April 17, 1956 C. C. HILLGREN 2,742,309

SLIDING DOOR LATCH

Filed May 7, 1954

Fig. 1.

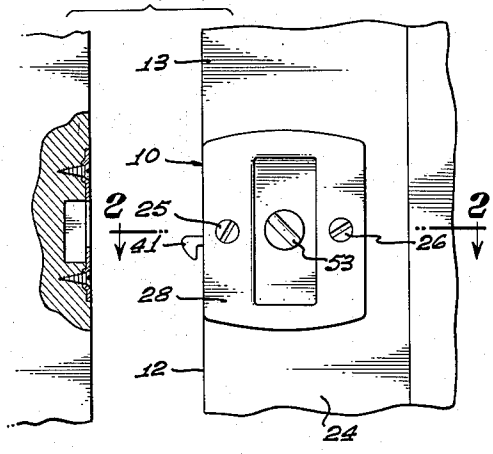


Fig. 2.

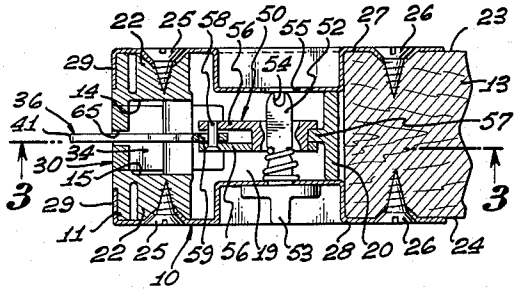


Fig. 3.

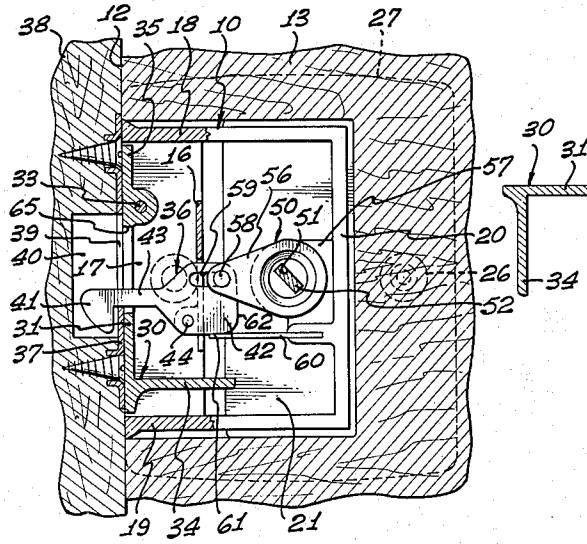
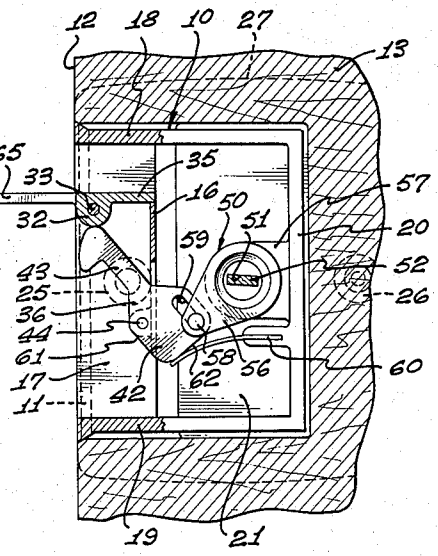


Fig. 4.



CARL C. HILLGREN,
INVENTOR.

Huebner, Beehler, Worrel & Herzig,
BY

Vernon L. Seeley

ATTORNEYS.

United States Patent Office 2,742,309 Patented Apr. 17, 1956

2,742,309

SLIDING DOOR LATCH

Carl C. Hillgren, Newport Beach, Calif.

Application May 7, 1954, Serial No. 428,318

6 Claims. (Cl. 292—100)

The invention relates to lock hardware and has particular reference to a latch mechanism adapted especially for use as a latch for sliding doors under circumstances where, when the door is open, the door and its latch is slid out of sight behind a panel.

With the advent of modern trends in building construction considerable attention has been directed to installation of sliding doors to take the place of conventional swinging doors under circumstances where frequently there is a very limited amount of space which would make employment of a swinging door very disadvantageous. Sliding doors are regularly built so that when slid to full open position every portion of the door passes behind a panel with only the edge of the door exposed. To be able to grasp the door in order to pull it closed, some means must be provided and this means in the past has comprised a balanced latch hook which can be extended by finger pressure so that a portion of the hook can be grasped by the finger as an aid in pulling the door from behind its panel. These doors also must be provided with latches so that when closed they can be latched in closed position with provision being made for unlatching when the door is to be opened.

Because of the desire to maintain a flush face at the edge of the sliding door, the catch in the form of a hook has ordinarily been located on the door frame. This has resulted in a permanently protruding hook which has been very prone to catch on clothing, causing rips in the clothing and sometimes scratching or injuring a person who might inadvertently brush against the protruding hook. Limitations in the hardware have heretofore been such that with such catches as have been devised there has not been sufficient room in the hardware element mounted on the sliding door to provide both a catch and a finger hook.

It is therefore among the objects of the invention to provide a new and improved latch mechanism for sliding doors which includes both a finger hook for opening and closing the door and a releasable catch element for holding the door closed until manually released.

Another object of the invention is to provide a new and improved latch mechanism for sliding doors which is relatively simple in that parts have been maintained at a minimum number and arranged in such a pattern that assembly of the latch mechanism is simple and rapid.

Still another object of the invention is to provide a new and improved latch mechanism for sliding doors wherein the finger hook for pulling the door closed and the latch mechanism occupy virtually the same location so that both mechanisms can be compactly located in a casing of relatively minimum size and of such design that the mechanism when installed in a sliding door presents a flush surface, there moreover being provided on the door frame nothing more than an aperture plate for cooperation with the catch mechanism.

Still further among the objects of the invention is to provide a new and improved latch mechanism especially well adapted for installation in sliding doors wherein the amount of material and number of parts has been substantially minimized and simplified so that the initial cost is kept low without sacrifice in a ruggedness of construction and design necessary to provide for long periods of service, the entire mechanism being kept sufficiently compact so that no portion thereof need extend beyond the wood surface of the door on either the exposed edge or the opposite faces.

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 side elevational view of a door section showing the device mounted therein with a catch hook extended.

Figure 2 is a transverse sectional view taken on the line 2—2 of Figure 1.

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

Figure 4 is an elevational sectional view similar to Figure 3 but showing the hand hook extended and the catch hook retracted.

In the device chosen for the purpose of illustration there is provided a somewhat open casing indicated generally by the reference character 10, one vertical end wall 11 designed to be positioned flush with an edge 12 of a sliding door 13. Behind the end wall 11 are partial walls 14 and 15 joining a transverse wall 16 and forming in effect a box-like chamber 17. An upper wall 18 and a lower wall 19 are joined at their inner ends to an inner end wall 20. The last defined walls may be considered as defining a chamber 21 which is open at the sides, bosses 22 on the walls 14 and 15, respectively, extending out to a plane substantially flush with respective inner and outer faces 23 and 24 of the sliding door 13. These bosses are adapted to the reception of screws 25 which together with screws 26 serve to hold face plates in position. An inner face plate 27 is located on the inner face 23 of the sliding door and an outer face plate 28 fits against the outer face 24 of the sliding door. Each face plate in turn encloses and conceals the chamber 21 and each face plate has a lip 29 overlying the outer end wall 11.

A hand hook indicated generally by the reference character 30 comprises a flat plate 31 having an enlargement 32 thereon spaced downwardly from the upper end of the flat plate and providing for reception of a pivot pin 33 by means of which the hand hook is pivotally supported in the casing 10 at the area of the partial walls 14 and 15. A projection 34 at the lower end of the hook is designed in retracted position to lie horizontally within the chamber 21 and adjacent the lower wall 19 thereof. The hand hook 30 is designed to occupy the positions illustrated in Figures 2 and 3 when retracted and to have a position such as that illustrated in Figure 4 when extended for being grasped by a person wishing to pull the door to a closed position. The hand hook can be extended by the exertion of finger pressure on an upper end 35 thereof in order to tilt the bottom portion outwardly to the position shown in Figure 4 where it can be readily grasped. When the hand hook is released it will fall by gravity about its pivot pin 33 to a closed position such as that illustrated in Figure 3.

For securing the door in closed position there is provided a catch hook 36 which is arranged to engage a catch plate 37 located in a door frame 38. The catch plate 37 includes an aperture 39 providing a lip at its lower edge over which the catch hook is enabled to ride so as to hook behind the catch plate, a notch 40 being made in

the door frame to accommodate a head **41** of the catch hook.

The catch hook has a body portion **42** and a neck **43** on the body portion by means of which the head **41** is attached to the body portion. The catch hook is pivoted about a pin **44** which in turn is mounted in the partial walls **14** and **15** of the outer end wall **11**.

To manipulate the catch hook there is provided a cam **50** which has a rectangular hole **51** extending therethrough adapted to accommodate a spindle **52** at the outer end of which is a finger grip **53**. A screw driver slot **54** at the inner end of the spindle to which access may be had through a hole **55** in the face plate **27** permits manipulation of the spindle if need be from the opposite side by use of a screw driver as a tool.

On the cam is a pair of arms **56** which rotatably overlie a bracket **57** by means of which the cam is rotatably mounted upon the casing **10** at the inner end wall **20**. The arms **56** moreover extend to positions overlying the body portion **42** of the catch hook. The arms are pivotally engaged with the body portion by means of a pin **58** which is received within a pin slot **59** on the body portion. It will be noted that the pin slot **59** is located when the catch hook is lowered in a horizontal position spaced a relatively substantial distance upwardly from the pin **30**.

To retain the catch hook in lowered or extended positions such as that illustrated in Figures 1, 2 and 3, there is provided a leaf spring **60** secured at the lower end of the bracket **57**, the leaf spring moreover being of such length that it lies against a flat edge **61** on the lower side of the body portion **42** as viewed in Figure 3.

A second flat edge **62** is also provided on the body portion at substantially right angles to the flat edge **61** so that when the catch hook is raised to the position shown in Figure 4 engagement of the leaf spring **60** against the flat edge **62** will serve to hold the catch hook in elevated position.

When the catch hook is in lowered position, as illustrated in Figures 1, 2, and 3, the door can be moved to a closed position and when the head **41** of the catch hook arrives at the catch plate **36** the hook will ride over the lower edge of the opening **39** of the catch plate by reason of the hook being supplied with an obliquely sloping cam face at the lower front side and after the head passes into the notch **40** the resilient pressure of the leaf spring **60** will rotate the catch hook counterclockwise until the head of the hook catches behind the catch plate.

When it is desired to release the catch, the finger grip **53** may be rotated counter-clockwise, as viewed in Figures 3 and 4, thereby to move the pin **58** against the body portion **42** causing the catch hook to rotate clockwise from the position shown in Figure 3 to the position shown in Figure 4. Pressure of the leaf spring **60** against the flat edge **62** as previously indicated will hold the catch hook in elevated position, as illustrated in Figure 4. If it be desired to again extend the catch hook, the finger grip is rotated in a clockwise direction. This will move the pin **58** obliquely upwardly in the slot **59** until the pin strikes the upper end of the slot, at which point continued movement of the pin disengages the flat edge **62** from the leaf spring and causes the catch hook to be moved to the position shown in Figure 3 wherein the leaf spring **60** again comes into play against the flat edge **61** as previously described. By use of a somewhat elongated slot **59** the catch hook can move to a slight extent without effecting any movement of the spindle when the catch hook operates to engage the catch plate.

To permit the head **41** of the catch hook to extend outwardly, there is provided a slot **65** in the flat plate **31** of the hand hook, this slot being relatively long. By having the slot long the head **41** can shift within the slot from the position shown in Figure 3 until it occupies the position shown in Figure 4. The catch hook therefore does not bind against the hand hook in any position. The hand hook accordingly may be lifted outwardly for operation or permitted to drop back to the position shown in Figure 3 whether the catch hook is extended or withdrawn. In withdrawn position the catch hook is entirely concealed inside the outer face of the flat plate **31**.

It also follows that there is no protrusion on the catch plate **37** of the door frame **38**. Hence when the catch hook is withdrawn out of catching position, there are no protrusions on either portion of the hardware, that is to say, neither on the door nor on the door frame, which are likely to be caught by the clothes of any person brushing past, nor is there any hook upon which a person might be injured.

The mechanism is compact and comprises direct acting parts. These parts are kept within a compact casing so that the face plates **27** and **28** can be located substantially flush with the corresponding faces **23** and **24** of the door **13**. The casing moreover can be kept so small that its entire opening at the edge of the door is filled by the flat plate **31** of the hand hook. Such provision as need be made for the accommodation of the head **41** of the catch hook is within the space occupied by the hand hook. No extra space need be provided. For that reason the casing **10** may be kept to a very small vertical dimension. The simple lost motion lever mechanism comprising the cam **50** and catch hook **36** also permits the casing to be kept small in its over-all depth behind the edge **12** of the door.

The compact combination thus shown and described provides a latch mechanism for a sliding door wherein such movements as may be required by operating parts need be only slight without in any way impairing the efficiency and effectiveness of the latch mechanism.

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 desired to secure by Letters Patent is:

1. In a latch for a sliding door a casing, a finger hook comprising a plate having a horizontally extending pivot connection to said casing and forming an outwardly facing end, a finger hold at one end of said plate extending into the casing in one position of the plate, said plate having another position with the finger hold protruding from the casing, said plate having a vertically extending slot therethrough, a catch having a fixed rotatable support on said casing and a separately mounted spindle element in the casing operatively engaging the catch, said catch having a lowered position wherein a portion thereof extends in latching position outwardly through said slot and a raised position wherein the catch is substantially confined within the casing, resilient means in the casing resiliently urged against the catch in one rotational direction at one position thereof and adapted to retain said catch in said one position, said resilient means being resiliently urged against the catch in the other rotational direction at a second position thereof and adapted to retain the catch in said last position, said plate in partly elevated position being adapted to move said catch against the resilient means thereby to enable extension of the plate when the catch is in extended latching position.

2. In a latch for a sliding door a casing, a catch member mounted in the casing and having a horizontally extending pivot connection at one side of the center line thereof to said casing, said catch having an elongated cam face slot at the other side of said center line, a hook element on a free end of said catch adapted in one position of the catch to extend beyond the casing and in another position of the catch to be confined substantially within the casing, a spindle actuatable cam rotatably mounted in the casing on a horizontal axis, an arm member on said cam and an extension on said arm ex-

tending into the slot in said catch whereby said catch is adapted to be rotated by said cam.

3. In a latch for a sliding door a casing comprising side walls, upper and lower walls and an inner end wall, a catch comprising a flat element having a horizontally extending pivot connection to said casing at a lower side of the center line of said catch, said catch having an elongated pin slot at the other side of said center line, a hook element on said catch adapted in lowered position of the catch to extend outwardly beyond the casing, a spindle-actuatable cam means rotatably mounted in the casing on a horizontal axis, an arm on said cam and a pin on said arm extending through the pin slot in said catch whereby said catch is adapted to be rotated by said cam, oppositely disposed flat areas on said catch and a leaf spring mounted in said casing having a position against one flat area when the catch is in lowered position and a position against the other flat area when the catch is in a raised position whereby to releasably retain said catch in one or the other of said positions.

4. In a latch for a sliding door a casing, a catch member mounted in the casing and having a horizontally extending pivot connection to said casing, a free end on said catch having a hook element adapted to move in an arcuate direction to locations where in one position of the catch member the hook element extends beyond an end wall of the casing to an operative position beyond the casing, said hook element and the catch member having an inoperative position wherein the hook element is adapted to be confined substantially within the casing, a spindle actuatable cam means rotatably mounted in said casing on a horizontal axis, an arm member on said cam means extending to a position adjacent said catch member, one of said members having a camway thereon and the other of said members having a cam element in engagement with said camway whereby said catch member is adapted to be rotated by said cam means, a spring-keeper on the casing, a spring abutment on said catch means, and a spring having in operative position of the catch member a pressure contact with the catch member in one rotational direction about said pivot and having in inoperative position of the catch member a pressure contact with the catch member in an opposite rotational direction about said pivot whereby to releasably retain said catch member in one or another of said positions.

5. In a latch for a sliding door a casing, a catch mounted in the casing centrally between opposite vertical sides and having a horizontally extending pivot connection on a lower side thereof to said casing, a free end on said catch comprising a hook element adapted to move in an arcuate direction to locations where in one position of the catch the hook element extends to an operative position beyond the casing, said hook element in an inoperative position of the catch being adapted to be confined substantially within the casing, said catch including an actuating section thereof extending above and inwardly of said pivot connection, a spindle actuatable cam means rotatably mounted in said casing on a horizontal axis, an arm section on said cam means extending to a position adjacent said actuating section of the catch, one of said sections having a cam slot therein and the other of said sections having a cam pin slidably interlocked with said cam slot whereby said catch is adapted to be rotated by said cam means, a springkeeper on the casing, a spring abutment on said catch, and a leaf spring engaging said springkeeper and having in operative position of the catch a pressure contact with the catch in one rotational direction about said pivot and having in inoperative position of the catch a pressure contact with the catch in an opposite rotational direction about said pivot whereby to releasably retain said catch and the hook element thereon in one or another of said positions.

6. In a latch for a sliding door a casing comprising side walls, upper and lower walls, an inner end wall and an outer end, a catch including a hook portion having a rotatable mounting on a fixed pivot, said catch having an extended position wherein the hook portion extends outwardly of the casing and a retracted position wherein the catch is entirely within the casing, a single resilient means engaging at one end with the casing, said catch having a spring engaging means having one location relative to the fixed pivot in extended position of the catch and another location relative to the fixed pivot in a retracted position of the catch whereby said resilient means is adapted to retain said catch in either of said positions, and a spindle assembly rotatably mounted on the casing, said catch having an extension thereon, an extension on the spindle assembly, one of said extensions having a slot therein and a pin on the other extension having a sliding fit throughout the length of said slot whereby said spindle is adapted to rotate said catch from one position thereof to another.

References Cited in the file of this patent

UNITED STATES PATENTS

1,378,518	Boardman	May 17, 1921
2,253,495	Cordrey et al.	Aug. 26, 1941
2,701,156	Palmer	Feb. 1, 1955
2,701,157	Le Bon	Feb. 1, 1955