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(54) **REVERSIBLE WRENCH**

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CLÉ RÉVERSIBLE

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(56) References cited:
DE-U1-202004 017 335 US-A1- 2002 023 519

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a wrench, especially to a reversible wrench.

Description of Related Art

[0002] Refer to Fig. 9, a conventional reversible wrench 50 is revealed. The wrench 50 includes a rotatable member 60 arranged at one end and used for being rotated to tighten and loosen nuts or bolts. A toothed ring 61 is disposed around the rotatable member 60. One side of the toothed ring 61 is engaged with a ratchet 70 and the ratchet 70 is moveable within a first chamber 51 inside the wrench 50. A curved surface 71 is formed on the other side of the ratchet 70, opposite to the side of ratchet 70 engaged with the rotatable member 60. The wrench 50 further includes a second chamber 52 communicating with the first chamber 51 and a control block 80 is mounted in the second chamber 52. An insertion hole 81 is formed on the control block 80 and a spring 82 is mounted in the insertion hole 81 while a leaning cover 83 is mounted on the top of the spring 82. The leaning cover 83 is so charged with pressure by the spring 82 that it abuts upon the curved surface 71 of the ratchet 70. The leaning cover 83 is controlled by the control block 80 so as to optionally bring the ratchet 70 to abut against different sides of the first chamber 51. Thereby the nuts/or bolts can be turned by one-way driving.

[0003] However, the conventional wrench mentioned above has certain shortcomings. First, the spring 82 and the leaning cover 83 are mounted between the ratchet 70 and the control block 80. One end of the leaning cover 83 is pushed by the spring 82 while the other end thereof slides and bears in this way against the curved surface 71 of the ratchet 70. When the ratchet 70 is vibrated due to rotation of the wrench 50 or the control block 80 is pulled to switch the direction, one end of the leaning cover 83 slides on the curved surface 71 of the ratchet 70 while the other end thereof rubs laterally against the insertion hole 81 of the control block 80. Thus the leaning cover 83 and the spring 82 are easy to pop out of the insertion hole 81 or experience permanent deformation. The operation stability is reduced by resistance generated and the strength of the structure is insufficient.

[0004] During the assembly of the wrench 50, firstly the control block 80 is mounted in the second chamber 52 and then is fastened and fixed. Thus the control block 80 can only be rotated. Next the spring 82 is inserted into the insertion hole 81 through the first chamber 51 and the leaning cover 83 is slipped on the top of the spring 82. An opening of the first chamber 51 is facing the rotatable member 60 so that the spring 82 is difficult to be installed. Moreover, both the spring 82 and the leaning

cover 83 have a smaller volume so that they are easy to fall off or lose during the assembly process. Thus the wrench 50 is more difficult to be assembled and there are too many parts included in the wrench 50.

5 **[0005]** The spring 82 and the leaning cover 83 are clamped between the ratchet 70 and the control block 80. One end of the leaning cover 83 is charged with pressure by the spring 82 while the other end thereof slides and bears in this way against the curved surface 71 of the ratchet 70. During actuation of the ratchet 70, the leaning cover 83 presses the spring 82 to compress. Thus there is a certain space between the ratchet 70 and the control block 80, allowing the ratchet 70 to move therein. The spring 82 and the leaning cover 83 may protrude from the insertion hole 81 so that the positioning effect of the spring 82 and the leaning cover 83 is reduced. Another similar tool can be seen in document US2002/023519A1.

20 SUMMARY OF THE INVENTION

[0006] Therefore it is a primary object of the present invention to provide a reversible wrench that overcomes the shortcomings mentioned above.

25 **[0007]** In order to achieve the above object, a reversible wrench according to the present invention is disclosed in claim 1 and includes a main body, a control member, a braking toothed member and a ratchet member. The main body consists of a first working portion and a second working portion. An assembly hole and a control hole are arranged at the first working portion and communicate with each other by means of a curved braking toothed slot disposed therebetween. The control member is composed of a handle and a shaft. A step-shaped clearance hole is radially arranged in the shaft. The shaft is inserted into the control hole and the braking toothed member is mounted in the curved braking toothed slot. One end of the braking toothed member facing the assembly hole is provided with a curved toothed portion while the other end thereof facing the control hole is provided with a recessed curved slot. A link shaft is mounted in the recessed curved slot and connected to the braking toothed member by an axial pin while an elastic member is slipped on the link shaft. The elastic member is mounted in the clearance hole along with the link shaft. The ratchet member is mounted in the assembly hole of the first working portion. An external toothed portion is formed on an outer surface of the ratchet member. The ratchet member is engaged with the curved toothed portion of the braking toothed member by means of the external toothed portion and thereby actuated. A tool hole is formed on the inner diameter of the ratchet member.

[0008] Preferably, a round head is formed on the front end of the link shaft while a through hole that allows the axial pin to pass through is arranged at the round head.

55 **[0009]** Preferably, a circular fixing groove is arranged at the inner edge of the assembly hole of the first working portion while a limiting circular groove is located on an

outer edge of the ratchet member. A C-shaped fastener is inserted in the limiting circular groove and then further locked in the circular fixing groove. Thus the ratchet member is limited in the assembly hole.

[0010] Preferably, a limiting groove is set on and extended from the top of the control hole of the main body for limiting the handle of the control member. The limiting groove possesses an opening.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein:

Fig. 1 is a perspective view of an embodiment according to the present invention;

Fig. 2 is an explosive view of an embodiment according to the present invention;

Fig. 3 is a partial plane view of an embodiment according to the present invention;

Fig. 4 is a sectional view of an embodiment according to the present invention;

Fig. 5 is a schematic drawing showing an embodiment being rotated clockwise and idly according to the present invention;

Fig. 6 is a schematic drawing showing an embodiment being rotated counterclockwise and a ratchet member also moved therewith according to the present invention;

Fig. 7 is a schematic drawing showing a control member of an embodiment being pulled and adjusted according to the present invention;

Fig. 8 is a schematic drawing showing an embodiment being rotated clockwise and a ratchet member also moved therewith according to the present invention; and

Fig. 9 is a schematic drawing of a prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] In order to learn the purposes, features and functions of the present invention, please refer to the following embodiments and related figures.

[0013] Refer to Fig. 1 and Fig. 2, a reversible wrench according to the present invention includes a main body 10, a control member 20, a braking toothed member 30 and a ratchet member 40. The main body consists of a first working portion 11 and a second working portion 12. An assembly hole 13 and a control hole 14 are disposed on the first working portion 11 and communicate with each other by a curved braking toothed slot 15 located therebetween. A circular fixing groove 131 is arranged at the inner edge of the assembly hole 13 while a limiting groove 141 having an opening 142 is set on and extended

from the top of the control hole 14. The control member 20 is composed of a handle 21, a shaft 22, whereat a step-shaped clearance hole 23 is radially arranged at the shaft 22. The shaft 22 together with the clearance hole 23 is inserted into the control hole 14 and the braking toothed member 30 is mounted in the curved braking toothed slot 15. A curved toothed portion 31 is formed on one end of the braking toothed member 30 facing the assembly hole 13 and a recessed curved slot 32 is set on the other end of the braking toothed member 30 facing the control hole 14. A link shaft 33 is mounted in the recessed curved slot 32 and connected to the braking toothed member 30 by an axial pin 321 while an elastic member 34 is slipped on the link shaft 33. A round head 331 is formed on the front end of the link shaft 33 while a through hole 332 is arranged at the round head 331. The axial pin 321 is inserted in the through hole 332. The elastic member 34 is mounted in the clearance hole 23 along with the link shaft 33. The ratchet member 40 is mounted in the assembly hole 13 of the first working portion 11 and including an external toothed portion 41, a tool hole 42, a limiting circular groove 43 and a C-shaped fastener 44. The external toothed portion 41 formed on an outer surface of the ratchet member 40. The ratchet member 40 is engaged with the curved toothed portion 31 of the braking toothed member 30 by means of the external toothed portion 41 and thereby activated. The tool hole 42 is formed on the inner diameter of the ratchet member 40. The limiting circular groove 43 is located on the outer edge of the ratchet member 40 and the C-shaped fastener 44 is mounted in the limiting circular groove 43.

[0014] Refer to Fig. 2, Fig. 3 and Fig. 4, the control member 20, the braking toothed member 30 and the ratchet member 40 are mounted in the control hole 14, the curved braking toothed slot 15 and the assembly hole 13 of the main body 10 respectively. The shaft 22 of the control member 20 is inserted into the control hole 14 while the handle 21 is limited within the limiting groove 141 and protrudes from the opening 142. The link shaft 33 is mounted in the recessed curved slot 32 and connected to the braking toothed member 30 by the axial pin 321 while the elastic member 34 is slipped on the link shaft 33. Then the link shaft 33 is moved to be opposite to the control hole 14, in order to put the braking toothed member 30 through the assembly hole 13 so that the braking toothed member 30 is mounted in the curved braking toothed slot 15. The link shaft 33 together with the elastic member 34 is also inserted into the step-shaped clearance hole 23 on the shaft 22 of the control member 20. Thereby the link shaft 33 is able to move elastically due to the elastic member 34 and the curved toothed portion 31 is facing the assembly hole 13. Lastly the ratchet member 40 is mounted in the assembly hole 13 and then locked between the limiting circular groove 43 and the circular fixing groove 131 by the C-shaped fastener 44. The assembly of the reversible wrench is completed.

[0015] While in use, as shown in Fig. 5 and Fig. 6, the main body 10 is connected with a screwing unit by means of the tool hole 42 of the ratchet member 40 and then the main body 10 is turned to tighten or loosen the screwing unit. The locking/braking direction between the braking toothed member 30 and the ratchet member 40 is controlled and switched by the control member 20. Both the link shaft 33 and the elastic member 34 bear against the braking toothed member 30 in a clockwise direction while the braking toothed member 30 is actuated to abut against the curved braking toothed slot 15 in the clockwise direction owing to the control member 20 being turned. As the main body 10 is turned in the clockwise direction (Fig. 5), the ratchet member 40 pushes the braking toothed member 30 back along the direction the elastic member 34 works because the actuating direction of the main body 10 is the same as the pushing direction of the elastic member 34. Thus the curved toothed portion 31 of the braking toothed member 30 is unable to get engaged with the external toothed portion 41 of the ratchet member 40 effectively and the wrench is rotated idly. In contrast, refer to Fig. 6, the braking toothed member 30 is unable to be pushed back owing to the fact that the direction, in which the link shaft 33 is pushed by the elastic member 34, is opposite to the direction, in which the main body 10 is actuated when the main body 10 is turned in a counterclockwise direction. Thus the curved toothed portion 31 of the braking toothed member 30 is firmly engaged with the external toothed portion 41 of the ratchet member 40 and thereby the ratchet member 40 is further driven to rotate and turn the screwing unit. Consequently, the screwing unit is turned only when the main body 10 is rotated in the counterclockwise direction.

[0016] Refer to Fig. 7 and Fig. 8, the braking toothed member 30 is moved to abut against the curved braking toothed slot 15 in the counterclockwise direction by pulling the control member 20 in the opposite direction. The braking toothed member 30 is also pushed by the link shaft 33 and the elastic member 34 in the counterclockwise direction. The ratchet member 40 pushes the braking toothed member 30 back along the direction the elastic member 34 works because the actuating direction of the main body 10 is the same as the pushing direction of the elastic member 34 when the main body 10 is turned in the counterclockwise direction. Thus the curved toothed portion 31 of the braking toothed member 30 and the external toothed portion 41 of the ratchet member 40 are unable to get engaged with each other effectively and the wrench is turned idly. Once the main body 10 is rotated in the clockwise direction, the braking toothed member 30 is unable to be pushed back because the direction, in which the link shaft 33 of the braking toothed member 30 is pushed by the elastic member 34, is opposite to the direction, in which the main body 10 is actuated. Thus the curved toothed portion 31 of the braking toothed member 30 is securely engaged with the external toothed portion 41 of the ratchet member 40 and thereby the ratchet member 40 is further driven to rotate and turn the

screwing unit. Consequently, the screwing unit is turned only when the main body 10 is rotated clockwise.

[0017] In summary, the present invention has the following advantages:

1. The link shaft 33 is mounted in the recessed curved slot 32 and connected to the braking toothed member 30 by the axial pin 321. The elastic member 34 is slipped on the link shaft 33 and then the assembly of the link shaft 33 with the elastic member 34 is mounted in the clearance hole 23 of the shaft 22 of the control member 20. Thus the braking toothed member 30 can be exactly moved along with the control member 20 by the link shaft 33 when the control member 20 is turned to change the direction. Moreover, the axial pin 321 forms a support point for smoother movement and operation of the braking toothed member 30. The elastic member 34 can also be extended and compressed in the clearance hole 23, without a failure condition such as permanent deformation or being popped out. Thus the operation stability and the engagement strength are both increased and so is the durability.

2. In the braking toothed member 30, the elastic member 34 is slipped on the link shaft 33. During the assembly, the elastic member 34 is limited in the clearance hole 23 by the link shaft 33. Thus the connection between the braking toothed member 30 and the control member 20 is completed. The assembly process of the main body 10 is simplified effectively so that the assembly time and labor costs are reduced significantly and economic benefits are increased.

Claims

1. A reversible wrench comprising:

a main body that includes

a first working portion that is provided with an assembly hole and a control hole, whereat the assembly hole and the control hole communicate with each other by means of a curved braking toothed slot located between the assembly hole and the control hole; and
a second working portion;

a control member having

a handle, and
a shaft at which a step-shaped clearance hole is radially arranged and that is mounted in the control hole;

a braking toothed member that is mounted in

the curved braking toothed slot and having

a curved toothed portion formed on one end thereof facing the assembly hole;
a recessed curved slot set on the other end thereof facing the control hole;
a link shaft mounted in the recessed curved slot and connected to the braking toothed member by an axial pin; and
an elastic member slipped on the link shaft; and

a ratchet member that is mounted in the assembly hole of the first working portion and including

an external toothed portion formed on an outer surface thereof and used for being engaged and moved with the curved toothed portion of the braking toothed member; and
a tool hole formed on the inner diameter of the ratchet member .

2. The device as claimed in claim 1, wherein a round head is disposed on the front end of the link shaft while a through hole allowing the axial pin to pass through is arranged at the round head.
3. The device as claimed in claim 1, wherein a circular fixing groove is disposed on the inner edge of the assembly hole of the first working portion while a limiting circular groove is located on the outer edge of the ratchet member; a C-shaped fastener is set in the limiting circular groove and then is further integrated in the circular fixing groove so as to limit the ratchet member in the assembly hole.

Patentansprüche

1. Reversibler Schraubenschlüssel, umfassend:

einen Hauptkörper, der beinhaltet
einen ersten Arbeitsabschnitt, der mit einem Montageloch und einem Steuerloch ausgestattet ist, wobei das Montageloch und das Steuerloch mittels eines gebogenen Bremszahnschlitzes, der zwischen dem Montageloch und dem Steuerloch angeordnet ist, miteinander in Verbindung stehen, und
einen zweiten Arbeitsabschnitt,
ein Steuerelement, das
einen Griff und
einen Schaft aufweist, an dem eine stufenförmige Freiraumöffnung radial angeordnet ist und der in dem Steuerloch angeordnet ist,
ein Bremszahnelement, das in dem gebogenen Bremszahnschlitz angeordnet ist und

einen gebogenen Zahnabschnitt, der an einem Ende davon ausgebildet ist, das zu dem Montageloch zeigt,
einen vertieften gebogenen Schlitz, der an einem anderen Ende davon angeordnet ist, der zu dem Steuerloch zeigt,
einen Verbindungsschaft, der in dem vertieften gebogenen Schlitz montiert ist und mit dem Bremszahnelement durch einen axialen Stift verbunden ist, und ein elastisches Element aufweist, das auf den Verbindungsschaft geschoben ist, und
ein Ratschenelement, das in dem Montageloch des ersten Arbeitsabschnitts montiert ist und einen äußeren Zahnabschnitt, der an seiner Außenfläche ausgebildet ist und verwendet wird, um mit dem gebogenen Zahnabschnitt des Bremszahnelements in Eingriff gebracht und damit bewegt zu werden, und
ein Werkzeugloch umfasst, das an dem inneren Durchmesser des Ratschenelements ausgebildet ist.

2. Vorrichtung gemäß Anspruch 1, bei welchem ein runder Kopf an dem vorderen Ende des Verbindungsschafts angeordnet ist, während ein Durchgangsloch, das dem axialen Stift ermöglicht, dadurch zu verlaufen, an dem runden Kopf angeordnet ist
3. Vorrichtung gemäß Anspruch 1, bei welchem eine kreisförmige Befestigungsrinne an dem inneren Rand des Montagelochs des ersten Arbeitsabschnitts angeordnet ist, während eine begrenzende kreisförmige Rinne an dem äußeren Rand des Ratschenelements angeordnet ist, wobei ein C-förmiges Befestigungselement in der begrenzenden kreisförmigen Rinne angeordnet ist und dann weiter in der kreisförmigen Befestigungsrinne integriert ist, um das Ratschenelement in dem Montageloch zu begrenzen.

Revendications

1. Clé réversible comprenant:

un corps principal qui inclut
une première portion de travail qui est dotée d'un trou d'assemblage et d'un trou de commande, au niveau de laquelle le trou d'assemblage et le trou de commande communiquent l'un avec l'autre au moyen d'une fente dentée de freinage courbe située entre le trou d'assemblage et le trou de commande; et
une seconde portion de travail;
un élément de commande présentant
un manche, et
un arbre au niveau duquel un trou d'espacement

- étagé est agencé radialement et qui est monté
 dans le trou de commande;
 un élément denté de freinage qui est monté dans
 la fente dentée de freinage courbe et présentant
 une portion dentée courbe formée sur une ex- 5
 trémité de celle-ci tournée vers le trou d'assem-
 blage;
 une fente courbe évidée placée sur l'autre ex-
 trémité de celle-ci tournée vers le trou de com- 10
 mande;
 un arbre gauche monté dans la fente courbe évi-
 dée et raccordé à l'élément denté de freinage
 par une broche axiale; et
 un élément élastique glissé sur l'arbre gauche; 15
 et
 un élément de cliquet qui est monté dans le trou
 d'assemblage de la première portion de travail
 et incluant
 une portion dentée externe formée sur une sur- 20
 face extérieure de celle-ci et utilisée pour être
 mise en prise et déplacée avec la portion dentée
 courbe de l'élément denté de freinage; et
 un trou d'outil formé sur le diamètre intérieur de
 l'élément de cliquet. 25
2. Dispositif selon la revendication 1, dans lequel une
 tête ronde est disposée sur l'extrémité avant de l'ar-
 bre gauche alors qu'un trou débouchant permettant
 à la broche axiale de passer au travers est agencé
 au niveau de la tête ronde. 30
3. Dispositif selon la revendication 1, dans lequel une
 rainure de fixation circulaire est disposée sur l'arête
 intérieure du trou d'assemblage de la première por- 35
 tion de travail alors qu'une rainure circulaire limitative
 est située sur l'arête extérieure de l'élément de
 cliquet ; un élément de fixation en forme de C est
 placé dans la rainure circulaire limitative et ensuite
 est en outre intégré dans la rainure de fixation circu- 40
 laire de sorte à limiter l'élément de cliquet dans le
 trou d'assemblage.

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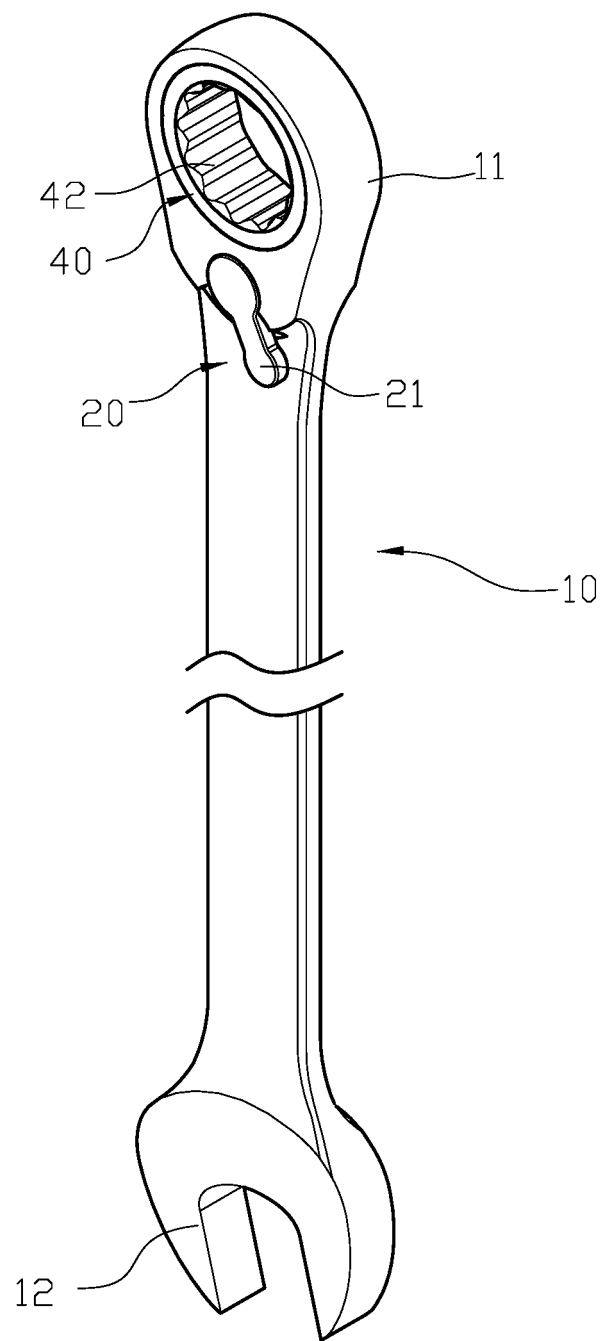


FIG. 1

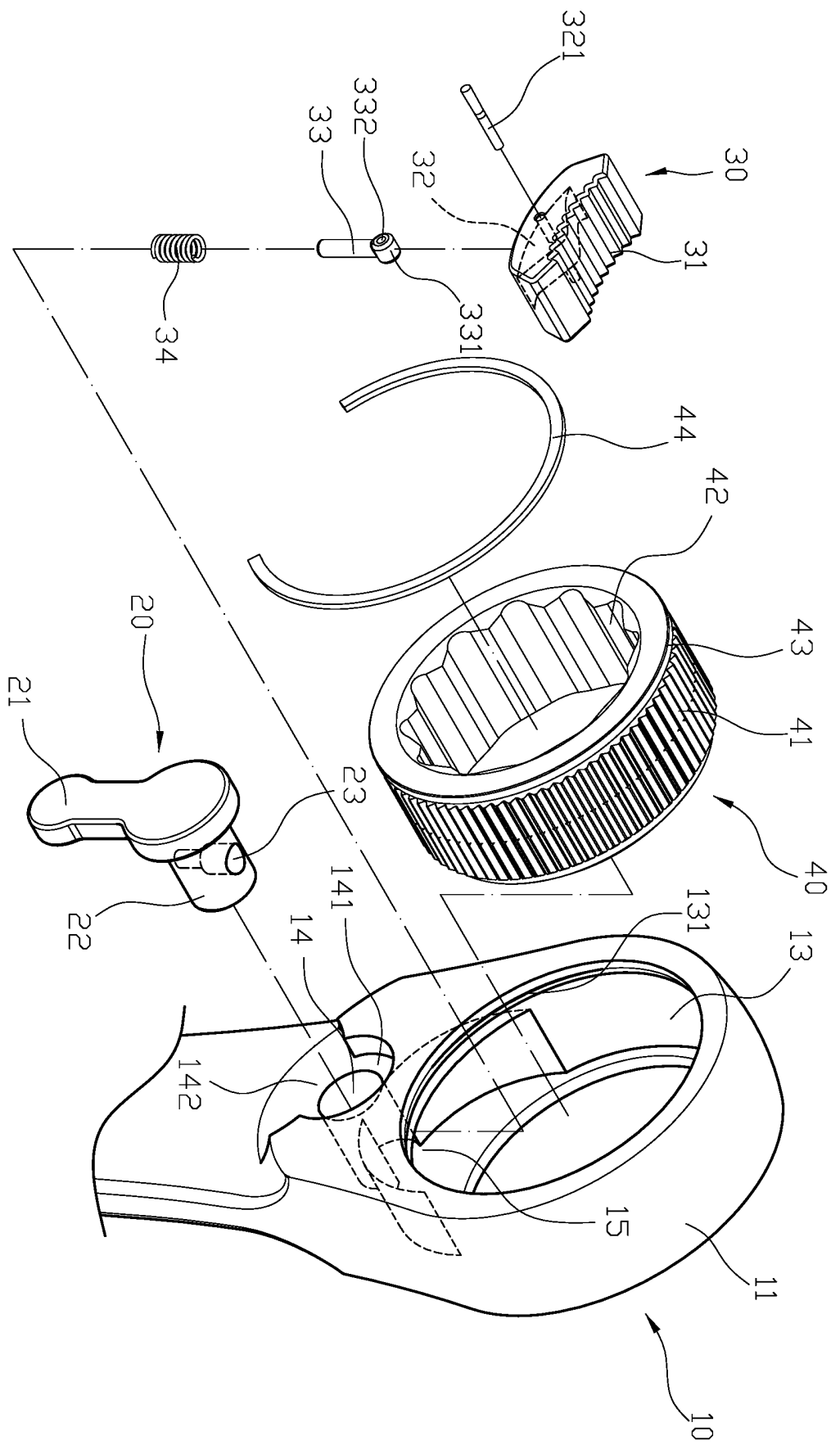


FIG. 2

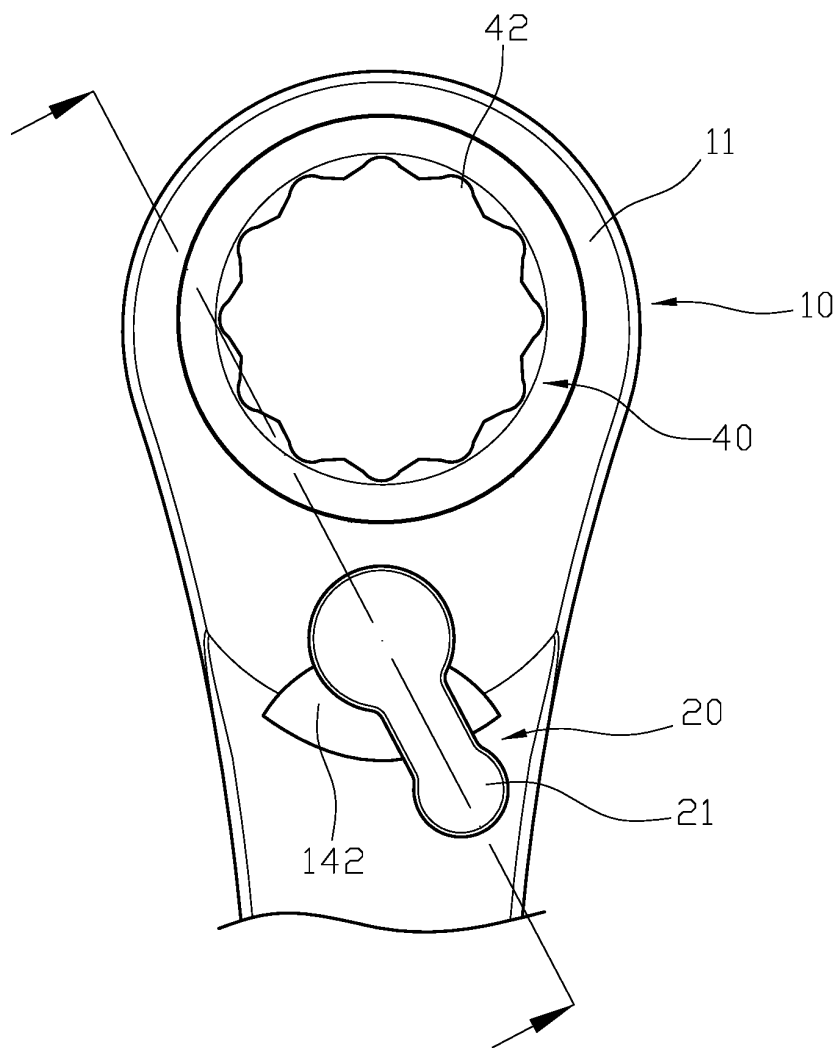


FIG. 3

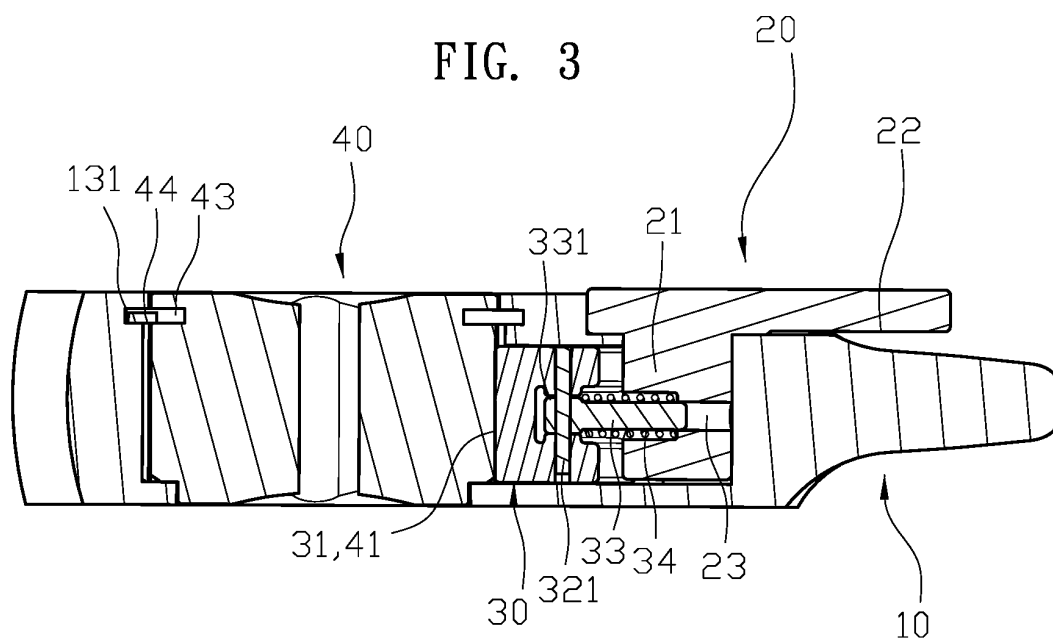


FIG. 4

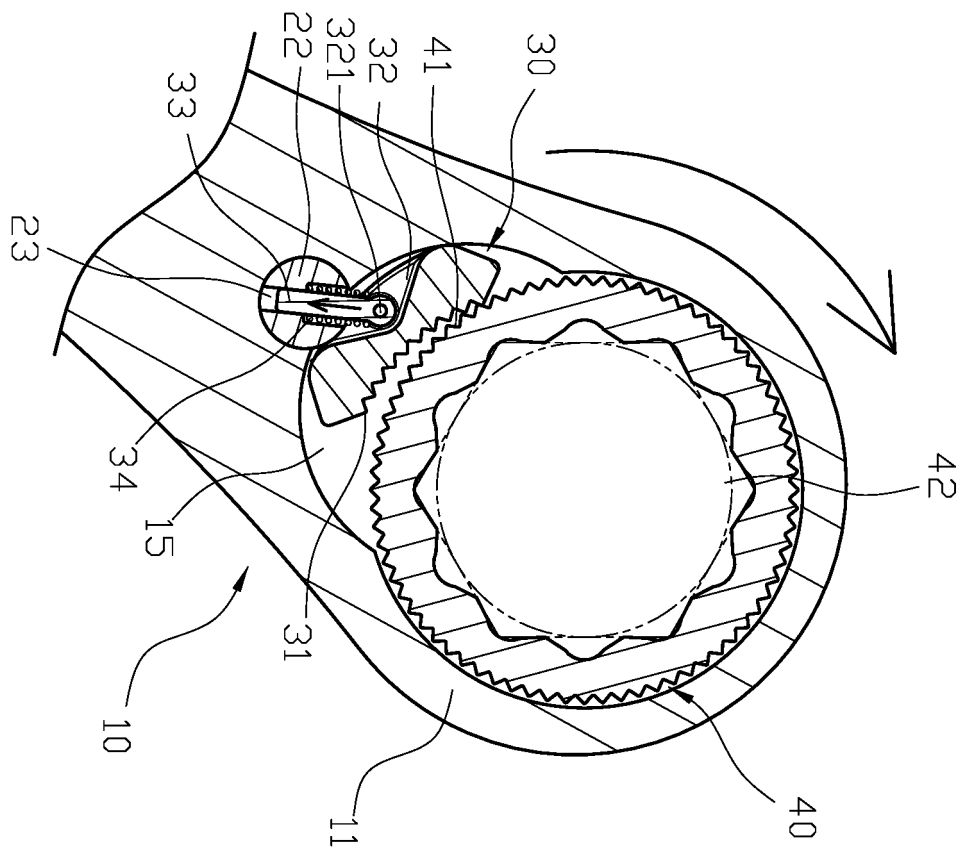


FIG. 5

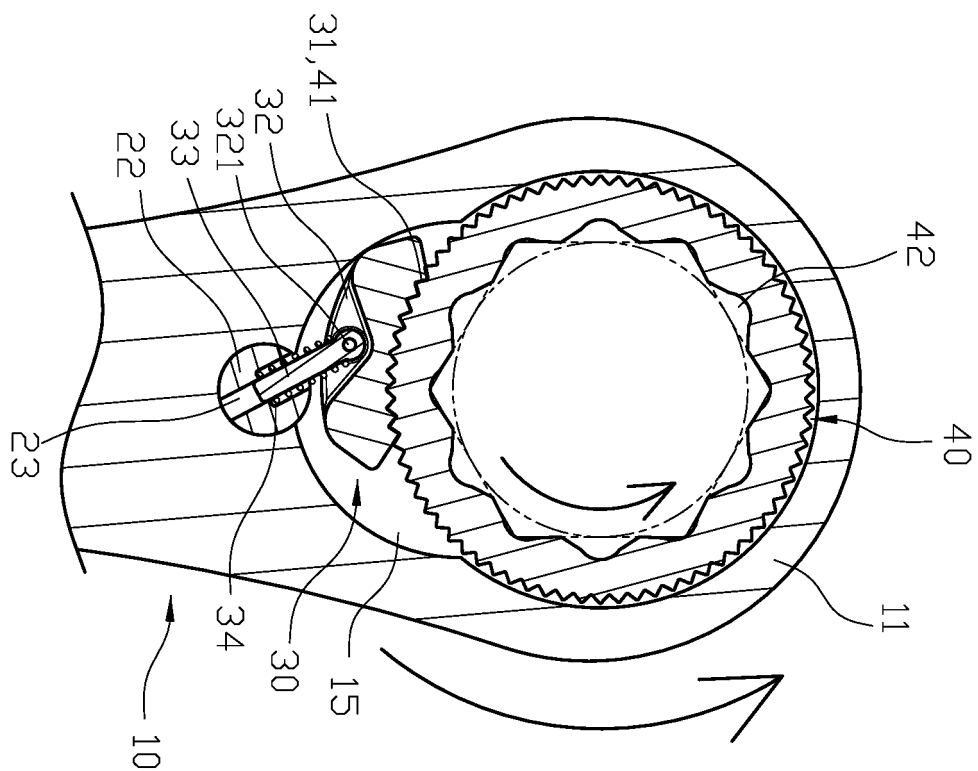


FIG. 6

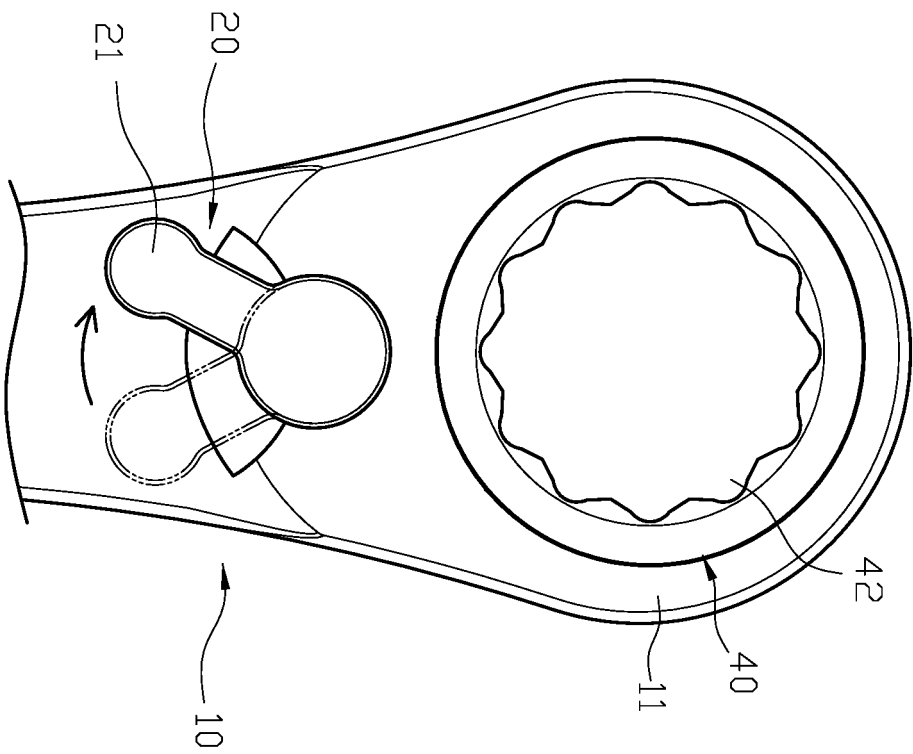


FIG. 7

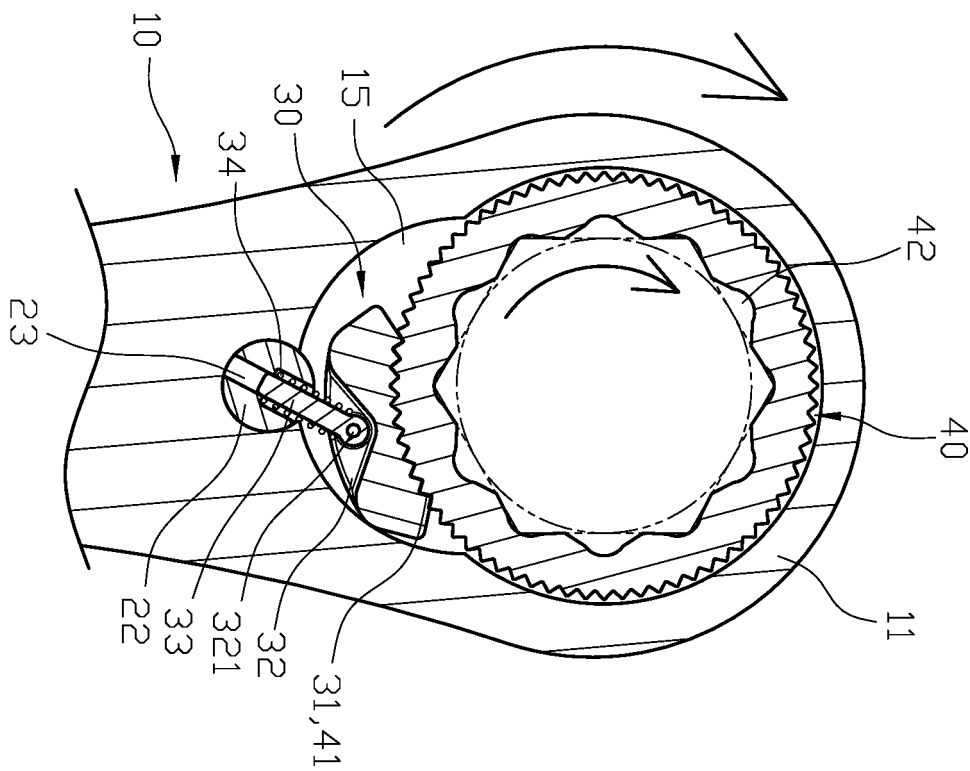


FIG. 8

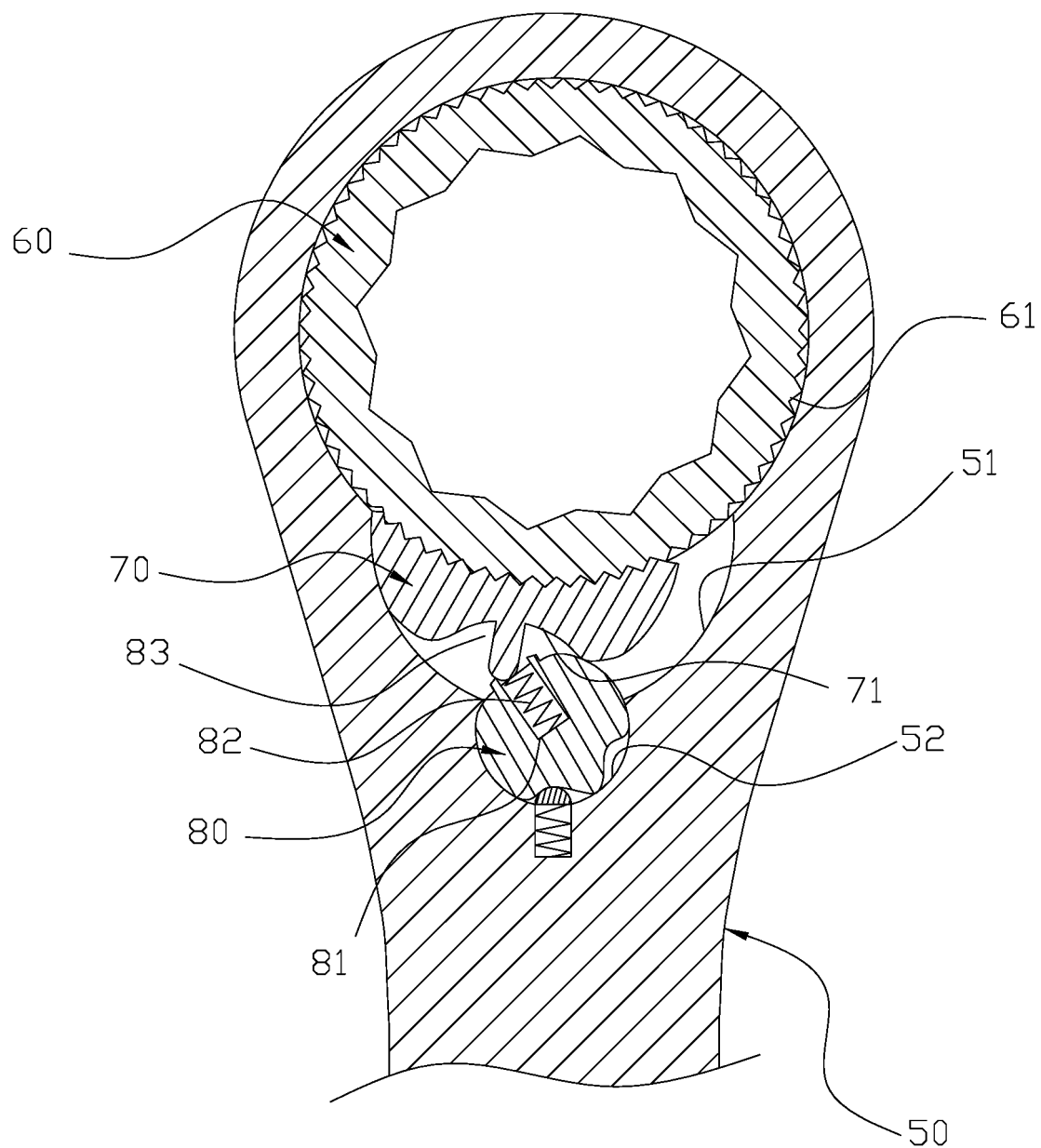


FIG. 9

PRIOR ART

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2002023519 A1 [0005]