April 18, 1961 F. J. RUSSELL 2,980,458

SLIDING DOOR LATCH WITH DEAD LOCK

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FIG. 1.

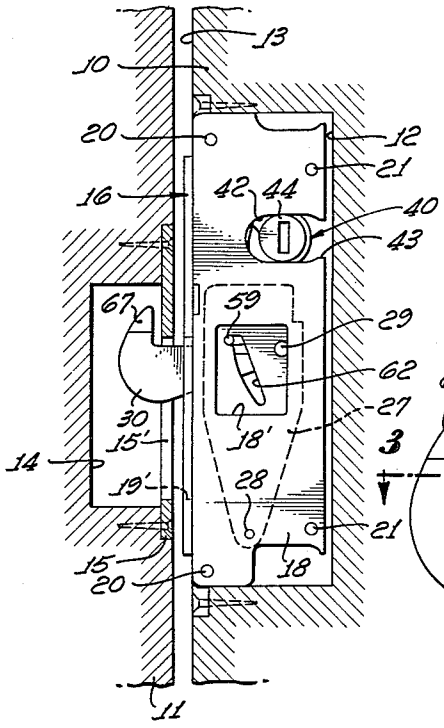


FIG. 2.

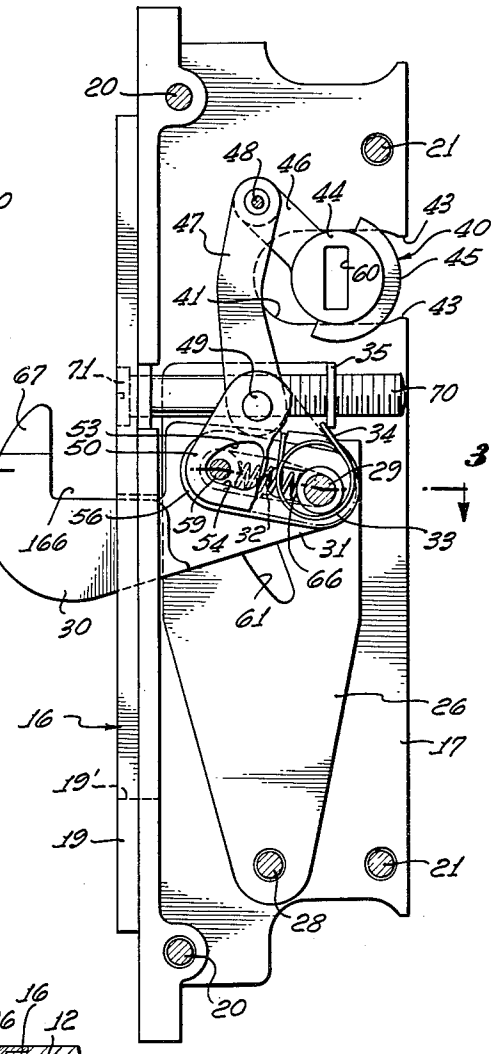
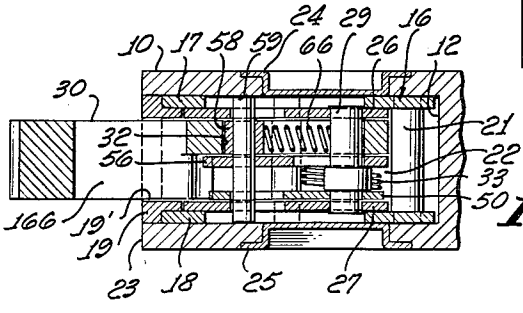


FIG. 3.



FRED J. RUSSELL
INVENTOR.

BY Beehler & Shanahan

ATTORNEYS.

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Fig. 4.

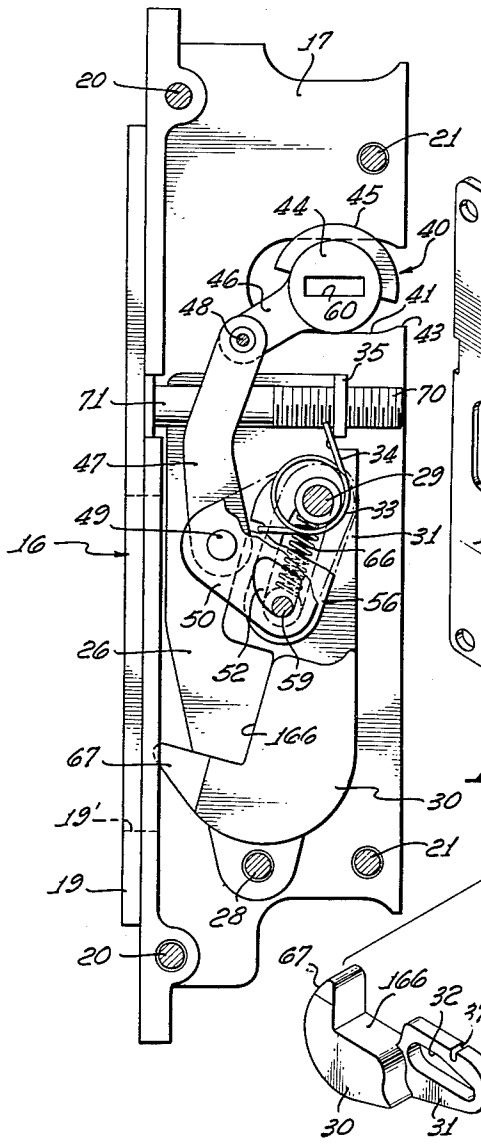


Fig. 5.

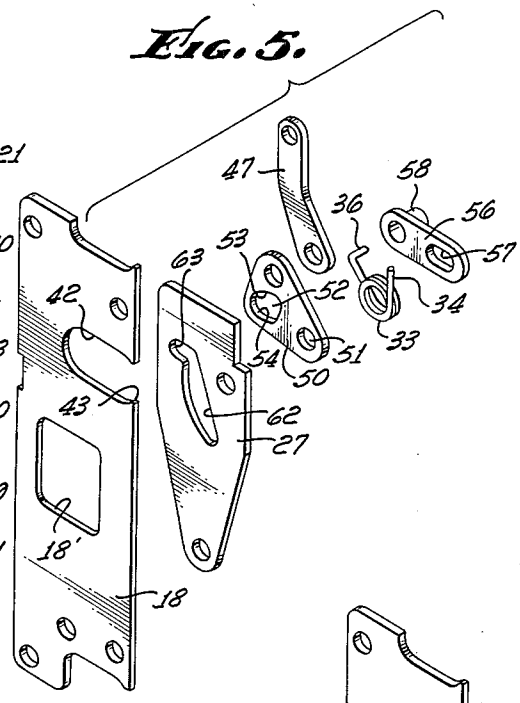
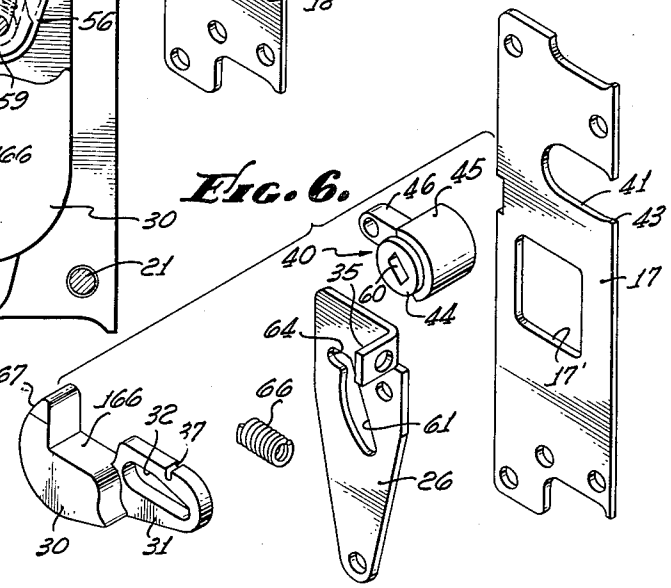


Fig. 6.



FRED J. RUSSELL
INVENTOR.

BY Beehler & Shanahan

ATTORNEYS.

April 18, 1961 F. J. RUSSELL 2,980,458

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Fig. 9

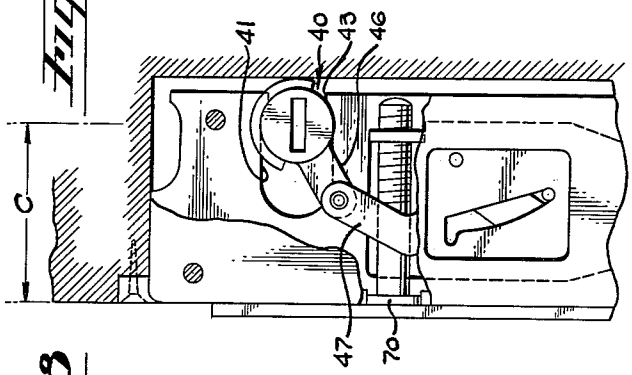


Fig. 8

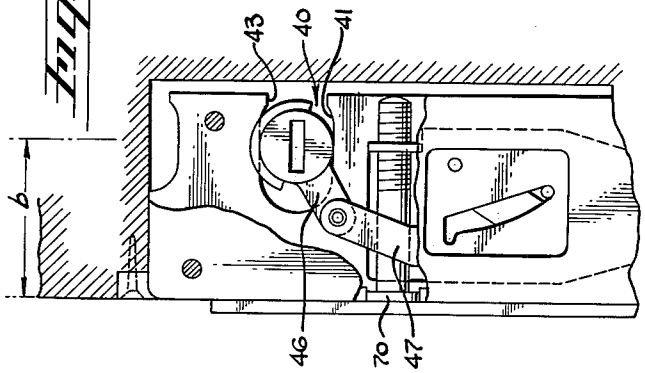


Fig. 7

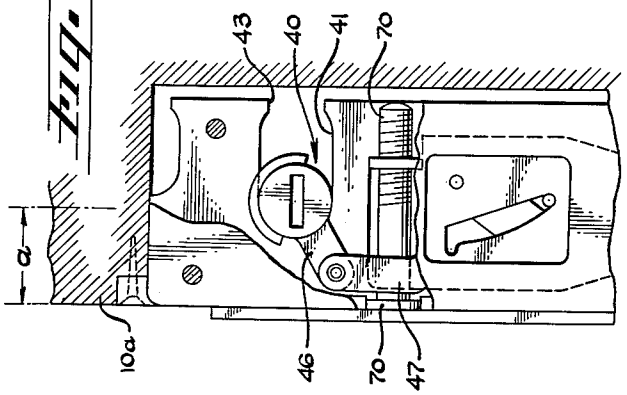


Fig. 13

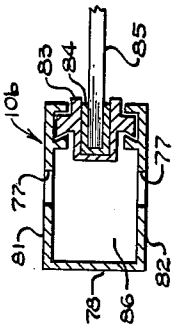


Fig. 12

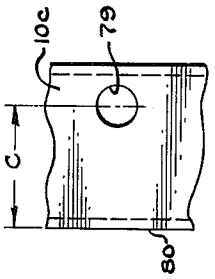


Fig. 11

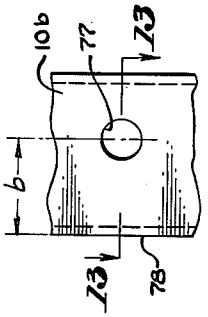
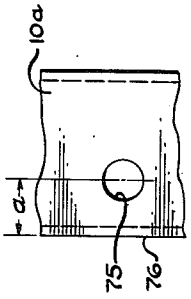


Fig. 10



INVENTOR.
FRED J. RUSSELL

BY
Beehler & Shanahan
ATTORNEYS

United States Patent Office 2,980,458
Patented Apr. 18, 1961

2,980,458

SLIDING DOOR LATCH WITH DEAD LOCK

Fred J. Russell, 3800 Don Felipe Drive, Los Angeles, Calif.

Filed May 11, 1959, Ser. No. 812,486

3 Claims. (Cl. 292—113)

The invention relates to door locks and has particular reference to a door lock especially designed for a sliding door and which incorporates supplemental features including a dead lock mechanism and a structure such as to permit the varying of the back-set of the hub. This is a continuation-in-part of copending application Serial No. 648,695, filed March 26, 1957 now Patent No. 2,924,475 issued February 9, 1960.

Recent trends in building construction and especially in the construction of residences has pointed to a very marked degree toward economy in the use of space. Although sliding doors have been known and used for a great many years, there has been a marked increase in the employment of sliding doors in current building projects because of the fact that they make it possible to employ tight spaces to better advantage. As a consequence the accelerating use of sliding doors has given rise to new wants and problems in connection with latches for such doors. To a large extent heretofore sliding doors have been used for passage only and therefore have not needed any more than a flush door opening pull or handle. In some instances simplified passage latch sets have sufficed. With an increasing demand, however, for sliding door latches capable of latching a door in closed position, new demands have pointed to a need for sliding door latches capable of barring the door from being opened on one side. Where such doors need to be barred it also becomes advisable to so construct the latch or lock set that it cannot be opened by unauthorized persons. From the very nature of the sliding door arrangement dead latching sets, though needed, have presented design problems not readily met by techniques heretofore employed.

The trend has been to a large extent to employ metal frames for certain types of doors which in some instances are steel and in other instances may be aluminum. The usual practice is to drill a hole in the frame for the lock spindle at a desired location while the frame is still at the shop. Extruded shapes and moldings of which the frames are made vary to a considerable degree among manufacturers and the location of the hole for the spindle is by no means uniform. It is, of course, undesirable for many reasons to enlarge on the job a wrongly located hole and it is extremely impractical to entirely relocate the hole in some instances where a particular sliding door latch has the spindle location so positioned that it does not match the hole made for it in the door frame. These circumstances, unless remedied, result in a considerable loss of time on the job when the installation is made and are often productive of unsightly and undesirable alterations.

It is therefore among the objects of the invention to provide a new and improved sliding door latch of high quality construction which comprises a relatively complete latch in that it is one capable of latching a sliding door in closed position and which can be easily manipulated so as to latch and unlatch the door by means of a handle or lever sufficiently compact to project a minimum distance from the door surface and therefore not impair the sliding of such door into its pocket when opened.

Another object of the invention is to provide a new and improved sliding door latch which is compact in its structural arrangement thereby making it possible to install the latch in light-weight sliding doors of relatively thin section but which though compact will be positive in its action.

Another object of the invention is to provide a new and improved sliding door latch which has a certain flexibility in the mechanism permitting the operating spindle to be shifted to a considerable degree either toward or away from the edge of the door, depending on the location of holes already made, without impairment in any way of the normal structure and operating character of the device.

Still another object of the invention is to provide a new and improved sliding door latch which can be shifted to latch and unlatched position and which has built into it a dead locking arrangement such as to bar the door when latched against access from one side.

Still another object of the invention is to provide a new and improved sliding door latch set which is versatile in its arrangement, thereby to permit variation of the back-set location of the hub throughout a considerable range to facilitate and simplify the accurate installation of such device in a sliding door.

Still further among the objects of the invention is to provide a new and improved sliding door latch which employs a hook capable of being extended to latched position and retracted to a concealed position and which in extended position will retract to withdrawn position upon sliding impact of the latch hook when extended to avoid damage to the mechanism.

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 vertical sectional view of a sliding door and door jamb showing the sliding door latch in elevation.

Figure 2 is a side elevational view of interior portions of the door latch in extended position.

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a view similar to Figure 3 with portions partialy broken away and showing the latch in retracted position.

Figure 5 is an exploded view of parts of the device on the near side of a vertical center line as viewed in Figure 4.

Figure 6 is an exploded view of parts on the far side of a vertical center line.

Figure 7 is a fragmentary side elevational view of the sliding door lock mounted in a door frame with the spindle at an extreme left-hand location nearest the edge of the frame.

Figure 8 is a view similar to Figure 7 showing the spindle at an intermediate location.

Figure 9 is a view similar to Figure 7 showing the spindle at an extreme right-hand location farthest removed from the edge of the door.

Figures 10, 11 and 12 are fragmentary side elevational views of door frames showing the spindle holes at locations corresponding respectively to Figures 7, 8 and 9.

Figure 13 is a cross-sectional view taken on the line 13—13 of Figure 11.

In an embodiment of the invention chosen for the pur-

pose of illustration there is shown a sliding door **10** adapted to fit against a door jamb **11**. The sliding door is provided with an edgewise extending opening **12** at an edge **13** of the door. A recess **14** is located in the door jamb immediately opposite the opening **12** for the accommodation of a latch plate **15** serving its conventional purpose.

The latch mechanism is shown contained in a frame or housing **16** comprising opposite parallel side walls **17** and **18** and a transverse end wall **19**. The side walls are shown attached to the end wall by means of pins **20** and are attached to each other by spacing pins **21**. The side walls and end walls when assembled form in effect a chamber **22** therebetween for reception of catch means comprising sundry working parts of the device. When in position in the door **10**, the end wall **19** is flush with an edge **23** of the door. Recessed trim plates **24** and **25** provide for a finger hold in opening and closing the door and further provide space for a suitable latch handle, not shown.

Located in the lower portion of the chamber **22** is a pair of pivot plates **26** and **27**. These pivot plates are elongated in character, as is clearly apparent in Figure 2, and are pivotally mounted at lower ends thereof to the side walls **17** and **18** by means of a pivot pin **28**.

At the upper left portion of the pivot plates, as shown in Figure 2, for example, a latch pivot pin **29** serves to attach a latch hook **30** to the pivot plates. As shown to good effect in Figure 6, the latch hook **30** is provided with an inner extension **31** in which is an elongated pivot slot **32** which is adapted to receive the latch pivot pin **29**.

A hair spring **33** having one end **34** pressed against a bracket **35** of the pivot plate **26** has a bent end **36** received in a spring notch **37** in the latch hook. The tension in the spring tends normally to rotate the latch hook **30** in a counterclockwise direction, as viewed, for example, in Figure 2.

In the end wall **19** is an opening **19'** through which the hook extends. An opening **15'** is provided in the latch plate **15** for reception of the hook in extended position.

To move the latch hook between the extended position shown in Figure 2 and the retracted position shown in Figure 4, there is provided a hook actuator linkage comprising a hub member **40** which is received both rotatably and slidably at its opposite ends within hub recesses **41** and **42**, respectively, in the side walls **17** and **18**. Protrusions **43** serve to prevent the hub member from being pushed out of the hub recesses. The hub member has cylindrical projections **44** at the ends between which is an enlargement **45** which assists in positioning the hub member in the recesses.

Extending radially outwardly from the hub member is an arm **46** at the outer end of which is attached the upper end of a link **47** by means of a pin **48**. At its lower end the link is attached by means of a pin **49** to a cam plate **50**. The cam plate in turn is pivotally mounted by aid of a pivot aperture **51** to the latch pivot pin **29**.

In the cam plate **50** is a cam opening **52** which serves to define intersecting camways **53** and **54**. To attach the cam plate to the latch hook there is provided a lock pin retainer block **56** having a slot **57** at one end adapted to receive the latch pivot pin **29**. Projecting outwardly from one side of the lock pin retainer block is a boss **58** which is adapted to fit slidably within the pivot slot **32** of the latch hook **30**. A pin **59** extends through the boss and also through the cam opening **52** in the cam plate. This same pin **59** also extends outwardly at both ends to a location flush with the outside surfaces of the side walls **17** and **18**, as shown in Figure 3. A square aperture **17'** in the wall **17** and **18'** in the wall **18** provides access to the pin **59** and a space within which the pin can move.

From the retracted position of the latch hook shown in Figure 4 by manipulation of the hub member **40** through the agency of a conventional handle, not shown, inserted in a hub slot **60**, the hub is rotated in a clockwise direction. This rotation elevates the link **47** which in turn pulls upon the cam plate **50** causing engagement of the camway **54** with the pin **59**. Lifting the pin as described serves to provide a pull upon the boss **58** which fitting in the pivot slot **32** lifts the latch hook to the position shown in Figure 2.

It will be noted that there are provided in the pivot plates **26** and **27**, respectively, oblique slots **61** and **62**. At the upper ends of the slots are intercommunicating dead lock recesses **63** and **64**. When the pin **59** is elevated by manipulation of the hub in the manner described to the upper ends of the slots **61** and **62**, a coiled spring **66**, pressing at one end against the pin **29** and at the other end against the boss **58**, tends to urge the pin **59** in a direction from right to left as viewed in Figure 2, thereby to enter the dead locking recesses **63** and **64**. It will be appreciated that by reason of the length of the pin **59** it extends at its opposite ends slidably within the oblique slots **61** and **62**. Thus positioned in the dead lock recesses the pin **59** prevents rotation of the latch hook **30** in a counterclockwise direction about the latch pivot pin **29**. Hence, the latch hook cannot be pried downwardly by manipulation of a screwdriver or similar object slid between the door and the door jamb. When the latch hook is in the position shown in Figure 1 with an upwardly open recess **166**, it permits a tip **67** of the hook to fall behind an appropriate portion of the latch plate **15**, as shown in Figure 1.

When the latch hook is to be returned from extended position to retracted position, the hub member **40** is rotated in a counterclockwise direction. This serves to depress the link **47** and the cam plate **50**. As the cam plate is depressed, the camway **53** pressing against the pin **59** tends to cam the pin rearwardly, thereby compressing the spring **65** until the pin **59** is moved from left to right far enough to fall out of the head lock recesses **63** and **64**. Thereafter by continuing rotation of the hub **40**, the pin **59** is caused to slide down the oblique slot **61** and **62** aided by action of the hair spring **33**. As a consequence, movement of the pin **59** downwardly moves the boss **58** in a similar direction and causes the latch hook **30** to be rotated in a counterclockwise direction from the position of Figure 2 to the position of Figure 4. The hair spring will tend to retain the latch hook in the retracted position until lifted therefrom by manipulation of the hub member.

It is to be noted that because of the linkage attached to the hub member it is permissible to shift the hub member to virtually any position between opposite ends of the hub recesses **41** and **42**. This permits considerable latitude in the location of the trim plates **24** and **25**. Though shifted to a considerable extent as described, the operation of the latch mechanism to shift the latch hook between extended and retracted position is in no way altered or modified.

Figure 10 shows a fragmentary section of the frame of a screen door, the frame being identified by the reference character **10***a*. As here shown, a hole **75** is located with respect to an edge **76** of the door at a distance indicated by the dimension *a*. According to well-known practice a conventional handle after having a spindle thereon (not shown) extends through the hole to engage the hub slot **60** in the hub, thereby to rotate the hub to latching and unlatching positions. This results in the hole **75** being determinative of a hub station. Figure 11 shows a door frame **10***b* wherein a hole **77** serving the same purpose as the hole **75** is located with respect to an edge **78** of the door by a distance indicated by the dimension *b*. In Figure 12 still another frame **10***c* is shown with a hole **79** therein spaced from an edge **80** of the door by a distance indicated by the dimension *c*. The hole **79** also serves the same purpose as the hole **75**. The hole **79** is farthest removed from the edge of the respective door frame and the hole **75** is closest to the door frame.

A typical section through a molding of the type fre-

quently encountered is illustrated in Figure 13 wherein it will be found that the frame **10***b* has opposite sides **81** and **82** joined by the edge **73** and which includes an extended section **83**, and a Neoprene liner **84** which assists in holding a glass **85** in place. This is illustrative of only an example of a means providing a space **86** for reception of a sliding door lock case.

In Figure 7 the sliding door latch is shown mounted as it would be in frame **10***a*. It will be noted in this instance that the hub member **40** is shifted to the leftmost end of the hub recess **41**, as viewed in Figure 7, because the hole **75** is located farthest toward the left. This shift is permitted by the freedom of movement permitted between the arm **46**, the link **47**, and the cam plate **50**. None of the operating parts, however, need to be changed to make this possible, except that, if desired, a minor adjustment may be made with respect to the adjusting bolt **70**.

Similarly, the latch may be inserted in the frame **10***b*, as illustrated in Figure 8, wherein the hub member **40** will be located intermediate opposite ends of the hub recess **41** because of the intermediate location of the hole **77**. It will be understood, of course, that the hub recess **42** previously described is immediately opposite the recess **41**. Here again there need be no change in the operating parts except that the link **47** will be shifted slightly in an angular direction and that on occasions there might be some slight shift in the angular position of the arm **46** to a negligible degree.

Also in Figure 9 the latch is mounted in a position such that the hub member **40** is at the extreme right-hand end of the hub recess **41** because of the hole **79** being located farthest toward the right and wherein it is retained as previously described by the protrusions **43**. Here again there is no appreciable shift in the angular position of the arm **46** and only a slight change in the tilt of the link **47** without any other shift in the normal relationship of the remaining operating parts.

Accordingly, it will be understood that no matter where the spindle hole may be located, the latch can be fitted to the hole location in the frame without the necessity of any internal adjustment, the trim plates **24** and **25** previously described will always provide a neat-appearing fit in the hole no matter where it may be located, and no change, adjustment, enlarging or resetting of the spindle bolt hole is needed.

To add to the effectiveness of a proper installation resulting in a snug fit of the latch hook in engagement with the latch plate or strike plate, an adjustment is provided to move the latch hook toward or away from the latch plate in extended position. This is accomplished by employment of a bolt **70** which has a head end **71** rotatably mounted in the transverse end wall **19** and has a threaded end threadably secured in the bracket **35**. When the bolt is rotated, the head end remains fixed and the bracket **35** in consequence is moved toward the right or left depending upon the direction of rotation of the bolt. If movement be toward the right, as viewed in Figures 1 and 2, the pivot plates **26** and **27** as a consequence will be rotated in a clockwise direction about the pin **28**. This causes a displacement of the pin **29** toward the right which results in drawing the tip **67** of the latch bolt to a position closer to the transverse end wall **19** of the housing. Conversely, the position of the latch hook can be adjusted whereby to move the tip further toward the left by rotation of the bolt **70** in an opposite direction, causing a displacement of the pin **29** toward the left.

There has accordingly been described herein a complete sliding door latch structure which is capable of being manipulated from either side, if desired. Under those circumstances the conventional handle with an appropriate spindle or shaft would be provided on both sides of the door. The structure, however, is one which, if desired, could employ a handle on one side only, in which event a trim plate on the opposite side would be closed so as to inhibit access to the hub member. In such an arrangement the latch is proof against tampering by action of the dead locking elements which would prevent unlatching the latch hook by some instrument from the outside. It will be appreciated that because of having a structure and arrangement as herein described, the door latch can serve just as readily on either edge of a sliding door, depending upon the direction in which the door is made to slide. Fitting trim plates to the structure need not necessitate any departure from conventional procedure. Further by constructing the latch hook as shown with the extension **31** of about one-half the thickness of the latch hook, space is provided to receive the lock pin retainer block **56** and the cam plate, thereby making possible a very thin structure which permits the latch to be used in relatively thin sliding doors without a weakening of the door adjacent the opening provided for reception of the latch. Sufficient freedom of movement is built into the combined mechanical elements so as to avoid the necessity of close tolerances either with respect to fabrication, assembly, or installation on the door without impairment of positive action over expected long periods of use.

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. In a sliding door latch combination, a housing having a vertical outer face adapted to be mounted flush with an edge of the door, a latch hook movably mounted on the housing and shiftable between an unlatching and a latching position by extending outwardly and inwardly of said outer face of said housing, an elongated recess means in the housing having a long axis thereof generally transverse relative to the outer face of the housing, operating means comprising a hub rotatably mounted in said recess means and slidable therein to a plurality of operable locations relative to the edge of the door, means forming a hub station on said door located at one of said operable locations, and a jointed connection between said hub and said latch hook operable in all positions of the hub in said recess means whereby said latch hook is shifted to said latching and unlatching positions by rotation of said hub at one of said operable locations within said recess means without change in the jointed connection.

2. In a sliding door latch combination a housing having an outer edge, a latch hook tiltably mounted on the housing, an elongated recess means in the housing having a long axis thereof generally transverse relative to the outer edge, operating means comprising a hub rotatably mounted in said recess means and slidable therein to a plurality of operative locations relative to said outer edge, and a jointed connection between said hub and said latch hook operable in all positions of the hub in said recess means a hub positioning means on the door in one of said operable locations whereby said latch hook is tilted to latching and unlatching positions by rotation of said hub at said one of said operative locations within said recess means without change in the jointed connection.

3. A sliding door latch combination adapted to be mounted in a door at a location adjacent an edge thereof for engagement with a strike plate, said combination comprising means forming an opening in the door at the edge thereof and a housing receivable in said opening, a latch hook movably mounted on the housing and shiftable between an unlatching position and a latching position by extending outwardly and inwardly of the edge of the door, an elongated recess means in the housing having a long axis thereof generally parallel to the plane of

movement of the latch hook, operating means comprising a hub rotatably mounted in said recess means, said hub having a plurality of operable locations throughout the length of said recess means, a jointed hook operating connection between the hub and the latch hook operable in all locations of the hub in the recess means whereby said latch hook is shifted to said latching and unlatching positions, and at least one handle supporting trim plate of selected form and size mounted on the door at a selected position relative to said opening and adjacent said recess means at one of said plurality of locations of the hub in said recess means whereby said latch hub is

adapted to be moved into a hook operating location in said recess means corresponding to the location of said handle supporting trim plate on the door without change in the jointed hook operating connection.

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