Nov. 22, 1960 F. J. RUSSELL ET AL 2,961,268

KNOB RETAINER

Filed June 1, 1959

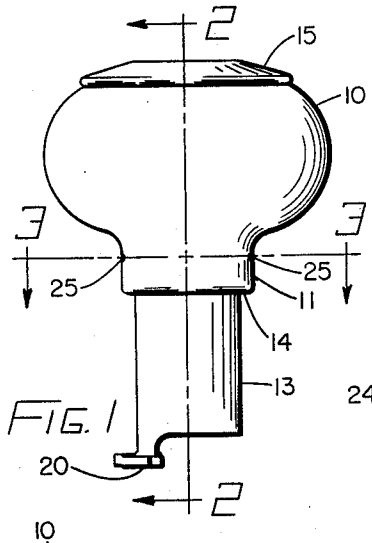


FIG. 1

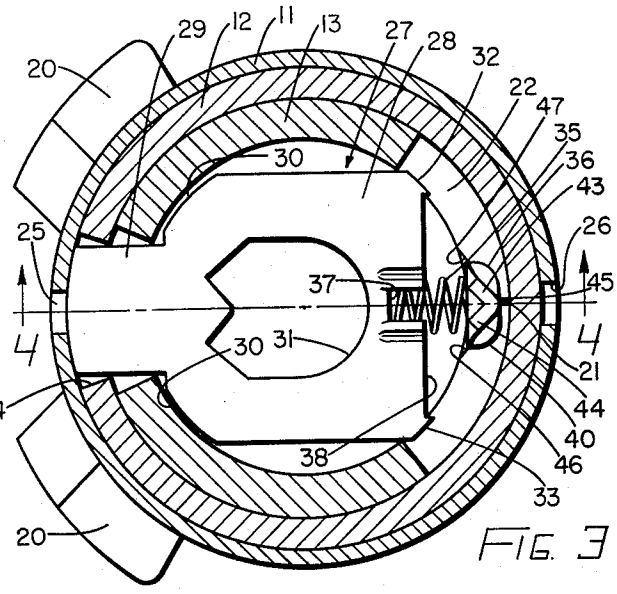


FIG. 3

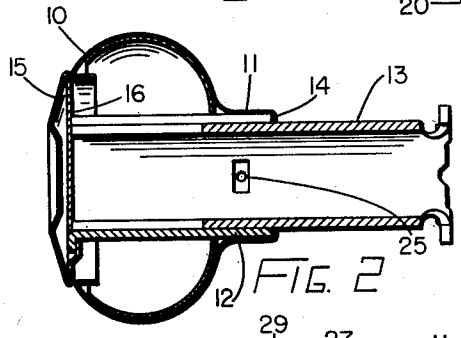


FIG. 2

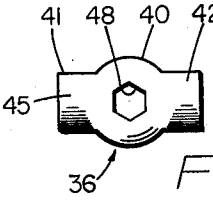


FIG. 8

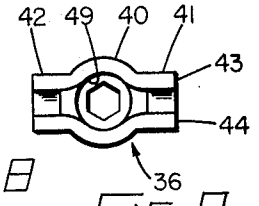


FIG. 9

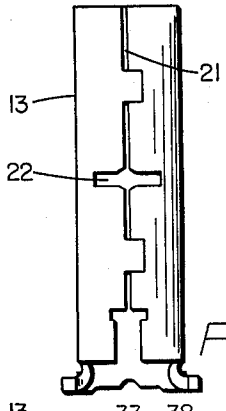


FIG. 6

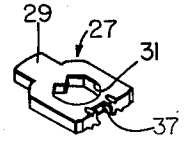


FIG. 7

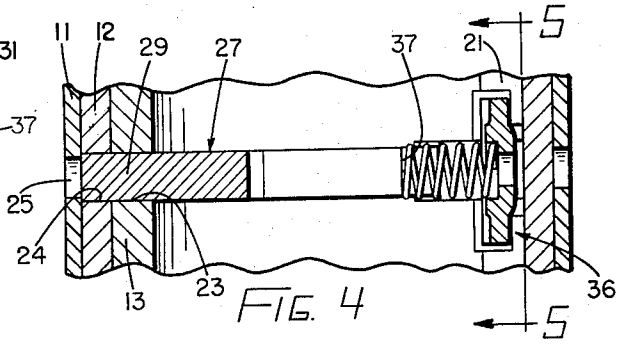


FIG. 4

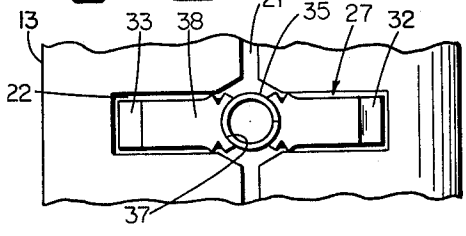


FIG. 5

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KNOB RETAINER

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6 Claims. (Cl. 292—352)

The invention relates to door lock sets and has special reference to a means by which a door knob is releasably attached to a spindle so that when the appropriate occasion arises the knob can be removed from the spindle without the necessity of disturbing the installation of the remaining portions of the latch set in the door.

More recently than the old style lock sets which made use of a short screw for holding a knob on a spindle, more modern lock sets have used resilient catches and retainers of one kind or another for securing a knob to the spindle in a manner which by manipulation of the resilient means facilitates removal of the knob. The sundry retainers and catches devised for this purpose have had certain drawbacks which this invention seeks to overcome. Some of the prior art devices have been difficult to assemble into the lock during its manufacture. Obviously, such devices have not been easy to use after installation of the lock set in a door. Where leaf type springs have been employed, many of the springs have been too stiff to permit ready manipulation or too limber to secure the knob fast to an extent prohibiting a certain degree of rattling. Leaf type springs have had a tendency to fail early in use. Moreover, the limited space available between the knob shank and the spindle under ordinary circumstances has compounded the problem of devising a satisfactory resilient catch or retainer which satisfies current demands with respect to ease of manipulation and cheapness in cost.

It is therefore among the objects of the invention to provide a new and improved spring actuated retainer for holding a knob to a spindle against withdrawal as well as against rotation, which is simple in construction, easy to install during the initial assembly, and which is also easy to operate when in use.

Another object of the invention is to provide a new and improved spring actuated knob retainer which is particularly rugged in construction but which is so devised that under proper circumstances it can be very easily released to permit removal of the knob and subsequent replacement.

Still another object of the invention is to provide a new and improved spring actuated knob retainer which is so constructed both with respect to its form and incorporation in the spindle as to take advantage of the relatively large cross-sectional area of the spindle rather than being confined to a limited space defined by the thickness of the spindle wall, thereby to provide a very dependable type of retainer which at the same time is easy and inexpensive to manufacture as well as easy to manipulate once the lock set is installed in a door.

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 of a knob attached to the hollow spindle, the remaining parts of the lock with which the spindle cooperates having been omitted in the interest of clarity.

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

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

Figure 4 is a fragmentary longitudinal sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary view showing the position of a spring keeper for the spring of a locking plate when assembled.

Figure 6 is a side perspective view of the hollow tubular spindle made use of in the assembly.

Figure 7 is a perspective view of the locking plate element.

Figure 8 is a top view of a spring keeper which is used in association with the locking plate.

Figure 9 is a bottom view of the spring keeper.

In an embodiment of the invention chosen for the purpose of illustration there is shown a knob **10** having an extension **11** thereon on the side which normally faces the door. In this particular form of the invention there is provided a retention sleeve **12** which is fastened inside the knob in a position extending into the extension and anchored fast within the knob so that it serves as a reinforcing interior for the knob and also as an element receptive of a tubular spindle **13**. It will be noted incidentally that the retention sleeve bears against a shoulder **14** at the inner end of the extension and that it is fastened at its outer end by employment of a face plate **15** anchored to a flange **16** of the sleeve.

On the tubular sleeve are roll-back elements **20** extending radially outwardly at an appropriate location at the inside end. A slot **21** extends throughout the entire length of the tubular spindle at one side thereof. For convenience this is along the side opposite the roll-back elements **20**, and is referred to herein as a longitudinal slot.

Extending transversely across one side of the tubular spindle on the side thereof opposite from the slot and at a location intermediate opposite ends is a transverse slot **22**, somewhat wider than the longitudinal slot in the chosen embodiment.

Also located on the tubular spindle is an opening **23** which is diametrically opposite the center of the slot **22** or, in other words, diametrically opposite the point of intersection of the slot **22** with the slot **21**. A similar opening **24** in the retention sleeve **12** is adapted to coincide with the opening **23** and is substantially the same length and breadth. In the chosen example both openings are rectangular. An access hole **25** is located in the extension **11** of the knob **10**, the access hole being centrally disposed with respect to the openings **24** and **23** and considerably smaller than the openings. Although the size of the access hole is not critical, it should be large enough to accommodate at least the point of

a four or a six penny nail. As a matter of convenience a second access hole **26** may be provided on the opposite side in case for any reason it becomes desirable to reverse the position of the knob on the spindle 180°.

An important phase of the invention consists of a locking plate indicated generally by the reference character **27** which comprises a body **28** and a projection **29**. The projection is rectangular in cross-section and is adapted to slide freely into the openings **23** and **24**, as shown in Figures 2, 3 and 4.

The body **28** is comparable in area to the area of the interior of the tubular spindle **13** and has curved edges **30** permitting the locking plate to move to a position close to the inside wall of the spindle. An opening **31** through the body is adapted to accommodate the tail piece of a tumbler cylinder (not shown).

On the side of the body opposite from the projection **29** are extensions **32** and **33** which project into the slot **22**. It is important to note that the extensions **32** and **33** clear the inside wall of the retention sleeve **12** by an amount which is slightly in excess of the thickness of the retention sleeve. This is necessary in order to be able to push the projection **29** entirely out of engagement with the opening **24** when the proper occasion arises. It is further of consequence that the length of the slot **22** be great enough so that the entire breadth of the body **28** can extend into the slot and be retained therein on one side. Constructed as described, the locking plate is guided at its opposite ends which facilitates its ease of movement when operated.

The locking plate is spring-pressed into the locking position shown in Figures 2, 3 and 4 by use of a coiled spring **35** which is retained by a spring keeper **36**. Sufficient space is provided between the bottom of the recess **37** and the spring keeper to assure that the coils of the spring **35** will at no time compress upon each other. A recess **37** in the edge **38** of the body is formed by some appropriate tool large enough to snugly receive the adjacent end of the spring **35**.

A spring keeper **36** is specially constructed to serve its purpose in that it needs to be anchored securely within the tubular spindle when assembled but be capable of removal from the spindle when the appropriate occasion arises.

The spring keeper consists of a central boss **40**, here having a rounded form, and an outside diameter slightly less than the breadth of the slot **22** but somewhat greater than the breadth of the slot **21**. Arms **41** and **42** extend radially outwardly from the central boss on diametrically opposite sides. The arms are somewhat wedge-shaped in cross-section, as shown in Figure 3, and are constructed with what may be described as legs **43** and **44** which terminate at an apex **45**. The slot **26** for a distance outwardly from opposite sides of the slot **22** is beveled at the inner edges, as indicated by the reference characters **46** and **47**.

Extending through the boss **40** is a non-circular aperture **48** here having the form of a hexagonal opening which may be engaged by an appropriately sized hexagonal wrench for manipulating the keeper. On the inner side of the keeper is a recess **49** which is adapted to receive the end of the spring **35** opposite from the end received in the recess **37**. The arms **41** and **42** of the keeper have such a size with relation to the bevelled parts **46** and **47** of the slot **21** that the keeper entirely clears the inside wall of the tubular spindle **13** in order to provide the greatest possible amount of space to be occupied by the spring **35** in order to permit movement of the locking plate a distance sufficient to have the projection **29** clear the opening **24** before the coils of the spring are compacted upon each other.

When the spring keeper **36** is in position in the cross slot **22** it will serve as a stop for the locking plate **27** when it is depressed. This is of special advantage when the knob is off the spindle and ready to be replaced inasmuch as it prevents over depressing of the spring **35** which could otherwise happen when the knob is removed.

The device in assembled position is as heretofore described shown in Figures 1, 2, 3 and 4. In this position the spring keeper lies with the arms **41** and **42** received in the beveled portions of the slot **21** and in this position the central boss **40**, even though of diameter greater than the slot **21**, extends into the slot **22** at its area of intersection with the slot **21** so that the entire keeper comfortably clears the inside diameter of the tubular spindle **13** as previously mentioned.

When it is desired to disengage the knob **10** and hence the retention sleeve **12** from the tubular spindle, a tool such as a nail is inserted into the hole **25** in order to press against the adjacent edge of the projection **29** and thereby depress the locking plate **27**, moving it against tension of the spring **35** a distance far enough to permit the edge of the projection to clear the inside wall of the retention sleeve. With the projection out of the opening **24**, the knob and sleeve can be slid endwise off the tubular spindle. When the knob is to be replaced, it is necessary only to again depress the projection by use of the fingers, if need be, far enough to clear the end edge of the retention sleeve and then press the sleeve and the knob endwise into place until the projection again falls into the opening **24** into which it is urged by pressure of the spring **35**.

When it becomes necessary to remove the locking plate entirely from the tubular spindle after the knob has been removed, a tool of appropriate shape and size such as a hexagonal wrench is inserted into the aperture **38**. If the tool is provided with a shoulder, it is helpful in pressing the spring keeper against tension of the spring **35** until the arms **41** and **42** clear the inside wall of the tubular spindle in which position the keeper is rotated 90° until the arms are in alignment with the slot **22**. By making the breadth of the arms slightly less than the breadth of the slot, the keeper then can be drawn outwardly together with the spring **35** through the slot **22**, after which the locking plate **27** can also be removed through the slot **22**.

When it becomes desirable to replace the locking plate, the plate is again passed through the slot **22** in reverse direction, the keeper with a spring mounted in the recess **49** is then passed through the slot **22** by use of the previously mentioned tool until it clears the inside wall of the tubular spindle, after which the keeper is again rotated 90° until it is in alignment with the slot **21**, after which the tool is removed and the spring **35** presses the keeper into the position previously described and shown in the beveled portions of the slot **21**.

It will be understood from the foregoing description that the parts necessary for the device are simple in character and capable of being made by conventional tools. The assembly is further simplified by the fact that the slit normally present in the tubular spindle is made use of in locking the spring keeper in place. Virtually the only additional operation needed on the conventional portion of the lock mechanism consists of the cutting of the slot **22** and the openings **23** and **24**. The device is consequently one which is relatively simple and inexpensive to manufacture as well as one which offers a considerable ease of assembly and manipulation after installation.

While we have herein shown and described our invention in what we have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of our 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 devices.

Having described our invention, what we claim as new and desire to secure by Letters Patent is;

1. In a door lock device including a knob assembly and a tubular spindle having a longitudinal slot therein mounting said knob assembly, the combination of a re-

tainer for releasably securing said knob assembly on said spindle, said retainer comprising a locking member mounted transversely within said spindle, means forming an opening through the wall of the spindle on one side thereof, means forming a second opening in the interior of the knob assembly coincident with said first opening and means forming an exterior access hole in said knob assembly in alignment with said second opening, said locking member having a portion thereof receivable in said openings whereby to secure said knob assembly to said spindle, means forming a transverse slot in the spindle intersecting the longitudinal slot, one of said slots being wider than the other slot, a releasable spring keeper having a breadth greater than the breadth of one of the slots and less than the breadth of the other of said slots, a spring between said keeper and said locking member, said keeper having an assembled position partially received in the slot of narrower breadth under pressure of said spring and being subject to rotation to a position of alignment with the slot of greater breadth whereby to enable removal.

2. In a door lock device including a knob assembly and a tubular spindle having a longitudinal slot therein mounting said knob assembly, the combination of a retainer for releasably securing said knob assembly on said spindle, said retainer comprising a locking member mounted transversely within said spindle, means forming an opening through the wall of the spindle on one side thereof, means forming a second opening in the interior of the knob assembly coincident with said first opening and means forming an exterior access hole in said knob assembly in alignment with said second opening, said locking member having a portion thereof receivable in said openings whereby to secure said knob assembly to said spindle, means forming a transverse slot in the spindle intersecting the longitudinal slot at a location opposite the opening in said spindle, one of said slots being wider than the other of said slots, the wider of said slots being receptive of said locking member, a releasable spring keeper having ends of breadth greater than the breadth of the wider of said slots and less than the breadth of the narrower of said slots, the wider of said slots having a recessed portion thereof adjacent the intersection for reception of said keeper, a spring having an engagement at one end thereof with said keeper and at the other end thereof with said locking member, said keeper having an assembled position received in the recessed portion under pressure of said spring and being subject to rotation to a position of alignment with the wider of said slots whereby to enable release and removal of said locking plate from said spindle.

3. In a door lock device including a knob assembly and a tubular spindle having a longitudinal slot therein mounting said knob assembly, the combination of a retainer for releasably securing said knob assembly on said spindle against rotation and endwise removal, said retainer comprising a locking member mounted transversely within said spindle, means forming an opening through the wall of the spindle on one side thereof, means forming a second opening in the interior of the knob assembly coincident with said first opening and means forming an exterior access hole in said knob assembly in alignment with said second opening, said locking member having a portion thereof receivable in said openings whereby to secure said knob assembly to said spindle, means forming a transverse slot in the spindle intersecting the longitudinal slot at a locaiton opposite the opening in said spindle and wider than said longitudinal slot, said transverse slot being receptive of said locking member, a releasable spring keeper having ends of breadth greater than the breadth of the longitudinal slot and less than the breadth of said transverse slot, a spring having an engagement at one end thereof with said keeper and at the other end thereof with said locking member, said keeper having an assembled position partially received in said longitudinal slot under pressure of said spring and being subject to rotation to a position of alignment with said transverse slot whereby to enable release and removal of said locking member from said spindle.

4. In a door lock device including a knob having an extension thereon, a retention sleeve secured in said knob and a tubular spindle having a longitudinal slot therein mounting said sleeve and said knob, the combination of a retainer for releasably securing said sleeve and said knob on said spindle against rotation and endwise removal, said retainer comprising a spring extendible locking plate mounted transversely within said spindle, means forming an opening through the wall of the spindle on one side thereof, means forming a second opening in the sleeve coincident with said first opening and means forming an access hole in said knob in alignment with said second opening, a projection on said locking plate receivable in said openings whereby to secure said sleeve to said spindle, means forming a transverse slot in the spindle intersecting the longitudinal slot at a location diametrically opposite the opening in said spindle and wider than said longitudinal slot, said transverse slot being receptive of said locking plate, a releasable spring keeper having wedge-shaped ends of breadth greater than the breadth of the longitudinal slot and less than the breadth of said transverse slot, a coil spring having an engagement at one end thereof with said keeper and at the other end thereof with said locking plate, said keeper having an assembled position partially received in said longitudinal slot under pressure of said spring and being subject to rotation to a position of alignment with said transverse slot whereby to enable release and removal of said locking plate from said spindle.

5. In a door lock device including a knob assembly and a tubular spindle having a longitudinal slot therein mounting said knob assembly, the combination of a retainer for releasably securing said knob assembly on said spindle, said retainer comprising a locking member mounted transversely within said spindle, means forming an opening through the wall of the spindle on one side thereof, means forming a second opening in the interior of the knob assembly coincident with said first opening and means forming an exterior access hole in said knob assembly in alignment with said second opening, said locking member having a portion thereof receivable in said openings whereby to secure said knob assembly to said spindle, means forming a transverse slot in the spindle intersecting the longitudinal slot, one of said slots being wider than the other slot, a releasable spring keeper having a breadth greater than the breadth of one of the slots and less than the breadth of the other of said slots, a spring between said keeper and said locking member, said keeper having an assembled position partially received in the slot of narrower breadth under pressure of said spring and being subject to rotation to a position of alignment with the slot of greater breadth whereby to enable removal means forming a recess in said locking member at an edge thereof facing said keeper for reception of the spring, said keeper being in blocking engagement with said locking member in the position of greatest depression of said locking member whereby to prevent separation of said locking member, the bottom of said recess in said position of greatest depression being spaced from the keeper a distance substantially in excess of the collapsed length of the spring whereby to prevent excessive depression of the spring.

6. In a door lock device including a knob assembly and a tubular spindle having a longitudinal slot therein mounting said knob assembly, the combination of a retainer for releasably securing said knob assembly on said spindle, said retainer comprising a locking member mounted transversely within said spindle, means forming an opening through the wall of the spindle on one side thereof, means forming a second opening in the interior of the knob assembly coincident with said first opening and means forming an exterior access hole in said knob

assembly in alignment with said second opening, said locking member having a portion thereof receivable in said openings whereby to secure said knob assembly to said spindle, means forming intersecting openings in the spindle of different size, a releasable keeper element having a breadth in one direction greater than the breadth of one of the intersecting openings and less than the breadth of the other intersecting opening, resilient means acting between said keeper and said locking member, said keeper having an assembled position partially received in the other of said intersecting openings under

pressure of said resilient means and being subject to re-alignment to a position of alignment with the intersecting opening in which it is not received whereby to enable removal.

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