Dec. 1, 1970 M. J. JAMES 3,544,147

DOOR LATCHES

Filed May 3, 1968 3 Sheets-Sheet 1

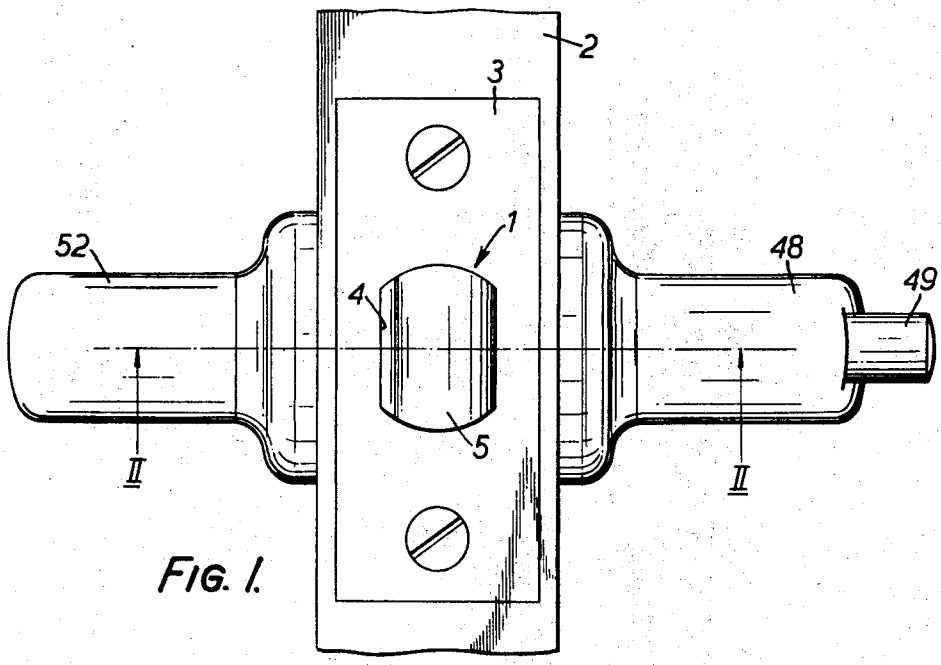


FIG. 1.

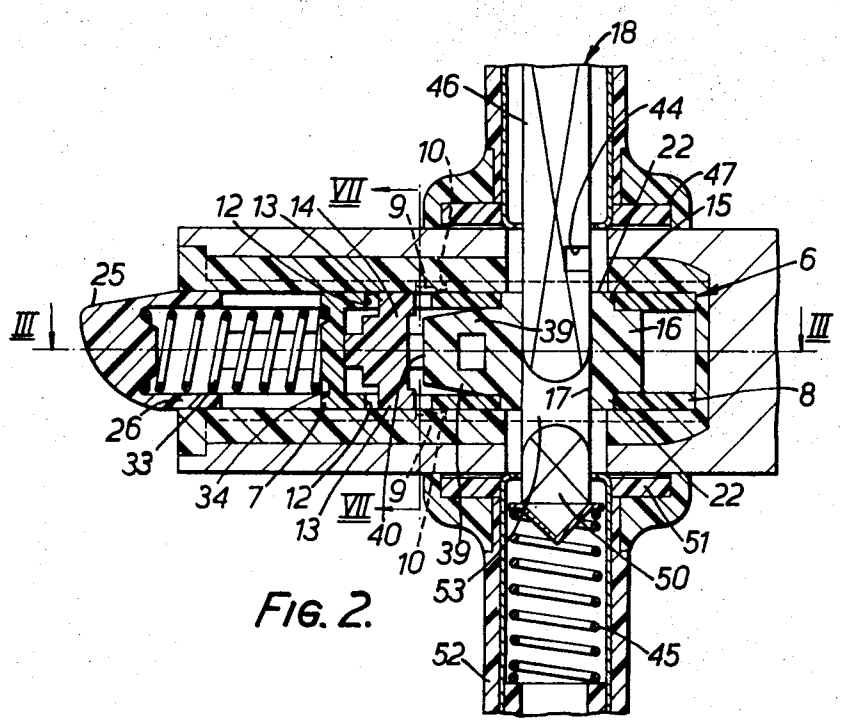


FIG. 2.

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DOOR LATCHES

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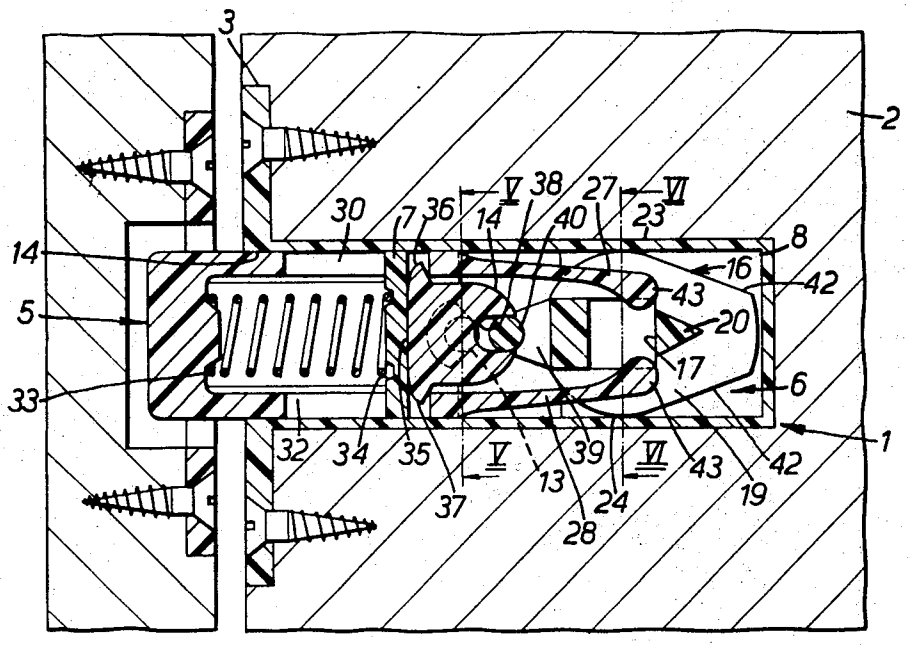


FIG. 3.

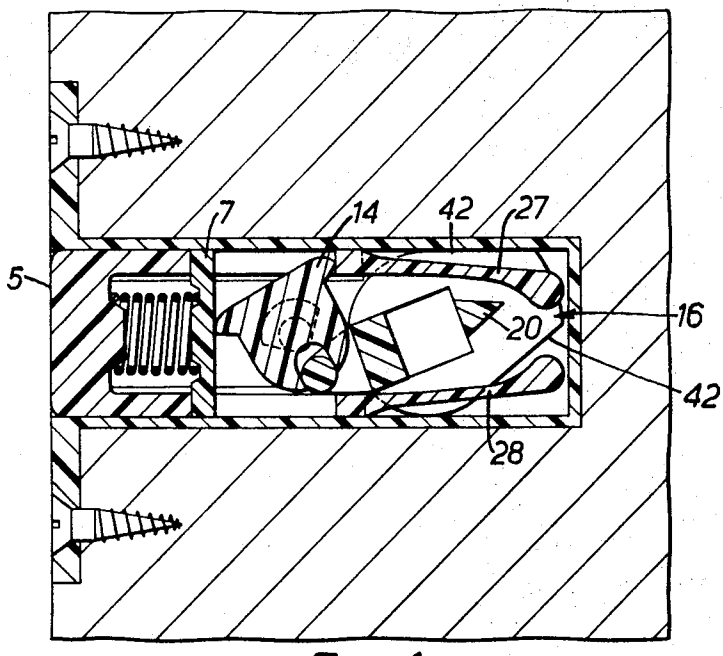


FIG. 4.

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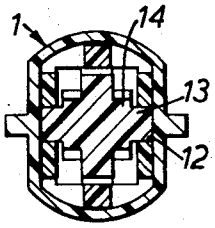


FIG. 5.

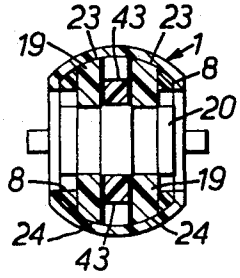


FIG. 6.

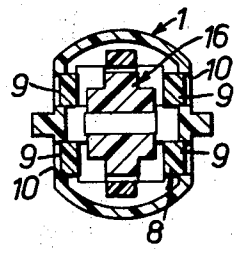


FIG. 7.

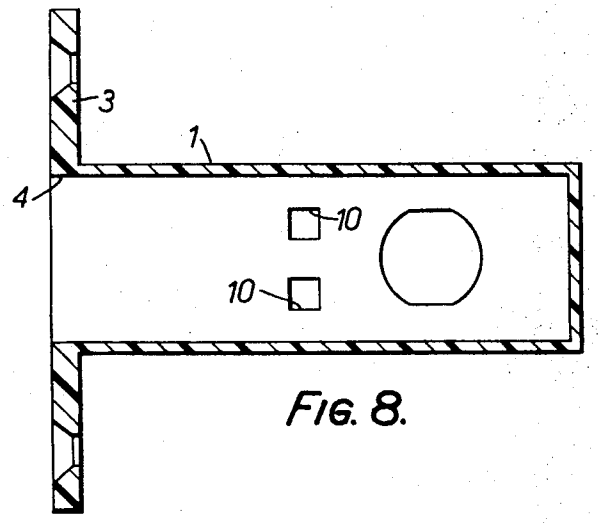


FIG. 8.

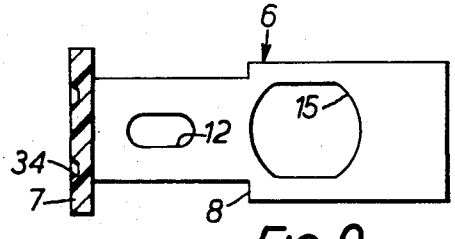


FIG. 9.

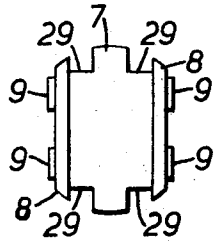


FIG. 10.

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3,544,147

DOOR LATCHES

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Int. Cl. E05c 1/12; E05b 3/00
U.S. Cl. 292—169 9 Claims

ABSTRACT OF THE DISCLOSURE

A door latch having a latch bolt and an operating shaft adapted to be rotationally coupled to door handles respectively mounted on opposite sides of the door and rotation of which produces inward movement of the bolt. When the latch is fitted the shaft is axially displaceable from one side of the door to a locking position in which rotation of the handle on the opposite side of the door is not prevented but is ineffective to release the latch, and retaining means are provided which comprise a resilient locking arm projecting from the inner end of the bolt for engagement with the shaft to retain the latter in the locking position.

This invention relates to door latches of the type having a slidable latch bolt which can be released by door handles respectively mounted on opposite sides of the door and interconnected by an operating shaft.

Door latches of this type normally have a square section shaft which engages both door handles, and the arrangement is commonly such that the door can be locked from one side so that it cannot be released by the handle on the opposite side which is thereby rendered ineffective. It has been proposed to effect locking by axial displacement of the operating shaft to a locking position in which rotation of said opposite side door handle is not prevented but is ineffective to release the latch. Such an arrangement is described in my U.S. Pat. No. 3,193,315, and the object of the present invention is to provide improved retaining means which engage and retain the shaft in the locking position.

According to the invention a door latch has a latch bolt, an operating shaft rotation of which produces inward movement of the bolt and which is adapted to be rotationally coupled to door handles respectively mounted on opposite sides of the door, when the latch is fitted the shaft being axially displaceable from one side of the door to a locking position in which rotation of the handle on the opposite side of the door is not prevented but is ineffective to release the latch, and retaining means comprising a resilient locking arm which projects from the inner end of the bolt for engagement with the shaft to retain the latter in the locking position.

The locking arm is moulded integrally with the main body of the bolt from a synthetic plastic material, for example from a material commonly known by the trade mark "Delrin." The locking arm is conveniently one of two such arms which respectievly engage opposite sides of the shaft.

A return spring preferably urges the shaft to the unlocked position, the shaft being displaceable against that spring to the locking position in which it is retained by engagement of the, or each locking arm when two such arms are provided, locking arm with a suitable lateral notch or recess in the shaft. Thus release of the latch, by turning the operative door handle, frees the retaining means as the locking arms move with the latch bolt free of the shaft which is automatically spring returned to the unlocked position. A very satisfactory self-cancelling arrangement is also obtained, i.e. if the latch is locked with the door open then on subsequent door closure the retaining means will be freed and the locking cancelled.

Preferably the shaft is permanently coupled in the rotational sense to an internal release element or elements which it controls, axial displacement of the shaft serving to uncouple it from the opposite side door handle. In a preferred construction a single release element is employed with upper and lower apertures through which end portions of two locking arms project for engagement with the shaft when the bolt is in the latching position.

The shaft may have a position of square section to engage in the unlocked position a corresponding aperture in the opposite side door handle for rotation therewith, and a circular or otherwise reduced portion which engages and can turn freely within said aperture when the shaft is in the locking position. The shaft conveniently remains permanently coupled to the locked side door handle through and from which it may project to form, in effect, a push-button which is depressed to lock the latch. Alternatively the shaft may have a lateral projection of trigger-like form which projects from a boss of the inner door handle and can be pulled to the locking position by the index finger of a hand by which that door handle is grasped.

The invention will now be further described with reference to the accompanying drawings which illustrate, by way of example, a mortice door latch in accordance with the invention. In the drawings:

FIG. 1 is a view of the latch from the edge of a door in which it is fitted,

FIG. 2 is a sectional view on the line II—II in FIG. 1,

FIG. 3 is a sectional view on the line III—III in FIG. 2,

FIG. 4 is a view similar to FIG. 3 showing the various internal elements in the latch-released positions,

FIGS. 5 and 6 are respectively sectional views on the lines V—V and VI—VI in FIG. 3,

FIG. 7 is a sectional view on the line VII—VII in FIG. 2,

FIG. 8 is a sectional view again on the line III—III of a housing of the latch,

FIG. 9 is a similar view of an internal element of the latch, and

FIG. 10 is an inner end view of the element shown in FIG. 9.

A moulded nylon tubular housing **1** is morticed into the door **2**, the housing **1** having the usual outer end fixing flange **3**. The "outer end" of the housing **1** is therein referred to as being the end adjacent the door edge into which it is morticed. The housing is closed at the inner end and at the flanged end has an opening **4** through which a slidably mounted slam bolt **5** projects when the latter is in the latching position as shown in FIGS. 1 to 3.

All the internal elements of the latch are included in a sub-assembly comprising a moulding **6** (shown in FIGS. **9** and 10) with an outer end abutment wall **7** disposed laterally of the housing and two side limbs **8** each formed with two locating projections **9** which on assembly snap into bores **10** in the wall of the housing **1** (see particularly FIG. 8) to locate all the internal elements in position. Towards the outer end the side limbs **8** of the yoke moulding **6** are moulded with aligned longitudinal slots **12** which are engaged by two projecting stub shafts **13** of a follower member **14** so that these slots define longitudinal sliding movement of the pivot axis of the member **14** within the housing. Towards the inner ends of the side limbs **8** they are formed with journal bores **15** for a moulded nylon release element **16** which has a square-section through aperture **17** for reception of an operating shaft **18**.

The release element **16** is of generally H section, with vertical side webs **19** which are joined by a central web **20** and lie close against the slide limbs **8** of the yoke moulding **6**. Projected journal pegs **22** on the side webs **19** are of

the same depth as the shaft aperture **17** but considerably wider, having only a partial bearing with said journal bores **15**, which are of truncated circular section, to provide only horizontal location of the release element **16**. The side webs **19** of the element **16** have arcuate upper and lower edge surfaces **23** and **24** respectively which bear on the upper and lower walls of the housing **1** to provide vertical location.

The bolt **5** is moulded from Delrin with a solid outer end portion **25** providing the usual bevelled and radiused nose of the bolt, and an adjoining short hollow box section **26** beyond which the bolt is split to provide upper and lower inwardly projecting limbs **27** and **28** respectively. The corners of the abutment wall **7** are cut away at **29** and the limbs **27** and **28** of the bolt **5** are longitudinally slotted over an intermediate portion **30** and **32** respectively so that the limbs can fit over and around the abutment wall **7** with the cut-away corners **29** thereof providing clearance for inward withdrawal of the bolt **5** to the release position of FIG. 4. The bolt limbs **27** and **28** are sufficiently resilient to allow fitting of the bolt **5** over the abutment wall **7** of the yoke moulding **6** to complete the sub-assembly, with the outer end of a latch spring **33** housed within the box section **26** of the bolt and the inner end of the spring **33** engaging an annular spring location groove **34** on the outer side of the abutment wall **7**.

At the outer end the follower member **14** is moulded with a flat face **35** which engages the inner surface of the abutment wall **7** to define the resting and latching position of the follower member which, also at the outer end, has upper and lower projecting ears **36** and **37** which respectively engage the slots in the intermediate portions **30** and **32** in the bolt limbs **27** and **28**. Engagement of the inner ends of these slots with the ears **36** and **37** also defines the resting and latching position of the bolt **5**, the parts being urged to the resting position by the spring **33**. The follower member **14** projects inwardly of the pivot axis thereof between the bolt limbs **27** and **28** and has an elongated slot **38** which is disposed axially of the housing **1** in the resting position, as shown in FIG. 3. The release element **16** has two spaced outwardly projecting arms **39** joined across at the outer ends by an integral peg **40** of the circular section. The peg engages the slot **38** in the follower member **14**, which fits with clearance between the projecting arms **39**, to provide a peg and slot connection between the release element **16** and the follower member **14**.

When the release element **16** is turned by means of the operating shaft **18** it turns the follower member **14**. The projecting ears **36** and **37** of the follower member **14** are reduced so that as the member **14** turns one of the ears **36**, **37** slides along and engages the inner surface of the abutment wall **7** in a cam-like manner with attendant sliding movement of the pivot axis of the follower member **14** inwardly of the housing **1**, this sliding movement being accommodated by the peg and slot connection **40**, **38**. At the same time the other ear **36** or **37** of the follower member **14** engages the inner end of the slot in the corresponding bolt limb portion **30** or **32** to produce inward withdrawal movement of the bolt **5** to release the latch, with the elements as shown in FIG. 4.

The side webs **19** of the release element **16** extend inwardly of the operating shaft **18** with a tapering tail-like formation, the edges **42** of these webs engaging in a face to face manner with the housing **1** to limit the operative handle movement, as shown in FIG. 4. This arrangement is of sufficient strength for separate handle stops to be dispensed with, thus enabling the use of door furniture of an extremely simple and cheap nature which in particular is not "handed."

The inner ends of the bolt limbs **27** and **28** are considerably narrowed and extend centrally of the housing **1** in vertical view to provide locking arms moulded integrally with the bolt. At the free inner ends these arms

have radially inwardly directed bulbous formations **43** and are disposed between the side webs **19** of the release element **16**. In the latching position the bulbous formations **43** project through apertures provided by slots in the central web **20** above and below the shaft aperture **17** for engagement with the shaft **18**. In FIG. 3 the shaft **18** is omitted to show the full projection of the bulbous formations **43** which, as later described, is utilised for locking purposes. With the shaft in latching position the locking arms engage a square section of the shaft and exert a centralising force thereof.

The operating shaft **18** is axially displaceable to a locking position for locking purposes, in which position it is retained by engagement of the locking arms **27** and **28** with notches **44** in the shaft. On withdrawal of the bolts **5** into the housing **1** by turning the inside door handle with the latch locked the ends of the arms **27** and **28** move inwardly of the shaft **18** and in fact ride out of the slots in the release element, thus allowing the shaft **18** to be moved by a return spring **45** back to the unlocked position shown in the drawings.

The operating shaft **18** has a mid portion **46** of square cross-section which engages the shaft aperture **17** in the release element **16** and a similarly shaped aperture in a drive plate **47** of an inner door handle **48**. At the inner end **49** the shaft is of plain cylindrical form and projects through and from the door handle **48** in the manner of a pushbutton, and this end can be depressed manually to move the shaft **18** to the locking position, in which the notches **44** are engaged by the bolt limbs **27** and **28** to retain the shaft. The length of the shaft portion **46** is such that in both positions of the latter it couples the inner door handle **48** to the release element **16** in the rotational sense.

At its outer end the shaft has a square section and portion **50** which in the unlocked position engages a square aperture in the drive plate **51** of the outside door handle **52**, so that the latter is also normally operative to release the latch. The return spring **45** is housed within the handle **52**, and when the shaft **18** is moved to the locking position a portion **53** of the shaft of reduced cross-section intermediate the two square section portions engages within the aperture in the outer drive plate **51** and is freely rotatable therein. Thus on any attempt to open the door **2** from outside the handle **52** turns freely without releasing the latch and can be said to "freewheel."

I claim:

1. A door latch having a latch bolt, an operating shaft axially displaceable between an unlocked and a locking position and rotation of which produces inward movement of the bolt, the shaft being adapted to be rotationally coupled to door handles respectively mounted on opposite sides of the door so that axial displacement of the shaft from one side of the door to said locking position renders rotation of the handle on the opposite side of the door ineffective to release the latch, and retaining means comprising a resilient locking arm which projects from the inner end of the bolt for engagement with the shaft to retain the latter in the locking position, said locking arm and bolt comprising an integral moulding of a synthetic plastic material.

2. A door latch according to claim **1**, wherein a return spring urges the shaft to the unlocked position, the shaft being displaceable against that spring to the locking position in which it is retained by engagement of the locking arm with a lateral notch or recess in the shaft.

3. A door latch according to claim **1**, wherein the shaft is permanently coupeld in the rotational sense to an internal release element, rotation of the release element with the shaft producing inward movement of the bolt, and wherein said axial displacement of the shaft serves to uncouple it from said opposite side door handle.

4. A door latch according to claim **3**, wherein said locking arm is one of two such arms of the integral moulding and the shaft is permanently coupled to a single

release element with upper and lower apertures through which end portions of the two locking arms project, for engagement respectively with opposite sides of the shaft, when the bolt is in the latching position.

5. A door latch according to claim 1 wherein the locking arm is one of two such arms which respectively engage opposite sides of the shaft.

6. A door latch according to claim 4, wherein the locking arms when the bolt is in the latching position engage a square-section portion of the shaft and exert a centralising force thereon.

7. A door latch according to claim 1 wherein the shaft has a portion of square section to engage when in the unlocked position a corresponding aperture in the opposite side door handle for rotation therewith, and a circular or otherwise reduced portion which engages and can turn freely within said aperture when the shaft is in the locking position.

8. A door latch according to claim 7, wherein the shaft remains permanently coupled to said one side door handle through and from which it projects to act as a pushbutton which is depressible to lock the latch.

9. A door latch according to claim 7, wherein the shaft has a lateral projection of trigger-like form which projects from a boss of said one side door handle and can be pulled to the locking position.

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U.S. Cl. X.R.

292—358