United States Patent

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[54] **DOOR LOCK**
8 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **70/146,** 292/173, 292/153, 70/208
[51] **Int. Cl.** **E05b 5/00,** E05c 1/14
[50] **Field of Search** ..... 70/81, 146, 208; 292/2, 173, (L.O.F.), (D.C.F.), (P.L.P.), (Z), (U), 366

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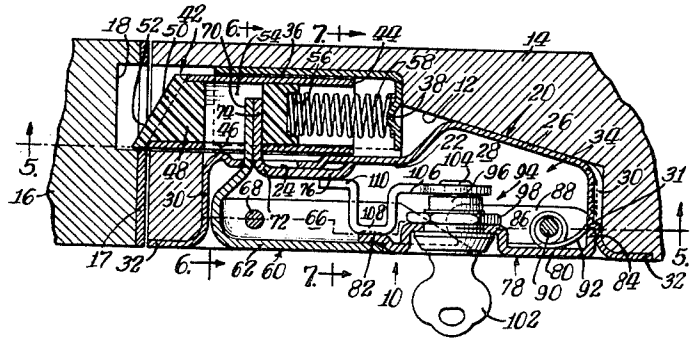
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ABSTRACT: A pan-shaped housing with a lock bolt slidably guided at the back wall thereof. The lock bolt comprises a hollow metal tube having longitudinal corners with a slight radius, and a plastic insert with an outer head portion presenting an inclined cam surface for cooperation with a keeper plate. Latching and locking members are pivotally mounted in the housing, and have plate portions which extend across and normally close the front of the housing. The latching member has a lever portion which extends through the housing back wall and projects into the plastic insert of the lock bolt for effecting retracting movement of the bolt upon pivoting of the latching member. The locking member has selectively operable lock means for preventing pivoting of the latching member and corresponding retracting movement of the bolt.



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SHEET 1 OF 2

Fig. 1.

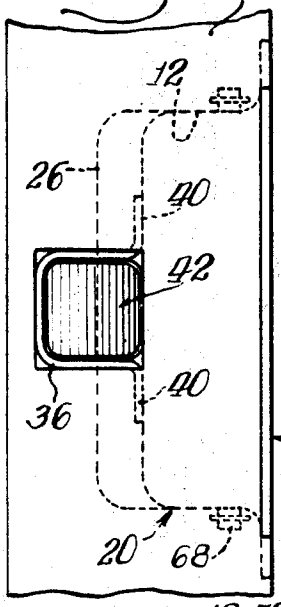


Fig. 2.

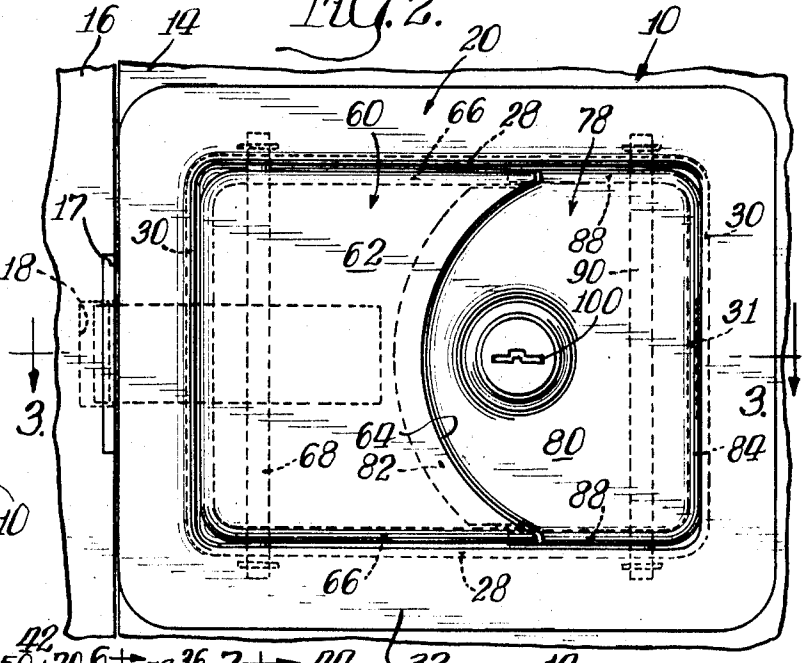
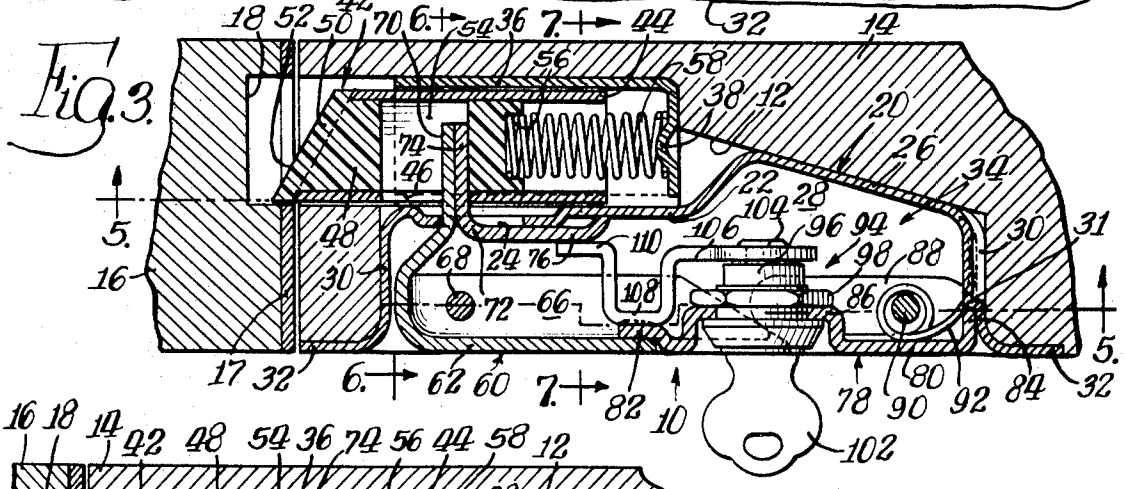


Fig. 3.



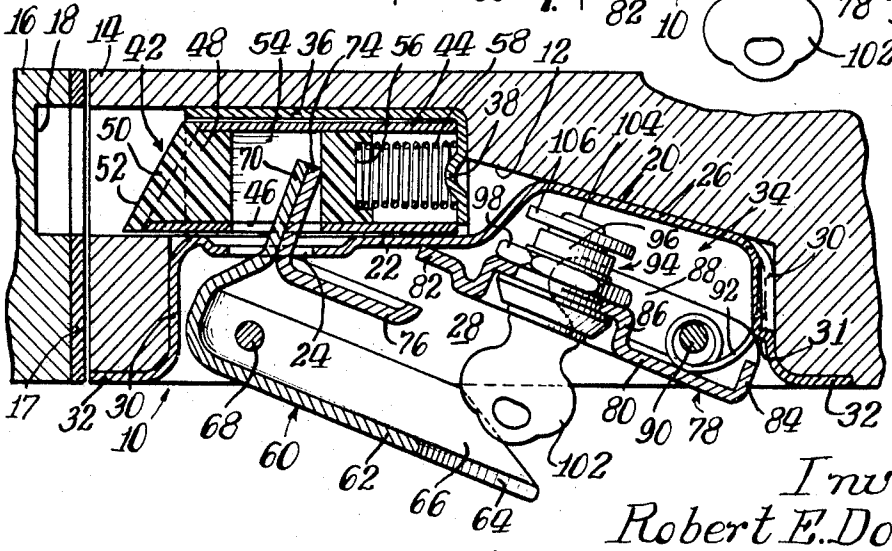


Fig. 4.

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Fig. 5.

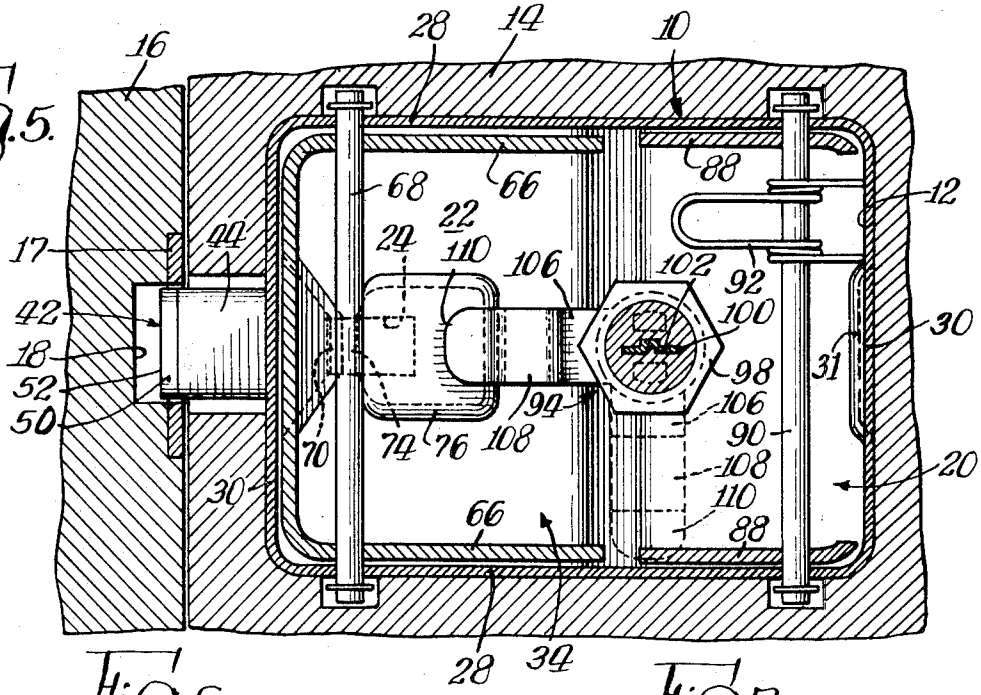


Fig. 6.

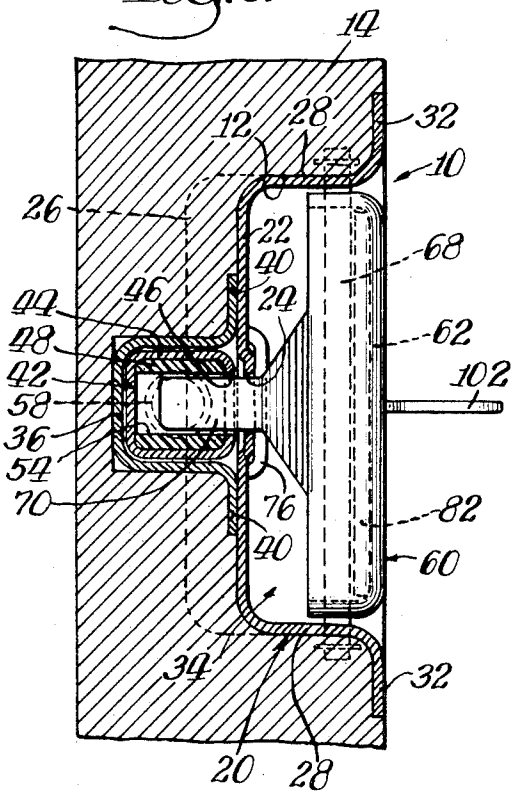
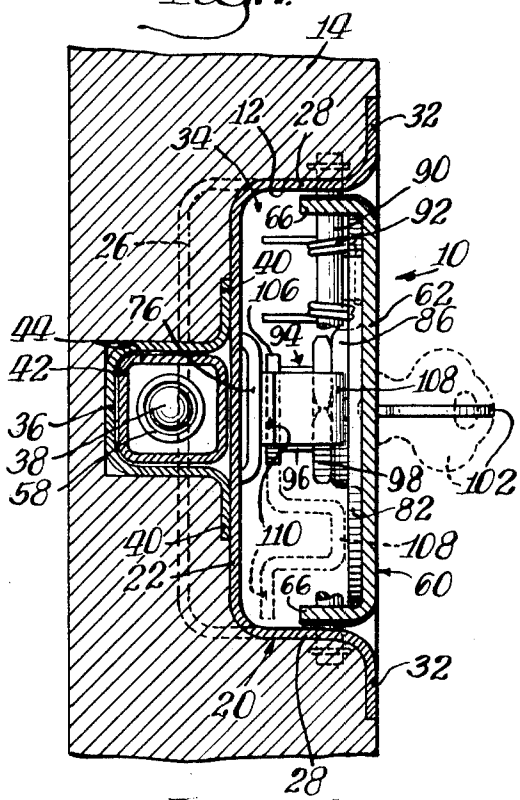


Fig. 7.



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DOOR LOCK

BACKGROUND OF THE INVENTION

The present invention pertains to flush-type door locks adapted for use on the doors of vehicles such as trucks and the like.

Conventional flush-type door locks comprise a housing, a slidable lock bolt, and an operating handle for retracting the lock bolt. Usually, the lock bolts are formed from solid metal bars; accordingly, fabrication costs are high, and movement of the bolts within their guides is erratic and difficult due to the presence of high frictional forces. In addition, the operating handles, although adapted to be locked, normally have exposed edges beneath which a crowbar or like tool can be inserted to pry open the handles. Furthermore, existing handles incompletely cover the housings; thus undesirable ice, dirt and other waste material are free to collect interiorly of the door locks. In sum, conventional flush-type door locks are expensive and inefficient, do not withstand tampering, and present unshielded interiors.

SUMMARY OF THE INVENTION

The flush-type door lock of the present invention comprises a pan-shaped housing, a slidable guided lock bolt at the back wall thereof, a latching member or operating handle pivotally mounted in the housing, and a locking member also pivotally mounted in the housing.

The latching and locking members have cooperating plate portions which extend across and normally cover the front of the housing. In this manner, the interior of the door lock is shielded from dirt and the like.

When the locking plate is swung into the housing, access is permitted to the latching plate which then may be swung out of the housing to effect retracting movement of the lock bolt. The locking member further includes key-operated lock means which is selectively operable for preventing pivotal or swinging movement of the latching and locking members whereby to secure the door lock. When so secured, the cooperating latching and locking plates not only cover the front of the housing but also present no exposed or protruding edges subject to possible prying or other tampering.

The lock bolt is comprised of a hollow metal tube and a plastic insert with an exposed head portion. The provision of the tube permits the forming of longitudinal corners with a slight radius (without grinding as would be required with a solid bar) for improved sliding action of the lock bolt within its guideway. The tube also permits the use of the plastic insert which facilitates smoother door closing and smoother lock bolt actuation.

By reason of the foregoing construction, and in contrast with conventional flush-type door locks, the door lock of the present invention is shielded, tamper-proof, economical to manufacture and efficient in operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial edge view of a door in which the door lock of the present invention is mounted;

FIG. 2 is a partial front view of the door and door lock of FIG. 1, and of a door jam adjoining the edge of the door;

FIG. 3 is a sectional view taken substantially along the line 3–3 of FIG. 2 with the parts being shown in a locked position;

FIG. 4 is a sectional view corresponding generally to FIG. 3 with the parts being shown in an operating position;

FIG. 5 is a sectional view taken substantially along the line 5–5 of FIG. 3;

FIG. 6 is a sectional view taken substantially along the line 6–6 of FIG. 3; and

FIG. 7 is a sectional view taken substantially along the line 7–7 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is indicated generally by the reference numeral **10** a flush-type door lock embodying the principles of the present invention. The door lock **10** is adapted to be mounted in a recess **12** formed at the edge of a door **14** associated with a side door jam **16**. Since the door **14** and door jam **16** do not form part of the present invention, only fragmentary portions thereof are shown in the drawings. The door jam **16** is provided with a keeper plate **17** and keeper notch **18** which are arranged in a conventional manner for cooperation with a lock bolt.

The door lock **10**, as shown in FIGS. **2**, **3** and **5**, comprises a pan-shaped metal housing **10** having a back wall **22** with a slot **24** and a depressed section **26**, opposed sidewalls **28**, opposed end walls **30** with one bearing an indented ridge **31**, and a peripheral flange **32** set flush with the front face of the door **14**. The walls of the housing **20** define a recessed area **34**. Extending along the exterior of the backwall **22**, and overlying the slot **24**, is a generally U-shaped metal channel guide member **36**. As shown in FIGS. **3** and **6**, the channel member **36** has a closed end **38**, and has side flanges **40** secured, as by welding, to the back wall **22**.

Slidably guided in the channel member **36** is a lock bolt **42** of new and improved construction. The lock bolt **42** comprises a square hollow metal tube **44** having the longitudinal corners thereof formed with a slight radius and having an opening **46** in one side thereof aligned with the back wall slot **24**. Disposed and secured in the tube **44** is an insert **48** fabricated of a plastic such as "Delrin." The plastic insert **48** is formed with a projecting outer head portion **50** presenting an inclined cam surface **52**, with an intermediate recess **54** aligned with the tube opening **46**, and with a rear cutout **56**. The bolt **42** is biased outwardly of the channel member **36** by a compression spring **58** arranged between the channel member end **38** and the insert cutout **56**.

To control and retract the lock bolt **42**, a paddle handle or latching member **60** is provided. The latching member **60**, as shown in FIGS. **2**, **3** and **6**, includes a plate portion **62** having a concave arcuate edge **64** at one end thereof, and having inwardly directed side flanges **66**. A pivot pin **68** projects through aligned apertures in the side flanges **66** and housing sidewalls **28** adjacent one end of the housing **20**, whereby the latching member **60** is pivotally mounted relative to the housing. The latching member **60** further includes an inwardly projecting relatively narrow lever portion **70** at the end of the plate portion **62** adjacent the pivot pin **68**. The lever **70** extends through the back wall slot **24** and tube opening **46**, projects into the insert recess **54**, and is engageable with the adjacent edge of the back wall slot **24** to prevent swinging or pivoting of the latching member **60** inwardly beyond a position flush with the housing flange **32** and to limit outward axial movement of the lock bolt **42**.

Also incorporated with the latching member **60** is an L-shaped cover member **72** having one leg **74** secured to the lever **70** with the other leg **76** extending parallel to the plate **62**. The plastic insert **48** of the spring biased lock bolt **42** operates against the cover member leg **74** and lever **70**, and biases the latching member **60** pivotally inwardly. The cover member leg **76** is engageable with the housing back wall **22** to cover substantially the back wall slot **24** whereby to minimize the passage of dirt and the like therethrough.

Cooperatively associated with the latching member **60** is a locking member **78**. As shown in FIGS. **2**, **3** and **5** the locking member **78** includes a plate portion **80** having a depressed convex arcuate edge or lip **82** at one end thereof, an inturned flange **84** at the other end, an intermediate depressed apertured well **86**, and inwardly directed side flanges **88**. A pivot pin **90** projects through aligned apertures in the side flanges **88** and housing sidewalls **28** adjacent the inturned flange **84**, for pivotally mounting the locking member **78** relative to the housing **20**. Disposed about the pivot pin **90** is a torsion spring **92** with its opposite ends engaged against the adjacent housing

end wall 30 and the underside of the plate portion 80, for biasing the latter pivotally outwardly. The inturned flange 84 is engageable with the housing rear wall ridge 31 to prevent swinging or pivoting of the lock plate 80 outwardly beyond a position flush with the housing flange 32. The locking member 78 further includes a key-actuated locking device 94 comprised of a cylinder 96 which is secured in the apertured well 86 by a nut 98, and which has a key slot 100, adapted to receive a key 102, and a rotatable stud 104. Secured to the stud 104 is a locking arm 106 having an intermediate outwardly offset supporting section 108 and a free outer end 110.

With the elements of the door lock 10 positioned as shown in FIG. 3, the door 14 is securely locked to the door jam 16. The outer end of the lock bolt 42 is maintained in the keeper notch 18 by the spring 58, the locking arm offset section 108 is engaged behind the edge 82 of the plate 80 to prevent inward pivotal movement of the locking member 78, and the locking arm end 110 is engaged in front of the cover member leg 76 to prevent outward pivotal movement of the latching member 60. While the latching plate 62 and locking plate 80 together extend across and cover the recessed area 34 within the lock housing 20 (FIG. 2), the locking arm 106 effects a rigid and tight seal along the overlapping arcuate bands of the concave plate edge 64 and the convex depressed plate edge 82. By reason of this arrangement, the undesirable accumulation of dirt, ice and the like interiorly of the door lock 10 is substantially eliminated. Additionally, there are no exposed or protruding edges under which a tool could be inserted to pry open the lock, and hence the door lock 10 of the present invention is tamper-proof.

When the door 14 is to be opened, the key 102 is inserted in the key slot 100 and turned counterclockwise, as viewed in FIG. 1, approximately 90°. As the key 102 is turned, the stud 104 rotates and the locking arm 106 is revolved from the solid line position shown in FIGS. 3 and 5 to the dotted line position shown in FIGS. 5 and 7. In this manner, the locking arm 106 is removed from blocking engagement with the plate edge 82 and the cover member leg 76. Then, the plate portion 80 of the locking member 78 is pushed pivotally inwardly, against the force of spring 92, from the position shown in FIG. 3 to the position shown in FIG. 4 thereby exposing a large gripping area at the free end 64 of the plate portion 62 of the latching member 60. Inward pivotal movement of the locking member 78 is accommodated by the depressed back wall section 26 which, to maintain the overall depth of the door lock 10 at a minimum, is arranged at a position spaced from the lock bolt channel 36. Next, the latching plate 62 is pulled pivotally outwardly from the position shown in FIG. 3 to the position shown in FIG. 4. As the latching plate 62 is thus pivoted, the lever 70 and the cover member leg 74 operating in contact with the plastic insert 48 move the lock bolt 42 inwardly of the channel member 36, against the force of spring 58, thereby effecting withdrawal of the lock bolt 42 from the keeper notch 18 and clear of the keeper plate 17. At this point, the door 14 may be swung open with additional pull on the latching plate 62 or otherwise.

Upon release of the latching plate 62, the spring 58 returns the lock bolt 42 and latching member 60 to the position shown in FIG. 3, while the spring 92 returns the locking plate 80 to the position shown in FIG. 3. When the door 14 is thereafter swung closed, the cam surface 52 rides over the keeper plate 17, and the lock bolt 42 is moved axially inwardly, until the latter is aligned with the keeper notch 18. Then the spring 58 causes the lock bolt 42 to snap into engagement with the keeper notch 18 whereupon the door is retained in closed position. Locking of the door is completed by turning the key 102 to return the locking arm 106 to the blocking position shown in FIG. 3.

If desired, the locking arm 106 may be disposed in its blocking position while the door 14 is open, and such advance locking of the door lock 10 will not interfere with subsequent closing of the door. In this respect, the lock bolt opening 46 and recess 54 provide a lost motion connection between the latching member lever 70 and the lock bolt 42. Hence, the lock bolt 42 is free to move inwardly of the channel member 36 during door closing while the latching member 60 remains locked. With further regard to the lock bolt 42, the provision of the hollow tube 44 permits the inexpensive forming of longitudinal corners with a slight radius for improved sliding action of the lock bolt within the channel member 36. Moreover, the hollow tube 44 permits the incorporation of the plastic insert 48 which accommodates smoother closing of the door and smoother actuation of the lock bolt by the latching member 60.

While there has been shown and described a preferred embodiment of the present invention, it will be understood by those skilled in the art that various rearrangements and modifications may be made therein without departing from the spirit and scope of the invention.

I claim:

1. A door lock comprising a pan-shaped housing with back and sidewalls, said back wall having a slot therein, a guide member supported on the outside surface of said back wall and open to said slot, a bolt slidable in said guide member, a spring in said guide member to bias said bolt into a projected latching position, a latching member pivotally mounted in said housing and having a lever portion with one end projecting through said slot for retracting said bolt against the force of said spring, and a locking member pivotally mounted in said housing and having locking means for selectively holding said latching and locking members in a locked position against any pivotal movement, each of said latching and locking members having a plate portion at opposite ends of said housing adjacent the outer ends of said sidewalls and which together cover the front face of said housing.

2. A door lock as defined in claim 1, wherein said locking means includes a key-actuable cylinder lock mounted in an opening in said plate portion of said locking member and having an inwardly extending rotatable stud, and a locking arm secured to the end of said stud.

3. A door lock as defined in claim 1, further comprising stop means to prevent said plate portion of said locking member from swinging outwardly beyond the outer edges of said sidewalls and spring means to bias said plate portion of said locking member away from said back wall.

4. A door lock as defined in claim 1, wherein said plate portions of said locking and latching members have conforming free ends and normally lie in the same plane to provide a substantially flush continuous surface across the front of said housing.

5. A door lock as defined in claim 4, wherein the free end of said plate portion of said locking member includes an outer lip that is offset inwardly and is normally in abutting engagement with the under surface of the free end of said plate portion of said latching member, and said locking means includes a supporting section which engages the under surface of said outer lip when said locking means is moved to hold said latching and locking members in a locked position.

6. A door lock as defined in claim 1, wherein said bolt operating on said lever portion biases said plate portion of said latching member pivotally toward said housing, wherein said lever portion is engageable with the adjacent edge of said slot to prevent said plate portion of said latching member from swinging inwardly of said housing, and including a cover member carried by said latching member and engageable with the inside surface of said back wall to cover substantially said slot.

7. A door lock as defined in claim 6, wherein said locking means includes a locking arm engageable with the outer surface of said cover member to hold the latter against said back wall when said locking means is moved to hold said latching and locking members in a locked position.

8. A door lock as defined in claim 1, wherein said bolt comprises a hollow steel tube having an opening formed in one side thereof aligned with said back wall slot, and a plastic insert secured in said tube with a cam surface projecting outwardly of said tube and having a recess therein aligned with said tube opening for receiving said lever portion.