July 9, 1940. K. A. BRAUNING 2,207,143

TUBULAR LOCK

Filed Aug. 27, 1936 2 Sheets-Sheet 1

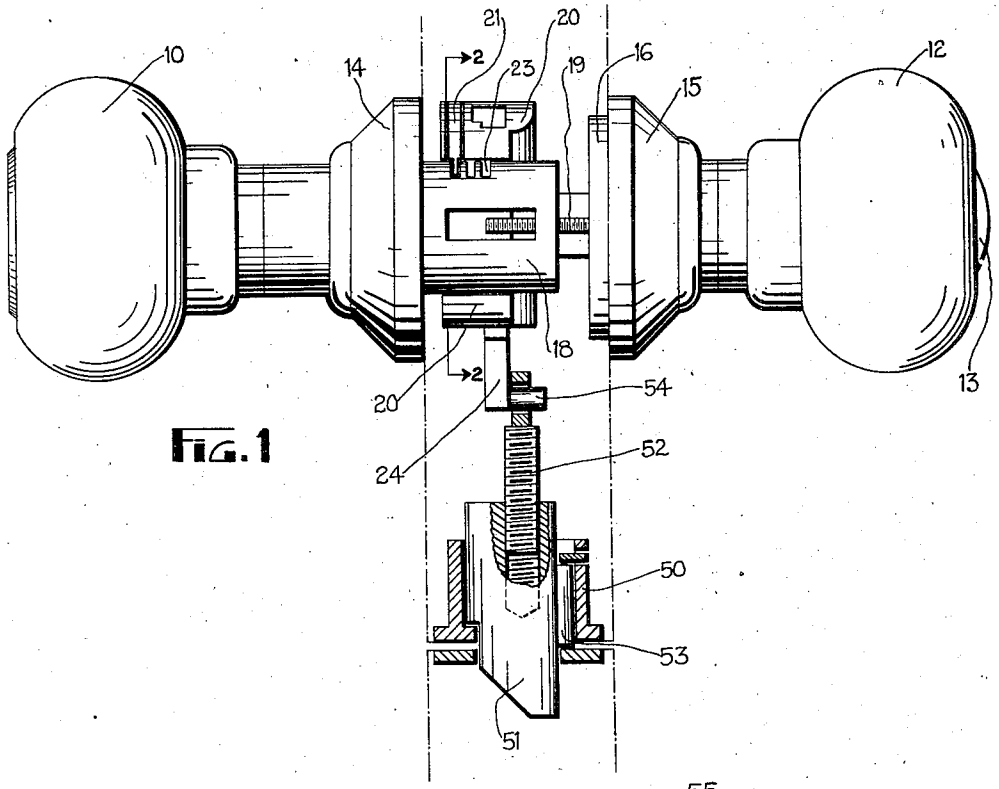


FIG. 1

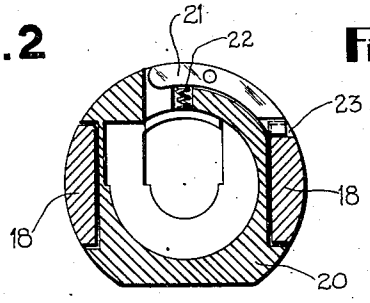


FIG. 2

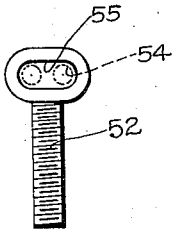


FIG. 3

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TUBULAR LOCK

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FIG. 4

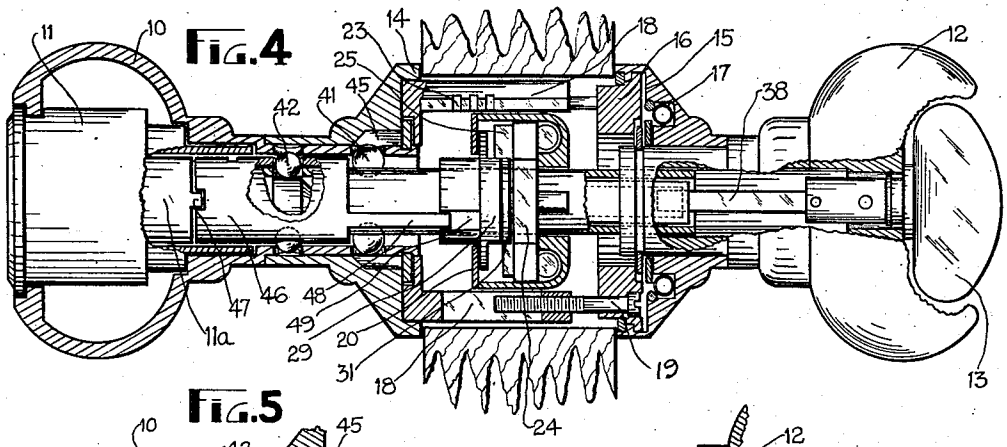


FIG. 5

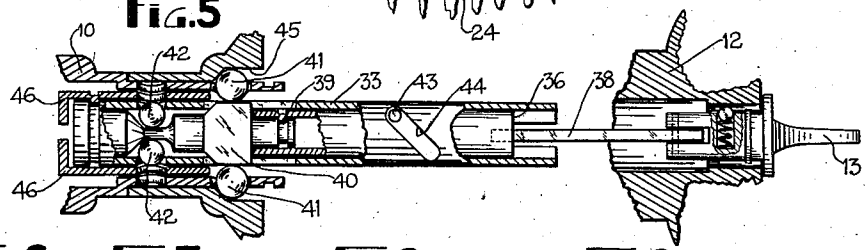


FIG. 6

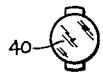


FIG. 7

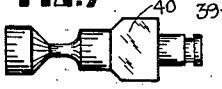


FIG. 8

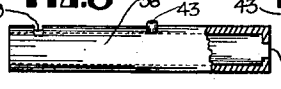


FIG. 9

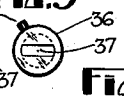


FIG. 11



FIG. 10

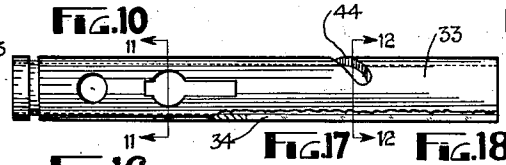


FIG. 12



FIG. 13

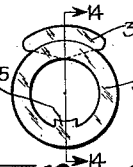


FIG. 14

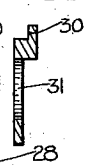


FIG. 15



FIG. 16

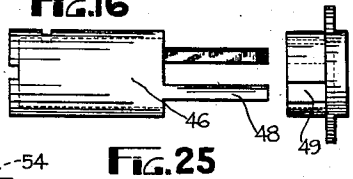


FIG. 17

FIG. 18

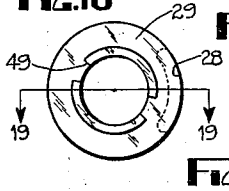


FIG. 19

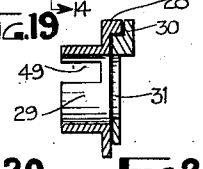


FIG. 22

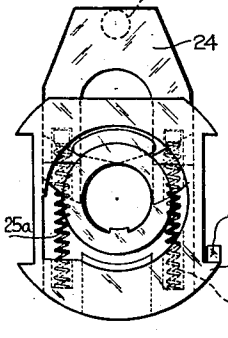


FIG. 25



FIG. 23

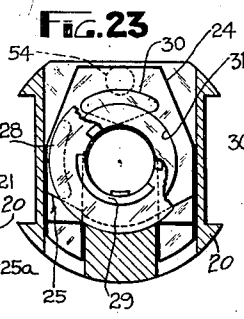


FIG. 24

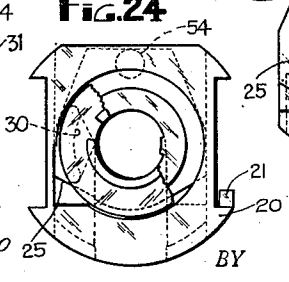


FIG. 20

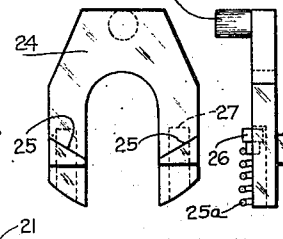


FIG. 21

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UNITED STATES PATENT OFFICE

2,207,143

TUBULAR LOCK

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Application August 27, 1936, Serial No. 98,166

10 Claims. (Cl. 292—337)

This invention relates to a lock of the type disclosed in my co-pending application, Serial No. 7,403, filed February 20, 1935. This type of lock is known to the trade as a tubular lock, and is mainly desirable because of the ease with which it is applied to a door.

My invention contributes to the art a tubular lock in which the latch bolt, the latch bolt retracting mechanism and the knob operated means are readily adjustable laterally relatively to one another. Because of special features, it is quite simple to assemble my lock relatively to a door, and to adjust the mechanism to various door thicknesses.

More particularly, as to this phase of the invention, my lock embodies a main casing assembled from two parts, one on each side of the door, in a manner well understood in the art, so as to form the main casing. Relatively to this main casing there is maintained in sliding lateral relationship, an auxiliary casing. This auxiliary casing preferably contains all the operating mechanism of the lock, such as the latch bolt retractor and the retractor operating rollback. I use rather unique detent means for locking the auxiliary casing to the main casing in any one of several laterally adjusted positions.

As an improved feature of the invention, I maintain the retractor operating rollback in sliding relation to a main knob operating spindle, and preferably, this means of connection embodies a lug on the rollback in sliding engagement with a slot on the spindle.

In locks of the type described, it is customary to lock the outside knob through means housed in the inside knob, and then to employ a key operated cylinder and plug in the outside knob for retracting the latch bolt. It is customary also to employ a spring which projects the latch bolt, and a further spring for maintaining at least the inside knob in a central position, since it is not possible to rely on the latch bolt spring to so maintain the knob. If the latch bolt spring were made sufficiently strong to position the inside knob fully, then the closing action of the door would be hindered, since relatively great force would be required to cam the latch bolt back.

The knob operation in locks of this type therefore requires the overcoming of the force of two springs. The knob action nevertheless remains fairly easy because considerable leverage is possible when one operates a relatively large knob. It is not possible, however, to obtain this leverage when the key operated cylinder retracts the latch bolt. Therefore, where the key operates against both the knob balancing spring and the latch retracting spring, a very difficult hard key action results. My invention provides an improvement over the usual key action in that I employ a special rollback operated by the key and required to overcome only the force of the spring maintaining the latch bolt in projected position. This feature I call an easy key action feature.

More particularly describing the invention, it may be well to indicate that this easy key action feature is obtained by a special rollback, which I term a cylinder rollback, mounted in the auxiliary casing and maintained in sliding relationship to the spindle while freely rotatable thereon. An auxiliary sleeve mounted on the spindle and in engagement with the key plug of the knob cylinder, rotates the rollback whenever the key plug is rotated.

As a further feature of the invention, I provide a latch bolt housing cooperable with the latch bolt retracting mechanism for obtaining some adjustment for thicknesses of doors independently of the adjustment of the auxiliary casing relatively to the main casing. As a further incidental feature, the latch bolt contained in the latch bolt housing is not actuated by a spring mechanism in the housing, but is actually spring pressed only when connected to the retractor mechanism. In this way, the retractor spring operates not only on the retractor, but also on the latch bolt itself.

For a description of my invention, I shall now refer to the drawings wherein Fig. 1 is a plan view of my invention showing certain of the parts in section. Fig. 2 is a section taken on lines 2—2 of Fig. 1. Fig. 3 is a view of a part of the latch bolt showing its relation to the retractor. Fig. 4 is a partial section through the lock of my invention. Fig. 5 shows some of the parts of Fig. 4 in a different position. Figs. 6 and 7 are respectively end and side views of a slide member which actuates the locking mechanism for the outside knob. Figs. 8 and 9 are respectively side and end views of the sleeve which operates the slide member of Figs. 6 and 7. Fig. 10 is a plan view of the spindle of my invention, while Fig. 11 is a section thereof taken along lines 11—11 of Fig. 10, and Fig. 12 is a section taken along lines 12—12 of Fig. 10. Figs. 13 and 14 are respectively a side view and section of the spindle and knob operated rollback. Figs. 15 and 16 are respectively front and side views of the cylinder operated sleeve of my in-

vention. Figs. 17 and 18 are respectively a side view and an elevation of the cylinder operated rollback. Fig. 19 is a section taken along lines 19—19 of Fig. 18 showing the cylinder operated rollback and also the knob operated rollback in nested relation. Figs. 20 and 21 are respectively side and end views of the latch bolt retractor. Fig. 22 is a view showing the retractor assembled relatively to the auxiliary casing. Figs. 23 and 24 are partial sections of parts of Fig. 22 illustrating the action of the rollbacks. Fig. 25 is a view of one of the springs which project the retractor.

Referring now more particularly to the drawings, and especially to Figs. 1 and 4, my lock comprises an outer knob 10 in which is mounted a cylinder 11, and an inner knob 12 in which is mounted a thumb turn 13. The knob 10 is held assembled relatively to an outer rose 14, while the knob 12 is held assembled relatively to a rose 15, the rose 15 being in turn supported on a plate 16, as is described in my co-pending application aforementioned. A balancing spring 17 encircles the rose 15 and maintains it in a central position and against rotation, in a manner quite well understood in this art.

The plate 16 is secured to a pair of lateral extensions 18 of the rose 14 by screws 19 in a manner well understood in the art. An auxiliary casing 20 slides relatively to the extensions 18, as is best shown in Fig. 2. Mounted on this auxiliary casing is a spring pressed pawl or detent 21 projected by a spring 22, so that its end portion enters one of a series of slots 23 in one of the extensions 18. It is quite apparent from Figs. 1 and 2 that the pawl or detent 21 may be readily operated at any time to remove its end from one of the slots 23, so that the auxiliary casing 20 may slide to a second position wherein the pawl 21 may enter one of the other slots 23. In this way, three adjusted positions of the auxiliary casing 20 relatively to the main casing are easily obtainable.

In the auxiliary casing there is mounted a sliding latch bolt retractor 24, maintained in projected position by a pair of springs 25*a* operating against pins 26 which fit into bored portions 27 of the retractor 24. The retractor 24 has shoulder lug portions 25 against which may abut the cam portion 28 of a cylinder rollback 29. Against the lugs 25 may also operate the cam portion 30 of a knob and spindle operated rollback 31. The two rollbacks are maintained in nested position in the auxiliary casing 20, as is best illustrated in Fig. 4. As a matter of preferred construction, one of the lugs 25 does not extend as far as the other, so that rotation of the rollback 29 in but one direction will operate the retractor 24.

In Fig. 22, I show the retractor 24 mounted in the casing 20 and held fully projected by the springs 25*a* with both rollbacks in their neutral position. In Fig. 23, I illustrate rollback 31 in its neutral position. The rollback 29 is, however, rotated with its cam portion 28 against one of the lugs 25 of the retractor, and in this position, the retractor is in latch bolt retracting position. In Fig. 24, I illustrate the retractor 24 held retracted by the cylinder rollback 31 through abutment of its cam portion 30 against one of the lugs 25.

While the spindle operation and knob operation per se form no part of this invention, yet I believe that it will be best to describe briefly their operation in order that a better appreciation of the present invention will be possible. For a detailed description, one may refer to my co-pending application supra.

A hollow spindle 33, shown in Fig. 10, is splined to the inner knob 12 so as to be integrally rotatable therewith. This spindle is slotted as at 34 for sliding coaction with the lug 35 of the knob rollback 31, so that that rollback will rotate integrally with the spindle 33 at all times. Thus, rotation of the knob 12 will always rotate the spindle 33 and rollback 31 through lug 35. At the same time, there exists a free sliding relationship between the two so that it is quite simple to obtain lateral adjustment of the auxiliary casing carrying the rollback 31, relatively to the spindle 33 and the main casing formed by the roses 14 and 15 and plate 16.

Maintained within the spindle 33 there is a sleeve 36 whose end surface is slotted at 37 for cooperation with tongue 38 of the thumb piece 13. Through means of a depressed portion 39, the sleeve 36 is maintained for integral sliding movement with the slide bar 40 which controls the locking balls 41 and the further locking balls 42, as is seen from Figs. 4 and 5. A pin 43 on the sleeve 36 operates in a cam slot 44 of the spindle 33, so that when thumb piece 13 is rotated, in turn rotating the sleeve 36, pin 43 engaging slot 44 will cause a forward movement of the sleeve 36 in the hollow spindle 33 and therefore a forward movement of the slide bar 40.

When the slide bar 40 is in its right hand position in Fig. 4, the balls 41 are held out of grooves 45 in the outside rose 14, and the knob 10 is free to rotate. At the same time, locking balls 42 will be maintained in an upward position illustrated in Fig. 4, in which position they will cause an engagement of parts now to be described.

As was previously indicated, the outside knob 10 carries a cylinder 11. This cylinder has a key plug 11*a* of the usual type which when rotated relatively to the knob and cylinder 11, actuates sleeve 46 (Fig. 16) through lugs 47. This sleeve 46 has a pair of prongs 48 which fit into slots 49 of the rollback 29 for rotating that rollback independently of the spindle 33 about which the rollback 29 is mounted for free rotation.

When the locking balls 42 previously described are in the position of Fig. 4, they connect sleeve 46 with the spindle 33 so that rotation of the knob 10, allowed because balls 41 are out of the slots 45 in Fig. 4, will rotate the cylinder 11, key plug 11*a*, sleeve 46 and spindle 33, so as to rotate the two rollbacks together and retract the latch bolt through the retractor 34. This retraction is of course resisted by the retractor springs 25*a* and the knob balancing spring 17.

If, on the other hand, the thumb turn 13 has been rotated so as to move the slide bar 40 to its position in Fig. 5, the balls 41 will now be maintained within the grooves 45 so as to maintain the outer knob 10 locked. At the same time, sleeve 46 is now maintained out of engagement with the spindle 33, due to the dropping of the balls 42, so that, as a matter of fact, knob 10 and cylinder 11 are released from the spindle 33, and rotation of the spindle 33 independently of the knob 10 by the inner knob 12 is possible. If, however, it now becomes desirable to rotate the rollback 29 from the outside to retract the latch bolt, a key need only be inserted in the key plug 11*a*, which is then rotated in the regular manner, rotating sleeve 46 and rollback 29 as best shown in Fig. 23, thus retracting the usual

latch bolt. This operation is of course resisted only by the springs 25a, so that I obtain a very easy key action.

My latch bolt housing which is shown in Fig. 1, is of the usual sleeve type 50 and holds a latch bolt 51. The tail of the latch bolt 51 is a screw threaded pin 52 having an eye 55. An auxiliary latch bolt 53 is utilized and cooperates with the latch bolt 51 in a manner well understood in the art. The latch bolt 51 is not spring actuated in any way except through its connection with the retractor 24.

This connection is through means of a pin 54 extending from the retractor 24 and into the eye 55 of the pin member 52. Because of the relation between the pin 54 and the eye 55, best illustrated in Figs. 1 and 3, it is possible to obtain a lateral adjustment between the latch bolt and its retractor 24, and it is also possible to obtain some slight vertical adjustment, all of which is highly desirable in a lock of this type.

I now claim:

1. In a door lock a main casing formed of an inner portion extending from the inside of the door, and an outside portion extending from the outside of the door, and with the two portions in adjustable relation to provide for varying door thicknesses, an auxiliary casing having latch bolt retracting mechanism and mounted for lateral sliding movement in said main casing, and a spring pressed detent carried by one of said castings and fitted into one of several cooperating detent portions in the other of said casings for securing said auxiliary casing in one of several adjusted positions.

2. In a lock, a main casing formed of an inner portion extended from the inside of the door, and an outside portion extending from the outside of the door, and with the two portions in adjustable relation to provide for varying door thicknesses, an auxiliary casing having latch bolt retracting mechanism and mounted for lateral movement in said main casing, a latch retracting spindle, means whereby said spindle and latch bolt retracting mechanism are in sliding relation to permit relative lateral movement of said latch bolt retracting mechanism while maintaining said mechanism in operating engagement with said spindle, and detent means for securing said auxiliary casing in one of several adjusted positions relatively to said main casing.

3. In a lock, a main casing formed of an inner portion extending from the inside of the door, and an outside portion extending from the outside of the door, and with the two portions in adjustable relation to provide for varying door thicknesses, an auxiliary casing mounted for lateral movement in said main casing, latch bolt retracting mechanism in said auxiliary casing, a latch retracting spindle, means whereby said spindle and latch bolt retracting mechanism are in sliding relation to permit relative lateral movement of said latch bolt retracting mechanism while maintaining said spindle in operating engagement with said mechanism, and detent means for securing said auxiliary casing in one of several adjusted positions relatively to one of said portions comprising said main casing.

4. In a door lock, a main casing formed of an inner portion extending from the inside of the door and an outside portion extending from the outside of the door, and with the two portions in adjustable relation to provide for varying door thicknesses, an auxiliary casing having a latch bolt retracting mechanism and mounted for lateral sliding movement in said main casing, and means on said auxiliary casing cooperable with any one of several means on one of the portions comprising said main casing for securing the auxiliary casing to said main casing in any one of several adjusted positions.

5. In a door lock, a main casing formed by the joining together of two portions extending from the inside and outside of the door, an auxiliary casing having latch bolt operating means and slidable laterally on said main casing, and a spring pressed detent for securing said auxiliary casing to said main casing in any one of several positions.

6. In a door lock, a main casing formed by the joining together of two portions extending from the inside and outside of the door, an auxiliary casing having latch bolt operating means and slidable laterally on said main casing, and means on one of said casings cooperable with any one of spaced means on the other of said casings for securing said auxiliary casing to said main casing in any one of several positions.

7. In a door lock, a main casing formed by the joining together of two portions extending from the inside and outside of the door, an auxiliary casing having latch bolt operating means and slidable laterally on said main casing, and means on said auxiliary casing cooperable with any one of several spaced means on said main casing for securing said auxiliary casing to said main casing in any one of several positions.

8. In a door lock, a main casing, an auxiliary casing having latch bolt retracting means and slidable on said main casing, and a spring pressed detent for securing said auxiliary casing to said main casing in any one of several positions.

9. In a door lock, a main casing, an auxiliary casing having latch bolt retracting means and slidable on said main casing, and means on one of said casings cooperable with any one of spaced means on the other of said casings for securing said auxiliary casing to said main casing in any one of several positions.

10. In a door lock, a main casing, an auxiliary casing having latch bolt retracting means and slidable on said main casing, and means on said auxiliary casing cooperable with any one of several spaced means on said main casing for securing said auxiliary casing to said main casing in any one of several positions.

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