Aug. 5, 1952 E. N. JACOBI 2,605,631

PILLAR LOCK

Filed Sept. 3, 1949

Fig. 1.

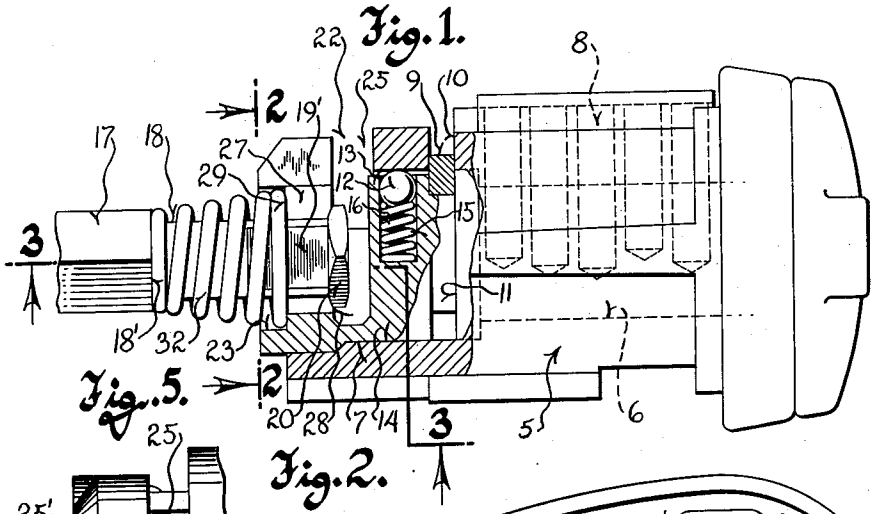



Fig. 5.

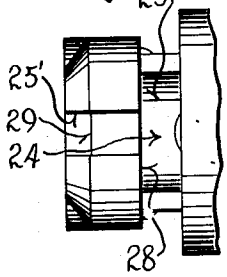



Fig. 2.

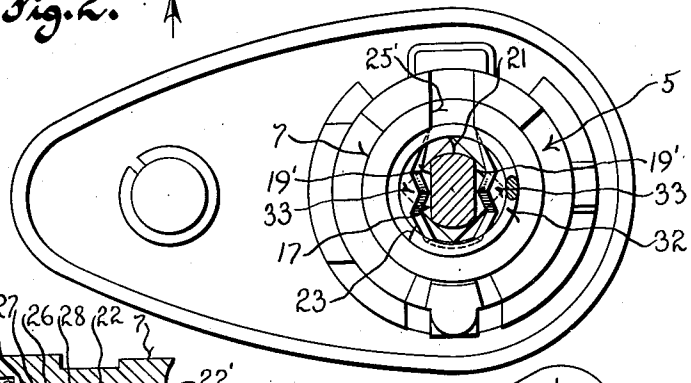



Fig. 3.

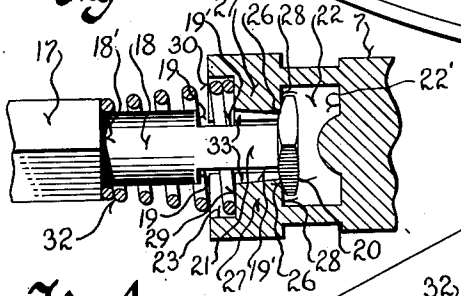



Fig. 4.




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# UNITED STATES PATENT OFFICE

2,605,631

## PILLAR LOCK

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Application September 3, 1949, Serial No. 113,952

4 Claims. (Cl. 70—379)

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This invention relates to locks and refers more particularly to automobile door locks of the type known as pillar locks.

The characteristic feature of a pillar lock lies in the fact that it is provided with a drive or operating shaft coupled with the lock cylinder and projecting axially rearwardly therefrom to transmit rotation of the cylinder to door latch mechanism to be actuated. In most instances it is particularly desirable to provide a detachable connection between the lock cylinder and the drive shaft which affords the shaft a degree of universal motion to compensate for misalignment between the cylinder and the latch mechanism on the door. It is also desirable that the operating shaft be yieldingly biased toward a position extending straight out from the rear of the lock cylinder and coaxial therewith to facilitate assembly of the lock on a door or the like.

A lock embodying these features forms the subject matter of the Edward N. Jacobi Patent No. 2,348,135. While the lock of this patent provides the desired universal motion for and detachability of the shaft, it does not completely meet the prerequisite of extreme simplicity.

It is therefore an object of this invention to provide an improved pillar lock of the character described featuring simplicity of construction.

Another object of this invention is to provide an improved manner of yieldingly biasing the operating shaft toward a position extending straight out from the rear of the lock cylinder and coaxial with the cylinder.

In this respect it is another object of this invention to accomplish biasing of the drive shaft by an expansive coil spring encircling the shaft and reacting thereon with an axial force tending to move the shaft lengthwise away from the cylinder, and which spring has the additional function of precluding accidental detachment of the shaft from the cylinder.

A further object of this invention resides in the provision of a biasing spring which is carried by the operating shaft and which is automatically loaded to exert an axial force on the shaft to hold it axially aligned with the cylinder by the act of coupling the shaft with the cylinder.

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.

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The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view of a pillar lock embodying this invention, parts thereof being broken away and shown in section;

Figure 2 is a cross sectional view through the operating shaft of the lock taken along the plane of the line 2—2 of Figure 1;

Figure 3 is a view partly in elevation and partly in longitudinal section and taken along the plane of the line 3—3 of Figure 1;

Figure 4 is a perspective view of the rear end portion of the lock cylinder, the adjacent end of the drive shaft, and the combination retaining and biasing spring by which these parts are held assembled; and

Figure 5 is a fragmentary plan view of the rear end portion of the lock shown in Figure 1, but with the operating shaft removed.

Referring now more particularly to the drawing in which like numerals indicate like parts, the numeral 5 designates the casing for a pillar lock of the type disclosed in the aforementioned Patent No. 2,348,135. The casing has a bore 6 to rotatably receive the lock cylinder 7, and both the casing and the cylinder are provided with the usual pin tumblers 8 by which the cylinder is secured against rotation out of a neutral position at which a proper key (not shown) may be inserted into and withdrawn from the cylinder. As is well understood, upon insertion of the proper key the cylinder is freed for rotation. This, however, constitutes the conventional structure of a pin tumbler lock.

The cylinder is inserted into the casing from its rear and is held against endwise displacement by any conventional means well known in the art, in the present instance by a stop 9, driven into a transverse slot 10 in the inner end portion of the casing, and projecting into an annular groove 11 in the rear end portion of the cylinder.

The neutral "key-in and key-out" position is defined by a ball type detent 12 carried by the cylinder and yieldingly urged by a spring 15 into and toward the bottom of a notch 13 in the wall of a counterbore 14 in the rear of the casing. The counterbore 14 is of a size to rotatably accommodate the enlarged rear end portion of the cylinder, which projects rearwardly beyond the casing 5. The detent 12 as well as its spring 15

is received in a well 16 extending radially into the cylinder and formed therein during die casting of the cylinder.

Attention is directed to the fact that the cylinder is a die casting and, as will appear more fully hereinafter, is so constructed that no machining operations thereon are required to effect satisfactory coupling of the cylinder to the drive shaft 17 which transmits rotation of the cylinder to door latch mechanism (not shown).

The drive shaft 17 comprises a length of square, relatively slender stock. The front or inner end portion of the shaft is adapted to be drivingly coupled to the cylinder and for this purpose the shaft is turned down to provide a cylindrical neck 18 extending a distance rearwardly from a point just behind the forward extremity of the shaft. The forward portion of the neck also has opposite notches 19 therein providing a pair of opposite flat surfaces 19' parallel to one another and at an angle of 45° to the flat sides of the shaft.

The formation of the front end portion of the shaft in this manner leaves a square head 20 at its forward extremity, and a substantially rectangular neck 21 connecting between the underside of the head 20 and the cylindrical neck 18. The latter, of course, defines a shoulder 18' at its junction with the square body of the shaft to the rear thereof.

The sides 26 of the notches which form the underside of the head 20 may be normal to the axis of the shaft or they may be slightly convex as illustrated, for as will be brought out in more detail hereinafter, these surfaces cooperate with shoulder-like surfaces in a socket 22 formed in the enlarged rear end portion of the cylinder to hold the shaft in a position extending axially from the cylinder to facilitate installation of the lock.

The socket 22 is cored coaxial with the cylinder and opens to the rear of the cylinder through an axial hole 23. A T-shaped opening 24 cored in the side of the cylinder provides a side entrance into the bottom portion of the socket, and the size and shape of this T-shaped side entrance is complementary to the headed front end of the shaft so that the shaft may be inserted laterally into the socket while held substantially parallel to the cylinder axis.

The head portion 25 of the T-shaped opening extends laterally of the cylinder with the front side thereof in line with the front end 22' of the socket 22 and projects to opposite sides of the detent well 16 with the ends of the head portion of the T terminating substantially tangentially to the sides of the socket. The stem portion 25' of the T-shaped opening extends rearwardly to open to the rear extremity of the cylinder, and is defined by the space between the adjacent faces of a pair of opposite identical abutments 27 projecting inwardly into the hole 23 from the opposite side walls of the enlarged rear of the cylinder intermediate the bottom of the socket 22 and the rear extremity of the cylinder.

Since the stem portion 25' of the T-shaped opening is radial to the axis of the cylinder and only slightly greater than the thickness of the substantially rectangular neck on the shaft, it can be seen that proper assembly of the shaft with the cylinder may be effected merely by aligning its headed front end with the T-shaped opening and inserting it laterally into the socket 22 while holding the shaft substantially parallel to the axis of the cylinder.

Referring to Figure 3, it will be noted that the abutments 27 are positioned slightly inwardly of the rear extremity of the cylinder so as to define laterally spaced shoulders 28 facing the front end 22' of the socket, and to define the bottom 29 of a relatively shallow axial well 30 at the rear extremity of the cylinder. Both shoulders 28 lie in a common plane normal to the cylinder axis, and the bottom 29 of the well 30 also lies in a plane normal to the cylinder axis.

As stated previously, proper assembly of the shaft with the socket end of the cylinder requires that the rectangular neck of the shaft be inserted in the stem portion of the T-shaped entrance to the socket with its flat sides between the abutments 27, or in a vertical position as seen in Figure 2. This engages the head 20 of the shaft ahead of the shoulders 28 to prevent axial withdrawal of the shaft from the socket.

Prior to such assembly of the shaft with the socketed end of the cylinder, however, a coil spring 32 is slipped over the headed end of the shaft to bear against the shoulder 18' thereon. The spring has a free length which is slightly greater than the distance from the shoulder 18' to the head 20 on the shaft, and the convolution of the spring which bears against the shoulder 18' is of a diameter to tightly grip the cylindrical neck 18 enabling the spring to be assembled with the shaft prior to connection of the shaft with the cylinder.

The convolutions of the spring 32 increase uniformly in diameter toward its forward end and the coil of the spring at the front of the shaft has a diameter only slightly less than that of the well 30 in the rear of the cylinder to seat in said well in the assembled position of the shaft, as seen best in Figures 1 and 3. Of course, the spring 32 is held compressed manually at the time the shaft is connected to the cylinder to assure that the head 20 of the shaft will pass forwardly of the abutments 27 and that the front coil of the spring will pass the rear extremity of the cylinder and snap into place in the well 30 against the rear of the abutments 27.

Since the convolutions at the front end of the spring encircle the rectangular neck portion of the shaft and also extend completely around the bottom of the well 30, it will be apparent that the spring blocks the stem portion 25' of the side entrance to the socket in the cylinder and thus holds the shaft against accidental detachment from the cylinder. Also since the spring is under compression when properly seated in the well 30, it exerts an axial rearward force on the shaft to bring the underside of the head 20 on the shaft into firm engagement with the forwardly facing shoulders 28 on the abutments 27. The engagement of the head 20 with the abutments 27 in this manner, in addition to the centering effect of the spring 32, causes the shaft to be yieldingly held in a position extending straight out from the rear of the cylinder and coaxial therewith. This, of course, facilitates connection of the rear end of the shaft with the door latch mechanism (not shown), during assembly of the lock on a door or the like.

The manner in which the spring acts to so hold the shaft straight out may be readily understood from Figure 3. Moreover, the connection between the shaft and the cylinder permits enough angular or universal motion of the shaft relative to the cylinder as to compensate for any possible misalignment which may exist between the latch mechanism and the lock cylinder.

In addition to its functions of holding the shaft in a straight out position as defined and of blocking the side entrance to the cylinder socket, the spring also exerts sufficient force on the shaft as to prevent rattles.

The flat surfaces 19' defining the sides of the rectangular neck portion of the shaft are adapted to cooperate with the abutments 27 to provide a rotation transmitting connection between the cylinder and the shaft embodying a degree of lost motion. For this purpose the opposing faces of the abutments which lie adjacent to the opposite sides of the rectangular neck portion of the shaft are provided with V-shaped driving lugs 33. Each of these lugs has its apex close to the adjacent side of the rectangular neck portion of the shaft, and lying in a transverse plane containing the axis of the cylinder, as will be apparent from Figure 2. Hence, the cylinder must be rotated a predetermined degree in either direction before rotation is transmitted to the shaft by the engagement of one inclined face of each driving lug with the adjacent face of the rectangular neck portion on the shaft.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art that this invention provides an improved pillar lock wherein the operating shaft of the lock is held against detachment from the cylinder and in a position extending straight out from the rear of the cylinder and coaxial therewith by a single compression spring arranged to exert an axial centering force on the shaft, which force is utilized in a simple manner to preclude rattling of the shaft at its points of connection to the cylinder and the latch mechanism operated by the shaft.

What I claim as my invention is:

1. A lock of the type having a rotatable cylinder and an operating shaft projecting substantially axially from the rear of the cylinder and coupled thereto in a manner precluding axial withdrawal of the shaft from the rear of the cylinder but enabling a degree of universal motion of the shaft relative to the cylinder as well as detachment of the shaft by bodily motion of the shaft laterally with respect to the cylinder axis, characterized by: means on the rear of the cylinder defining a relatively shallow rearwardly opening well coaxial with the cylinder; a shoulder on the projecting end of the shaft facing said end of the cylinder; and an expansive coil spring encircling the shaft with the convolutions thereof at one end received in said well to block lateral detaching motion of the shaft relative to the cylinder, said spring bearing against the bottom of the well at one end and reacting against said shoulder on the shaft at its other end to exert a "centering" effect on the shaft tending to hold the same coaxial with the cylinder.

2. In a lock of the character described: a rotatable lock cylinder having a cavity opening to the rear end thereof, and a T-shaped aperture in the side wall of the cylinder providing a side entrance to said cavity, the head portion of said T-shaped aperture extending laterally of the cylinder substantially in line with the front end of said cavity, and the stem portion of the aperture extending longitudinally rearwardly from the head portion to the rear end of the cylinder and leading substantially radially through the side wall of the cylinder; a pair of opposing abutments on the cylinder projecting into said cavity at opposite sides of the stem portion of said aperture to divide said cavity into a relatively shallow well rearwardly of the abutments and a socket forwardly of the abutments; a drive shaft having a headed end received in said socket and a neck portion beneath the head passing rearwardly between said abutments in line with the stem portion of said aperture, said head and neck portion being of a size to pass laterally into and out of said T-shaped aperture in the side of the cylinder, and the head being engageable with the front side of said abutments to preclude axial withdrawal of the shaft from the rear of the cylinder; cooperating surfaces on the abutments and said neck portion of the shaft through which rotation is transmitted from the cylinder to the shaft; a shoulder on the shaft spaced from but facing the rear of the cylinder; and an expansive coil spring encircling the shaft with one end in engagement with said shoulder thereon and its other end received in said shallow well at the rear of the cylinder to preclude passage of the neck portion of the shaft laterally out of the stem portion of said aperture, said spring reacting against the rear side of said abutments at the bottom of the well to thereby exert a rearward axial thrust on the shaft to engage its head with the front side of said abutments with a force sufficient to preclude rattling of the shaft at its connection to the cylinder.

3. The lock set forth in claim 2 wherein said well in the rear of the cylinder is coaxial with the cylinder, and the first designated end of the spring has a diameter small enough to tightly grip the shaft, while the opposite end of the spring has a diameter substantially equal to the diameter of said well, whereby the expansive force of the spring is utilized to yieldingly hold the shaft substantially coaxial with the cylinder.

4. In a lock of the character described: a rotatable lock cylinder having a cavity opening to the rear end thereof, and a T-shaped aperture in the side wall of the cylinder providing a side entrance to said cavity, the head portion of said T-shaped aperture extending laterally of the cylinder substantially in line with the front end of said cavity, and the stem portion of the aperture extending longitudinally rearwardly from the head portion to said end of the cylinder and leading substantially radially through the side wall of the cylinder; a pair of segment-like abutments in said cavity projecting from laterally opposite sides thereof, said abutments having rear surfaces lying in a plane normal to the cylinder axis and spaced slightly forwardly of the rear end of the cylinder to define the bottom of a relatively shallow well opening to the rear of the cylinder, and having front surfaces lying in a plane normal to the cylinder axis and spaced a distance rearwardly of the bottom of the cavity to provide a socket adjacent to the bottom of the cavity; a drive shaft having a head received in said socket and a neck portion beneath the head passing rearwardly between said abutments in line with the stem portion of said aperture, said head and neck portion being of a size to pass laterally out of said T-shaped opening, and the head being engageable with the front side of said abutments to preclude axial withdrawal of the shaft from the rear of the cylinder; cooperating surfaces on the abutments and said neck portion of the shaft through which rotation is transmitted from the cylinder to the shaft; a shoulder on the shaft spaced from but facing the rear of the cylinder; and an expansive coil spring encircling the shaft with one end

in engagement with said shoulder thereon and its other end received in said shallow well at the rear of the cylinder to preclude passage of the neck portion of the shaft laterally out of the stem portion of said aperture, said spring reacting against the rear side of said abutments at the bottom of the well to thereby exert a rearward axial thrust on the shaft to engage its head with the front side of said abutments with a force sufficient to preclude rattling of the shaft at its connection to the cylinder.

EDWARD N. JACOBI.




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