

June 11, 1935.

E. N. JACOBI

2,004,435

LOCK

Filed Aug. 27, 1934

2 Sheets-Sheet 1

Fig. 1.

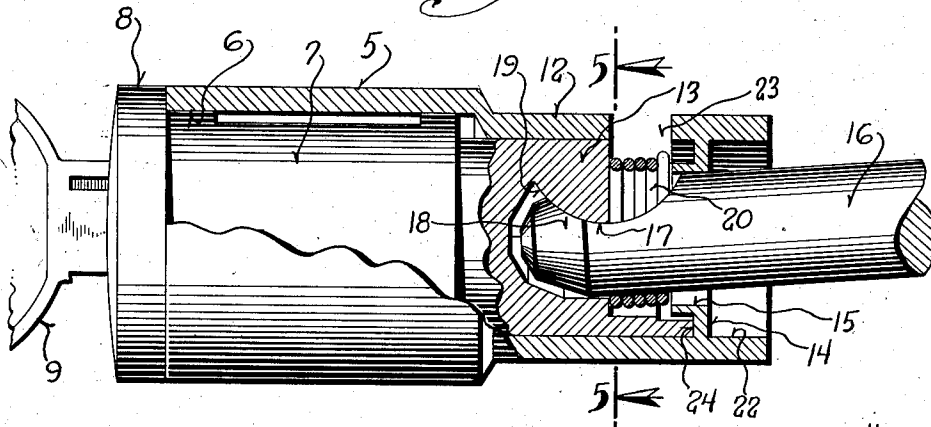


Fig. 2.

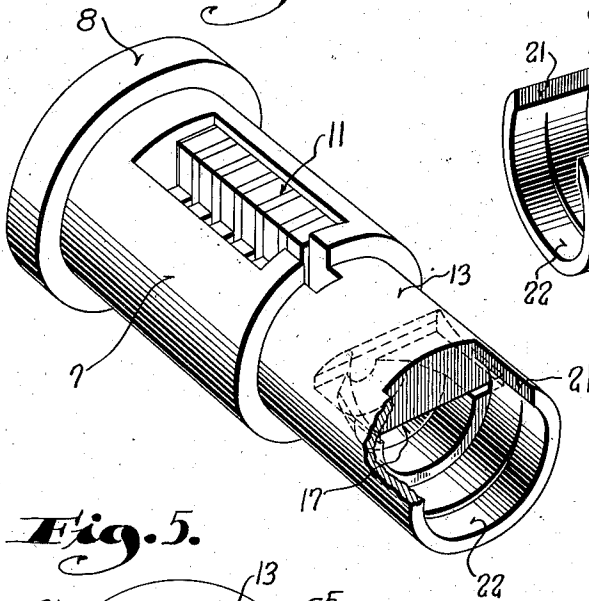


Fig. 3.

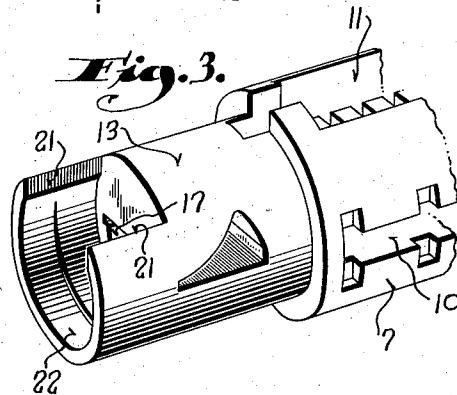
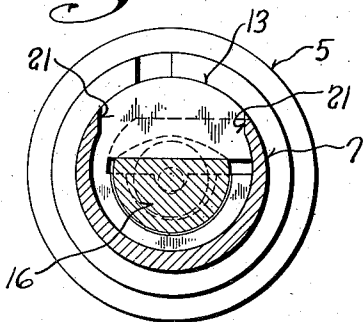
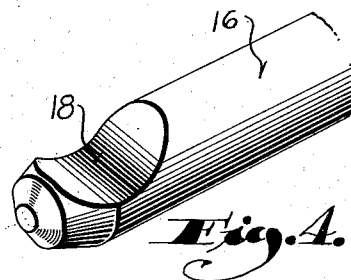


Fig. 5.



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Fig. 6.

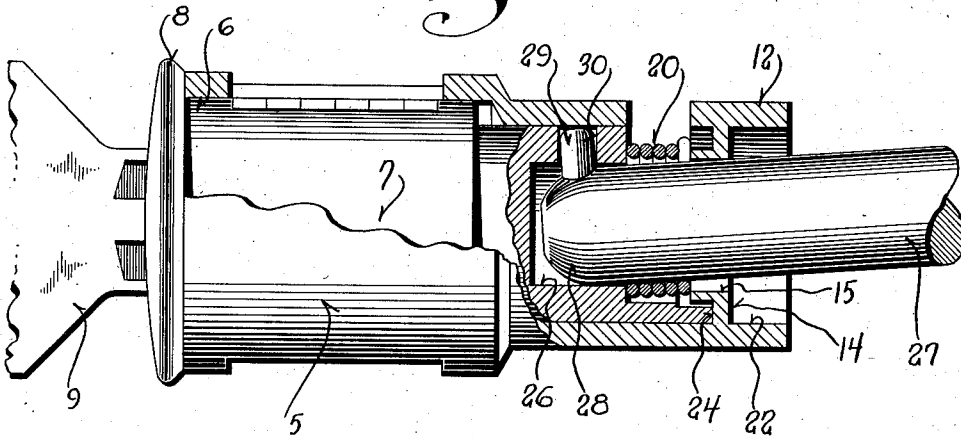


Fig. 7.

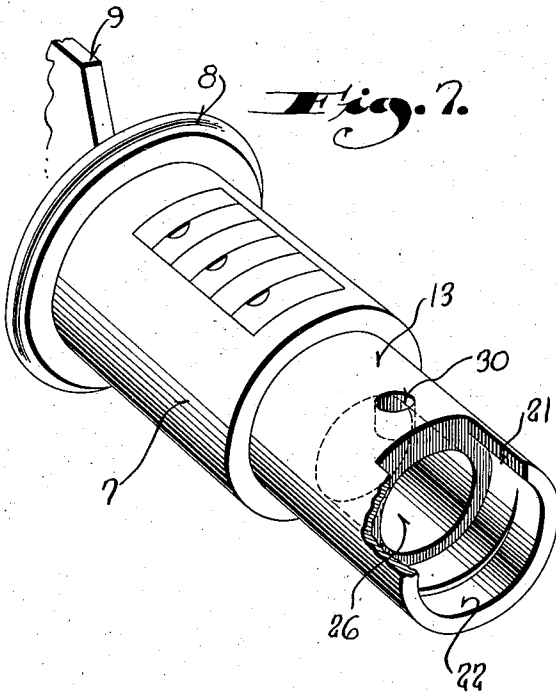
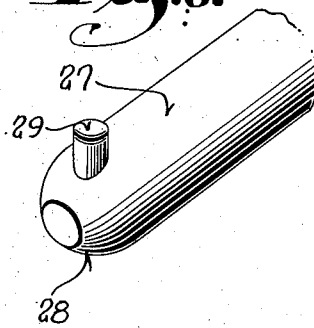


Fig. 8.



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UNITED STATES PATENT OFFICE

2,004,435

LOCK

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Application August 27, 1934, Serial No. 741,537

17 Claims. (Cl. 70—46)

This invention relates to improvements in cylinder locks and refers more particularly to pillar locks.

In locks of this type, an operating shaft or stem extends rearwardly from the lock cylinder to drive lock mechanism located inwardly of the cylinder, and it is a general object of this invention to provide novel means for attaching the stem or shaft to the cylinder.

Heretofore, this attachment has generally been rigid, although in some constructions a more or less universally jointed connection between the cylinder and the operating shaft or stem has been employed to accommodate misalignment between the cylinder and the lock mechanism to be actuated, but the connections heretofore employed for loosely joining the cylinder and stem have been more or less complicated and expensive to manufacture, and it is therefore, a more specific object of this invention to provide an improved and simplified connection affording a degree of universal motion between the cylinder and the stem, which can be embodied in the locks at no greater expense than the conventional rigid connection.

Another object of this invention is to provide a connection between the lock cylinder and the shaft which is so constructed that these parts may be readily joined at any time so that the lock per se may be carried through all of its various manufacturing operations before the shaft is attached. This permits the lock to be equipped with a shaft of any length without in any wise altering the manufacturing and handling equipment for the locks per se.

A further object of this invention is to provide a lock construction in which the usual torsion spring whose function is to return the cylinder to unlocked position, also serves to damp out rattles.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate two complete examples of the physical embodiment of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view partly in side elevation and partly in longitudinal section of a lock embodying this invention;

Figure 2 is a perspective view of the cylinder per se with parts broken away and in section to more clearly illustrate its portion of the connection between the cylinder and shaft;

Figure 3 is a perspective view illustrating part of the opposite side of the cylinder;

Figure 4 is a perspective view of the inner end of the shaft;

Figure 5 is a cross section view taken through Figure 1 on the plane of the line 5—5;

Figure 6 is a view similar to Figure 7, but illustrating a slightly modified embodiment of this invention;

Figure 7 is a perspective view similar to Figure 2 showing the cylinder of the modified embodiment; and

Figure 8 is a perspective view of the inner end of the shaft employed in the modified embodiment.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views the numeral 5 represents the casing or mounting member of the lock which is bored as at 6 to rotatably receive a lock cylinder 7. At its forward end the cylinder has an enlarged flange 8 which engages the front end of the casing to limit axial motion of the cylinder in one direction. Any suitable means, not shown, may be provided to secure the cylinder against withdrawal in an outward axial direction.

The particular manner in which the cylinder is secured against rotation under control of a key 9 forms no part of this invention and is therefore not shown in detail. However, in this respect the lock is preferably like Patent No. 1,965,336, issued to John W. FitzGerald, July 3rd, 1934, wherein the locking member is projectible radially from a recess or chamber 10 in the side of the cylinder for locking engagement with the casing, by key operable tumblers movable perpendicularly to the motion of the locking member in a tumbler receiving chamber 11.

Extending rearwardly from the casing is a skirt 12 in which the reduced inner end 13 of the cylinder is received. Near its inner end the skirt has a transverse wall 14 bored as at 15 to loosely receive the shaft 16 which serves to transmit the rotation of the cylinder to the lock mechanism, not shown.

The shaft 16 projects through the bore 15 and is connected to the adjacent inner end of the cylinder in a novel manner which permits a degree of universal relative motion between the cylinder and shaft to accommodate mis-

alignment between the axis of the lock proper and the lock mechanism, or the bore in which the shaft operates.

This connection consists of a recess 17 in the inner end portion of the cylinder and a hooked end 13 on the shaft engaging in the recess.

The recess 17 has a substantially semi-circular mouth opening to the inner end of the cylinder, and its wall 19 leading back from the straight side of the mouth curves outwardly with respect to the cylinder axis to increase the cross sectional area of the recess and give it an undercut formation.

The cylinder as is customary in lock manufacture is die cast and the under cut recess 17 is conveniently formed by two intercommunicating pockets produced by two cores, one of which is pulled axially of the cylinder and the other radially thereof. The core which is pulled radially of the cylinder gives the recess its undercut formation by forming that part of the recess partially defined by the curved wall 19 and as best shown in Figure 3 this portion of the recess is so located that the core forming it may be withdrawn simultaneously with the core forming the recess or chamber 10 in which the locking member operates.

The hooked end of the shaft which fits into the recess 17 is formed by milling a round bottomed cut in one side of such size that at its deepest portion the shaft has a cross sectional area a little less than the cross sectional area of the semicircular mouth of the recess 17 so that the cylinder and shaft will be non-rotatably connected while at the same time a degree of universal motion between the cylinder and shaft will be afforded.

As will be readily apparent from an inspection of the drawing, a tapered portion 18' is formed at the extreme end of the shaft 16 to supply the necessary clearance for universal-joint action. The tapered end portion 18' also facilitates assembly of the shaft with the cylinder. The shaft, to be assembled with the cylinder, must be inserted therein while disposed in an angular position with respect to the axis of the cylinder. Such angular disposition of the cylinder and shaft, however, can only be had when the cylinder is withdrawn from the casing, consequently the connection between the cylinder and the shaft cannot be disengaged when the lock is assembled in its casing.

In locks of this type the cylinder is generally yieldably maintained in an unlocked position of rotation by means of a torsion spring 20 coiled about the shaft 16 with its ends hooked over the edges 21 of a slot formed in a rearwardly extending flange 22 on the cylinder and the sides of an opening 23 formed in the adjacent portion of the casing. To insure the engagement of the rearmost end of the spring with its edge 21, the flange 22 extends into an annular channel 24 formed in the transverse wall 14.

The disposition of the torsion spring with respect to the under cut recess 17 is such that the spring normally tends to swing the shaft in the direction of movement necessary to disengage the shaft from the cylinder, as shown in Figure 1.

The motion of the shaft produced by the spring is, however, limited by the engagement of the shaft with the bore 15 in the partition wall 14 so that as long as the cylinder is assembled

with its casing detachment of the shaft is impossible.

This action of the spring takes up play in the connection between the shaft and the cylinder and serves to press the cylinder and the shaft to one side of the bores in which they operate so that play therebetween will be taken up. Rattles are thus effectually overcome.

In the modified embodiment of the invention illustrated in Figures 6, 7 and 8, the cylinder has a bore 26 in its inner end into which the adjacent end of the shaft or stem 27 projects.

Unlike the structure illustrated in Figures 1 to 5, inclusive, the shaft or stem has no flattened portion, but is circular throughout. Its extreme inner end 28 is rounded as illustrated and the diameter of the bore 26 is sufficiently large to allow a degree of swiveling motion on the part of the stem or shaft therein.

To provide a driving connection between the cylinder and shaft, a radial pin 29 which may be considered a hook or abutment projects radially from the inner rounded end 28 of the shaft to extend into a radial opening 30 communicating with the bore 26.

The opening 30 is sufficiently large to permit the pin 29 to move slightly therein to enable engagement and disengagement of the shaft with the cylinder by inserting the shaft end into the cylinder bore 26 at an angle, and to allow the desired universal motion.

As in the embodiment illustrated in Figures 1 to 5, inclusive, a torsion spring 20 is provided to yieldably maintain the cylinder in a predetermined position of rotation which spring also reacts against the shaft or stem to hold the same at an angle with respect to the axis of the cylinder so that in use the tension of the spring serves to damp out rattles.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which this invention appertains, that the connection between the shaft and cylinder afforded by this invention is exceedingly simple and may be produced as cheaply as the heretofore commonly used rigid connection; and that the assembly of the shaft with the cylinder may be left to the last so as to facilitate the handling of the locks during the manufacture thereof; and that the construction of the joint or connection is such as to utilize the conventional spring which serves to hold the cylinder in its normal position of rotation, to damp out rattles.

What I claim as my invention is:

1. In a lock of the character described, a cylinder having a cavity to provide an under cut recess in one end, a shaft to transmit rotation of the cylinder to mechanism to be actuated, said shaft having a hooked end portion adapted to be non-rotatably received in said under cut recess, the shaft being readily detachable from the cylinder while in a predetermined angular position with respect to the cylinder, and a casing for the cylinder having a part to engage the shaft and hold the same against movement to said predetermined angular position in which it is detachable from the cylinder.

2. In a lock of the character described, a rotatable lock cylinder, a shaft to transmit rotation from the cylinder to mechanism to be actuated, a non-rotatable connection between the shaft and the cylinder so constructed as to afford a degree of relative universal movement between the cylinder and shaft, said connection being readily de-

tachable with the shaft in a predetermined angular position with respect to the cylinder, and a casing for the cylinder having a part extending rearwardly therefrom to engage the shaft and hold the same against movement to said predetermined angular position.

3. In a lock of the character described, a rotatable lock cylinder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, a substantially universal-joint connection between the shaft and cylinder, comprising a hooked end portion on the shaft having a portion noncircular in cross section and fitting in an under cut recess in the cylinder the mouth of which is of a shape corresponding to the noncircular cross section of the hooked end portion on the shaft, said connection being readily detachable with the shaft in a predetermined angular position with respect to the cylinder, and a casing for the cylinder having a part to engage the shaft and hold the same against movement to said predetermined angular position.

4. In a lock, a rotatable cylinder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, and a connection between the shaft and cylinder having a degree of relative universal motion between the cylinder and shaft, and said connection comprising a substantially semi-circular recess opening to one end of the cylinder with the flat wall of said recess cut back to increase the cross sectional area of the recess, and a hooked end portion on the shaft engageable in said recess in an angular position with respect to the axis of the cylinder, said hooked end portion having a portion of minimum cross section substantially corresponding in shape and size to the semi-circular mouth of the recess.

5. In a lock, a rotatable cylinder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, and a connection between the shaft and cylinder having a degree of relative universal motion between the cylinder and shaft, and said connection comprising a substantially semi-circular recess opening to one end of the cylinder with the flat wall of said recess cut back to increase the cross sectional area of the recess, a hooked end portion on the shaft engageable in said recess in an angular position with respect to the axis of the cylinder, said hooked end portion having a portion of minimum cross section substantially corresponding in shape and size to the semi-circular mouth of the recess, and means engageable over the cylinder and shaft to hold the same against movement to the relative positions at which the shaft is disengageable from the cylinder recess.

6. In a lock, a bored casing, a lock cylinder rotatable therein with one end terminating short of the adjacent end of the casing, a shaft to transmit rotation from the cylinder to mechanism to be actuated, the shaft having an end portion inserted through said end of the casing and adapted to be connected with the cylinder, a non-rotatable connection between the shaft and cylinder affording a degree of relative universal motion between the shaft and cylinder, said connection being readily detachable when the shaft and cylinder are in predetermined positions angular with respect to each other, means on the casing engageable with the shaft to hold the same against movement to said predetermined position so that detachment of the shaft from the cylinder necessitates withdrawal of the cylinder and shaft from the casing.

7. In a lock, a rotatable cylinder, a shaft to

transmit rotation of the cylinder to mechanism to be actuated, a non-rotatable connection between the shaft and cylinder affording a degree of relatively universal motion between said shaft and cylinder, the connection being such that the shaft is readily detachable from the cylinder in an angular position with respect to the axis of the cylinder, and a casing for the cylinder having a bore through which the shaft projects, said bore being sufficiently large to accommodate a degree of relative universal motion between the shaft and cylinder while holding the shaft against movement to its angular position at which it is detachable from the cylinder.

8. In a lock of the character described, a rotatable cylinder having a recess provided with a non-circular restricted mouth, a shaft to transmit rotation of the cylinder to mechanism to be actuated, said shaft having a hooked end provided with a portion of reduced cross section substantially corresponding in size and shape to the mouth of the recess in the cylinder and readily engageable and disengageable from the said recess with the shaft in an angular position with respect to the axis of the cylinder, and a casing for the cylinder having a bore to receive the shaft, said bore being of the size to permit the shaft a degree of universal motion with respect to the cylinder while holding the shaft against movement to its angular position at which its hooked end is disengageable from the cylinder recess.

9. In a lock, a rotatable cylinder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, and a non-rotatable connection between the shaft and cylinder so constructed as to be readily disengageable and affording a degree of relative universal motion between the shaft and cylinder, said connection comprising a hooked end on the shaft fitted in an under cut recess in the cylinder, said recess in the cylinder being formed jointly by a noncircular pocket axial to the cylinder and opening to the inner end thereof intercommunicating with a second pocket opening to one side of the cylinder, and said recess having a portion of greatest cross sectional area inwardly of its open mouth.

10. In a lock of the character described, a die cast lock cylinder, a shaft to transmit movement of the lock cylinder to mechanism to be actuated, and a substantially universal joint connection between the shaft and cylinder including a recess in the inner end of the cylinder receiving the adjacent end portion of the shaft, said recess being formed jointly by two cored intercommunicating openings, one of which extends axially of the cylinder and opens to the inner end of the cylinder and the other of which extends substantially diametrically of the cylinder and opens to one side thereof, said second opening being of such shape as to give the composite recess an under cut configuration.

11. In a lock of the character described, a bored casing, a lock cylinder rotatable in the casing bore with its inner end terminating short of the adjacent end of the casing, a shaft to transmit rotation of the cylinder to mechanism to be actuated having a hooked end portion received in the casing and engaged in a recess in the adjacent inner end of the cylinder, said hooked portion of the shaft and the recess in the cylinder being so shaped as to afford a non-rotatable connection between the cylinder and shaft having a degree of relative universal motion to permit misalignment between the cylinder

der and shaft, and spring means connected with the cylinder and casing to yieldably maintain the cylinder in a predetermined position of rotation, said spring means bearing against the shaft and tending at all times to move the shaft angularly with respect to the axis of the cylinder to maintain the several parts under spring tension and preclude rattles.

12. In a lock of the character described, a bored casing, a lock cylinder rotatable in the casing bore, a shaft to transmit rotation of the cylinder to mechanism to be actuated and having an end portion extending into the casing for connection with the cylinder, interengaging means on the cylinder and shaft portion received in the casing to afford a non-rotatable connection having a degree of relative universal motion between the shaft and cylinder, an annular slotted flange extending rearwardly from the cylinder with its inner wall spaced from the shaft, and a torsion spring coiled about the shaft with its ends engaging the sides of the slot in the annular flange of the cylinder and also abutments on the casing to yieldably maintain the cylinder in a predetermined position of rotation with respect to the casing, and said spring reacting against the shaft to tend to hold the shaft at all times in an angular position with respect to the axis of the cylinder and thereby take up play in the connection between the shaft and the cylinder and between the cylinder and its casing and the shaft and the bore in which it may be received.

13. In a lock, a rotatable cylinder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, the cylinder having a recess opening to one end to receive the adjacent end of the shaft and having a substantially radial opening communicating with the recess and defining an undercut shoulder within the mouth of the recess, and a substantially radially projecting hook on the shaft to lie behind the shoulder in the cylinder recess to maintain the shaft connected with the cylinder.

14. In a lock, a rotatable cylinder having a recess opening to its inner end and having an opening communicating with the recess inwardly of its mouth to define a shoulder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, said shaft having an end portion loosely received in said recess so as to have a degree of universal motion with respect to the

cylinder, and a substantially radially projecting portion on the shaft engageable in said opening communicating with the cylinder recess to maintain the shaft assembled with the cylinder.

15. In a lock, a rotatable cylinder having an axial bore opening to its inner end and having a radial opening communicating with the bore inwardly of its mouth, a shaft having an end portion loosely received in said bore, and a substantially radial projection on said end portion of the shaft disposed in said opening to maintain the shaft detachably assembled with the cylinder, said end portion of the shaft and the radial projection thereon being respectively smaller than the bore and the opening communicating therewith to enable angular displacement of the shaft with respect to the cylinder for insertion and removal of the shaft and to afford a degree of relative universal motion between the shaft and cylinder.

16. In a lock, a rotatable cylinder having a bore opening to its inner end and a substantially radial opening communicating with the bore inwardly of its mouth, a shaft having a rounded end of smaller diameter than the bore disposed within said bore, and a pin projecting radially from the rounded end of the shaft and loosely received in said radial opening to retain the shaft assembled with the cylinder, the rounded end of the shaft and the play between the pin and its opening enabling removal of the shaft from its bore in an angular position of the shaft with respect to the axis of the cylinder.

17. In a lock of the character described, a rotatable lock cylinder, a shaft to transmit rotation of the cylinder to mechanism to be actuated, a substantially universal-joint connection between the shaft and the cylinder which is readily detachable with the shaft in a predetermined angular position with respect to the cylinder, said connection comprising a hooked end portion on the shaft having a portion non-circular in cross section and fitting in an undercut recess in the cylinder, the mouth of which is of a shape corresponding to the non-circular cross section of the hooked end portion on the shaft, and a casing for the cylinder having an extension adapted to encircle the shaft and restrict its angular displacement with respect to the cylinder to less than that required for detachment, while allowing said shaft a degree of universal motion.

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