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Nakai

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[54] NARROW PROFILE DOOR LATCH

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[52] **U.S. Cl.** **292/166;** 292/153; 292/336.3

[51] **Int. Cl.**[2] **E05C 1/16**

[58] **Field of Search** ..... 292/153, 166, 168, 174, 292/336.3, 359, DIG. 31; 70/153, 208

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Attorney, Agent, or Firm—Christensen, O'Connor, Garrison & Havelka

[57] **ABSTRACT**

A door latch without outwardly projecting knobs or the like is comprised of a normally extended bolt which is longitudinally retractable by an actuator having generally disc-like inner and outer housings mountable on the door with their outer surfaces essentially faired with those of the door. The inner and outer actuator housings include outwardly opening recesses into which a hand is insertable to engage longitudinally movable vertical pusher bars positioned therein for retractively moving the bolt. A pivotal lock member rotatively supported from the inner housing is provided to lock the latch from the inside of the door; but can be moved to unlock the latch from both sides thereof.

10 Claims, 5 Drawing Figures

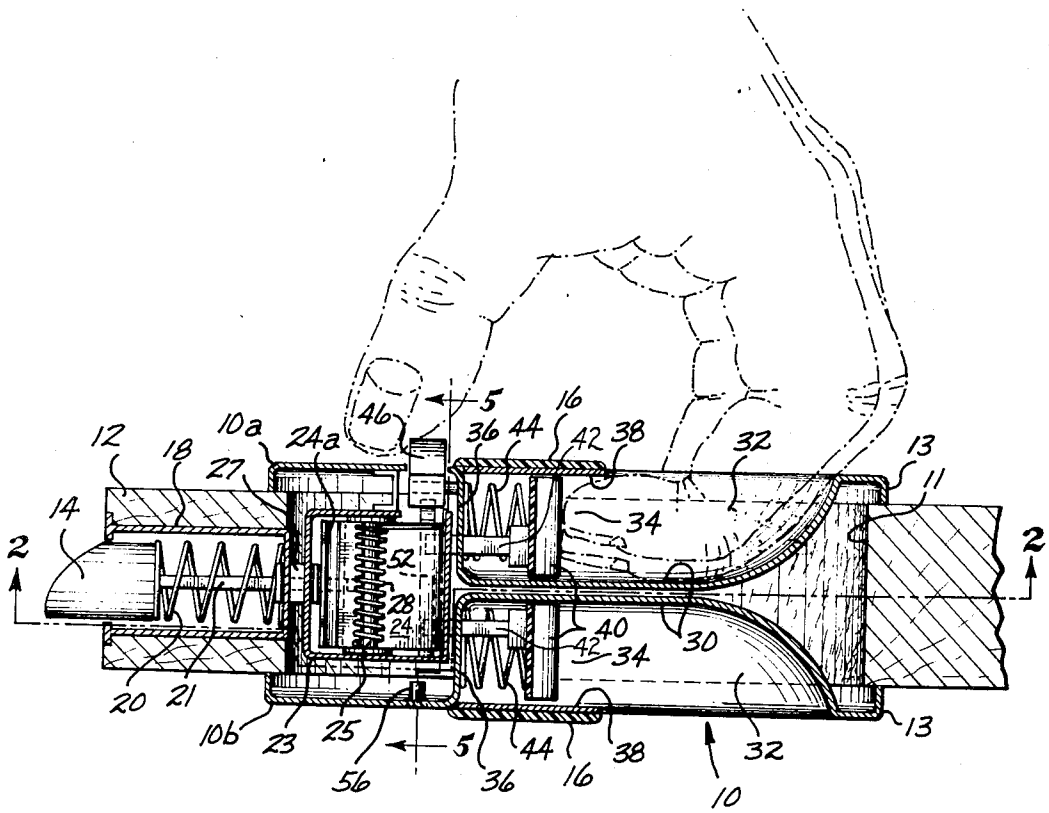
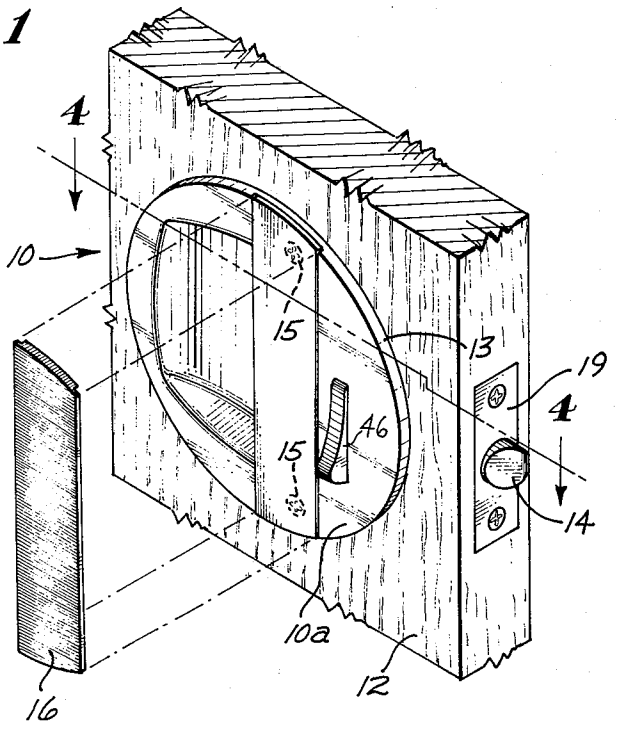


Fig. 1


4
10
15
13
19
4
46
15
14
10a
12
16

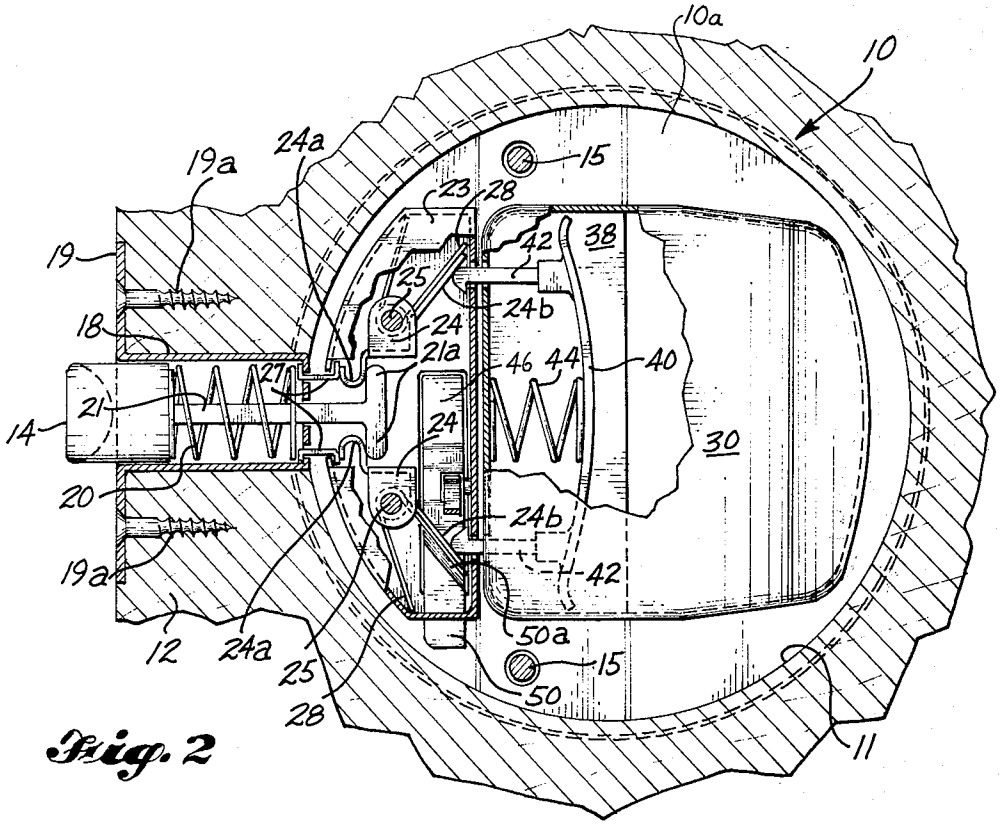

10a
10
19a
24a
15
23
28
19
42
38
25
24b
18
24
21a
46
44
40
27
21
24
14
30
20
24b
19a
42
50a
12
24a
25
15
28
50
11

Fig. 2

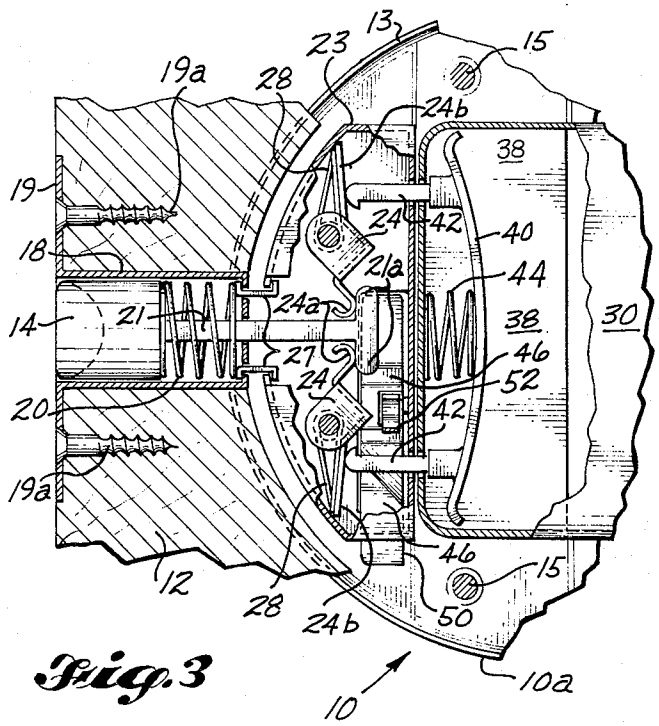


Fig. 3

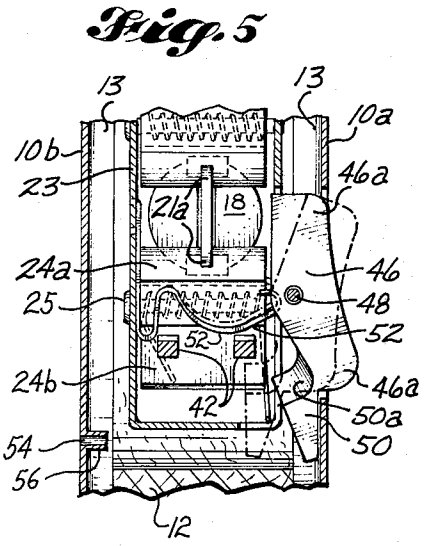


Fig. 5

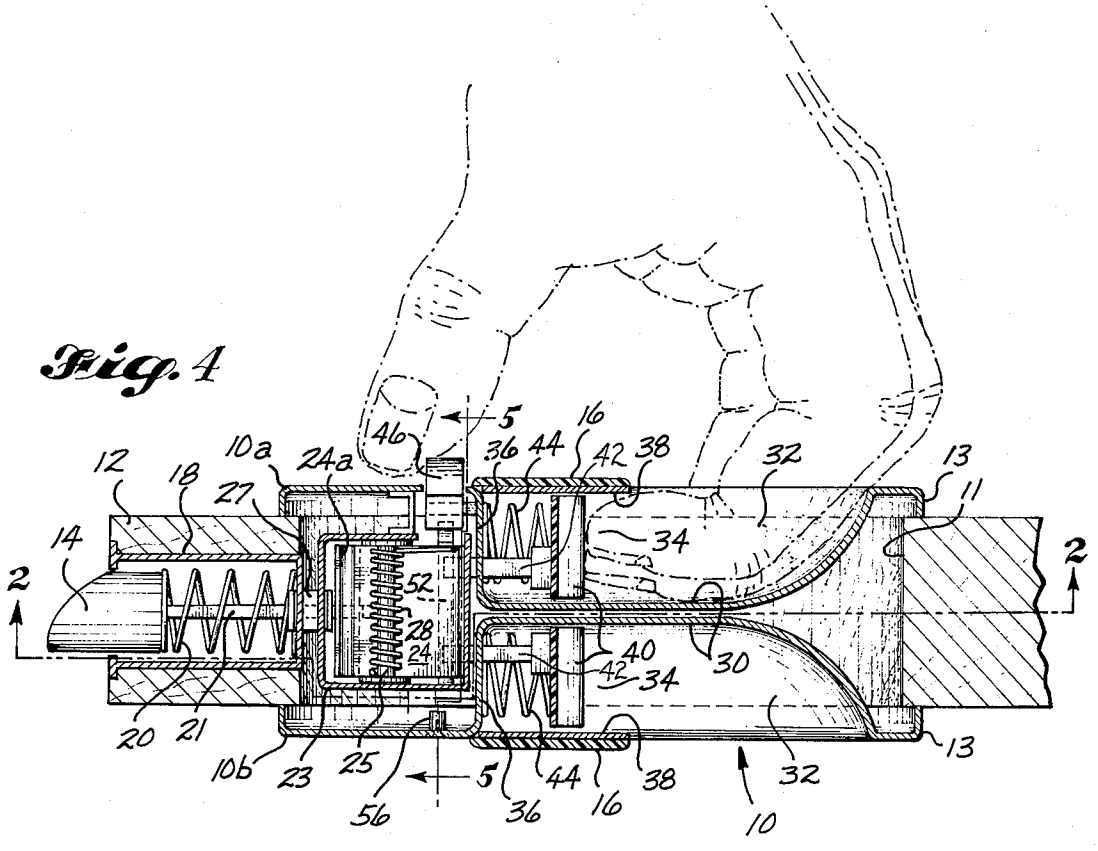


Fig. 4

NARROW PROFILE DOOR LATCH

BACKGROUND OF THE INVENTION

This invention relates to door latches of the type in which a normally extended bolt is selectively retractable by a door mounted latch actuator including one or more operator members, such as knobs or levers, which are movable by the user's hand to operate the actuator.

Door latch actuators typically include rotatively mounted door knobs or levers projecting transversely outwardly from one or both sides of the door. These knobs or levers are undesirable in a narrow passageway, because passersby are likely to collide with them. They also make it uneconomical to ship and manufacture doors with such actuators installed because the doors cannot be stacked face to face with one another for shipping without damage thereto or the use of costly spacers and special packaging materials.

Accordingly, it is an object of the present invention to provide a door latch of the type described which does not utilize transversely outwardly projecting knobs, levers or the like to operate the latch.

Another object is to provide such a door latch actuator which is mountable within a conventional door with its outer surfaces essentially faired together with the outer surfaces of the door. A related object is to provide a lock for selectively disabling the actuator.

SUMMARY OF THE INVENTION

A door latch according to the present invention includes a normally extended bolt and an actuator for selectively retracting the bolt. The actuator is comprised of disc-like inner and outer housings, the outer surfaces of which are essentially faired with those of the door in which it is mountable. One or both of these housings respectively define inner and outer outwardly opening recesses in which are positioned reciprocatively movable pusher bars retractively connected with the bolt. Preferably, the pusher bars are vertically positioned within the recesses and are longitudinally movable therein forwardly and rearwardly of the door. The pusher bars are coupled to the bolt by a linkage which transmits retractive movement to the bolt in response to forward longitudinal movement of one or both of the pusher bars. Preferably, this linkage is comprised of one or more pivotal plates rotatively mounted intermediate their ends for rotative movement about axes extending transversely to the length of an elongated connecting rod extending rearwardly from the bolt and with which rod they are rotatively engageable.

A lock for selectively locking the latch includes an elongated lock element rotatively mounted intermediate its ends from one of the housings for movement about a transverse axis extending longitudinally of the door. The lock typically is mounted from the inner housing near the inner pusher bar. An inwardly projecting end of the lock element is selectively rotatively engageable with one element of the linkage to lock the latch. Preferably, the inwardly projecting end engages one of the pivot plates. The outer housing of the actuator has a hole opposite the inwardly projecting end of the lock element and in communication with a transversely extending guide tube through which an elongated object can be inserted to engage the inwardly projecting end of the lock member to unlock the latch from the outside.

Other features, objects and advantages of the present invention will become apparent from the detailed description to follow taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective of the latch according to the present invention.

FIG. **2** is a cross-section of the latch taken along line **2—2** in FIG. **4** depicting the latch of FIG. **1** with parts broken away and with its bolt extended.

FIG. **3** is similar to FIG. **2** depicting the latch of FIG. **1** with its bolt retracted.

FIG. **4** is a longitudinal horizontal section taken along line **4—4** in FIG. **1.**

FIG. **5** is a transverse vertical section taken along line **5—5** in FIG. **4.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIGS. **1–5** of the drawings, wherein like parts bear like reference numerals, there is shown a door latch which includes an actuator assembly **10** mountable within a circular cutout **11** of a door **12** and retractively coupled with a longitudinally reciprocative slidable bolt **14** normally projecting transversely outwardly from the front end of the door **12,** as shown (FIG. **1**). The actuator assembly **10** is comprised of inner and outer disc-like housings **10***a* and **10***b* (outer housing not shown in FIG. **1**) which have inwardly projecting peripheral flanges **13** (FIG. **4**) at diameters greater than the circular cutout **11** for engageably clamping, respectively, the inner and outer surfaces of the door **12** therebetween using transversely extending screws **15.** These screws are covered by detachable decorative plastic outer panels **16** extending vertically of each housing parallel to and nestled with the outer surfaces thereof.

The illustrated bolt **14** is of conventional design and construction and is beveled transversely of the door toward the inside thereof. The bolt **14** is slidably supported for reciprocal movement longitudinally of the door within a generally tubular bolt housing **18** having a face plate **19** secured to the front end of the door **12** by screws **19***a*. The bolt **14** is normally biased toward its extended position by a forward spring **20.** The bolt **14** is movable rearwardly in response to engagement with a door jam or the like. The rear end of the bolt **14** is fixed to an elongated connecting rod **21** which projects rearwardly longitudinally of the door into the circular door cavity defined by the cutout **11** and terminates at its rear end in vertical upwardly and downwardly projecting shoulders **21***a*.

The rear end of the connecting rod **21** projects rearwardly into a forward housing **23** dependly mounted from the inside housing **10***a* intermediate the inner and outer housings **10***a* and **10***b*, as shown (FIG. **4**). The connecting rod **21** is forwardly biased by the forward spring **20** into engagement, respectively, with the vertical downwardly and upwardly projecting forward ends **24***a* of upper and lower pivot plates **24** rotatively supported from the forward housing **23** by mounting pins **25** extending transversely of the door, respectively, above and below the longitudinal axis of the connecting rod **21.** As best shown in FIG. **4,** the pivot plates **24** extend transversely the width of the forward housing **23.** The front end of the forward housing **23** is apertured

and engages the hooked ends of projecting fingers **27** extending rearwardly from the bolt housing **18.** As best shown in FIGS. **2** and **4,** these fingers vertically and longitudinally align the forward housing **23** relative to the connecting rod **21** and also limit forward rotative movement of the upper and lower pivot plates **24.** The pivot plates are rotationally biased oppositely into engagement therewith by torsional coil springs **28** about the mounting pins **25.** The upper and lower pivot plates **24** also include, respectively, rear upwardly and downwardly sloping cam faces **24***b* (FIGS. **2, 3**).

As best shown in FIG. **4,** the central portions **30** of the inner and outer housings **10***a* and **10***b* are generally concave and define opposite outwardly opening generally square recesses **32.** The recesses **32** progressively deepen longitudinally and terminate at their forward ends in rearwardly opening pockets **34** between square faced forward shoulders **36** and elongated vertical overhanging finger plates **38.** The finger plates **38** project rearwardly from the forward exterior surfaces of the inner and outer housings **10***a* and **10***b* and parallel thereto. Vertical plastic pusher bars **40** are slidably supported within the pockets **34** from the forward housing **23** by longitudinally forwardly projecting upper and lower guide rods **42.** The pusher bars **40** are biased rearwardly by rear springs **44** toward their retracted positions in which transversely projecting forward shoulders of their associated guide rods **42** engage the forward housing **23,** as shown (FIG. **2**). The pusher bars **40** alternately are movable forwardly toward their advanced positions (FIG. **3**) by the user's hand, the fingers of which are insertable into the recesses **32,** as shown (FIG. **4**). In the latter positions of the pusher bars **40,** the upper and lower guide rods **42** associated therewith engage and move rotationally in opposite directions, respectively, the upper and lower rear cam faces **24***b* of the upper and lower pivot plates **24.** The forward downwardly and upwardly projecting ends **24***a* of upper and lower pivot plates **24** respectively rotatively engage and move rearwardly the upwardly and downwardly projecting shoulders **21***a* of the connecting rod **21** which retractively moves the bolt **14.** The upper and lower pivot plates **24** are rotatively movable by either pusher bar **40** so that the latch can be operated from inside or outside the door **12.** The door **12** is opened and closed by the user engaging the rearwardly projecting or overhanging interior surfaces of finger plates **38,** as depicted in FIG. **4.**

As best shown in FIG. **5,** an elongated lock **46** is rotatively supported intermediate its ends from the inner housing **10***a* for rotation about a transverse horizontal axis defined by a supporting pin **48** extending longitudinally of the door **12.** The lock **46** includes a lower inwardly projecting shoulder **50** beveled rearwardly transversely to the length of the lock **46.** The shoulder **50** has a rearwardly sloping beveled face **50***a* which is generally similar in form (see FIG. **2**) to the rear downwardly sloping cam face **24***b* of the lower pivot plate **24** and which is engageable with the underside thereof, as depicted in broken lines in FIG. **5.** In the latter locked position the lower pivot plate **24** and the lower guide rods **42** engageable therewith cannot move and hence the connecting rod **21** and the pusher bars **40** are disabled. The lock **46** is alternately rotatively positionable at an unlocked position depicted in solid lines in FIGS. **1–5.** An over center spring **52** secured to the opposite side of the forward housing **23** alternately maintains the lock **46** in its locked and unlocked positions. The outer ends **46***a* of the lock alternately project transversely outwardly from the side of the inner housing **10***a* and are engageable by the user's hand for rotatively moving the lock, as depicted in FIG. **4.** An aperture **54** in the outer housing **10***b* opposite the shoulder **50** communicates with a transverse guide tube **56** through which a small diameter elongated object is insertable to engage the shoulder **50** and outwardly rotate the lock **46** to its unlocked position. Thus the lock **46** can be opened from both sides of the door.

The inner and outer housings **10***a* and **10***b* typically are positioned to project outwardly from the sides of the door by their peripheral flanges **13.** It will be recognized, however, that their flanges can be recessed into the door so that their outer surfaces are completely faired or conforming with the exterior surfaces of the door.

Thus it will be appreciated that by this invention, there is provided a door latch by which the above mentioned objectives are completely fulfilled. It also will be appreciated that various modifications and/or changes can be made in the embodiment described without departing from the spirit or scope of the present invention. For example, the pusher bars **40** can be positioned horizontally to be reciprocatively movable upwardly and downwardly.

It is to be understood, therefore that the foregoing description is illustrative only of a preferred embodiment, not limiting, and that the true spirit and scope of the present invention will be determined by reference to the appended claims.

I claim:

1. A door latch having a selectively retractable, normally extended bolt, comprising:

inner and outer housings respectively mounted within the inside and outside surfaces of the door, the exterior surfaces of the inner and outer housings being essentially faired, respectively, with the inside and outside surfaces of the door;

the inner housing defining an inner recess into which a hand or similar object is insertable, the recess opening transversely outwardly from the inside of the door;

an inner elongated pusher element positioned vertically within the inner recess and reciprocatively movable therein in a forward direction and in a reverse direction;

the outer housing defining an outer recess into which a hand or similar object is insertable, the outer recess opening transversely outwardly from the outside of the door;

an outer elongated pusher element positioned vertically within the outer recess and reciprocatively movable therein in a forward direction and in a reverse direction;

means connecting the inner and outer pusher elements with the bolt for retractively moving the bolt in response to forward movement of the pusher elements, said means permitting said bolt to advance to a door jam engaging position upon movement of said pusher elements in said reverse direction.

2. The door latch according to claim **1,** wherein the inner and outer recesses further extend forwardly of the door and respectively terminate in vertically elongated rearwardly opening inner and outer pockets, and wherein the inner and outer pusher elements are re-

spectively vertically positioned within the inner and outer pockets.

3. The door latch according to claim **2,** wherein the inner and outer pockets are defined by, respectively, inner and outer vertical elongated finger plates projecting rearwardly from the exterior forward surfaces, respectively, of the inner and outer housings and parallel thereto, the finger plates extending rearwardly, respectively, of the inner and outer pusher elements.

4. The door latch according to claim **1,** wherein the connecting means comprises inner and outer elongated connecting elements extending, respectively, from the inner and outer pusher elements and movable conjointly therewith, a second elongated connecting element extending rearwardly from the bolt and movable conjointly therewith, and rotatively movable coupling means alternately rotatively coupling together the second connecting element with the inner and outer connecting elements for retractively moving the bolt in response to forward movement of the inner and outer pusher elements.

5. The door latch according to claim **4,** wherein the second connecting element terminates at its rear end in first and second projections extending perpendicularly to its length, and wherein the coupling means includes first and second pivotal members each having forward and rear ends, means for rotatively supporting the pivotal members intermediate their forward and rear ends for rotative movement about axes extending transversely to the length of the second connecting element, the forward ends of the first and second pivotal members being engageable, respectively, with the first and second projections, the rear ends of the first and second pivotal members being engageable with the inner and outer connecting elements.

6. The door latch according to claim **1,** including means for normally biasing the inner and outer pusher elements in the reverse direction.

7. The latch according to claim **1,** including means for locking the latch comprising: an elongated locking member selectively alternately engageable with the connecting means to prevent retractive movement of the bolt and disengageable from the connecting means to permit retractive movement of the bolt.

8. The door latch according to claim **7,** wherein the locking means further includes means for rotatively supporting the locking member intermediate its ends from the inner housing, the locking member being rotatively movable about a horizontal axis extending longitudinally of the door, the locking member having an inwardly projecting shoulder, the shoulder alternately being engageable with the connecting means and disengageable therefrom in response to rotative movement of the locking member.

9. The door latch according to claim **8,** wherein the outer ends of the locking member alternately project transversely outwardly from the side of the inner housing.

10. The door latch according to claim **8,** wherein the outer housing includes an aperture transversely opposite the inwardly projecting shoulder.

* * * * *