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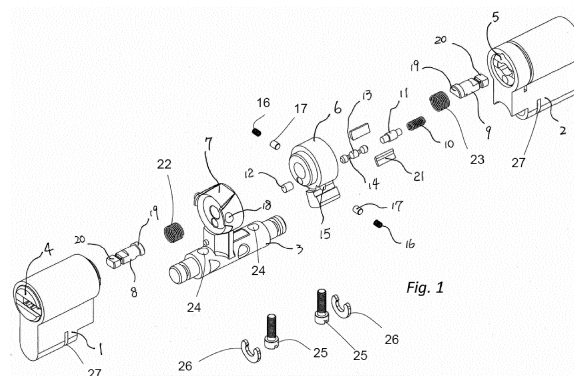
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(54) **AN IMPROVED STRUCTURE OF KEY CYLINDER**

(57) A key cylinder includes a first cylinder body 1 and second cylinder body 2, connected by a connection member 3, the first cylinder body 1 housing a first barrel 4, and the second cylinder body 2 housing a second barrel 5, an unlocking cam 6 located between the first cylinder body 1 and the second cylinder body 2. The connection member 3 features a fixed block 7 extending from its side, set between the first barrel 4 of key cylinder 1 and the unlocking cam 6. The key cylinder includes a first driving shaft 8 which extends through a bore in the fixed block 7 and torsionally connects the first cylinder barrel 4 and the unlocking cam 6 such that the first cylinder barrel 4 can drive the unlocking cam 6 between a locked and an unlocked position, and a second driving shaft 9 which torsionally connects the second cylinder barrel 4 and the unlocking cam 6 such that the first cylinder barrel 4 can drive the unlocking cam 6 between a locked and an unlocked position. A resilient member 10 and lifting pin 11 are in the second barrel 5 of key cylinder 2, while a restraining plug 12 is set inside the fixed block 7, and a sliding stop pin 13 is set at an eccentric position from the axis of rotation of the unlocking cam 6. One end of the sliding stop pin 13 abuts a lifting pin 11, the other end cooperates with the restraining plug 12. The sliding stop pin 13 features at least one circumferential groove 14. At least one lock-stopping channel 15 is formed in a radial direction in the unlocking cam 6, the lock-stopping channel 15 being equipped with a lock-stopping spring 16 and a lock shotpin 17. The mechanism is arranged such that when the first cylinder body 1 is broken off from the re-

mainder of the key cylinder, the restraining plug is released, allowing the resilient member 10 to move the sliding stop pin 13 until the lock shotpin 17 engages with the lock-stopping channel 15, preventing the rotation of the unlocking cam 6 to an unlocked position.



Description

Field of technology

[0001] This invention involves a kind of improved structure of a key cylinder

Background technology

[0002] Through applying force to damage a key cylinder on one side of a common door lock, burglars can unlock a door lock through sliding the lock's unlocking cam. In this respect then, the lock's performance is not ideal.

Contents of the Invention

[0003] To solve the problem that, in the current technology, the performance of the common door lock under the resistance to force applied by a burglar is not ideal, this invention provides an improved structure of a key cylinder. It is designed to be compact, and can positively limit the rotating opening of the unlocking cam under certain damage by force, which improves its burglar resistance and has a high reliability.

[0004] According to the present invention, there is provided A key cylinder including:

a first cylinder body and second cylinder body, connected by a connection member,
the first cylinder body housing a first barrel, and the second cylinder body housing a second barrel;
an unlocking cam located between the first cylinder body and the second cylinder body ;
characterised in that the connection member features a fixed block extending from its side;
the fixed block set between the first barrel of the key cylinder and the unlocking cam ;
the key cylinder additionally including:

a first driving shaft which extends through a bore in the fixed block and torsionally connects the first cylinder barrel and the unlocking cam such that the first cylinder barrel can drive the unlocking cam between a locked and an unlocked position;

a second driving shaft which torsionally connects the second cylinder barrel and the unlocking cam such that the first cylinder barrel can drive the unlocking cam between a locked and an unlocked position; and

a sliding stop pin,

the sliding stop pin being initially set in a first position which allows the unlocking cam to rotate, and restrained in that position by the pres-

ence of the first cylinder body, and biased to a second position by a resilient member in which the unlocking cam preventing the rotation of the unlocking cam to an unlocked position, such that the sliding stop pin is urged to this second position in the case that the first cylinder body is broken off from the remainder of the key cylinder.

[0005] Through the above detailed design of this invention, we can see that when one side of the cylinder body is broken by force, the sliding stop pin will knock the restraining plug away and enter the fixed block, and then it will lock the unlocking cam and the fixed block. And thus the unlocking cam cannot rotate any more, which will prevent the opening caused by force. It has advantages including simple and compact design, strong burglar resistance, wide range of application and high reliability.

Brief Description of the Drawings

[0006] The detailed contents of the invention can be illustrated through the drawings and living examples below.

Figure 1 is an exploded diagram of an embodiment of the lock structure;

Figure 2 is a side elevation with partial cutaway showing the assembly structure of the lock structure.

Figure 3 is a side elevation with partial cutaway showing when one side of the cylinder body has been broken by force

Figure 4 is the A-A section view of Figure 2.

Figure 5 is the B-B section view of Figure 2.

Figure 6 is the C-C section view of Figure 3.

Specific mode of execution

[0007] Referring to figure 1, this invention includes a left cylinder body 1 and right cylinder body 2, connected by connection member 3.

[0008] A left barrel of key cylinder 1 and a right barrel 5 of key cylinder 2 are inserted into a left cylinder body or housing 1 and the right cylinder body or housing 2 respectively. Between the left cylinder body 1 and the right cylinder body 2, an unlocking cam 6 is set. An extension from the side of the connection member 3 forms a fixed block 7.

[0009] The fixed block can be set between the left barrel of key cylinder 1 and the unlocking cam 6, or between the right barrel 5 of key cylinder 2 and the unlocking cam 6, depending on the specific requirement. The indication here of right or left, is not to prescribe a limit to the range. The left cylinder barrel 4 and the unlocking cam 6 are connected and driven by the left driving shaft 8 which extends through a bore in the fixed block 7. The unlocking cam 6 and the right barrel 5 of key cylinder 2 are con-

nected and driven by the right driving shaft 9. The connection member 3 is initially positioned in the left key cylinder 1 by a circlip 26 which engages in a slot 27 on the left key cylinder 1 and secured with bolt 25 which extends through bore 24 before engaging with a threaded bore in the left key cylinder 1. The connection member 3 is secured to the right key cylinder 2 in a similar manner.

[0010] The specific structure of the driving shaft described above, is that on the proximal end

[0011] (i.e. the ends nearest the unlocking cam 6) of both the left driving shaft 8 and the right driving shaft 9, there is formed a convex cam surface 19, and the other distal end forms the connection joint having convex profiles as shown, which engages with key cylinder; the end of the convex joint driving shaft 9 can be axially inserted into the barrel of the key cylinder, and is rotationally driven by the barrel of the key cylinder; the end of the convex joint of cam 19 can be axially inserted into the into the unlocking cam 6 (and held in position by spring 22, 23 which fits behind the cam 19) to drive the unlocking cam 6 to rotate it. Compressed spring 10 and lifting pin 11 are set in the right barrel 5 of key cylinder 2. A restraining plug 12 is set inside the fixed block 7.

[0012] A sliding stop pin 13 is set at an eccentric position from the axis of rotation of the unlocking cam 6 sets. Referring also to figure 2, one end of sliding stop pin 13 abuts a lifting pin 11, the other end cooperates with the restraining plug 12. Around the sliding stop pin 13, two circumferential grooves 14 are symmetrically formed. Two lock-stopping channels 15 are formed in a radial direction in the unlocking cam 6, the lock-stopping channels 15 each being equipped with a lock-stopping spring 16 and a lock shotpin 17, packed by the sealing covers 21, and the lock shotpin 17 corresponds with the circular grooves 14. The effect of the cooperation between the lock shotpin 17 and the circular grooves 14 is to prevent burglars from removing the sliding stop pin 13 in order to rotate the unlocking cam 6. When one side of the lock body and the restraining plug 12 are taken away or fall apart under force, the lock shotpin 17 maintains an engagement with the sliding stop pin 13 through the circumferential groove 14.

[0013] Limit lugs 18 are set on the two sides of walls of the fixed block 7, which prevents the whole key cylinder being knocked into the lock body by force while the key cylinder as a whole is installed in the lock body.

[0014] Referring also to figure 3, when the left cylinder body 1 is damaged by force, the right compressing spring 10 will no longer be resisted, and it will push (through the lifting pin 11) the sliding stop pin 13 leftwards. One left end of the sliding stop pin 13 will knock the restraining pin 12 to enter the fixed block 7, making the unlocking cam 6 and the fixed block 7 locked, so that the unlocking cam 6 can no longer rotate. In this way, the lock structure prevents unlocking through force. Referring to figure 4, when the sliding stop pin 13 is moved to this position, the lock shotpin 17 under the urging of the lock-stopping spring 16 enters the circumferential groove 14 of the slid-

ing stop pin 13 through the zigzag profile of the sliding stop pin 13, which prevents further movement of the sliding stop pin 13. With the stop pin constrained in this way, the burglars cannot rotate the unlocking cam through taking the sliding stop pin out, further enhancing the lock's ability to guard against burglary.

[0015] The embodiment above is just to describe the optimized mode of execution of an improved structure of key cylinder of this invention, not a conception of this invention nor to limit the range of it. Provided the principles of the invention are not departed from, all the changes of the appearance and improvement of the technical proposals of this invention made by the technicians in this field should belong to the scope of protection of the improved structure of the key cylinder of this invention. In particular, the mechanism could be adapted using the same principles so that rotation of the unlocking is prevented when either key cylinder is removed by force. It will also be realised that though both cylinders shown here are key operated barrel locks, the principles may be extended to other barrel types, such as electronic operated locks, or one side may have a thumb turn, and other variations as is known in the art.

[0016] Many variations are possible without departing from the scope of the present invention as defined in the appended claims.

Claims

1. A key cylinder lock including:

a first cylinder body (1) and second cylinder body (2), connected by a connection member (3), the first cylinder body (1) housing a first barrel (4), and the second cylinder body (2) housing a second barrel (5);

an unlocking cam (6) located between the first cylinder body (1) and the second cylinder body (2);

characterised in that the connection member (3) features a fixed block (7) extending from its side;

the fixed block (7) set between the first barrel (4) of the key cylinder (1) and the unlocking cam (6);

the key cylinder additionally including:

a first driving shaft (8) which extends through a bore in the fixed block (7) and torsionally connects the first cylinder barrel (4) and the unlocking cam (6) such that the first cylinder barrel (4) can drive the unlocking cam (6) between a locked and an unlocked position;

a second driving shaft (9) which torsionally connects the second cylinder barrel (4) and the unlocking cam (6) such that the first cyl-

- inder barrel (4) can drive the unlocking cam (6) between a locked and an unlocked position; and
 a sliding stop pin (13),
 the sliding stop pin (13) being initially set in a first position which allows the unlocking cam (6) to rotate, and restrained **in that** position by the presence of the first cylinder body (1), and
 biased to a second position by a resilient member (10) in which the unlocking cam (6) preventing the rotation of the unlocking cam (6) to an unlocked position, such that the sliding stop pin (13) is urged to this second position in the case that the first cylinder body (1) is broken off from the remainder of the key cylinder.
2. A key cylinder lock according to claim (1) **characterised in that** one end of sliding stop pin (13) abuts a lifting pin (11) biased by the resilient member (10) set in the second barrel (5) of key cylinder (2); and the other end of the sliding stop pin (13) cooperates with a restraining plug (12) set inside the fixed block (7);
 such that in the case of the first a first cylinder body (1) being broken off from the remainder of the key cylinder, the restraining plug (12) is released, allowing the resilient member (10) and lifting pin (11) to move the sliding stop pin (13) into the second position.
3. A key cylinder lock according to either previous claim **characterised in that** the sliding stop pin (13) is housed in an eccentric position from the axis of rotation of the unlocking cam (6).
4. A key cylinder lock according to any previous claim **characterised in that** the sliding stop pin (13) features at least one circumferential groove (14); and the unlocking cam (6) features at least one lock-stopping channel (15) formed in a radial direction in the unlocking cam (6), the lock-stopping channel (15) being equipped with a lock-stopping resilient member (16) and a lock shotpin (17);
 such that on the movement of the sliding stop pin (13) from the first position, the lock shotpin (17) engages with the lock-stopping channel (15) and constrains the sliding stop pin (13) in the second position.
5. A key cylinder lock according to any previous claim **characterised in that** the sides of walls of the fixed block (7) feature one or more limit lugs (18) which constrain the axial movement of the fixed block (7) relative to the key cylinder.
6. A key cylinder lock according to any previous claim **characterised in that** the ends of the first driving shaft and/or the second driving shaft (9) feature convex cam profiles (19) which engage the unlocking cam (6).
7. A key cylinder lock according to any previous claim **characterised in that** the ends of the first driving shaft and/or the second driving shaft (9) feature convex profiles which engage with the first barrel (4) and/or second barrel.

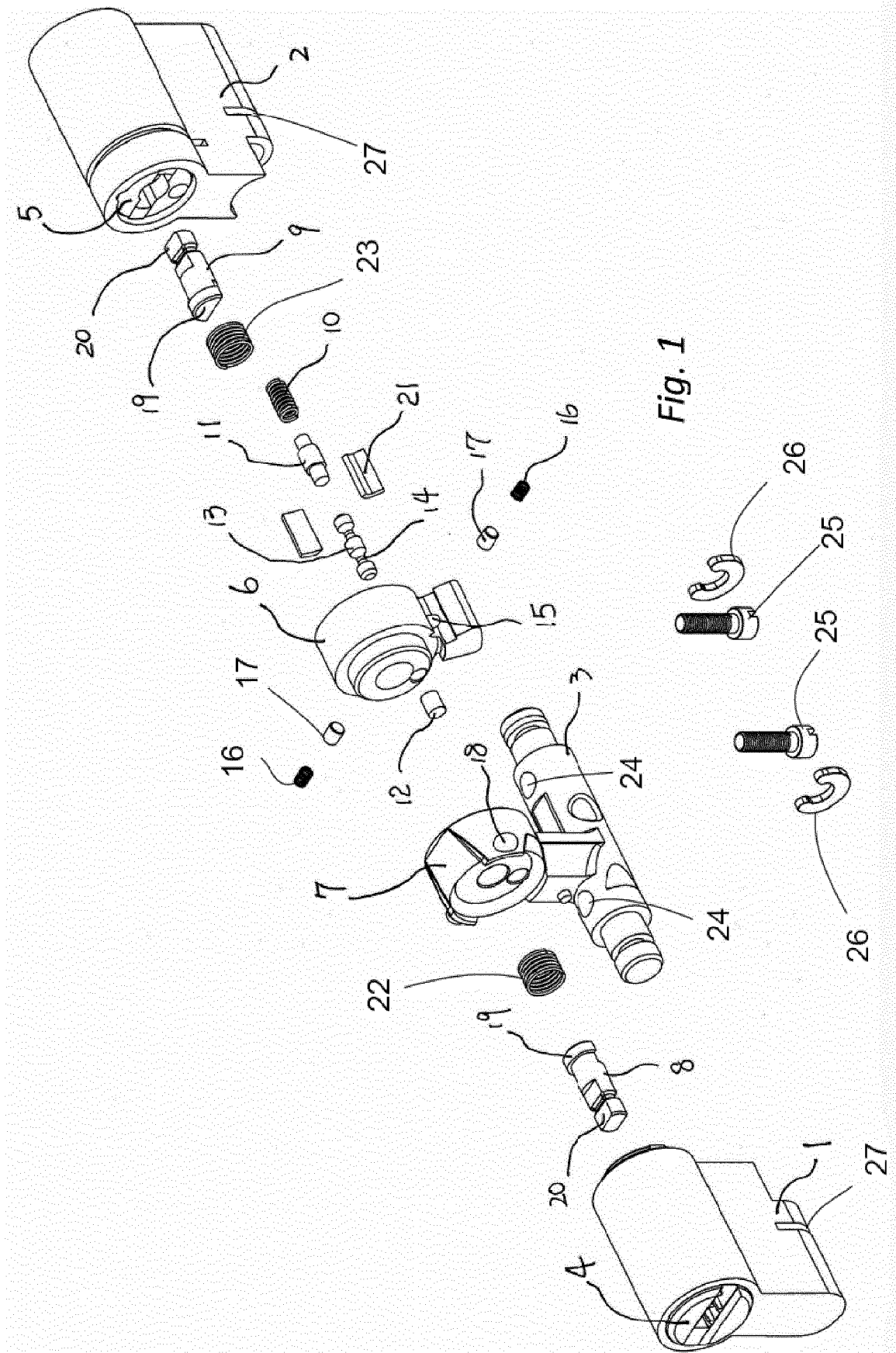


Fig. 1

Fig. 2

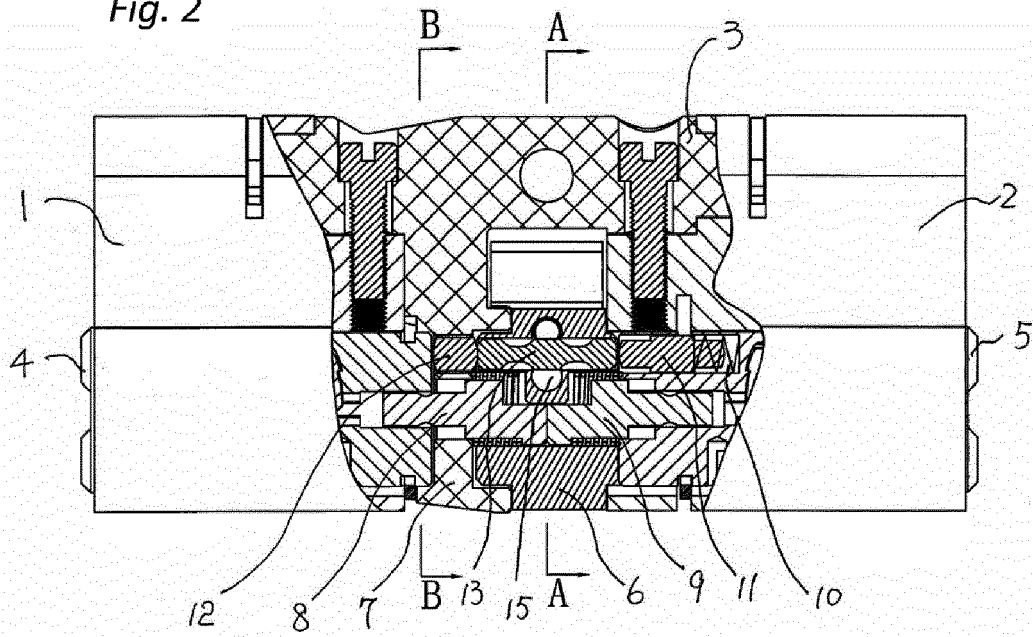
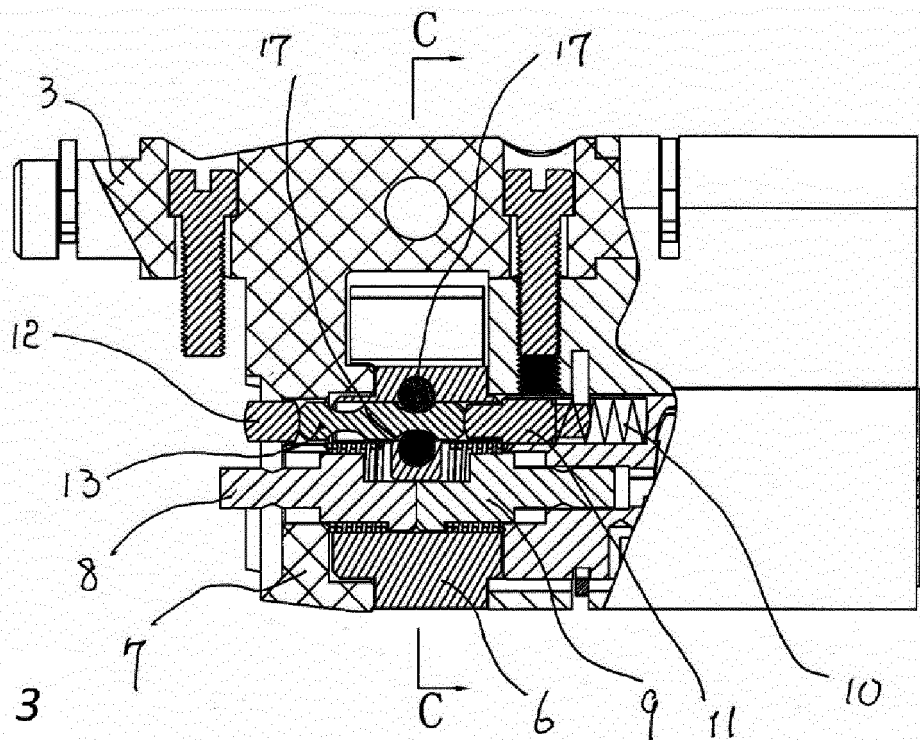
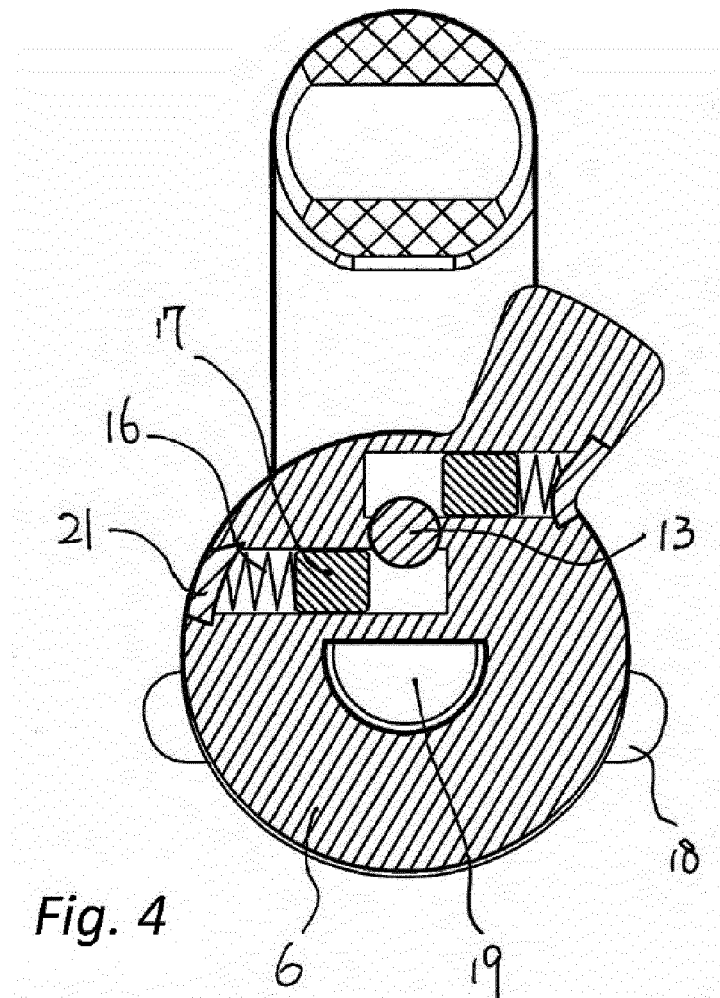
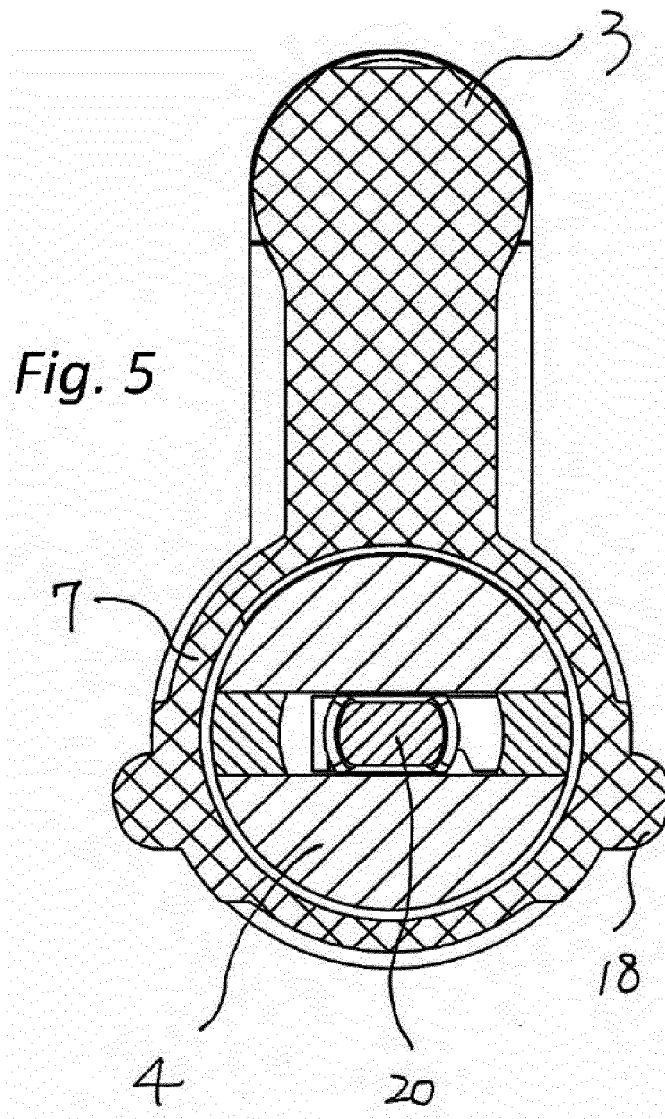
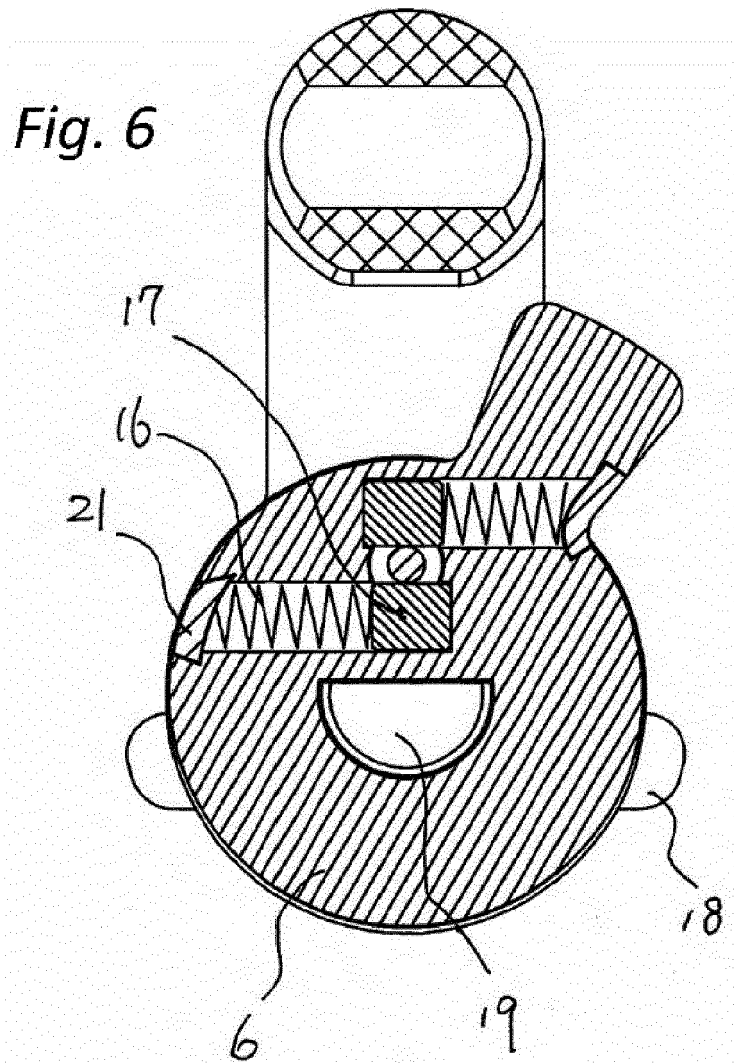


Fig. 3











EUROPEAN SEARCH REPORT

 Application Number
 EP 15 16 0487

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	EP 2 730 727 A2 (EVVA SICHERHEITSTECHNOLOGIE [AT]) 14 May 2014 (2014-05-14) * the whole document *	1-7	INV. E05B17/20 E05B9/04
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 November 2015	Examiner Geerts, Arnold
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 16 0487

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-11-2015

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