Aug. 26, 1941. G. R. ADAMS 2,253,547

FLUSH LOCK

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FIG. 1.

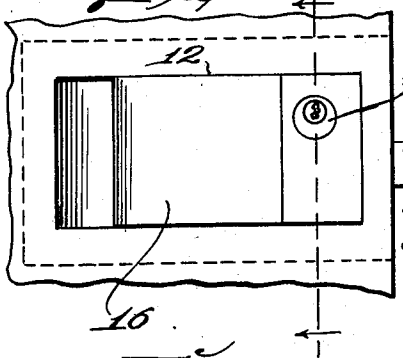


FIG. 2.

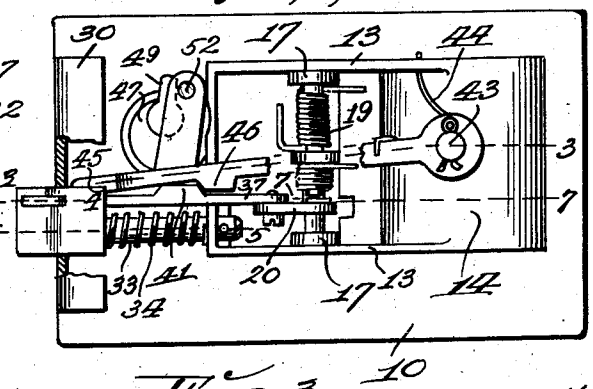


FIG. 4

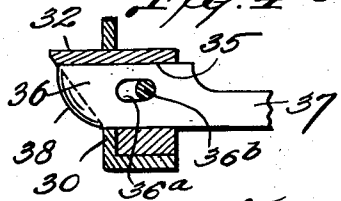


FIG. 3.

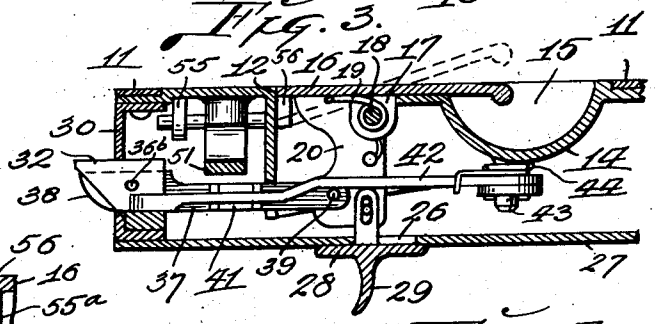


FIG. 5.

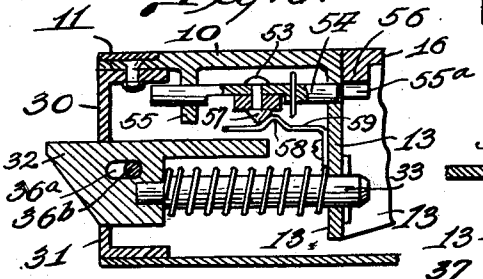


FIG. 7.

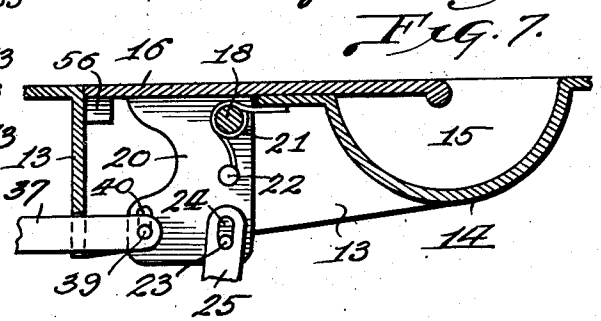


FIG. 6.

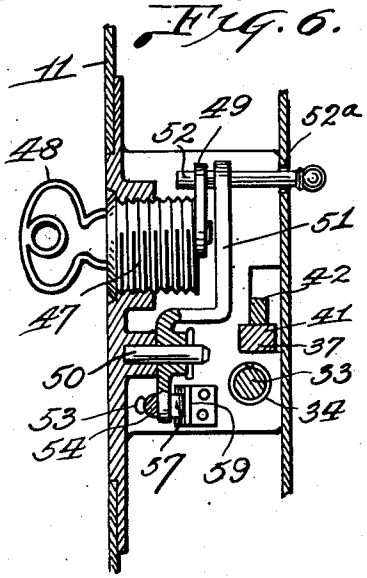
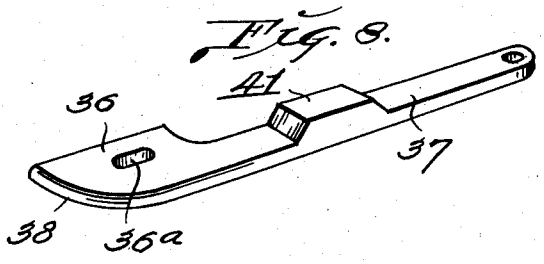


FIG. 8.



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Fig. 9.

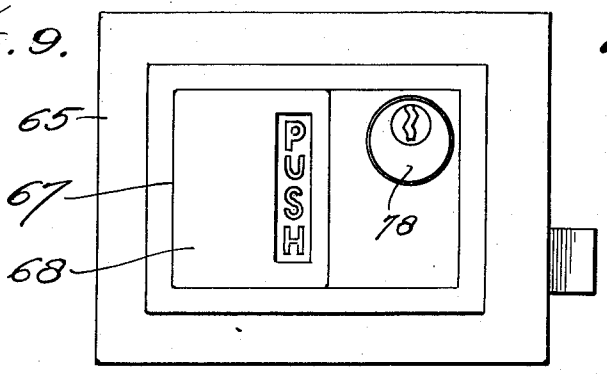


Fig. 14.

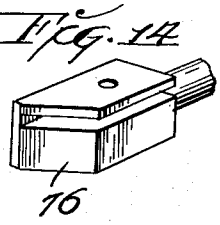


Fig. 10.

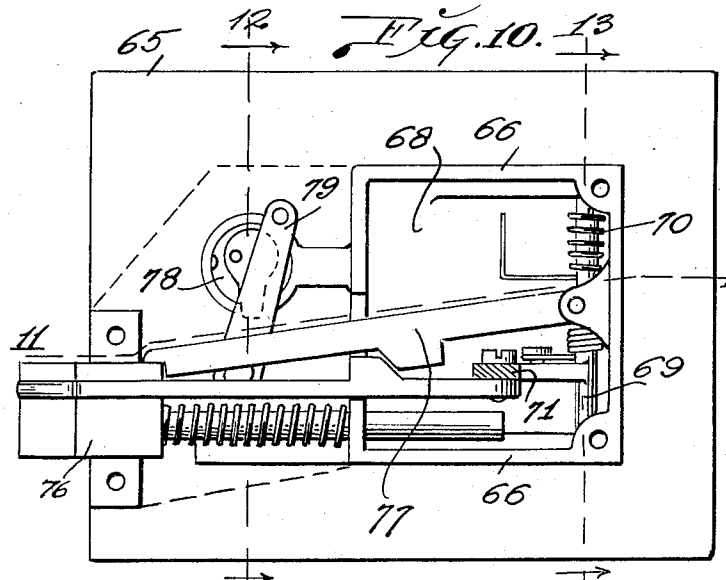


Fig. 12.

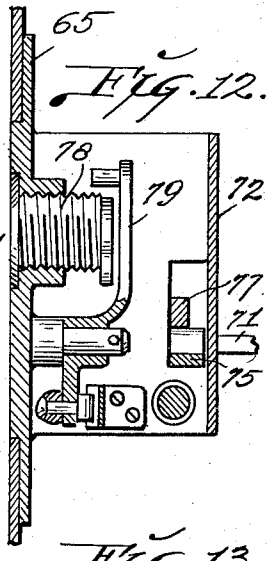


Fig. 11.

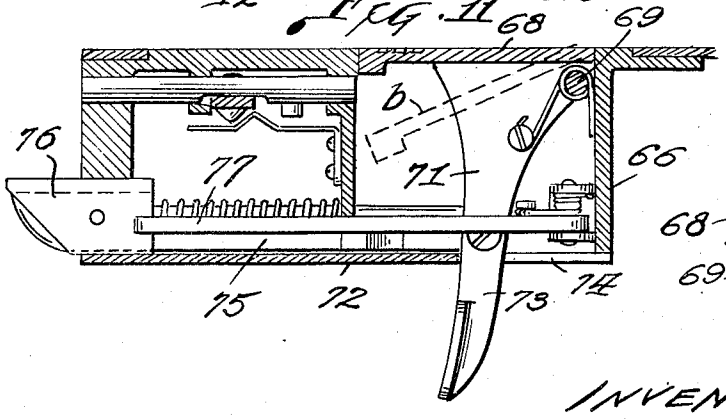
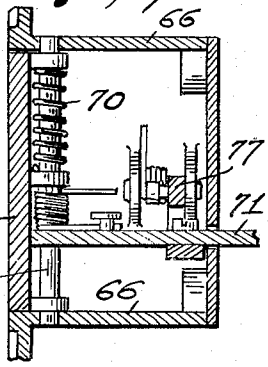


Fig. 13.



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UNITED STATES PATENT OFFICE

2,253,547

FLUSH LOCK

George R. Adams, Los Angeles, Calif.

Application December 4, 1940, Serial No. 368,474

7 Claims. (Cl. 70—208)

My invention relates to a flush lock and has for its principal object, to provide a relatively simple, practical, and highly efficient lock that is particularly applicable for use wherever it is necessary or desirable to arrange the lock so that its outer face is flush with the outer face of the door or other structure in which the lock is seated, for instance, the doors of airplanes, motor vehicles, and the like.

A further object of my invention is, to provide a flush lock with simple means, under control of a manually operable swinging plate arranged on the external face of the lock for engaging and positively holding the locking bolt against retractile movement and to associate with the locking bolt and said holding means, a trip bar that is actuated by engagement with the strike that is engaged by the locking bolt when the door is closed and the actuation of which trip bar is effective in releasing the holding means for the bolt.

A further object of my invention is, to provide a flush lock of the character referred to having key operated means for positively locking the door to which the lock is applied and the lock structure including simple means operable from the inside of the door for enabling the door to be opened from the inside, even though the key operated locking means has been actuated from the outside of the door to lock the latter when closed.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawings in which:

Fig. 1 is an elevational view looking against the outer face of the lock as the same appears when properly applied to a door.

Fig. 2 is an elevational view looking against the rear side of the lock.

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged detail section taken on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged horizontal section taken on the line 5—5 of Fig. 2.

Fig. 6 is an enlarged vertical section taken on the line 6—6 of Fig. 1.

Fig. 7 is an enlarged horizontal section taken on the line 7—7 of Fig. 2.

Fig. 8 is a perspective view of a trip bar utilized in connection with the locking bolt and with the means for normally holding said bolt against retractile movement.

Fig. 9 is an elevational view looking against the outside face of a modified form of the lock.

Fig. 10 is an elevational view looking against the inside of the modified form of lock.

Fig. 11 is a horizontal section taken approximately on the line 11—11 of Fig. 10.

Fig. 12 is a vertical cross section taken on the line 12—12 of Fig. 10.

Fig. 13 is a vertical cross section taken on the line 13—13 of Fig. 10.

Fig. 14 is a perspective view of the outer end of the locking bolt.

Referring by numerals to the accompanying drawings and particularly to the form of lock illustrated in Figs. 1 to 8 inclusive, 10 designates a plate that forms the outside wall of the lock, which plate is suitably mounted in a door with the outer sheet metal sheathing 11 of the door overlying the marginal portions of said plate.

Formed in the central portion of plate 10 is an opening 12, preferably rectangular in shape, and formed integral with the plate above and below and in front of said opening are walls 13 that enclose certain parts of the lock operating mechanism. A portion of the plate 10 to the rear of the upper and lower walls 13 and between the rear ends of said upper and lower walls, is extended rearwardly to form a substantially semi-circular cup 14 and the chamber 15 within this cup-shaped portion is open on the outside of the plate in order to permit the insertion of the fingers that are utilized in manipulating the plate that is actuated when the door is opened.

This plate designated by the numeral 16 is preferably rectangular in shape and a portion thereof normally closes the opening 12 in plate 10 and a portion of the rear end of said plate projects into the chamber 15 in order that it may be conveniently engaged by the fingers utilized in retracting the bolt of the lock when the door is to be opened.

Formed integral with the face of the plate 16 near its top, bottom, and center, are inwardly projecting lugs 17 and passing therethrough is a hinge pin 18, the ends of which are journalled in the walls 13 that are positioned above and below opening 12. Positioned on the upper portion of the hinge pin 18 is a torsional spring 19, the upper end of which bears against the inner face of plate 10 and the lower end of which is extended upwardly a short distance and bears against the central portion of the inner face of

plate 16, thus normally positioning said plate so as to close the opening 12.

Rigidly fixed on the lower portion of hinge pin 18 is a horizontally disposed plate 20, the end of which adjacent the hinge pin 18 bears directly against the inner face of plate 16. Mounted on the lower portion of the hinge pin 18 between the intermediate one of the lugs 17 and plate 20 is a torsional spring 21, one end of which bears against the inner face of plate 10 and the other end thereof bearing against a stud 22 that is seated in plate 20 a short distance rearwardly from the hinge pin. This spring normally maintains plate 20 in position with its end adjacent the hinge pin 18 against the inner face of the plate 16.

Seated in plate 20 adjacent the end opposite the end that bears against plate 16 is a pin 23 that occupies a slot 24, the latter being formed in the inner end of a short arm 25, said arm projecting through a horizontally disposed slot 26 that is formed in the sheet metal 27 that forms the inner wall of the door. A plate 28 is secured to the end of the arm 25 that projects through slot 26, said plate being positioned directly against the inner wall 27 of the door structure and being provided with a finger piece 29 that may be engaged from the inside of the door to retract the bolt of the lock from the inside in the event that the door has been locked from the exterior thereof.

Formed integral with or fixed to the end of plate 10 that is positioned at the edge of the door and on the inside of said plate 10 is a plate 30 disposed at right angles to said plate 10 and arranged to slide through an opening 31 that is formed in said plate is a bolt 32 having an inclined outer end face that is adapted to engage a conventional strike on the door jamb when the door is closed.

Secured to the lower portion of the inner end of bolt 32 is one end of a horizontally disposed pin 33, the outer end portion of which is arranged for sliding movement through an aperture that is formed in the wall 13 that occupies a vertical position at the end of the opening 12. Positioned upon this pin between the inner end of bolt 32 and the vertical end wall 13 is an expansive spring 34 that yieldingly maintains the bolt in its normal projected position.

Formed in the upper portion of the bolt 32 is a horizontally disposed slot 35 in which is arranged for sliding movement a horizontally disposed plate 36 that is formed on one end of a trip bar 37. The outer end of plate 36 is curved outwardly as designated by 38 so that a portion of said plate normally projects a slight distance beyond the inclined face of the bolt 32.

Formed in plate 36 is a short slot 36*a* through which passes a pin 36*b* that is seated in the bolt, thus permitting the trip bar to move a short distance lengthwise independently of the bolt before the latter is engaged and moved lengthwise with said trip bar and which action takes place when the bolt is retracted to permit the door to be opened.

Seated in the end of the trip bar 37 opposite the end provided with plate 36 is a pin or screw 39 that passes through a short slot 40 that is formed in plate 20, thereby providing a flexible connection between the trip bar and said plate. Formed integral with the intermediate portion of the trip bar and on the upper face thereof is a lug 41.

The means utilized for normally holding the bolt 32 against inward movement comprises an arm 42, one end of which is pivotally mounted on a stud 43 that projects from the central portion of the inner face of the cup-shaped member 14. Arranged upon stud 43 is the coiled portion of a torsional spring 44, one end of which is secured to the upper one of the walls 13 and the other end overlying the top of arm 42 so as to yieldingly resist upward swinging movement of said arm.

Formed on the under side of arm 42 adjacent its free end is a shoulder 45 that normally engages against the inner end face of bolt 32 so as to hold the same against inward movement and formed on the under side of the central portion of the arm 42 is a lug 46 that normally occupies a position immediately to the rear of lug 41 on trip bar 37.

Removably seated in plate 10 between the vertical one of the plates 13 and the end plate 30 is the cylinder 47 of a conventional lock of the type having a plurality of pins controlled by a key 48 and mounted on the inner end of the rotating cylinder of this lock is a short upwardly projecting arm 49. Projecting rearwardly from front plate 10 below the lock 47 is a pin 50 on which is mounted for rotation the lower portion of a vertically disposed arm 51 and seated in and projecting forwardly from the upper portion of this arm in the path of travel of the arm 49 that is carried by the lock cylinder is a pin 52.

The lower end of arm 51 is pivotally connected by means of a pin or rivet 53 to the intermediate portion of a horizontally disposed locking pin 54 that is arranged for sliding movement through a bracket 55 that is formed on the inner face of plate 10 and through the vertically disposed one of the walls 13.

Under normal conditions or while the door is unlocked, pin 54 occupies the position as illustrated in Fig. 5, with its right hand end positioned in the vertical wall 13 and when the door is locked the pin is moved toward the right hand until its right hand end portion projects through the vertical wall 13 and engages in a notch 55*a* that is formed in a lug 56 on the inner face of hinged plate 16.

When pin 54 is thus positioned behind plate 16, the latter can not be swung upon its axis and therefore the bolt 32 of the lock can not be withdrawn from its strike to permit the door to be opened from the outside.

To yieldingly retain the pin 54 at the ends of its longitudinal movement, the inner end of the pin or rivet 53 is provided with a head 57 that is substantially wedge-shape in horizontal section and which head is adapted to engage on opposite sides of a vertically disposed rib 58 that is formed on the intermediate portion of a horizontally disposed retaining finger 59 of resilient metal, one end of which is suitably secured to the vertical one of the walls 13.

When the door to which my improved lock is applied is unlocked, the parts of the lock occupy the positions as illustrated in the drawings with the pin 54 at the left hand end of its travel and with the bolt in projected position so as to engage in the strike on the door jamb. To open the door, the end of plate 16 that projects into the pocket or recess 15 is engaged by the fingers and said end is pulled outwardly to the position indicated by dotted lines *a* in Fig. 3, thus swinging said plate upon its axis, the pin 18, and said plate pressing against the end of plate 20 will swing the same upon its axis, the pin 18. As such

movement takes place, the trip bar 37 pivotally connected to plate 20 will be moved longitudinally, thereby causing lug 41 to engage lug 46 on the under side of arm 42, thereby elevating the free end of said arm so as to disengaged shoulder 45 from the rear face of bolt 32.

The initial movement imparted to trip bar 37 by the swinging plate 20 does not impart corresponding movement to the bolt 32 due to the pin and slot connection between plate 36 of the trip bar and the bolt 32, but when the end of the slot 36a engages pin 36b in the bolt, the latter will be retracted and thereby withdrawn from the strike on the door jamb and consequently enabling the door to be opened.

As the plate 16 is released, bolt 32, trip bar 37, and plate 20, will return to their normal positions under the influence of the springs 34, 19, and 21, and arm 42 will return to its normal position to engage and hold the bolt 32 against retractile movement by spring 44.

In the drawings, the lock is shown in unlocked condition with pin 54 at its limit of movement toward the end plate 30 and with the arm 49 carried by the rotating member of the lock 47 positioned against one side of pin 52.

To place the lock in a locked condition so as to prevent the plate 16 from being swung on its axis to actuate the parts that retract the bolt 32, the key 48 is inserted in lock 47 and the rotary member therein that carries arm 49 is rotated approximately one complete turn so that said arm engages on the opposite side of pin 52 and moves the same a short distance to swing arm 51 on its axis, the pin 50, and as the lower end of said arm is connected to pin 54 the latter will be moved so that the end portion that passes through the vertical end wall 13 will be projected into the recess 55a of lug 56 that is carried by the inner face of plate 16 and consequently preventing said plate from being swung on its axis, the hinged pin 18 to effect retraction of bolt 32.

In order that the door may be opened from the interior after having been locked from the exterior, it is only necessary to engage member 29 and slide plate 28 toward the right hand and due to the connection between said plate 28 with the plate 20, the latter will be swung on its axis, the hinge pin 18, so as to actuate trip bar 37 and arm 42 to withdraw the projecting end of bolt 32 from the strike on the door jamb.

When the lock 47 is actuated by means of the key to swing arm 51 on its axis, the head 57 of the pin or rivet that connects the lower end of arm 51 to pin 54 will ride from one side of the rib 58 on resilient finger 59 to the other and thus, the arm 51 is yieldingly held at both ends of its swinging movement.

In the construction heretofore described, one end of the plate 16 is engaged and drawn outwardly away from the lock housing in order to impart retractile movement to the bolt of the lock, whereas in the modified construction the corresponding plate is constructed and mounted so that one end thereof may be engaged and pushed inwardly into the lock housing to effect retraction of the bolt.

In the modified construction of the lock, a plate 65 which corresponds with plate 10 is provided on its inner or rear face with a housing comprising four walls 66 and which housing surrounds an opening 67 that is formed in plate 65. A push plate 68 normally closes the opening 67, said push plate being hinged to a vertically disposed pin 69 having its ends seated in the top and bottom walls of the housing on the rear side of the plate and the inward movement of plate 68 being yieldingly resisted by a spring 70 that corresponds with spring 19 in the construction previously described.

Secured to pin 69 is a plate 71 similar to plate 20 previously described and extending from this last mentioned plate outwardly through a rear or inner wall 72 that is secured to the housing comprising the walls 66 is a short arm 73 that is adapted to move through a slot 74 that is formed in said wall 72.

Pivotally connected to arm 73 is one end of a trip bar 75 practically identical with trip bar 37, the opposite or outer end of which trip bar passes through a bolt 76 that corresponds with previously described bolt 32. A spring held arm 77 is pivotally connected at one end to one of the walls of the housing 66 and the opposite end of said arm normally engages bolt 76 to hold it against retractile movement.

This modified form of the lock is fitted with a key operated lock 78 that corresponds with the lock 47 and said lock being adapted to actuate an arm 79 that corresponds with arm 51 for actuating a bolt 80 that corresponds with bolt 54 and which, when moved so that a portion extends into the chamber within the housing 66, prevents the plate 68 from being swung inwardly to withdraw bolt 76.

Pin 52 is extended rearwardly through a slot 52a in the lining 27 in order to enable arm 51 to be swung on its axis, the stud 50, so as to shift rod 54 into position to free the plate 16, thus unlocking the key actuated lock from the inside of the door.

The construction of the modified form of lock illustrated in Figs. 9 to 14 inclusive is substantially the same as the construction heretofore described, with the exception of the swinging plate that is engaged and actuated by the fingers for effecting the release of the bolt.

To actuate this form of lock, it is only necessary to apply pressure to the external face of the plate 68 and swing the same inward as indicated by dotted lines b, Fig. 11, with the pin 69 functioning as an axis to withdraw the bolt 76 from its strike and thereby permitting the door to be opened.

When bolt 80 is actuated to project one end thereof into the housing 66 and which movement follows operation of the key actuated lock 78, it is impossible to swing plate 68 on its axis to retract the bolt 76, but the bolt may be retracted from the inside of the door by engaging arm 73 and swinging the same on its axis, the pin 69, so as to withdraw the bolt 76.

In some installations it may be found desirable to mount the lock in the jamb or frame of the door and where such construction is employed, the strike that is engaged by and which receives the bolt 32 is mounted on the edge of the door.

Thus it will be seen that I have provided a flush lock that is relatively simple in construction, inexpensive of manufacture and very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved flush lock, may be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a flush lock, a plate provided with an opening, a second plate hinged to the first mentioned plate for normally closing said opening, a wall at the end of the first mentioned plate, a spring held bolt arranged for sliding movement through said wall, means normally engaging said bolt for holding the same against retractile movement, a third plate hinged to the first mentioned plate and normally bearing against the inner face of the plate that closes the opening in said first mentioned plate, a trip bar extending through said bolt and pivotally connected to the third mentioned plate and means on said trip bar for disengaging the holding means from said bolt as the latter and said trip bar are moved longitudinally as a result of contact with a strike that receives the bolt when in projected position.

2. A flush lock as set forth in claim 1 and with manually operable means connected to said third mentioned plate for imparting retractile movement to said bolt and trip bar.

3. A flush lock as set forth in claim 1, with key operated means for locking the plate that closes the opening in the first mentioned plate against inward swinging movement and manually operable means connected to said third mentioned plate for imparting retractile movement to said bolt and trip bar.

4. In a flush lock, a face plate provided with an opening, a housing formed on the rear side of said face plate around the opening therein, there being an externally arranged recess formed in said face plate at one end of said housing and said opening, a member hinged to said housing and normally closing the opening in said face plate, a portion of which hinged plate extends into the recess in said face plate, a horizontally disposed plate hinged within the housing, one end of which last mentioned plate bears against the rear face of the plate that closes the opening in the face plate, a wall secured to one end of said face plate on the rear side thereof, a bolt arranged for sliding movement through said wall, a trip bar associated with said bolt and pivotally connected to said hinged horizontally disposed plate, a spring held arm for normally engaging said bolt and holding same against retractile movement and means on said trip bar for engaging and actuating said arm to release said bolt at the beginning of retractile movement imparted thereto.

5. A flush block as set forth in claim 4 and with manually operable means on the rear side of the lock for actuating the plate that bears against the inner face of the plate that closes the opening in said face plate and for imparting retractile movement to said bolt and trip bar.

6. In a flush lock, a housing including a face plate and an end plate, a spring pressed bolt arranged for sliding movement through the end plate of the housing, a spring pressed arm pivoted at one end within the housing, the other end normally engaging the bolt to hold the same against movement into the housing, a trip bar having one end arranged for sliding movement through the bolt, a pin and slot connection between said trip bar and bolt, means on the trip bar for engaging and lifting the arm that normally holds the bolt against inward movement and manually operable means operable from the exterior of the face plate of the housing for imparting longitudinal movement to said trip bar.

7. In a flush lock, a housing including a face plate and an end plate, a spring held bolt arranged for sliding movement through the end plate, the outer end of said bolt having an inclined free, a trip bar having an end portion arranged for sliding movement lengthwise through said bolt, the outer end of the portion of said trip bar that slides through said bolt being curved and normally occupying a position beyond the inclined end of the bolt, a pin and slot connection between said trip bar and bolt, an arm pivoted within the housing and normally engaging said bolt to hold the same against retractile movement, means on the trip bar for disengaging said arm from said bolt as said trip bar moves longitudinally within the housing and means operable from the exterior of the face plate for imparting longitudinal movement to said trip bar.

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