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KEY-OPERATED DOOR KNOB ASSEMBLY

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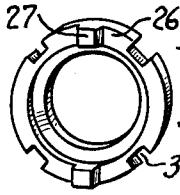



FIG. 5.

FIG. 1.

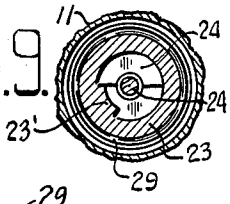



FIG. 9.

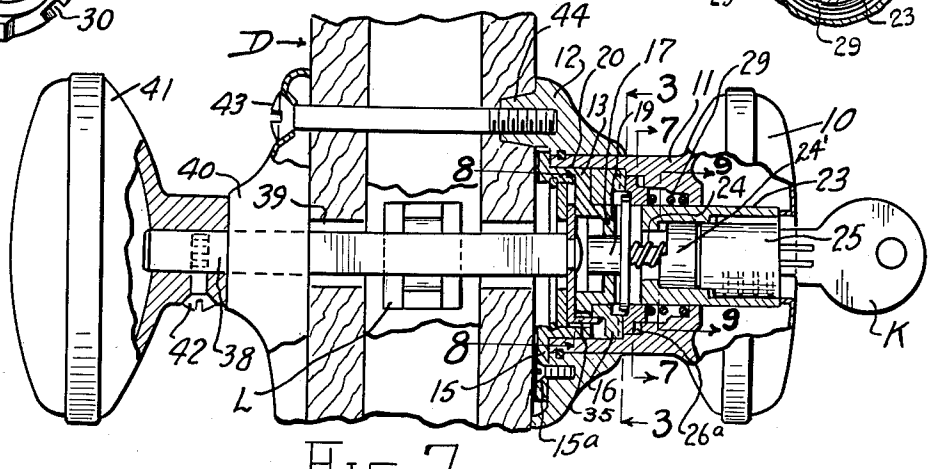



FIG. 7.

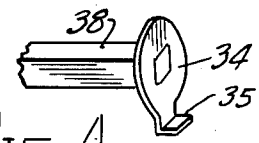
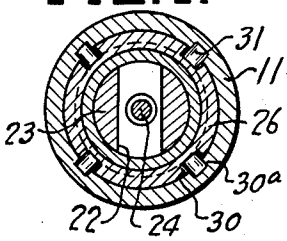



FIG. 4.



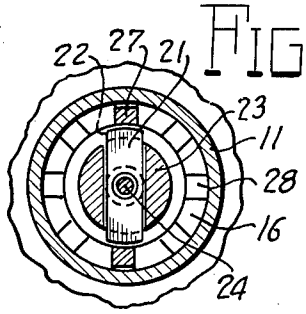




FIG. 3.

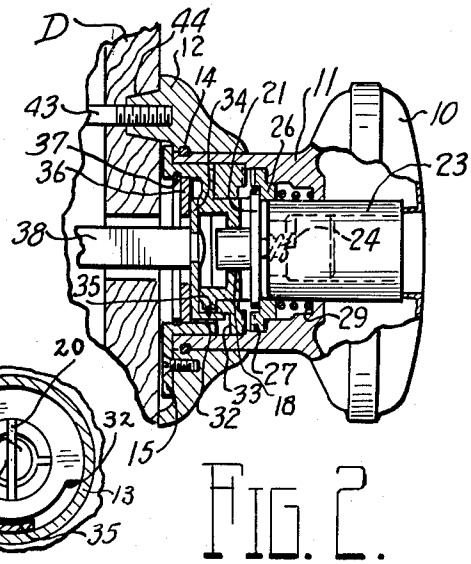



FIG. 2.

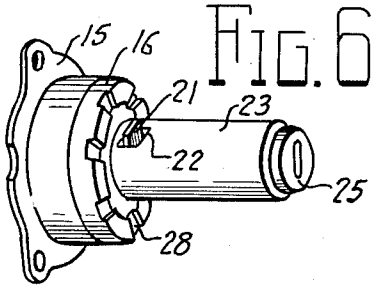



FIG. 6.

FIG. 8.

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# KEY-OPERATED DOOR KNOB ASSEMBLY

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7 Claims. (Cl. 70—223)

This invention relates to door latch mechanisms, but more particularly to door locks in which key-operated mechanism is carried by the outside operated door knob or associated parts.

An object is to produce a new and improved door lock mechanism by providing a free spinning door knob when the latter is rendered ineffective for door opening purposes, the mechanism affording positive disengagement of the clutching parts in response to key actuation and spring impelled engagement of these parts to establish an operative relation between the door knob and the latch parts.

Another object is to produce a sturdy and reliable organization of the above character which can be readily assembled and disassembled, afford efficient service over an extended period, and can be economically produced on a large quantity basis.

Other objects and advantages of the invention will hereinafter appear, and for purposes of illustration but not of limitation, an embodiment of the invention is shown on the accompanying drawings, in which:

Figure 1 is a fragmentary sectional view of a door lock mechanism applied to a door and showing the mechanism in clutched or operative position by which the latch operating spindle can be turned or oscillated by the outside operated door knob;

Figure 2 is a fragmentary sectional view showing the outside operated knob and showing the parts in operative or declutched position enabling the outside knob to spin relative to the latch operating spindle;

Figure 3 is a transverse sectional view on the line 3—3 of Figure 1;

Figure 4 is a fragmentary perspective view of the latch operating spindle end portion showing the knob operated member at one end thereof;

Figure 5 is a perspective view of the driving clutch ring or collar;

Figure 6 is a perspective view of a portion of the mechanism showing the driven clutch ring or collar, the clutch actuator, sleeve and key operated lock cylinder;

Figure 7 is a transverse sectional view substantially on the line 7—7 of Figure 1;

Figure 8 is a transverse sectional view substantially on the line 8—8 of Figure 1; and

Figure 9 is a transverse sectional view substantially on the line 9—9 of Figure 1.

The illustrated embodiment of the invention comprises an outside operated door knob **10** which is of hollow metallic construction formed with an integral inwardly extending sleeve-like hub **11**. The inner end of the sleeve is rotatable within an escutcheon **12** which is secured to the door D. For retaining the hub **11** against endwise movement, a wire retainer **14** is disposed within complementary grooves in the hub and escutcheon. Forming bearing for the inner side of the door knob hub **11** is a bearing member **13** which has a lateral flange **15** at its inner end, screws **15***a* securing the flange **15** to the inner side of the escutcheon **12**. The bearing member **13** has a flat annular bearing surface against which a driven



clutch ring or collar **16** engages, the clutch ring rotatably engaging the cylindrical walls of an integral sleeve extension **23**. Formed in the sleeve **23** in the region of the clutch ring **16** is a transverse wall **17** which has a central aperture **18** in which is disposed a cylindrical nut **19**. The inner end portion of the nut **19** has a notch **19***a* which receives a rigid transversely disposed key **20** carried by the bearing member **13**, the arrangement being such that the nut **19** is held against turning movement but can shift or slide axially within the aperture **18**.

Extending transversely of the cylindrical sleeve **23** is a narrow elongate metallic strip or clutch actuator **21**, the end portions of which project laterally beyond the outside of the sleeve **23** through longitudinally elongate slots **22** formed in the sleeve. The actuator **21** has a central aperture through which freely extends a screw-threaded stem **24**, the inner end portion of which threadedly engages the nut **19**. Turning movement of the stem **24** in one direction or the other causes the nut **19** to shift or move longitudinally, and movement of the nut outwardly bodily moves the clutch actuator **21** in an outward direction. Thus the actuator **21** is positively moved by the nut **19** in a direction to the right of Figure 1, but when the nut **19** is moved to the left of the figure, the actuator **21** is permitted to move to the left of the figure but is not positively shifted in that direction.

The outer end of the screw-threaded stem **24** is rigid with a cylindrical head **24'** which has limited turning movement in the sleeve **23**. Under some circumstances, it may be desirable to reverse the nut and head, i. e. make the nut **19** rigid with the stem **24** and the head **24'** a separate nut in threaded engagement with the stem. Integral with the sleeve **23** is a lug **23'** engageable by a shouldered portion of the head **24'**, thereby to restrict the angular movement of the head to less than 180°. Within the outer portion of the sleeve **23** is a key-operated lock cylinder unit **25** suitably clutched to the head **24'** so that turning of the lock cylinder by the key K imparts corresponding turning movement to the head. As shown, there is an opening in the central portion of the knob **10** to afford access to the outer end of the lock cylinder **25** for inserting a key K as will be readily understood. Construction and operation of the key cylinder unit **25** is well understood to those skilled in this art so that further description and illustration are not considered necessary.

Slidable on the sleeve member **23** on the outer side of the driven clutch ring **16** is a driving clutch ring or collar **26** which has on its inner face a pair of diametrically opposed driving lugs or teeth **27** which are adapted to engage in a pair of lug-receiving notches **28** formed in the outer face of the driven clutch ring **16**. As shown, the clutch ring **16** is formed with eight notches **28** which are spaced equi-distantly from each other, thereby to enable the driving lugs or teeth **27** to engage in one pair or another of these notches.

Bearing against the outer face of the driving clutch collar **26** is a helical coil spring **29** which has its outer end abutting against a shoulder on the hub sleeve **11**, the outer movement of the driving clutch collar **26** being limited by a flange **26***a* on the hub **11**. Thus it will be understood that the clutch actuator **21** is positively moved by the nut **19** to the right of Figure 1, thereby to move the driving clutch collar or ring **26** away from the driven clutch ring **16**. When the screw-threaded stem **24** is turned in the opposite direction for shifting the nut **19** to the left of the figure, then the coil spring **29** forces the driving clutch collar **26** to the left of the figure for causing the driving lugs or teeth **27** operatively to engage a pair of notches **28** in the driven clutch ring **16**. At the same time, the clutch actuator **21** is moved to the left of

Figure 1 by the driving clutch collar which engages the outer surface thereof as will be readily understood.

The driving clutch collar 26 rotates with the outside door knob 10 and as shown, the inside of the hub sleeve 11 is formed with a plurality of notches 30*a* which register with notches 30 extending from side to side of the driving clutch 26. Pins 31 in the registering notches 30 and 30*a* establish a driving connection between the hub sleeve 11 and the driving clutch collar 26, the arrangement being such that the clutch ring or collar 26 can shift axially on the sleeve 23 but cannot rotate independently of the knob sleeve 11.

Formed in the transverse wall 17 of the stationary bearing member 13 is an arcuate slot 32 and in the inner face of the driven clutch ring or collar 16 is a notch or socket 33. Extending through the arcuate slot 32 and into the socket 33 is a lug or upturned end portion 35 integral with a disc-like plate 34 which is rigid with the adjacent end of a latch operating spindle 38. A washer 36 abuts against the inner side of the disc-like plate 34 to retain it in position and a wire retainer 37 in the bearing member 13 holds the washer in place.

The operating door latch spindle 38 extends through holes 39 in the door D and is suitably connected to operate a door latch L of any suitable or well-known type. The structure of the latch mechanism forms no part of the present invention so that detail description and illustration thereof are not considered necessary but the same will be well understood by those skilled in this art. The spindle 38 passes freely through an inside escutcheon 40, and an inside door knob 41 is secured to the opposite end of the spindle 38 by a screw 42. As shown, a screw 43 extends through the door and connects the two escutcheons, the outside escutcheon 12 having a lug 44 which projects into a socket formed in the outer portion of the door to receive the screw and hold the escutcheon against turning movements.

It will be understood that when the clutch rings 16 and 26 are separated from each other or are out of clutching relation, the knob 10 can rotate freely relative to the latch operating spindle 38. However, upon turning the key K in one direction, thereby rotating the screw-threaded stem 24, the nut 19 is moved to the left of Figure 1 and the coil spring 29 is enabled to move the clutch ring or collar 26 into operating engagement with the clutch ring 16. When the two clutch rings are in operative engagement so that the lugs 27 engage a pair of notches 28 of the driven clutch ring or collar 16, turning movement of the knob 10 is transmitted through the two clutch collars to the upstanding lug 35 of the disc plate 34 on the spindle 38. Thus the turning of the knob 10 will turn the spindle 38 and effect retraction of the latch bolt of the latch mechanism L in the usual and well-known manner.

It will be further understood by turning the key K so that the clutch actuator 21 positively moves the driving clutch collar or ring 26 to the right of Figure 1, the spring 29 is compressed and the parts are declutched. Thereupon the knob 10 rotates freely independently of the latch operating spindle 38.

From the above description, it is manifest that the outside operated knob 10 is free spinning when the door is locked, so to speak. This is effected by a positive movement of the driving clutch collar 26 away from the driven clutch collar or ring 16. In order to establish a driving engagement between the outside operated knob and the latch operating spindle 38, it is merely necessary to insert the key K into the lock cylinder unit 25 and turn it to cause rotation of the screw-threaded stem 24 in the opposite direction. The driving clutch collar 26, in response to the action of the coil spring 29, is yieldingly urged into operative engagement with the driven clutch collar 16.

From the above description, it will be apparent that the lock cylinder 25 is always in the same position relative to the door so that the key K is always inserted in



the same position regardless of any turning movement of the knob 10. This is particularly desirable at night since a person knows that in a certain position of the key determined by feeling, it can be entered into the lock cylinder. It will also be understood that the key K cannot be removed from the lock cylinder until the door is locked since it must be turned back to its entering position before it can be freed.

It is to be understood that numerous changes in details of construction, arrangement, operation and choice of materials may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. Door latch operating mechanism comprising a latch operating spindle, an outside operated knob, a mounting for said knob affording turning movements thereof, a driven clutch member, an operative connection between said driven clutch member and said spindle for turning the latter in response to turning movements of the former, a driving clutch member shiftable to and from operative engagement with said driven clutch member, an operative connection between said knob and driving clutch member, a key operated lock cylinder, stationary tubular means independent of said knob for mounting said lock cylinder thereby to enable the lock cylinder to receive its key in a predetermined position irrespective of the position of the knob, means responsive to movement of said key lock cylinder for moving said driving clutch member away from said driven clutch member and controlling the movement of said driving clutch member to said driven clutch member, and a spring for urging said driving clutch member into operative engagement with said driven clutch member.

2. The organization as claimed in claim 1, in which said moving means comprises a screw-threaded stem, a nut on said stem, means for holding said nut against turning movements but enabling axial shifting movements, and an actuator movable by said nut and engageable with said driving clutch member for shifting the latter away from said driven clutch member.

3. The organization as claimed in claim 2, in which the operative connection between the knob and driving clutch member comprises registering notches in said member and knob, and pins in said notches, thereby to cause the parts to turn together but enabling axial shifting of said member relative to the knob.

4. The organization as claimed in claim 2, in which the operative connection between the driven clutch member and the spindle comprises an element fixed to the spindle, and a part of said element engaging and movable with the driven clutch member.

5. Door latch operating mechanism comprising an outside operated knob, a hub sleeve for said knob, a bearing member on which said sleeve rotates, means for holding said bearing member stationary, a bearing sleeve rigid with said bearing member, a driven clutch ring rotatable on said bearing sleeve, a latch operating spindle, a plate fixed to said spindle having an off center lug, an operative connection between said lug and driven ring, a driving clutch ring rotatable and axially shiftable on said bearing sleeve, spring means for urging said driving ring toward said driven ring, an operative connection between said driving ring and hub sleeve enabling axially shifting movements of the driving ring and holding said ring against movements relative to the hub sleeve, and key operated means within said bearing sleeve for axially shifting the driving ring out of operative engagement with the driven ring.

6. Door latch operating mechanism comprising an outside operated knob, a hub sleeve for said knob, a bearing member on which said sleeve rotates, means for holding said bearing member stationary, a bearing sleeve rigid with said bearing member, a driven clutch ring rotatable on said bearing sleeve, a latch operating spindle, a plate

fixed to said spindle having an off center lug, an operative connection between said lug and driven ring, a driving clutch ring rotatable and axially shiftable on said bearing sleeve, spring means for urging said driving ring toward said driven ring, a nut within said bearing sleeve, a mounting for said nut to cause same to move only in axial directions, a screw-threaded stem engaging said nut, key operated means for rotating said stem, longitudinally elongate slot means in said bearing sleeve, and an actuating member projecting through said slot means and engageable with said nut and driving ring respectively thereby to move the driving ring out of operative engagement with said driven ring upon rotation of said stem and shifting movement of said nut.

7. Door latch operating mechanism comprising latch spindle operating means, a key-actuated lock cylinder, a normally free spinning handle knob, a bearing support for said knob, a stationary rigid mounting having a tubular portion extending centrally of the knob and open to the outside, said lock cylinder being within said tubular portion in position to receive its operating key in a predetermined position irrespective of the position of the knob, and clutch means on said mounting and responsive to actuation of the lock cylinder by its key for operatively connecting the knob and said spindle operating means.



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