Nov. 22, 1966 F. J. RUSSELL ETAL 3,287,054

SPINDLE ROTATING PULL MEANS

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Fig. 1

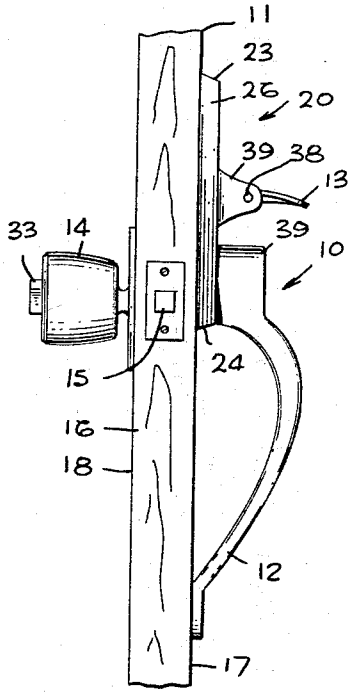


Fig. 2

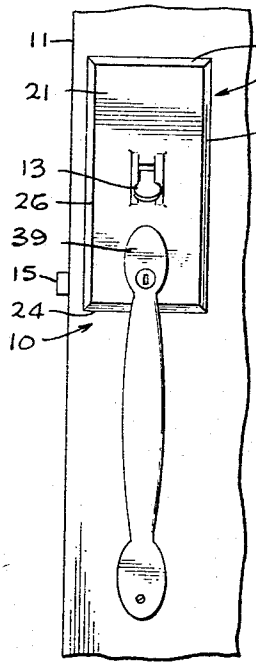


Fig. 4

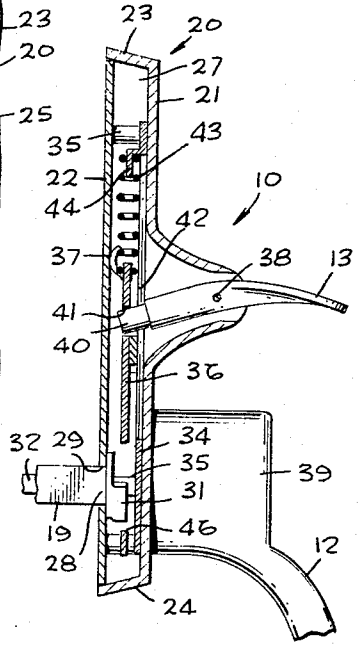


Fig. 3

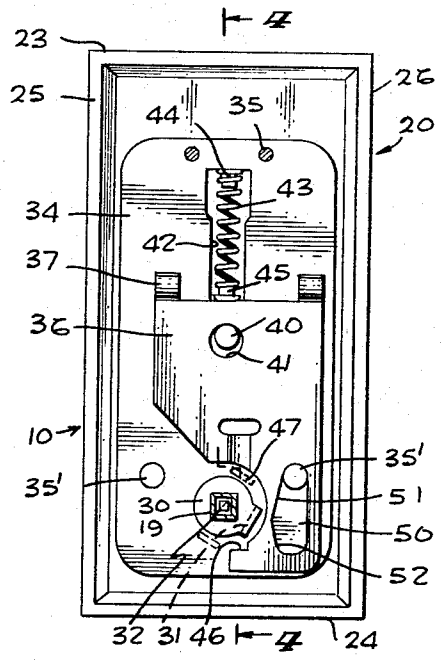
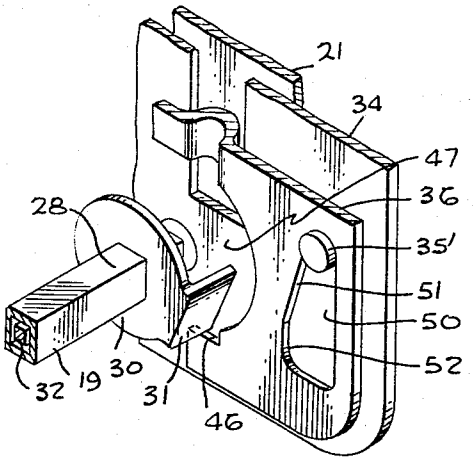


Fig. 7



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Fig. 5

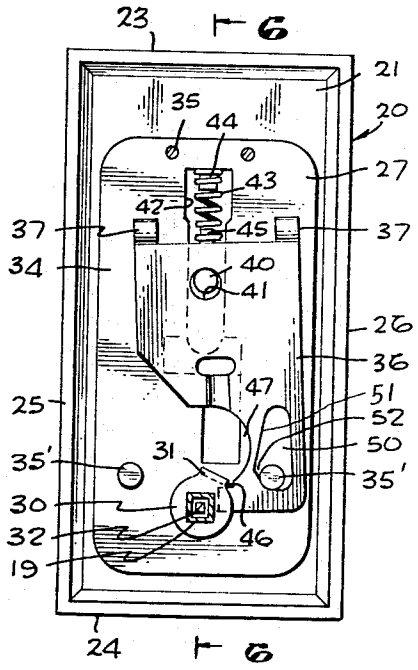


Fig. 6

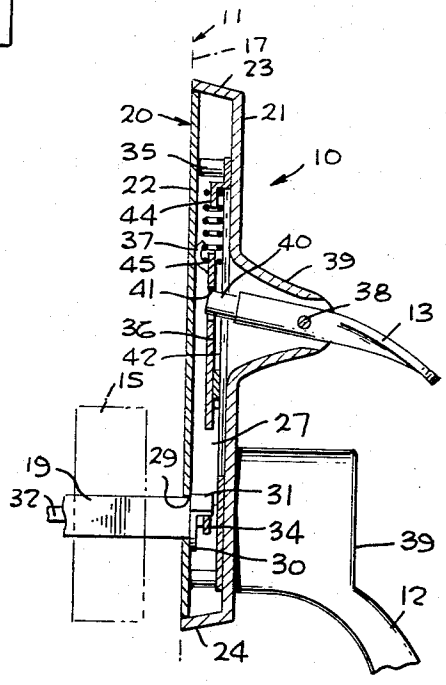
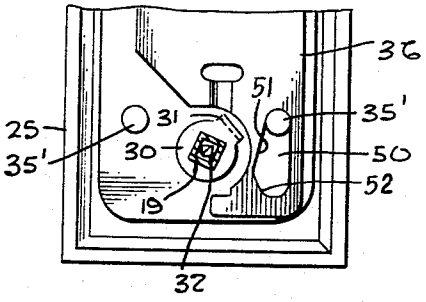


Fig. 8



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SPINDLE ROTATING PULL MEANS

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Filed Mar. 23, 1964, Ser. No. 353,741
4 Claims. (Cl. 292—336.3)

The invention has reference to door locks and, to be more specific, door locks customarily associated with a door where they are provided with a vertical handle and with a thumbpiece for manipulating the latch bolt.

When a thumbpiece is depended upon to manipulate the spindle and latch bolt in this kind of lock, some mechanism must be provided for transferring the vertically reciprocating motion of the thumbpiece to the spindle and at the same time converting it to motion capable of rotating the spindle. Mechanisms heretofore employed for this type of lock have been more complicated and costly than current market conditions can tolerate, especially where forms of other types of door locks have been attractively modernized.

It is therefore among the objects of the invention to provide a new and improved door lock structure in which a spindle is adapted to be rotated by a thumbpiece wherein the motion converting mechanism is simple in its construction and easy in its operation.

Another object of the invention is to provide a new and improved lock mechanism wherein the conventional spindle has a mounting such that it can be rotated in the customary fashion by means of an inside rotating knob and which, at will, can also be rotated from the outside by a reciprocating thumbpiece.

Still another object of the invention is to provide a new and improved door lock which makes use of a sliding plate to translate movement of one kind taken from a reciprocating thumbpiece to a rotational movement for operating the spindle.

Still another object of the invention is to provide a new and improved lock mechanism which is simple and compact in its structure and assembly, which is of such character that it can be built relatively inexpensively, and also one which operates freely and easily while at the same time being of such design that it remains particularly durable after installation and use for long periods of time.

Also included among the objects of the invention is to provide a new and improved lock mechanism which makes use of a sliding plate arranged in such fashion that various movements are confined to relatively few pieces, simply constructed and simply mounted, thereby to very greatly simplify and reduce the assortment of parts needed to make a small, compact and especially effective mechanism.

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 the door lock mounted in customary fashion upon the outer side of a door.

FIGURE 2 is a front elevational view of the outer side of the door lock of FIGURE 1.

FIGURE 3 is a view of the door lock viewed from the rear.

FIGURE 4 is a longitudinal sectional view of the door lock taken on the line 4—4 of FIGURE 3.

FIGURE 5 is a view similar to FIGURE 3 but showing the parts in a second operative position.

FIGURE 6 is a longitudinal sectional view taken on the line 6—6 of FIGURE 5.

FIGURE 7 is a fragmentary rear perspective view of important operating portions of the device.

FIGURE 8 is a rear elevational view similar to FIGURE 3 but showing the parts in a different operative positon.

In an embodiment of the invention which has been selected as a good example of the principle involved, there is shown a door lock indicated generally by the reference character **10** mounted upon a door **11** in such fashion that on the outside of the door there is a vertical handle **12** in association with a thumbpiece **13**. On the inside of the door **11** is a rotating knob **14**. The thumbpiece **13** and rotating knob **14** serve to manipulate a conventional latch bolt **15** on an edge **16** of the door **11**. The vertical handle **12** is applied to an outside face **17** of the door **11** opposite to the inside face **18** of the door **11**.

The inside rotating knob **14** is nonrotatably attached to a square tubular spindle **19**, and conventional appropriate mechanism (not shown) serves to translate the rotating motion of the spindle 19 to a reciprocating motion of the latch bolt **15**, so that it can be withdrawn and released at will.

Although the connection between the knob **14** and the spindle **19** can be direct, an appropriate interconnecting mechanism must be provided in order to translate the tilting movement of the thumbpiece **13** to a movement which rotates the spindle **19**. At the same time, it is important that even though the door lock **10** be locked from the outside, prohibiting movement of the thumbpiece **13** from operating the latch bolt **15**, the arrangement of parts must remain such that the latch bolt **15** can be withdrawn by rotation of the rotating knob **14** even through the lock **10** might be locked. These problems have been long recognized in the past and have heretofore been solved by the employment of various familiar conventional mechanisms.

In the device here under consideration, virtually all of the operating parts are mounted and contained within a frame **20**. The frame **20** in this embodiment consists of a front plate **21**, a back plate **22**, end plates **23** and **24** and side plates **25** and **26**. These plates encompass a chamber **27** in which is located operating parts of the device.

The square tubular spindle **19** has an end **28** rotatably mounted in an appropriate hole **29** in the back plate **22**. A disc **30** serving as a crank arm nonrotatably attached to the end **28** is located within the chamber **27**. A crank **31** is attached to the perimeter of the disc **30** and is also located within the chamber **27**. A solid, small, square locking shaft **32** is rotatably mounted inside of the square tubular spindle **19** and serves as a locking shaft. The locking shaft **32** extends inwardly through the rotating knob **14**, where it engages a turn button **33**.

Although the frame **20** up to this point has been described as consisting of the plates **21**, **22**, **23**, **24**, **25** and **26**, thus creating the chamber **27**, another plate element **34** also comprising a portion of the frame **20** is mounted upon the pegs **35**, **35'** adjacent the inner face of the front plate **21**. The plate element **34** is therefore a stationery portion of the frame **20** lying within the chamber **27**.

A slide plate **36** has a vertically sliding movement within the chamber **27** and is guided in part for sliding movement by the presence of shoes **37** which slide upon the inside surface of the back plate **22**.

In order to manipulate the slide plate **36**, the thumbpiece **13** is pivotally mounted by means of a pin **38** upon a bracket **39** extending outwardly away from the front plate **21** so that a drive portion **40** of the thumbpiece **13** can move up and down in its position within the chamber **27**. A slot **42** in the plate element **34** allows the drive portion **40** to move freely. In the slide plate **36** is an opening **41** into which the drive portion **40** extends, and the drive portion **40** bears against the opening **41**

of the slide plate **36** when the thumbpiece **13** is depressed.

When the thumbpiece **13** is depressed, the drive portion **40** is tilted upwardly, and this causes the slide plate **36** to move upwardly. Upward motion is resisted by tension of the spring **43** which is retained by a keeper **44** at the upper end extending from the plate element **34** and by a keeper **45** at the lower end which is an upwardly extending projection from the slide plate **36**. These last defined keepers can be readily observed in FIGURE 3.

In order to convey the vertically reciprocating movement of the slide plate **36** to the crank **31**, the slide plate **36** is provided with a shoulder **46**, as shown in FIGURES 3, 5, and 7. In initial or normal position of the slide plate **36** and shoulder **46**, there is space between the shoulder **46** and the crank **31**, so that should the crank **31** be rotated by manipulation of the rotating knob **14** in a conventional fashion, there is no impediment to free rotation. Accordingly, the space between the shoulder **46** and the crank **31** is provided, as is also the arcuate space **47** immediately above the shoulder **46** as viewed in FIGURE 3.

For additional guidance in positioning of the slide plate **36**, there is provided in the slide plate **36** a vertically elongated opening **50** having on the left side, as viewed in FIGURE 3, an edge **51**, below which is another edge **52** which together form a clearance for and a cam track to cooperate with the respective peg **35'** which lies within the opening **50**. The peg **35'** thereby serves as a camming means.

From the position and direction of the edge **51**, it will be observed that as the slide plate **36** is moved upwardly by manipulation of the thumbpiece **13**, the lower end of the slide plate **63** will move from left toward the right, as viewed in FIGURES 3 and 5, as it is permitted to do by the sloping direction of the edge **51**. In this way, the shoulder **46** will be brought into engagement with an adjacent edge of the crank **31** as soon as the slide plate **36** moves upwardly enough to close the initial distance between the shoulder **46** and the crank **31**. Movement toward the right will continue until the engaged edge **51** passes its transverse center line of the peg **35'**. Thereafter, as the slide plate **36** continues to move upwardly, the edge **52** will come to bear against the peg **35'** as viewed in FIGURE 5, thus limiting the side-to-side movement of the slide plate **36** until it reaches the position as shown in FIGURE 5. Once engaged, the shoulder **46** is maintained in positive engagement with the crank **31**. This movement, in addition to being a vertical movement of the slide plate **36**, also is a tilting or pivotable movement of the side plate **36** in a manner such that the lower end of the slide plate **36**, as exemplified in part by the shoulder **46**, pivots about the drive portion **40** as a center of rotation. Hence, the wall of the slot **41** may be said to constitute a shoulder in the upper end of the slide plate **36** in engagement with the drive portion **40**.

When the thumbpiece **13** is released, tension built up in the spring **43** will return the slide plate **36** downwardly. The cam track embodied in the edges **52** and **51** will become operative against the peg **35'**, thus limiting the side-to-side movement of the slide plate **36**. The slide plate **36** will move the shoulder **46** to the position of FIGURE 3, where space is left between the shoulder **46** and the crank **31**, so that the crank **31** can again be freely rotated by manipulation of the knob **14**.

From the foregoing description of parts and their movement, it will be apparent that about the only parts needed to translate a vertical tilting movement of the thumbpiece **13** and drive portion **40** to a rotating movement for the spindle **19** is the slide plate **36** pivotally hung upon the drive portion **40** and guided during its movement by engagement between crank **31** and shoulder **46**.

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. A door lock structure including a frame adapted to be mounted on a door, a spindle having a manually actuable handhold thereon, said spindle being rotatably mounted on the structure, a crank arm in nonrotatable engagement with the spindle, a manually actuable thumbpiece pivotally mounted on the frame and a drive portion of said thumbpiece having a path of movement relative to said frame, a slide plate having a vertically movable and laterally yieldable mounting on said frame, a first shoulder on said slide plate in engagement with said drive portion and a second shoulder on said slide plate adjacent said crank arm, said second shoulder being vertically and laterally shiftable against said crank arm upon movement of the slide plate in response to movement of the drive portion of the thumbpiece whereby to rotate said crank arm.

2. A door lock structure including a frame adapted to be mounted on a door, a spindle having a manually actuable handhold thereon, said spindle being rotatably mounted on the structure, a crank arm in nonrotational engagement with the spindle, said crank arm when rotated being movable between positions of maximum and minimum displacement laterally relative to the center of rotation, a manually actuable thumbpiece pivotally mounted on the frame and a drive portion of said thumbpiece having a path of movement relative to said frame, a slide plate having both a laterally and vertically movable mounting on said frame, a first shoulder on said slide plate having a freely swinging engagement with said drive portion and a second shoulder on said slide plate adjacent said crank arm, the position of said second shoulder being shiftable with the slide plate in response to action of said crank arm to successive positions following a path of movement of said crank arm when said slide plate is in motion.

3. A door lock structure including a frame adapted to be mounted on a door, a spindle rotatably mounted on the structure, a crank arm in nonrotatable engagement with the spindle, said crank arm when rotated being movable between positions of maximum and minimum displacement laterally relative to the center of rotation, a manually actuatable thumbpiece pivotally mounted on the franme and a drive portion of said thumbpiece having a path of movement relative to said frame, a slide plate movably mounted on said frame, a first shoulder on said slide plate having a freely swinging engagement with said drive portion and a second shoulder on said slide plate adjacent said crank arm and in an initial position clear of said crank arm whereby to permit conventional rotation of the spindle, the position of said second shoulder being shiftable in response to action of said crank arm when said slide plate is in motion first to a position of initial engagement with said crank arm and then to successive positions following a path of movement of said crank arm.

4. A door lock structure including a frame adapted to be mounted on a door, a spindle rotatably mounted on the structure, a crank arm in nonrotatable engagement with the spindle, said crank arm when rotated being movable between positions of maximum and minimum displacement laterally relative to the center of rotation, a manually actuatable thumbpiece pivotally mounted on the frame and a drive portion of said thumbpiece havinig a path of movement relative to said frame, a slide plate movably mounted on said frame, a first shoulder on said slide plate having a freely swinging

engagement with said drive portion and a second shoulder on said slide plate adjacent saidcrank arm and in an initial position clear of said crank arm whereby to permit conventional rotation of the spindle, guide means on said frame, complementary guide means on said slide plate, one of said guide means having a clearance relative to the other at the location of maximum displacement of said crank arm, the position of said second shoulder being shiftable in response to action of said crank arm when said slide plate is in motion first to a position of initial engagement with said crank arm and then to successive positions following a path of movement of said crank arm, and a portion of one of said guide means biased in a direction toward a position of vertical alignment with the axis of rotation of said crank

arm adapted to shift said second shoulder toward said position of vertical alignment.

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