March 20, 1962 F. J. RUSSELL ET AL 3,026,136

DOOR LOCKING MECHANISM HAVING A DUAL PURPOSE BLOCKER

Filed Sept. 4, 1959 2 Sheets-Sheet 1

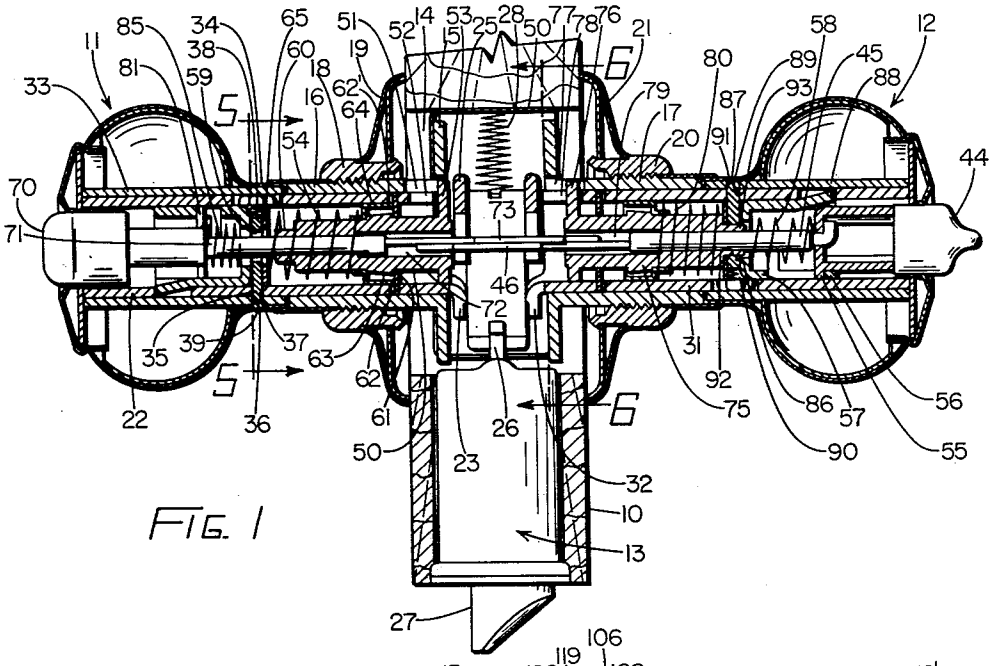


FIG. 1

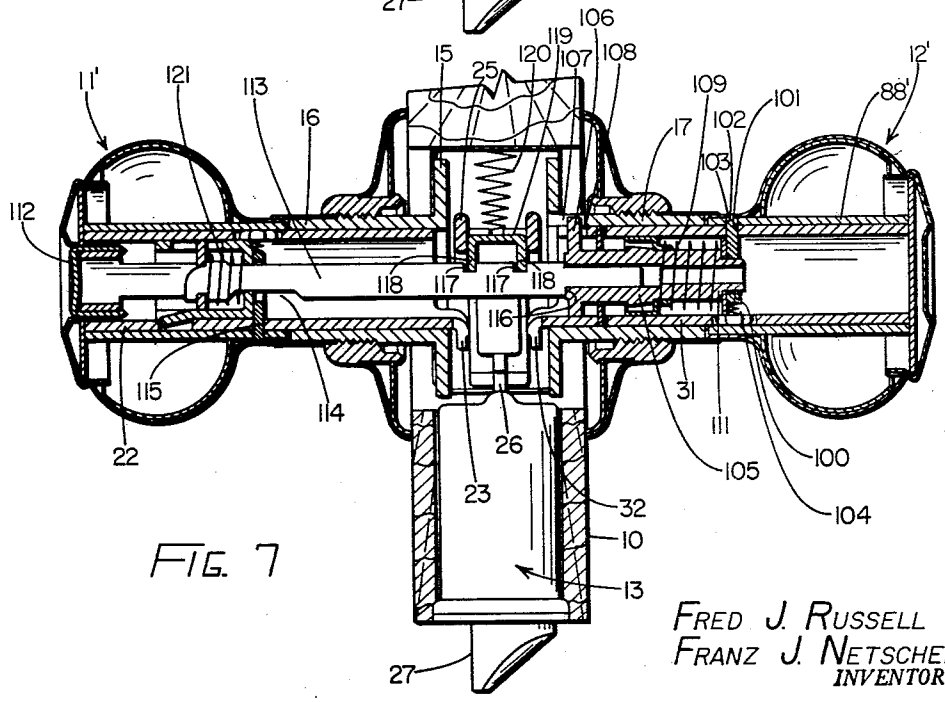


FIG. 7

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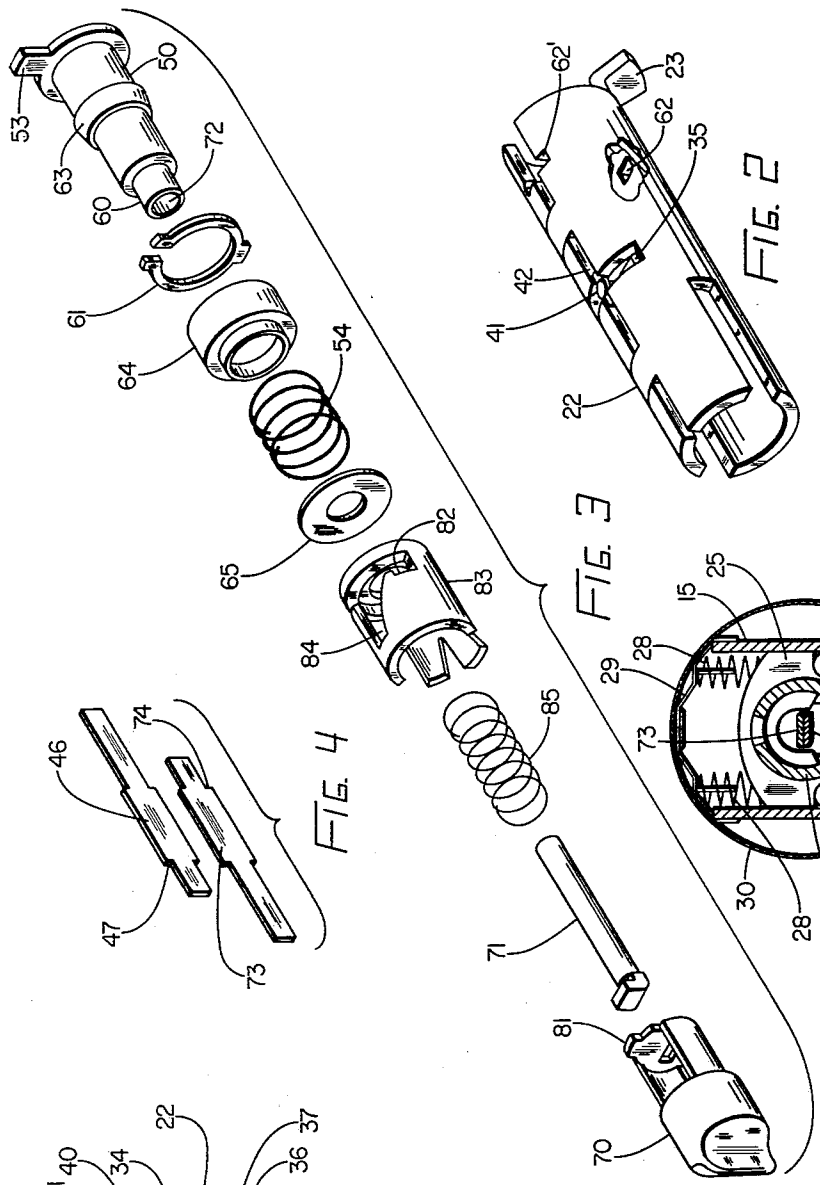


FIG. 3

FIG. 2

FIG. 4

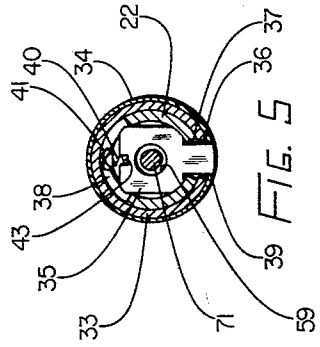


FIG. 5

FIG. 6

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3,026,136

Patented Mar. 20, 1962

3,026,136

DOOR LOCKING MECHANISM HAVING A DUAL PURPOSE BLOCKER

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Filed Sept. 4, 1959, Ser. No. 838,281
4 Claims. (Cl. 292—336.3)

The invention relates to door locks of the kind which may be locked by such device as a push button or turn button in one door knob acting through suitable mechanism to block rotation of the opposite door knob, thereby to bar opening the door from the opposite side.

More particularly, the invention has reference to a dual purpose mechanism which when operated from the knob on one side of the door to bar operation by the knob on the opposite side of the door serves also to prevent manipulation of the customary means employed for removing the opposite knob from the spindle.

A disadvantage in lock constructions of the type heretofore employed has been that the door knob on the side of the door opposite from the knob containing the locking device may be removed from the spindle by unauthorized persons even though the knob is blocked against rotation, thereby permitting access to the interior and unlocking the door by use of ordinary tools.

It is therefore among the objects of the invention to provide a new and improved door lock of the privacy lock character which when operated from one side to lock or block the knob on the opposite side against rotation sets in operation mechanism which also bars the opposite knob against removal from the spindle.

Another object of the invention is to provide a new and improved door lock construction of the type herein made reference to which makes use of a single blocker element to serve a double purpose, namely, that of barring the knob against rotation and also that of barring or blocking removal of the knob from the spindle as long as the knob remains locked against rotation.

Still another object of the invention is to provide a new and improved door lock construction of relatively simple design wherein a single element serving as a blocker by provision of two separate projections or extensions thereon can be moved axially between a position wherein the knob is free to manipulate the door latch and, if need be, removed from the spindle to a second position wherein the knob is simultaneously barred from being manipulated to operate the door latch and cannot be removed from the spindle.

Still another object of the invention is to provide a door lock of relatively simple construction which may have both knobs provided with a simple locking device so that by manipulating the locking device in the knob on either side of the door the knob on the opposite side is blocked or locked against rotation and at the same time blocked or locked against removal from its spindle.

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 horizontal sectional view through a door lock showing locking mechanisms in each door knob so arranged that the opposite door knob can be blocked against rotation.

FIGURE 2 is a horizontal perspective view of the left-hand spindle used in FIGURE 1.

FIGURE 3 is an exploded view of parts which are

contained within the left-hand knob and spindle of FIGURE 1.

FIGURE 4 is a horizontal perspective view showing shafts employed in the form of the lock of FIGURE 1 for transferring the locking motion from actuators in the knob to the blocking means in the opposite knob.

FIGURE 5 is a cross-sectional view taken on the line 5—5 of FIGURE 1.

FIGURE 6 is a cross-sectional view taken on the line 6—6 of FIGURE 1.

FIGURE 7 is a horizontal sectional view through a modified form of door lock of a type which is locked from one side only.

In an embodiment of the invention chosen for the purpose of illustration there is shown a door 10 in which is mounted a locking mechanism comprising a left-hand knob assembly indicated generally by the reference character 11, a right-hand knob assembly indicated generally by the reference character 12, and a latch bolt assembly indicated generally by the reference character 13 so arranged as to be manipulated by the knob assemblies.

Mounted in a space 14 within the door is a frame 15, the frame having a left-hand spindle bearing 16 extending horizontally outwardly therefrom and a right-hand spindle bearing 17 extending horizontally outwardly in the opposite direction. A collar 18 supports an escutcheon 19 on the left-hand side and a similar collar 20 supports an escutcheon 21 on the right-hand side in a manner and for purposes well known in the art.

Rotatably mounted in the left-hand spindle bearing 16 is a tubular spindle 22, the spindle being provided with roll backs 23 which act upon rollers 24 in a retractor slide 25 whereby to manipulate a tailpiece 26 to which the slide is attached, thereby to withdraw a latch bolt 27. Springs 28 retained by a keeper 29 within a housing 30 serve to be compressed when the latch bolt is withdrawn and upon release of the spindle and appropriate roll back the springs act to return the slide 25 to extended position. A spindle 31 on the right-hand side mounted in the right-hand spindle bearing 17 is provided with similar roll backs 32 which act upon the rollers 24 in order to manipulate the latch bolt from the opposite or right-hand side of the door.

As shown in FIGURE 1, the left-hand knob assembly 11 is constructed upon a sleeve 33 which serves to mount the knob assembly upon the spindle 22. The knob includes a shank portion 34 which extends axially inwardly toward the left-hand spindle bearing 16. The knob assembly is fixed non-rotatably upon the spindle 22 by means of a knob retaining slide 35. To accomplish the retention a hole 36 is provided in the sleeve 33 which can be aligned axially with a hole 37 in the spindle 22 so that when the knob assembly is properly oriented upon the spindle, the slide by extending through both holes 36 and 37 anchors the knob assembly upon the spindle against both endwise movement and rotation. An opening 38 on the opposite side of the spindle provides space for movement of the slide when it is depressed in order to release the knob assembly from engagement with the spindle. Depression can be accomplished by inserting some common object through an access hole 39 in the shank 34 of the knob. The slide is normally extended into the holes 36, 37 by means of a spring 40 packed by a keeper 41 which anchors in a slot 42 of the spindle, the opposite ends of the spring being contained in a notch 43 of the slide.

The knob assembly 11 in the embodiment shown is adapted to be blocked against rotation and hence locked against the opening of the door by manipulation of an actuator button 44 in the knob assembly 12. To accomplish this a shaft 45 anchored to the actuator button extends into endwise engagement with a bar 46. On the

bar 46, as shown to good advantage in FIGURE 4, is a shoulder 47 which is adapted to bear against the right-hand end of a blocker 50 so that the blocker can be moved endwise from right to left when the button 44 is pushed into the right-hand knob assembly 12.

In order that the blocker may be able to block the spindle 22 against rotation, there is provided a slot 51 in the stationary portion or more particularly the spindle bearing 16 and a corresponding slot 52 in the tubular spindle 22. These slots are normally in alignment when the latch bolt 27 is extended. A dog 53, normally pressed out of engagement with the slot by means of a spring 54, is moved into the slots 51, 52 when the blocker 50 is moved from the right-hand position of FIGURE 1 toward the left.

In order to hold the parts in the positions just described, the actuator button 44 after being pushed inwardly is rotated a portion of a turn until a projection 55 on the actuator button engages beneath a shoulder 56 on a sleeve 57 where it is retained by pressure of a spring 58. When the blocker is to be released, the actuator button 44 is rotated in a contrary direction until the projection 55 is released from the shoulder 56, whereupon the spring 58 returns the button endwise in a direction from left to right, thereby to release the dog 53 from engagement with the slots 51, 52.

What is important in the construction and operation of the device herein described is the functioning of the blocker when in a position locking the knob assembly 11 against rotation to prevent depression of the retaining slide 35 and hence preventing removal of the knob assembly 11 from the spindle 22. To accomplish this the retainer slide is provided with an aperture 59 slightly larger in diameter than a projection 60 at the left end of the blocker 50. When the blocker is moved from the position of FIGURE 1 toward the left far enough for the dog 53 to enter the slots 51, 52, the projection 60 at the same time enters the aperture 59. When this occurs, the retainer slide 35 cannot be depressed because of being blocked by the projection and hence the knob assembly 11 cannot be removed from the spindle 22 as long as this condition prevails. Upon release of the blocker in the manner heretofore described, the blocker moves from left to right, whereupon the projection 60 is withdrawn from the aperture 59, and when this condition prevails, which is unlocked condition for the left-hand knob assembly 11, the slide 35 can be depressed and the knob assembly 11 removed from the spindle 22.

To further improve the operation of the mechanism, there is provided a retainer 61 extending into holes 62, 62' in the spindle 22, serving to limit motion of the blocker from left to right by engagement with a collar 63 on the blocker. A spring abutment 64 bearing against the opposite side of the collar 63 serves to retain one end of the spring 54, the other end of the spring being retained by a washer 65.

In order to block the right-hand knob assembly 12 against rotation, there is provided in the left-hand knob assembly 11 an actuator button 70 to which is connected a shaft 71, the shaft extending through a bore 72 in the blocker 50, the shaft engaging endwise against a bar 73. The bar has shoulders 74 thereon adapted to engage the left end of a blocker 75 whereby the blocker can be shifted by endwise movement of the actuator button 70. The construction and operation of the blocker 75 is similar to that of the blocker 50 in that there is provided on the blocker a dog 76 which moves into engagement with a slot 77 in the spindle bearing 17 and a slot 78 in the spindle 31. In the blocker 75 is a bore 79 receptive of the bar 73 as well as the previously described shaft 45 and bar 46. The blocker 75 moves against a spring 80 which is mounted in the same fashion as the spring 54 already described. A projection 81 on the button 70 engages a shoulder 82 on the sleeve 83 against which it is pressed by the spring 85 after rotation of the button, thereby to hold the dog 76 in blocking or locking engagement. When the engagement is to be released, the button 70 is pressed slightly from left to right to release the projection from the shoulder 82, after which it is rotated in a contrary direction until the projection can follow into a recess 84 under impetus of the spring 85, whereupon the spring 80 is enabled to return the blocker 75 to released position into which it is moved from right to left.

For maintaining the knob assembly 12 upon the spindle 31 a means similar to that previously described is employed which is embodied in a retaining slide 86. The retaining slide is adapted to be received in a hole 87 in a sleeve 88 of the knob assembly 12 and also in an aligned hole 89 in the spindle 31. An opening 90 at the opposite side of the spindle permits reciprocation of the slide 86 when it is depressed. There is also provided an access hole 91 in the knob assembly in order that the slide may be reached by an appropriate tool.

In the same manner as heretofore described the slide is provided with a transverse aperture 92 which is adapted to receive a projection 93 on the blocker 75 when the blocker is moved into blocking or locking position, which is the position illustrated in FIGURE 1. When this condition prevails and the knob assembly 12 is locked against manipulation of the latch bolt, the slide is also blocked against depression and the knob assembly 12 cannot be removed from the spindle 31.

From the foregoing description it will be clear that the special dual purpose blocker can be made use of in either one or both spindles, the blockers being so fashioned that the shaft and bar of one actuator button extends freely through the blocker on the nearest side and thence into engagement with the blocker on the opposite side so that there is no interference whatsoever with the desired manipulation of the device. Hence, although each blocker separately serves a dual purpose, it furthermore serves a still added purpose of providing a way through which manipulation of the opposite blocker can be accomplished.

In a modified form of the invention illustrated in FIGURE 7, a slightly different actuating button is employed for manipulation of the dual purpose blocker. In the modified form of device, the latch bolt 27 is manipulated by the retractor slide 25 under impetus of either the roll backs 23 of the spindle 22 or the roll backs 32 of the spindle 31. A right-hand knob assembly 12' including a sleeve 88' is mounted upon the spindle 31 and retained thereon by a retainer slide 100. The retainer slide is similar to that heretofore described in connection with FIGURE 1 in that it is adapted to extend through a hole 101 in the spindle 31 and an aligned hole 102 in the sleeve 88', thereby to secure the knob assembly 12' non-rotatably upon the spindle. An access hole 103 is provided to give access to the spindle so that it may be depressed by insertion of an appropriate instrument. An opening 104 provides a clearance so that the slide can reciprocate. Spring means already described is made use of likewise in connection with the slide 100 to urge it into the retaining position illustrated in FIGURE 7.

A blocker 105 is provided with a dog 106 receivable in a slot 107 in the spindle bearing 17 and a similar slot 108 in the spindle 31 when the dog is moved axially in a position from left to right to the relationship illustrated in FIGURE 7, against tension of a spring 109. When this occurs, a projection on the blocker extends into an aperture 111 of the slide 100, thereby to bar or block the slide against depression and hence prevent removal of the knob assembly 12' when the knob assembly and its spindle is locked or blocked against rotation.

In this modified form of the device the locking or blocking is accomplished by manipulation of an actuator button 112 in a left-hand knob assembly 11'. The button is connected to a bar 113 which is provided with a recess 114 at the area where it passes through a retainer slide 115 so that the conventional depression of the slide 115 is at no time interfered with.

The bar is provided with shoulders **116** movable endwise against the left-hand end of the blocker **105** so that when the button **112** is depressed, the blocker and the dog **106** thereon will be moved into blocking or locking position. In order to hold the blocker in this position, the bar is provided with recesses **117** positioned to receive sides **118** of a latching slide **119**. A spring **120** urges the sides **118** into engagement with the recesses in the fully depressed position of the button **112** and the bar **113**.

The blocked position is releasable in one of two ways, either by rotating the knob assembly **11'** or by pushing the latch bolt **27** to withdrawn position. Either operation moves the retractor slide **25** upwardly, as viewed in FIGURE 7. The retractor slide carries with it the latching slide **119**, thereby removing the sides **118** from the recesses **117**. When this condition prevails, the spring **109** acts to shift the blocker and its dog **106** out of blocking position. At the same time the bar **113** is returned to normal position as is also the button **112**, the latter movement being assisted by operation of a spring **121**.

The description of the manipulation of the dual purpose blocker in the modified form of the device has been included as illustrative of the simple and direct action of the dual purpose blocker in a locking device of a slightly different sort which is significant of its versatility.

From the foregoing description it will be understood that there has been provided a very simple and rugged axially movable dual purpose blocker which due to the special construction of the blocker and retaining slide enables the blocker to cooperate with the slide as a result of no more than the usual limited axial movement needed to shift the blocker into locking position.

While the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the 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 the invention, what is claimed as new in support of Letters Patent is:

1. In a locking mechanism a stationary portion comprising a frame and a spindle bearing on each side of the frame, a first spindle rotatably mounted in one bearing, a second spindle rotatably mounted in the other bearing, and a knob non-rotatably mounted on each spindle, and a releasable retaining device for securing each knob to the respective spindle comprising means forming holes respectively in said spindle and the respective knob thereon, a slide and spring means yieldably holding said slide in said holes, said slide having an aperture extending transversely therethrough, means forming slots respectively in said stationary portion and in said spindles, a blocker in each spindle having an axially slidable mounting therein, each said blocker having a spindle locking position in the slots of the respective spindle and stationary portion and a released position removed axially from at least one of said slots, a portion of each blocker having a position in the aperture of the respective slide when the blocker is in spindle locking position, and an actuator in each knob, an extension on each actuator extending through the adjacent blocker and having an axially slidable movement into engagement with the other blocker whereby when the respective actuator is operated to move said other blocker into position locking the respective spindle against rotation the slide in said last spindle is blocked by said last blocker against depression whereby to prevent removal of the knob from said last spindle.

2. In a locking mechanism a stationary portion comprising a frame and a spindle bearing on each side of the frame, a first spindle rotatably mounted in one bearing, a second spindle rotatably mounted in the other bearing, and a knob non-rotatably mounted on each spindle, and a releasable knob retaining device for securing the knob to said first spindle, blocking elements respectively in said stationary portion and in said first spindle, a blocker having an axially slidable mounting in said first spindle, said blocker having a spindle locking position in engagement with said blocking elements and a released position removed axially therefrom, a portion of said blocker having a position in engagement with the knob retaining device when the blocker is in spindle locking position, and a manually operated actuator assembly extending through the knob on said second spindle to a position accessible from outside the knob, said actuator assembly having an axially slidable movement into engagement with said blocker, said blocker being movable in an axial direction by said actuator assembly into a position locking said first spindle against rotation, and a detent means in said mechanism having a releasable retaining engagement with said actuator assembly when said actuator assembly is in engagement with said blocker, said knob retaining device being blocked by said blocker against movement to a position of disengagement with the first spindle whereby to prevent removal of the knob from said first spindle.

3. In a locking mechanism a stationary portion comprising a frame and a spindle bearing on each side of the frame, a first spindle rotatably mounted in one bearing, a second spindle rotatably mounted in the other bearing and a knob non-rotatably mounted on each spindle, and a releasable knob retaining device for securing the knob to said first spindle comprising means forming holes respectively in said first spindle and the knob thereon, a slide having a position received in said holes when the knob is fastened thereby and a position removed from the holes when the knob is released, said slide having a configuration therein, blocking elements respectively in said stationary portion and in said first spindle, a blocker having an axially slidable mounting in said first spindle, said blocker having a spindle locking position in engagement with said blocking elements and a released position removed therefrom, a portion of the blocker having a position of engagement with the configuration on the slide when the blocker is in spindle locking position, and a manually operable actuator assembly extending through the knob on said second spindle to a position accessible from the exterior of said last knob, said actuator assembly having an axially slidable movement into engagement with said blocker, said blocker being movable in an axial direction by said actuator assembly into a position locking said first spindle against rotation, and detent means in said mechanism having a releasable endwise retaining engagement with said actuator assembly when said actuator assembly is in engagement with said blocker, said knob retaining device being blocked by said blocker against movement when said configuration is in engagement with said blocker whereby to prevent removal of the knob from said first spindle.

4. In a locking mechanism a stationary portion comprising a frame and a spindle bearing on each side of the frame, a first spindle rotatably mounted in one bearing, a second spindle rotatably mounted in the other bearing, and a knob non-rotatably mounted on each spindle, and releasable knob retaining device for securing the knob to said first spindle comprising means forming radially aligned holes respectively in said first spindle and the knob thereon, a slide and spring means yieldably holding said slide in said holes, said slide having an aperture extending transversely therethrough, means forming slots respectively in said stationary portion and in said first spindle having edges thereof in alignment, a blocker having an axially slidable mounting in said first spindle, a dog on said blocker having a spindle locking position in said slots and a released position removed axially from at least one of said slots, and a projection on the blocker having a position in the aperture of the slide when the dog is in spindle locking position, and an actuator assembly extending through the knob on said second spindle to a position accessible from

outside said last knob, an extension on said actuator having an axially slidable movement into engagement with said blocker, said blocker being movable in an axial direction by said actuator assembly into a position wherein said dog is at a location blocking said first spindle against rotation, detent means in said mechanism having a releasable endwise retaining engagement with said actuator assembly, said slide being blocked by said projection against movement to a position out of at least one

of said holes whereby to prevent removal of the knob from said first spindle.

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