March 20, 1956 F. J. RUSSELL 2,739,004

SELF-ALIGNING LOCK STRUCTURE

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Fig. 1.

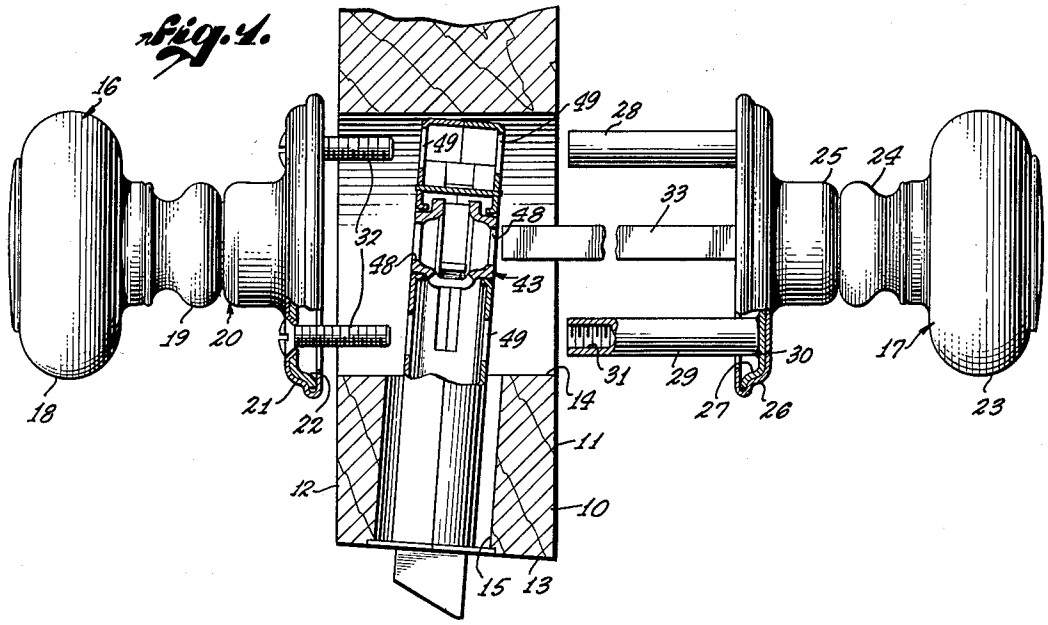
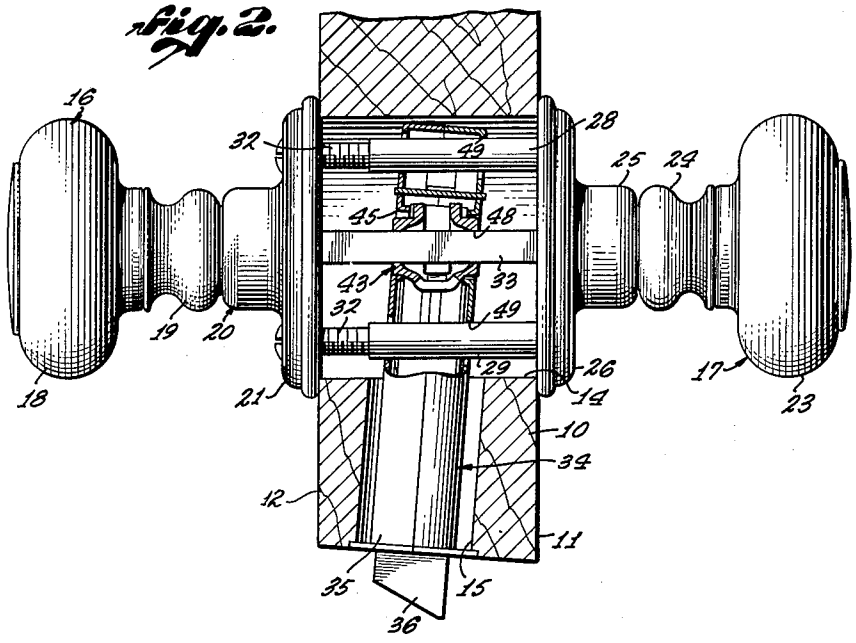


Fig. 2.



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Fig. 3.

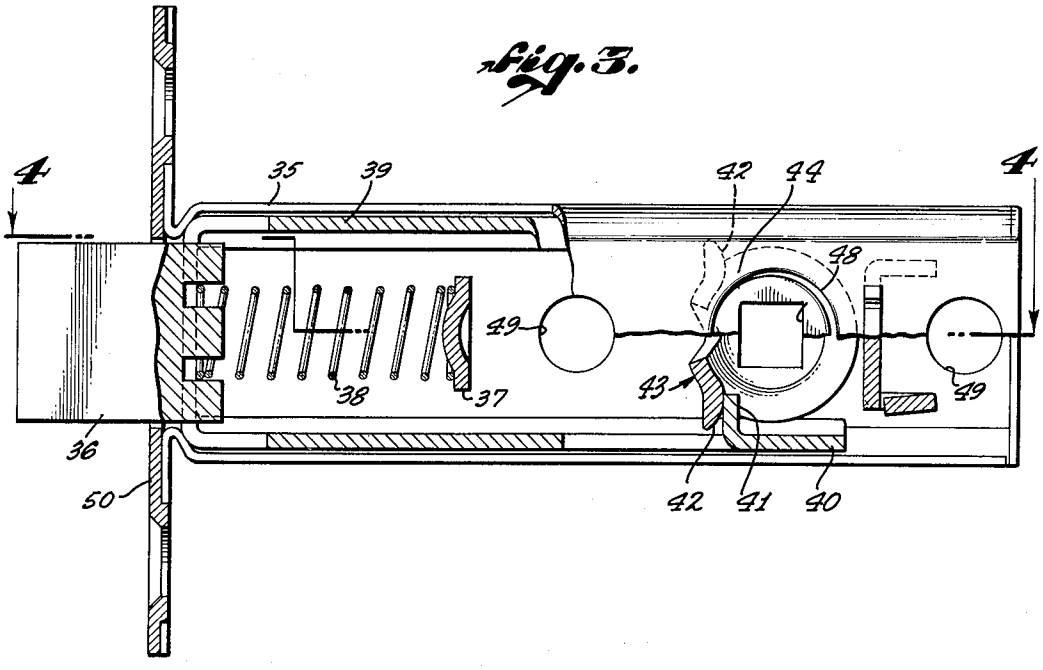
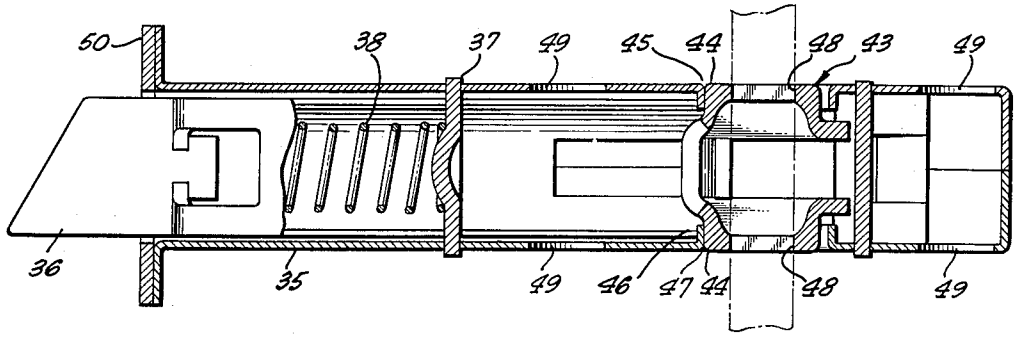


Fig. 4.



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SELF-ALIGNING LOCK STRUCTURE

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Application January 15, 1953, Serial No. 331,409

2 Claims. (Cl. 292—337)

The invention relates to door locks and has particular reference to what are commonly designated tubular locks, namely, locks differing from the old conventional locks in that the latch is confined in a tubular body which can be installed in a single round hole of proper depth in the edge of a door, the hole intersecting a clearance side hole or holes which permit operative engagement between handles and latch.

In lock units of this kind considerable difficulty has been experienced in the past in achieving a uniformly correct alignment. The modern trend in carpentry and building mechanics is to install lock hardware as quickly and inexpensively as possible, this being partly the result of exceptionally high wages in the building trades and partly the result of insufficient training and experience of the installers. Although tubular locks of the kind herein referred to have been engineered and designed to present a unitary and uniform construction particularly well adapted to quick and accurate installation as well as installations having considerable neatness of appearance, nevertheless they have the usual defects of devices having mechanically moving parts which must be put together to work properly in that the moving parts must be in proper alignment. In devices of this kind, furthermore, alignment depends to a certain extent upon the millwork in which the devices are installed. Where the millwork is inaccurate or where surfaces are not in precise right angular alignment, unskilled workmen are prone to bore holes for the installation following the misalignment of the millwork and this very commonly results in a misalignment of the moving parts when they are installed. This is particularly true in cases where holes cut in the millwork determine the position of the moving parts.

Since it is on many occasions extremely difficult to properly align holes in the millwork or to realign holes which have been initially improperly positioned, hardware which can suffer a certain amount of misalignment without impairing the smoothness of its operation is highly advantageous.

It is therefore among the objects of the invention to provide a new and improved self-aligning hardware set, such as a lock set, which will operate smoothly and efficiently even though misaligned to a considerable degree when installed in a door or other appropriate building structure.

Another object of the invention is to provide a new and improved lock set which in addition to post indexing, as that practice has been employed, is also built so that the spindle will be properly indexed with the latch mechanism in all positions of misalignment of the parts which might be permitted by the post indexing.

Still another object of the invention is to provide a new and improved lock set wherein a hub in the latch unit is mounted with a sufficient degree of flexibility permitting the axis of the spindle aperture through the bushing to be cocked to a considerable degree with respect to the line of action of the latch bolt, thereby to accommodate the latch unit to the spindle even though the latch unit may be a considerable number of degrees off a ninety-degree attitude with respect to the spindle axis.

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 transverse sectional view through a door installation showing the lock parts in position occupied just prior to assembly with the latch unit shown in misalignment.

Figure 2 is a view similar to Figure 1 with the lock parts aligned and assembled in the millwork.

Figure 3 is a vertical longitudinal view partially in section showing the interior portions of the latch unit and the mounting of a hub for reception of a spindle.

Figure 4 is a horizontal longitudinal sectional view taken on the line 4—4 of Figure 3.

As illustrated in Figures 1 and 2 there is shown a section of millwork which may be described as a door **10** having opposite faces **11** and **12** parallel to each other but having an end edge **13** bevelled as is frequently done so that the end edge is at an angle other than one of 90 degrees to the faces **11** and **12**.

A transverse opening **14** extends through the door between the faces **11** and **12**, presumably at right angles to the plane of those surfaces. A latch hole **15** extends inwardly from the end edge **13** to join the opening **14**. In the example shown the axis of the latch hole is shown normal or perpendicular to the bevelled end edge **13** in which circumstance it is misaligned with respect to the axis of the opening **14**, the misalignment being exaggerated in Figures 1 and 2 for purposes of illustration.

The lock hardware herein made reference to consists of a knob or operating assembly **16** adapted to engage the face **12** of the door and a somewhat similar knob or operating assembly **17** adapted to engage the opposite face **11** of the door. Although details of the knob assemblies are of secondary importance, the assembly **16** may be described as comprising a knob **18** attached to a shank **19** which in turn is rotatably mounted upon a collar **20** of a rose **21**. A rose insert **22** lies beneath and strengthens the rose **21**.

Similarly the knob assembly **17** comprises a knob **23** having a shank **24**, the knob and shank being rotatably mounted upon a collar **25** of a rose **26** which in turn is reinforced and strengthened by a rose insert **27**.

Attached to the rose insert **27** is a pair of posts **28** and **29**, these being secured by welding or similar means **30** to the rose insert. Both of the posts have an interior threaded bore **31**. The interior threaded bore is adapted to receive a corresponding screw **32** which extends through an appropriate hole in the rose **21** and rose insert **22**. A spindle **33**, preferably non-circular and here shown square in cross-section, is non-rotatably mounted in the knob **23**. The spindle is adapted to be received non-rotatably in the knob **18** when the parts of the lock are assembled, as illustrated in Figure 2.

In the type of lock herein described the latch bolt is mounted in a latch unit **34**; that is to say, the latch bolt and operating parts are all contained within a two-part shell **35** which is preferably secured in assembled position so as to function as a unit.

The latch unit, as seen to good advantage in Figures 3 and 4, includes a latch bolt **36** which is adapted to reciprocate back and forth within the shell **35**. In the particular construction chosen for the purpose of illus-

tration a spacer 37 provides a bottom support for a spring 38 positioned normally to urge the latch bolt outwardly. The latch bolt in turn has secured thereto a slide 39 surrounding the spring 38 and extending from right to left, as viewed in Figure 3, to a position such that an inner end 40 of the slide lies adjacent the spindle 33. The inner end 40 has an inwardly bent shoulder 41 on each side located in a position where it can be moved by means of a cam 42. For smoothness of operation two shoulders are provided operated by respective cams 42 so that no matter which way the spindle 33 may be rotated the bolt 36 will be withdrawn to an unlatched position.

A hub 43 forms an operating element of the latch and is the element of which cams 42 are a part to the extent that rotation of the hub 43 causes one or another of the cams 42 to be moved against the respective shoulder 41. The hub 43 has a bush portion 44 on each side thereof. To receive the bush portions 44 the shell 35 is provided with inwardly bent flanges 46, one on each side, forming an aperture 47. It will be noted that the diameter of the inside wall of each flange 46 forming the respective aperture 47 is substantially greater than the outermost diameter of the bush portion 44 at the largest porion. The difference in diameters provides what may be designated in the trade as a loose or sloppy fit of the hub in the apertures. This fit permits considerable angular deflection of the hub with respect to the shell.

Extending through each bush portion is a square hole 48 sized to admit the square spindle 33 with a smooth, loose, sliding fit. It should be noted further that not only can the hub tilt to a considerable extent angularly, but it can also shift bodily in a lateral direction for a limited distance toward one side or the other as viewed either in Figure 3 or Figure 4.

In the installation of the device herein described it is important to consider that post holes 49 in the shell 35 of the latch unit are considerably greater in diameter than the exterior diameter of the posts 28 and 29 which are adapted to be inserted through the post holes. When this relationship is established, the parts of the lock unit may be assembled even though they are in a misalignment somewhat like that illustrated in Figure 1. There is sufficient tolerance or clearance between the post holes 49 and the posts 28 and 29 to permit the screws 32 to find their way into the threaded bores 31 without necessitating the shell being mounted with its axis precisely at right angles to the axes of the posts and screws. The permissive misalignment is suggested in the assembled condition of Figure 2.

It is not sufficient, however, to provide only for post indexing as suggested by the permitted misalignment of the posts with the post holes and consequently the axis of the knobs with the axis of movement of the latch bolt 36. Since movement within the latch unit must be free and easy, it is necessary further that the hub which carries the cams 42 also be capable of misalignment without binding operation of the bolt 36 and its attached slide 39. It is for this reason that the bush portions 44 are adapted to tilt and shift freely to a limited extent within the rounded aperture 47. With the hub permitted this latitude of movement and angular shift, the spindle 35 can be inserted through the square holes 48 of the hub, thereby to throw the axis of the hub into alignment with the axis of the spindle and out of alignment with the axis of action of the bolt 36 and slide 39. Because of the fact that there is merely surface contact between the cams 42 and the respective shoulders 41, tilting the hub out of alignment to align it with the spindle 33 still permits freedom of action of the cams on the shoulders and will in no wise bind movement of the slide 39. Hence even though the latch hole 15 may be cut or bored considerably out of alignment necessitating mounting of the latch unit out of alignment when an

end plate 50 is fastened to the end edge 13, nevertheless the latch continues to operate smoothly.

There has accordingly been described herein a latch construction following conventional lines but in which by a new arrangement and association of parts there is provided a sufficient freedom of motion and misalignment of parts to the end that the separate units of the lock may be installed in a door so as to function and operate effectively and successfully even though there may be inadvertent misalignment of holes bored in the door for the reception of those parts.

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 lock for a closure comprising an outer operating assembly, an inner operating assembly, a latch unit including a reciprocating latch bolt member and a housing therefor, and a spindle means adapted to extend between the operating assemblies and the latch unit, a separate hub element in the latch unit having a hole therethrough for the spindle means, said spindle means having a snug sliding fit in said hole, said hub having opposite annular outside ends and having a mid-portion of diameter greater than the outside ends and rounded shoulder portions between the outside ends and the mid-portion, said shoulder portions having a lesser distance therebetween than opposite inner side walls of said housing, said housing including an aperture in the side wall on each side of the housing of diameter less than the mid-portion and substantially exceeding the outside diameter of outside ends of the hub and adapted to receive said hub in a variety of positions of misalignment, means on the hub operably engaging a complementary portion of the latch bolt member in any of said positions of misalignment of the hub, and connecting means independent of the spindle engaging with the latch unit and incorporated in said operating assemblies for positioning said operating assemblies in operating relationship with said latch unit when installed on a closure, said connecting means and said latch unit having an engagement at extreme positions of misalignment, said hub and said latch unit having a circumferential clearance at the limit of misalignment of the connecting means and the latch unit wherein said hub remains free to rotate in the latch unit when the connecting means and the latch unit engage at their limit of misalignment.

2. A lock for a door comprising an outer operating assembly including an anchoring plate adapted to lie against one side of a door, an inner operating assembly including an anchoring plate adapted to lie against the other side of the door, a pair of post elements on one plate, a pair of screws on the other plate adapted to engage the post elements, a latch unit including a reciprocating latch bolt member and a housing therefor, index holes extending into the housing having a diameter exceeding the diameter of said post elements and adapted to receive said elements in different positions of misalignment up to a limit determined by the relationship of said diameters, a separate hub element having a noncircular spindle hole therethrough and a spindle means extending from the operating assemblies into the latch unit and having a snug sliding fit in said hole, said hub having outside ends and said housing having an aperture on each side of the housing of diameter exceeding the outside diameter of outside ends of the hub by an amount

greater than the amount the diameter of the index holes exceeds the diameter of the post elements, said aperture being adapted to freely receive said hub in a variety of positions of misalignment and in all positions of the post elements in said index holes, and cam means on the hub operably engaging a complementary portion of the latch bolt member in all positions of misalignment of the hub.

References Cited in the file of this patent

UNITED STATES PATENTS

733,142	Coley	July 7, 1903
812,904	Voight	Feb. 20, 1906
1,826,093	Schlage	Oct. 6, 1931
1,895,894	Moore	Jan. 31, 1933
2,538,647	Lickteig	Jan. 16, 1951
2,634,151	Russell et al.	Apr. 7, 1953