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(54) **Ratchet wrench**

(57) A one-way wrench includes an annular head, an annular gear, a pawl and an elastic element. The annular head includes a circular space defined therein and a crescent space defined in the wall of the circular space. The annular gear is put in the circular space. The annular gear includes teeth extending from an external face. The pawl is put in the crescent space. The pawl includes teeth extending from a side for engagement with the teeth of the annular gear and first and second

protrusions both extending from an opposite side. The elastic element is compressed between the pawl and the wall of the crescent space. The wall of the crescent space pushes the first protrusion as the annular head drives the annular gear in a direction through the pawl. The wall of the crescent space pushes the second protrusion so as to pivot the pawl from the annular gear as the annular head rotates relative to the annular gear in an opposite direction.

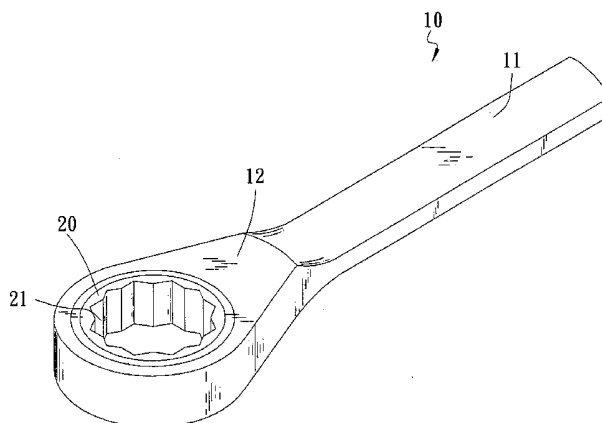


Fig. 1

Description

Field of Invention

[0001] The present invention relates to a one-way wrench.

Background of Invention

[0002] Referring to Figures 6 and 7, a conventional one-way wrench 60 includes a handle 62 and an annular head 64 formed at an end of the handle 62. The annular head 64 includes a circular space 66 defined therein. In the wall of the circular space 66 is defined a crescent space 68. In the wall of the crescent space 68 is defined a semi-circular space 70. An annular gear 72 is put in the circular space 66. The annular gear 72 includes a toothed internal face 74 for engagement with a bolt or nut and a toothed external face 76. A pawl 78 is put in the crescent space 68. The pawl 78 includes a toothed face 80 for engagement with the toothed external face 76 and a smooth face 82 sliding on the wall of the crescent space 68. A portion of a C-shaped spring 84 is put in the semi-circular space 70 while outside the semi-circular space 70 is located the remaining portion of the C-shaped spring 84 in contact with the pawl 78. Referring to Figure 6, a user can pivot the handle 62 clockwise so as to rotate the annular head 64 clockwise. The wall of the crescent space 68 moves the pawl 78 clockwise. The pawl 78 rotates the annular gear 72 clockwise. The annular gear 78 accordingly rotates a bolt or nut in engagement therewith. Referring to Figure 7, when the user pivots the handle 62 counterclockwise, he or she moves the wall of the crescent space 68 from the pawl 78, thus allowing disengagement of the pawl 78 from the annular gear 72. Hence, the pawl 78 cannot rotate the annular gear 72 counterclockwise. That is, the user cannot rotate the bolt or nut counterclockwise with the conventional one-way wrench 60. However, the toothed face of the pawl 78 sometimes sticks to the toothed external face of the annular gear 72, thus causing undesired counterclockwise rotation of the bolt or nut with the conventional one-way wrench 60. To ensure a smooth operation, the user may press the bolt or nut as he or she pivots the conventional one-way wrench 60 counterclockwise. This is however inconvenient.

[0003] The present invention is therefore intended to obviate or at least alleviate the problems encountered in prior art.

Summary of Invention

[0004] It is the primary objective of the present invention to provide a one-way wrench that ensures one-way driving of a bolt or nut.

[0005] According to the present invention, a one-way wrench includes an annular head, an annular gear, a pawl and an elastic element. The annular head includes

a circular space defined therein and a crescent space defined in the wall of the circular space. The annular gear is put in the circular space. The annular gear includes teeth extending from an external face. The pawl is put in the crescent space. The pawl includes teeth extending from a side for engagement with the teeth of the annular gear and first and second protrusions both extending from an opposite side. The elastic element is compressed between the pawl and the wall of the crescent space. The wall of the crescent space pushes the first protrusion as the annular head drives the annular gear in a direction through the pawl. The wall of the crescent space pushes the second protrusion so as to pivot the pawl from the annular gear as the annular head rotates relative to the annular gear in an opposite direction.

[0006] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description in conjunction with the attached drawings.

Brief Description of Drawings

[0007] The present invention will be described via detailed illustration of the preferred embodiment referring to the drawings.

[0008] Figure 1 is a perspective view of a one-way wrench according to the preferred embodiment of the present invention.

[0009] Figure 2 is an exploded view of the one-way wrench of Figure 1.

[0010] Figure 3 is a cross-sectional view of the one-way wrench of Figure 1 pivoted counterclockwise.

[0011] Figure 4 is similar to Figure 3 but showing the one-way wrench pivoted clockwise.

[0012] Figure 5 is similar to Figure 4 but showing how the one-way wrench prevents driving a bolt or nut clockwise.

[0013] Figure 6 is a top view of a conventional one-way wrench pivoted clockwise.

[0014] Figure 7 is similar to Figure 6 but showing the conventional one-way wrench pivoted counterclockwise.

Detailed Description of Preferred Embodiment

[0015] Referring to Figure 1, according to the preferred embodiment of the present invention, a one-way wrench 10 includes a handle 11 and an annular head 12 formed at an end of the handle 11.

[0016] Referring to Figure 2, the annular head 12 includes a circular space 13 defined therein. In the wall of the circular space 13 is defined a crescent space 14. In the wall of the crescent space 14 is defined a hole 15.

[0017] An annular gear 20 is put in the circular space 13. The annular gear 20 includes a plurality of teeth 21 extending from an internal face for engagement with a bolt or nut (not shown) and a plurality of teeth 22 extend-

ing from an external face.

[0018] A pawl 30 is put in the crescent space 14. The pawl 30 includes a first side, a second side opposite to the first side, a first end and a second end opposite to the first end. The pawl 30 includes a plurality of teeth 31 extending from the first side for engagement with the teeth 22, a first protrusion 32 extending from the second side near the first end, a second protrusion 34 extending from the second side near the second end and an insert 33 extending from the second end.

[0019] In the preferred embodiment, the teeth 22 and 31 are ratchets in order to emphasize one-way rotation. In other embodiments, the teeth 22 and 31 may however be ordinary teeth.

[0020] A spring 40 includes a first end 41 in which the insert 33 is fit and a second end 42 put in the hole 15.

[0021] Referring to Figure 3, a user can pivot the handle 11 clockwise so as to rotate the annular head 12 clockwise. The wall of the crescent space 14 pushes the first protrusion 32 and therefore the pawl 30 clockwise. As the teeth 31 engage with some of the teeth 22, the pawl 30 rotates the annular gear 20 clockwise. The annular gear 20 accordingly rotates a bolt or nut in engagement therewith.

[0022] Referring to Figure 4, as the user pivots the handle 11 counterclockwise, he or she moves the wall of the crescent space 14 from the pawl 30, thus allowing disengagement of the teeth 31 from the teeth 22. Hence, the pawl 30 cannot rotate the annular gear 20 counterclockwise. That is, the user cannot rotate the bolt or nut counterclockwise with the one-way wrench 10.

[0023] Should the teeth 31 stick to the teeth 22, as the annular head 12 is rotated counterclockwise, the wall of the crescent space 14 pushes the second protrusion 34. Referring to Figure 5. Thus, the first end of the pawl 30 is lifted from the annular gear 20 as the pawl 30 is pivoted like a seesaw. Hence, the teeth 22 can be disengaged from the teeth 31 so as to prevent the pawl 30 from driving the annular gear 20 counterclockwise.

[0024] The present invention has been described via detailed illustration of the preferred embodiment. Those skilled in the art can derive variations from the preferred embodiment without departing from the scope of the present invention. Therefore, the preferred embodiment shall not limit the scope of the present invention defined in the claims.

Claims

1. A one-way wrench (10) including:

- ☐ an annular head (12) including a circular space (13) defined therein and a crescent space (14) defined in the wall of the circular space (13);
- ☐ an annular gear (20) put in the circular space (13), the annular gear (20) including teeth (22) extending from an external face;

- ☐ a pawl (30) put in the crescent space (14), the pawl (30) including teeth (31) extending from a side for engagement with the teeth (22) of the annular gear (20), first and second protrusions (32; 34) both extending from an opposite side; and
- ☐ an elastic element (40) compressed between the pawl (30) and the wall of the crescent space (14);
- ☐ wherein the wall of the crescent space (14) pushes the first protrusion (32) as the annular head (12) drives the annular gear (20) in a direction through the pawl (30);
- ☐ wherein the wall of the crescent space (14) pushes the second protrusion (34) so as to pivot the pawl (30) from the annular gear (20) as the annular head (12) rotates relative to the annular gear (20) in an opposite direction.

2. The one-way wrench (10) according to claim 1 wherein the annular gear (20) includes teeth (21) extending from an internal face.
3. The one-way wrench (10) according to claim 1 including a handle (11) extending from the annular head (12).
4. The one-way wrench (10) according to claim 1 wherein the all the teeth (22; 31) are ratchets.
5. The one-way wrench (10) according to claim 1 wherein the annular head (12) includes a hole (15) defined in the wall of the crescent space (14) for receiving the elastic element (40).
6. The one-way wrench (10) according to claim 1 wherein the elastic element (40) is a spring.
7. The one-way wrench (10) according to claim 6 wherein the spring (40) is a helical spring.
8. The one-way wrench (10) according to claim 7 wherein the pawl (30) includes an insert (33) extending into the helical spring (40).

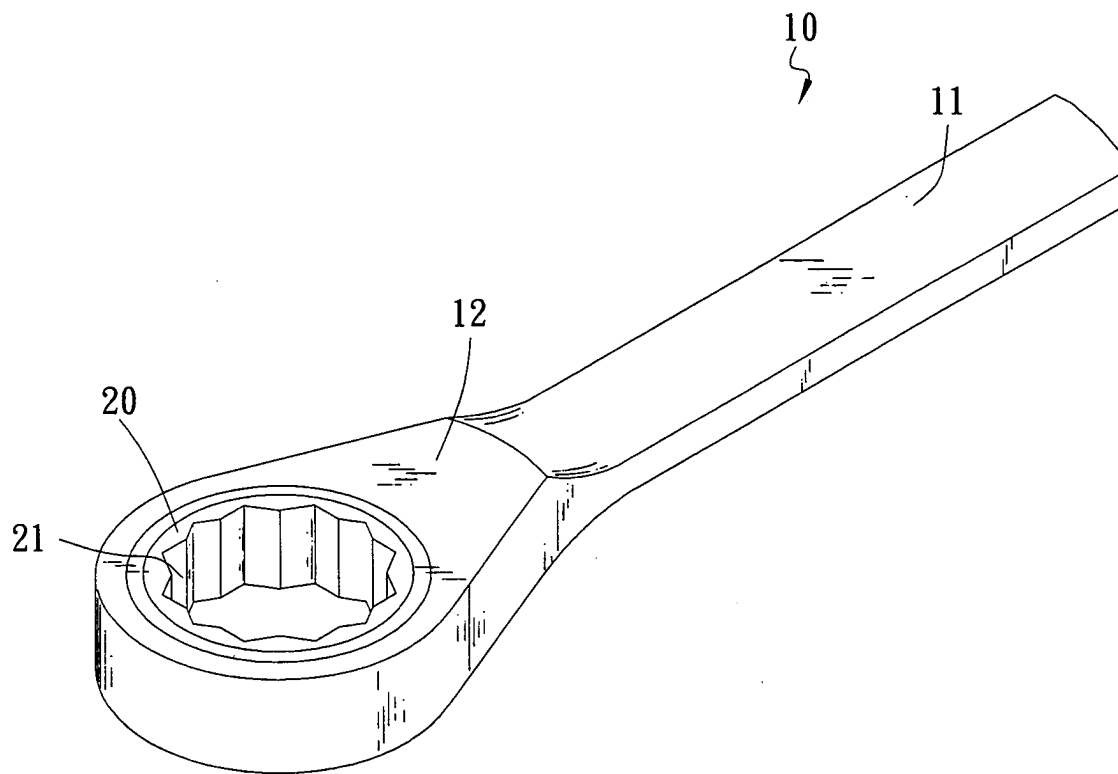


Fig. 1

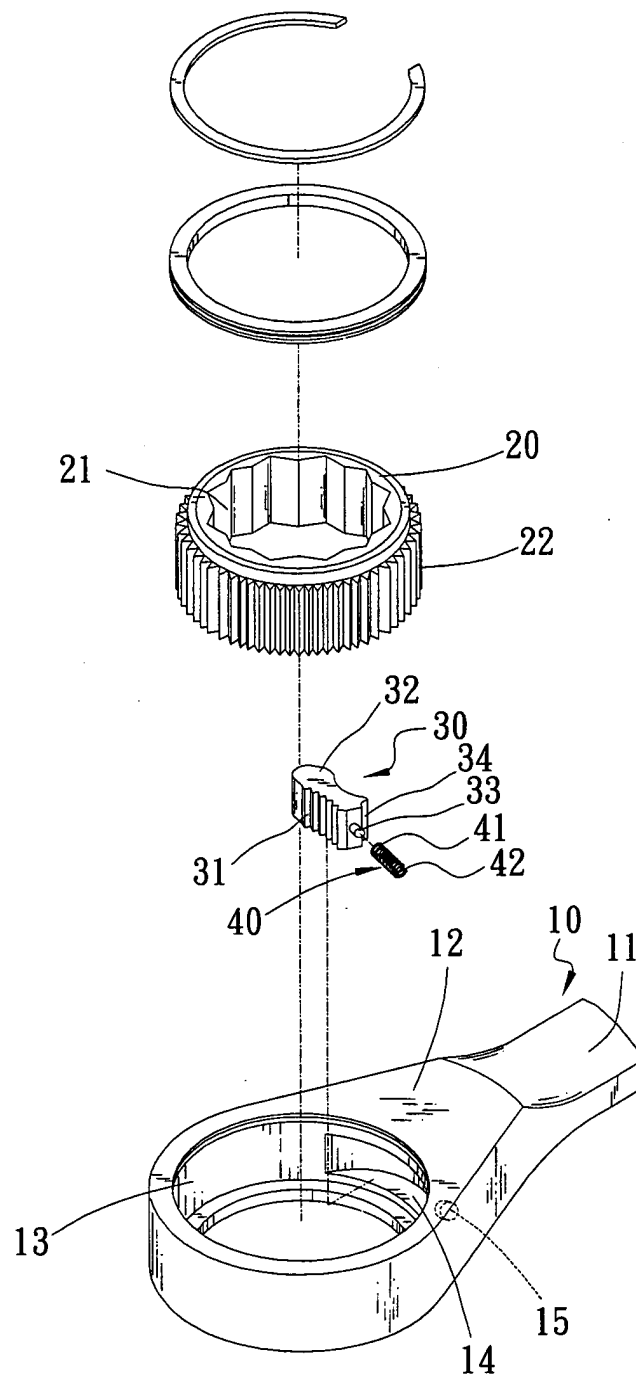


Fig. 2

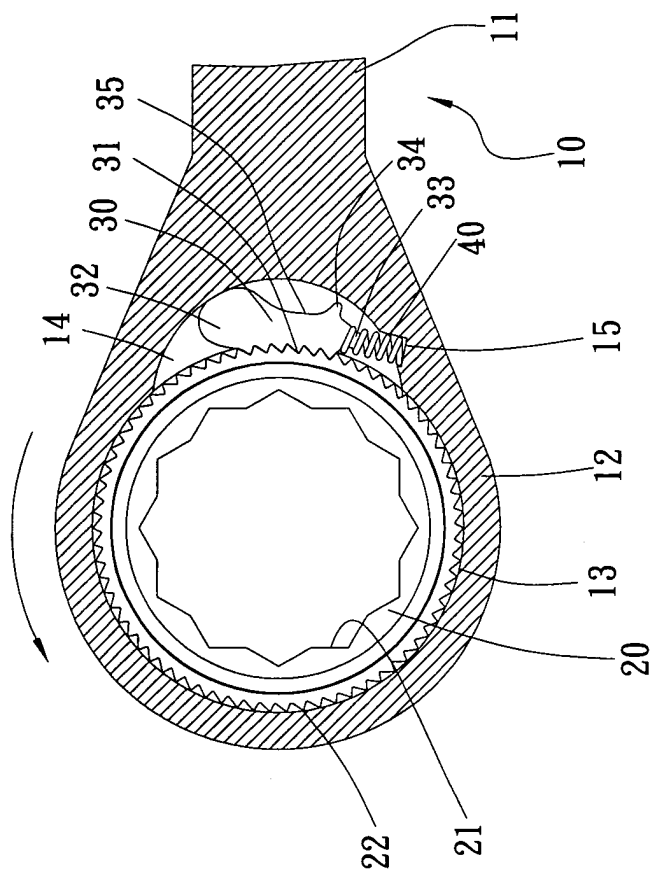


Fig. 3

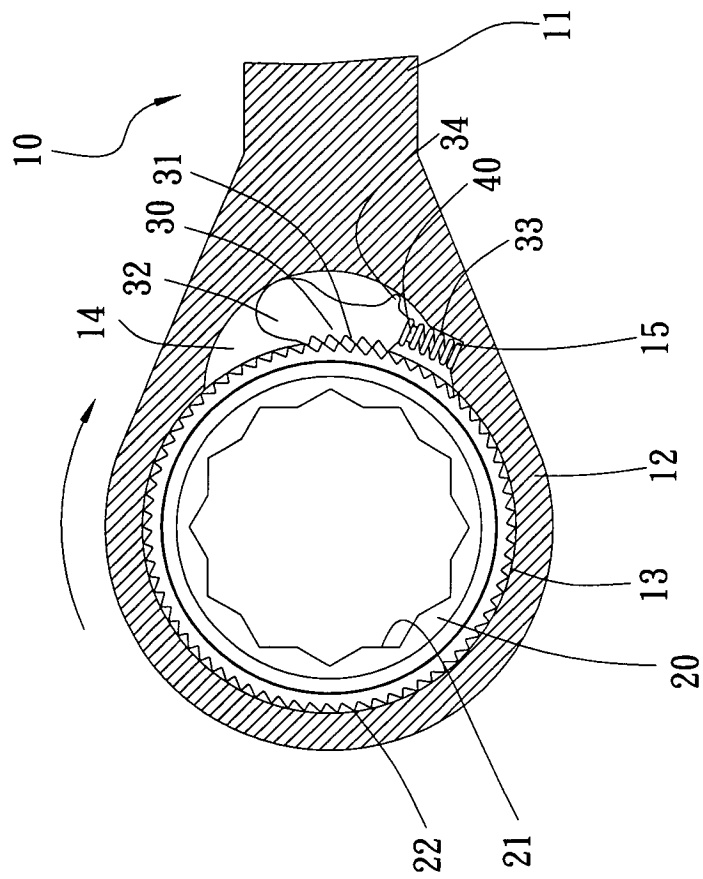


Fig. 4

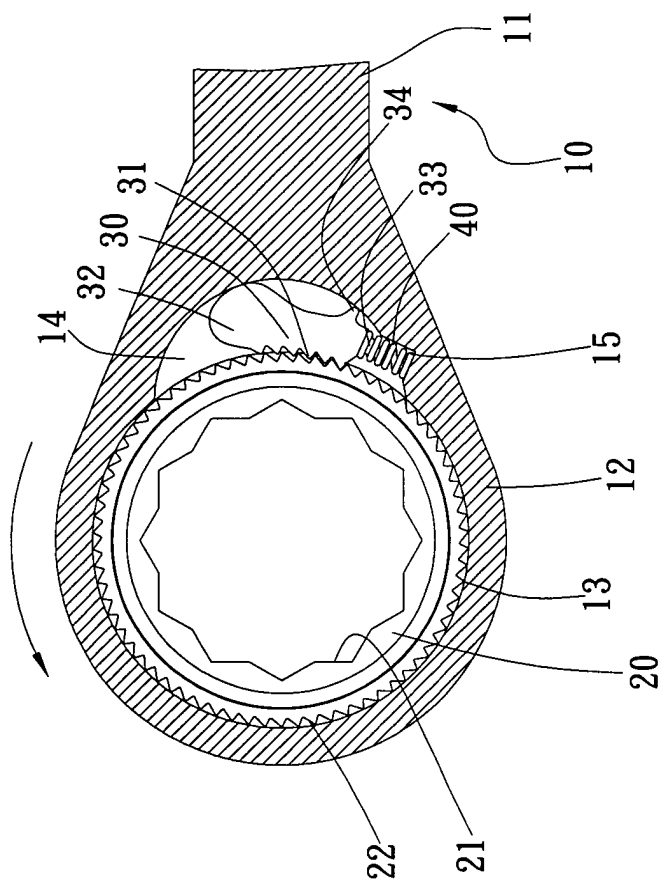


Fig. 5

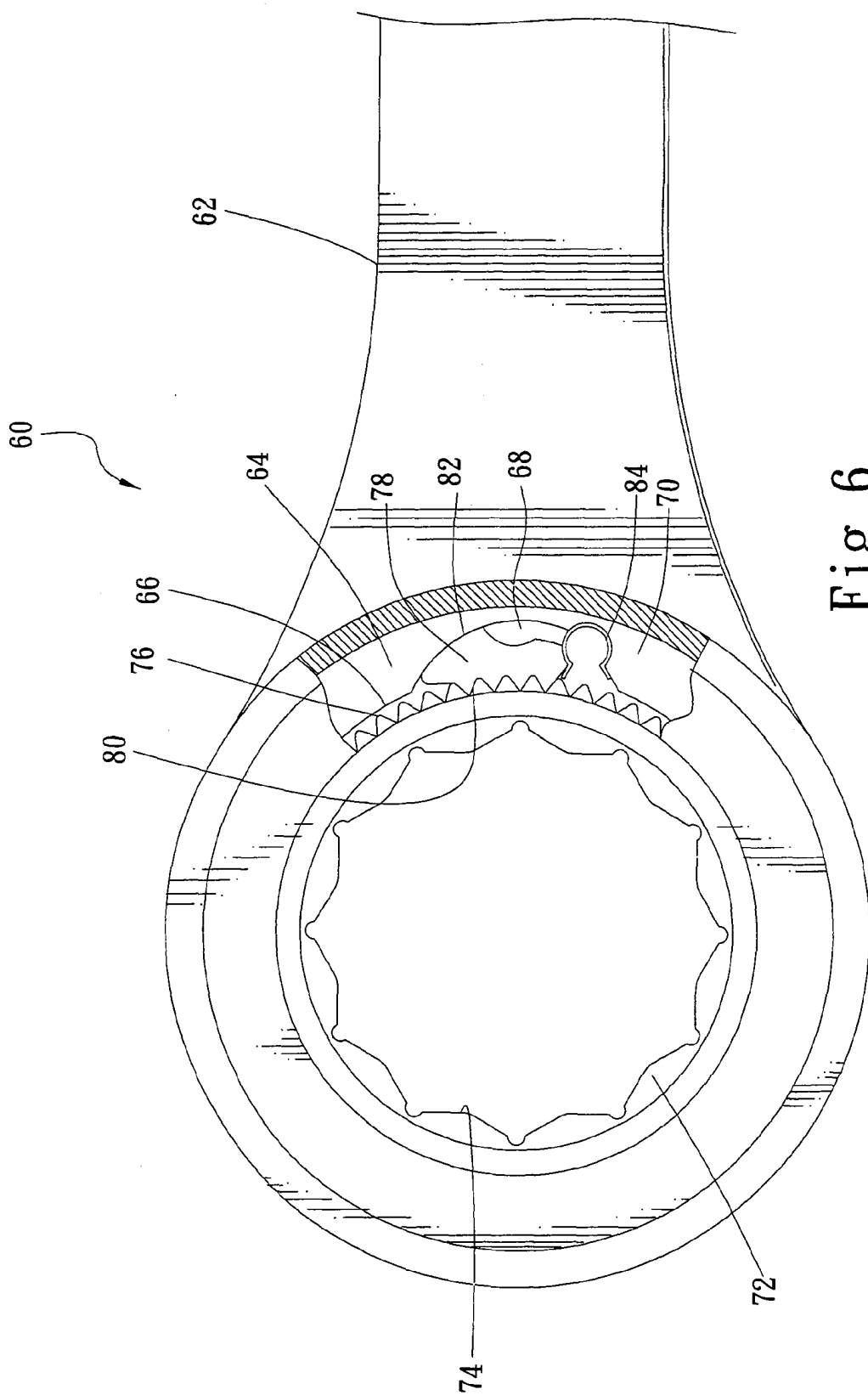


Fig. 6
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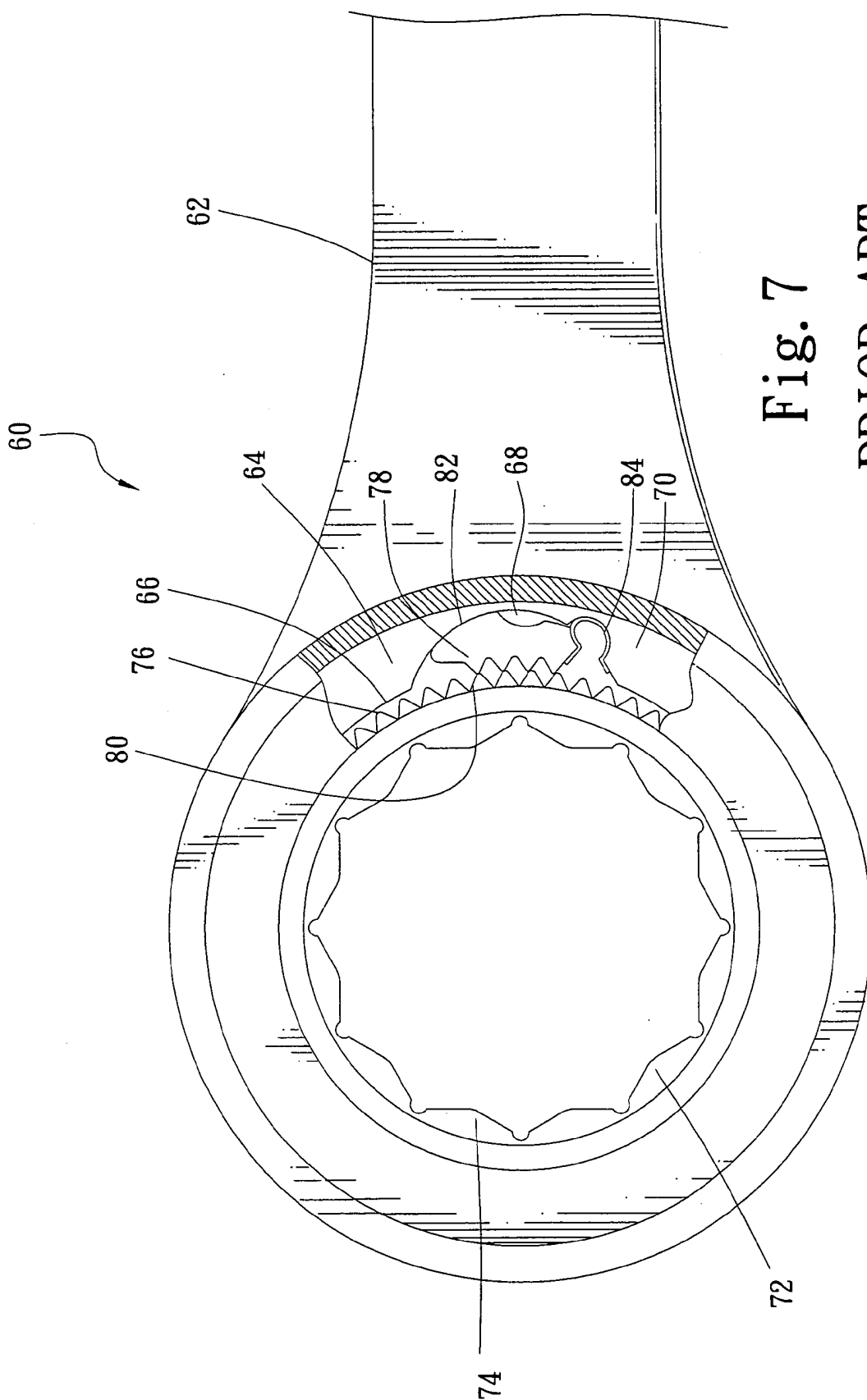


Fig. 7
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