May 11, 1954

L. H. FISLER ET AL

2,677,953

DEMOUNTABLE KNOB AND CYLINDER LOCK

Filed July 17, 1952

2 Sheets-Sheet 1

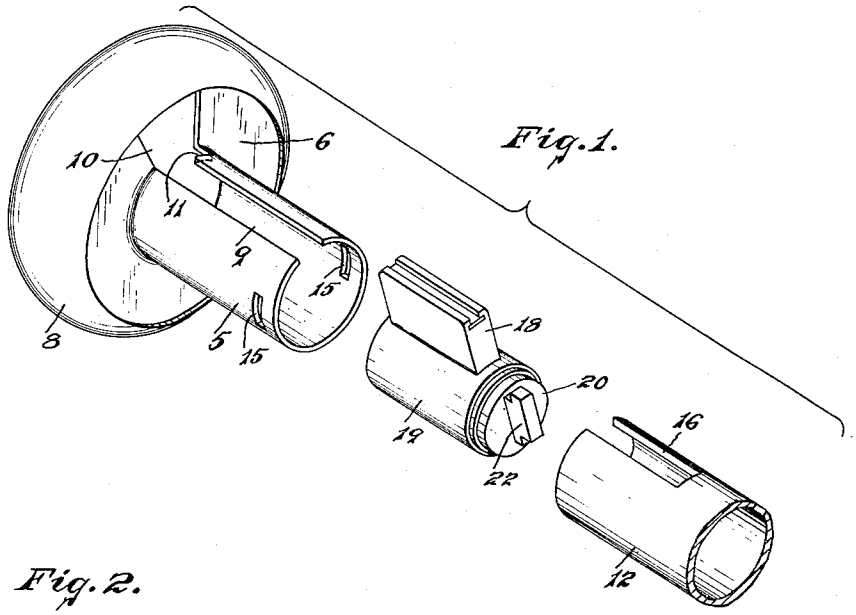
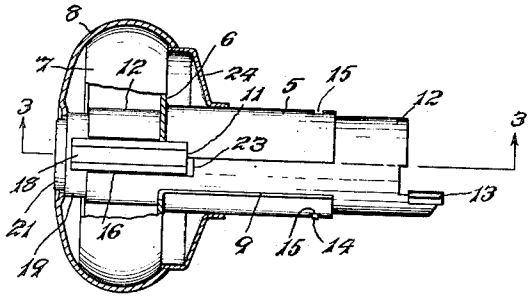


Fig. 1.

Fig. 2.



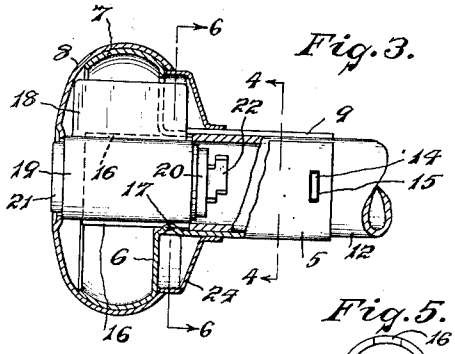


Fig. 3.

Fig. 4.

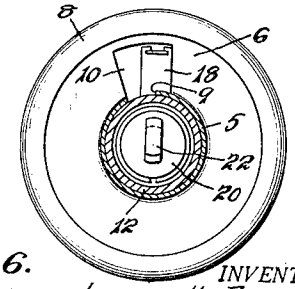


Fig. 5.

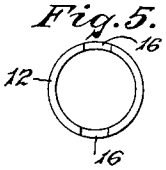
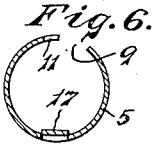


Fig. 6.



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Fig. 7.

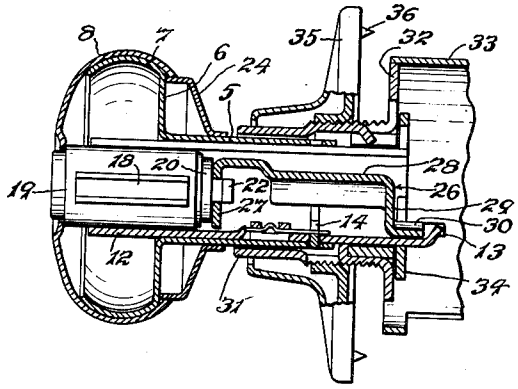


Fig. 8.

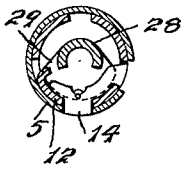


Fig. 9.

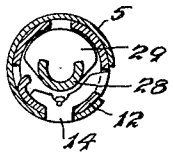


Fig. 10.

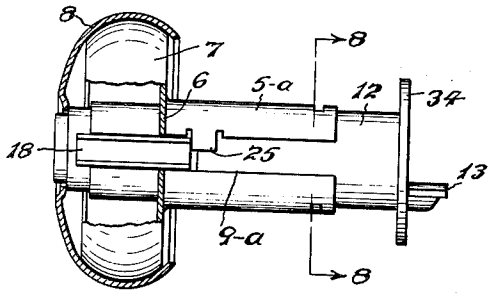
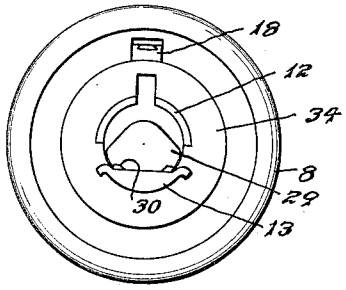


Fig. 11.



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DEMOUNTABLE KNOB AND CYLINDER LOCK

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Application July 17, 1952, Serial No. 299,372

9 Claims. (Cl. 70—224)

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This invention relates to a de-mountable knob and cylinder lock and more particularly to the novel construction of a knob for cylindrical door locks which is adapted to have a cylinder lock unit detachably mounted therein.

An object of this invention is to provide a knob having improved means for retaining a cylinder lock unit in position within the knob.

A further object of the invention is to provide means which may be pre-constructed to properly retain a de-mountable cylinder lock in position within the knob to thereby eliminate a defective fit, between the said cylinder lock and the knob, which may result from discrepancies or inaccuracies caused by the accumulation of manufacturing tolerances which are required for economical production.

A further object of this invention is the provision of novel means for retaining a de-mountable lock unit in position within the knob and preventing unauthorized removal of the knob from the cylindrical lock mechanism to which the said knob is connected.

Further objects and advantages of this invention will be more clearly understood from the following description and the accompanying drawings in which:

Fig. 1 is an exploded isometric view illustrating the construction of the knob assembly embodying our invention.

Fig. 2 is a plan view of the knob partly in central horizontal section.

Fig. 3 is a side view of the said knob partly in central vertical section.

Fig. 4 is a sectional end view of said knob on line 4—4 of Fig. 3.

Fig. 5 is a front end view of the spindle.

Fig. 6 is a sectional end view of the knob shank on line 6—6 of Fig. 3.

Fig. 7 is a plan view in central horizontal section showing our improved de-mountable knob and cylinder lock assembled in a cylindrical lock mechanism.

Fig. 8 is a sectional end view on line 8—8 of Fig. 10.

Fig. 9 is a similar view, but showing a portion of the mechanism in position to permit detachment of the knob assembly from the spindle.

Fig. 10 is a plan view, partly in section, illustrating a modified form of our invention.

Fig. 11 is an end view thereof.

In the embodiment of our invention which is illustrated in the drawings, the numeral 5 denotes a tubular shank which has an annular flange forming an end wall 6 that is perpendicular to the axis of the said shank and is formed with a curved annular flange 7 to receive an outer shell 8 to thereby provide a knob on the said shank.

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The shank 5 has a slot 9 in the wall thereof which extends longitudinally for the full length of the shank and communicates with an opening 10, in the wall 6, which is wider than the slot 9 and forms a notch in the side of said slot which provides a shoulder 11 adjacent to and facing the opening 10.

The shell 8 has an axial opening therein which is in axial alignment with the shank 5.

The said shank is adapted to receive a tubular spindle 12 which, in the form illustrated in the drawings, is provided at the end thereof with a rollback portion 13 for operating the retractor of a cylindrical lock unit. The knob is retained on the spindle by a suitable retainer 14, as fully described in the co-pending application of Leland H. Fisler et al., Serial No. 269,168, filed January 31, 1952, which is normally forced outwardly from the spindle into either of a pair of opposed retaining openings 15—15 in the wall of the shank. The said spindle 12 is provided with elongated opposed notches 16—16 in the end thereof, either one of which is adapted to receive an inwardly extending projection 17 on the shank to slidably and non-rotatably secure the spindle to the shank.

The said notches 16—16 are also adapted to receive the radial projection 18, which forms the pin-tumbler chamber, on the case 19 of a conventional cylinder lock which has the usual key plug 20 that is rotatable therein by means of a suitable key. The said key plug is provided, at the outer end thereof, with a head portion 21 which extends into the axial opening in the knob shell 8 and positions the said cylinder lock in the knob. The opposite end of the key plug is provided with a projection 22, by means of which the key plug is operatively connected to a suitable member of the lock mechanism, such as the auxiliary rollback fully described in the co-pending application of Leland H. Fisler, Serial No. 299,303, filed July 19, 1952, and entitled Door Lock.

Heretofore, it has been common practice to position the lock case between the inner marginal surface of the axial opening in the knob shell 8 and the end 23 of one of the notches 16—16 and, as well known to those skilled in the art, it has been very difficult to maintain a uniform distance between the said inner surface and the end of the notch due to manufacturing tolerances

which commonly occur in producing such parts in large quantities. Therefore, in order to assure a fit for the lock case, the notches 16—16 have been commonly made longer than necessary. This construction permitted lengthwise movement of the lock case within the knob and was found very objectionable since even a slight longitudinal movement is extremely noticeable when the lock is operated. It was also found that at times, the head 21 of the key plug moved out of the opening in the knob shell and into the knob thereby rendering the lock inoperative since the key could not be properly inserted into the plug.

Our herein described invention eliminates the objectionable lengthwise movement of the lock case, when it is assembled in the knob, by the provision of the shoulder 11 which engages the end of the pin-tumbler chamber 18 of the cylinder lock to retain the lock in position, and greatly facilitates the maintenance of a uniform distance between the said inner marginal surface of the axial opening in the knob shell and the said shoulder 11, with the result that the cylinder lock is securely retained in position and against objectionable longitudinal movement.

In the modified form shown in Fig. 10, there is provided a bendable tab 25 which projects into the slot 9–*a* in back of the chamber 18. This tab may be bent into its operative position relatively to the chamber after the lock has been inserted into the knob.

As shown in Figs. 7 to 11, the cylinder lock may be connected to a retractor operating member, such as an auxiliary rollback 26 which is fully described in said co-pending application of Leland H. Fisler, Serial No. 299,808, filed July 19, 1952, and which has a head portion 27, with a hole therein by means of which the said auxiliary rollback is secured to the hook on the projection 22 on the key plug 20, a shank portion 28, a front plate portion 29 and a rollback portion 30. The said plate portion 29 is formed so that it extends perpendicularly from one side of the shank portion and is adapted to engage the retainer 14 when in normal position as will be more fully hereinafter described.

As shown in Fig. 7, and described in the said co-pending application, Serial No. 269,168, the spindle 12 is rotatably mounted in a sleeve 31 which projects from an end plate 32 on the case 33 of a basic cylindrical lock unit. The said spindle is secured to the said case by means of a thrust washer 34 which abuts the inner surface of the end plate and prevents the spindle from being detached from the case as fully shown and described in the co-pending application of Frank J. McConnell, Serial No. 275,613, filed February 8, 1952.

The retainer 14 is accessible through a notch in the said bearing sleeve 31 which is covered by the outer rose 35 that is threaded to the bearing sleeve and has prongs 36 that project into the surface of the door to prevent detachment of the said rose when the cylindrical lock is assembled in the door.

The parts above described are assembled in the following manner:

The cylinder lock 19 is first inserted into the end of the shank 5 with the chamber 18 in the slot 9. The lock is then moved longitudinally into said shank until the head 21 of the key plug projects through the axial opening in the shell 8. The lock case is then rotated slightly to move the end of the chamber 18 into engagement with

the shoulder 11 and into the position shown in Fig. 2 of the drawings. A cap 24 is then placed over the shank and against the back of the knob 7, as shown, to cover the cylinder lock and also to reinforce the said shank.

The auxiliary rollback member 26 is then inserted into the shank 5 and secured to the hooked projection 22 on the cylinder lock plug. The key plug 20 is then rotated 180 degrees with the proper key to place the plate portion 29 of the auxiliary rollback in the position shown in Fig. 9 so that the said plate portion will clear the retainer 14 as the rollback is moved into the spindle. The shank is then passed over the spindle 12 with the chamber 18 in position to enter one of the notches 16—16 therein. The opposite one of said notches will receive the projection 17. The knob assembly is then forced inwardly on the spindle until the end of the knob shank is adjacent the retainer 14. The key plug is then rotated back to normal position to properly locate the auxiliary rollback with respect to the spindle 12 and the retainer is then depressed and the knob assembly moved inwardly on the spindle until said retainer is in register with and engages the cooperating opening 15 in the shank thereby locks the shank and the knob assembly to the spindle as illustrated in Fig. 7 of the drawing.

When the shank is thus locked to the spindle, rotation of the shank relatively to the spindle is prevented by means of the projection 17 which extends into the respective notch 16. The lock case is held against rotation relatively to the spindle by the chamber 18 which is positioned in the opposite slot 16 so that said chamber 18 will be retained in engagement with the shoulder 11.

When the modified form shown in Fig. 10 is used, the projection 17 may be omitted since the shank will be locked to the spindle by means of the chamber 18 which fits within the notch 16 in the spindle and the slot 9–*a* in the shank. It will be understood that when the cylindrical lock unit incorporating our knob and cylinder lock is installed in a door, the rose 35 covers the notch adjacent to the retainer 14 so that said retainer cannot be operated until the rose 35 is first removed. This cannot be done, on account of the prongs 36, until the rose on the inner side of the door, not shown, is detached and the entire unit moved outwardly to disengage the said prongs 36 from the door.

Should an unauthorized person succeed in forcing the rose 35, so as to gain access to the retainer 14 in an attempt to detach the knob assembly from the spindle so as to gain access to the retractor in the case 33, he may disengage the retainer from the knob shank, but he may only pull the knob assembly outwardly on the spindle until the plate portion 29 on the rollback, which is normally in the position shown in Fig. 8, engages said retainer 14. Further outward movement of the knob assembly will then be prevented since the auxiliary rollback will be locked to the spindle by the said retainer, the cylinder lock unit 19 is locked to said rollback by the hook on the boss 22, and the shank of the knob is locked to the cylinder lock unit by means of the shoulder 11, or the tab 25, and the entire assembly is locked to the case 33 by means of the thrust washer. It will, therefore, be understood that, in order to detach the knob assembly from the spindle 12, it is necessary to use the proper key for the cylinder lock so that the key

plug and auxiliary rollback can be rotated to the position shown in Fig. 9 to thereby permit the said rollback to clear the retainer 14 as the knob assembly is detached from the spindle.

It can be clearly understood from the above description that our present invention provides a novel construction for a de-mountable knob and cylinder lock which securely retains the lock against endwise and rotatable movement relatively to the knob and which is highly economical to manufacture on a quantity production basis since close tolerances, which have been heretofore difficult to maintain, are now rendered unnecessary.

By the provision of the two openings 15—15 and the two notches 16—16, the shank 12 may be connected to the spindle in two different positions 180 degrees apart so that the knob may be used on either right or left hand doors with the chamber 18 of the lock always at the top of the case, and without disturbing the position of the rollback portion 13 relatively to the retractor.

We claim:

1. A de-mountable knob and lock construction comprising a knob having a tubular shank extending therefrom and an opening therein coaxial with said shank, the said shank having a longitudinal slot in the wall thereof and an abutment in the side of said slot for retaining a lock in position in said axial opening.

2. A de-mountable knob and lock construction comprising a knob having a tubular shank extending therefrom and an opening coaxial with said shank, the said shank having a longitudinal slot in the wall thereof, and a tab at one side of said slot bendable into position to retain a lock against movement in said knob.

3. A de-mountable knob and cylinder lock construction comprising a knob having an axial opening therein and an end wall with a tubular shank extending perpendicularly therefrom, the said wall having an opening therein, the said shank having a longitudinal slot communicating with said opening in the wall; one side of said slot having an abutment forming a retaining shoulder which faces a portion of said opening for retaining a lock against movement relatively to the knob.

4. A de-mountable knob and cylinder lock construction including a knob having a tubular shank with a perpendicularly extending wall portion and a knob portion, the said shank having a longitudinal slot in the wall thereof communicating with an opening in said wall portion, the said knob portion having an axial opening in axial alignment with the shank, a retaining shoulder in a side of the said slot and located adjacent to the wall portion, the said opening in the knob portion being adapted to receive a portion of a cylinder lock and the said retaining shoulder being adapted to engage a projection on the lock for retaining the lock against longitudinal movement relatively to the knob, a spindle slidable within said shank, means on said spindle engageable with the lock for retaining it in engagement with the said retaining shoulder and means for preventing rotation of the spindle relatively to the shank.

5. A de-mountable knob and cylinder lock comprising a knob having a tubular shank with a perpendicular wall portion extending therefrom and a knob portion secured to said wall portion, the said tubular shank having a slot in the wall thereof extending the full length of the shank and communicating with an opening in the said

wall portion, the said slot being narrower than said opening and having one side thereof terminating in a retaining shoulder facing a portion of said opening, an axial opening in the said knob portion in alignment with the axis of the shank, the said axial opening being adapted to receive a portion of a cylinder lock and the said retaining shoulder being adapted to abut a projection on said lock and retain the lock in position against endwise movement relatively to the knob, a spindle slidable within said shank, a notch in said spindle for receiving the projection on the lock to prevent disengagement of said projection from the retaining shoulder, and means securing the spindle against rotation relatively to the shank.

6. A de-mountable knob and cylinder lock construction comprising a shank portion having a radial wall extending perpendicularly from an end thereof and a knob portion mounted on said wall, the said shank having a longitudinal slot therein extending throughout the length thereof and communicating with an opening in the said wall, the said opening being wider than the slot providing a notch in the shank on one side of said slot and an abutment shoulder facing the said opening, the said knob portion having an opening therein in axial alignment with the shank, a cylinder lock having a portion fitting within said axial opening and a projection theron fitting within the opening in the wall and within the notch in the side of the slot, a spindle slidable in the shank and having opposed notches in the end thereof, one of said notches receiving the projection on the lock to prevent the rotation of the said lock, a projection on the shank extending inwardly into the other notch in the spindle for preventing rotation of the spindle relatively to the shank, and a retainer in the spindle engageable with an abutment on the shank for retaining the spindle against longitudinal movement relatively to the shank.

7. A de-mountable knob and cylinder lock as set forth in claim 4, including an annular cap surrounding the shank portion and fitting against the back of the knob to cover the cylinder lock therein and reinforce the said shank portion.

8. In a cylindrical lock including a casing having a sleeve extending therefrom, a spindle rotatable in said sleeve and having a notch in the wall thereof; said spindle being secured against removal from the sleeve and a retainer in said spindle, the combination of a de-mountable knob and cylinder lock assembly including a knob having a tubular shank projecting therefrom, a slot extending longitudinally in said shank, an abutment adjacent to said slot engageable with a portion of a cylinder lock for retaining said lock in position within the knob, said portion being received in the notch in the spindle to prevent disengagement from said abutment; the said shank having an opening therein for the reception of said retainer to releasably secure the said assembly to the spindle, a retractor operating member secured to the lock, and a projection on said operating member engageable with the retainer in the spindle to prevent unauthorized detachment of the assembly from the spindle, the said projection on the operating member being positionable to clear the retainer in said spindle when the said member is rotated to a predetermined position by key operation of the lock.

9. In a cylindrical lock unit, the combination of a case, a sleeve extending from said case, a spindle rotatable in said sleeve, means for re-

taining said spindle within the sleeve, a retainer in said spindle accessible through an adjacent opening in the sleeve, a rose threaded to said sleeve and covering said opening therein, the said spindle having a notch adapted to receive a portion of a cylinder lock, a knob having an axial opening therein, a shank on said knob having a slot extending longitudinally in the wall thereof and adapted to receive the said portion of the cylinder lock, an abutment on the shank engageable with said portion of the cylinder lock for preventing detachment from the knob, an auxiliary rollback member secured to said lock, a plate portion on said auxiliary rollback extending towards one side thereof, the said plate portion being engageable with the retainer in the spindle to prevent unauthorized detachment of the knob assembly and being movable by key operation of the lock into a position within said spindle where it will clear the said retainer and permit detachment of the knob.

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