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(54) **Door adjustment mechanism**

Türjustierungsmechanismus

Mécanisme de réglage de porte

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DE-A1- 19 548 512 US-A- 5 980 006

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Description

Technical Field

[0001] The present invention relates to mechanisms, which is mounted to the doors of built-in white goods in order to adjust the stiffness of opening and closing of such doors.

Prior Art

[0002] Covering plates made usually from wooden materials and mounted on the doors of built-in white goods are being widely used. Since such white goods of different models and functions have doors of varying sizes, and since covering plates of various weights are applied on such doors, special weight balancing mechanisms are required.

[0003] Particularly for built-in white goods such as dish washers, no aesthetical closing plate is provided on the machine as it is originally delivered out of the factory. The users supply such closing plates to be mounted onto the built-in white goods according to their own preferences. The closing plates preferred by the users, however, may be very different from each other with respect to their weights. If there is no mechanism available for tolerating this weight difference in white goods, heavy doors may quickly drop down as they are opened. On the other hand, the opening of relatively lighter doors may become more difficult. Therefore, a mechanism to compensate this weight difference becomes crucial in such white goods.

[0004] In the mechanism used for balancing the covering plate as disclosed in the published patent application US5980006 under the prior art, the tightening and loosening operations are carried out by means of a screw. The tip of the screw provided in the mechanism first contacts a roller system. When the screw is tightened, the screw tip stretches the roller and a rope connected to the roller system so as to produce a stiffer spring for heavier doors to be mounted, or a looser spring for lighter doors to be mounted in a loose manner. In another published patent application DE19548512 under the prior art, the door weight is balanced by tightening or loosening a spring directly connected to a screw by means of the screw.

[0005] In a further published patent application WO2006137039 under the prior art is disclosed a mechanism which coils a cable connected to the door's spring on a rotating element. By rotating an adjustment bar in this mechanism, the cable is coiled or loosened on a rotating element coupled to said adjustment bar. Thus the tension of the door's spring is adjusted.

Brief Description of Invention

[0006] As differing from the aforementioned examples, the door adjustment mechanism according to the present

invention comprises a mechanism body, an adjustment gear which can rotate in a slot on said body; a pin positioning gear rotated by said adjustment gear; a worm gear passing through the pin positioning gear and moving forth and back according to the movement of this gear; and a spring connection pin which can move forth and back together with the worm gear and of which one end is coupled to a stretching spring.

[0007] When the mechanism is mounted, the rotation of said adjustment gear makes the positioning gear rotate around its own axis. The teeth at the adjustment gear and the positioning gear do engage to each other, such that the adjustment gear rotates the positioning gear. The rotation of the positioning gear drives the worm gear passing through the interior of said gear. The engagement of the screw thread outside the worm gear to the screw thread inside the positioning gear, and the introducing of a protrusion provided at the mechanism body into a channel on said worm gear allows the worm gear only to move back and forth.

[0008] The worm gear is supported both by the interior of the positioning gear, and by a slot in the mechanism body. By rotating the positioning gear, the forth and back moving worm gear carries the spring connection pin together with itself. For this reason the tension of the spring connected to the spring connection pin is altered. The applicability of the same mechanism on the doors of white goods of differing weights provides a simple adjustment of the tension of the door spring and of the stiffness of opening or closing the door of such white goods.

Objective of Invention

[0009] The objective of the present invention is to produce a mechanism to adjust the door opening and door closing stiffness in built-in white goods.

[0010] Another objective of the present invention is to provide a mechanism which provides simple adjustment and occupies relatively less space.

[0011] A further objective of the present invention is to develop a mechanism which is capable of minimizing the loosening of door spring during use.

[0012] Still a further objective of the present invention is to produce a door adjustment mechanism, which can be quickly mounted, can be applied to any kind of white goods, and is inexpensive and reliable.

Description of Figures

[0013] An illustrative embodiment of the subject door adjustment mechanism is illustrated in annexed figures briefly described hereunder.

Figure 1 is a perspective view of the adjustment mechanism.

Figure 2 is a perspective view of the mechanism body.

Figure 3 is a perspective view of the worm gear.

Figure 4 is a perspective view of the spring connection pin.

Figure 5 is a perspective view of the adjustment gear.

Figure 6 is a perspective view of the pin positioning gear.

[0014] The parts in said figures are individually enumerated as following.

Adjustment mechanism (A)
 Mechanism body (1)
 Worm gear (2)
 Spring connection pin (3)
 Adjustment gear (4)
 Positioning gear (5)
 Stopper (6)
 Slot (12)
 Protrusion (12a)
 Slot (14)
 Slot (15)
 Base (16)
 Screw thread (21)
 Channel (22)
 Hole (23)
 Lower section (26)
 Slot (27)
 Straight surface (27a)
 Hole (35)
 Slot (36)
 Pin head (37)
 Straight surface (37a)
 Teeth (41)
 Pin (42)
 Key slot (43)
 Teeth (51)
 Screw thread (52)
 Pin (55)

Description of Invention

[0015] Figure 1 gives a perspective view of the door adjustment mechanism (A) according to the present invention in an assembled form. Said adjustment mechanism (A) comprises a mechanism body (1), an adjustment gear (4) which can rotate in a slot (14) on this body (1); a pin positioning gear (5) rotated by said adjustment gear (4); a worm gear (2) passing through this gear (5) and moving forth and back with respect to the rotation direction of this gear (5); and a spring connection pin (3) which can move forth and back together with the worm gear (2) and of which one end is coupled to a stretching spring (not illustrated in the figure).

[0016] Figure 2 is a perspective illustration of the mechanism body (1). The mechanism body (1) is a part fixed to a white good or to the door of such a white good. On said body (1) are provided a slot (14) wherein said adjustment gear (4) is supported in a rotating manner; another slot (15) wherein said positioning gear is sup-

ported in a rotating manner; and a further slot (12) wherein the worm gear is supported in a forth- and back-movable manner. In the internal section of said slot (12) is provided a protrusion (12a), which prevents said gear (2) from rotating in said slot (12) by entering into a channel on the worm gear (2) and guides said gear (2) so that the latter (2) is enabled only to make a forth- and back-displacement.

[0017] Figure 3 is a different perspective view of said worm gear (2). Said worm gear (2) is a rod-like piece, with a screw thread (21) provided on its exterior extending lengthwise. As for the interior of said worm gear (2), there is provided a lengthwise hole (23). Said hole (23) is embodied to have the spring connection pin (3) settled therein. Said screw thread (21) is divided into two lengthwise regions by a channel (22). The protrusion (12a) in said slot (12) is formed so as to introduce into this channel (22).

[0018] The lower section (26) of the worm gear (2) has a straight form, so that, once the mechanism (A) is mounted, it settles on the straight-surfaced body base (16). The channel (22) is located at the upper section of the worm gear (2). At one end of the worm gear (2) is provided a slot (27), into which the pin head (37) provided at one end of said spring connection pin (3) is settled.

[0019] The slot (27) and pin head (37) are formed in a mutually complementary manner so as to avoid the rotation of the pin (3). For instance, a straight section (37a) on a side of the pin head (37) leans against the straight section (27a) at the slot (27) and thus, the rotation of the spring connection pin (3) within the hole (23) in the worm gear (2) is prevented.

[0020] Figure 4 is a perspective view of said spring connection pin (3). The spring connection pin (3) is a rod-like piece, with said pin head (37) provided at one side thereof. At the other end of said pin (3) is provided a hole (35), into which (35) one end of the spring is attached (not illustrated in the Figure). A slot (36) is provided above said hole (35), wherein (36) a stopper (6) (illustrated as a screw in Figure 1) is inserted. The aim of using said stopper (6) is to prevent any unwanted dislocation of said worm gear (2). When the worm gear (2) displaces maximally towards one side, the stopper (6) piece leans against the positioning pin (5) and avoids any further displacement of the gear (2). As the worm gear (2) and pin (3) are mounted to each other, the stopper (6) piece becomes located at the end of the worm gear (2).

[0021] Figure 5 is a perspective illustration of the adjustment gear (4). Teeth (41) are provided at one end of the adjustment gear (4) so as to yield a gear. As for the pin (42) making up the central part, it is supported in said slot (14) in the mechanism body (1) so as to rotate there. At the other end of the gear (4) is provided a key slot (43), which can be rotated by means of the tip of a hand tool, such as a screwdriver, allen wrench, etc.

[0022] Figure 6 is a perspective illustration of the positioning gear (5). Teeth (51) are provided at one end of the positioning gear (5) so as to yield a gear. As for the

pin (55) making up the rear part, it is supported in said slot (15) in the mechanism body (1) so as to rotate there. In the interior of the gear (5) is provided a screw thread (52), which extends lengthwise along the main axis and is complementary to the screw thread (21) on the worm gear (2).

[0023] When the mechanism (A) illustrated in Figure 1 is mounted, rotating the adjustment gear (4) by means of the wrench slot (43) brings about the rotation of the positioning gear (5) around its own axis. Since the teeth (41, 51) at the ends of the adjustment gear (4) and the positioning gear do engage to each other, the adjustment gear (4) rotates the positioning gear (5) as well.

[0024] Since the sections (41, 51) at which teeth are provided is made conically in the exemplary mechanism given in the figures, the main axes of both gears (4, 5) are perpendicular with respect to each other. In alternative embodiments of the present invention, however, the main axes of said gears (4, 5) may also be positioned at different angles with respect to each other.

[0025] The rotation of the positioning gear (5) drives the worm gear (2) passing through the interior of said gear (5). The engagement of the screw thread (21) outside the worm gear (2) to the screw thread (52) inside the positioning gear (5), and the introducing of the protrusion (12a) provided at the body into the channel (22) on said worm gear (2) allows the worm gear (2) only to move forth and back.

[0026] The worm gear (2) is supported both by the interior of the positioning gear (5), and by said slot (12) in the mechanism body (1). By rotating the positioning gear (5), the forth and back moving worm gear (2) carries the spring connection pin (3) together with itself. For this reason, the tension of the spring connected to the spring connection pin (3) is changed. The applicability of the same mechanism (A) on the doors of white goods of differing weights provides a simple adjustment of the tension of the door spring and of the stiffness of opening or closing the door of such white goods.

Claims

1. A door adjustment mechanism (A) for white goods, said mechanism (A) being **characterized by** comprising
 - a mechanism body (1) fixed to the white good or to the door of such white good,
 - an adjustment gear (4) supported by a slot (14) on the body (1) in a rotating manner;
 - a positioning gear (5) supported by another slot (15) on the body (1) in a rotating manner, said gear (5) being rotated by said adjustment gear (4);
 - a worm gear (2) passing through the interior of said positioning gear (5) and moving forth and back according to the rotation direction of said gear (5);
 - a spring connection pin (3), of which one end is coupled to a stretching spring connected to the white

good or to the door of such white good, and which can move forth and back together with the worm gear (2).

2. A mechanism (A) according to Claim 1, **characterized by** comprising a screw thread (21) extending in a lengthwise manner outside of said worm gear (2), and another screw thread (52) extending within the hole in the positioning gear (5) and engaging with the former screw thread (21).
3. A mechanism (A) according to Claim 2, **characterized by** comprising a slot (12) on the body (1) whereby said worm gear (2) is supported.
4. A mechanism (A) according to Claim 3, **characterized by** comprising a channel (22) dividing said screw thread (21) into two lengthwise regions, and a protrusion (12a) provided in said slot (12) to become introduced into said channel (22).
5. A mechanism (A) according to Claim 1, **characterized in that** mutually-engaging teeth (41, 51) are provided at one end of each of said adjustment gear (4) and positioning gear.
6. A mechanism (A) according to Claim 1, **characterized in that** a wrench slot (43) is provided at the other end of said adjustment gear (4), said wrench slot (43) being embodied so as to be rotated/turned by the tip of a hand tool.
7. A mechanism (A) according to Claim 1, **characterized by** comprising a hole (23) extending lengthwise along the interior of said worm gear (2), said spring connection pin (3) being settled into said hole (23).
8. A mechanism (A) according to Claim 7, **characterized by** comprising a slot (27) at one end of said worm gear (2), and a pin head (37) provided at one end of said spring connection pin (3) that settles into said slot (27).
9. A mechanism (A) according to Claim 8, **characterized in that** said pin head (37) is settled into said slot (27) so as to avoid the rotation of said pin (3).
10. A mechanism (A) according to Claim 9, **characterized in that** one straight surface (27a, 37a) is provided on each of such slot (27) and pin head (37), said surfaces (27a, 37a) leaning against each other.
11. A mechanism (A) according to Claim 1, **characterized in that** one end of said pin (3) is provided with a hole (35), wherein one end of the stretching spring is inserted.
12. A mechanism (A) according to Claim 1, **character-**

ized by comprising a pin (42) whereby said adjustment gear (4) is supported in the said slot (14) in a rotating manner.

13. A mechanism (A) according to Claim 1, **characterized by** comprising a pin (55) whereby said positioning gear (5) is supported in said slot (15) in a rotating manner.
14. A mechanism (A) according to Claim 1, **characterized in that** said worm gear (2) comprises a straightened lower section (26), and **in that** a straight-surfaced base (16) is provided on the body (1) whereon said section (26) is leaned.
15. A mechanism (A) according to Claim 11, **characterized in that** a slot (36) is provided above said hole (35), into (36) which a stopper (6) piece is inserted.
16. A mechanism (A) according to Claim 15, **characterized in that**, once the worm gear (2) and the pin (3) are assembled to each other, said stopper (6) piece becomes located at the end of said worm gear (2).

Patentansprüche

1. Türeinstellmechanismus (A) für Haushaltsgeräte, wobei der Mechanismus **dadurch gekennzeichnet ist, dass** er umfasst:

ein Mechanismushauptteil (1), das am Haushaltsgerät oder an der Tür eines solchen Haushaltsgeräts befestigt ist,
 ein Einstellgetriebe (4), das von einem Schlitz (14) am Hauptteil (1) drehend gehalten ist;
 ein Positionierungsgetriebe (5), das von einem anderen Schlitz (15) am Hauptteil (1) drehend gehalten ist, wobei das Getriebe (5) durch das Einstellgetriebe (4) gedreht wird;
 ein Schneckengetriebe (2), das durch das Innere des Positionierungsgetriebes (5) verläuft und sich entsprechend der Drehrichtung des Getriebes (5) vor und zurück bewegt;
 einen Federanschlusstift (3), von dem ein Ende mit einer Spannfeder verbunden ist, die an das Haushaltsgerät oder die Tür eines solchen Haushaltsgeräts angeschlossen ist und sich zusammen mit dem Schneckengetriebe (2) vor und zurück bewegen kann.

2. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** er ein Schraubengewinde (21), das sich der Länge nach vom Schneckengetriebe (2) nach außen erstreckt, und ein weiteres Schraubengewinde (52) umfasst, das sich in der Öffnung im Positionierungsgetriebe (5) erstreckt und mit dem vorherigen Schraubengewinde (21) in Eingriff steht.

3. Mechanismus (A) nach Anspruch 2, **dadurch gekennzeichnet, dass** er einen Schlitz (12) am Hauptteil (1) umfasst, wodurch das Schneckengetriebe (2) gehalten ist.

4. Mechanismus (A) nach Anspruch 3, **dadurch gekennzeichnet, dass** er eine Hohlkehle (22), die das Schraubengewinde (21) der Länge nach in zwei Bereiche unterteilt, und einen Vorsprung (12a) umfasst, der in dem Schlitz (12) vorgesehen ist, um in die Hohlkehle (22) eingeführt zu werden.

5. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** ineinandergreifende Zähne (41, 51) an einem Ende des Einstellgetriebes (4) bzw. Positionierungsgetriebes vorgesehen sind.

6. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Schraubenschlüsselschlitz (43) am anderen Ende des Einstellgetriebes (4) vorgesehen ist, wobei der Schraubenschlüsselschlitz (43) so ausgeführt ist, dass er mit der Spitze eines Handwerkszeugs gedreht werden kann.

7. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** er eine Öffnung (23) umfasst, die sich der Länge nach entlang des Innenraums des Schneckengetriebes (2) erstreckt, wobei der Federanschlusstift (3) in der Öffnung (23) festgesetzt ist.

8. Mechanismus (A) nach Anspruch 7, **dadurch gekennzeichnet, dass** er einen Schlitz (27) an einem Ende des Schneckengetriebes (2) umfasst und ein Stiftkopf (37) an einem Ende des Federanschlusstifts (3) vorgesehen ist, der sich in dem Schlitz (27) festsetzt.

9. Mechanismus (A) nach Anspruch 8, **dadurch gekennzeichnet, dass** der Stiftkopf (37) im Schlitz (27) festgesetzt ist, um die Drehung des Stifts (3) zu verhindern.

10. Mechanismus (A) nach Anspruch 9, **dadurch gekennzeichnet, dass** eine gerade Fläche (27a, 37a) jeweils am Schlitz (27) und Stiftkopf (37) vorgesehen ist, wobei die Flächen (27a, 37a) aneinander anliegen.

11. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Ende des Stifts (3) mit einer Öffnung (35) versehen ist, in die ein Ende der Spannfeder eingesteckt ist.

12. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** er einen Stift (42) umfasst, wodurch das Einstellgetriebe (4) drehend im Schlitz (14) gehalten ist.

13. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** er einen Stift (55) umfasst, wodurch das Positionierungsgetriebe (5) drehend im Schlitz (15) gehalten ist.

14. Mechanismus (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Schneckengetriebe (2) einen begrabigten unteren Abschnitt (26) umfasst, und dass eine geradflächige Grundfläche (16) am Hauptteil (1) vorgesehen ist, auf welcher der Abschnitt (26) aufliegt.

15. Mechanismus (A) nach Anspruch 11, **dadurch gekennzeichnet, dass** ein Schlitz (36) über der Öffnung (35) vorgesehen ist, in dem ein Anschlagteil (6) eingesteckt ist.

16. Mechanismus (A) nach Anspruch 15, **dadurch gekennzeichnet, dass**, sobald das Scheckengetriebe (2) und der Stift (3) zusammengebaut sind, das Anschlagteil (6) am Ende des Schneckengetriebes (2) zu liegen kommt.

Revendications

1. Mécanisme de réglage de porte (A) pour produits blancs, ledit mécanisme (A) étant **caractérisé en ce qu'il** comprend :

un corps de mécanisme (1) fixé sur le produit blanc ou la porte d'un tel produit blanc, un engrenage de réglage (4) supporté par une fente (14) sur le corps (1) d'une manière rotative ;

un engrenage de positionnement (5) supporté par une autre fente (15) sur le corps (1) d'une manière rotative, ledit engrenage (5) étant entraîné en rotation par ledit engrenage de réglage (4) ;

un engrenage à vis sans fin (2) passant par l'intérieur dudit engrenage de positionnement (5) et se déplaçant d'avant en arrière selon la direction de rotation dudit engrenage (5) ;

une broche de raccordement de ressort (3), dont une extrémité est couplée à un ressort extensible raccordé au produit blanc ou à la porte d'un tel produit blanc, et qui peut se déplacer d'avant en arrière avec l'engrenage à vis sans fin (2).

2. Mécanisme (A) selon la revendication 1, **caractérisé en ce qu'il** comprend un filetage de vis (21) s'étendant dans le sens de la longueur à l'extérieur dudit engrenage à vis sans fin (2), et un autre filetage de vis (52) s'étendant à l'intérieur du trou dans l'engrenage de positionnement (5) et se mettant en prise avec le premier filetage de vis (21).

3. Mécanisme (A) selon la revendication 2, **caractérisé en ce qu'il** comprend une fente (12) sur le corps (1) moyennant quoi ledit engrenage à vis sans fin (2) est supporté.

4. Mécanisme (A) selon la revendication 3, **caractérisé en ce qu'il** comprend un canal (22) divisant ledit filetage de vis (21) en deux régions dans le sens de la longueur, et une saillie (12a) prévue dans ladite fente (12) pour s'introduire dans ledit canal (22).

5. Mécanisme (A) selon la revendication 1, **caractérisé en ce que** les dents à mise en prise mutuelle (41, 51) sont prévues au niveau d'une extrémité de chacun parmi ledit engrenage de réglage (4) et l'engrenage de positionnement.

6. Mécanisme (A) selon la revendication 1, **caractérisé en ce qu'une** fente de clé (43) est prévue au niveau de l'autre extrémité dudit engrenage de réglage (4), ladite fente de clé (43) étant mise en oeuvre afin de pouvoir être entraînée en rotation/pivotée par la pointe d'un outil à main.

7. Mécanisme (A) selon la revendication 1, **caractérisé en ce qu'il** comprend un trou (23) s'étendant dans le sens de la longueur le long de l'intérieur dudit engrenage à vis sans fin (2), ladite broche de raccordement de ressort (3) étant installée dans ledit trou (23).

8. Mécanisme (A) selon la revendication 7, **caractérisé en ce qu'il** comprend une fente (27) au niveau d'une extrémité dudit engrenage à vis sans fin (2), et une tête de broche (37) prévue au niveau d'une extrémité de ladite broche de raccordement de ressort (3) qui s'installe dans ladite fente (27).

9. Mécanisme (A) selon la revendication 8, **caractérisé en ce que** ladite tête de broche (37) est installée dans ladite fente (27) afin d'éviter la rotation de ladite broche (3).

10. Mécanisme (A) selon la revendication 9, **caractérisé en ce qu'une** surface droite (27a, 37a) est prévue sur chacune parmi une telle fente (27) et la tête de broche (37), lesdites surfaces (27a, 37a) s'appuyant l'une contre l'autre.

11. Mécanisme (A) selon la revendication 1, **caractérisé en ce qu'une** extrémité de ladite broche (3) est dotée d'un trou (35), dans lequel une extrémité du ressort extensible est insérée.

12. Mécanisme (A) selon la revendication 1, **caractérisé en ce qu'il** comprend une broche (42) moyennant quoi ledit engrenage de réglage (4) est supporté dans ladite fente (14) d'une manière rotative.

13. Mécanisme (A) selon la revendication 1, **caractérisé en ce qu'il** comprend une broche (55) moyennant quoi ledit engrenage de positionnement (5) est supporté dans ladite fente (15) d'une manière rotative. 5
14. Mécanisme (A) selon la revendication 1, **caractérisé en ce que** ledit engrenage à vis sans fin (2) comprend une section inférieure redressée (26) et **en ce que** la base à surface droite (16) est prévue sur le corps (1) sur lequel ladite section (26) est appuyée. 10
15. Mécanisme (A) selon la revendication 11, **caractérisé en ce qu'une** fente (36) est prévue au-dessus dudit trou (35), dans lequel une pièce de butée (6) est insérée. 15
16. Mécanisme (A) selon la revendication 15, **caractérisé en ce que**, une fois que l'engrenage à vis sans fin (2) et la broche (3) sont assemblés, ladite pièce de butée (6) est positionnée au niveau de l'extrémité dudit engrenage à vis sans fin (2). 20

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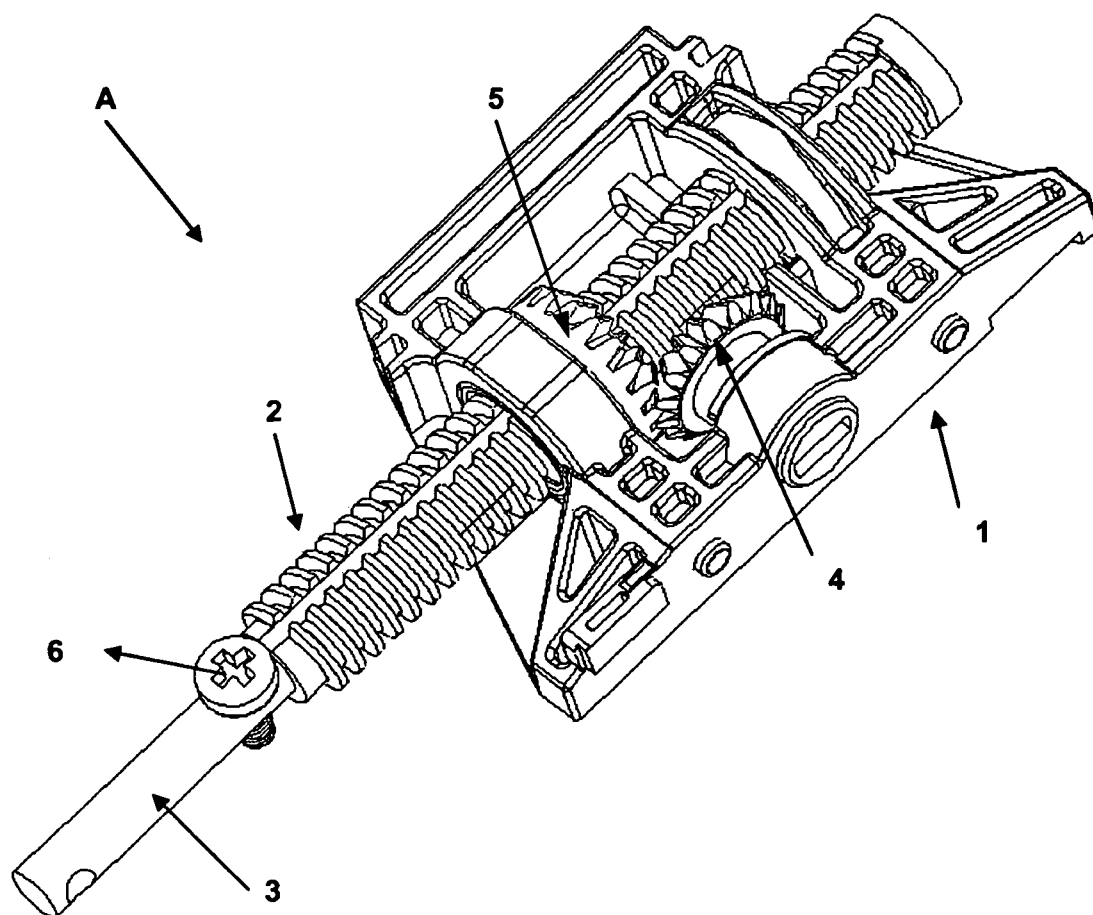


Figure - 1

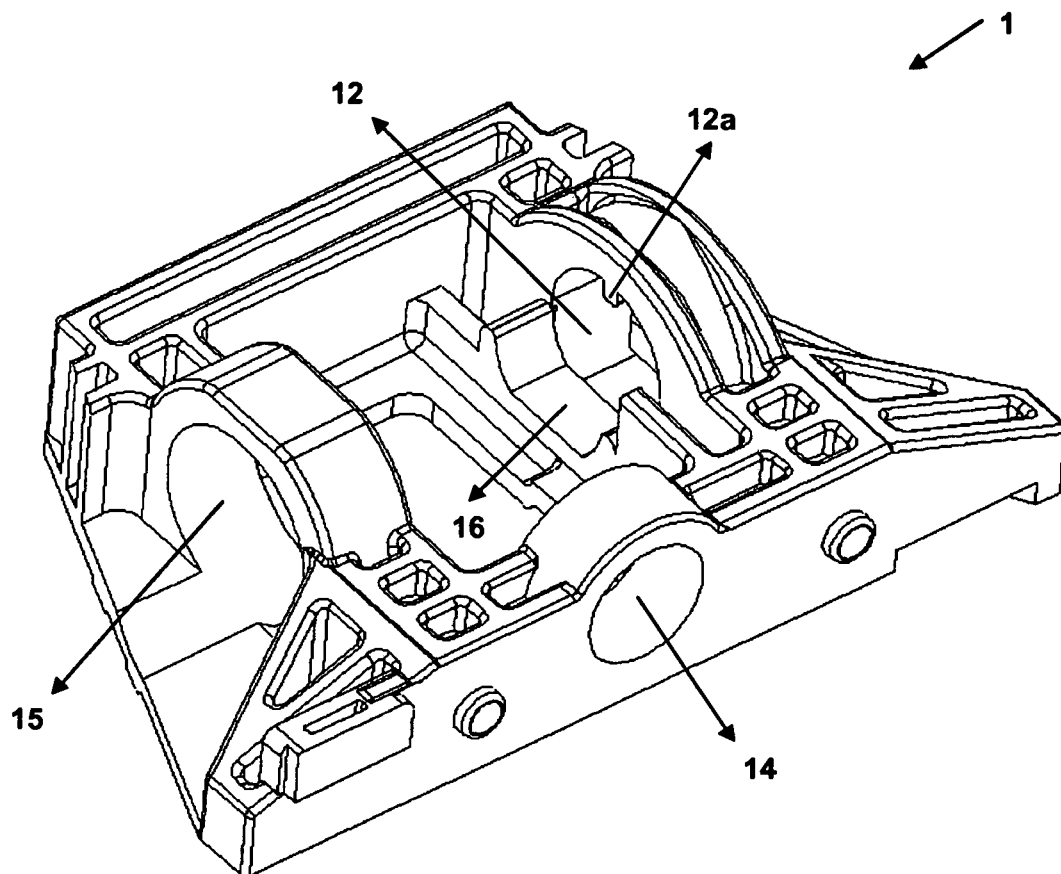


Figure - 2

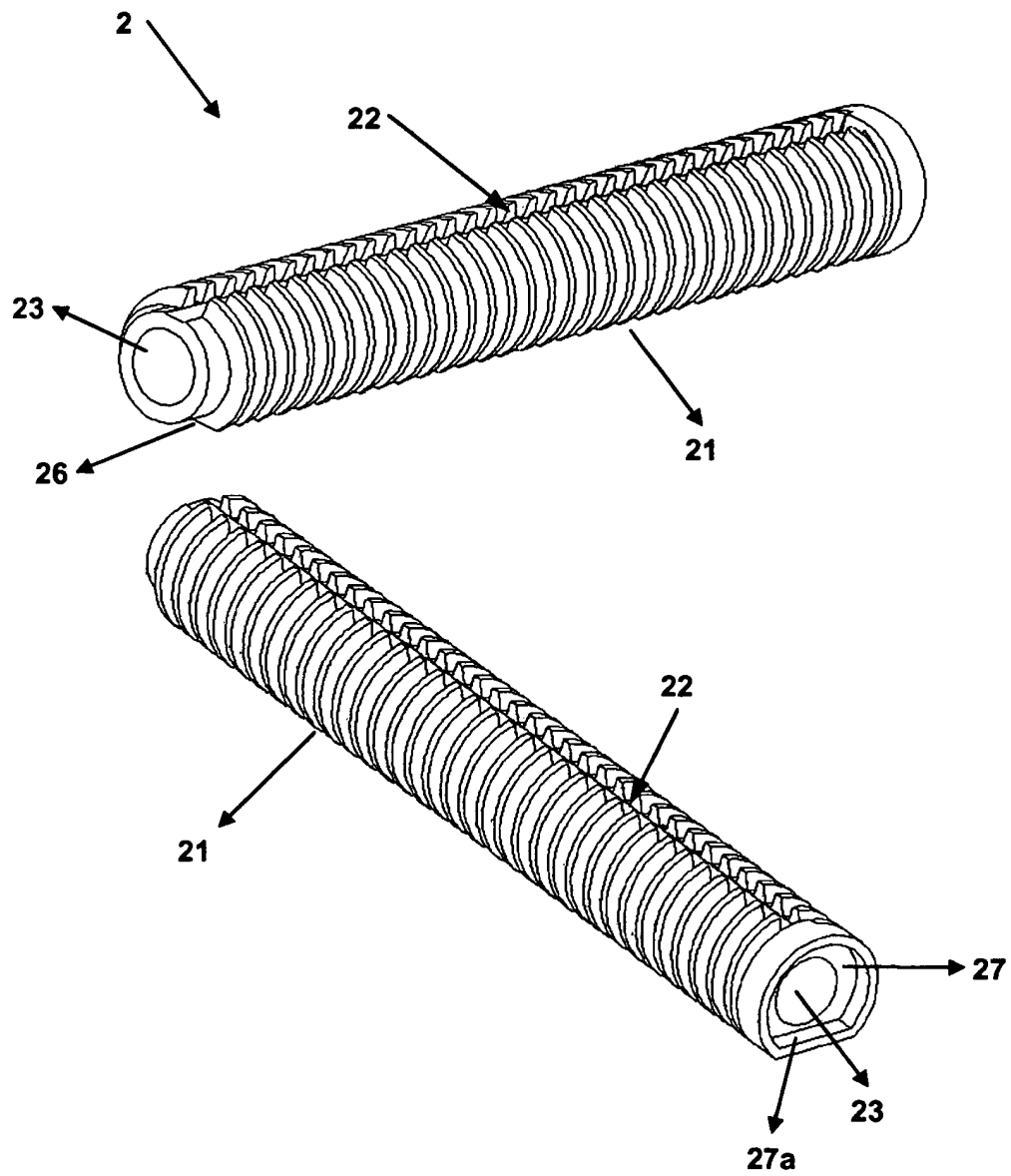


Figure - 3

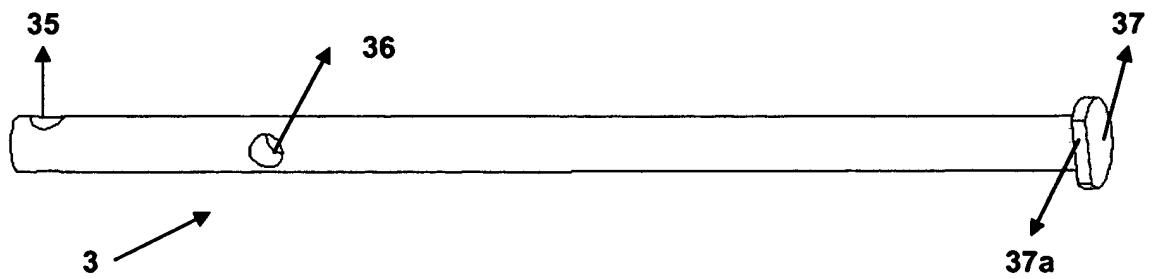


Figure - 4

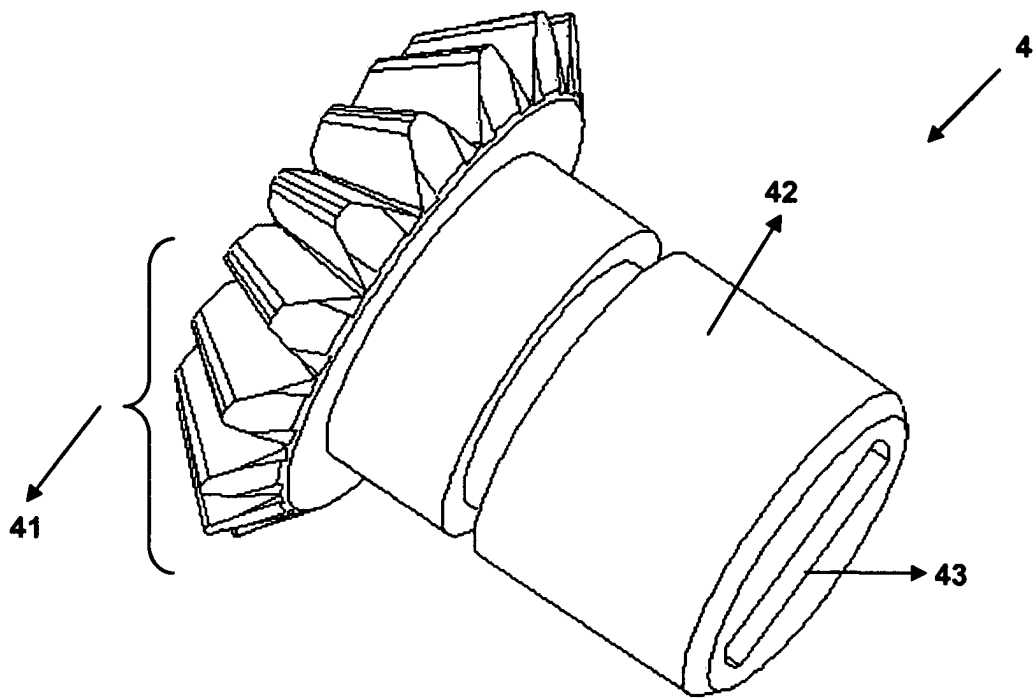


Figure - 5

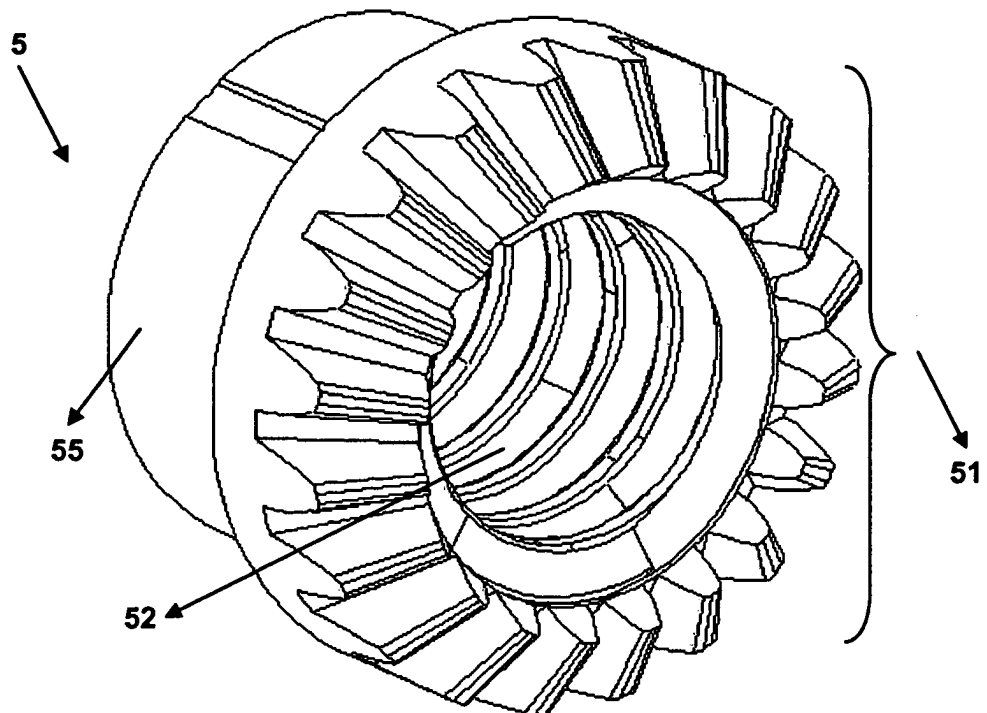


Figure - 6

REFERENCES CITED IN THE DESCRIPTION

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