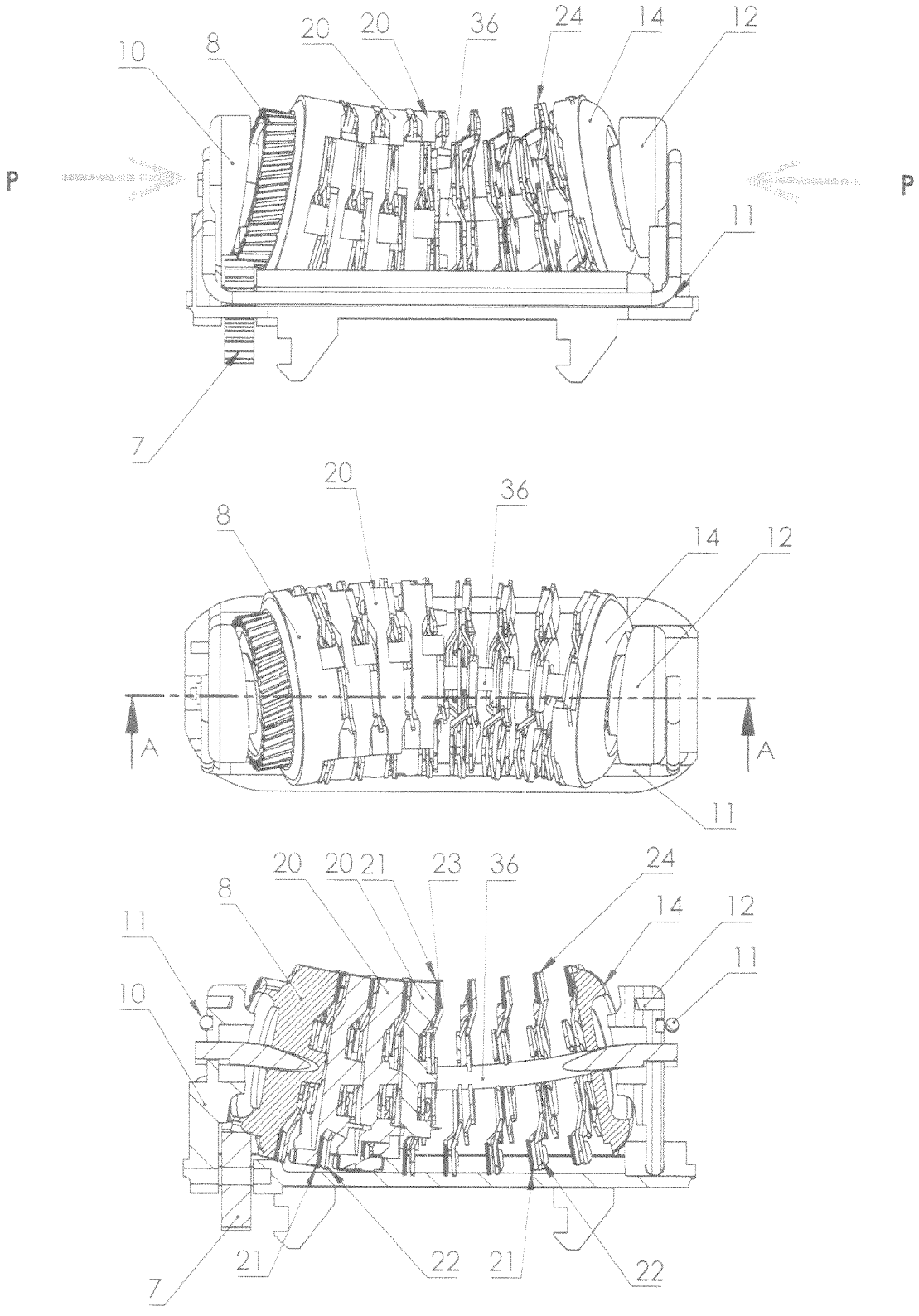
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FIG 6

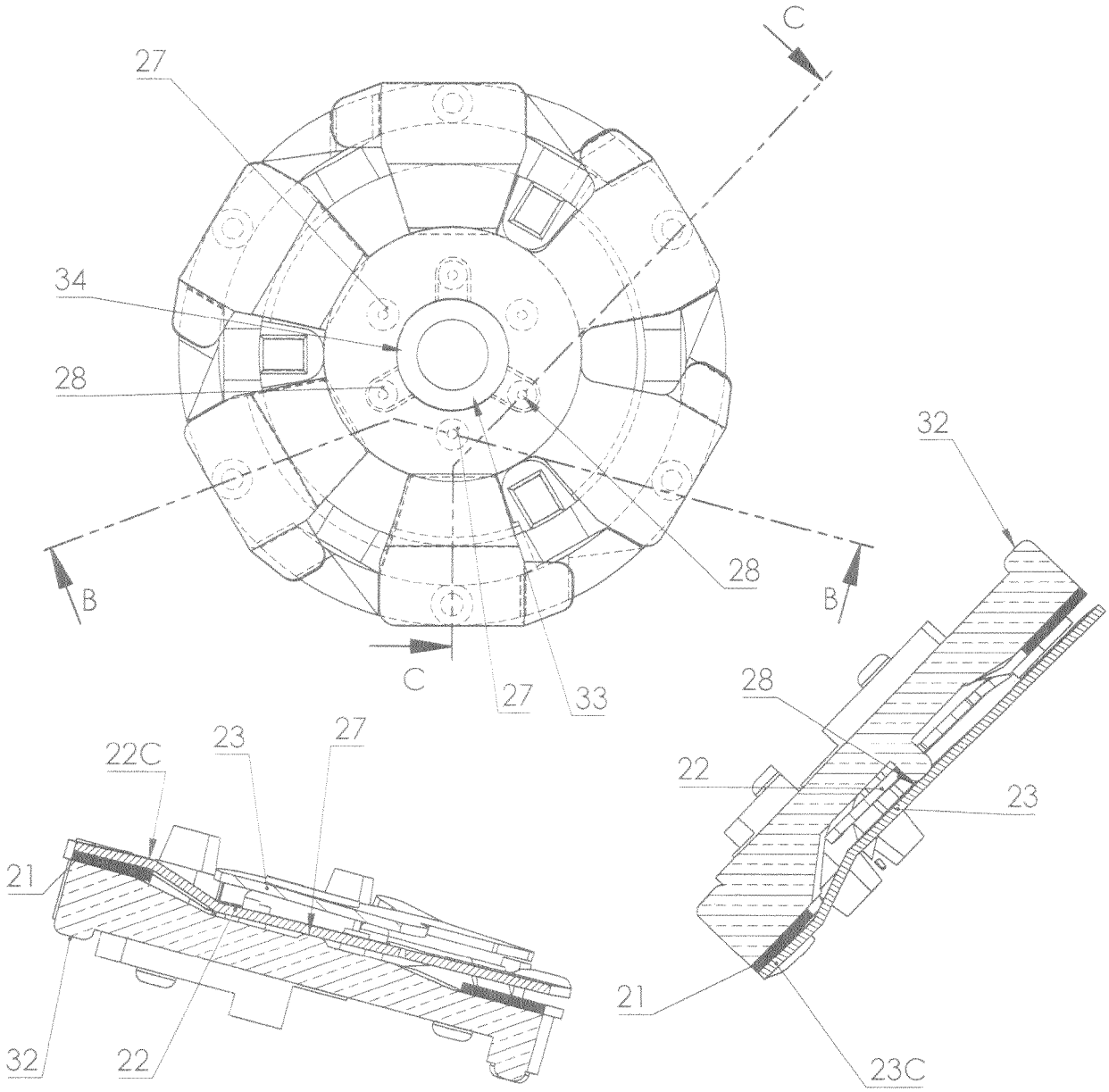

FIG7

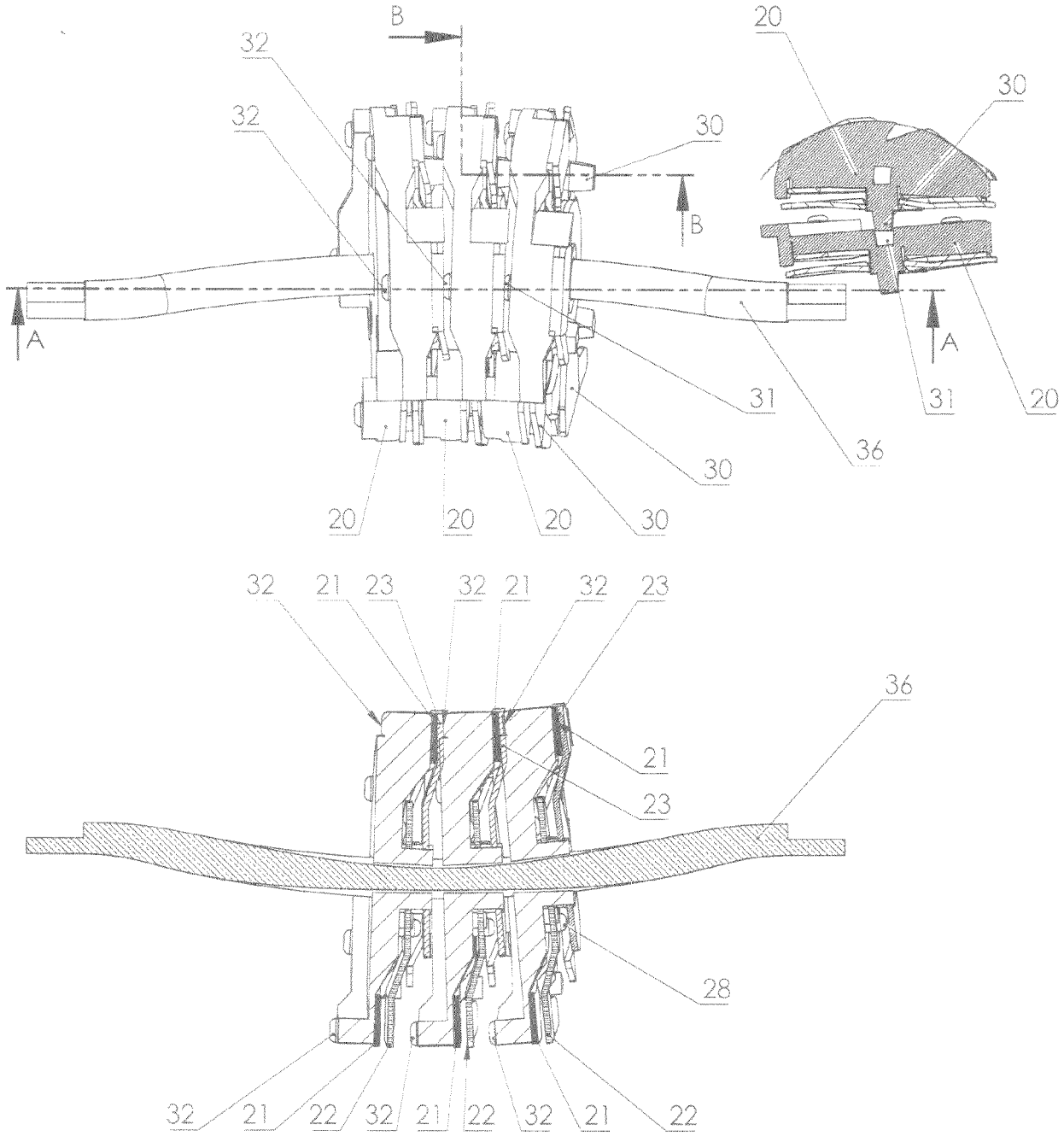
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FIG 8

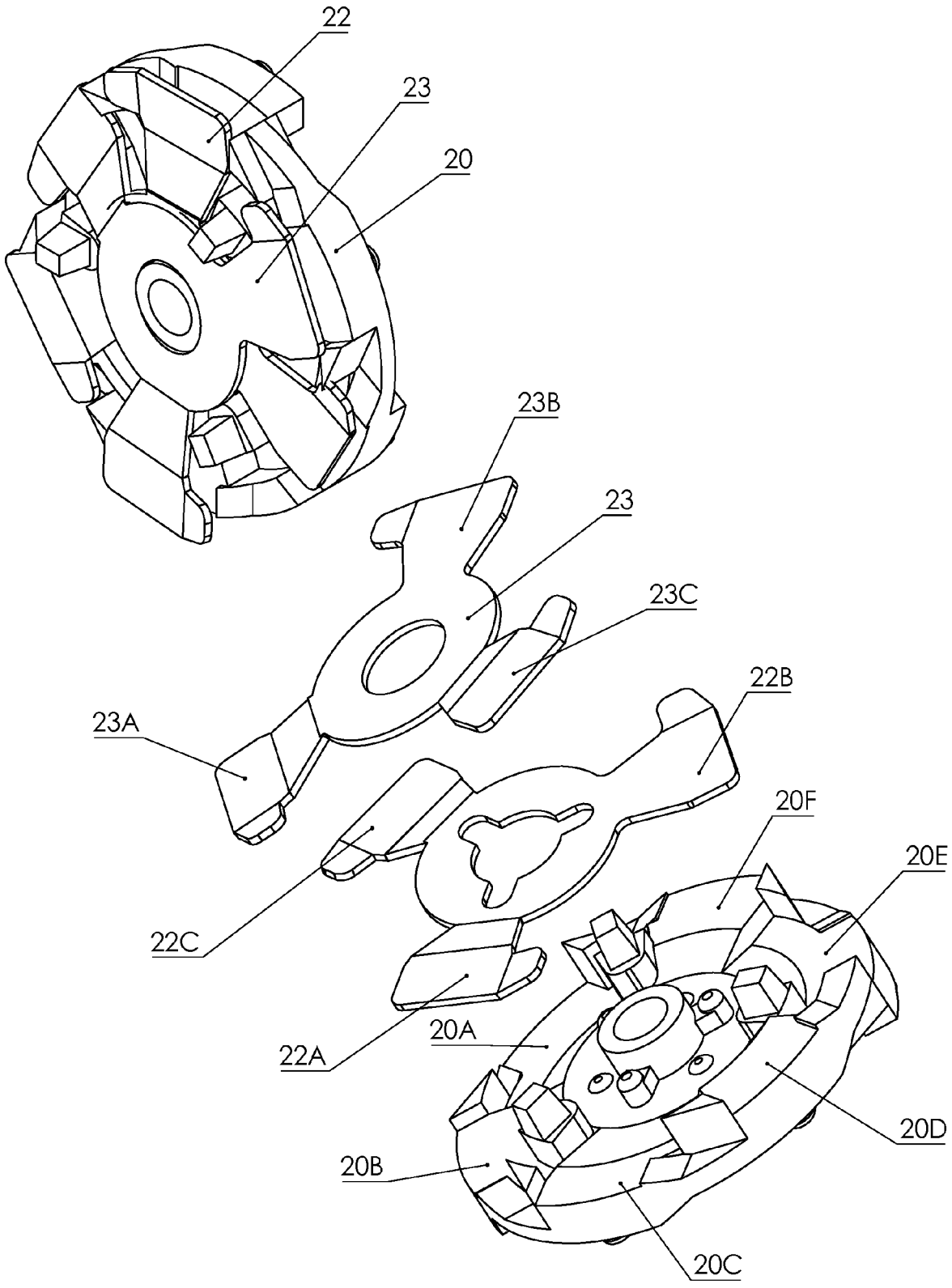

FIG 9

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 2220

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2012/035621 A1 (PLATEK AVNER [IL]) 9 February 2012 (2012-02-09) * paragraph [0011] - paragraph [0057]; figures 1-13 * -----	1-15	INV. A45D26/00

TECHNICAL FIELDS SEARCHED (IPC)

A45D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 May 2018	Ehrsam, Sabine

CATEGORY OF CITED DOCUMENTS

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US 2012035621 A1	09-02-2012	NONE	

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