United States Patent

Eads et al.

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[54] **NARROW STILE LATCH-LOCK STRUCTURE**

[72] Inventors: **Charles L. Eads**, Palm Springs, Calif. 92262; **Harry D. Brotman**, Hollywood, Calif. 90028

[73] Assignee: **Adams Rite Manufacturing Company**, Glendale, Calif.

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[52] **U.S. Cl.**.....**70/107**, 70/DIG. 42, 292/5

[51] **Int. Cl.**.....**E05b 59/00**

[58] **Field of Search**...70/107, 108, 111, 461, DIG. 6; 292/5, 8, 150

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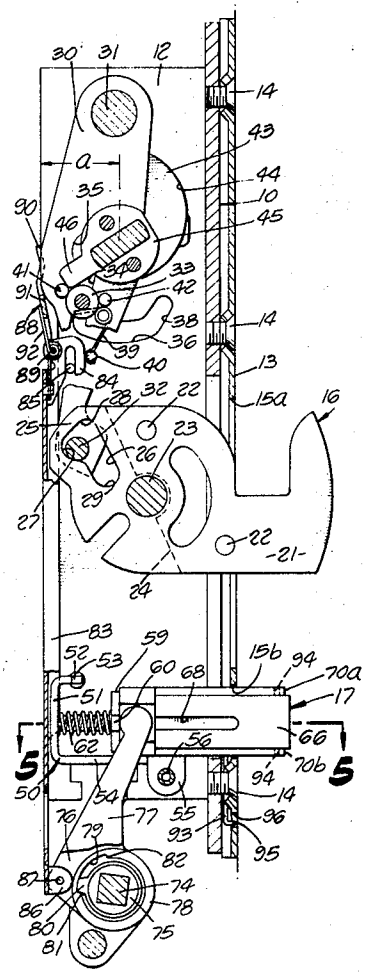
Primary Examiner—Albert G. Craig, Jr.

Attorney—Whann & McManigal

[57] **ABSTRACT**

An improved combination locking and latching assembly for mounting between the side faces of a narrow tubular stile frame member of a door to provide both locking and latching operations, respectively, by means of a locking bolt and a latch member, and wherein the latch member is spring urged to a latched position and is independently operable by a latch handle to an unlatched position, while the locking bolt is arranged to be actuated in a normal manner being further operable, in an unlocked position of the locking bolt, to move the latch member to a retracted or unlatched position.

13 Claims, 5 Drawing Figures



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SHEET 1 OF 2

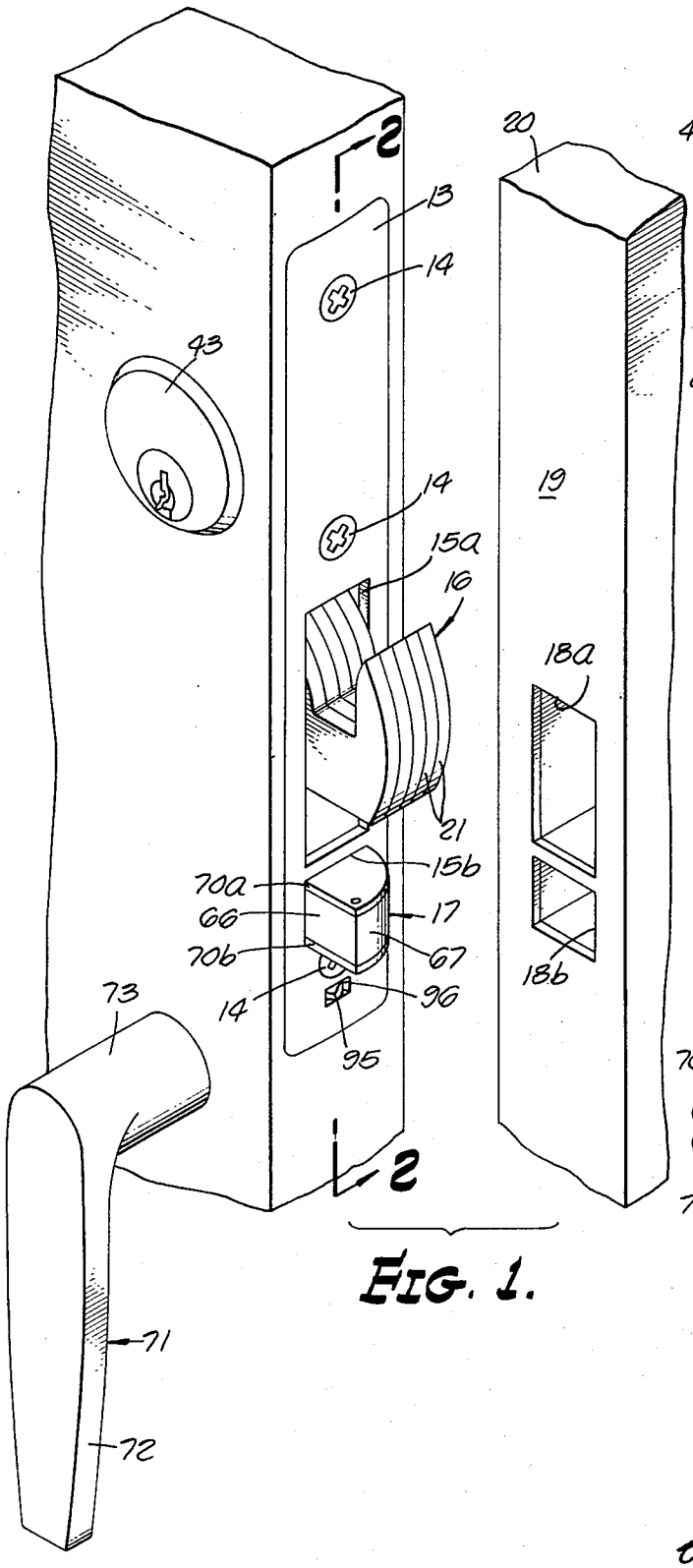


FIG. 1.

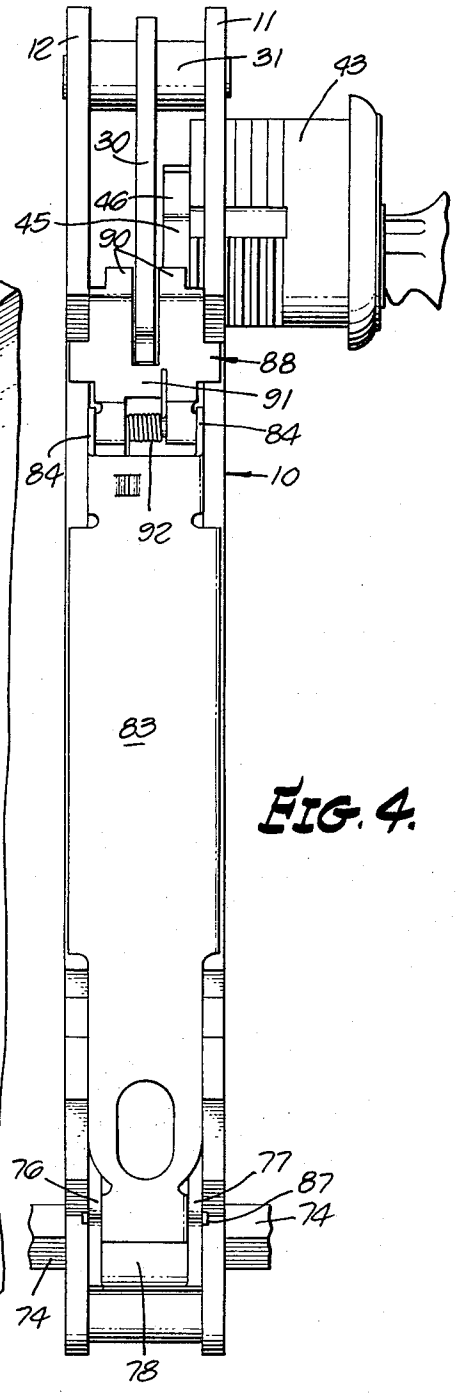


FIG. 4.

CHARLES L. EADS
HARRY D. BROTMAN
INVENTORS.
WHANN & McMANIGAL
Attorneys for Applicants
BY

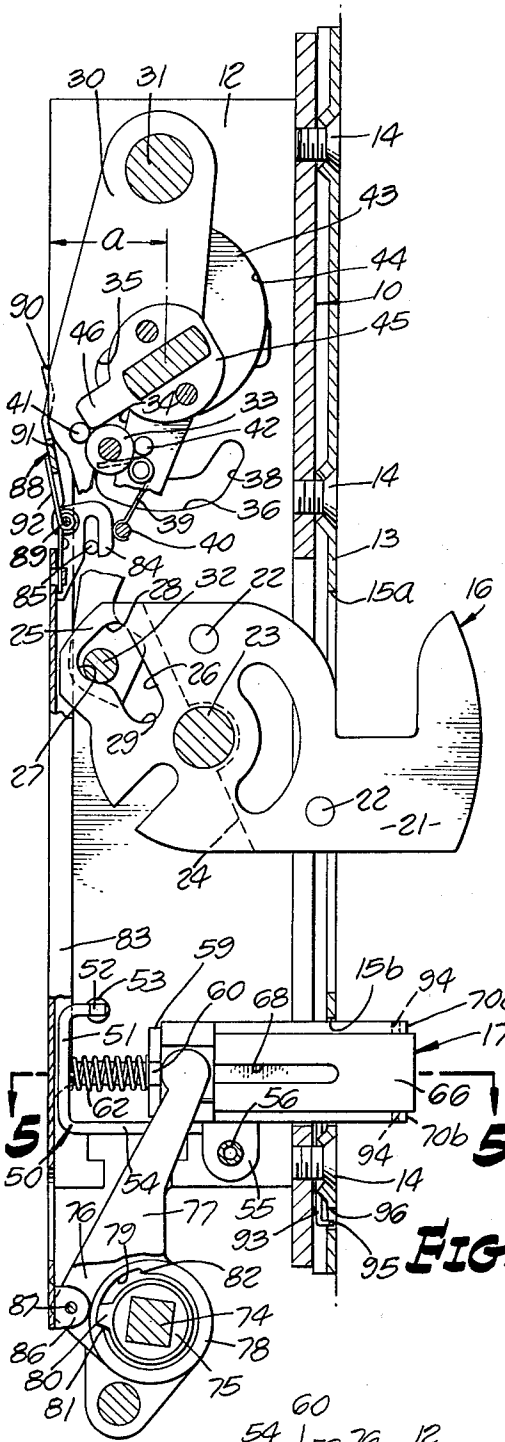
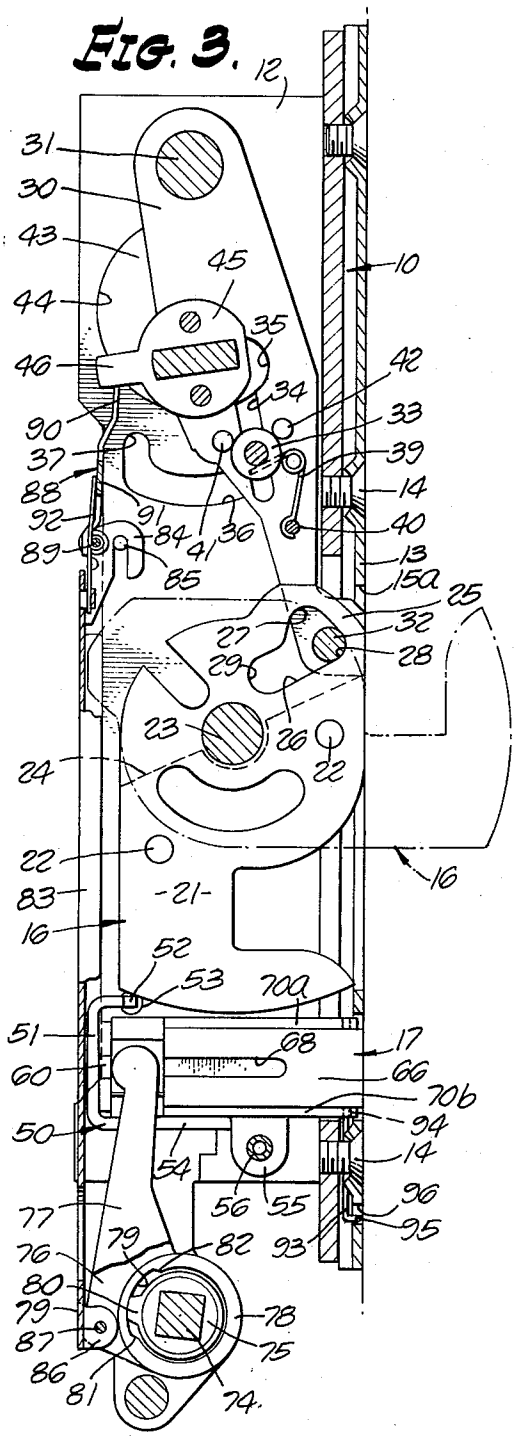


FIG. 2.

FIG. 3.



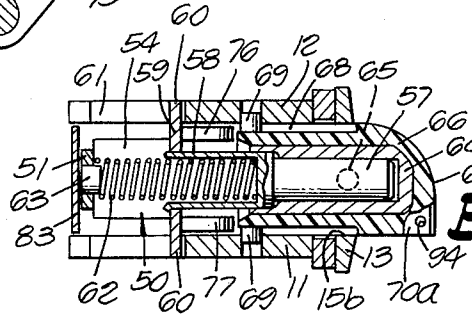


FIG. 5.

CHARLES L. EADS
HARRY D. BROTMAN
INVENTORS.
WHANN & McMANIGAL
Attorneys for Applicants
BY

NARROW STILE LATCH-LOCK STRUCTURE

BACKGROUND OF THE INVENTION

The invention relates generally to the field of locks.

It has heretofore been known to provide separate door locking means wherein the locking bolt was key controlled from both sides of a door, and the latch member was arranged for manual operation from one side of the door only. Such an arrangement, however, had the disadvantage that while a locked and latched door or an unlocked and latched door could be opened from one side, there was no way to permit entrance from the other side of the door, even though the party rightfully possessed a key. The latch would prevent opening the door from the other side.

The present invention proposes to retain the augmented security obtained by utilizing both a latch member and locking bolt, and provide the improvement which will permit through the use of a single key controlled means a normal locking and unlocking operation of the locking bolt from either side of a door, and also additionally permit the further use of the key controlled means, after actuating the locking bolt to an unlocked position, to effect movement of the latch member to an unlatched position.

In U.S. Pat. No. 2,989,859 it was known to utilize a single key controlled means for actuating a plurality of locking bolts simultaneously to locked and unlocked positions, but such concept made use of the movement of one bolt, which was actuated directly by the key controlled means, to actuate the second bolt which was operatively coupled to it. This arrangement, it will be noted, did not envision the concept of utilizing the single key controlled means for selectively actuating the locking components. The present invention therefore constitutes an improvement over this patent and provides features and advantages as will be more fully pointed out herein.

SUMMARY OF THE INVENTION

The present invention relates generally to locks, and is more particularly concerned with a combination locking and latching assembly for narrow stile door frames, in which provision is made for selective operation of the locking bolt and latching member from a single key controlled means.

Although the present invention is described and claimed in connection with lock mechanisms and latching mechanisms finding particularly advantageous use with narrow stile doors, the invention is likewise applicable to other doors, where space is not a limitation. It is therefore contemplated that the invention shall not be limited solely to use on narrow stile doors.

It is one object of the herein described invention to provide a unique combination of locking and latching mechanisms which provide a greater degree of security, yet permit the selective operation of the locking and latching members by means of key controlled means.

A further object is to provide in the foregoing combination means for actuating the locking bolt in a normal manner independently of the position of the latch member, and actuation of the latch member independently of the locking bolt position.

A still further object is to provide a unique combination locking mechanism and latching mechanism in which a latch member of the latching mechanism is operable by means of a handle which is connected with the locking mechanism through a lost motion connection.

Another object is to provide in a combination locking mechanism and latching mechanism according to the present invention, a unique mounting for the latching member which permits easy accommodation for lock assemblies having different back-sets.

Still another object is to provide in connection with the latching member, improved releasable detent means whereby the latch member may be releasably retained in a non-latching position.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the accompanying drawings, which are for illustrative purposes only:

FIG. **1** is a perspective view of a locking mechanism and latching mechanism assembly embodying the features of the present invention, together with an associated door jamb;

FIG. **2** is an enlarged fragmentary sectional view, taken substantially on line **2—2** of FIG. **1**, showing the cooperative relationship of the locking and latching components, the locking bolt being in extended position;

FIG. **3** is a view similar to FIG. **2**, except that the locking bolt is shown in retracted position;

FIG. **4** is an enlarged fragmentary rear view of the assembly; and

FIG. **5** is a fragmentary sectional view taken through the latching member, substantially on line **5—5** of FIG. **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more specifically to the drawings, for illustrative purposes there is disclosed in FIG. **1** a casing which is designated generally by he numeral **10**. This casing comprises generally a pair of side plates **11** and **12** which are secured in spaced apart relation by conventional spacing pins or other means, and including a face plate **13** which may be removably attached as by suitable screws **14** at the forward edges of the side plates. This face plate is formed with adjacent rectangular slots or openings **15*a*** and **15*b*** within which a bolt structure **16** and latch structure **17**, respectively, are movable to retracted and extended positions, as will hereinafter be explained more fully.

The bolt structure **16** and latch structure **17** in their respective locked and latched positions, are adapted to extend into suitable openings **18*a*** and **18*b*** formed in an edge face **19** of an associated jamb **20**. The bolt **16** is shown as a laminated structure in which a plurality of metallic plates **21** are secured together by suitable rivets **22** or other conventional means. The bolt is pivotally mounted for swinging movements through an angle of substantially 90° between its extended and retracted positions, a pivot pin **23** being positioned between the bolt ends, this pin having its opposite ends supported in the side plates **11** and **12** respectively.

The configurations of the inner ends of the bolt plate members are perhaps best shown in FIGS. 2 and 3. The innermost end of the central plate is terminated at the pivot pin 23 in an angularly extending end edge 24, as shown in dotted lines, beyond which extends the adjacent ends of the outer plates, thus forming a space therebetween. The adjacent ends of the outermost plates on each side thus have overlapping end portions which receive the pivot pin 23 therethrough and support the bolt for pivotal rotation. These outer plates also provide lobe portions 25—25, which are in each case formed with a Y-slot 26 having dwell positions at its ends as indicated by the numerals 27, 28 and 29 for a purpose which will hereinafter be explained in detail.

The bolt 16 is actuated between its retracted and extended positions by means of an actuating lever 30 supported for swinging movement on a pivot 31 at one end, this pivot being vertically positioned with respect to the pivot pin 33 of the bolt 16. The other end of the actuating lever extends into the previously mentioned space at the inner end of the bolt and carries a transversely extending pin 32 having its ends respectively positioned on opposite sides of the lever and respectively positioned in the adjacent Y-slots 26—26 of the bolt structure. As thus arranged, the lever 30 is constrained to limited singing movement between the forward and rear edges of the side plates 11 and 12.

Provision is made for positively releasably locking the bolt 16 in its retracted position and its extended position. This is accomplished by detent means associated with the lever 30, which includes a cylindrical detent 33. This detent is provided with a circumferentially extending groove (not shown) intermediate its ends which forms a portion of reduced diameter, this portion being slidable in a slot 34 in the actuating lever. As shown in FIGS. 2 and 3, this slot is constructed with an enlarged end portion 35 to facilitate mounting the detent in its operative position. The outermost ends of the detent 33 are respectively positioned for movement in arcuate slots 36 respectively formed in the side plates 11 and 12. The slot 36 has dwell notches 37 and 38 at its ends. The detent is biased in an upward direction in the slot 34 by a coiled spring 39 placed on each side of the actuating lever 30, one end of the coil spring being secured to an anchor pin 40 carried by the lever, and the other end of the spring bearing against and seated in a circumferential groove (not shown) formed in the detent. As thus arranged, the detent will be biased into the dwell notch 37 in the extended position of the bolt 16, and into the dwell notch 38 in the retracted position of the bolt, as respectively shown in FIGS. 2 and 3. In the dwell positions of the detent 33, the detent assumes a position between transversely extending spaced abutment pins 41 and 42, as shown in FIGS. 2 and 3 respectively.

Various mechanisms may be utilized for motivating swinging movement of the lever 30, and with the lock structure disclosed herein, provision is made for actuating the lever from either side of the casing. For purposes of illustration, a lock cylinder 43 of conventional type operable by a key is mounted in an opening 44, such an opening being formed in each of the side plates 11 and 12 for the accommodation of the lock cylinder. The lock cylinder carries rotatably mounted means 45 having a cam extension 46. The rotatably mounted means 45 is controlled by a key by means of which the cam extension may be rotated through 360° in opposite directions from a key insertion and removal position. It will also be observed that the center of rotation of the rotatably mounted means 45 is vertically aligned with the center of rotation of the actuating arm pivot 31, but off-set relatively thereto.

Advantage is taken of the path of movement of the cam extension 46 with respect to the movement of the abutment pins 41 and 42, which enables the utilization of the cam extension to serve the dual purpose of releasing the detent 33 and thereafter shift the actuating arm from one of its locked positions to the other so as to motivate the bolt 16 from one position to the other. As shown in FIG. 2, the detent is positioned in the dwell notch 37 and the pin 32 is positioned in the dwell position 27 of the Y-slot of the bolt. In this position, the bolt 16 is positively locked in its extended position. Should it be desired to move the bolt to its retracted position, the cam extension 46 would be rotated in a counterclockwise direction from the key insertion and removal position, which in this case is when the extension is extended vertically upward. Upon movement of the cam extension to the position shown in FIG. 2, it will be observed that the abutment pins 41 and 42 are in such a position that the outermost end of the cam extension will pass the abutment pin 41 and move into engagement with the detent 33. Continued movement of the cam extension will cause it to force the detent from the dwell notch 37 and to a position which permits the extension end to pass between the abutment pins 41 and 42. As the cam extension comes in contact with the abutment pin 42, the applied forces will now shift the actuating arm 30 to the position shown in FIG. 3. In this position, the bolt 16 will be in a retracted position, and the pin 32 will be in the dwell position 28 of the Y-slot. In this position of the arm, the detent 33 will be biased into the dwell notch 38, as the cam extension is continued in its counterclockwise movement. In this position of the actuating arm, it will be observed that the abutment pin 42 has assumed a position which will permit the end of the cam extension to pass by this abutment pin and be continued in its movement to the key insertion and removal position. The action of the lock elements will be similar to that just described except in reverse order, when rotating the cam extension from the key insertion and removal position in a clockwise direction. During actuation of the bolt between its retracted and extended positions, the pin 32 will move into dwell position 29 of the Y-slot at the intermediate position of the bolt. Moreover, the curvature of the Y-slot is such that the pin 32 will act to restrain free movement of the bolt in going from an extended position to retracted position.

From the foregoing description, it is believed that it will be evident that the key cannot be removed and inserted at a position which would leave the bolt in other than a fully extended locking position or a fully retracted unlocked position.

As will be seen from the drawings, the latch structure 17 is positioned below the bolt structure 16, and as shown, comprises a generally L-shaped supporting bracket 50 which is positioned between the side plates 11 and 12, this bracket having one leg 51 positioned at

the back of the casing and attached at its ends by means of lateral side projections **52** which extend into openings **53** formed in the side plates. The other leg of the bracket, as indicated at **54**, extends toward the front of the casing and is provided at its end with depending side lugs **55—55** provided with openings for receiving a retaining pin **56** having its ends respectively supported in the side walls of the casing. The flat surface of the leg **54** provides a supporting surface upon which the latch structure is slidably supported for reciprocable movements between retracted and extended positions.

As shown in FIG. **5**, the latch structure assembly includes a latch pin or stem **57** which has a tubular end portion **58** supported by coining or otherwise mounting in an opening of a connected guide plate **59** having side projections **60** arranged to extend into an associated guide slot **61** in the associated side plates of the casing. A compression spring **62** is mounted with one end seated in the cylindrical end portion **58**, and its other end anchored as indicated at **63** to the leg **51** of the bracket **50**. This spring normally urges the latch pin or stem **57** towards the front of the casing so that the latch structure will be normally in an extended latching position.

The latch structure may assume various forms, but is shown as comprising in this case an inner body **64**, preferably of a suitable metal, which is adapted to slip over the outer end of the stem **57** to which it may be secured by means of a suitable set screw, as indicated at **65**.

Surrounding the body is an outer shroud **66** formed of a suitable plastic to provide parallel side walls and a rounded outer end, as indicated at **67**. The side walls are provided with elongate guide grooves, as shown at **68**, which are adapted to receive a pin **69** mounted in the respective side plates of the casing. This pin and groove arrangement stabilizes the reciprocable movement of the latch member. As a protective measure, the top and bottom surfaces of the shroud are provided with a metal top plate **70*a*** and metal bottom plate **70*b***. These plates are coextensive with the upper and lower surfaces of the shroud and provide a protective shielding therefor.

Provision is made for manually moving the latch from an extended or latching position by providing an actuating handle, as generally indicated at **71**, in FIG. **1**. This handle has an elongate grip portion **72** and a hub portion **73** which is provided with a square shaft **74** adapted to be operatively positioned within a rotatably mounted latch lever bearing **75**, the opposite ends of this bearing being rotatably supported in depending extensions of the side plates **11** and **12** of the casing. The arrangement just described permits the handle **71** to be selectively mounted on either side of the door structure, depending upon the type of operation required at the particular installation.

The latch lever bearing provides a support for a latch lever in which a pair of spaced lever arms **76** and **77** are secured to a cylindrical hub **78** which is rotatably mounted on the bearing **75**. The outermost ends of the lever arms **76** and **77** are positioned on opposite sides of the cylindrical end portion **58** and in front of the guide plate **59** in such a manner that rotation of the lever arms in a counterclockwise direction, as viewed in FIGS. **2** and **3**, will effect a retraction of the latch from its extended latching position to a retracted unlatched position. As will subsequently become evident, it is desirable in the present invention to provide a lost motion connection between the latch lever bearing **75** and the lever arm structure hub **78**. For this purpose, there is provided a circumferentially extending arcuate recess **79** at the hub **78** within which a projection **80** carried by the latch lever bearing **75** is movable between spaced shoulders which form abutments **81** and **82** at the ends of the recess **79**.

Provision is made for actuating the latching mechanism by the key controlled means, when the lock mechanism is in an unlocked position. For such purpose, there is provided at the back side of the casing a slide plate **83** which is mounted for endwise guided movement. At its upper end, this plate has on each side a hook element **84** which is slidingly engaged with a guide pin **85** carried by the adjacent side plate of the casing. At its lower end, the slide plate is provided on each side with a lug **86** which is connected by a pivot pin **87** to the adjacent lever arm as positioned on its side of the casing.

The upper end of the slide plate **83** carries an H-shaped hinge extension, as generally indicated at **88**, this extension being hinged at its inner end **89** to the slide plate. The outermost end of the hinge extension provides spaced fingers **90—90** which are adapted to be positioned adjacent the opposite side plates of the casing so as to be engageable under certain conditions, as will hereinafter be explained, by the cam extension **46**. The side fingers are interconnected by a bridging bar portion **91**. A spring **92** normally urges the hinge extension in a clockwise direction, as viewed in FIGS. **2** and **3**.

In the locked position of the bolt **16**, as shown in FIG. **2**, it will be observed that spring **62** urges the latch **17** towards its extended position, and acts through the lever arms **76, 77** to move the slide plate in an upward direction. It will also be observed that in this position the bridging bar **91** of the hinge extension is engaged by the adjacent edge of the actuating lever **30** and will be moved in a counterclockwise direction so that the outer fingers **90—90** will be positioned out of the path of travel of the cam extension **46**, thus permitting the cam extension to perform its normal operation of motivating the lock mechanism so as to move bolt **16** to an unlocked position, as shown in FIG. **3**.

In the unlocked position, the actuating lever **30** is moved away from the hinge extension **88** so that the hinge extension can now move under the action of spring **92** in a clockwise direction in order to position the fingers **90—90** in the path of travel of the cam extension **46**, during its counterclockwise rotation subsequent to its having actuated the bolt **16** to an unlocked or retracted position. Further rotation of the rotatable means **45** will cause the slide plate to move downwardly and actuate the latch **17** to a retracted position. This actuation is independent of the latch handle operation by virtue of the lost motion connection between it and the lever arms **76, 77**.

Provision is also made for releasably retaining the latch member in retracted position, when desired. For this purpose, there is provided a wire detent **93** which is mounted for sliding movement below the metal bottom

plate 70*b* of the latch structure, the bottom plate containing a recess opening 94, as shown in FIG. 5, which is adapted to receive the end of the wire detent when the latch is in retracted position. Movement of the detent is accomplished by providing a deflected portion 95 at its lowermost end, this portion being engageable through an opening 96 in the face plate below the latch element, as shown in FIG. 1.

Another feature of the disclosed invention resides in the adaptability of the latching mechanism for installations wherein the back-set may vary. For casing structures having different back-sets, the distance, as indicated at *a* in FIG. 2, between the center of rotation of the rotatable means 45, and the back edge of the side plate of the casing, is maintained at a constant value. Thus, to accommodate for the different back-sets, it is only necessary to change the length of the latch or stem pin 57 to adapt the latch mechanism for the different back-sets.

From the foregoing description, it is believed that it will be appreciated that the lock and latch structure described accomplishes the stipulated objects set out for the invention.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of our invention, and hence, we do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated.

We claim:

1. A combination locking and latching assembly for a movably mounted door having a relatively narrow stile, comprising:
   a. a casing structure positionable in said stile, said structure presenting adjacently positioned front openings in an edge facing of said stile;
   b. a locking mechanism in said casing including a locking bolt supported for selective movements to a retracted unlocked position and to an extended locked position projecting through one of said openings;
   c. a latching mechanism operable independently of said locking mechanism and including a retractable latch member normally urged to an extended latching position; and
   d. key actuated means selectively connectable with said locking mechanism, for moving said locking bolt to extended and retracted positions, and with said latching mechanism for moving said latch member to a retracted position, the connection with said latching mechanism including a slide member supported for guided movement on an axis rearwardly of said openings and extending generally length-wise of the casing and associated narrow stile.

2. A combination locking and latching assembly according to claim 1, wherein the latch member has a side opening, and releasable detent means including a wire member mounted for sliding movement to a position in which an end of the wire is positioned in said opening for retaining said latch member in a retracted position.

3. A combination locking and latching assembly according to claim 1, comprising handle means for manually actuating the latching mechanism, independently of the key actuated means, so as to move the latch member from an extended latching position to a retracted position.

4. A combination locking and latching assembly according to claim 3, wherein said slide member and said handle means are interconnected by a lost motion connection.

5. A combination locking and latching assembly for a movably mounted door having a relatively narrow stile, comprising:
   a. casing structure positionable in said stile, said structure having adjacently positioned openings in an edge facing of said stile;
   b. a locking mechanism in said casing including a locking bolt supported for selective movements to a retracted unlocked position and to an extended locked position projecting through one of said openings;
   c. key actuated means operable to positions for selectively moving said locking bolt to extended and retracted positions;
   d. a latching mechanism including:
      a latch member mounted for reciprocable movements between a retracted position and an extended latching position;
      a lever swingably pivoted at one end, and having its other end engaged with said latch member;
      elongated axially movable means extending along said casing having one end operably associated with said key actuated means and its other end pivotally connected with said lever;
      spring means normally urging said latch member towards its extended position, and swinging said lever in a direction to axially move said elongated means towards said key actuated means; and
   e. rotatable cam means operable by said key actuated means to a position for moving said elongated means, lever and latch member against the action of said spring for positioning the latch member in a retracted position.

6. A combination locking and latching assembly according to claim 5, wherein said cam means are operable to other positions for selectively actuating said locking bolt to retracted and extended positions.

7. A combination locking and latching assembly according to claim 5, including a latch actuating handle connected with said lever and being operable to swing the lever in a direction to move the latch member to retracted position.

8. A combination locking and latching assembly according to claim 7, wherein the actuating handle is connected with said lever through a lost motion connection.

9. A combination locking and latching assembly according to claim 8, wherein the lever has spaced shoulder portions circumferentially of its pivot axis, and said handle includes a rotatable member having a projection movable between said shoulder portions.

10. A combination locking and latching assembly according to claim 5, wherein said elongated means at said one end has a spring urged hinge extension adapted for engagement by said cam means when utilizing the key actuated means to move the latch member to retracted position.

11. A combination locking and latching assembly according to claim 10, wherein the hinge extension is maintained out of the path of travel of said cam means when the locking bolt is in extended position, but is

spring urged into the path of travel of said cam means when the locking bolt is in retracted position.

12. A combination locking and latching assembly according to claim 10, including an actuating member connected with said bolt, and being movable by said cam means to selectively position the locking bolt in retracted and extended positions, said actuator member in the extended position of said locking bolt being engaged with and moving said hinge extension out of the path of travel of said cam means.

13. A combination locking and latching assembly for a movably mounted door having a relatively narrow stile, comprising:

a. a casing structure positionable in said stile, said structure having adjacently positioned openings in an edge facing of said stile;

b. a locking mechanism in said casing including a locking bolt pivoted for swinging movements to a retracted unlocked position and to an extended locked position projecting through one of said openings;

c. a latching mechanism operable independently of said locking mechanism including a latch member mounted for reciprocable movements and being normally urged to an extended latching position; and

d. key actuated means selectively connectable with said locking mechanism for moving said locking bolt to extended and retracted positions, and with said latching mechanism for moving said latch member to a retracted position.

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