July 15, 1947. A. F. LICKTEIG 2,423,988

LOCKING LATCH

Filed Aug. 16, 1944 2 Sheets-Sheet 1

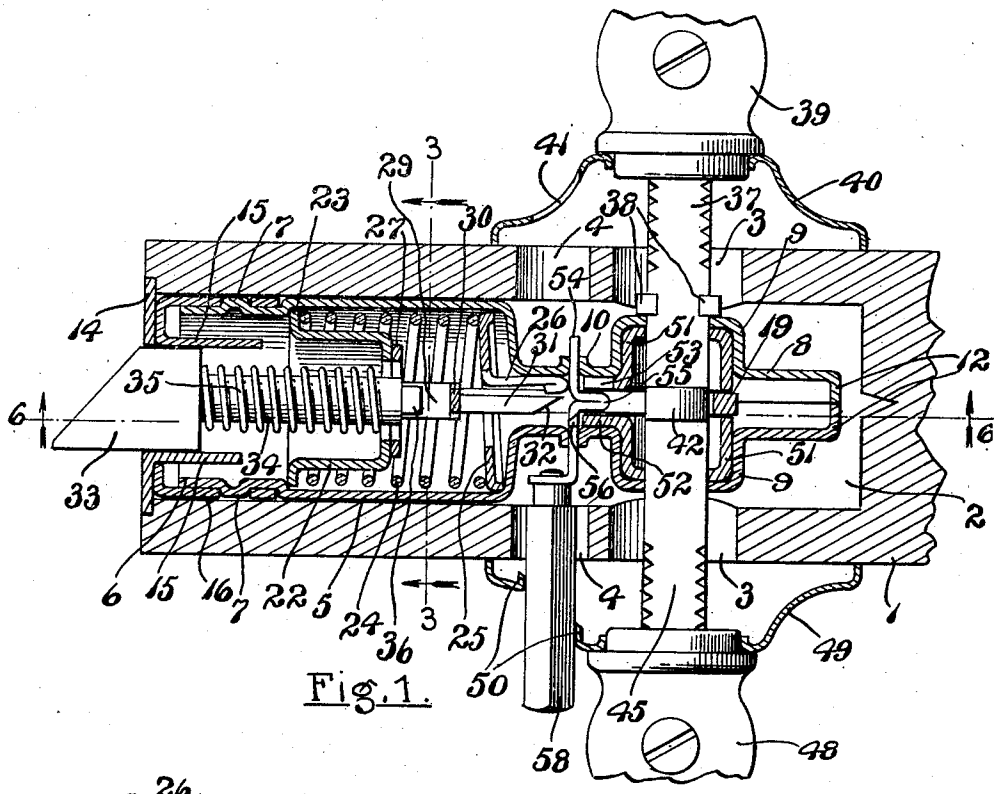


Fig. 1.

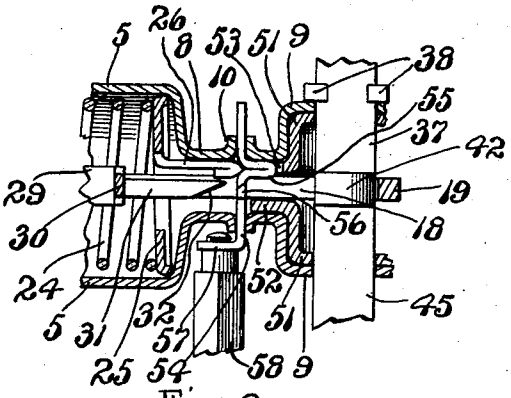


Fig. 2.

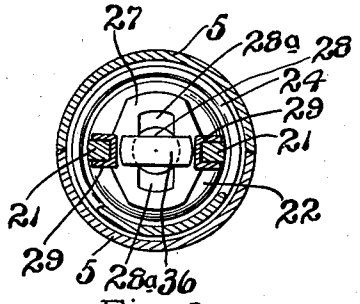


Fig. 3.

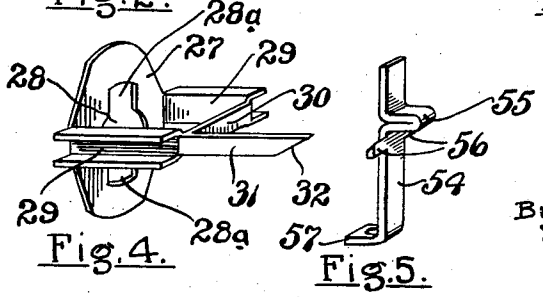


Fig. 4.

Fig. 5.

Inventor
Albert F. Lickteig
By Lineman and Van Antwerp
Attorneys

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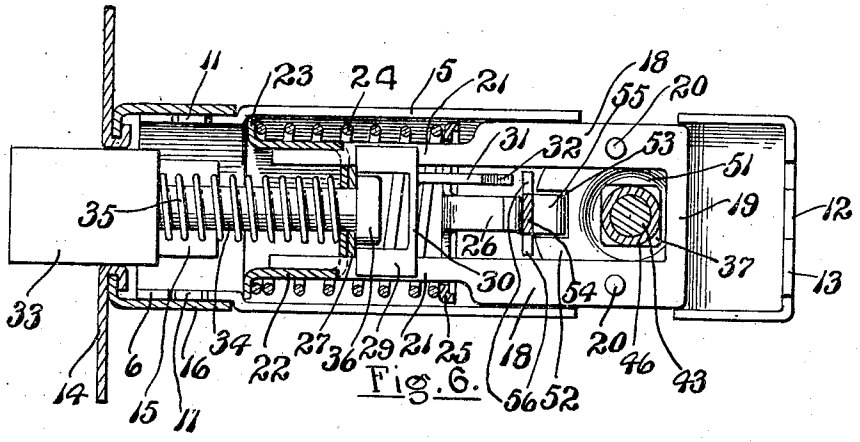



Fig. 6.

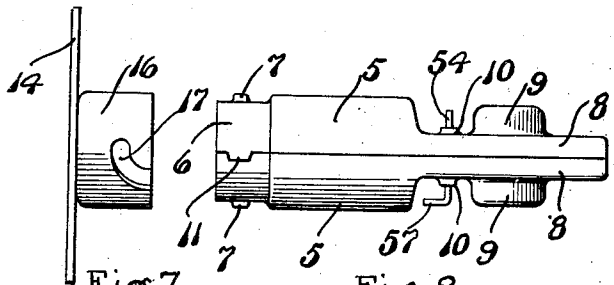



Fig. 7.

Fig. 8.

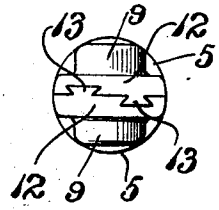



Fig. 9.

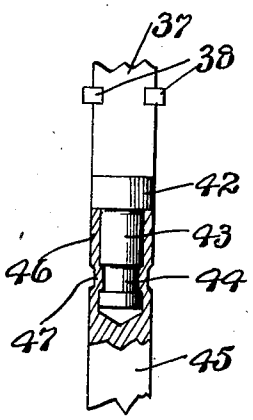



Fig. 11.

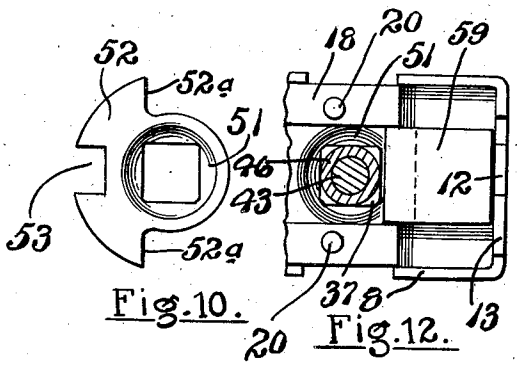



Fig. 10.

Fig. 12.

Inventor
Albert F. Lickteig
By Liverance and Van Antwerp
Attorneys

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# UNITED STATES PATENT OFFICE

2,423,988

## LOCKING LATCH

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

Application August 16, 1944, Serial No. 549,644

11 Claims. (Cl. 292—169)

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The present invention relates to door latches, and particularly of the type which may be locked against operation from the outer side of the door while readily capable of operation at the inner side of the door. Latches have been supplied for doors which broadly and generally are operable to serve such functions but they are expensive in structure and in installation. My invention is directed to a very economical and relatively simple latch structure which may be installed on the door in a most practical simple and economical manner, requiring only the boring of a cylindrical opening to receive the latch and of transverse openings through the door for the passage of the door knob operated bar and for the manually operable locking element which will prevent operation of the latch from the outer side of the door while permitting its ready operation from the inner side thereof.

In addition many other objects and purposes and functions to be obtained are inherent in the latch structure which I have produced as, for example, an emergency means for releasing the lock which holds the latch against operation from the outer side of the door in a case where it is desirable or necessary that it be performed, and also for automatically moving and releasing said lock upon closing the door from the outside after it had been previously locked against operation from the inside of the room. As an example the latch applied to a bathroom door may be locked against operation from the outside and thereafter upon leaving the room, and without releasing the lock any closure of the door will automatically release the locking mechanism.

To these and other ends not specifically enumerated, with simplicity and economy in construction governing, and a marked shortening of the over all length of the latch being attained through novel construction, I have produced the invention, an understanding of which may be had from the following description taken in connection with the accompanying drawings, in which,

Fig. 1 is a horizontal section through the latch showing its mounting upon a door which is shown fragmentarily in section, with the latch parts in the position in which it may be operated from either side of the door.

Fig. 2 is a fragmentary section similar to Fig. 1 illustrating the position of the parts when the latch is locked against outside operation.

Fig. 3 is a transverse vertical section through the latch construction substantially on the plane of line 3—3 of Fig. 1.

Fig. 4 is a perspective view of an element utilized in the latch for the automatic release of the lock thereof.

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Fig. 5 is a perspective view of the locking bar.

Fig. 6 is a side elevation and section of the interior latch mechanism partly in section and with one-half of the housing therefor shown in elevation, substantially on the plane of line 6—6 of Fig. 1.

Fig. 7 is an elevation of the front member of the latch housing.

Fig. 8 is an elevation of the two-part latch housing back of the front member.

Fig. 9 is a rear view thereof.

Fig. 10 is an elevation of one of the immediate actuating members for withdrawing the latching bolt and showing the recess therein into which the locking bar moves when in operative position, and

Fig. 11 is a fragmentary elevation and section showing the rotative connection of the two-part transverse operating bar of the latch.

Fig. 12 is a fragmentary side elevation and section of a modified rear part of the structure shown in Fig. 6.

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

The door 1, shown fragmentarily in horizontal section in Fig. 1, may be of any conventional structure and at its free edge portion a cylindrical opening 2 is bored thereinto the necessary distance to receive the housing of the latch. Transverse openings 3 and 4 spaced short distances from each other are bored through the door, the operating bar for the latch passing through the openings 3, and the manually operable means for moving the locking member passing through one of the openings 4 at the inner side of the door. Said openings 3 and 4 are bored through the door so that their axes cross the axis of the opening 2. This is all that is required in the way of work upon the door for the installation of the latch, avoiding wholly the tedious and expensive cutting of mortised holes, rectangular in cross section which are required for the installation of numerous other latch constructions.

The novel outer housing of the latch includes two members of sheet metal, the forward or outward portions of which are of semi-cylindrical form as indicated at 5, reduced slightly in diameter at their outer ends as at 6. From each of the sections 6 a projection 7 is pressed outwardly as shown (Fig. 8). Inwardly of the cylindrical sections 5 the sheet metal is pressed and formed into two channel sections 8 having flat outer sides with inwardly extending flanges which meet at

their edges. From each of the flat outer sides or webs of the channel parts 8, housing projections 9 are pressed outwardly opposite each other and each has an opening at its outer end for the passage of the operating bar later to be described. Between said projections 9 and the semi-cylindrical portions 5 guides 10 are pressed outwardly as shown providing openings for the passage of the latch locking member. At the outer reduced cylindrical section 6 complementary tongues and recesses to receive them, as indicated at 11, are made at opposite edges and at the rear end of the housing the end portions 12 are provided with complementary dovetailed tongues 13 and dovetailed recesses to receive them (Fig. 9). Such dovetail parts hold the two parts of the housing against separation away from each other at their rear ends, and the notches and recesses at 11 hold them against relative longitudinal movement.

The latch housing is completed by an outer member including a rectangular sheet metal plate 14 with an opening therethrough for the passage of the head of a latch bolt and with bolt guides 15 turned inwardly from said opening. A cylindrical sleeve 16 is secured at the inner side of the plate 14 and has diametrically opposed slots 17 of a bayonet-slot character. The interior diameter of the sleeve 16 is such that it may pass snugly over the sections 6 of the housing with the projections 7 extending through the slots at 17 and when the assembly is complete such projections are at the inner closed ends of said slots.

The interior latch structure includes a member of flat metal having spaced apart legs 18 integrally connected at their inner ends by a cross bar 19. Pins 20 pass through the legs 18 a short distance ahead of the rear ends thereof, said pins extending a short distance to either side of said legs. The legs 18 are reduced in width and continued in narrower extensions 21 (Fig. 6) and at their forward end portions are still further reduced in width and pass through the bottom of a cup-like member 22 of sheet metal, which member, at its outer open end, has an outwardly extending flange 23 normally held against the annular shoulder which is formed interiorly of the housing between the larger and smaller sections 5 and 6 of said housing (Figs. 1 and 8). A relatively heavy coiled spring 24 is located around the member 22 and bears at its outer end against the flanges 23 and extends back of said member 22 and along the leg sections 21, at its inner end bearing against a ring 25 which goes around the reduced leg sections 21 and is stopped by coming against the shoulders provided between the channel sections at 8 and the semi-cylindrical sections 5 of the housing. The ring 25 is provided with an arm 26 integral with and struck from the metal used in making the ring 25, which arm is bent to extend to the rear as best shown in Fig. 1. Preferably, at its free end it is turned back upon itself for a short distance as shown.

At the rear side of the cup-like member 22 a member made of sheet metal is located including a flat plate 27 which has a centrally disposed opening 28 therethrough at the opposed sides of which are slots 28*a* (Fig. 4). From opposite sides of the plate channels 29 extend rearwardly and are connected at their ends by a cross bar 30. A finger 31 provided at its free end with an inclined edge 32 extends from one end of the bar 30 as shown in Fig. 4. This member is mounted upon the reduced leg extensions 21 previously described and has a slidable movement thereon.

The latch bolt includes a head 33 of conventional construction having a beveled side as usual in door latch bolts of this type, from the inner end of which a rod 34 extends into the cup-like member 22 and through an opening in the bottom thereof, with a relatively light coiled spring 35 located around the stem 34, bearing at one end against the inner end of the head 33 and at the other end against the bottom of the member 22. It is evident with this construction that spring 35 in effect is telescoped partly within spring 24, with a marked shortening of the length of the latch. At its inner end the stem 34 is provided with a transverse head or bar 36 of dimensions such that it may readily pass through the opening 28 and slots 28*a* of the plate 27 and then, by turning said plate through 90° the head will occupy a position as in Fig. 3 preventing disconnection of the keeper engaging bolt from the remainder of the latch mechanism. With the structure described the head 33 may be assembled as shown or in a reversed position so that the latch is available without special structure for use on doors swinging in either direction.



The operating bar or rod which is manually turned to retract the latch bolt comprises two parts each square in cross section. One part 37 has lugs 38 projecting therefrom to come against one of the outwardly extending housings 9 (Fig. 1) to limit the extent of inward movement thereof. A knob 39 may be detachably connected with the outer end portion of the part 37 in the usual manner and between the knob and the side of the door 1 an escutcheon 40 of sheet metal is provided which, in substantial alinement with the opening 4, at the outer side of the door is provided with an opening 41. Near its inner end portion the square bar 37 is machined to cylindrical form, as at 42, and has projecting therefrom a pin or stem 43 which near its free end is provided with an annular groove 44 (Fig. 11). The other part or section 45, also square in cross section, is bored to provide an opening from its inner end into which the stem or pin 43 is freely inserted, the surrounding sleeve provided at 46 around said stem being indented inwardly as at 47 to connect the two rod parts 37 and 45 and prevent their longitudinal separation but permit the free rotative movement of one with respect to the other.

A knob 48 may be detachably connected to the outer end of the rod section 45 and an escutcheon 49 located between it and the inner side of the door. The escutcheon 49 in substantial alinement with the opening 4 at the inner side of the door has an opening preferably of hexagonal outline therethrough with guide lips 50 (Fig. 1) through which the operating member for the lock of the latch is adapted to be passed as hereinafter described.

Within each of the housing projections 9 an immediate operating member, or roll-back, as it is called, is placed having a cup-like portion 51 fitting within and freely rotatable in its respective housing portion 9, and from which an arcuate flange 52 extends at its forward inner edge providing the shoulders at 52*a*, as shown in Fig. 10, which are located immediately ahead of the pins 20 on the legs 18. One of said flanges 52 has a notch or recess 53 therein as shown in Figs. 1 and 10.

The locking member 54 is made from a piece of flat metal and is bent upon itself and formed to provide a projection 55 extending to one side thereof, adjacent which and at each edge of the bar 54 outwardly extending fingers 56 with in-

clined edges at one side are formed integral with the bar. At its outer end the bar is turned at right angles to provide a foot 57 to which a manually engageable push bar 58 also hexagonal in cross section is screw connected at one end being first connected with the foot 57 by passing through the opening 4 at the inner side of the door, and the escutcheon 49 thereafter put in place with the push bar 58 being guided through the guide lips 50 (Fig. 1). The bar 54 passes through the guide openings in the housing indicated at 10, and in the outer position as shown in Fig. 1 the rearwardly extending part 55 lies between the arc shaped flanges 52. But when the push bar 58 is pushed upon at its outer end and the bar is slidably moved said projecting portion 55 enters the slot or recess at 53.

It is to be understood that the operating bar parts 37 and 45, square in cross section, pass through squared openings in the parts 51 so that a rotation of the bar section 45 for example in either direction will turn its associated roll-back 51 and its attached flange 52, bringing a shoulder 52a against a pin 20 to move the U-shaped member 18—19 inwardly or toward the closed end of the housing, with a retraction of the cup member 22 against spring 24 and a consequent retraction of the bolt head 33 to unlatch the door.

It will be evident that in either position of the locking member 54, that shown in Fig. 1 or that in Fig. 2, the section 45 of the operating bar or rod may be turned by grasping the knob 48; therefore, at the inner side of the door the latch may be operated at any time through the rotation imparted to the roll-back 51 and its flange 52 which flange does not have the notch or recess 53 in it. It will also be evident with the parts in position as shown in Fig. 1, the latch bolt may be retracted by engaging and turning the outer knob 39. But when the locking member has been pushed from the position shown in Fig. 1 to that shown in Fig. 2, and the part at 55 is seated in the notch or recess at 53, the outer knob and its connected bar 37 are locked against rotative movement. Thus one who is in a room on closing the door and pushing inwardly upon the push bar 58 locks the door against opening from the outside, while it can be opened from the inside as freely as when the locking member is in its inoperative position.

It will be noted (Fig. 1) that the free end of the arm at 26, bears against the forward or outer side of the bar 54, being pressed and held thereagainst by the spring 24. When the locking member or bar 54 is moved inwardly to its locking position, as in Fig. 2, the free and somewhat pointed end of the arm 26 snaps into the groove made in the forward or outer side of the bar 54 opposite the projection at 55 thereby normally holding the lock in its operative position. If, as an example, a door should be closed by a child and the lock moved to its operative position and the child be unable to turn the knob, the lock can be pushed back to releasing position by engaging the end of the bar 54 through the opening at 41 in the escutcheon.

It is not necessary to return the locking bar or member to its inoperative position when the door has been opened from the inside leaving the lock in the position shown in Fig. 2. Upon the door being closed with the lock in such position, the lock is automatically returned to its inoperative position, as in Fig. 1; or if the door is closed, the lock is automatically made ineffective on opening the door. This is accomplished upon



closing the door by inward movement of the head 33 of the latch which will move the inner head 36 inwardly striking the cross bar 30 on the channels 29 and moving it inward with the finger 31 so that its inclined end 32 will engage a finger 56 to move the locking bar into inoperative position. On opening the door by turning the inner knob 48 the cup 22 will be retracted and its inner end bears directly against the plate 27 which will therefore move the channels 29 with the bar 30 and finger 31 rearwardly to engage one of the fingers 56 on the locking bar, whereupon the locking bar is moved from its operative position shown in Fig. 2 to inoperative position shown in Fig. 1, and the door may then be opened from either side.

The construction described is of parts, the major portions of which are very quickly and economically made from sheet metal and the installation on a door is in the simplest and most economical manner possible. The construction has safeguards against all conditions and is of particular value in use upon the inner doors of houses. Of course the outside escutcheon 40 may be made without the opening 41, whereupon the latch may be very readily used as a night latch for an outside door.

With the construction described, the length of the latch in comparison with others previously produced may be decreased, making the latch available for mounting on doors which in accordance with the present practice are becoming more and more narrow as to the outside frame members which surround the door panels.

In Fig. 12 the over-all length of the latch is shortened by eliminating the cross bars 19 and guiding the bars 18 between a center block 59 of sheet metal and the sides of the housing. In the operation of the structures shown bar 19 strikes against the bottom of the housing, and in Fig. 12 the ends of the bars 18 so strike, preventing complete rotation of the operating members 37 and 45 and the knobs attached thereto.

Various other modifications in structure may be resorted to without departing from the invention or losing the functions performed. For example the flanges 52 on both of the roll-back members may contain the notch at 53 in which case only one of them will be for a useful purpose. The fingers at 56 prevent the movement of the locking bar 54 any farther when they strike against the inside of the channel housing section 8, stopping the projection 55, so that if the roll-back 51 at the lower side in Fig. 1 also had the notch 53 therein said notch would be ineffective for any purpose. But by so constructing both roll-backs in the same manner the number of distinct parts is reduced with a reduction in needed tools and equipment for manufacture.

In place of the bayonet slot and lug connection between the two-part cylindrical body and the sleeve 16 a modified construction may be used which comprises an annular groove pressed into the body parts near their ends with diametrically opposite longitudinally extending grooves joining said annular groove and extending to the end of the body. The lugs 7 may be provided on the interior of the sleeve and may be inserted into the longitudinal grooves and thence received in the annular groove to retain the sleeve in place on the body but at the same time to permit rotation thereof which will permit the latch bolt, which is guided in the sleeve, to be rotated 180° to accommodate the latch for either right or left hand swinging doors.

One major feature of the invention outside of the locking which has been fully described, is the construction by means of which the housing is shortened in length involving the heavier spring **24** and the lighter spring **35**. As shown in Fig. 1 the heavier spring extending over the cup member **22** at its front portion overlaps the light spring **35** for substantially one-half of its length, thereby reducing the over-all length of the two springs by such approximate one-half of the length of the spring **35**. With the two springs located one entirely ahead of the other as has been previous practice, the length of the housing must be correspondingly increased. A further very deisrable and practical feature of the invention is the mounting of the roll-backs **51** within the lateral housing projections **9** of a substantially cylindrical form, providing a large bearing for said roll-backs and making a particularly effective durable structure.

The construction is practical and useful and has proved successful in practice. 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 construction comprising a housing having an outer portion of substantially cylindrical form and open at its outer end and an inner portion of substantially rectangular form, said inner portion at each side thereof having an outwardly pressed cup-shaped section, a transverse operating bar extending through each of said cup-shaped sections, said bars meeting within the housing, means connecting the bars within the housing to hold them against longitudinal separation and permit rotative movement of either relative to the other, a cup member located within each of said cup-like housing projections and provided with an arcuate flange having shoulders thereon, one of said flanges having a recess therein, a bolt actuating member located between said flanges of the cup members having pins extending from its sides back of said shoulders on the flanges, said cup members being operatively connected one with each of said bars to be turned thereby, the turning of which engages said pins and retracts the actuating member, spring means normally moving said actuating member in an outward direction, a spring actuated latch bolt normally extending at its outer end beyond the end of the housing, said latch bolt being independently movable inward by pressure against its outer end portion and being retracted and drawn inwardly by inward movement of said actuating member, as specified.

2. A latch comprising, a housing having a cylindrical forward portion and a rear portion rectangular in cross section extending inwardly from said cylindrical portion, said housing having an opening at its outer end and said cylindrical portion of the housing between its ends being reduced in diameter to provide an inwardly extending annular shoulder between the smaller and larger parts of said housing, a cup member having an outwardly extending flange seated against said shoulder, said cup member having an opening in its bottom, a ring located within the housing substantially at the innermost portion of the cylindrical part thereof, said ring having an arm extending rearwardly from its intermediate portion, a relatively heavy coiled spring between the flange on said cup member and said ring, a U-shaped stirrup member having spaced legs connected at their forward ends to said cup member, an operating means extending transversely through the rear portion of the housing and comprising two bar parts having inner ends joined within said housing to hold them against longitudinal separation but permitting independent rotative movement thereof, means on each of said bars operatively associated with said stirrup member whereby rotation of either bar in either direction retracts said stirrup member against the force of said spring, and a latch bolt including a head, a stem extending inwardly therefrom and relatively light coiled spring around the stem mounted in the outer portion of the housing and with said head normally projecting partially through the open end of the housing, the inner end of said stem passing through the opening in the bottom of said cup member and having means thereon to prevent outward movement and disconnection of the latch bolt from said cup member but permitting independent inward movement of the latch bolt, as specified.



3. A latch construction comprising, an elongated housing having an opening at its outer end, a latch bolt normally at its outer portion projecting through said opening and extending into the housing, a yielding spring normally forcing said bolt outwardly, a second spring of greater strength within the housing, movable means against which the second spring bears at its front end and against which the first mentioned spring bears at its rear end, said means extending over the rear portion of the first mentioned spring and said second spring extending over said means and spring, and means for manually retracting said movable means to thereby compress the second spring, said latch bolt being connected with said movable means and retractable therewith.

4. A latch comprising, an elongated housing having a cylindrical outer portion, the outermost portion of which is of a lesser diameter than the cylindrical portion back of it, thereby providing a shoulder within the housing, a cup member located within the housing having an outwardly extending flange at its open outer end bearing against said shoulder, a latch bolt having a head at its outer end and a rod extending therefrom rearwardly freely through the bottom of said cup member, said rod having a head at its inner end to extend across the bottom of said cup member and prevent disconnection of the bolt, a coiled spring of relatively light strength between the head of the bolt and the bottom of the cup member, a coiled spring of greater strength having its front portion surrounding said cup member and its front end bearing against said flange, said spring at its rear end having a base against which it bears, retracting means connected to said cup member extending inwardly therefrom and adapted to be moved inwardly to thereby compress said second spring and move said latch bolt and the first mentioned spring thereon bodily inward, and manually operable means connected with the retracting means for moving the same inwardly, the forward portion of said second mentioned spring located around the cup member extending over the rear portion of the first spring located within the cup member.

5. A latch construction having an elongated housing open at its outer end, a latch bolt having a head normally extending through said open end and a rod extending inwardly from said

head, a movable member transverse of the housing through which the rod freely passes, said rod at its inner end having means to prevent disconnection from said member by outward movement away therefrom, a spring around said rod between the head and said transverse member normally moving the bolt outwardly, a retracting member mounted within the housing and connected with said transverse member, means for manually operating said retracting member to move the same inwardly and draw said latch bolt in the same direction, and spring means of heavier strength than the first spring acting upon said transverse member to move it outwardly, said second mentioned spring means at its forward portion overlapping the rear portion of the first spring.

6. In a construction of the class described, an elongated casing having a cylindrical front portion and a portion at its rear end substantially rectangular in cross section, each side of said rear end portion of the housing having outwardly pressed cylindrical portions, an operating bar extending through the housing at the outwardly pressed cylindrical portions thereof and manually turnable about its longitudinal axis, operating members within said outwardly pressed housing portions having cylindrical portions received therein, the outer sides of which have bearing engagement with the inner sides of said cylindrical projections, a spring actuated latch bolt mounted within the housing and means operatively connected with said latch bolt and said operating bar whereby turning the bar in either direction will retract the latch bolt.

7. A housing for latches of a cylindrical form at its front portion and of a form rectangular in cross section at its rear portion, said housing comprised of two parts, the front portion of each of which is semi-cylindrical and the rear portion of channel form with the edges of said two parts in contact, said parts of the housing at their front ends having cooperating tongues and recesses at their edges preventing longitudinal displacement of one part of the housing with respect to the other, and said housing parts at their rear ends having inturned flanges provided with cooperating dovetailed tongues and recesses interfitting with each other and preventing lateral separation of the housing parts, as specified.

8. A construction containing the elements in combination defined in claim 7, and a cylindrical holding member at the front end portion of the housing telescoping thereover to maintain the housing parts against lateral separation.

9. In a latch of the class described, a two-part housing having a cylindrical portion, a sleeve surrounding said housing, means for attaching said sleeve to said housing for rotation thereon through at least 180°, a latch bolt guided in said sleeve and non-rotative therein, means within said housing for retracting said latch bolt and means for rotatably connecting said latch bolt to said retracting means.

10. A latch comprising a housing, a retractor member within said housing, manual means for retracting said retractor member, a relatively strong coiled spring acting on said retractor member to thrust it outwardly, a latch bolt projecting from said housing and slidably connected to said retractor member, and a relatively light coiled spring acting between said retractor member and said latch bolt to thrust the latch bolt outwardly, said springs being in longitudinal overlapping relation.

11. The elements of claim 10 in which said retractor member includes a cup shaped portion and said strong spring surrounds the exterior of the cup shaped portion and said light spring extends within said cup shaped portion.

ALBERT F. LICKTEIG.

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