Feb. 28, 1956 F. J. RUSSELL 2,736,597

TAIL STRUCTURE FOR DOOR LOCKS

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Fig. 1.

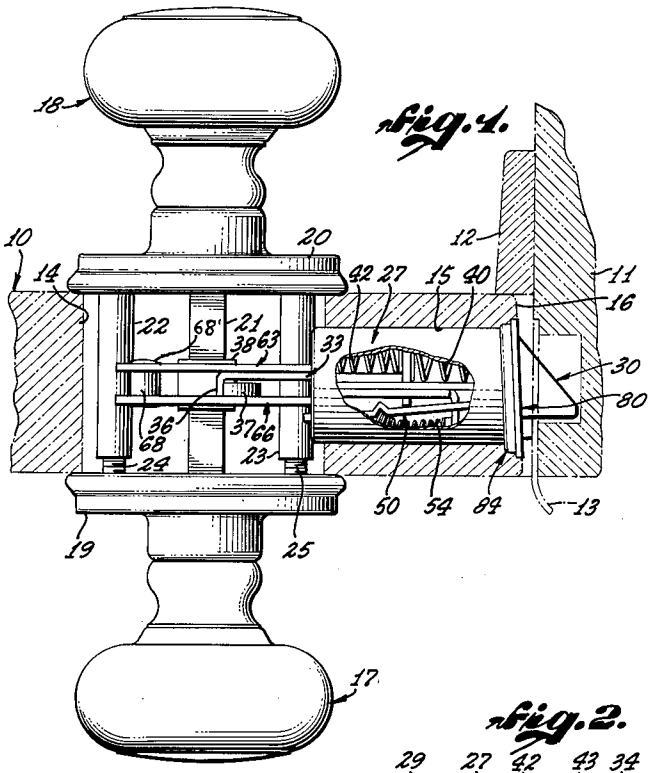


Fig. 4.

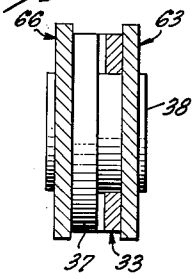


Fig. 2.

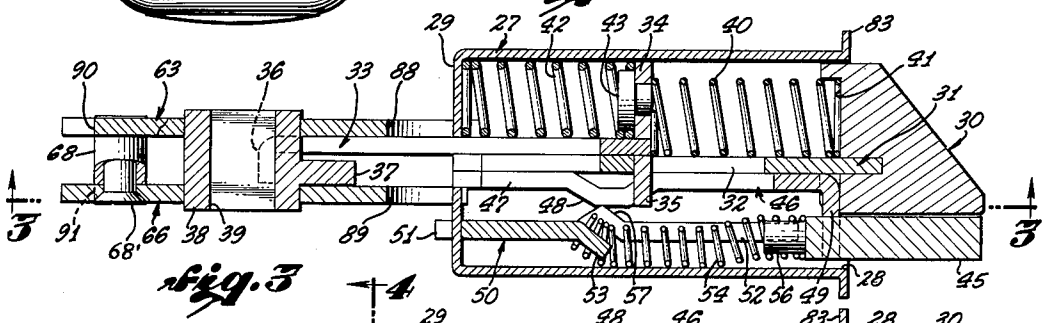
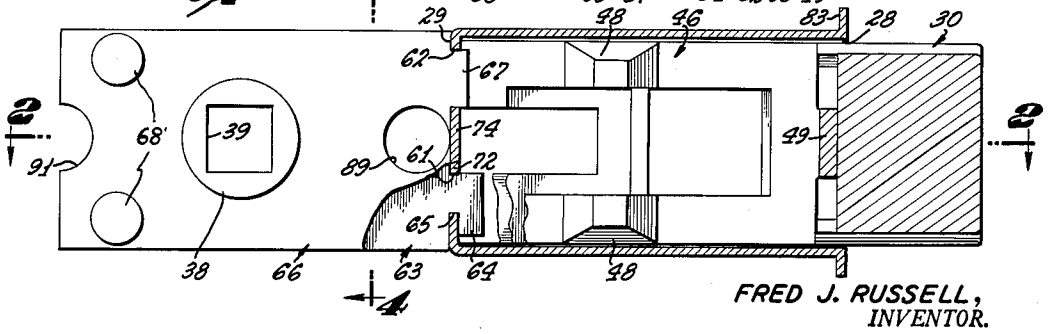


Fig. 3



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Filed June 1, 1954 2 Sheets-Sheet 2

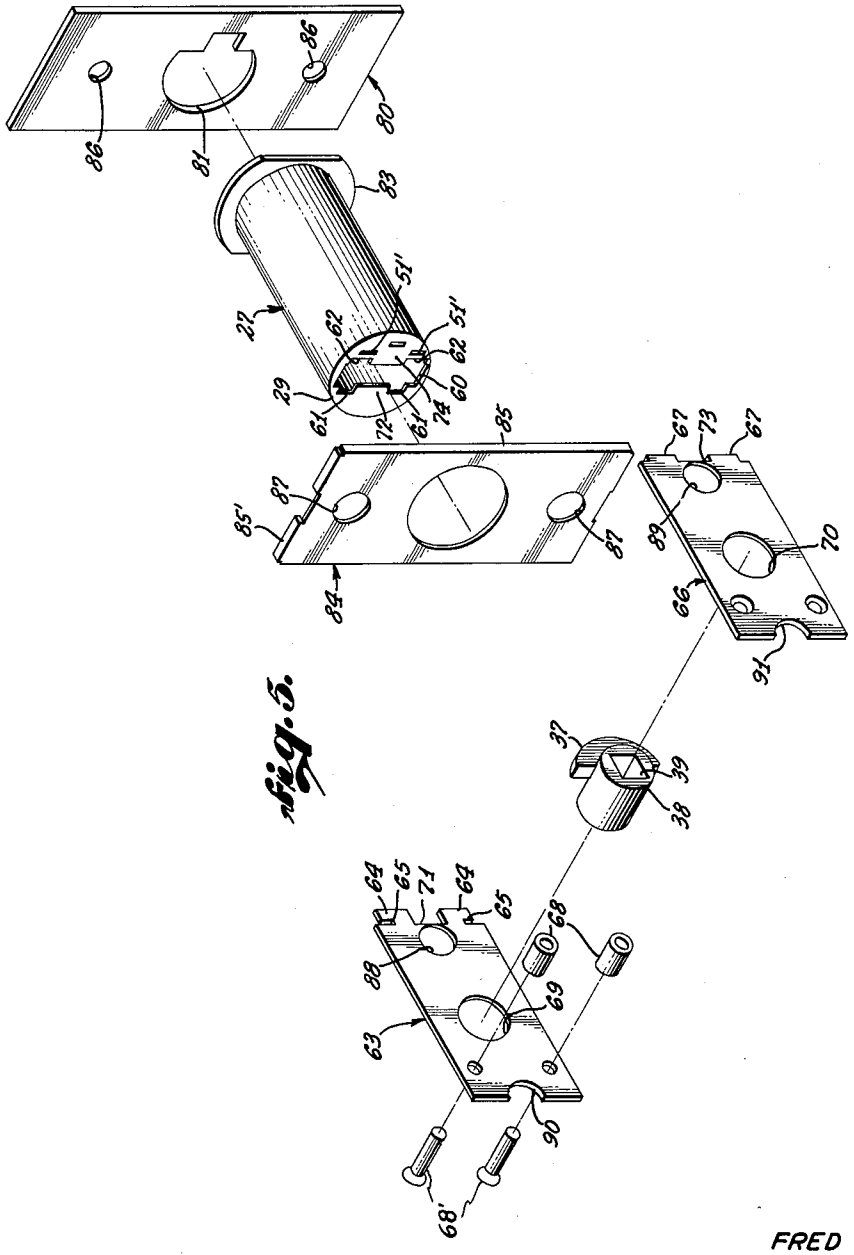


Fig. 5.

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TAIL STRUCTURE FOR DOOR LOCKS

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Application June 1, 1954, Serial No. 433,413

4 Claims. (Cl. 292—337)

The invention relates to door locks and has particular reference to the construction of a housing or casing whereby a hollow portion of the casing housing certain reciprocating parts is coupled with an extension or tail assembly somewhat flexibly joined to the hollow portion and so arranged that the combined parts can be fitted into a door for cooperation with the spindle and actuating assemblies such as the knobs.

In the design and construction of lock hardware, the trend has been very steadily toward the production of cylinder locks and tubular lock mechanisms in the interest of making lock mechanisms more compact and smaller in their over-all size, thereby to improve the ease with which the lock structures can be installed in a door. In reducing the size of the package, that is to say, in reducing the over-all size of the structure containing the working parts, various parts, various problems have been encountered among which are those which heretofore have required rather careful and accurate machining of relatively small parts. Because of innovations necessary in the designs tending to make possible reception of all of the working parts in small housings and casings, parts of odd sizes have been contrived and the oddness of the sizes has been such as to require a relatively large number of special castings ultimately requiring an unnecessarily large number of machine operations to finish the castings in such fashion that they can be effectively used. Relatively little attention has been given heretofore to the design of compact lock mechanisms which can be constructed to a very large extent from stock raw materials formed by a few simple steps into the lock mechanism. The result has been that even by use of smaller and more simple mechanisms occupying less space than heretofore, the designs have required so much in the way of extra operations that such lock mechanisms still are unnecessarily costly. Many, moreover, have been so requisite of accurate machining and precise operation as to preclude their being installed in great numbers. With others, installations are often objectionable because of the device being not satisfactorily operable after installation due largely to a lack of sufficient attention to a necessary precision installation on the part of the installing carpenter or mechanic.

It is therefore among the objects of the invention to provide a new and improved lock structure which is simple in its design, easy to assemble, and which after assembly is sufficiently flexible to permit ready installation in a door without impairment to its operating effectiveness even though installed without the employment of special skill.

Another object of the invention is to provide a new and improved lock structure wherein the parts ordinarily comprising the casing are so designed that only a small proportion of the lock mechanism need be housed within a hollow container thereby making it possible to keep the hollow container as small as possible and substituting an extension on the container joined to the container by a somewhat flexible connection whereby the container

may be mounted in a door in such fashion as to be indexed in position through the extension by connection with the operating assembly, usually constituting a spindle and suitable knobs.

Still another object of the invention is to provide a new and improved lock structure wherein a hollow casing or housing is joined by a somewhat loose flexible connection to a tail structure constructed of relatively flat pieces which can be assembled with the housing or casing by a simple interlocking operation.

Still another object of the invention is to provide a new and improved lock structure which is particularly inexpensive in that it can be readily constructed of stock raw materials needing no more than simple machine operations to enable them to serve as elements in the general assembly of parts.

Still further among the objects of the invention is to provide a new and improved lock structure wherein there is a certain limited flexibility in joining a hollow casing or housing to a tail structure facilitating ready installation in the field and which at the same time makes possible the construction of the lock mechanism by use of a relatively small quantity of material but without impairing the effectiveness of the device when assembled and installed.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a horizontal view showing the device installed in a door with a portion of the casing broken away to show the interior parts.

Figure 2 is a horizontal sectional view of the casing and tail piece portions accompanied by the requisite operating parts with the spindle removed.

Figure 3 is an elevational view partially in section taken on the line 3—3 of Figure 2.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 2.

Figure 5 is an exploded view of the casing and tail structure parts.

In order that the effectiveness of the casing and tail structure portions of the device be understood and appreciated, Figure 1 has been chosen for the purpose of illustrating the relationship of those parts with the usual portions of a lock structure when assembled in a door **10**. The door is shown in Figure 1 mounted so that it assumes a closed position with respect to a frame **11**, jamb **12**, and strike plate **13**. The door is shown provided with a hole **14** extending through the door from one side to the other and a bore **15** extending edgewise through the door from an outside edge **16** into communication with the hole **14**.

There is further shown an outer operating assembly **17** and an inner operating assembly **18**, these assemblies including mounting plates **19** and **20** and a spindle **21** extending between the operating assemblies. Posts **22** and **23** together with screws **24** and **25** enable the operating assemblies to be mounted in proper operating relationship in the hole **14**.

The latch mechanism or latch bolt assembly comprises a substantially cylindrical housing **27** having an open outer end **28** and an inner end wall **29**. A latch bolt head **30** has a latch bolt shaft **31** secured thereto. The latch bolt shaft is in the form of a flat plate extending inwardly and having at its inner end a rectangular opening **32**.

Cooperating with the latch bolt shaft is an actuator plate **33** likewise flat and having at the end within the

housing 27 a transverse platform 34, one end 35 of which extends through the opening 32 and is adapted to hook over the adjacent side of the opening 32.

At its innermost end the actuator plate terminates in transversely extending shoulders 36 against which ends of a cam 37 are adapted to be pressed for withdrawing the latch bolt head 30 inwardly into the housing. The cam is mounted upon a hub 38 which has a square aperture 39 extending therethrough for reception of the spindle 21 which is also square. Further details of this portion of the mechanism are illustrated and described in my copending application Serial No. 437,605, filed June 18, 1954.

For normally urging the latch bolt head 30 outwardly to the positions illustrated in Figures 1, 2 and 3, there is provided a spring 40 bearing at one end upon the platform 34 and at the other end upon an inside face 41 of the latch bolt 30.

A separate spring 42 somewhat heavier and supplying a greater tension is biased between the inside face of the inner end wall 29 and the oppositely disposed face of the platform 34 confined in proper position by a springkeeper 43.

In the particular embodiment chosen for the purpose of illustration, the lock mechanism is shown coupled with a dead bolt mechanism featuring a dead bolt head 45 joined to a dead bolt shaft 46. The dead bolt shaft, here shown as a flat element, has an inner end terminating in legs 47 having raised portions 48 thereon. At its outer end the dead bolt shaft 46 has wings 49 which engage in suitable slots in the dead bolt head 45 thereby to attach the dead bolt shaft to the dead bolt head.

A dead bolt blocker 50 constructed of flat material has lugs 51 at its inner end extending through suitable apertures 51' in the inner end wall. The dead bolt may be bifurcated at its outwardly extending end providing arms 52 between which is a springkeeper 53 and a blocker spring 54 secured at one end by the keeper 53 and at the other end by a keeper 56, the last keeper being on the inner end of the dead bolt head 45. It will be noted that the blocker has a raised portion 57 which, in the relationship of parts illustrated in Figure 2, bears against the raised portion 48 of the dead bolt shaft 46.

The inner end wall, as best seen in Figure 5, is provided with a somewhat diametrically extending slot 60 extending from one side to the other. On one side of the slot 60 are notches 61 communicating with the slot 60, two being shown in the selected form. On the other side are notches 62 also communicating with the slot 60, the notches 62 being somewhat longer than the notches 61.

Two tail plates are provided for engagement in the notches. One tail plate 63 has hooked lugs 64 at one end providing recesses 65. The hooked lugs 64 are designed to be inserted into the slot 60 and then moved sidewise so that the small portions of the hooked lugs 64 are forced into the notches 61, the recesses 65 thereby receiving outer ends of the notches 61 so that there is a hooked-over relationship.

A second tail plate 66 has lugs 67 approximately of the same length as the length of the notches 62 so as to be readily received therein. When the tail plates are positioned with the respective lugs received in the respective notches provided for them, there will be a substantial space between the tail plates. This space is sufficient to provide room for the thickness of the actuator plate 33 and also the latch bolt shaft 31 and the legs 47 of the dead bolt shaft. Interposition of these parts between the tail plates 63 and 66 serves to hold the tail plates spread apart and in engagement with the notches. The space between the tail plates is also sufficient to accommodate the cam 37.

Once assembled the tail plates are anchored securely in position by use of rivets 68' and collars 68, as illustrated in Figure 2. Centrally disposed holes 69 in the

tail plate 63 and 70 in the tail plate 66 provide a bearing space for rotation of the hub 38. A recess 71 between lugs 64 is adapted to receive a section 72 lying between the notches 61 of the inner end wall. Similarly a recess 73 is adapted to receive the section 74 lying between the notches 62.

To complete the assembly there is provided a face plate 80 having an irregular aperture 81 adapted to receive together the latch bolt head 30 and dead bolt head 45. The face plate 80 is adapted to overlie a flange 83 at the outer end of the housing and is secured to the flange by means of an anchor plate 84. The anchor plate may be provided with outwardly turned edges or flanges 85, 85' so as to overlie appropriate edges of the face plate.

In assembling the device it is preferable to affix the face plate and anchor plate, retaining them by some appropriate screw or bolt extending through holes 86 and 87 before the tail plates are mounted in position. When the entire structure is mounted in the door 10, the plates last described overlie the outside edge of the door indicated by the reference character 16 and can be secured by suitable screws extending through the holes 86, 87.

When in assembled condition with the tail plates positioned as described, there remains a certain flexibility between the tail plate structure or assembly and the housing 27. The looseness is deliberate and is provided not only by a somewhat general clearance between parts normally designed to engage each other, but also by reason of the fact that the tail plate structure is attached to the housing merely by hooking over the lugs 64 on the appropriate portion of the inner end wall, it being appreciated that the lugs 67 are merely positioning lugs and are not hooked to the inner end wall. This slight flexibility or jointing of the two parts thus described permits easy insertion of the casing and tail plate assembly in a door and admits of free and easy operation of the latch bolt by rotation of the spindle even though the alignment of parts may not be perfect.

Indexing of the actuator assemblies with respect to the casing is effected by the provision of post holes 88 and 89 respectively in the tail plates 63 and 66 at one end and post recesses 90 and 91 on the same respective tail plates at the opposite ends.

It will further be appreciated that by confining the hollow portion of the device exemplified by the housing 27 to a cylindrical housing no longer than one necessary to confine the springs and moving parts of the latch bolt shaft and dead bolt shaft, the structure is considerably simplified and rendered more inexpensive, especially where the tail plate structure is constructed initially of sheet metal parts or sheet metal strips initially perfectly flat and merely punched out where needed to form interengaging elements and bent if needed so as to supply elements such as the platform 34 and raised portions 48 and 57. The simplified structure thus provided admits of a particularly low initial material cost as well as a low assembly cost, both of which contribute materially to the acceptability of the structure in company with the over-all design which admits of easy and rapid installation in a door.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my 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 my invention, what I claim as new and desire to secure by Letters Patent is:

1. A latch construction comprising a substantially cylindrical casing having an inner end wall, an actuator plate adapted for engagement with a latch bolt shaft, said end wall having a slot therein having a width providing a sliding fit for said actuator plate and said plate extending

through said slot, and a tail member on said housing comprising tail plates mounted in parallel spaced relation on said end wall and extending outwardly therefrom and having said actuator plate therebetween, said end wall having notches on the sides of the slot having a depth substantially equal to the thickness of the respective tail plate, one of said tail plates having straight lug means in engagement with the notches on one side, the other of said tail plates having a hooked lug means in engagement with notches on the other side and hooked over the inner face of said end wall, said actuator plate comprising a separator for said tail plates whereby to retain said plates extended laterally into the respective notches, and means connecting outer ends of the tail plates in spaced relation.

2. In a latch construction a latch bolt assembly comprising a housing including an inner end wall having a slot therein for reception of a latch bolt actuator plate the combination of a tail member on said housing comprising separate tail plates mounted in parallel spaced relation on said end wall and extending outwardly therefrom and having an actuator plate receiving space therebetween, said end wall having engaging means on opposite sides of the slot, one of said tail plates having means in a position of engagement with the inner face of said end wall and in a position of relatively loose engagement with the engaging means of said end wall permissive of a limited angular movement between the tail plates and the end wall, and means connecting outer ends of the tail plates in spaced relation.

3. In a latch construction including an actuator plate therefor, a substantially cylindrical housing having an inner end wall, and said end wall having a slot therein adapted to slidably receive said actuator plate, the combination of a separate tail member comprising tail plates mounted in parallel spaced relation on said end wall and extending outwardly therefrom and having said actuator plate therebetween, said end wall having notches on the sides of the slot, one of said tail plates having straight

lug means in engagement with the notched portion of the end wall, the other of said tail plates having hooked lug means in a position of engagement with the notches of the end wall and hooked over the inner face of said end wall, said lug means and notches having a clearance where engagement is effected permissive of a limited angular movement therebetween, and means connecting outer ends of the tail plates in spaced relation.

4. A latch construction comprising a substantially cylindrical casing having an inner end wall, said end wall having a slot therein and an actuator plate having a sliding fit with and extending through said slot, a separate independently constituted tail member on said housing comprising a pair of tail plates loosely mounted in parallel spaced relation on said end wall and extending outwardly therefrom and having said actuator plate therebetween, said end wall having a pair of notches on each side of the slot, one of said tail plates having a pair of straight lugs in a position of engagement with one of said pairs of notches, the other of said tail plates having a pair of hooked lugs in a position of engagement with the other of said pairs of notches and hooked over the inner face of said end wall, said tail plates and notches having a clearance where engagement is effected permissive of limited angular movement therebetween, said actuator plate being located between and slidably relative to said tail plates whereby to prevent removal of the tail plates from the respective notches while the actuator plate is in position, and means connecting outer ends of the tail plates in spaced relation.

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