Jan. 7, 1947. W. R. SCHLAGE 2,413,733

DOOR LOCK

Filed Dec. 16, 1944 2 Sheets-Sheet 1

Fig. 1.

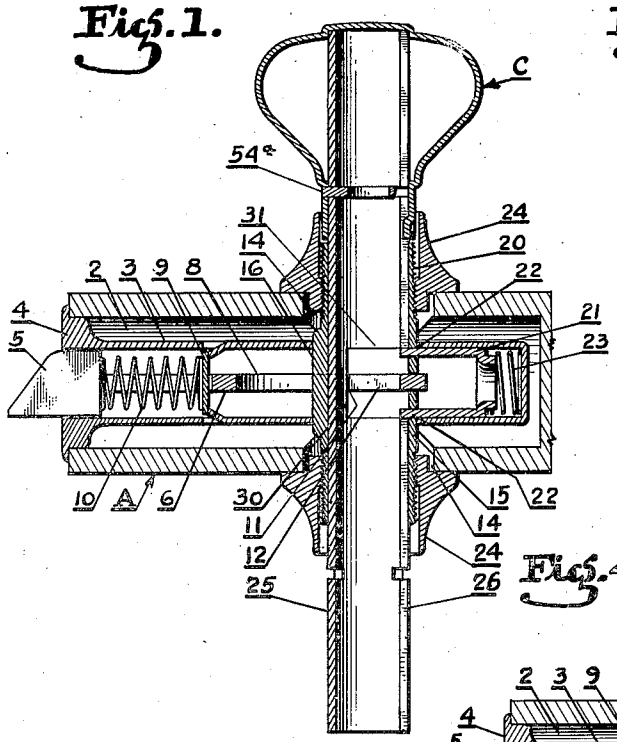


Fig. 5.

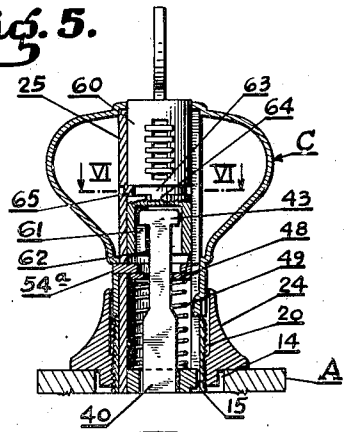


Fig. 4.

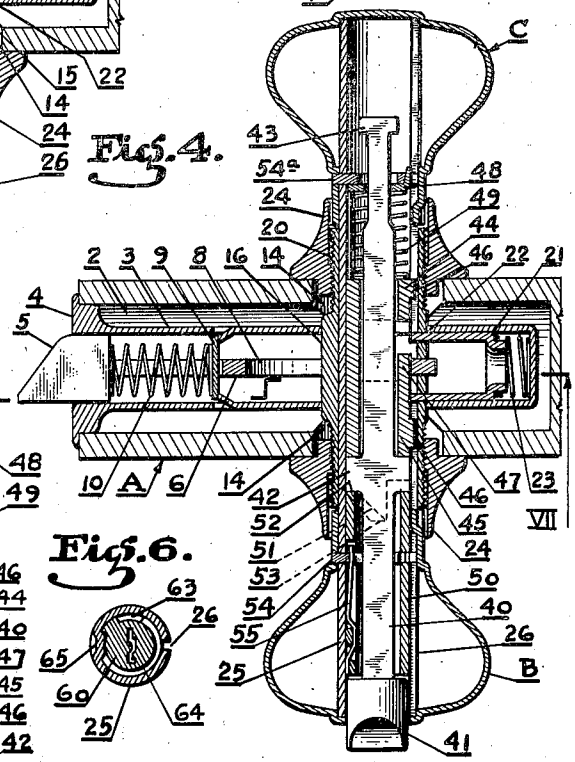


Fig. 2.

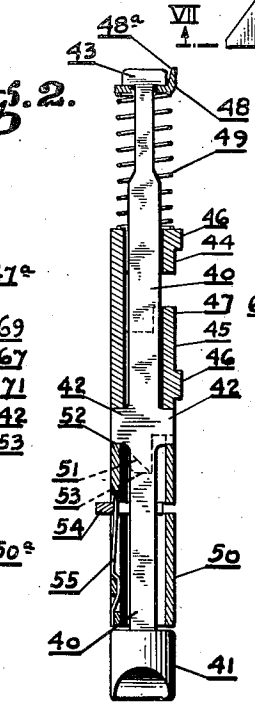
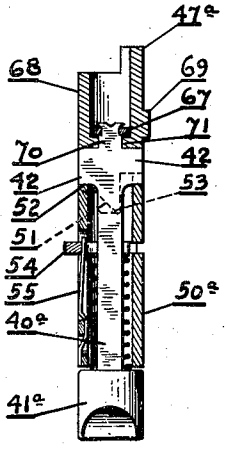


Fig. 6.

Fig. 3.



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DOOR LOCK

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Fig. 8.

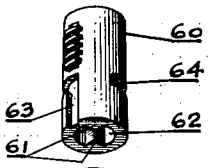


Fig. 7.

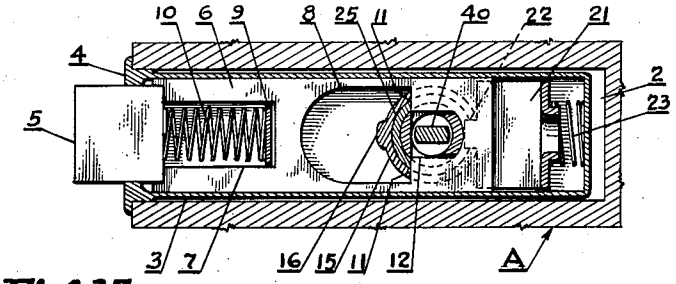


Fig. 9.

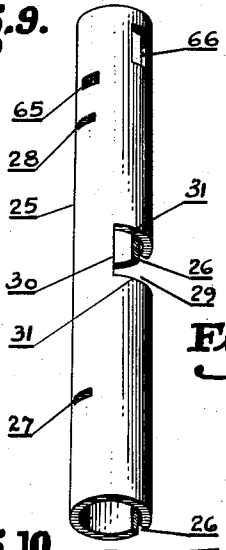


Fig. 15.

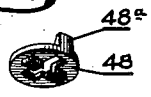


Fig. 21.



Fig. 14.

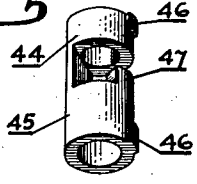


Fig. 16.



Fig. 20.

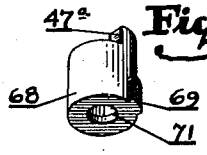


Fig. 10.

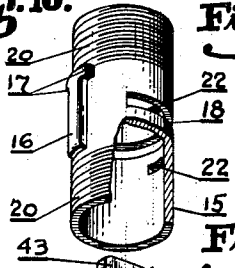


Fig. 13.

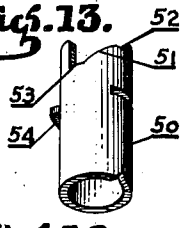


Fig. 19.

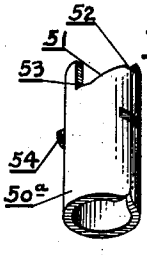


Fig. 17.

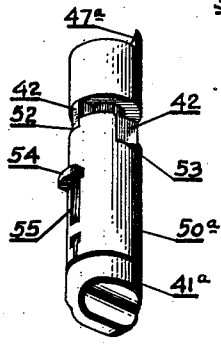


Fig. 12.

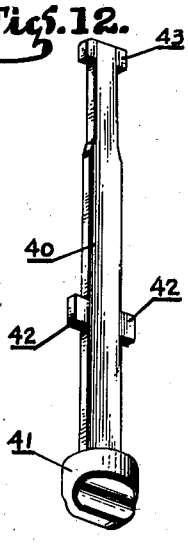


Fig. 11.

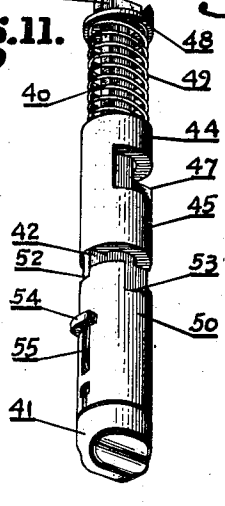
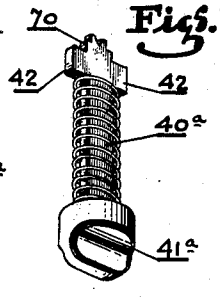


Fig. 18.



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UNITED STATES PATENT OFFICE

2,413,733

DOOR LOCK

Walter R. Schlage, Burlingame, Calif.; Anna Schlage, executrix of said Walter R. Schlage, deceased, assignor to Schlage Lock Company, San Francisco, Calif., a corporation of California

Application December 16, 1944, Serial No. 568,493

16 Claims. (Cl. 70—146)

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This invention relates to door locks, and especially to a novel form of dogging mechanism whereby the knobs and spindle of the lock may be dogged against operation.

The object of the present invention is generally to improve and simplify the construction and assembly of door locks in general; to provide a lock structure, which fundamentally consists of two units, to wit, a latch bolt operating unit and a locking unit; to provide a lock structure which automatically aligns and interlocks both units when being assembled; to provide a lock structure which permits various types of locking functions to be inserted or removed from the latch bolt operating unit, even after the operating unit has been installed on the door; to provide a lock structure in which the locking unit is fully contained and releasably interlocked within a tubular spindle; to provide a lock structure having a single means for releasably interlocking interchangeable locking functions within a tubular spindle; to provide a lock structure having a single means for releasably securing all locking functions and both knobs with the tubular spindle; to provide a lock structure having a locking unit which can be actuated from either end of a tubular spindle and can be released and removed from the inner side of the door; to provide a lock structure having a locking unit which can be actuated from the outer or inner end of a tubular spindle, a key controlled mechanism actuating the locking unit from the outer side of a door and a turn button actuating the locking unit from the inner side, the key controlled mechanism can be removed from the spindle only after the locking unit is released and removed from the spindle.

The invention is shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is a horizontal section of a door showing a lock inserted therein but the dogging mechanism being removed;

Fig. 2 is a longitudinal section of the dogging mechanism;

Fig. 3 shows a modified form of the dogging mechanism;

Fig. 4 is a horizontal section of a door showing the dogging and latching mechanism in section;

Fig. 5 is a section of the outer knob and the key actuated mechanism carried thereby;

Fig. 6 is a cross-section taken on line VI—VI of Fig. 5;

Fig. 7 is a vertical section taken on line VII—VII of Fig. 4;

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Fig. 8 is a perspective view of a key cylinder;

Fig. 9 is a perspective view of the spindle;

Fig. 10 is a perspective view of the spindle housing;

Fig. 11 is a perspective view of the dogging unit;

Fig. 12 is a perspective view of the dogging bar;

Fig. 13 is a perspective view of the cam sleeve;

Fig. 14 is a perspective view of the dogging sleeve;

Fig. 15 is a perspective view of the dogging bar washer;

Fig. 16 is a perspective view of the outer knob catch;

Fig. 17 is a perspective view of a modified form of dogging unit;

Fig. 18 is a perspective view showing a modified form of dogging bar;

Fig. 19 is a perspective view showing the cam sleeve;

Fig. 20 is a perspective view showing the dogging sleeve;

Fig. 21 is a perspective view of the dogging bar washer.

Referring to the drawings in detail, and particularly Figs. 1, 4 and 7, A indicates a portion of a door having an opening 2 formed therein in which is insertable a latch bolt housing generally indicated at 3. Suitably secured on the outer end of said housing is a face plate 4 and slidably mounted in said face plate is a latch bolt 5 on the inner end of which is secured a retractor plate 6. Formed in the retractor plate are two openings, generally indicated at 7 and 8. The opening 7 straddles a cross-bar 9 secured between the side walls of the latch bolt housing, and this bar forms a support for a spring 10 which normally maintains the latch bolt and retractor plate in a projected position. The opening 8 is provided to permit insertion of a spindle housing, hereinafter to be referred to, and to form a pair of shoulders 11—11 between which is formed a slot 12.

Also formed in the door are two openings 14—14 which are disposed at right angles to the opening 2. Insertible through said openings and through similar and aligning openings formed in the side walls of the latch bolt housing is a tubular-shaped spindle housing 15 (see Fig. 10). This housing has a rib 16 and a pair of stop shoulders 17 formed thereon, and it has a cross-slot 18 formed therein midway of its length. Also, its opposite ends are threaded as indicated at 20, and these threaded ends project beyond the opposite faces of the door. The key 16 formed on the

spindle housing enters notches formed in the side walls of the latch bolt housing 3 and thereby secures the spindle housing against rotation with relation to the latch bolt housing when inserted therein. The shoulders 17 engage one side wall of the latch bolt housing, and as such maintain the slot 18 of the spindle housing in exact alignment with the retractor plate 6.

In order that the spindle housing may be inserted, it is necessary that the latch bolt and connected retractor plate be depressed so that the opening 8 formed in the retractor plate aligns with the openings 14—14 formed in the door proper. In this position the spindle housing 15 may be inserted, and when the stop shoulders 17 engage one side wall of the latch bolt housing, it is properly positioned and the latch bolt may be released. When it is released, spring 10 projects it outwardly and the shoulders 11—11 at the rear end of the retractor plate will then enter the slot 18 of the spindle housing.

The spindle housing is secured against endwise removal when inserted in one direction by the shoulders 17, but in addition thereto, it is also secured against removal in either direction by an anchor member generally indicated at 21 which enters slots 22 formed in the spindle housing (see Figs. 1 and 10), said anchor member being held in anchoring position by a spring 23. This anchor member forms no part of the present invention, and as it is fully disclosed and claimed in other co-pending applications, further description thereof is thought unnecessary.

The spindle housing is also secured after engagement by the anchor member by escutcheon plates 24—24 which are internally threaded to engage and screw over the threaded ends 20 of the spindle housing. These plates when screwed up against the opposite faces of the door, clamp the spindle housing in place and rigidly secure it.

The spindle housing serves as a bearing for a spindle generally indicated at 25 (see Figs. 1, 4 and 9). This spindle has a key-way 26 formed in it which extends from end to end. It has two cross-slots formed in it as indicated at 27 and 28, and a center portion is cut away as at 29 to form a roll-back member generally indicated at 30. In order to insert the spindle, the latch bolt and retractor plate must again be depressed or pushed inwardly so that the spindle may be inserted, and when it is inserted, the latch bolt is released, and when released, shoulders 11—11 formed at the inner end of the retractor plate will enter the cut away portion 29 of the spindle and engage the rollback member 30, and it will be secured against endwise removal by the anchor member 21, as the inner ends of the anchor member will engage the shoulders 31 formed by the cut out portion 29.

By applying a pair of knobs to the opposite ends of the spindle as indicated at B and C, a complete door lock is provided. That is, by rotating either knob, spindle 25 will be rotated, and when it is rotated, the rollback member 30 will engage one or another of the shoulders 11 formed on the retractor plate, and thus force the retractor plate together with the latch bolt 5 inwardly, and when either knob is released, reverse rotation will take place, and the latch bolt will be projected due to pressure exerted by the projecting spring 10.

A lock of this character would be perfectly satisfactory for closets or interior doors, but where security is required, a locking mechanism of some kind must be provided. In the present case, this has been done in the form of a self contained

locking or dogging unit. Two forms are shown in Figs. 2 and 3, and these units are interchangeable with each other and with relation to the spindle. In order to make it possible to lock a door of this character, or in other words to render the spindle inoperative so that the latch bolt cannot be retracted, a dogging mechanism has been provided in the present instance which dogs the spindle and knobs against rotation. This dog may be manually operated from the inside and it may be key actuated from the outside. One form of the dogging mechanism and a turn button whereby it may be manually actuated is shown in Figs. 2 and 4 and 11. The dogging mechanism comprises a bar 40 which will hereinafter be referred to as the dogging bar and is in some instances actuated by a key mechanism. The dogging bar is a flat bar. It has a turn button 41 secured at one end, said turn button being journalled in the inner end of the spindle and projecting beyond the face of the inner knob B so that it may be grasped and rotated. A pair of shoulders 42 are formed on the dogging bar substantially midway of its length and on the end of the dogging bar opposite the turn button is a head 43, the function of which will hereinafter be described. Insertible through the inner end of the spindle is a dogging sleeve which consists of two connected parts 44 and 45. These parts are in the form of sleeves and they are spaced apart as clearly shown in Fig. 14. Both of the parts carry keys 46 which project into the key-way of the spindle, and thus secure the sleeve 44 against rotation independently of the spindle. The member 45 carries a dog 47. A washer 48 having an upturned lug 48a engages the head 43 of the dogging bar and a spring 49 interposed between the washer and the sleeve member 44 maintains both sleeves in engagement with the shoulders 42 of the dogging bar. Also carried by the dogging bar is a sleeve 50 (see Figs. 2, 4, 11 and 13) on the inner end of which is formed a cam face 51. This cam terminates in two seats, one indicated at 52 and one at 53. The sleeve also carries a knob catch 54 which is actuated by a spring 55 (see Fig. 2).

When the connected sleeve 44—45 and the sleeve 50 are assembled on the dogging bar together with the spring 49 and washer 48 they comprise a complete assembly which can be inserted or removed from the spindle 25 as a complete unit. This unit is inserted in the spindle at the inner end and the keys on the sleeves 44—45 will enter the key-way 26 formed in the spindle and secure these members against rotation with relation to each other. When the knob catch 54 engages the inner end of the spindle, it is depressed against the action of the spring 55 so that it may enter and engage the inner surface of the spindle. Then by pushing the entire mechanism still further inwardly or to the position shown in Fig. 4, the knob catch will register with the cross-slot 27 and also with a similar slot formed in the shank of the knob B and when it registers with these cross-slots, it will be projected by the spring 55, thus securing the sleeve 50, the dogging bar 40 and the connected sleeves 44 and 45 against removal from the spindle, and at the same time securing the knob B against removal. A somewhat similar knob catch to secure the outer knob C is also disclosed and indicated at 54a. It, however, differs to this extent—that it has an enlarged opening formed therein through which the head 43 of the dogging bar will pass, and a groove 54b

to receive the lug 48*a* of the washer 48 when the dogging unit is fully inserted. Thus when inserting the dogging bar and connected mechanism, the knob catch 54*a* is placed in position as in Fig. 4 and as the head 43 of the dogging bar 40 passes through the central opening in the knob catch 54*a*, the washer 48 with its lug 48*a* will engage the knob catch and the lug 48*a* entering the grooved portion 54*b* and secure the knob catch 54*a* against inward movement, thereby the outer knob 54*a* cannot be released until the dogging unit is released and partly withdrawn from the inner end of the spindle by releasing the inner knob catch 54.

In actual operation it should be realized that the sleeve 50 is held within the spindle 25 both against rotation and longitudinal movement by means of the knob latch 54, and also that the connected sleeve members 44 and 45 have only one movement and that is a longitudinal movement within the spindle as the keys 46 on these members engage the key-way in the spindle. Again it has been stated that the dogging bar and turn button are rotatable in unison, the amount of rotation being approximately a quarter turn. Thus, as a person for instance, enters a bedroom and desires to dog the outer knob and spindle against operation, all that is necessary is to grasp the button 41 and rotate it so that the shoulder 42 on the dogging bar moves along the cam 51 from the seat 53 to the seat 52. In doing so, both the button and the dogging bar move inwardly. During this inward movement, the shoulder on the dogging bar engages the connected sleeve members 44 and 45 and moves them inwardly. In doing so the dog 47 carried by the sleeve member 45 enters the slot 12 formed in the retractor plate between the shoulders 11—11 and thus assumes the position shown at 47 in Figs. 4 and 7. The button and dogging bar will remain in this position as the shoulder 42 seats in the seat 52 and is retained there by the action of spring 49. With the dog assuming the last-named position, it becomes impossible to rotate the outer knob and the spindle as the dog 47 engages one side or the other of the slot 12 when rotation is attempted, it being remembered that the dog is formed on the sleeve member 45 which is keyed to the spindle. To unlock or undog the spindle, it is only necessary to reverse the rotation of the button. Such reverse rotation moves the shoulder 42 of the dogging bar out of engagement with the seat 52 and as it rotates, it moves outwardly on the cam 51 and finally engages the seat 53, this outward movement being caused by pressure of the spring 49. In that position the dog 47 is retracted with relation to the slot 12 and the spindle is thus free to be rotated by either knob and when it is rotated, the rollback member 30 of the spindle will engage one or another of the shoulders 11 and thus cause retraction of the latch bolt.

In Figs. 2, 4 and 12 a long dogging bar 40 is shown. In fact it is so long that the inner end or head 43 projects into the outer knob C. This extra long bar is provided where it is desired to employ a key actuated mechanism to undog the spindle through the outer knob C. In that instance a key cylinder such as shown at 60 in Fig. 8 is placed in the outer knob. Key cylinders of this character are provided with the usual rotatable core which projects beyond the inner end of the key cylinder. Lugs are formed thereon as indicated at 61 and these engage the head 43 of the dogging bar. Thus, by inserting the key

and rotating the core member, rotary motion may be transmitted to the dogging bar and it may thus be rotated to cause the lugs 42 to engage either one or another of the seats 52 or 53, thereby either dogging or undogging the spindle. In place of lugs such as shown at 61, the core may be formed as shown at 62 (see Fig. 8). A slot or key-way 63 is formed in one side of the key cylinder 60 and extends from the inner end of the cylinder to a slot 64 circumferentially formed ¾ around the cylinder 60 as shown on Fig. 8 and near the outer end of the spindle an indent or lug 65 is formed inwardly and of such size and shape to fit the slots 63 and 64 in the cylinder 60. The cylinder is inserted into the outer end of the spindle, using key to retract tumblers, the lug 65 engaging the slot 63 and the cylinder is pushed inward until the lug 65 engages the inner end of slot 64 which is ¾ turn of the cylinder, the key may now be removed allowing the tumblers to enter the slot 66 in the spindle, thus locking the cylinder to the spindle with relation to rotation and removal.

The dogging mechanism as shown in Figs. 2 and 11 is now inserted at the other or inner end of spindle and as previously described with the button in locked position as shown. The head member 43 of the dogging bar enters the core 62 of the cylinder, engaging a pair of shoulders 61, the head member 43 can make ¼ turn in one direction and back, and this rotation is controlled by the dogging mechanism, as described. The cylinder can make a quarter turn with the key. Thus the cylinder is locked against removal after the locking mechanism is completely installed within the spindle and can only be removed when the dogging mechanism is removed from the inner end of the spindle and with the proper keys being inserted in the cylinder to retract the tumblers.

A modified form of the dogging mechanism is shown in Figs. 3, 17 and 20. In this instance the sleeve is shown at 50*a* and is identical to the sleeve shown in Fig. 13. It has the same cam 51 and the same seats 52 and 53 and it also carries the spring actuated knob catch shown in Fig. 4. The same type of turn button is employed and is indicated at 41*a*. A dogging bar 40*a* is secured to the button and it has the same type of shoulders 42, but terminates just beyond the shoulders into a washer as shown as at 67. A sleeve member 68 is employed as shown in Fig. 20 and has a key 69 which secures it against rotation with relation to the spindle. The forward end of the sleeve has a dog 47*a* identical to the one shown in Figs. 2, 11 and 14. The parts are assembled as shown in Figs. 3 and 17, the dogging bar 40*a* being rotatable with relation to the sleeve 68 due to the head member 70 projecting into the sleeve 68 having shoulder hole 71 and the washer 67 secured to the bar 40*a*, thus the bar 40*a* is rotatable with relation to the sleeve 68. Thus, when the button and turn bar is turned in one direction, the shoulders 42 will follow the cam 51 from one seat to the other and it will thus either project the dog 47*a* into the slot 12 of the retractor plate or retract it. This shorter form of key bar and connected sleeve and dog is employed where there is no intention of converting or adapting the lock for key operation. While this and other features of my invention have been more or less specifically described and illustrated, I nevertheless wish it understood that changes may be resorted to within the scope of the appended claims, and that the materials

and finish of the parts employed may be varied in accordance with judgment and experience of the manufacturer, or as varying conditions or use may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a lock, a housing, a latch bolt carried by the housing, a tubular rotatable spindle in the housing whereby the latch bolt is actuated, a removable dogging mechanism insertible in the tubular spindle, a dog actuated by the dogging mechanism for rendering the spindle inoperative to actuate the latch bolt, and depressible means carried by the dogging mechanism which automatically interlocks with the spindle during insertion and thereby secures the dogging mechanism against removal.

2. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journalled in the housing adapted to operate the latch bolt, a dogging mechanism for rendering the spindle inoperative, and depressible means carried by said dogging mechanism for automatically interlocking with the spindle while being inserted.

3. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journalled in the housing and adapted to operate the latch bolt, a dogging mechanism for rendering the latch bolt inoperative and adapted to be secured within the spindle, and spring actuated means carried by said dogging mechanism for automatically interlocking with the spindle during insertion.

4. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journalled in the housing and adapted to operate the latch bolt, a turn button actuated dogging mechanism insertible in the spindle for rendering the spindle inoperative, and means carried by said dogging mechanism for automatically forming an interlocking connection with the spindle, when inserted.

5. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journalled in the housing and adapted to operate the latch bolt, a dogging mechanism insertible in the spindle, and a depressible latch carried by the dogging mechanism adapted to interlock with the spindle, when inserted.

6. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journalled in the housing and adapted to operate the latch bolt, and means insertible in the spindle for rendering the spindle inoperative, said means also adapted to form a releasable resilient interlocking connection with the spindle when it is inserted.

7. In a lock, a latch bolt, a rotatable tubular spindle for operating the latch bolt, a key operated mechanism insertible in one end of the tubular spindle, a turn button operated mechanism insertible in the other end of the spindle and means carried by the turn button mechanism whereby both mechanisms are secured in the spindle against removal.

8. In a lock, a latch bolt, a tubular spindle for operating the latch-bolt, a locking mechanism insertible and releasably mounted in one end of the spindle, a dogging mechanism insertible and releasably mounted in the other end of the spindle, and means for rendering the locking mechanism non-releasable from the spindle, when the dogging mechanism is inserted.

9. In a lock, a latch bolt, a tubular spindle for operating the latch bolt, a key operated mechanism insertible and releasably mounted in one end of the spindle, a turn button operated mechanism insertible and releasably mounted in the other end of the spindle, and means for rendering the key operated mechanism non-releasable from the spindle when the turn button operated mechanism is inserted.

10. In a lock, a tubular spindle, an outer and an inner knob on the spindle to rotate the spindle, a dogging mechanism insertible in the spindle for dogging the spindle against operation, means for securing the dogging mechanism within the spindle, and means actuated by the dogging mechanism for securing the outer knob against endwise removal from the spindle.

11. In a lock, a tubular spindle, an inner and an outer knob attached to the spindle, a dogging mechanism within the spindle to render the spindle inoperative, means actuated by the dogging mechanism for securing the outer knob against removal, and a common means carried by the dogging mechanism to secure the inner knob and the dogging mechanism against removal from the spindle.

12. In a lock, a housing, a latch bolt and a connected retractor mounted in the housing, a tubular spindle rotatable in the housing and having a rollback member engageable with the retractor, a turn button insertible in one end of the spindle, a dogging mechanism also insertible in the spindle and longitudinally movable to dog the spindle against rotation, means actuated by the turn button for controlling the position of the dogging member, and a depressible member carried by the dogging mechanism for securing the dogging mechanism and the turn button against removal from the spindle.

13. In a lock, a housing, a latch bolt and a connected retractor mounted in the housing, a tubular spindle rotatable in the housing and having a rollback member engageable with the retractor, a turn button insertible in one end of the spindle, a dogging mechanism also insertible in the spindle and longitudinally movable to dog the spindle against rotation, means actuated by the turn button for controlling the position of the dogging member, an inner and an outer knob on the spindle, and a common means carried by the dogging mechanism for securing the inner knob the turn button and the dogging mechanism against removal from the spindle.

14. In a lock, a housing, a latch bolt and a connected retractor mounted in the housing, a tubular spindle rotatable in the housing and having a rollback member engageable with the retractor, a turn button insertible in one end of the spindle, a dogging mechanism also insertible in the spindle and longitudinally movable to dog the spindle against rotation, means actuated by the turn button for controlling the position of the dogging member, an inner and an outer knob on the spindle, a common means carried by the dogging mechanism for securing the inner knob, the turn button and the dogging mechanism against removal from the spindle, and means actuated by the dogging mechanism for securing the outer knob against removal from the spindle.

15. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journaled in the housing and having a rollback member formed thereon to operate the latch bolt, an inner and an outer knob on the spindle to rotate the same, a dogging mechanism inserted in the spindle and adapted to render

the spindle inoperative, and depressible means carried by said dogging mechanism for securing the inner knob and the dogging mechanism against removal from the spindle.

16. In a lock, a housing, a latch bolt slidably mounted in the housing, a rotatable tubular spindle journaled in the housing and having a rollback member formed thereon to operate the latch bolt, an inner and an outer knob on the

spindle to rotate the same, a dogging mechanism inserted in the spindle and adapted to render the spindle inoperative, depressible means carried by said dogging mechanism for securing the inner knob and the dogging mechanism against removal from the spindle, and means actuated by the dogging mechanism for securing the outer knob against removal.

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