Oct. 18, 1949. A. F. LICKTEIG 2,485,054

THUMB PIECE LATCH

Filed Dec. 11, 1944

3 Sheets-Sheet 1

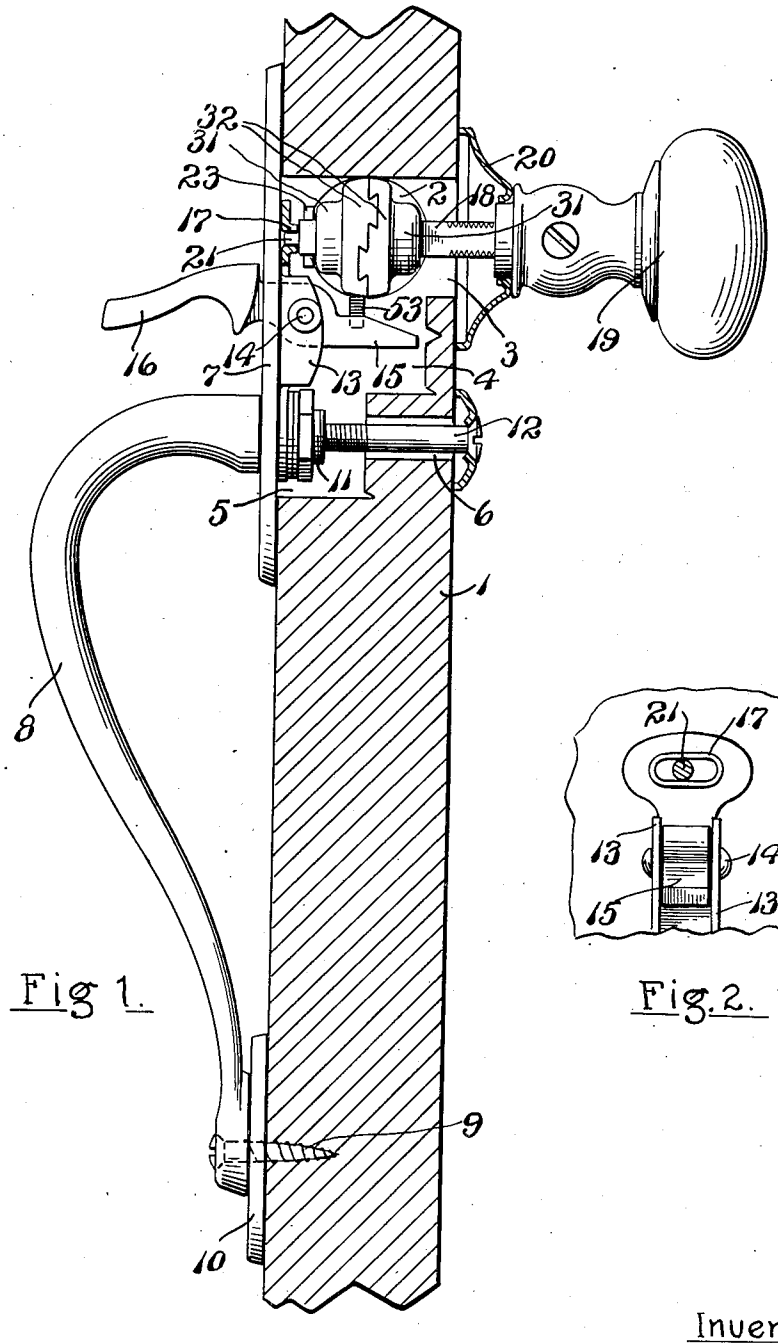


Fig 1.

Fig. 2.

Inventor
Albert F. Lickteig
By Lineaweaver and Van Antwerp
Attorneys

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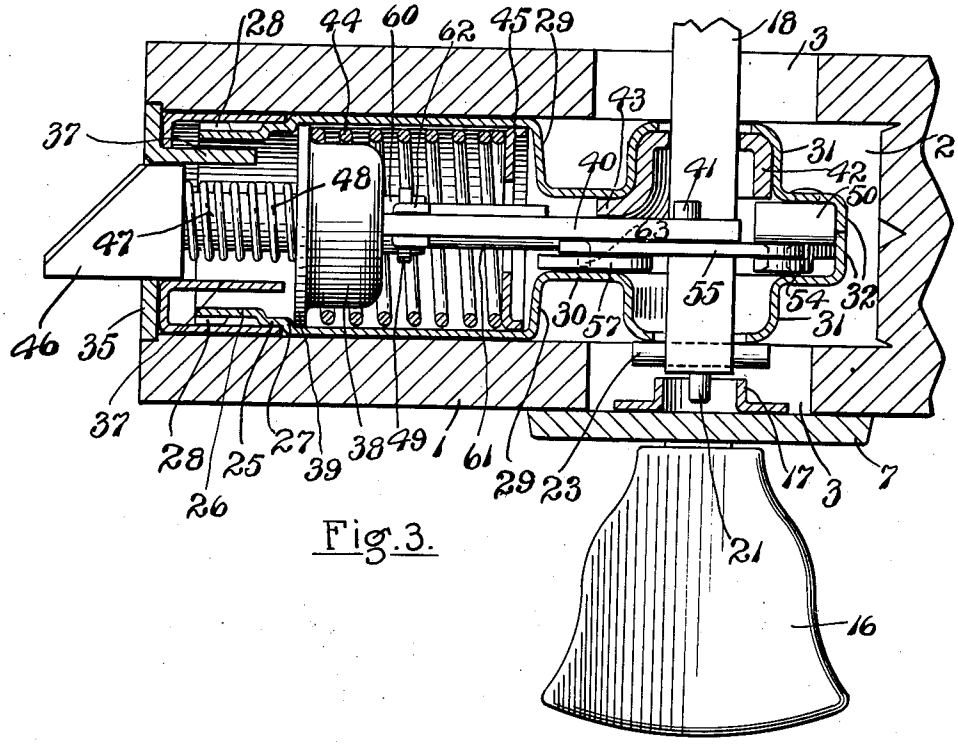


Fig. 3.

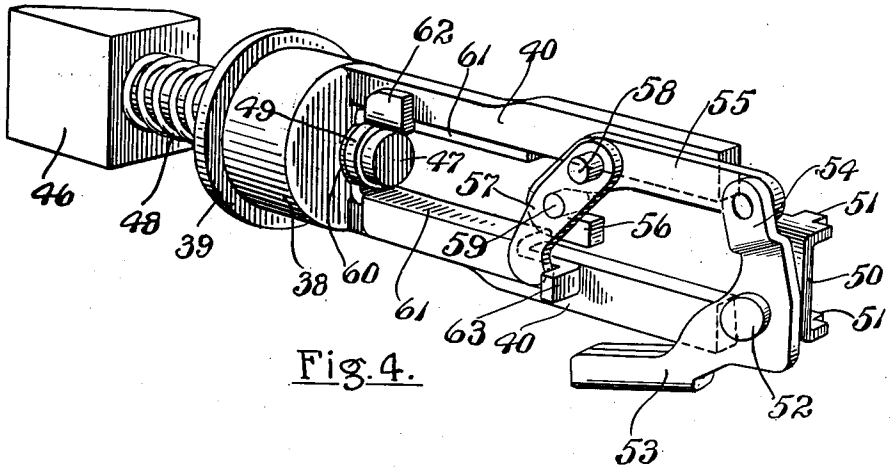


Fig. 4.

Inventor
Albert F. Lickteig
By Livernace and Van Antwerp
Attorneys

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THUMB PIECE LATCH

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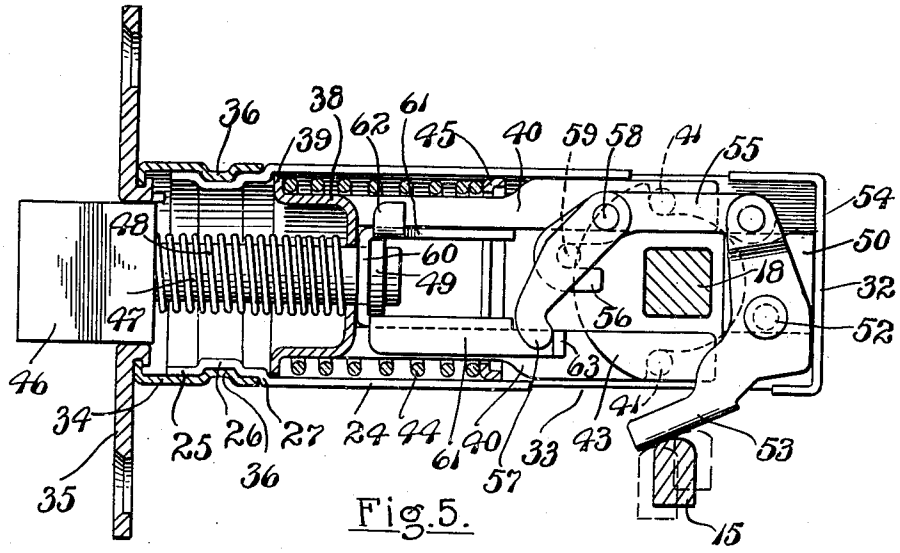


Fig.5.

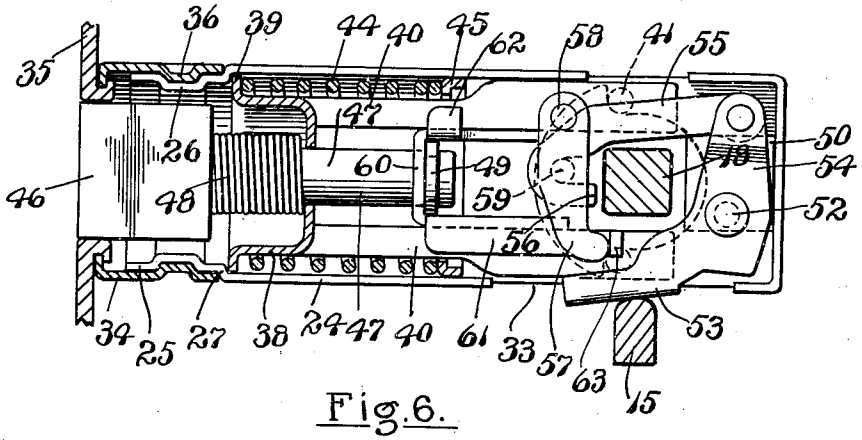


Fig.6.

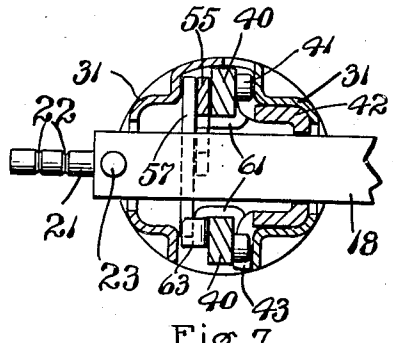


Fig.7.

Inventor
Albert F. Lickteig
By Livernace and Van Santvoss
Attorneys

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UNITED STATES PATENT OFFICE

2,485,054

THUMBPIECE LATCH

Albert F. Lickteig, Grand Rapids, Mich., assignor to National Brass Company, Grand Rapids, Mich., a corporation of Michigan

Application December 11, 1944, Serial No. 567,539

10 Claims. (Cl. 292—167)

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This invention relates to a novel construction of door latch which is easily installed, and in which the latch bolt may be retracted from either side of the door, at the inner side by manual operation of the usual door knob against the resisting force of a relatively heavy spring, and at the outer side by a thumb operated lever against the resistance of a spring of much lighter force. The latch has a cylindrical or barrel type of housing readily installed by boring a hole at the free edge of the hingedly mounted door, into which the latch may be inserted and secured and with an operating means which is worked from the inner side of the door passing through the housing of the latch and through a transverse opening in the door for such passage, while at the outer side of the door a thumb operated lever mounting may be secured with a means in the construction of the latch and housed substantially within the latch housing for withdrawing the latch bolt against the lighter spring mentioned. Furthermore as doors to which the latch is applicable are of different thicknesses, novel means is provided for adjusting the latch operating means at the outer side of the door to compensate for variations in the leverage through which the thumb pressure is exerted, whereby for the different thicknesses of doors to which the latch is applicable, substantially the same degree of pressure may be applied to the thumb-piece of the operating lever.

To these ends a novel construction of latch mechanism, of operating means therefor and for mounting said operating means in proper association with the latch mechanism have been developed by me, an understanding of which may be had from the following description taken in connection with the accompanying drawing, in which,

Fig. 1 is a vertical section through a door on which the latch of my invention is mounted taken a distance inward from its free vertical edge substantially at the plane where the operating means for the latch both at the inner and outer sides of the door are mounted.

Fig. 2 is a fragmentary rear elevation of the outside door plate upon which the thumb operated lever is mounted.

Fig. 3 is a fragmentary horizontal section through the door and through the latch mechanism mounted thereon.

Fig. 4 is a perspective view showing the major portion of the latch mechanism which is mounted within the housing.

Fig. 5 is a longitudinal vertical section through the latch housing and its interior mechanism with

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the parts in the position taken when the latch bolt is projected outwardly.

Fig. 6 is a similar view showing the parts in the position when the latch bolt is retracted from the outer side of the door, and

Fig. 7 is a vertical transverse section through the latch substantially at the plane of its bolt withdrawing mechanism.

Like reference characters refer to like parts in the different figures of the drawings.

The door 1 to which the latch is applicable, at the proper height and at its free vertical edge is bored horizontally to provide a cylindrical receiving opening 2 for the body of the latch. At a distance inwardly of the free edge of the door a transverse opening 3 is made entirely through the door, and below it a second opening 4 is made from the front side of the door partly therethrough but terminating short of its rear side; and below the opening at 4 a shorter opening 5 is made as shown in Fig. 1, all of the openings being made by means of a bit or auger so that they are quickly and readily produced. Likewise a smaller cylindrical opening 6 is bored from the bottom of the opening at 5 through to the rear side of the door as shown.

In the installation of the latch, a plate 7 of required size and which may have a decorative outline is located to cover all of the openings 3, 4 and 5 at their exposed ends at the outer side of the door. A depending handle 8, at its upper end, is connected to the plate substantially at the opening at 5 and extends downwardly and is directed inwardly toward the door and secured by means of a screw 9 passing through the lower end of the handle and through a plate 10 between it and the door as shown in Fig. 1. The handle 8 at its upper end portion 11 is reduced in diameter and threaded and passed through an opening in the plate 7 for the reception of a securing nut 11. A screw 12 of less diameter than the opening 6 passes therethrough from the inner side of the door to and is threaded into an interiorly bored opening in the part 11. With this construction there is permitted a limited lateral adjustment of the upper portion of the plate 7 by a swinging movement about the axis of the screw 9, the larger size of the opening 6 permitting a limited degree of sidewise movement of the screw 12.

At the inner side of the plate spaced ears 13 connected thereto project inwardly into the opening at 4 and upon a pivot 14 passing through said ears an operating lever is pivotally mounted between its ends, its inner arm 15 passing underneath the housing (later described) of the body

of the latch structure. Said lever passes through the plate 7 and at its outer end is formed into a widened thumb engaging piece 16 which, preferably, at its upper side, is concaved for ready engagement of the ball of the thumb therewith. The lever is spring actuated (not shown) so as to normally lift the thumb piece 16 to an upper position as shown in Fig. 1. Above the ears 13 a sleeve 17 is secured which is of an elongated form in a horizontal direction as best shown in Fig. 2, the purpose of which will be later described.

For the operation and withdrawal of the latch bolt from the inner side of the door a spindle bar 18 square in cross section, adapted to have a door knob 19 threaded thereon and detachably secured, at its inner end is passed through the opening 3 and through the housing of the latch, with the usual escutcheon plate 20 at the inner side of the door secured thereto to cover said opening 3 and rotatably mount the knob 19. Said bar at its outer end is provided with a pin 21 extending axially therefrom and which (Fig. 7) may be annularly grooved at spaced points in its length at 22. This pin at its free end enters the sleeve 17, and with the door of greatest thickness the pin is not changed in any manner; but for doors of lesser thickness either one or both of the sections shown between the groove 22 may be broken off, depending upon the thickness of the door, for reception in the lateral elongated sleeve 17. Said sleeve provides a locating and guiding member in the installation of the latch when the spindle bar 18 is passed through the latch housing, and permits a limited lateral adjustment of the plate 7 as is evident. The spindle bar 18 adjacent its inner end is drilled for the passage of a pin 23 therethrough to hold it against outward movement after it has been passed through the latch housing. It is to be understood that the about-to-be-described latch mechanism is operated from the inner side of the door by turning the knob 19 and from the outer side of the door by depressing the thumb piece 16.

The latch construction includes a housing of sheet metal the body of which is made of two stamped parts. Each of said parts between its ends and toward the outer end thereof is of a semi-cylindrical from, as shown at 24, and has a front extension 25 also of semi-cylindrical form of a lesser diameter, the parts 25 being depressed inwardly to provide a continuous annular trough or groove 26 when the two parts of the housing are placed together in edge to edge contact. Between the larger and smaller diameter sections 24 an annular shoulder 27 is provided. Also the section 25 outwardly from the annular groove at 26 is pressed inwardly to provide short longitudinal slots as at 28 diametrically opposite each other in the assembled housing (Fig. 3).

At the inner ends of the semi-cylindrical sections 24 of the housing the metal is pressed inwardly on each, making shoulders 29 and thence bent and continued to the rear with parallel sides 30 and flanges extending toward each other to provide an inner housing portion of substantially rectangular shape in cross section. Said sides 30 between their ends are outwardly pressed to make cup-like lateral housings 31 and the inner end of the housing is completed by two inturned flanges 32 which may be joined together by a dovetail construction (Fig. 1) in the manner fully described in my prior application, Ser. No. 549,644, filed August 16, 1944, now Patent Number 2,423,988, dated July 15, 1947. The two parts of

the housing when placed together in edge to edge contact complete the housing making an enclosure which, however, at its lower side and toward its rear end has a longitudinal slot 33 therein (Figs. 5 and 6) formed by cutting away edge portions of the metal. At the upper side of the housing a similar but shorter slot is made (not numbered) as shown.

The housing is completed, after the two parts thereof have been put together in edge to edge contact and with the ends 32 joined as indicated, by a cup-like member 34 open at its inner end and joined at its outer end to a rectangular plate 35 which, when the latch is installed, seats in a suitable mortice at the free edge of the door made to receive it, and has openings for the passage of screws to connect to the door. The cylindrical sides of the cup member 34 between the ends thereof and at diametrically opposed points have projections 36 pressed inwardly of a size to traverse the slots at 28 and be received in the groove at 26 for rotative movement therearound to locate the securing plate 35 at a proper position. Said plate 35 and the bottom of the cup member 34 engaging thereagainst have latch bolt head passing openings and are formed with suitable guides 37 at opposite sides of the opening for said bolt head.

A retractor means including member 38 of cylindrical form closed at its inner end except for a central opening through its bottom and with an annular flange 39 at its outer end is located within the cylindrical portion of the housing, said flange being adapted to guide the front end of the retractor 27. Two spaced apart means in the housing retracting bars 40 are permanently integral at their front end portions to the cup member 38 and extend rearwardly in the housing to the lateral housing portions 31, each carrying a pin 41 adjacent its inner end at the side thereof nearest the inner side of a door on which the latch is installed. In the lateral housing portion 31 nearest the inner side of the door a roll-back 42 is mounted for rocking movement having a flange 43 of the usual construction of the shape best shown in Fig. 5, behind the shoulders of which the pins 41 pass. The housing portions 31 have openings at their outer sides and the roll-back 42 has a squared opening to pass the square spindle bar 18 so that on turning the knob 19 and rocking the bar 18 the roll-back is rocked, a shoulder on the flange 43 bearing against a pin 41 on one of the bars 40 upon rocking the bar 18 in either direction, thereby moving the bars 40 and attached member 38 inwardly lengthwise of the housing. A relatively heavy coiled spring 44 at its front end bears against the inner side of the flange 39 and at its rear end against a disk 45 which in turn bears against the shoulders 29 of the housing previously described, it being evident that on rocking the spindle bar 18 and moving bars 40 and connected member 38 inwardly said spring 44 is compressed.

The latch bolt includes a latch bolt head 46 of conventional construction, having a beveled strike plate engaging side and passing through the openings in the plates 35 and the bottom of the housing cup member 34. A rod 47 extends from the inner end of the head 46 passing through the central opening in the bottom of the member 38. A light coiled compression spring 48 is located around the rod between the inner end of the head 46 and said bottom of member 38. At its inner end portion rod 47 is annularly

grooved for the reception of a split spring ring 49 which seats in said groove.

Within the housing at its rear end and at the inner side thereof a channel shaped bracket 50 is located having tongues 51 extending from the flanges thereof to pass through the adjacent side of the housing for riveting over to secure the bracket in place. Bracket 50 carries a pivot pin 52 upon which a bell-crank lever is mounted, one arm 53 of which extends downwardly and forwardly through the slot at 43. The other arm 54 extends upwardly and has pivotal connection to the rear end of a link bar 55, which lies alongside the upper bar 40, and at its forward end portion is extended downwardly and turned back to provide a hook 56 open at its rear side. A finger 57 is pivotally carried by a pin 58 at its upper end, which pin passes through the outer side of the housing and is riveted over, a pin 59 between the ends of the finger extending in the opposite direction and being engaged by the hook 56.

Between the split ring 49 and the bottom of the member 38 a saddle including cross bar 60 of metal is located having an opening through which rod 47 passes. The cross bar 60 at its ends is turned at right angles forming parallel arms 61 guided on the bars 40 by reason of their angle shape in cross section and ear 62 as shown. One of said bars is extended further to the rear than the other and turned laterally at 63 to provide a lug against which the free end of the finger 57 bears at the outer side of the lug.

It is apparent that on turning the knob 19 in either direction, as previously described, an inward movement of retracting bars 40 and the connected member 38 will take place, resisted by the heavy coiled spring 44. By reason of rod 47 passing through the bottom of the member 38 and the ring 49 carried thereby such movement will withdraw the latch bolt head 46. Thus the bolt head may be released from a keeper on a door jamb with which it is engaged freeing the door for opening on turning knob 19 in either direction. It is further apparent that on closing the door the beveled or cam side of the head 46, striking against the keeper will cause the head to be forced inwardly with a compression of the light spring 48 and a movement of the rod 47 inwardly.

On the operation of the latch from the outer side of the door, a depression of the thumb piece 16 elevates the inner arm 15 thereby turning the bell crank lever about its pivot 52 moving the link 55 inwardly; and hook 56 being in engagement with pin 59, finger 57 is moved inwardly (Fig. 6). Such finger at its free end, bearing against the lug 63, pulls the saddle consisting of the cross bar 60 and the bars 61 from the position shown in Fig. 5 to that in Fig. 6, withdrawing the latch bolt head 46 in the position shown in Fig. 6, and compressing the lighter spring 48. Inasmuch as in this operation the lighter spring 48 only has to be overcome, no undue exertion of force is required upon the thumb piece 16 to accomplish it; and which would be required if the heavy spring 44 was compressed.

Because of the varying thicknesses of doors to which the latch is applied with a varying of the effective length of lever arm 15, it is desirable to vary the length of the arm 53 of the bell crank lever through which the force of the thumb operated lever is exerted. For example in Fig. 5 one location of the inner arm 15 of the thumb operated piece is shown in full lines and at two other positions indicated in dash lines. It is evident that the distances of the applications of force from the arm 15 to the bell crank lever arm 53 to the axis of pivot 52 are thus varied; and of course the position of contact of the bell crank arm 53 against the upper side of the arm 15 is at different distances from the axis of the pin 14 about which the thumb operated lever is turned. This lateral adjustment indicated in Fig. 5 of the arm 15 is accomplished by shifting the plate 7 laterally to different positions to get a proper adjustment and compensation for the varying leverages so that, irrespective of the door thickness, substantially the same force is required against the thumb-piece 16 of the outside operating lever under all conditions.

The construction described is relatively simple, manufactured and installed with economy, is sure in operation and durable in service. The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A latch including an elongated housing having an opening in one end, a bolt including a bolt head adapted to pass through said opening and a rod extending inwardly therefrom into the housing, a cup-shaped member through which said rod passes, a relatively light spring between said head and cup member located around the rod, said housing having a shoulder against which said cup member engages limiting its outward movement, a relatively heavy spring means acting on said cup member to normally move it in an outward direction, two spaced retractor bars extending from the cup member toward the inner end of the housing, manually operable means at one side of the housing engaging with said bars to retract the cup member against said heavy spring means, a saddle having spaced apart arms and a cross member connecting them at their outer ends through which said cross member said bolt rod passes, said saddle being mounted for slidable movement on said retractor bars, means adjacent the inner end of said bolt rod and engaging against the inner side of said cross bar of said saddle to operatively connect the bolt and saddle whereby the bolt is retracted on inward movement of the saddle, and means mounted within the housing adapted to be manually operated and engaging with said saddle for retracting the bolt against the light spring.

2. A latch construction including an elongated generally tubular housing adapted to be received in a cylindrical opening bored at the vertical edge of a door, said housing having an opening at its outer end, a latch bolt having a head passing through said opening and a rod extending inwardly from said head, a retractor means projected by a stronger spring means located within the housing, and operatively connected with said rod, a relatively light spring means between said bolt head and retractor means normally projecting the bolt head outwardly but yieldable upon pressure of the bolt head to move it and said rod inwardly without movement of said retractor means, two spaced bars forming a part of said retractor means extending inwardly into said housing, a roll-back mounted in the housing at one side of the bars with interengaging means between said roll-back and bars for retracting the retractor means against its stronger spring on rotation of the roll-back in either direction thereby moving the retractor means and the bolt inwardly in said housing, a second retractor means slidably mounted on and between said

bars having an operative connection to said bolt rod, a bell crank lever mounted in the housing adjacent the inner end thereof, one arm of which extends through a side of the housing, and means connected with the other arm of the bell crank lever and engaging with said second retractor whereby on movement toward the housing of the outwardly extending arm of the bell crank lever said second retractor is moved inwardly with an accompanying inward movement of said latch bolt.

3. A construction as defined in claim 2, combined with a spindle rod extending through said housing and through the roll-back therein, said spindle rod having a non-circular cross section and the roll-back a like non-circular opening through which the spindle passes, said spindle being adapted to be rocked about its horizontal axis and said spindle at its inner end passing through the side of the housing opposite that at which the roll-back is mounted, and a transverse pin passing through the inner end portion of the spindle at the outer side of said opposite side of the housing.

4. A construction as defined in claim 2 and a spindle of non-circular cross section extending through the housing and through the roll-back therein, said roll-back having a like opening for such passage, and said spindle at its inner end after passing through the housing having a transverse opening therethrough, a transverse pin passing through said opening, an axial pin projecting from the inner end of said spindle, a plate adapted to be secured at the outer adjacent side of the door, and a lateral elongated sleeve secured at the inner side of the plate to receive said pin.

5. A construction as defined in claim 2, and a spindle extending transversely through said housing and roll-back, said spindle having a non-circular cross section and the roll-back having a corresponding opening for its passage, a transverse pin passing through said spindle at its inner end and at the outer side of the opposite side of the housing, an axial pin extending from the inner end of the spindle, a plate adapted to be secured to a door on which the latch mechanism is installed, a lateral elongated sleeve at the inner side of the plate into which said axial pin extends permitting lateral adjustment of the plate, and a lever passing through said plate and pivotally mounted thereon having an outer manual engageable arm and having an inner arm passing underneath the arm of the bell crank lever which extends through a side of the housing.

6. A construction as in claim 2, and an operating spindle passing transversely through said housing and roll-back, said spindle being of non-circular cross section and the roll-back having a like opening for said passage, means at the inner end of the spindle preventing its withdrawal through the housing, an axial pin extending from the inner end of said spindle, said pin being provided with spaced apart reductions in cross section whereby sections thereof may be readily broken off, and a plate adapted to be secured to a door on which the latch is installed adjacent said pin, a lateral elongated sleeve on the inner side of the plate, one interior dimension of which is slightly larger than the diameter of the pin and the other of which is greatly in excess of the diameter of the pin, and a manually operable lever pivotally mounted on and extending through the plate having an inner arm

adapted to be located in operative position with respect to the arm of the bell crank lever which extends through a side of the housing for operation of said bell crank lever by manual operation of the plate carried lever.

7. A latch structure adapted to be mounted at the free vertical edge of the door in an opening made therefrom horizontally in the door comprising, a housing adapted to be received in said opening, said housing having an open outer end, a latch bolt having a head projectable through said opening, a light spring means acting on said bolt normally projecting it outward, retractor means operatively connected with said bolt, a heavier spring means acting on said retractor means for normally moving it toward the open end of the housing, stop means for limiting the extent of outward movement of the retractor means, manually operable means extending into the housing and operable from one side thereof for retracting said retractor means against said heavier spring and moving the bolt and said first mentioned spring inwardly, a second retractor means slidably mounted on the first retractor means and operatively connected with the bolt, inward movement of which retracts the bolt with compression of the light spring means, mechanism located within the housing operatively connected with the second retractor means and having an element projecting through a side of the housing adapted to be engaged and moved to retract said second retractor means, said element extending through one side of the housing comprising, an arm of a bell crank lever pivotally mounted in said housing, the other arm of which is operatively connected to said second retractor for manual operation thereof.

8. A latch comprising, an elongated generally tubular housing and having at least at one side thereof a roll-back receiving housing portion, said housing at its outer end having an opening for the passage of a bolt head, a bolt having a head extending through said opening and a rod extending inwardly therefrom, retracting means comprising a cup shaped member and two spaced substantially parallel bars extending inwardly therefrom through the bottom of which said rod passes, a relatively light spring means between the bottom of the cup member and the inner side of the bolt head, pins extending to one side from the rear end portions of each of said bars, a roll-back rotatably mounted in said roll-back receiving portion of the housing having an arcuate flange with shoulders back of which said pins extend, means for manually rocking said roll-back in either direction, stop means in the housing for limiting the outward movement of the retractor means, a saddle slidably mounted on and between said bars having a front end portion through which the bolt head rod passes, connections between said saddle and rod for withdrawing the rod on inward movement of the saddle, a manually operable means mounted within and having a part extending through one side of said housing engaging with said saddle to move it inwardly on said retractor bars for retracting the bolt against the force of the lighter spring, said manually operable means including a bell crank lever pivotally mounted within said housing near the rear end thereof having a free arm extending through a side of the housing, a finger pivotally mounted at one end on and within said housing, said saddle having a lateral projecting lug at its inner end in front of which the free end of said finger en-

gages, and a link pivotally connected at one end to the other end of the bell crank lever and provided at its free end with a hook, said finger having a laterally projecting pin between its ends with which said hook is engaged, whereby inward pressure against the free end of the bell crank lever moves said saddle and connected latch bolt inwardly.

9. A latch comprising a latch bolt, means for retracting said latch bolt including a pivoted lever, a thumb piece pivoted between its ends and engageable with said lever at one side of its pivot and means for adjusting the engagement between the thumb piece and the lever at different distances from the pivot of the lever.

10. A latch comprising a latch bolt, means for retracting said latch bolt including a rotatable spindle, other means for retracting the latch bolt including a pivoted lever, a plate, a thumb piece pivoted between its ends on said plate, means

for mounting said plate for engagement of said thumb piece at one side of its pivot with said pivoted lever at adjustable distances from the pivot thereof and means on said plate for adjustably receiving and guiding an end of said spindle.

ALBERT F. LICKTEIG.

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