July 1, 1941. L. A. BITTORF ET AL 2,247,937

LATCH STRUCTURE

Filed May 16, 1938

Fig. 1.

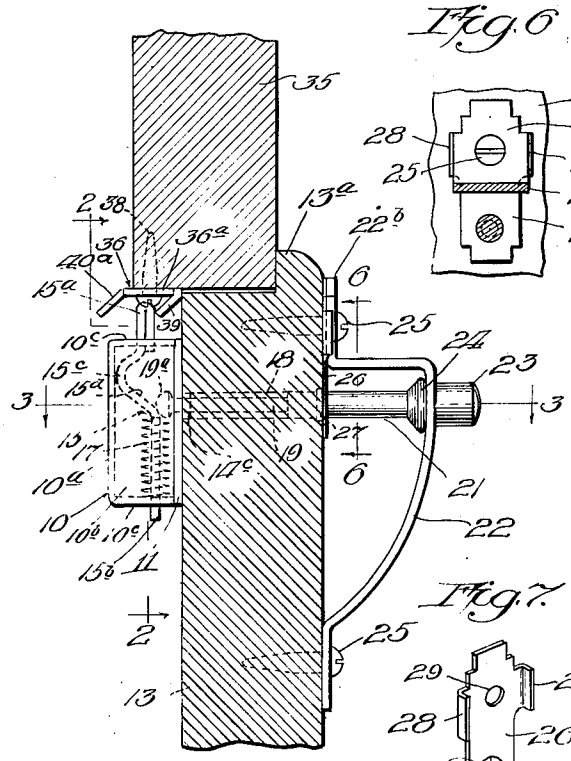


Fig. 2.

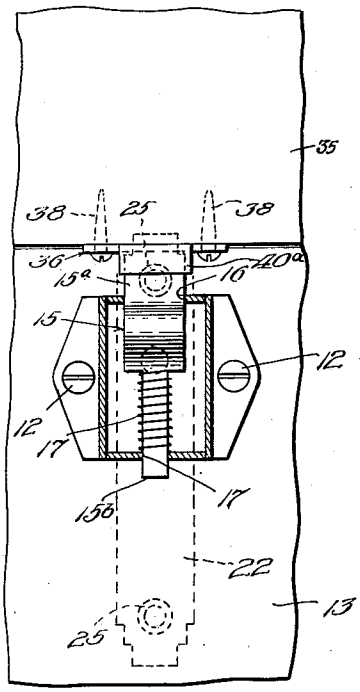


Fig. 6

Fig. 7.

Fig. 3.

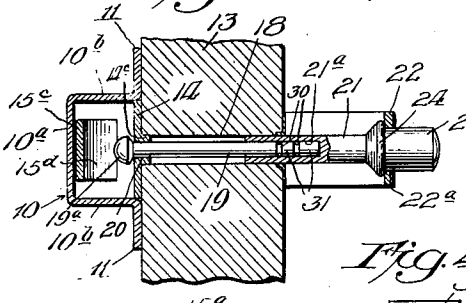


Fig. 8.

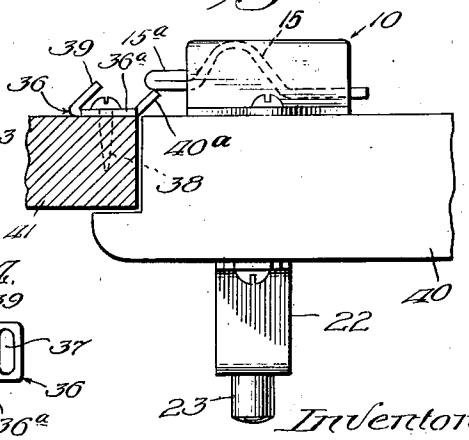


Fig. 4.

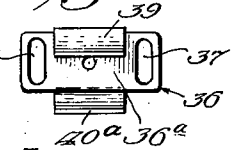
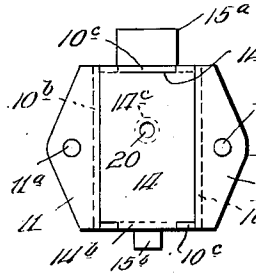


Fig. 5.



Inventors:
Louis A. Bittorf and
Frank Decker Jr.
by Davis, Hudson, Smith & Shorte
Attys

Patented July 1, 1941 2,247,937

UNITED STATES PATENT OFFICE

2,247,937

LATCH STRUCTURE

Louis A. Bittorf and Frank Decker, Jr., Sterling, Ill., assignors to National Manufacturing Co., Sterling, Ill., a corporation of Illinois

Application May 16, 1938, Serial No. 208,168

9 Claims. (Cl. 292—174)

This invention relates to latches for cupboard doors and the like, and it has to do particularly with a latch adapted to automatically engage catch means in the closing movement of a door and to be released for opening the door by push means extending through an opening in the door.

One of the objects of this invention is to provide improved latch structure of the foregoing character which is of simple construction, may be manufactured quite cheaply, embodies but few operating parts, is strong and durable and serves its intended purpose in a highly efficient manner.

Another object is to provide a latch structure of the foregoing character which includes a universal catch means adapted to be mounted on the door jam along either its edge defining the door opening or along its rear face adjacent the door opening to accommodate different door-and-jamb arrangements. To this end we provide a catch device having a body with a pair of similarly inclined integral cam-acting catch elements thereon, the body being adapted for attachment in either an upright or inverted position.

Other objects are to provide an improved and sectional push means for operating the latch bolt, which means includes an inner bolt-engaging pin that has spaced, weakened end portions providing end parts that may be broken away to shorten the pin and adapt the latch for doors of different thickness; to provide improved means serving as a handle and for guiding and supporting an outer pin-operating section of the push means, which handle means is positively positioned relative to the push means in such a way that the push means is accurately centered with respect to the remainder of the structure, thereby insuring a free and ready-acting latch structure; to provide an improved form of latch bolt; and to provide latch structure including mainly sheet metal parts so constructed and arranged that they may be easily and quickly assembled into operating relation.

Other objects and advantages will become apparent as this description progresses and by reference to the drawing wherein,

Figure 1 is a fragmental sectional view of one form of cabinet door structure, illustrating one form of latch structure embodying our invention applied thereto;

Fig. 2 is a section taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a section taken substantially on line 3—3 of Fig. 1;

Fig. 4 is a separated top plan view of the catch device shown in Figs. 1 and 2;

Fig. 5 is a bottom plan view of the casing supporting the latch bolt;

Fig. 6 is a section taken substantially on the line 6—6 of Fig. 1;

Fig. 7 is a separated perspective view of a plate member employed for centering the latch operating means with respect to its guiding and supporting means; and

Fig. 8 is a view similar to Fig. 1 and illustrating another cabinet door arrangement wherein the catch device is located along an inner face of the door jamb, instead of the position shown in Fig. 1.

The latch structure shown in the drawing includes a rectangularly shaped sheet metal casing 10 having an integrally formed top wall 10a, side walls 10b and end walls 10c. The side walls 10b are provided with outwardly turned flanges 11 having openings 11a for reception of screws 12, or other suitable fastening means, for mounting the casing on the inner face of a door 13, near the free edge of the latter. The casing 10 is further provided with a friction-fitted and removable bottom cover 14 provided with a notch 14a at one end and a tongue 14b at its other end. The tongue 14b of the bottom plate is adapted to be received in a similarly-shaped notch in the upper end of the adjacent casing end wall 10c, and the notch 14a at the other end of such plate is adapted to receive a similarly-shaped tongue portion at the upper end of the other end wall 10c, the arrangement being such that when the bottom plate 14 is forced into position with these notches and tongues engaged, respectively, the bottom plate is removably held in position substantially flush with the adjacent surfaces of the side wall flanges 11. This permits the side wall flanges 11 to be secured firmly against the inner face of the door.

The casing 10 supports a sheet metal latch bolt 15 which is mounted for lengthwise movement of such casing. This latch bolt is provided with a front end or catch engaging nose portion 15a rounded and strengthened by folding the sheet metal material back upon itself. The bolt 15 is longer than the casing 10 and its front end portion extends slidably through a slot 16 in the forward end wall 10c and its rear end 15b projects slidably through a slot 17 in the rear casing end wall 10c. The intermediate portion of the bolt 15 is provided with a portion 15c offset in concave fashion toward the top wall 10a, providing a downwardly and forwardly inclined camway 15d, the purpose of which will become obvious hereinafter. The depth of the offset 15c

is such that it rides upon the casing top wall 10a, thereby avoiding distortion of the bolt when its cam surface 15d is acted upon in order to retract the bolt. The forward part of the bolt 15, including its offset portion 15c, is considerably wider than its rear portion 15b.

The bolt 15 is constantly urged forwardly into its catch-engaging position by a coil spring 17 which surrounds the rear portion 15b of the bolt within the casing 10. This spring is confined under compression between the rear end wall 10c of the casing and the enlarged offset portion 15c of the bolt. The bolt 15 is actuated to disengage the catch to permit opening of the door by push means having reciprocable parts extending through an opening 18 in the door 13.

Specifically, the push means comprises a unit including an inner pin 19 and an outer pin 21. The inner pin 19 is located in the inner part of the door opening 18 and extends through an opening 20 in the casing bottom wall 14 into the casing 10. The end of the pin 19 within the casing 10 is enlarged and rounded and it is so located that it engages the upper end of the bolt camway 15d in the normal, extended position of the bolt 15. It will be seen that by pushing the pin 19 toward the bolt, the pin head 19a will ride upon the camway 15d and retract the bolt 15 against the compression of the spring 17. The pin 19 is pushed inwardly by the outer pin member 21 which has an axial opening 21a in its inner end in which the adjacent end of the pin 19 is freely received. The actuating pin 21 is slidably received in the outer part of the door opening 18 and it is retained against displacement from the opening 18 by a stationary grip-type handle 22. More particularly, the outer end of the actuating pin 21 is provided with an enlarged head 23 having an annular, enlarged shoulder 24 formed at the inner end thereof. The handle 22 is formed of sheet metal and it is provided with an opening 22a in which the head 23 of the actuating pin 21 is slidably received. The pin shoulder 24 is of greater diameter than the handle opening 22a so that when the handle 22 is secured in place, as by screws 25 passing through openings in the opposite ends of the handle 22, the pin 21 is confined against removal from the door opening but is reciprocable therein. The parts above described are, preferably, so constructed and arranged as indicated in Fig. 3, that in the normal, latched position of the structure the spring 17 moves and holds the parts so that the outer end of the pin 19 engages the inner end of the opening 21a in the pin 21 and the shoulder 24 on the pin 21 seats against the handle 22, the pin unit being reciprocably retained between the bolt 15 and handle 22. The head 23 of the pin 21 is shaped to be engaged by, preferably, the thumb of the user so that, by grasping the lower part of the handle 22 with the fingers and pressing inwardly on the pin head 23 with the thumb, the bolt-actuating structure is moved inwardly to retract the bolt 15. Upon releasing the pin head 23, the spring 17 will quickly return the parts to the normal, latched position as indicated in Figs. 1, 2 and 3.

It is highly desirable that the handle 22 be mounted in such a way that its opening 22a is accurately centered with respect to the door opening 18 so that the free reciprocating action of the pin unit will not be cramped or hindered in any way. To accomplish this, I provide a centering plate 26 (Figs. 1, 6 and 7). This centering plate is provided at its lower end with an opening 26a surrounded by an inwardly extending, annular flange 27 which is of a size adapted to fit snugly within the outer end of the door opening 18. The upper end of the plate 26 is provided with side wings 28 between which the upper leg 22b of the handle 22 is received and confined, the plate being provided with an upper opening 29 which coincides with the opening in the handle leg 22b through which the screw 25 is passed. It will be seen, therefore, that by first forming the door opening 18, then applying the centering plate 26 with its flange 27 properly engaged in the door opening, then applying the handle 22 with its leg 22b engaged with the upper end of the plate as stated, and then securing these parts by screw 25, the handle opening 22a is properly centered with respect to the door opening 18. Further and proper alignment between the pin 19 and the door bolt is assured by an outwardly turned flange 14c on the casing bottom wall 14, which flange fits snugly within the inner end of the door opening 18, centering the casing 10 with respect to such opening.

It is highly desirable that latch structures of this character be adapted for application to doors of different thickness. This greatly facilitates production and stock handling of the devices and, to that end, I provide a novel form of bolt-operating pin 19. Specifically, the outermost end of this pin is provided with a plurality of spaced-apart circumferential grooves 30 of such depth as to weaken the pin at those points, providing, in effect, weakened sections 31 that may readily be broken away by applying pressure laterally thereto. For example, with all of the sections 31 intact, as shown in Fig. 3, the structure is adapted for a door of a certain thickness or for a certain range of thicknesses; and by breaking off the outermost section 31 or any desired number thereof, the structure is adapted for doors of reduced thicknesses or range of thicknesses. It will be understood, of course, that the weakened pin sections 31 do not affect the ability of the pin to do its intended work, since the operating pressure is applied thereto in longitudinal direction without any tendency to break the weakened portion.

Our invention is adapted for use with various door and jamb arrangements. For example, as shown in Fig. 1, the door 13 may be employed with a jamb 35, the door being provided with an extended outer face portion 13a providing an overlapping seal edge. In this case, the inner face of the door is offset outwardly from the inner face of the jamb and the locking bolt 15 is operatively associated with a catch device 36 located on the uncovered door opening edge of the jamb 35 in a plane at right angles to the inner and outer faces of the door 13 and jamb 35. Also, as illustrated in Fig. 8, the door 40 and jamb 41 may be so arranged that the inner face of the door coincides with the inner face of the jamb and, in this case, the catch device 36 is mounted on the inner face of the jamb in a plane parallel with the inner face of the door 40. In other instances, the locking bolt and its operating mechanism may be carried by a door similar to the doors 13 and 40 and the catch device may be carried by a companion door (not shown), in which case the catch device will be mounted on the inner face of the companion door similarly to the mounting illustrated in Fig. 8. These different catch mountings present a problem in the assembly of the latch structure, in that a catch device having a single catch element adapted to cooperated with the locking bolt 15 in the position shown in Fig. 1 would not afford an operative

relation between the locking bolt and catch device when such device is mounted in the position shown in Fig. 8. We have taken care of this problem by providing a universal form of catch device which will operably function with the locking bolt in all catch-mounting positions.

To the foregoing end, the catch **36** is formed of sheet metal and includes an elongated flat body portion **36a** having transversely elongated openings **37** at its opposite ends and through which screws or other fastening devices **38** may be passed for securing the device in place. The elongated openings **37** permit the device to be shifted laterally to insure the proper engagement between the locking bolt **15** and the catch elements **39** and **40a**. The catch elements **39** and **40a** extend integrally from the side edges of the catch body **36a** and are inclined in the same direction and in substantially parallel relation. In mounting the catch on the wall of the jamb **35** bounding the doorway, as shown in Fig. 1, its body **36a** is secured longitudinally of the jamb with the catch element **39** located next to the door **13**. In this position, the catch element **39** is inclined away from the door in the path of the bolt **15** for cooperation with the latter. With this arrangement, as the door is closed, the rounded nose **15a** of the locking bolt engages the catch element **39** and is cammed inwardly against the action of spring **17**. The catch is so located that as the door reaches its fully closed position, the locking bolt will have passed by the end of the catch element **39** and become engaged therebehind through the action of the spring **17**. The lock bolt **15** remains in this position until the pins **19** and **21** are pushed inwardly to cam the locking bolt back out of engagement with the catch element **39**, releasing the latch structure for opening of the door.

If the catch is located on the inner face of the jamb, as illustrated in Fig. 8, the catch element **39** cannot be adjusted to any position in which it would be operably engaged with the locking bolt. The locking bolt may, however, be operably engaged with the latch element **40a**, when the catch is positioned as stated, by merely inverting the catch body **36a** and securing it in the position shown in Fig. 8 adjacent the doorway, wherein the latch element **40a** will project inwardly and rearwardly of the doorway and into position to be engaged by the locking bolt **15** in the manner described with respect to the catch element **39**. In this way, the latch structure is adapted for any form of mounting, and it is necessary to include only one catch device in each latch set, thereby facilitating manufacture, stock handling of parts and assembly of the latch structure. In other words, our invention eliminates the necessity of stocking and packaging, with each latch set, a plurality of catch devices in order to adapt the latch structure for universal mounting.

It is believed that the operation and advantages of our invention will be readily understood from the foregoing description. The entire latch structure is simple and embodies but few operating parts. It may be manufactured quite cheaply, all without sacrificing the desired strength and durability. The parts may be so mounted that they are free-acting, whereby the latch may readily be engaged automatically by moving the door to its closed position with a minimum of force; and very slight pressure is required to actuate the bolt-releasing means. The ease with which the structure may be applied to doors of different thickness and the universal mounting characteristics above mentioned have added materially to the success experienced by this latch structure.

We claim:

1. Latch structure adapted to be applied to one face of a door having an opening therethrough, comprising a casing including top, end and bottom walls, said end and bottom walls having openings therein, a sheet metal strip constituting a latch bolt disposed lengthwise within said casing with its opposite ends projecting through and beyond and guided in the openings in said end walls, said strip bolt having its mid portion within said casing offset to provide a camway thereon inclined forwardly away from the opening in the bottom wall and toward the top wall, a spring constantly urging said strip bolt forwardly toward a latched position, and means adapted to extend through the door and casing bottom openings into free abutting engagement with said camway at substantially right angles to the direction of movement of said bolt and adapted to be pushed inwardly against said camway to displace said strip bolt in opposition to said spring.

2. Latch structure adapted to be applied to a door having an opening therethrough, comprising a casing having top, side and end walls, a latch bolt having a comparatively wide forward part slidably projecting through an opening in the forward end wall of said casing and a narrower rear part slidably projecting through an opening in the rear end wall of said casing, in horizontal alignment with its forward portion, the wide part of said bolt adjacent its narrower part being offset toward and against the top wall of said casing for slide support thereon, said offset portion being shaped to provide a camway inclined forwardly and outwardly spring means associated with said narrower bolt part constantly urging said bolt forwardly into latching position, and push means engaging said camway and adapted to be mounted in said door opening, the arrangement being such that by moving said push means inwardly such means engages said camway and retracts said bolt against the action of said spring means.

3. Latch structure adapted to be applied to a door having an opening therethrough, which comprises a latch bolt and a support therefor adapted to be mounted on the inner face of the door in alignment with its opening, spring means constantly urging said bolt toward latching position, and push means for retracting said bolt against the action of said spring means including a pair of pin members adapted to be mounted in the door opening, one of said pin members having one end disposed in free abutting engagement with said bolt and its other end freely received in a recess formed in the inner end of the second of said pin members whereby said pin members are maintained in longitudinal alignment at all times, the second pin member being long enough to project beyond the outer face of the door, and means adapted to be secured to the outer face of the door and slidably supporting the outer end of said second pin member and also serving as a handle for moving the door, and means associated with said second pin member engaging said handle means, limiting the outward movement of said pin members and retaining said pin members, handle means and bolt in associated relation.

4. Latch structure adapted to be applied to a door having an opening therethrough, comprising a latch bolt having a camway intermediate

its ends and reciprocable in one plane, push means engaging said camway for operating said bolt and reciprocable in a plane at substantially right angles to the plane of movement of said latch bolt, said push means including an inner pin member adapted to be mounted in the door opening with one end abuttingly engaging the camway of said bolt, an outer pin member having an axial opening in its inner end freely receiving the other end of said first pin member for maintaining the pin members in longitudinally aligned relation as the push means is reciprocated, said outer pin member being adapted to be mounted in the door opening with its outer end projecting outwardly therefrom, means adapted to be secured to the outer face of the door and slidably supporting the outer end of said outer pin member, said means serving also as a door handle, and stop means on said outer pin member adapted to engage said handle means in the outermost position of said outer pin member to retain said pin members, bolt and handle means in operative assembled relation.

5. Latch structure adapted to be applied to a door having an opening therethrough, which comprises a latch bolt and a support therefor adapted to be mounted on the inner face of the door in alignment with its opening, spring means constantly urging said bolt toward latching position, and means for operating said bolt which includes a pin unit adapted to be reciprocably mounted in the door opening, said unit including an inner pin having a rounded head at one end adapted to engage said bolt, an outer pin having an opening in its inner end in which the other end of said inner pin is freely received, an enlarged head at the outer end of said outer pin adapted to be engaged by the thumb or finger of the user, a support member adapted to be mounted on the outer face of the door and in which said enlarged head is slidably received, said support member being shaped to provide a stationary grip handle to be grasped by the hand of the user, and stop means on said outer pin adapted to engage said support member and limit the extent of outward movement of said outer pin and to retain said pins in assembled relation between said bolt and support member.

6. A sheet metal latch bolt for latch structure in which the bolt is reciprocated toward and from a latching position, which comprises a comparatively wide forward portion having its forward end bent back upon itself providing a thickened catch-engaging nose having a rounded outer end, a narrower rear portion in substantially the same plane as said wide portion, an intermediate offset portion in said wide portion adjacent said narrower portion, said offset portion being shaped to provide an outwardly and forwardly extending camway leading substantially from said narrower portion.

7. Latch structure adapted to be mounted on a door having an opening therethrough, which comprises a casing adapted to be mounted on the inner face of the door and having an opening in one of its walls, an integral annular flange on said casing wall surrounding said casing opening and adapted to fit into the inner end of the door opening, a reciprocable latch bolt carried by said casing in alignment with said casing opening, pin means adapted to be mounted in the door opening and having one end projecting through said casing opening into engagement with said bolt, and having its other end adapted to project outwardly from the outer end of the door opening, a grip-shaped handle adapted to be mounted on the outer face of the door and having an opening in which the outer end of said pin means is received, means at the opposite ends of the handle for attaching the same, and a centering plate for aligning the handle opening with the door opening and having an opening surrounded by a flange which is adapted to be received in the outer end of the door opening, and another opening therein coinciding with the fastening means at one end of said handle.

8. Latch structure adapted to be applied to a door having an opening therethrough, which comprises a latch bolt movable toward and from a latching position, bolt-operating means including a pin unit adapted to be reciprocably mounted in the door opening, said unit including a part adapted to project from the outer face of the door, a grip member adapted to be mounted on the outer face of the door and having openings at its opposite ends for fastening means and an intermediate opening for slide reception of said projecting pin unit part, and a plate member adapted for centering said intermediate grip member opening with the opening in the door, said plate member having an opening with a flange adapted to be received in the door opening and another spaced opening adapted to align with the opening in one of the ends of said grip member.

9. A latch structure comprising a latch bolt, means supporting said latch bolt for reciprocation in one plane, and a pin engageable with said latch bolt arranged to effect reciprocation thereof by application of a thrust force, said pin being reciprocable at substantially right angles to the plane of movement of said latch bolt, said pin having a plurality of longitudinally spaced annular grooves formed in the periphery thereof adjacent to one end thereof to provide weakened sections capable of being broken away as a group or in succession to vary the length of said pin in accordance with the thickness of the door in which it is to be mounted and a second pin member having a bore in one end thereof adapted to slidably receive therewithin the normally weakened or grooved sections of said first-mentioned pin, said bore having a bottom adapted to abuttingly engage with said end of said first-mentioned pin, whereby an axial thrust force applied to said second pin will be transmitted through said first pin to actuate said latch bolt.

LOUIS A. BITTORF.
FRANK DECKER, JR.