June 6, 1950 G. K. E. KLEEBERG 2,510,746

DOOR LATCH

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Fig. 1.

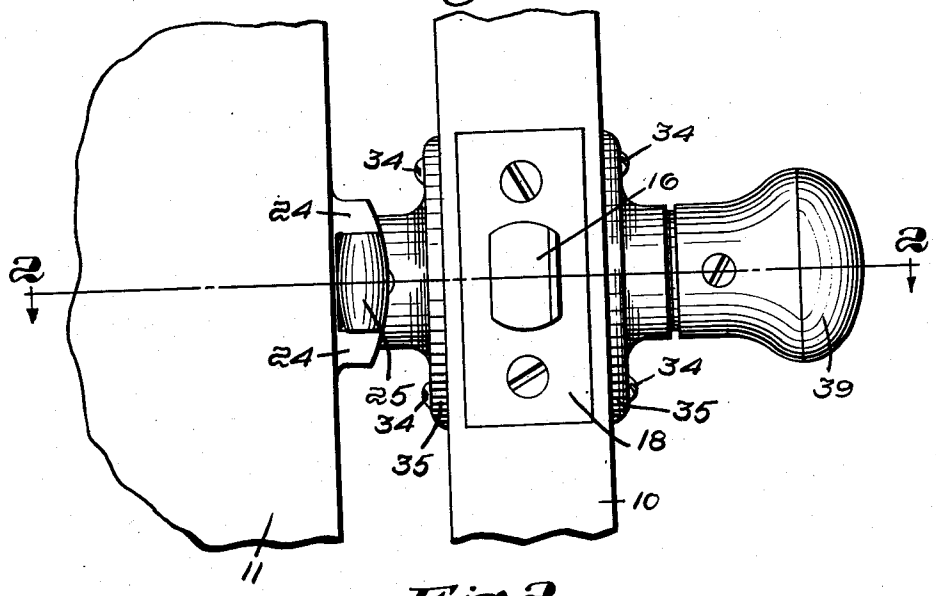
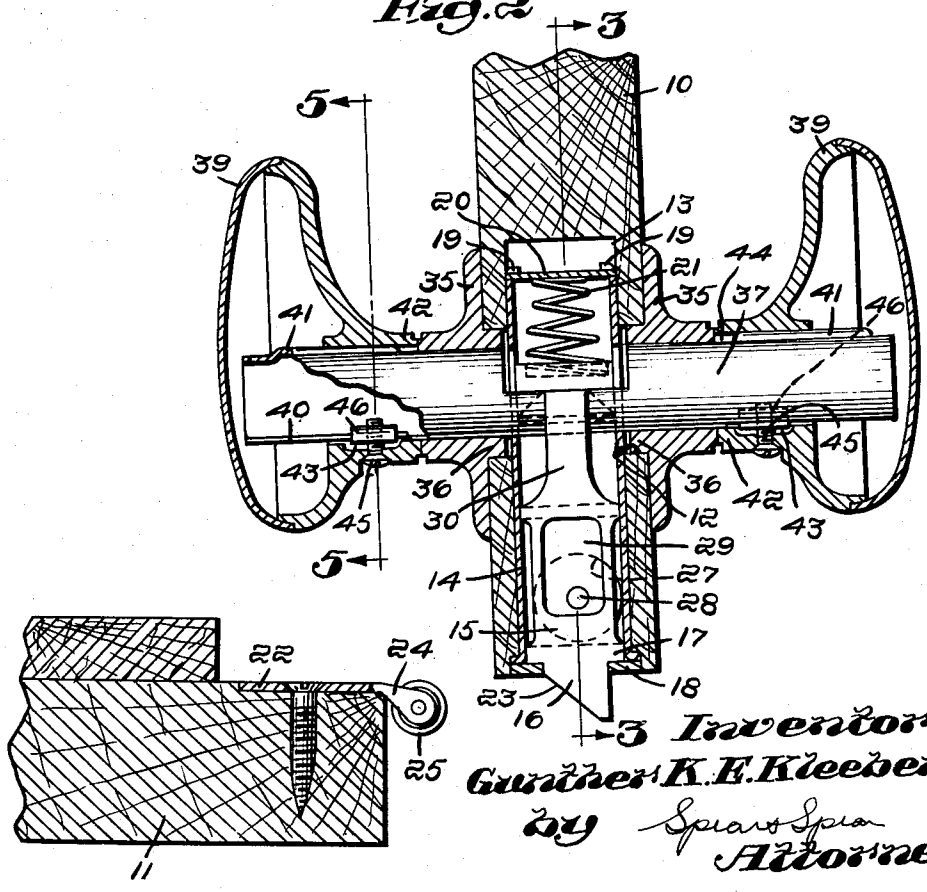


Fig. 2



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Fig. 3.

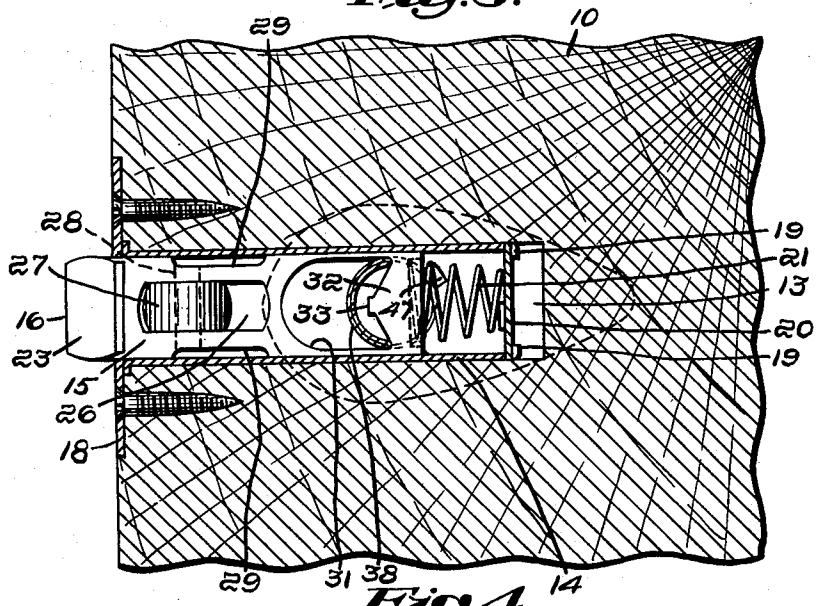


Fig. 4.

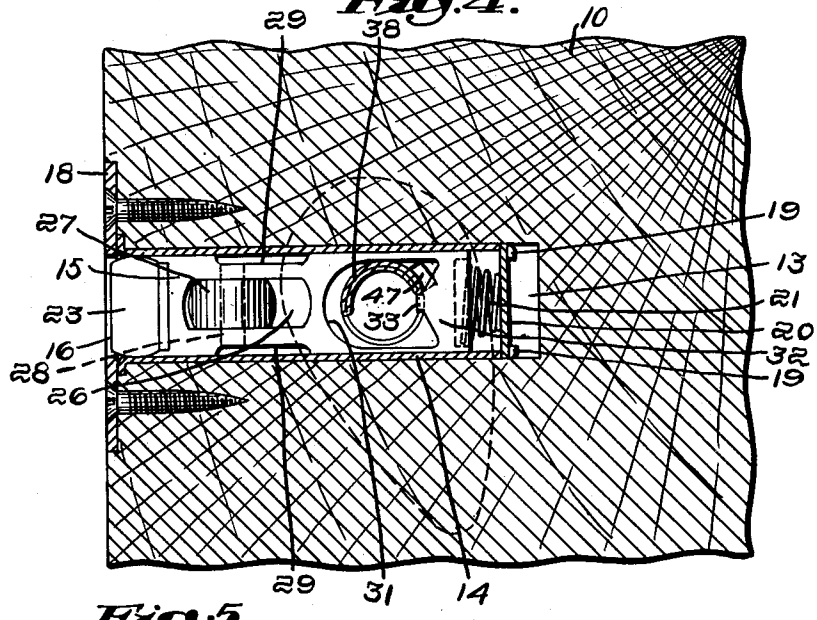
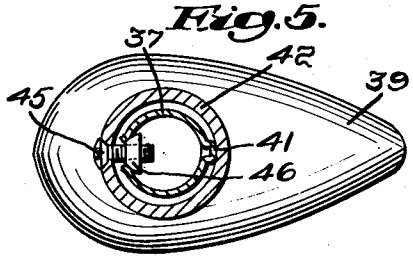


Fig. 5.



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UNITED STATES PATENT OFFICE

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DOOR LATCH

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Application October 9, 1946, Serial No. 702,182

4 Claims. (Cl. 292—169)

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My present invention relates to door latches and particularly to a door latch of the type adapted to be installed in a door having a transverse bore to receive the spindle and intersecting at right angles a bolt receiving bore extending inwardly from the edge of the door.

In accordance with my invention, I provide a door latch having a housing to be inserted in the bore in the edge of the door in which the bolt is mounted for movement between an inner unlocked position and an outer locking position into which generally it is yieldably urged by a spring. In its locking position, the head of the bolt protrudes from the edge of the door to enter the locking aperture of the strike plate and has a beveled face disposed so that the bolt is readily cammed into its inner position on engagement with the strike plate as the door is being closed. I provide the bolt with a roller disposed in engagement with the inner surface of the housing in a zone substantially opposite to the beveled face of the bolt head to minimize friction when the bolt is cammed into its unlocked position. I also provide the strike plate with a double tapered roller disposed to be engaged by the beveled face of the bolt head to further facilitate the movement of the bolt into its unlocked position as the door is shut.

My latch spindle is preferably of cylindrical stock and has a central portion of arcuate section. Both the housing and the bolt have apertures through which the spindle may be inserted and the aperture in the bolt is elongated. The bolt has a centrally disposed, wedge-shaped element projecting forwardly into the bolt aperture such a distance that the cylindrical portions of the spindle may pass through the bolt aperture when the bolt is fully seated in the housing. When the extremities of the arcuate spindle portion or equivalent spaced means, if the spindle is otherwise formed, are disposed to straddle the wedge-shaped bolt element and the bolt is released from such a fully seated position, the bolt and the spindle are interconnected. By this construction, partial rotation of the spindle causes a camming action by which the bolt is moved into its unlocked and locking positions with the bolt roller ensuring maximum ease of operation.

The bolt spindle extends through rose plates having hubs externally tapered to ensure a tight fit in the transverse spindle receiving bore and to the extremities of the spindle I attach handles or knobs.

While the handles may be connected to the spindles in any desired way, I have found it most

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satisfactory to provide means to frictionally interlock each handle to its spindle by means which so vary the relation between the peripheral extent of the spindle receiving bore in the handle and that of the spindle that the handle is suitably secured thereto.

This result may be accomplished, for example, by utilizing tubular stock and providing each extremity of the spindle with a slot and a substantially opposite and outwardly disposed rib. The hub of each handle has a groove to receive a rib and has an internal annular recess. By this construction, the handle may be keyed to the spindle and, in addition, I employ a screw extending through the hub, the hub recess and the slot. To the screw I thread a wedge-shaped nut adapted to expand the spindle against the hub to prevent the handle from being pulled from the spindle. This construction also has the advantage that the screw may be tightened until the spindle stock is deformed into the recess of the hub making the interlock between the handle and the spindle more positive even if the nut should become loose or the screw should fall out.

In accordance with my invention I am thus able to provide a door latch that is inexpensive to manufacture, simple to install, and combines ease with reliability of operation.

In the accompanying drawings, I have shown an illustrative embodiment of my invention from which these and other of its novel features and advantages will be readily apparent.

In the drawings:

Fig. 1 shows an installed door latch in accordance with my invention as viewed to show the edge of the door and the double tapered roller of the strike plate.

Fig. 2 is a section along the lines 2—2 of Fig. 1.

Fig. 3 is a section along the lines 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 3, but shows the bolt in its unlocked position, and

Fig. 5 is a section along the lines 5—5 of Fig. 2.

In the embodiment of my invention shown in the drawings, I have indicated generally at 10 and 11, a door and its frame respectively with the trim of the frame removed. The door 10 is shown as having a bore 12 extending through it and intersecting at right angles a bore 13 extending inwardly from its edge.

Within the bore 13 is a housing 14 slidably supporting the bolt 15 for movement between its in-

ner unlocked position (see Fig. 4) and its outer locking position (see Figs. 2 and 3). The bolt has a head 16 preferably formed to establish a shoulder 17 engaged by a keeper plate 18 secured to the edge of the door in engagement with the outwardly flared end of the housing 14. The rear end of the housing 14 has tabs 19 bent to attach the end closure 20 thereto and between it and the rear face of the bolt 15 is a spring 21 yieldably urging the bolt 15 into its locking position. By this construction, the closure 20 may be readily removed and the bolt reversed if it is desired to use any particular latch in an oppositely closing door.

The bolt head 16 protrudes from the edge of the door when the bolt is in its locking position and is adapted to enter the locking aperture of the strike plate 22. The bolt head 16 has the conventional beveled face 23 which, on engagement with the strike plate 22 as the door is being shut, causes the bolt 15 to be cammed into its unlocked position against the action of the spring 21. Preferably, I provide the strike plate 22 with arms 24 disposed to support a double tapered roller 25 in a position to be engaged by the face 23 thereby to more readily initiate the inward movement of the bolt.

The bolt 15 preferably has cylindrical portions adjacent its extremities. Adjacent its head end, the bolt 15 has a slot 26 in which a roller 27 is pivotally mounted on the pin 28 so that it engages the interior of the housing along a zone substantially opposite to the bolt head face 23 to ensure maximum ease of bolt movement when cammed into its unlocked position as the door is shut.

I have shown the bolt 15 as slightly flattened in the zone of the slot 26 and the roller 27 as being of a diameter only slightly less than the inside diameter of the housing 14. I also have shown the bolt as flattened as at 29 in the zone of the extremities of the pivot pin 28.

The intermediate portion 30 of the bolt 15 is reduced in thickness as is apparent in Fig. 2 and it is provided with an elongated aperture 31 forwardly into which projects a centrally disposed wedge-shaped element 32. The extremity 33 of the element 32 constitutes a stop as will presently be explained.

To each side of the door 10, I attach as by screws 34 a rose plate 35 having a hub 36 externally tapered to ensure a tight fit in the bore 12 thereby to minimize any strain on the screws 34. The rose plates and the housing 14 are apertured to receive the spindle 37 which is preferably of tubular stock having a central portion 38 of arcuate cross section. The portion 38, where the spindle 37 is of tubular stock, may be conveniently established by depressing one substantially semi-circular portion of the spindle 37 inwardly until it is seated against the other semi-circular portion thereby to provide an arcuate section having rounded extremities and being of substantial strength due to its double thickness.

The spindle 37 may be inserted through the bolt 15 when it is so fully seated in its housing 14 as to position the forward portion of the bolt aperture 31 in alinement with the apertures in the housing 14 and the rose plates 35. This enables the spindle 37 to pass forwardly of the wedge-shaped bolt element 32 and when the extremities of its arcuate portion 38 are disposed to straddle the element 32 and the bolt 15 is released, the spindle and bolt are interconnected. In practice, as may be clearly seen in Figs. 3 and 4, when the spindle and bolt are thus interconnected, the extremities of the arcuate spindle section 38 are both in engagement with the surfaces of the bolt element 32. When the spindle 37 is partially rotated in either direction, the bolt 15 is cammed inwardly or outwardly until the extremity in engagement with the bolt element encounters the stop 33.

While any desired handle or hub 39 may be attached to the extremities of the spindle 37 in any desired manner, I prefer to provide the hub of the handle with a passage freely receiving an extremity of the spindle and utilize means to so vary the peripheral extent of one of the mated parts that a tight frictional interlock is established.

Such a result may be readily attained, where at least the extremities of the spindle are tubular, by providing each extremity with a slot 40 and an external rib 41 located diametrically opposite thereto. Each hub 42 of a handle 39 has an internal annular recess 43 and a groove 44 intersecting it and establishing a keyway for a rib 41 so that the handle 39 may be effectively keyed to the spindle 37. The handle 39 may be conveniently locked to the spindle 37 to prevent its being pulled therefrom by means of a screw 45 extending through the handle hub 42, its recess 43, and a slot 40, and threaded thereon is a nut 46, preferably wedge-shaped. By this construction, the desired frictional interlock between the handle 39 and the spindle 37 is readily established by the screw 45 to expand the spindle extremity tightly against the spindle receiving bore in the hub 42. If desired, a positive interlock may be established by tightening the screw 45 until the spindle hub is deformed into the recess 43 so that even if the screw 45 became loosened or fell out, the handle could not be accidentally pulled from the spindle.

Where the spindle 37 is formed with ribs 41, it is necessary to form the passage through the hubs 36 of the rose plates 35 and the apertures in the housing 14 to accommodate them. I have indicated at 47 in Figs. 3 and 4 that part of the aperture through the housing 14 which accommodates the ribs 41 and it will be apparent that when the bolt 15 is positioned to permit the assembly or disassembly of the spindle and bolt, the bolt element 32 is so spaced as not to be engaged by a rib 41 regardless of from which side of the door 10 the spindle 37 is inserted.

From the foregoing, it will be apparent that door latches in accordance with my invention are inexpensive to manufacture and are very easily installed. While they are well adapted to withstand hard usage, their use is characterized by ease of operation and positive action.

What I therefore claim and desire to secure by Letters Patent is:

1. A bolt to be mounted in the tubular housing of a door latch to slide between an inner unlocked position and an outer locking position, said bolt including a head having a beveled face to be disposed in the direction in which the door is closed, at least two cylindrical portions of a diameter slightly less than the inside diameter of said housing, an intermediate portion having a slot in parallel with the bolt axis, a roller, and pivot means pivotally supporting said roller in said slot to engage with the inner surface of said housing along a path opposite to said beveled bolt face.

2. The bolt of claim 1 in which the intermediate portion of the bolt is of lesser thickness than the cylindrical portions as measured at right angles to the pivot means and the diameter of the

roller is slightly less than the maximum diameter of the bolt.

3. The bolt of claim 1 in which the intermediate portion is of lesser thickness than the cylindrical portions as measured at right angles to the pivot means, the diameter of the roller is slightly less than that of the cylindrical portions and the extremities of the pivot means are countersunk.

4. A door latch comprising a tubular housing, a bolt mounted in said housing to be moved between an inner position and an outer locking position, spring means yieldably urging said bolt into its locking position, said housing having transversely alined apertures and a tubular handle supporting spindle to enter said apertures, said bolt having an elongated aperture, a centrally disposed wedge-shaped bolt element extending forwardly into said aperture and including at its extremity stop portions, the part of said bolt aperture forwardly of said element being dimensioned to accommodate said spindle, and said spindle including an intermediate arcuate portion to straddle said element so that when said spindle is partially rotated to effect engagement of one of its extremities with one of the surfaces of said element said bolt is cammed against the action of said spring means until that extremity engages one of said stop portions.

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