June 3, 1941. F. E. BEST 2,244,238

KNOB AND KNOB LOCKING MEANS

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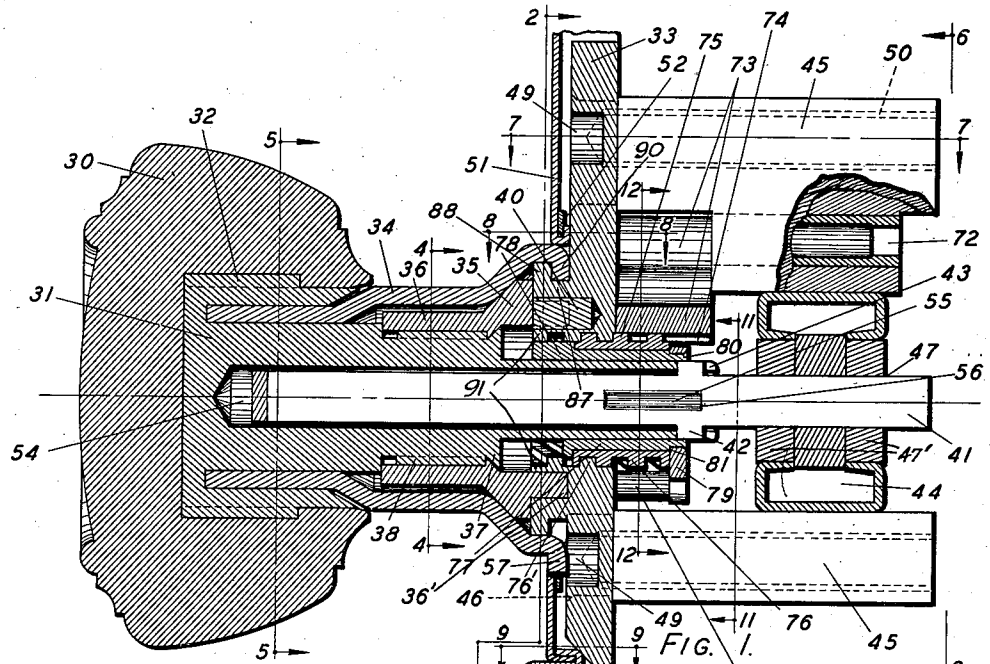


FIG. 1.

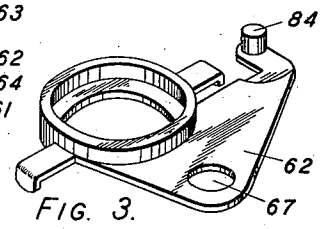


FIG. 3.

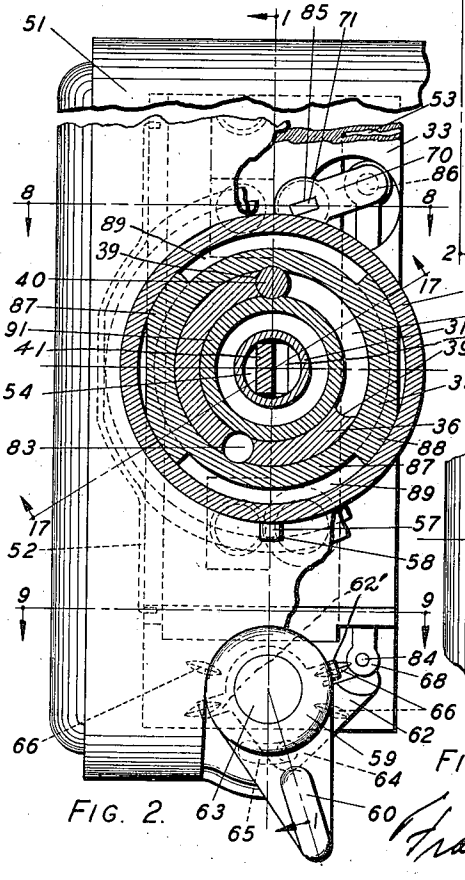


FIG. 2.

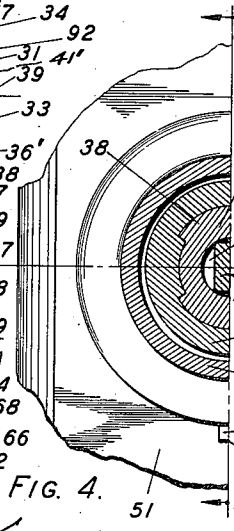


FIG. 4.

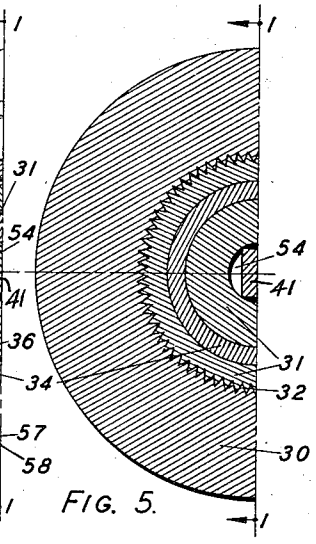


FIG. 5.

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KNOB AND KNOB LOCKING MEANS

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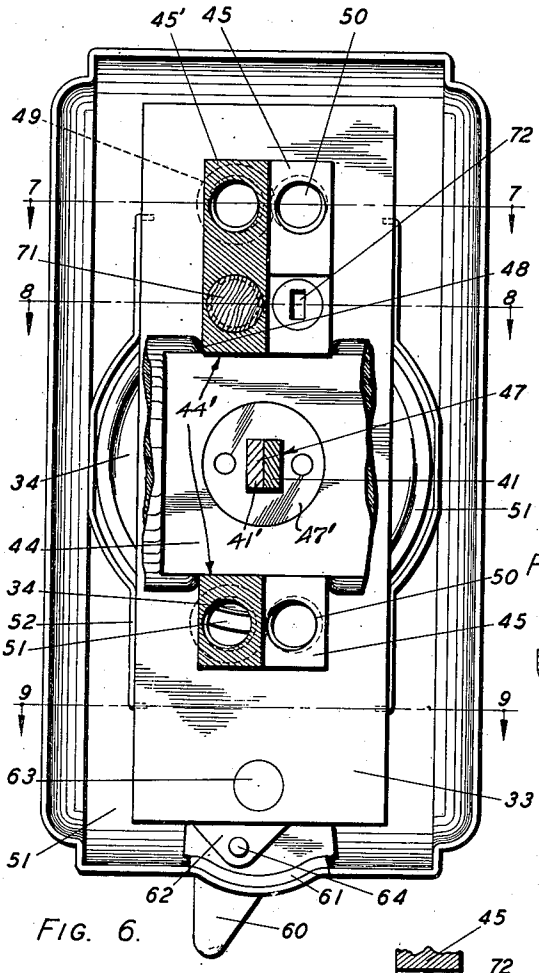


FIG. 6.

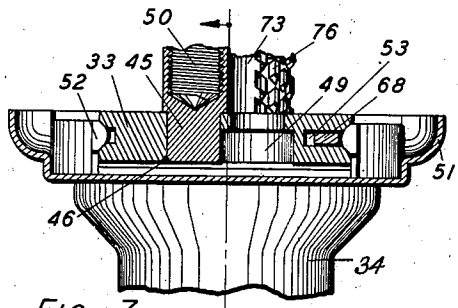


FIG. 7.

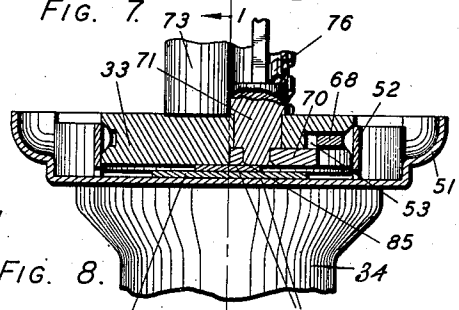


FIG. 8.

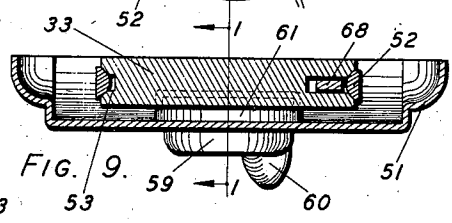


FIG. 9.

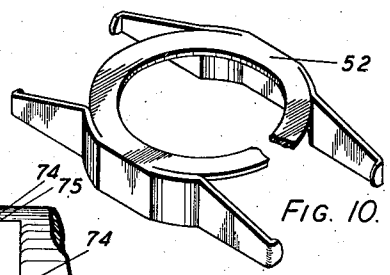


FIG. 10.

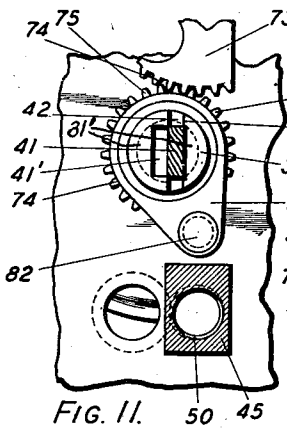


FIG. 11.

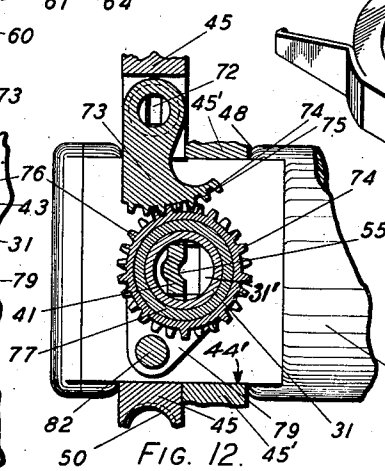


FIG. 12.

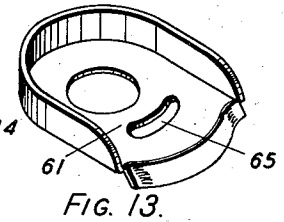


FIG. 13.

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2,244,238

KNOB AND KNOB LOCKING MEANS

Frank Ellison Best, Indianapolis, Ind., assignor to Frank E. Best, Inc., Seattle, Wash., a corporation of Washington

Application August 17, 1939, Serial No. 290,593

7 Claims. (Cl. 292—356)

My invention relates to improvements in knobs and knob locking mechanisms. The objects of my invention are first, to provide rigid aligning means between the latch housing and the adjoining knob assembly, and second, to provide a knob and knob neck free from all outside set screws which could work loose and become a danger to a person's hands.

Other objects of my invention are to provide a novel way to fasten an escutcheon plate to an escutcheon retainer plate without the use of screws and to provide a unit of smooth rugged appearance embodying great strength and practical utlity.

Another object is to provide a method of locking through devices on one side of a door, a knob on the opposite side of the door.

I accomplish these and other objects by means shown in the accompanying drawings in which:

Fig. 1 is a longitudinal vertical cross section of my device taken on line 1—1, Fig. 2 except that certain parts are shown as they would appear if sectioned on line 17—17 of Fig. 2.

Fig. 2 is a transverse cut-away section on line 2—2, Fig. 1.

Fig. 3 is a detached perspective showing crank mechanism disclosed in Figs. 1 and 2.

Fig. 4 is a fragmentary transverse section on line 4—4, Fig. 1, showing parts in elevation.

Fig. 5 is a fragmentary transverse section on line 5—5, Fig. 1.

Fig. 6 is a rear view on line 6—6 of Fig. 1, of the assembled unit, the latch housing being broken away.

Fig. 7 is a horizontal section with parts broken away, taken on line 7—7, of Figs. 1 and 6.

Fig. 8 is a horizontal section with parts broken away, on lines 8—8, of Figs. 1, 2 and 6.

Fig. 9 is a horizontal section on line 9—9, of Figs. 1, 2 and 6.

Fig. 10 is a detached perspective view of an escutcheon plate clamp.

Fig. 11 is a fragmentary view partly in section and partly in elevation on line 11—11, Fig. 1.

Fig. 12 is a fragmentary view partly in section and partly in elevation taken substantially on line 12—12, of Fig. 1.

Fig. 13 is a detached perspective of a lever mechanism cover.

Similar reference numerals refer to the same or similar parts throughout the several views.

Knob 30, molded over outer skirt of spindle guide 31, and held from twisting by flutes 32, Figs. 1 and 5, is fastened to escutcheon retainer 33 by knob neck 34. Knob neck 34 is held in spindle guide 31 by shoulder 35 on retaining sleeve 36, which in turn, is held firmly to spindle guide 31 by riveting 37 and inner flutes 38. The outer end portion of knob neck 34 fits into the annular space between the spindle guide and the outer skirt thereof and provides a firm bearing.

Escutcheon retainer sleeve 36 is shown in Fig. 1 as it would appear if sectioned on line 17—17, Fig. 2.

When knob 30 is turned, it carries retainer sleeve 36 with it until surface 39 on retainer sleeve 36 contacts pin 40, Fig. 2.

Spindle guide 31 comprises an inner tubular portion having a bore 54 and an outer skirt portion spaced from the inner tubular portion to provide an annular recess for receiving the end portion of knob neck 34. A spindle 41 fits within bore 54 and is turned by projections 42 on said spindle that fit into a slot 43 in the inner end portion of spindle guide 31. The end portions of the spindle guide 31 are bent or spun over the end of said spindle guide, as shown in Fig. 11 to provide for a rectangular opening to receive the end portion of another spindle, 41' that may lie alongside of spindle 41 and to engage with the end 56 of a stop member 55 that is punched or stamped in the spindle 41. The spindle 41 operates mechanism in latch housing 44.

Guides 45, which are fastened to retainer plates 33 by staking, as shown at 46, fit on opposite sides of the latch and align a spindle hole 47 that is provided within suitable throw mechanism 47' in the latch mechanism 44, directly with spindle 41. Raised portions 48, Figs. 6 and 12 are provided on the latch housing 44 at the ends of the flattened portions 44' thereof for engagement with the latch positioning members 45—45' to stop any longitudinal movement of the latch.

Guides 45 on escutcheon retainer plate 33 and the corresponding guides 45' on the retainer plate on the opposite side of the door can slide past each until escutcheon retainer plate 33 comes in contact with the door. Then the escutcheon retainer plate 33 and its mating piece on the other side of the door are drawn together by machine screws, the heads of which are held in holes 49 and the threaded portions of which screw into the tapped holes 50 in positioning members 45 and 45'.

The escutcheon plate 51 is crimped over escutcheon clamp 52, Figs. 1, 2, 6, 7, 8, 9, 10, and the ends of escutcheon clamp 52 are snapped into grooves 53 on escutcheon retainer 33.

The spindle 41' of the mating lock unit on the opposite side of the door slides alongside of spindle 41 in the process of assembly as shown in Fig. 11, and may enter spindle guide 31.

Spindle 41, being flat, is bent over at the outer end to fill the spindle hole 54 stopping play transversely.

Spindle 41 has a transversely displaced portion 55, Fig. 1, provided therein, as by punching or stamping, thereby forming shoulder 56 which keeps spindle in place when the end 31' of the spindle guide 31 is crimped over in closing off part of the spindle hole 54 and providing a stop for the shoulder 56, Figs. 11, 12.

Lip 57 on neck 34, Figs. 1 and 2, fits into cut 58 on escutcheon 51 keeping escutcheon 51 from turning.

Manually operated locking means are provided comprising a cap 59, a lever 60, lever mechanism cover 61 and crank 62 all fastened securely to escutcheon retainer 33 by rivet 63. Lever 60 can move until lever pin 64 reaches end of slot 65, shown by dotted lines in Fig. 2. At each end of its movement, detent members 62' on crank 62 snap into recesses 66, Fig. 2, which hold it from working loose. The recesses 66 are shallow and cooperate with detent members 62' to releasably hold the crank 62 against accidental movement but to permit movement of said crank when a torque is manually exerted on lever 60.

Crank 62 is turned with lever 60 by lever pin 64 which projects into crank hole 67 in crank 62, see Figs. 1, 2, and 3. The action of the crank 62 moves rod 68 and arm 70. Rod 68 and arm 70 are connected by pin 86, Fig. 2, riveted into arm 70. Crank 62 and rod 68 are connected by pin 84, Figs. 2 and 3, which is riveted into crank 62. A spindle 71 is staked into arm 70, as shown at 85, Figs. 2 and 3.

The spindle 71 carries across to a similar knob unit (not shown), on other side of door and fits into a recess on this adjoining knob unit similar to recess 72, (shown Figs. 1 and 6).

Similar knob unit on other side of door carries mechanisms identical to mechanisms shown in Fig. 1 so that when a lever on the other side of the door is operated the gear segment 73 is turned by a spindle 71 shown in Figs. 2 and 6.

The locking mechanism operated by the spindle 71 comprises a gear segment 73 provided with gear teeth 74 that mesh with gear teeth 75 of a pinion 76. The gear teeth 75 are also cut so that they constitute a spiral thread which screws into a mating thread 76' in escutcheon retainer plate 33 so that when gear segment 73 is angularly moved it imparts rotation to pinion 76 and this rotation causes pinion 76 to be moved longitudinally by the screw means thereon.

When the threaded pinion 76 moves axially it carries a sleeve 77 with it. Threaded pinion 76 is held between a rim 78 and a cap 79 on sleeve 77. The cap 79 is fastened to sleeve 77 by riveting at location 80. A shoulder 81 holds cap 79 away from threaded pinion 76, allowing threaded pinion 76 to move freely.

Pin 82 riveted to cap 79 is the locking pin. It moves axially forward fitting into locking hole 83 in retaining sleeve 36. With retaining sleeve 36 held from turning by pin 82, the knob is also locked from turning.

With this mechanism, as shown in the accompanying drawings, it is possible to lock, with a lever, from one side of a door the knob on the other side.

Assembly and operation

The knob 30 is preferably molded on the spindle guide 31 before any of the parts are assembled.

In assembling the parts the retaining sleeve 36 is inserted into the larger end of the tubular knob neck 34 and the spindle guide 31 is inserted from the smaller end into said tubular knob neck 34 and into the retaining sleeve 36, the skirt portion of the spindle guide fitting over the knob neck. The end flange 37 of the spindle guide 31 is then expanded or staked to secure these parts in assembled relation. When these three parts are thus assembled the inner flutes 38 in the retaining sleeve 36 interfit corresponding external flutes on the spindle guide 31 and the retaining sleeve 36 and spindle guide 31 are locked together so that they rotate as one piece. The knob neck is fixed and non-rotatable after it has been applied to the escutcheon retainer 33.

The eschutcheon retainer 33 has an outwardly protruding boss 87 rigid therewith to receive and hold the knob. The boss 87 has spaced apart overhanging external flanges 88 between which are open spaces 89 to provide clearance for inturned flanges 90 on the inner end of the knob neck whereby the inner end portion of the knob neck may be slipped over the boss 87 and turned to interlock the flanges 88 and 90 and thus rigidly secure the knob assembly to the eschutcheon retainer 33.

The lug 57 on the periphery of the knob neck 34 fits within the notch 58 in the escutcheon plate 51 and prevents rotary movement of knob neck 34 after the escutcheon plate is secured in place.

The escutcheon plate 51 is secured in place by the escutcheon clamp 52, shown detached in Fig. 10 and parts of which are shown in Figs. 1, 2, 6, 7, 8 and 9. The ring portion of this escutcheon clamp 52 is secured to the escutcheon plate 51 by crimping a portion of the escutcheon plate surrounding the central opening thereof over said ring portion.

Four resilient arms of the escutcheon clamp 52 have inwardly directed detent members on their outer ends that snap into the grooves 53 in the edges of the escutcheon retainer plate 33 to secure the escutcheon plate in place. The ends of the detent members of the escutcheon clamp 52 are rounded or beveled as shown so that the escutcheon plate 51 may be detached by inserting a thin flat tool under the edge of the same and prying outwardly.

The escutcheon plate 51 is slipped over the knob neck 34 before the knob neck is secured to the escutcheon retainer 33 and the escutcheon clamp 52 is snapped into engagement with grooves 53 by exerting pressure against the escutcheon plate 51 after the knob neck 34 has been properly positioned to bring the lug 57, Fig. 2, on the periphery of said knob neck, into proper registration with the slot 58 in the escutcheon plate.

The boss 87 has a centrally positioned hub 91, Fig. 2, spaced from said boss to leave an annular groove 92 for the reception of a stop member 36' on the retaining sleeve 36. The stop pin 40 is positioned in the groove for engagement by the ends 39 of the stop member 36' to limit the amount of turning movement of the knob parts on the neck 34.

The two spaced apart rigid latch positioning members 45 on the escutcheon retainer 33 are

positioned to one side of the center, Figs. 6 and 11, and mate with and lie alongside of two similar latch positioning members 45' when this lock is assembled in a door it being understood that a lock unit will be provided on each side of the door. As this other lock unit may be similar to the one shown in Fig. 1, only a fragment of the same is shown.

The housing 44 carries any suitable secondary lock or latch mechanism. The positioning members 45 and 45' from opposite sides of the door lie alongside of each other and extend across the flattened parts 44' of this latch housing and fit closely between shoulders 48 and closely against the flat surfaces 44 so that they hold the latch housing 44 firmly and align it accurately with the knob mechanism and spindles 41.

The screws entering through the holes 49 in one escutcheon retainer plate 33 screw into the threaded holes 50 in the ends of the positioning members 45 or 45' that are rigidly secured to the opposite retainer. This provides means for tightly binding two opposite retainer plates 33 against opposite sides of the door and means for securing the latch housing in the door and means for properly aligning the latch housing 44 and other parts connected with the knobs. The screws that enter through holes 49 and screw into members 45 and 45' are the only screws required in assembling this lock in a door, there being no screws in the knob neck or in the escutcheon plates. Ease and speed of installation, accuracy of alignment and freedom from binding of the parts are thus provided for.

Also as screws entering through the retainer plates 33 on both sides of the door help to hold the parts assembled in the door it is impossible to get past the lock by removing the screws from one side.

The locking mechanism herein disclosed provides manually operated means on one side of a door for locking a knob on the opposite side of the door. Thus the lock spindle 71 shown in Fig. 2, when angularly moved by movement of knob 60 connected therewith through lever arms 62 and 70 and link 64, will lock a knob (not shown), on the opposite side of the door.

In a similar manner angular movement of a lock spindle controlled from the opposite side of the door and entering opening 72, Figs. 1 and 12, will angularly move gear segment 73 and act through gear teeth 74 and 75 to rotatively move threaded pinion 76. As the teeth 75 of threaded pinion 76 are both gear teeth and spiral threads that mate with spiral threads 76' of retainer plate 33 it will be obvious that rotation of threaded pinion 76 will simultaneously move it longitudinally.

The longitudinal movement of threaded pinion 76 will be communicated to sleeve 77, cap 79 and pin 82. This longitudinal movement will either move the pin 82 into the hole 83 to lock the knob, or withdraw the pin from said hole 83 to release the knob, depending on the direction of the movement. The threaded pinion 76 thus functions both as a gear and a screw.

Having described my invention, what I claim as new and desire to protect by Letters Patent of the United States is:

1. In lock means of the class described an escutcheon retainer plate having grooves in the edge portions thereof, an escutcheon plate having an opening therein to fit over a knob neck, and an escutcheon clamp comprising a ring member secured to the escutcheon plate and extending around the opening, resilient arms extending outwardly from said ring member and lugs on the ends of said arms to releasably engage within said grooves in said escutcheon retainer plate.

2. In lock means of the class described an escutcheon retainer plate, knob means, releasable means securing said knob means to said escutcheon retainer plate, and an escutcheon plate applicable to said escutcheon retainer plate having devices cooperating with said knob means preventing release of said knob means while said escutcheon plate is in engagement with said escutcheon retainer plate.

3. In lock means of the class described an escutcheon retainer plate, knob means including a knob neck, interlocking means for securing said knob neck to said escutcheon retainer plate, said interlocking means being movable into engaged or disengaged position by rotary movement of said knob neck relative to said escutcheon retainer plate, an escutcheon plate releasably engaging said escutcheon retainer plate, and means on said escutcheon plate preventing rotary movement and disengagement of said knob neck when said escutcheon plate is in engagement with said escutcheon retainer plate.

4. In lock means of the class described, a non-rotatable knob neck, a spindle guide rotatable within said knob neck and having a skirt portion that extends over the outer end portion of said knob neck and a knob secured to said skirt portion.

5. In lock means of the class described a spindle guide having an external skirt member on its outer end portion spaced from the inner part of the spindle guide and providing an annular recess open at the inner end, a knob on said skirt member, and a fixed and non-rotatable tubular knob neck having a relatively long bearing portion fitting within said annular recess rotatably supporting said spindle guide.

6. In lock means of the class described a spindle guide having an external skirt member on its outer end portion providing an annular recess open at the inner end, a tubular knob neck having an outer end portion fitting within said annular recess and providing a bearing for said spindle guide, and having an inner end portion of larger diameter than said spindle guide and spaced from said spindle guide, a retaining sleeve on said spindle guide within the larger end portion of said knob neck, a plate, and means to rigidly and non-rotatably connect the inner end portion of said knob neck to said plate.

7. In lock means of the class described, a spindle guide, a tubular knob neck on said spindle guide, the outer end portion of said knob neck fitting and providing a bearing for the outer end portion of said spindle guide and the inner end portion of said knob neck being of larger internal diameter than said spindle guide providing an annular space between it and the spindle guide, a retaining sleeve non-rotatably secured on said spindle guide within the larger portion of said knob neck holding said knob neck and said spindle guide in assembled relation, a plate member, and means fixedly securing said knob neck to said plate member leaving said spindle guide rotatable therein.

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