May 23, 1961 F. J. RUSSELL 2,985,478

REMOVABLE TORSION SPRING ASSEMBLY

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Fig. 1.

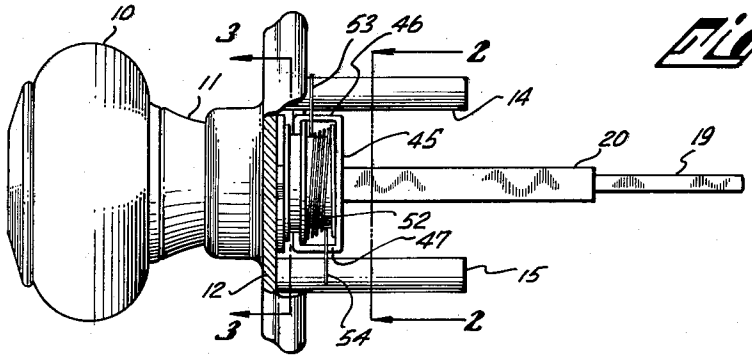


Fig. 2.

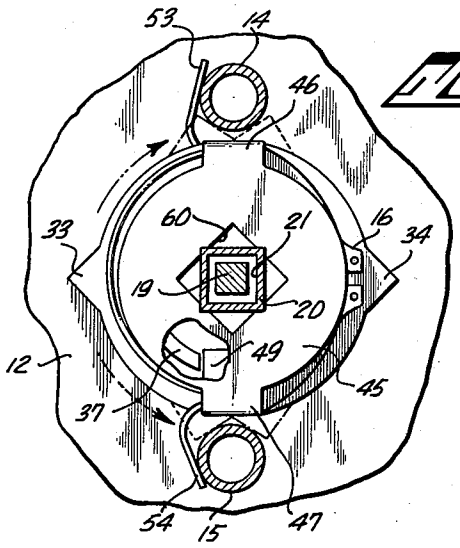


Fig. 3.

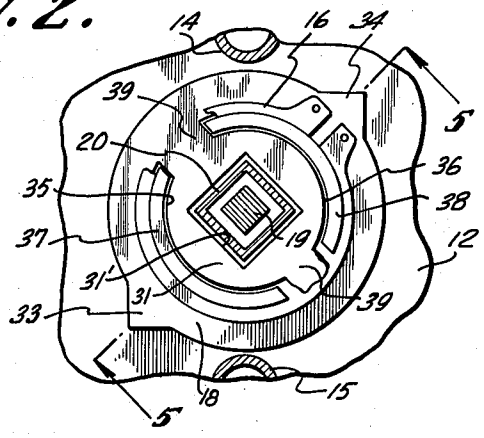
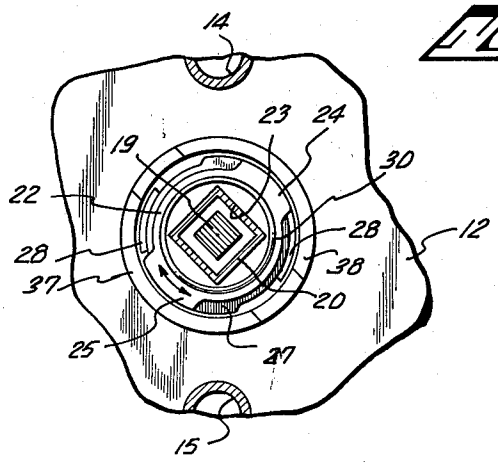


Fig. 4.



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Fig. 5.

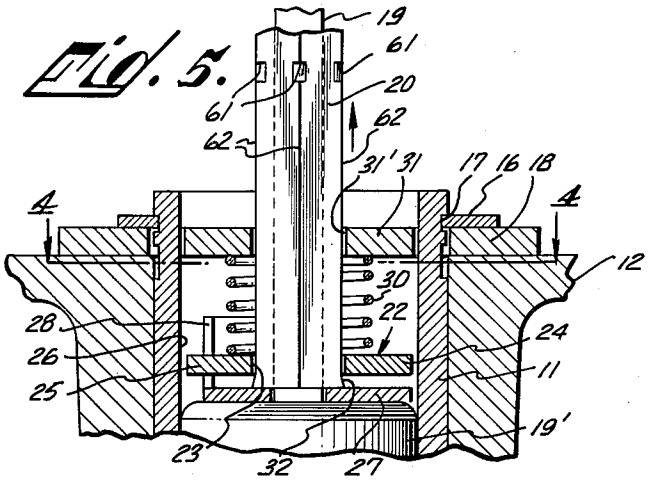


Fig. 6.

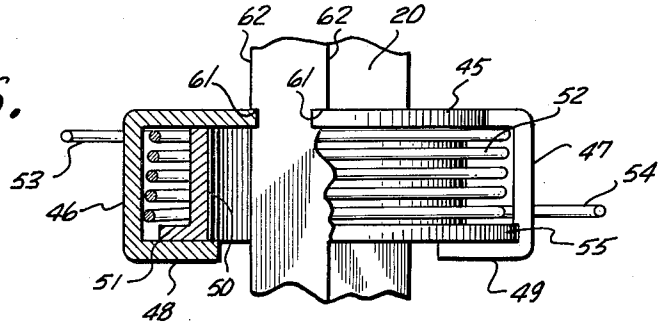
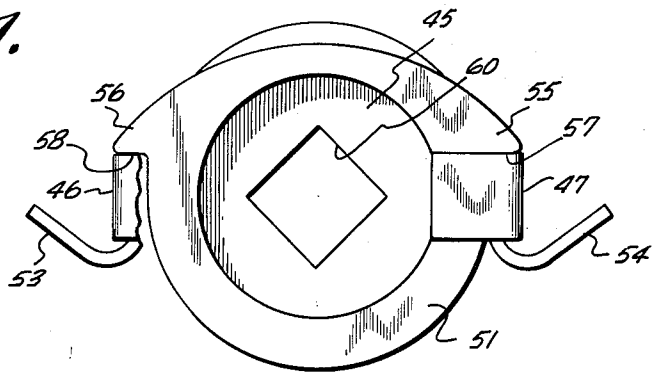


Fig. 7.



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REMOVABLE TORSION SPRING ASSEMBLY

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3 Claims. (Cl. 292—336.3)

The invention relates to door locks and has particular reference to that portion of a door lock which provides spring resistance for rotation of the hand hold arranged in such fashion that it facilitates easy assembly and disassembly of certain parts of the lock.

Most door locks are so constructed that a spring at one location or another within the mechanism serves to hold the knob, handle or operating element in initial position and to return the knob to that position after the lock or latch has been manipulated. Also, it is customary to have the neutral position of the knob such that it can be rotated in either direction, clockwise or counterclockwise, to unlatch the door.

Although there are a great variety of expedients available to designers and manufacturers of door locks by means of which the knob can be held as desired, many of these fail to take into consideration the necessity for occasionally disassembling the latch for sundry purposes, such, for example, as for re-keying. Very frequently the resiliency employed to return the knob to its initial position is designed in such fashion that it can be easily installed only at the factory assembly bench where special tools are available and which once installed can be removed only at the expenditure of considerable effort and time. Structure and parts heretofore employed for torsion spring returns which have been installed in certain locks have made use of a considerable number of extra parts of relatively small size and fashioned in a manner which not only consumes considerable time in assembly and disassembly but also which provides moving parts subject to considerable wear. Such parts consequently need replacement from time to time.

It is therefore among the objects of the invention to provide a new and improved removable torsion spring assembly for use in door locks and latches which substantially minimizes the number of parts and which can be quickly and easily installed and removed.

Another object of the invention is to provide a new and improved removable torsion spring assembly for door locks and latches which is especially rugged in that it eliminates the necessity for use of extra small pieces and snap rings by substituting therefor relatively simple configurations in necessary parts of the latch or lock which can be manipulated into and out of engagement.

Another object of the invention is to provide a new and improved removable torsion spring device for door locks and latches of sundry kinds which can be slipped into and out of position without the employment of special tools.

Still another object of the invention is to provide a removable torsion spring assembly of such design that it comprises a unitary structure of relatively few parts which in itself can be easily assembled and disassembled and which when assembled can be quickly dropped into place and, when needed, can be removed as a unit to

permit quick partial disassembly of the latch for sundry purposes including re-keying.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view showing one form of knob assembly partially broken away with the torsion spring assembly operatively mounted therein.

Figure 2 is a cross-sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a cross-sectional view partially broken away taken on the line 3—3 of Figure 1.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 5.

Figure 5 is a fragmentary longitudinal sectional view taken on the line 5—5 of Figure 3.

Figure 6 is a longitudinal view partially broken away of the separate torsion spring assembly but showing a section of the spindle extending therethrough.

Figure 7 is a bottom view of the device of Figure 6 partially broken away.

In an embodiment of the invention chosen for the purpose of illustration there is shown one side of a door latch consisting of a knob **10** having a shank **11** thereon rotatably mounting the knob in an anchor plate **12**. The anchor plate is provided with conventional index posts **14** and **15** which cooperate with the knob assembly from the opposite side of the door (not shown) in receiving the usual screws employed to hold the anchor plate in proper position against a door. The shank is retained in the anchor plate by employment of a snap ring **16** contained in an annular groove **17** in a position such that the snap ring overlies a washer **18**.

Attached to a lock cylinder within the knob is an inner solid spindle **19** which is adapted to rotate with the knob. An outer hollow spindle **20** surrounds the inner spindle **19** and has an inside bore **21** sufficiently larger than the inner spindle **19** to permit the inner spindle **19** to rotate relative to the outer hollow spindle.

At the inner end of the outer hollow spindle **20** is a stop washer **22** provided with a square hole in this instance whereby it is adapted to be non-rotatably slid over the outer spindle. Lugs **24** and **25** extend outwardly of the stop washer within a central bore **26** of the shank **11**.

A stop plate **27** forming part of the knob has outwardly extending shoulder elements **28** located in such position that the lugs **24** and **25** can be engaged by the shoulder elements when the knob is rotated but wherein the shoulder elements are spaced from each other to permit a limited movement of the knob in one direction or another before the lugs are engaged, thereby to provide a degree of lost motion rotation between the knob and the outer hollow spindle **20**. A compression spring **30** acts between the spring retaining washer element **31** and the stop washer **22** and since the spindle **20** has an outwardly flared portion **32** at its innermost end, action of the spring and the stop washer tends to press the square spindle inwardly to the position illustrated in Figure 5. The washer element **31** comprises the inner part of the washer **18** and has a square hole **31'** therein through which the spindle **30** can freely slide.

Attention is directed to the washer **18** which has extensions **33** and **34** thereon. These extensions protrude outwardly to a location where they can engage against the posts **14** and **15** in certain positions of operation.

From an examination of the disclosure of Figure 3, it

will be noted that the washer 18 is provided with arcuate recesses 35 and 36 receptive of segments 37 and 38 of the shank 11 and that neck portions 39 lie between the segments whereby to key the washer 18 to the shank and also connect the spring retaining washer element 31 in connected relationship to the washer 18.

The removable torsion spring assembly unit shown separately in Figures 6 and 7 and in assembled position in Figure 1 comprises a retaining plate 45 provided with legs 46 and 47 extending slightly outwardly from the perimeter of the plate and having at ends of the legs respectively end elements in the form of feet 48 and 49. It will be clear from an examination of Figure 6 that the feet 48 and 49 are parallel to the retaining plate and spaced at a considerable distance therefrom.

A hollow cylindrical core 50, at one end of which is a flange 51, is located between the feet 48 and 49 and the retaining plate 45. Wound around the core in loosely fitting loops is a torsion spring 52 having ends 53 and 54. The diameter of the spring is substantially larger than the outside diameter of the core 50 so that when the spring is compressed there will be no binding between turns of the spring or between the spring and the containing parts at any time.

It will be noted that the flange 51, as clearly shown in Figure 7, is of special construction in that it has extensions 55 and 56 at the perimeter providing respectively shoulders 57 and 58. These shoulders lie on a line spaced from a diametrical line parallel to them.

When the spring assembly parts are to be assembled, the torsion spring 52 is placed over the core and the ends 53 and 54 rotated toward each other so as to contract the spring. The ends are moved close enough together so that they can be passed between the legs 46 and 47, after which the ends are released and spring out to the position illustrated in Figure 7. Tension exerted between the ends of the spring when they press against adjacent edges of the legs draws upon the core 50 and pulls the shoulders 57 and 58 into engagement with opposite edges of the legs 46 and 47, thereby to hold the three parts of the torsion spring assembly in assembled relationship.

As indicated the retainer plate 45 is provided with an opening 60 which in the chosen embodiment is a square opening somewhat larger than the square exterior of the hollow spindle 20 so that the retainer plate slides freely over the spindle. Although a square spindle and appropriate square opening is employed in the chosen embodiment, it will be appreciated that other non-circular complementary forms may be employed with equal success.

The square spindle 20 at a location spaced outwardly of the washer 18 and the spring retaining portion thereof is provided with notches forming shoulders 61 on each of the corners 62 of the spindle. The notches have a breadth slightly in excess of the thickness of the retainer plate 45. The purpose of the notches is to engage the retainer plate whereby to hold the torsion spring assembly in operating position.

The assembly is accomplished by sliding the torsion spring assembly over the spindle 20 until the retainer plate 45 lies adjacent the notches forming the shoulders 61. The spindle 20 is then pulled outwardly against tension of the spring 30 a slight amount sufficient to have the shoulders 61 overlie sides of the aperture 60. The spindle is then rotated approximately 45 degrees relative to the retaining plate 45 and in any event sufficient to have the shoulders 61 engage the outer surface of the retainer plate. If the rotation be something slightly less or greater than 45 degrees, engagement will be secure but the feet 48 and 49 will not fall into spaces between ends of the segments 37 and 38. This engagement can be accomplished by rotating the knob 10 slightly until the spaces fall directly in alignment with the feet and the spring tension of the spring 30 pulls the feet inwardly into position. After this interlock has taken place the torsion spring assembly will remain fixed in position until deliberately disassembled.

When disassembly is desired, the operation consists of again lifting the spindle 20 against the yielding tension of the spring 30 sufficient to permit the feet 48 and 49 to be lifted from their positions in the spaces between the segments 37 and 38. The spindle is then rotated by rotation of the knob sufficient to misalign the feet 48 and 49 with the spaces between the said segments 37 and 38 and to also disengage the shoulders 61 from the surface of the retainer plate 45 by aligning the square hole 60 of the plate 45 with the square sides of the spindle 20. Since there now is little or no tension exerted by the ends 53 and 54 of the torsion spring assembly upon the index posts 14 and 15, the torsion spring assembly can then be readily slid outwardly over the spindle and removed. Thereafter, by disengaging the snap ring 16, the washer element 31 then can be removed to provide access to the interior of shank 11 and knob 10 can be removed for re-keying or for any other servicing purpose.

It will be appreciated from the structure herein described that the spindle itself and the body of the torsion spring assembly without change or alteration therein is made use of to provide interlocking the torsion spring assembly with the parts of the lock, thereby eliminating the necessity of extra snap rings, washers, and other connections. The means for mounting the torsion spring moreover is of such compact and positive character that its construction and assembly can be accomplished with a minimum of cost, and attachment of the assembly thus formed can also be accomplished with a minimum of time and effort. The resulting combination is one having positive operating characteristics, one which is secured without extra attaching parts and also one which can be disassembled and reassembled without special tools and in a minimum amount of time.

Although I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent structures and devices.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An operating assembly for latches comprising a casing, protrusion means on the casing, a hand hold rotatably mounted in the casing, a spindle non-rotatably attached to the hand hold, and a torsion spring assembly having elements in engagement with said protrusion means yieldably holding said hand hold in a position of rotation intermediate opposite extreme positions, said torsion spring assembly comprising a retaining plate having a non-circular opening slidably receptive of said spindle, said spindle having axially extending corners and shoulders on said corners located in a plane extending transversely relative to the axis of the spindle, said shoulders being in retentive engagement with said plate at a selected position of rotation of the spindle relative to the plate.

2. An operating assembly for latches comprising a casing, protrusion means on the casing, a hand hold rotatably mounted in the casing, a non-circular spindle non-rotatably attached to the hand hold including resilient means urging said spindle in an axial direction, and a torsion spring assembly having elements in engagement with said protrusion means yieldably holding said hand hold in an intermediate position of rotation, said torsion spring assembly comprising a retaining plate having a non-circular opening slidably receptive of said spindle, said spindle having axially extending corners and shoulders on said corners, said shoulders being in retentive engagement with said plate at a selected position of rotation of the spindle relative to the plate under pressure of said resilient means, configuration means on said hand hold and complementary

configuration means on the spring assembly engageable therewith whereby to secure the spring assembly non-rotatably to said hand hold when said spindle is in axially fixed operative engagement with said torsion spring assembly.

3. An operating assembly for latches comprising a casing, protrusion means on the casing, a hand hold rotatably mounted in the casing, a non-circular spindle non-rotatably attached to the hand hold including resilient means urging said spindle in an axial direction, and a torsion spring assembly having elements in engagement with said protrusion means yieldably holding said hand hold in an intermediate position of rotation, said torsion spring assembly comprising a retaining plate having a non-circular opening slidably receptive of said spindle, said spindle having axially extending corners and shoulders at fixed locations on said corners extending transversely relative to the axis of the spindle, said shoulders being in retentive engagement with said plate at a selected position of rotation of the spindle under pressure of said resilient means, a washer non-rotatably positioned over said spindle and stop means on said washer having positions of engagement with said protrusion means at extreme positions of rotation of said washer and said plate, configuration means on said hand hold and complementary configuration means on the torsion spring assembly engageable with said configuration means whereby to secure the torsion spring assembly non-rotatably to said hand hold when said spindle is in retentive engagement with said torsion spring assembly.

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