Dec. 20, 1955 A. R. ADAMS 2,727,771

SLIDING DOOR LOCK AND LATCH

Filed June 14, 1954 2 Sheets-Sheet 1

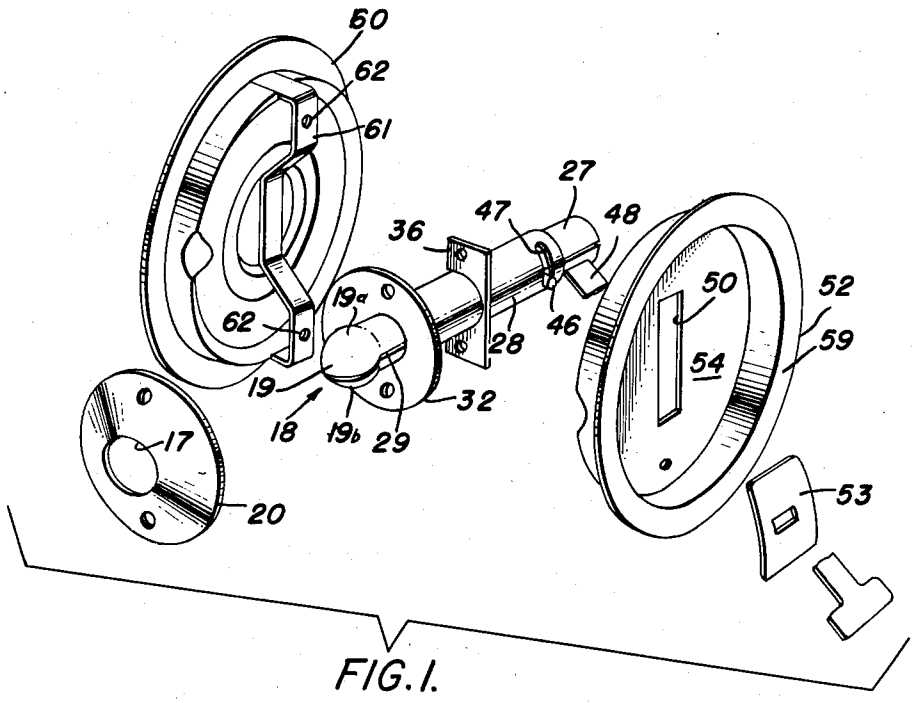


FIG. 1.

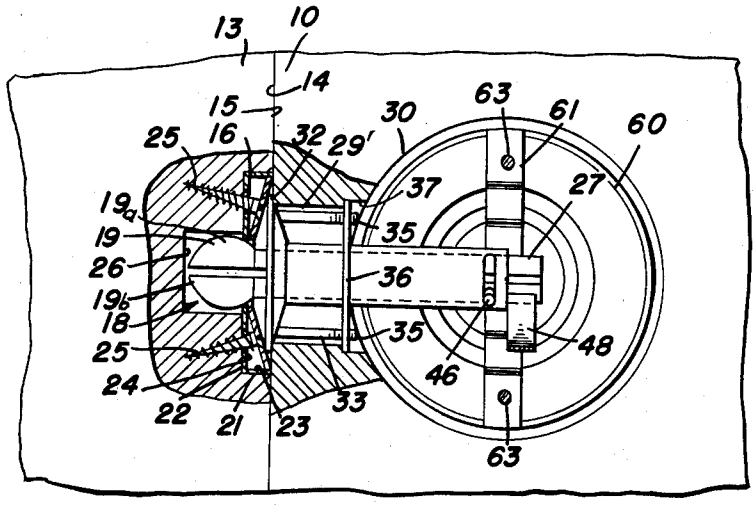


FIG. 2.

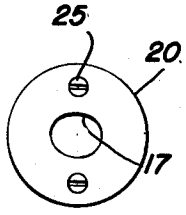


FIG. 3.

ARTHUR R. ADAMS
INVENTOR.

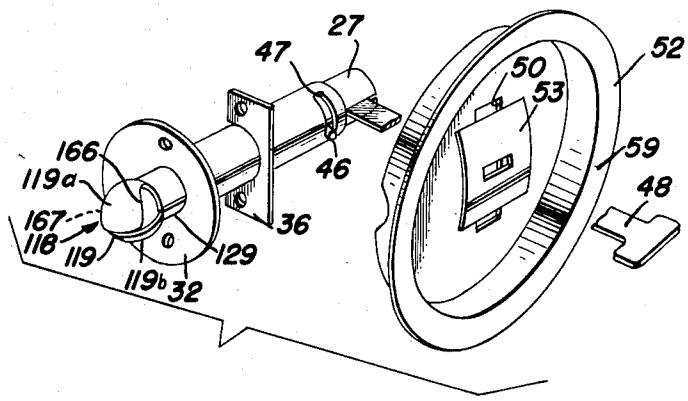
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Attorney

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SLIDING DOOR LOCK AND LATCH

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FIG. 4.



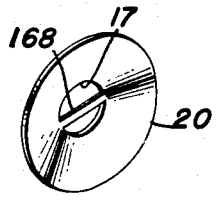


FIG. 5.

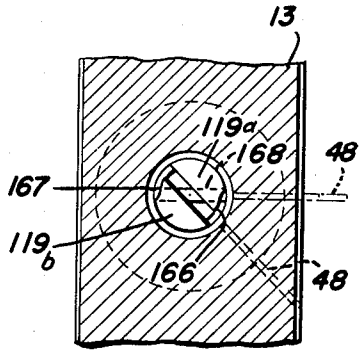


FIG. 7.

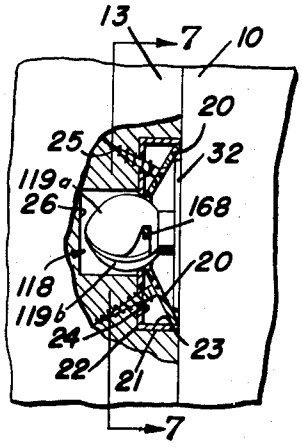


FIG. 6.

ARTHUR R. ADAMS

INVENTOR.

BY

Attorney

United States Patent Office 2,727,771 Patented Dec. 20, 1955

2,727,771

SLIDING DOOR LOCK AND LATCH

Arthur R. Adams, Pasadena, Calif.

Application June 14, 1954, Serial No. 436,306

12 Claims. (Cl. 292—17)

This invention relates to separable means for holding parts together, and particularly to an improvement for holding the parts locked after they have been brought together, simply by rotating one of the elements already present. The invention is particularly adaptable in a device for holding a sliding door in closed position in a door frame. The invention may, however, be used in other applications where it is desired to releasably latch two parts together, and at times to positively lock the parts together. The invention may conceivably find applications in connection with seat or cargo tie-downs; as a holding device for conveyor belts or for shipping pallets; or it may be used as a small luggage or suitcase catch. The invention might be utilized in other suitable applications.

This invention is a continuation-in-part of this inventor's earlier filed application, Serial No. 387,399, filed October 21, 1953; and also, earlier filed application, Serial No. 436,305, filed June 14, 1954.

The present invention is concerned primarily with an improvement in the earlier inventions, whereby the positive locking of the separable parts is achieved in a simple and effective manner merely by rotation of the latching bolt or pin itself.

It is, accordingly, an object of the invention to provide an improved means and manner of positively locking a device adaptable for employment as a releasable latch between separable parts, as, for example, a sliding door and its frame, without utilizing additional structural elements.

It is another object of the invention to provide a releasable latching device for separable parts having a resilient projection extending from one part into an opening in the other part, wherein positive locking is achieved by rotating the resilient projection to a position preventing its withdrawal from the other part.

The projection referred to may take the form of a bolt having a compressible-expansible knob or head rotatable to a position wherein resiliency of the head will not permit withdrawal of the projection from its cooperating opening. In general, the invention has the objectives of inexpensiveness, and that it be foolproof to manufacture, install and service. The invention accomplishes its purpose positively and with a reduced number of moving parts, adapting themselves well to manufacturing methods and assembly. The invention is not seriously limited to any particular dimensions, shapes or configurations of separable parts to which it may be adapted.

Further objects and numerous additional advantages of the invention will become apparent from the following detailed description and annexed drawings, wherein:

Fig. 1 is an exploded view showing all the parts of the device of the invention;

Fig. 2 is a view partly in section, showing part of a sliding door and frame, with the device of the invention in latched position.

Fig. 3 is a detail view of the strike plate which receives the resilient projection;

Fig. 4 is an exploded view of a modified form of the invention;

Fig. 5 is a detail view of the strike plate used with the form of the invention of Fig. 4;

Fig. 6 is a detail view of the projection engaged in the strike plate of the receptacle; and

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6.

Referring now to Figs. 1, 2 and 3 of the drawings in detail, numeral 10 designates a portion of the front face of a sliding door 12 in engagement with a door frame 13. In Fig. 2 the door is in closed position, with the device of the invention latched. The front edge face 14 of the door is in engagement with the edge face 15 of the frame 13.

The frame 13 has therein a receptacle 16 having an opening 17 which receives a projection 18 carried by the door 12 in a position projected from its edge face 14. In the form of the invention shown, the projection 18 is in the form of a rounded knob or head 19 which is slightly pointed as shown, arranged to expand in the receptacle 16 beyond the opening 17, so that removal of the knob 19 from the receptacle 16 requires contraction or compression of the knob 19, as will be described.

As shown in Fig. 1, the receptacle 16 comprises a dished washer 20, and means for supporting the washer 20 in a shallow recess 21, formed by a wood bit in the edge face 15 of the door frame 13. The means for holding the dished washer 20 in the recess 21, comprises a circular shallow dished member 22 having a cylindrical wall 23 and a radially extending wall 24, there being openings for the passage of screws 25 in both the members 20 and 22, so that the receptacle 16 will be firmly held in place. A hole 26 is drilled inwardly from the bottom of the recess 21 to accommodate that portion of the knob 19 which projects inwardly from the receptacle 16.

As may be seen in Fig. 1, the projection 18 comprises the head or knob 19 and a shank 27, which shank in the assembled position of the parts extends into a sleeve 28 which is extended through an opening 29' which connects the edge face 14 of the door 12 with a larger opening or chamber 30 which is bored through the edge portion 10 of the door from the front face 11 to the rear face thereof, as shown in Fig. 2, the axis of the opening 30 being perpendicular to the axis of the opening 29 and intersecting the same. The sleeve 28 has on its front end a dished flange 32 which is countersunk into the edge face 14 of the door 12, and screws 33 are extended through the flange 32 and through screw openings 34, the inner threaded ends 35 being threaded into a plate 36 which rests in a recess 37 which extends from the circular wall of the opening 30 and surrounds the sleeve 28. This prevents the pulling out of the sleeve 28 from the door except by breaking out of the wood between the edge face 14 of the door 12 and the opening 30.

The knob 19 and the shank 27 are formed from sheet metal so as to provide a hollow pin structure having a longitudinal slot 29 which extends along one side of the pin structure and around the knob, and partly along the length of the knob on the other side. The knob thus has two parts or halves 19*a* and 19*b* which are resiliently supported and are compressible towards each other. When the knob 19 is pushed into or pulled from the receptacle 16, the parts 19*a* and 19*b* are moved toward each other so that the knob 19 will be compressed or contracted, as will be described, to an extent permitting it to pass through the opening 17 in the plate or washer 20 of the receptacle 16.

The invention provides a particular adjusting arrangement for the knob 19 so that it cannot be pulled out of the opening 17 of the receptacle 16, thereby prevent-

ing the door from being opened from the position in which it is shown in Fig. 3. Whereas the knob **19** normally releasably latches the parts together, as will now be described it may be rotated to a position wherein it serves to positively lock the parts together. It will be observed that in the normal latching of the parts, the head **19** is compressed as it passes through the opening **17** of the plate **20**, this opening being elongated laterally, or rather, narrowed in a vertical direction as shown in Fig. 3, so that the halves **19***a* and **19***b* are forced together as they pass through the opening; that is, opening **17** is generally elliptical. The halves **19***a* and **19***b* re-expand after they pass through the opening. The upper and lower portions of the opening **17** are defined by arcuate walls or lips to engage the diametrally opposed faces of the knob parts **19***a* and **19***b* when the largest diametral portion of the knob **19** has passed through the opening **17**. Thus, the knob **19** is normally releasably held in the receptacle **16**, requiring a certain amount of force to remove it. For positively locking the parts together the projection is rotatable in sleeve **28** while the head **19** is engaged in receptacle **16**. The projection **18** carries a laterally extending pin **46** movable in an arcuate slot **47** in the side of sleeve **28**. Numeral **48** designates an actuating lever for projection **18** which extends laterally from projection **18** through an opening **50** in a cover plate **52**, and through a sliding shoe **53** on the outside of the cover plate. Thus, projection **18** may be rotated into and out of locking position by the lever **48**. In locking position the slot **29** is displaced 90° from the major axis, that is, the longer axis of opening **17**. In this position, as will be observed, the lips, or upper and lower edges of opening **17** engage behind the head **19**, and since the slot **29** is not coincident with the shorter axis of opening **17**, the head **19** cannot be contracted to allow its withdrawal from the opening, and the parts are positively locked together. The circular shoulder, as between the head **19** and shank of projection **18**, is relatively sharp so that the head can be firmly held by the shorter axis of opening **17**. The front cover plate **52** is seated in the front portion of the opening **30**, this cover plate having a flange **59** extending outwardly over the adjacent portion of the front face **11** of the door **12**. The rear portion of the opening or cavity **30** is closed by a rear cover plate **60**, in general similar to the front cover plate **52**, but having therein a diametrally arranged bar **61** provided with threaded openings **62** to receive screws **63**, which are extended across the intervening space from the bottom wall of the front cover plate **54**.

From the foregoing, those skilled in the art will observe that I have provided a device for releasably latching separable parts together, in which there is provided a very simple and effective means for positively locking the parts as desired. The positive locking is achieved simply by the 90° rotation of the latching pin or projection. The mechanism utilizes a reduced number of simple parts, providing for foolproof manufacture, installation and maintenance. The device can be made completely effective for its purpose in that the head of the projection when rotated, positively engages the lips of the opening in the receptacle, to prevent its withdrawal.

Referring to Figs. 4, 5 and 6 of the drawings, there is shown a modified form of the invention, wherein the positive locking of the parts is achieved in a different manner. The parts that are different in the present modification of the invention are numbered using numerals 100 higher than corresponding parts in the previous modification, other parts being the same in the two modifications. In Fig. 4 the projection or pin is indicated at **118** and it is similar to that of the previous modification except that each of the halves **119***a* and **119***b* of the head **119** has a lateral notch or slot as indicated at **166** and **167**. The strike plate **20** of the receptacle

for the projection has a cross-bar or member **168** extending across the central part of the opening **17**. The knob **119** is received in the opening **17** as in the previous modification; however, in the present form of the invention the bar or cross-member **168** is received in the slot **129** of the pin or projection **118**, in a position adjacent to the slots or notches **166** and **167** in the halves **119***a* and **119***b* of the head **119**. The relative positions of these parts is shown in Fig. 6, and as can be seen, when the projection is rotated 90° about its longitudinal axis, as in Fig. 6, the notches or slots **166** and **167** move in a manner to straddle, or, that is, engage with the transverse bar member **168**, in a manner to positively prevent retraction of the projection **118**. In order to retract the projection it must be rotated back into a position in which the slot **129** is horizontal and in which the notches **166** and **167** do not engage the transverse member **168**. The operation of the present embodiment is otherwise the same as that of the previously described embodiment.

In both forms of the invention the knob or head of the projection is formed so as to be sufficiently pointed such that if it strikes the strike plate in a locked or partly locked position, that is, a rotated position, the engagement of the head with the strike plate will have a camming action, returning it to horizontal position of the slot in the projection, so that it can enter the opening **17** in a normal manner. The embodiment of the invention of Figs. 4, 5 and 6 provides for positive physical interlocking between the projection and the receptacle by way of pin and slot connections as shown, whereby retraction of the projection is dependent upon rotation of the projection back to a position in which the slot in it is horizontal.

The foregoing disclosure represents preferred forms of my invention, it being understood that the invention is susceptible of variations and modifications, and adaptability to different environments. The disclosure is to be interpreted in an illustrative rather than a limiting sense, the scope of the invention to be in accordance with the claims appended hereto.

I claim:

1. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means forming an opening in the other part, adapted to receive and retain the projection, the projection having resiliency to enable it to pass through said opening and the projection being rotatable to another position in said opening, the projection having an unyielding portion in engaging relation with a part of said opening at said position whereby the parts are positively locked together.

2. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means in the other part adapted to receive and retain the projection, the said last means having a lip, and the said projection having resiliency to enable it to override the lip, the said projection being rotatable to a locking position; and means whereby in said position the second mentioned means engages the projection to positively prevent its withdrawal.

3. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means in the other part adapted to receive and retain the projection, the said last means having a lip, the said projection having resiliency to enable it to override the lip, the said projection being rotatable to a locking position, and the projection and the second means having mutually engageable unyielding parts at said position whereby the parts are positively locked together at said position.

4. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means having an opening in the other part adapted to receive and retain the projection, the said last means having a lip, and the said projection

having a lip engaging portion having resiliency to enable it to override the lip to provide a releasable latching arrangement, the said projection being rotatable to a locking position, the projection and the second means having mutually engageable parts at said position whereby to positively lock the parts together.

5. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means forming an opening in the other part adapted to receive and retain the projection, the said opening being of generally elliptical shape, the projection having an enlarged head and having resiliency enabling it to pass through the opening and to be releasably engaged thereby; and means to rotate the said projection to a position wherein an unyielding portion of the projection is adjacent the shorter axis of the opening whereby the parts are positively locked together.

6. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part, the said projection having an enlarged head formed in sections resiliently compressible towards each other; means forming an opening in the other part adapted to receive and retain the projection, the said opening having a dimension requiring contraction of the said sections in order for the head to pass therethrough; and means for rotating the said projection to another position in said opening, the said projection having an unyielding portion engaging a portion of said opening at said position whereby the parts are positively locked together.

7. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means forming an opening in the other part, adapted to receive and retain the projection, the projection having resiliency to enable it to pass through said opening and one of said means being rotatable to another position in said opening, the projection having an unyielding portion engaging a part of said opening at said position whereby the parts are positively locked together.

8. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means in the other part adapted to receive and retain the projection, the said last means having a lip, and the said projection having resiliency to enable it to override the lip, the said projection being rotatable to a locking position, the projection having a shoulder and the second means having a conformation adapted to be engaged by said shoulder in said position for positively locking the parts together.

9. In a device for separably attaching relatively movable parts, in combination: means forming a projection

extending from one part; means in the other part adapted to receive and retain the projection, the said last means having a lip, and the said projection having resiliency to enable it to override the lip, the said projection being rotatable to a locking position, the projection and the second means having pin and slot connections at said position whereby the parts are positively locked together at said position.

10. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means having an opening in the other part adapted to receive and retain the projection, the said last means having a lip, and the said projection having a lip engaging portion having resiliency to enable it to override the lip to provide a releasable latching arrangement, the said projection being rotatable to a locking position, the projection and the second means having mutually engageable parts comprising an inwardly extending member in said opening and a slot in said projection whereby to positively lock the parts together in said position.

11. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part; means forming an opening in the other part adapted to receive and retain the projection, the said opening being of generally elliptical shape, the projection having an enlarged head and having resiliency enabling it to pass through the opening and to be releasably engaged thereby; means to rotate the said projection to another position; and means providing pin and slot connections between the projection and the second means at said other position whereby the parts are positively locked together.

12. In a device for separably attaching relatively movable parts, in combination: means forming a projection extending from one part, the said projection having an enlarged head formed in sections resiliently compressible towards each other; means forming an opening in the other part adapted to receive and retain the projection, the said opening having a dimension requiring contraction of the said sections in order for the head to pass therethrough, and having a member adapted to be received between said sections; and means for rotating the said projection to another position in said opening, at least one of said sections having a slot engageable with said member at said position whereby the parts are positively locked together.

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