April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

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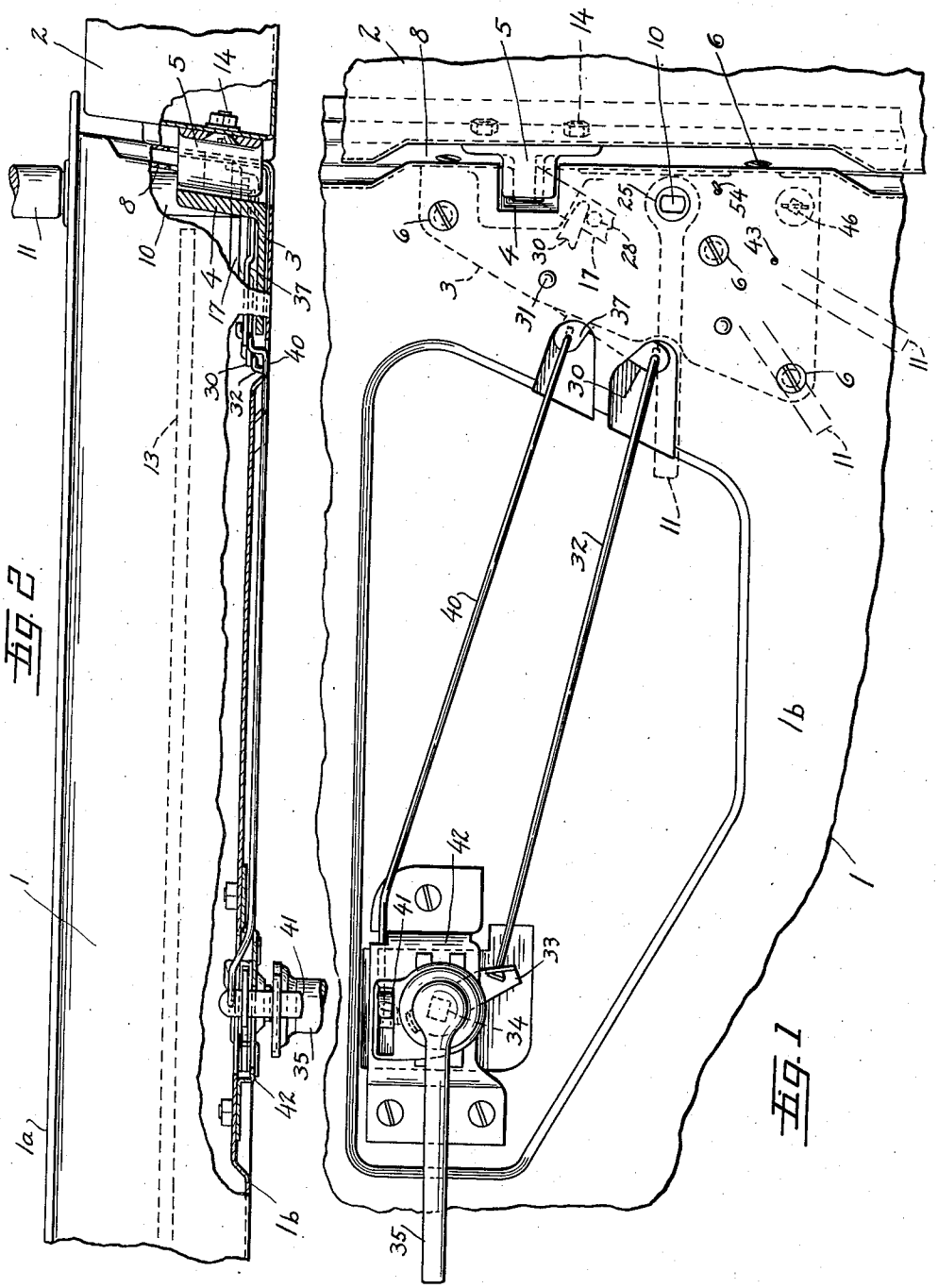

Fig. 2

Fig. 1

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April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

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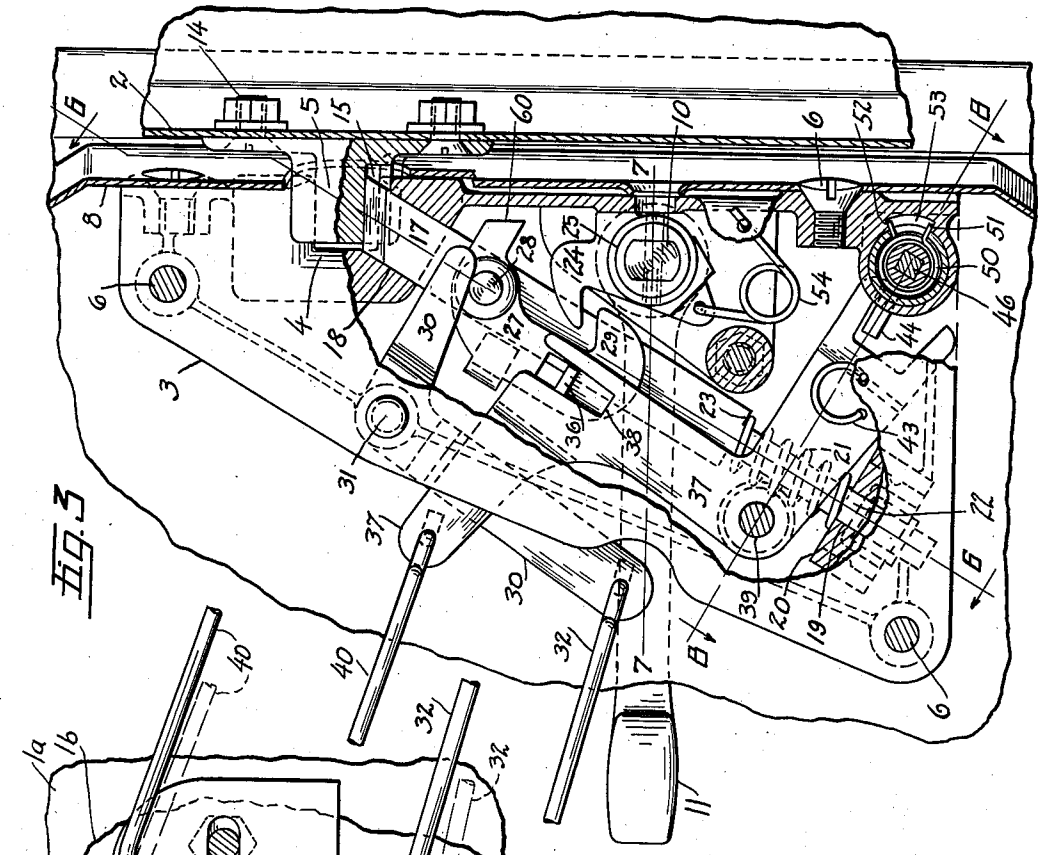

Fig. 3

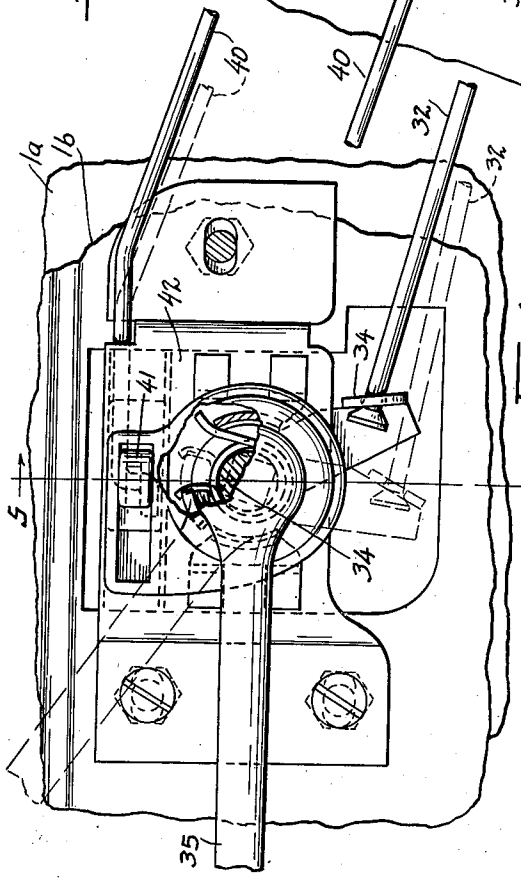

Fig. 4

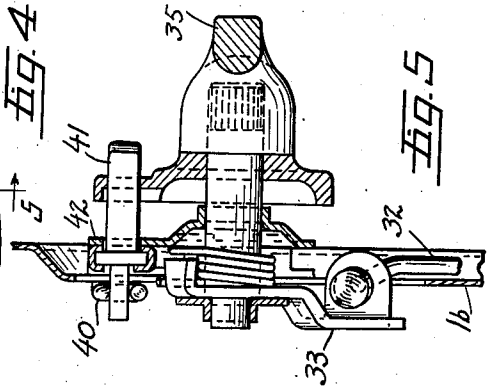

Fig. 5

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DOOR LOCK

Filed Jan. 10, 1938 8 Sheets-Sheet 3

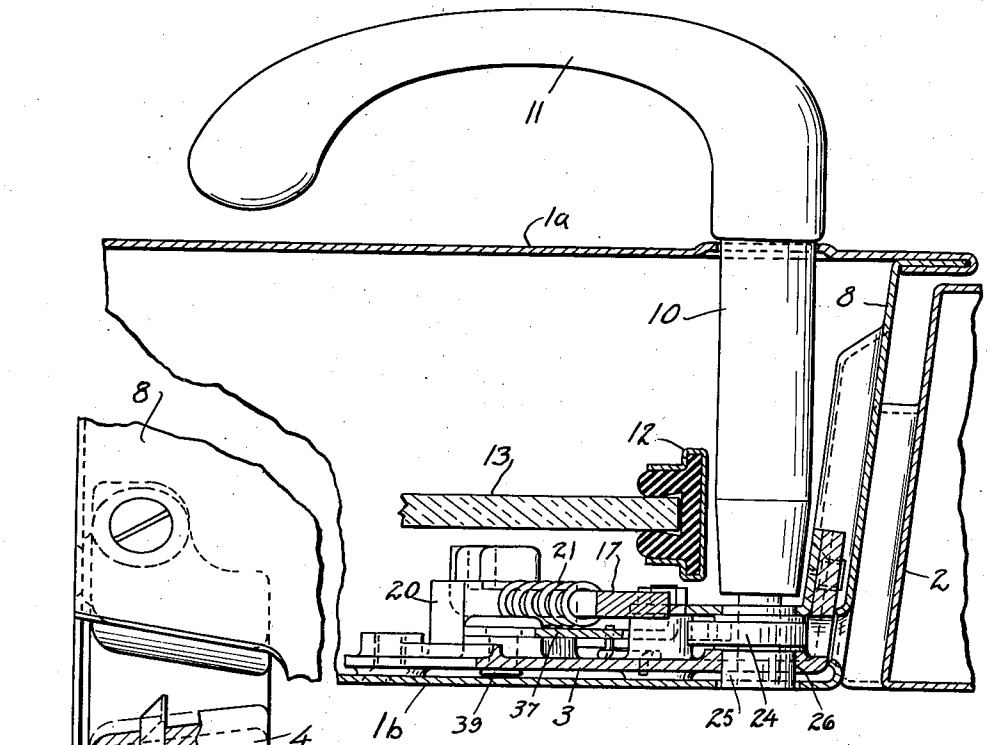

Fig. 7

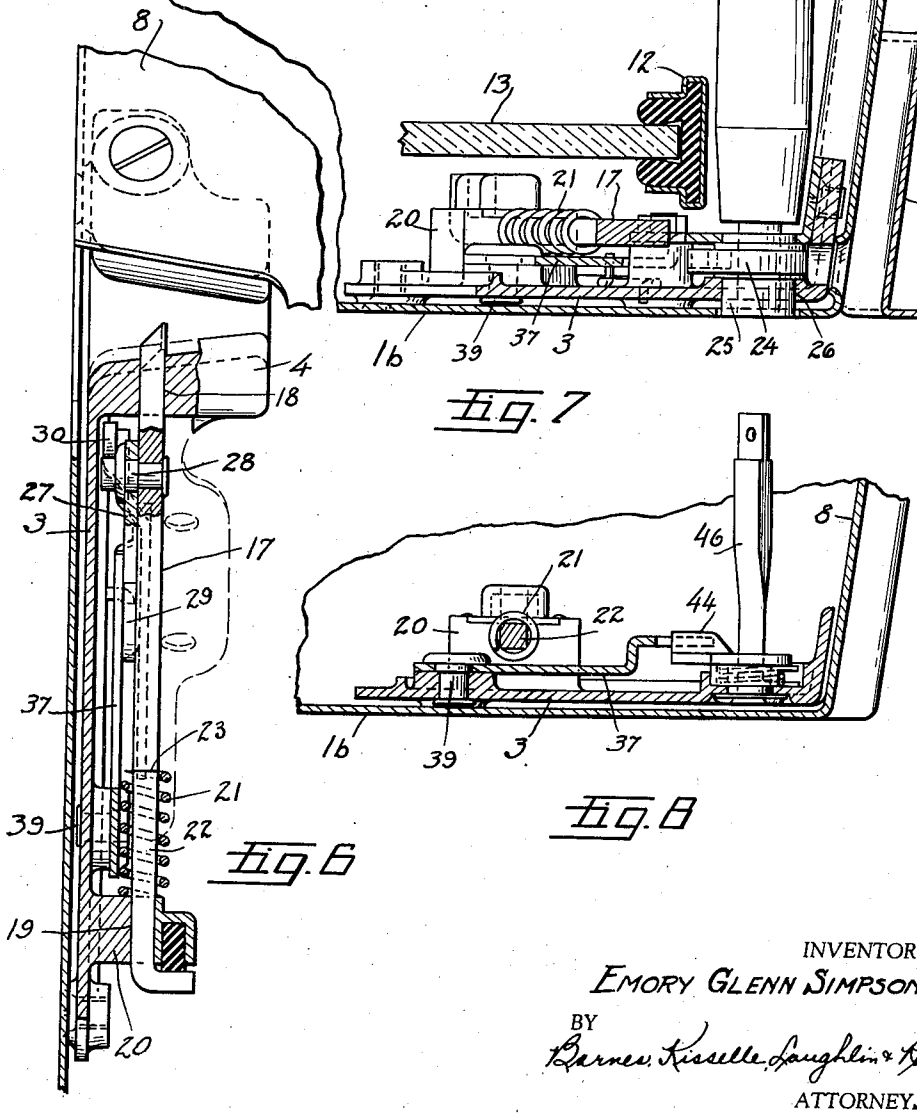

Fig. 6

Fig. 8

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April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

Filed Jan. 10, 1938 8 Sheets-Sheet 4

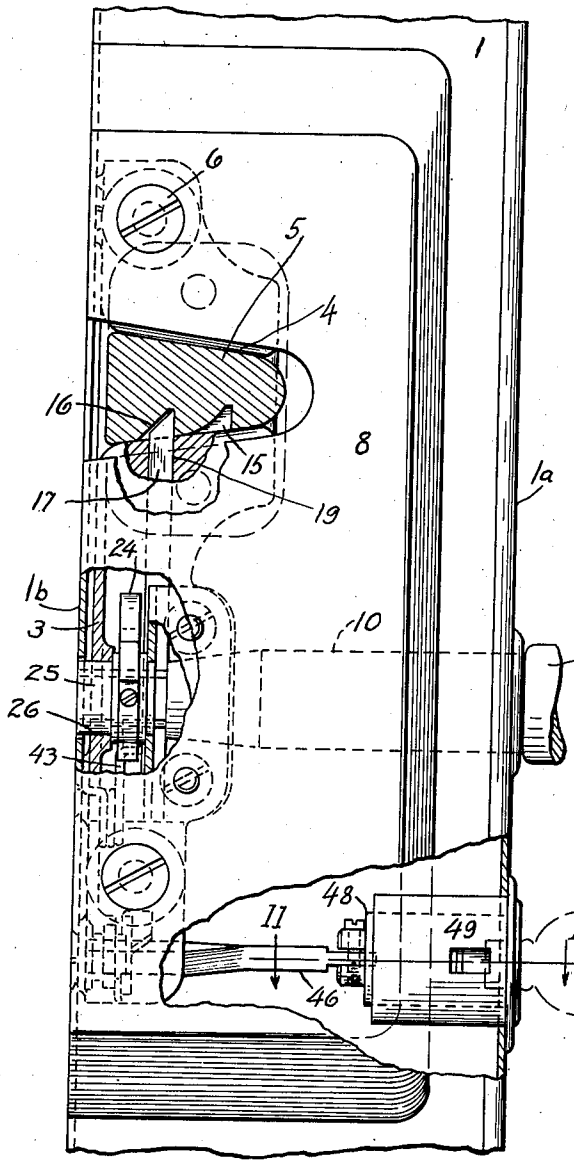

Fig. 9

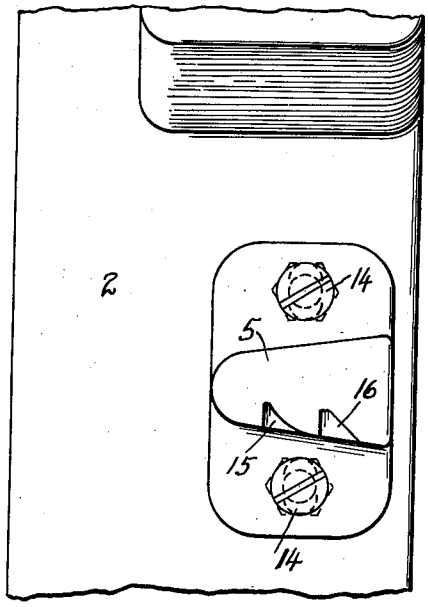

Fig. 10

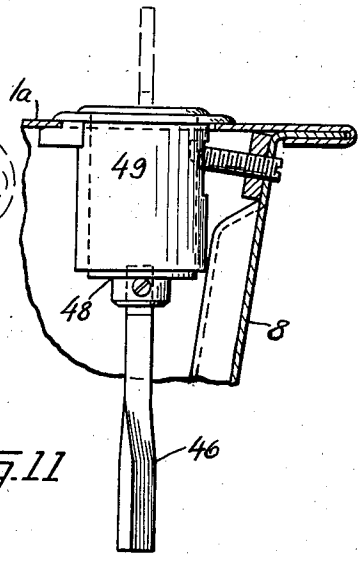

Fig. 11

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April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

Filed Jan. 10, 1938 8 Sheets-Sheet 5

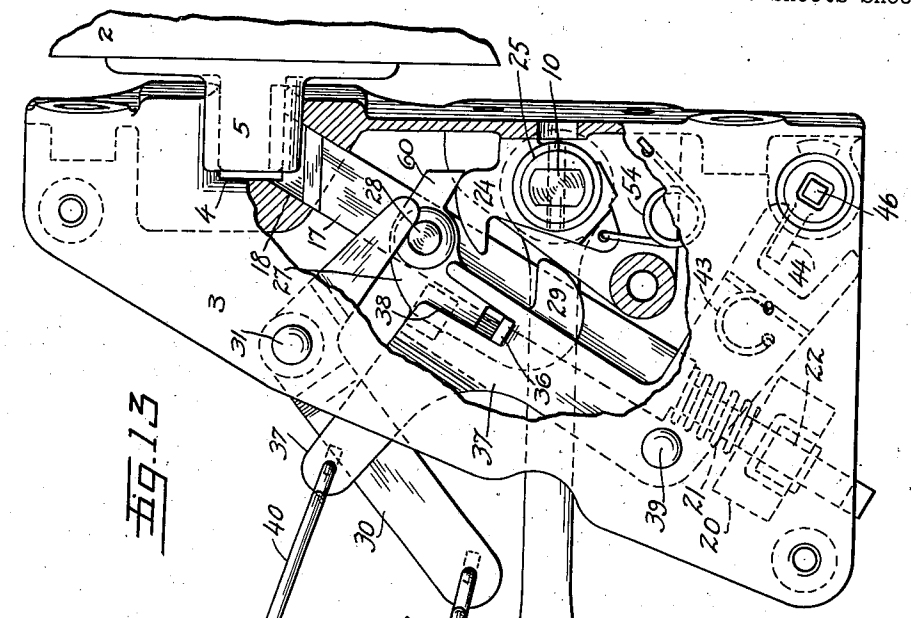

Fig. 13

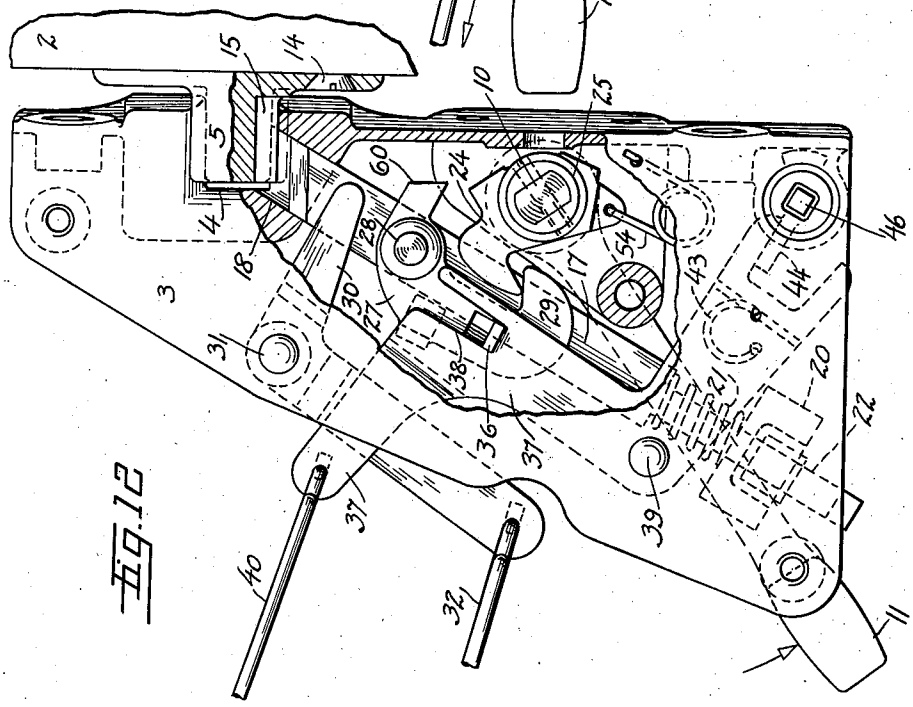

Fig. 12

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April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

Filed Jan. 10, 1938 8 Sheets-Sheet 6

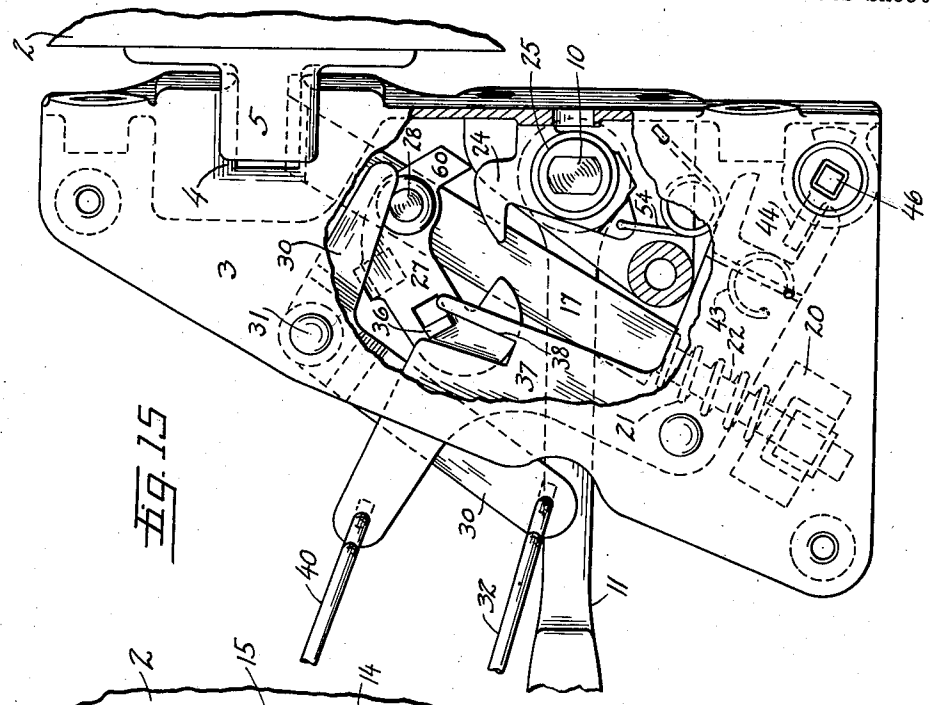

Fig. 15

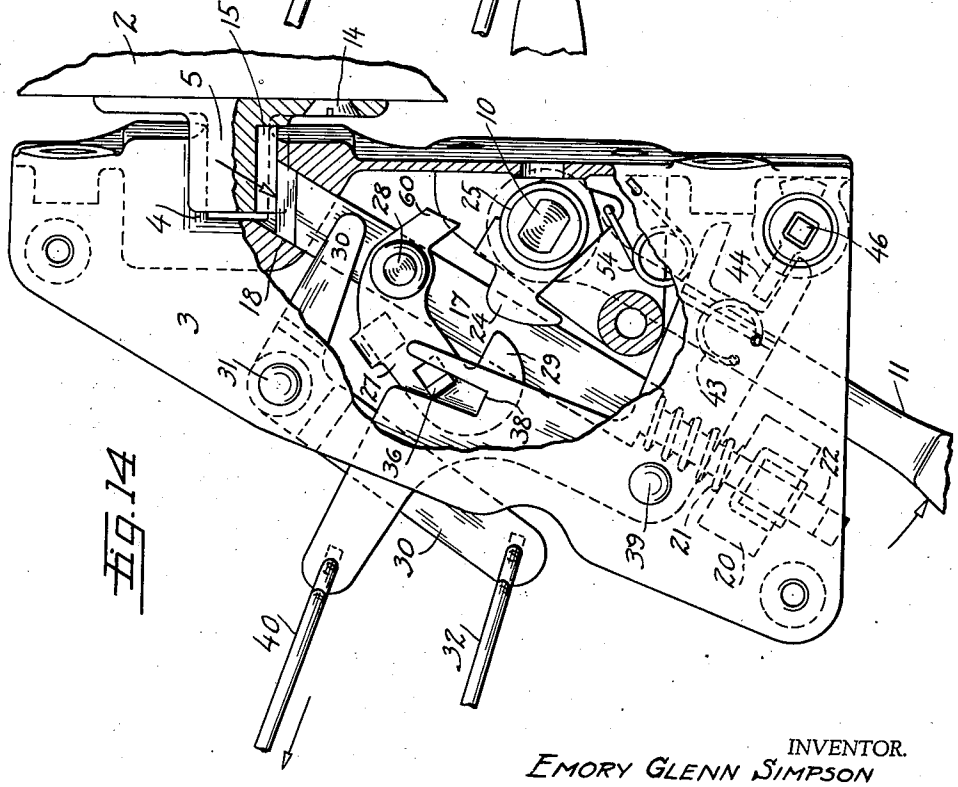

Fig. 14

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April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

Filed Jan. 10, 1938 8 Sheets-Sheet 7

Fig. 19

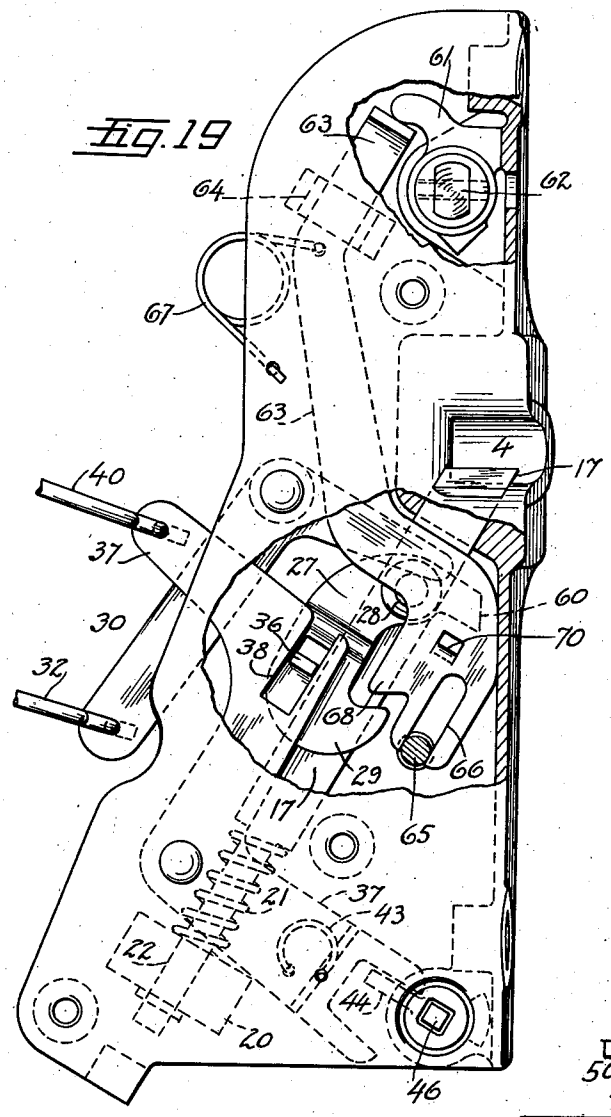
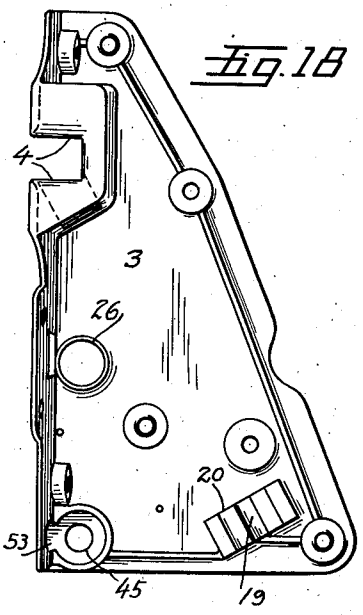


Fig. 18



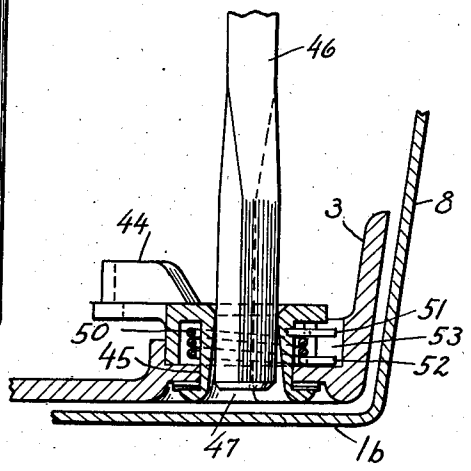


Fig. 16

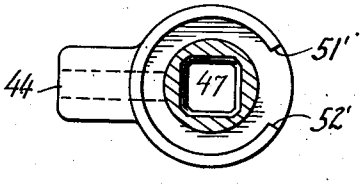


Fig. 17

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April 9, 1940. E. G. SIMPSON 2,196,477

DOOR LOCK

Filed Jan. 10, 1939 8 Sheets-Sheet 8

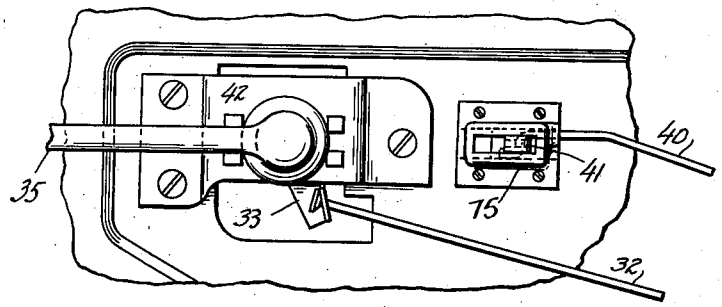

Fig. 20

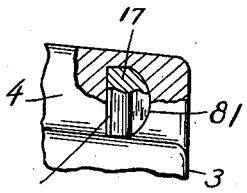

Fig. 23

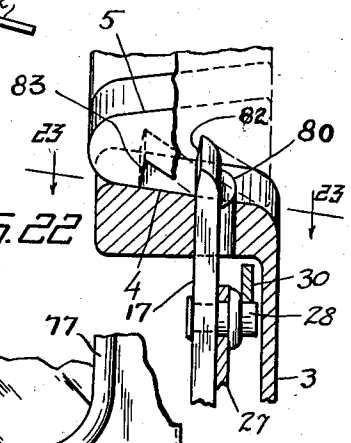

Fig. 22

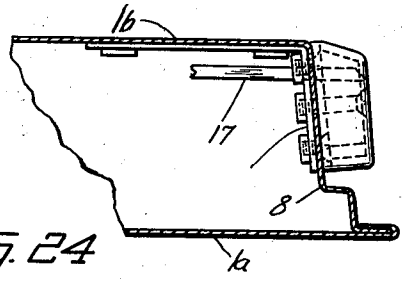

Fig. 24

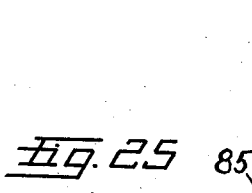

Fig. 25

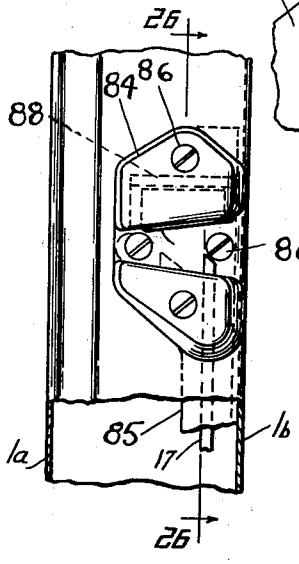

Fig. 26

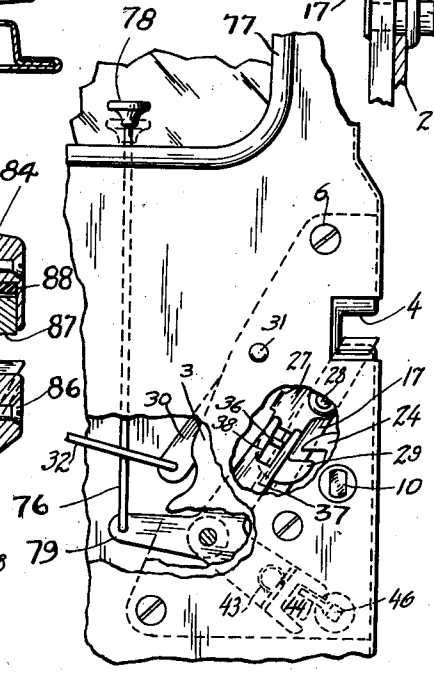

Fig. 21

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Patented Apr. 9, 1940 2,196,477

UNITED STATES PATENT OFFICE

2,196,477

DOOR LOCK

Emory Glenn Simpson, Detroit, Mich., assignor to Ternstedt Manufacturing Company, Detroit, Mich., a corporation of Michigan

Application January 10, 1938, Serial No. 184,216

5 Claims. (Cl. 292—302)

This invention relates to a door lock and more particularly to a door lock for an automotive vehicle.

A combined dovetail and door lock for an automobile with a vertically reciprocating bolt is shown in the patent to Kehoe, Patent No. 1,275,700, August 13, 1918. In the present day automobile the steel door lock pillar is made as narrow as possible to correspondingly decrease the obstruction it offers to the vision of the driver or other occupant of the car. This permits the guide for the vertical edge of the window glass to be positioned closely adjacent the inner face of the door lock pillar. Since it is practice to position the door lock on the inside of the door, the connection between the outside door handle and the latch must not obstruct the raising and lowering of the glass. Obviously the lock shown in the Kehoe patent is not suitable for a narrow pillar door.

It is the object of this invention to produce an automobile door lock with a bolt which reciprocates up and down and is adapted for use with a narrow door lock pillar.

It is also an object of this invention to produce a door lock which is easily retractable both by hand from within and without the door as well as in the closing of the door when the bolt rides up and is automatically retracted by the striker.

This invention also contemplates a lock which is of simple structure throughout and particularly in the arrangement for disconnecting the outside door handle from the bolt and for automatically reconnecting the outside door handle and bolt when the bolt is retracted by the striker during the closing of the door.

In the drawings:

Fig. 1 is a fragmentary elevational view from within the vehicle body of an automobile door and body pillar with the trimming removed showing the door lock assembled to the door and body pillar.

Fig. 2 is a fragmentary top plan view of an automobile door and body pillar with parts broken away to show the assembly of the lock to the door and adjacent body pillar.

Fig. 3 is a view within the body of the lock assembled to the door with parts of the lock frame broken away showing the relative positions of the parts when the door is latched but not locked.

Fig. 4 is a view from within the vehicle body of the inside remote handle control for the lock.

Fig. 5 is a section along the line 5—5 of Fig. 4.

Figs. 6, 7 and 8 are sectional views along the lines 6—6, 7—7 and 8—8 respectively of Fig. 3.

Fig. 9 is a vertical section through the keeper taken between the outer faces of the door lock pillar and the body pillar showing the door latched.

Fig. 10 is an elevation showing the striker secured to the body pillar.

Fig. 11 is a section along the line 11—11 of Fig. 9.

Fig. 12 is a view similar to Fig. 3 but showing the position of the several parts of the lock when the latch bolt is retracted by the outside door handle.

Fig. 13 is a view similar to Fig. 3 but showing the relative position of the parts with the bolt retracted by the inside remote handle control.

Fig. 14 is a view similar to Fig. 3 but showing the door being closed after the inside push button has been operated to disconnect the outside rollback from the bolt with the outside handle being swung down to bolt retracting position to prevent reconnecting of the bolt and handle as the bolt is retracted by the striker.

Fig. 15 is a view similar to Fig. 3 but showing the relative position of the parts of the lock when the door is locked, that is, when the outside handle and rollback are disconnected from the latch bolt.

Figs. 16 and 17 are detail views of the key controlled spindle and tumbler for locking and unlocking the bolt, that is, disconnecting and connecting the outside rollback from the bolt.

Fig. 18 is an elevational view showing the combined die-cast lock frame and dovetail socket.

Fig. 19 is an elevation of a modified form of the latch where the outside rollback and handle is positioned above the bolt and dovetail socket.

Fig. 20 is a modification showing the inside lock control button separate from the inside remote handle assembly.

Fig. 21 is a modification showing the inside lock control in the form of a rod and button extending upwardly through the garnish molding.

Fig. 22 is a detail view showing a modified form of bolt.

Fig. 23 is a section along the line 23—23 of Fig. 22.

Figs. 24 and 25 show a modified form of dovetail socket.

Fig. 26 is a section along the line 26—26 of Fig. 25.

Referring more particularly to the drawings there is shown a door 1 comprising an outer panel 1*a*, an inner panel 1*b*, and a lock pillar 8. The principal parts of the lock are carried by a die-cast latch frame 3 (Fig. 18). The latch

frame 3 and dovetail socket 4 which receives the striker member 5 are an integral die-casting cast in a single operation. The frame 3 is secured by bolts 6 to a sheet metal inner panel 1b and to the door lock pillar 8. The door lock pillar 8 is bulged and the adjacent body pillar 2 correspondingly indented in the area occupied by the lock frame which permits the shank 10 of the outside handle 11 to extend through the door between the window guide 12 for the vertically sliding glass 13 and the door lock pillar 8, Fig. 7.

The striker 5 is secured by bolts 14 to the indented portion of the body pillar 2. The striker 5 is wedge-shaped and the socket 4 is also correspondingly wedge-shaped so that the two members will interengage when the door is closed to serve as a dovetail. The striker 5 is provided with notches 15 and 16 in its lower face which receive the head of the bolt 17. Thus the striker 5 serves both as the male member of the dovetail and as the lock striker.

The bolt 17 is guided for rectilinear sliding movement at its upper end in an opening 18 cast in the bottom face of the socket portion of the latch frame and at its lower reduced end in the opening 19 in the guide lug 20 which is die-cast integrally with the latch frame 3. The bolt 17 is projected by means of a compression coil spring 21 threaded over the reduced end 22 of the bolt and positioned between the lug 20 and the shoulders 23 on the bolt. It will be noted that the upper end of the bolt, when projected, projects into the dovetail socket 4 adjacent the door pillar 8 and the bolt extends angularly downwardly and inwardly of the door from the door pillar 8. Thus, the head of the bolt 17 interengages the striker 5 approximately in the plane of the door pillar and the body portion of the bolt which is adapted to be operatively connected with the outside rollback is positioned inwardly of the door pillar. This permits the hub 25 of the outside rollback 24 to be journalled in the opening 26 in the latch frame closely adjacent the bulged portion of the door pillar 8 so that it can be directly connected to the reduced end of the outside handle spindle 10 which extends across the door at the edge of the glass 13.

For connecting the rollback with the bolt a retractor in the form of a lever 27 is pivoted by the pin 28 on the bolt 17. The lever 27 is provided with a hooked end 29 which normally interengages the rollback 24 when rotated to retract the bolt 17. For retracting the bolt 17 from inside the vehicle a bell crank lever 30 is pivotally mounted as at 31 on the latch frame 3. One arm of the bell crank overhangs the pin 28. The bell crank is connected by the draft link 32 with the crank arm 33 fixed on the spindle 34 which is rotated by the inside remote handle 35. Thus, when the bell crank 30 is swung clockwise by the remote handle 35, the overhanging arm of the bell crank acts through the pin 28 to retract the bolt, as shown in Fig. 13.

To lock the bolt the retractor 27 is arranged to be swung out of the path of the rollback 24. To this end the retractor 27 is provided with a lug 36 which slidably engages the bell crank lever 37 in the slot 38. The bell crank lever 37 is pivotally mounted on the latch frame 3 by the pin 39. One end of the bell crank lever 37 is connected by the push and pull link 40 with a sliding button 41 slidably mounted on the remote handle support plate 42.

As shown in Fig. 3, the retractor 27 is operatively connected with the rollback 24 and yieldably held in this position by the over-center spring 43, one end of which is secured to the latch frame 3 and the other end of which is secured to the lever 37. When the sliding button 41 is slid to the left, as viewed in Fig. 4, the lever 37 is swung to the position shown in Fig. 14 which disconnects the retractor 27 from the rollback 24. The lever 37 is yieldably held in this position by the over-center spring 43.

The bell crank lever 37 has its lower end bifurcated for reception of the tumbler 44. The tumbler 44 is journalled in the opening 45 in the latch frame, see Fig. 16. The tumbler 44 is arranged to be key operated from the outside of the door. To this end a square section shaft 46 extends across the door beneath the handle shank 10. The inner end of the spindle 46 interengages the tumbler in a square opening 47 and the other end of the spindle 46 is secured to the cylinder 48 of a key operated cylinder lock generally designated 49, which is fixed to the outer panel of the door 1, see Fig. 11. The tumbler 44 carries the torsion spring 50, the free ends 51 and 52 of which engage the latch frame 3 in the notch 53. The tumbler 44 is provided with spaced shoulders 51' and 52' (Fig. 17). Normally the fingers 51 and 52 of the torsion spring 50 engage the opposite ends of the recess 53 and normally the spring end 51 engages the shoulder 51' and the spring end 52 engages the shoulder 52' of the tumbler 44. Thus, the spring normally holds the tumbler 44 in center or neutral position, as shown in Fig. 3, and always returns the tumbler to this position as soon as the operator releases the key and relieves the torque on the shaft 46. It is important that the tumbler 44 returns to the neutral position each time that the operator releases the key because this at all times permits the bell crank 37 to be operated from the inside by the sliding button 41 to throw the retractor 27 to set position shown in Fig. 3 or to released position shown in Fig. 15. For purposes of description the retractor 27 is referred to as "set" when it connects the bolt with the outside rollback, as shown in Fig. 3, and as "released" when released from the outside rollback, as shown in Fig. 15. The rollback is yieldably held against the latch frame and the handle 11 held horizontally as shown in Fig. 3 by the spring 54, one end of which is secured to the latch frame and the other end of which is secured to the rollback.

The retractor 27 is provided with a turned under lug 55. Whenever the lever 37 is swung clockwise to throw the retractor 27 into set position, as soon as the retractor reaches set position the lug 55 abuts the bolt and prevents the retractor from swinging counterclockwise (Fig. 3) beyond set position.

As viewed in Fig. 3, the tumbler 44 is positioned at an angle approximately 30° from the horizontal which is neutral position for the tumbler and necessarily neutral position for the shaft 46. To accommodate this neutral position of the tumbler, the shaft 46, as shown, is twisted between its inner end and the lock cylinder 49 through approximately 30° so that the inner end of the shaft 46 will fit in the square opening within the tumbler 44.

The operation of this form of lock is shown in Figs. 3 and 12 through 15. As shown in Fig. 3, the door is closed and the bolt 17 projected into interengagement with the striker 5 and the retractor 27 is in set position so that turning of the outside handle will retract the bolt. In Fig. 12 the outside handle has been

turned down. This rotates the outside rollback 24 which, acting through the retractor 27, retracts the latch bolt and permits the door to be swung open. As shown in Fig. 15, the retractor has been swung to released position either by key operation of the tumbler 44 from the outside or by shifting the sliding button 41 to the left, Fig. 4. This disconnects the outside rollback and handle from the bolt so that the outside handle is in semi-freewheeling position and turning of the same is ineffective to retract the bolt.

If, while the door is open, the retractor 27 is thrown to the position shown in Fig. 15 to disconnect the outside retractor from the bolt, then upon closing of the door the bolt 17 will ride over the striker 5 and be cammed downwardly. As the bolt is cammed downwardly by the striker, as shown in Fig. 13, the projecting end 60 of the retractor 27 will strike the top of the rollback 24 and swing the retractor 27 counterclockwise to set position, shown in Fig. 13. Thus, whenever the retractor is released while the door is open and the door swung shut, the retractor is automatically reset. When the retractor is released it is automatically reset when the bolt is retracted by the inside remote handle 35 because the projecting end 60 abuts the roll back 24 and swings the retractor to set position.

If the operator desires to lock the door without using his key, then while the door is open he can first throw the sliding button 41 to the left, as viewed in Fig. 4, which releases the retractor 27 and then turn the handle downwardly to bolt retracting position, as shown in Fig. 14. If the operator now closes the door while holding the handle down in the position shown in Fig. 14, the bolt is retracted in the usual manner by the striker but the rollback has been turned down and outside the range of the projecting end 60 of the retractor 27. Since the rollback is clear of the projecting end 60, the retractor 27 remains in released position. As soon as the door is closed the operator merely releases the outside handle and the spring 54 again returns the rollback to the position shown in Fig. 15 and the door is locked.

As shown in Fig. 12, the door can be locked from without by means of the key upon turning the tumbler 44 clockwise. As shown in Fig. 15, the door is locked but can be released from the outside by means of a key upon turning the tumbler 44 counterclockwise. In each case the tumbler turns the bell crank 37 to respectively release and set the retractor 27.

In Fig. 19 there is shown a modified form of the lock above described. This lock differs from the principal form of the invention primarily in that the outside roll back 61 and outside handle shaft 62 are positioned vertically above the bolt 17 and the dovetail socket 4. By comparing Fig. 19 with Figs. 12 and 13, it will be noted that the rollback 61 and, of course, the outside door handle in the modified form of the invention, turns counterclockwise and in the same direction as the outside handle 11 (Figs. 12 and 13) to retract the bolt. The outside rollback 61 operates a sliding plate 63 which is slidably mounted upon the latch frame by the bracket 64 and the pin 65 which engages the slide in the notch 66. The slide 63 is normally held in raised position, as shown in Fig. 19, by the hairpin spring 67, one end of which is connected to the latch frame and the other end to the slide 63. The slide 63 has a projection 68 which overhangs the retractor 27. Whenever the roll back 61 is rotated counterclockwise, the slide 63 is slid downwardly and the projection 66 strikes the retractor 27 and retracts the bolt.

The outside rollback is disconnected from the bolt in the same fashion as above described, to wit: The bell crank 37 is swung by either the inside control or outside control to set or release the retractor 27.

If the retractor 27 is released while the door is open, then upon closing the door the bolt is retracted by the striker. At this time the projecting end 60 of the retractor strikes the turned in lug 70 on the slide 63. The spring 67 which is sufficiently strong to overcome the over-center spring 43 and the friction in the moving parts of the lock, holds slide 63 stationary and causes the lug 70, acting through the projecting end 60 of the retractor 27, to swing the retractor back to set position. The modified form of the lock can be locked by releasing the retractor through the sliding button 41 while the door is open and the outside door handle swung down and held down during the closing and until the door is completely closed the same as in the principal form of the invention as above described.

In the form shown in Fig. 20 the sliding button 41 is slidably mounted on a plate 75 which is separate from the support plate 42' for the inside remote handle 35.

In Fig. 21 the inside lock control takes the form of a push and pull rod 76 which extends upwardly through the garnish molding 77 and is provided with a button 78. The lower end of the rod 76 is connected to a projection 79 on the bell crank lever 37.

In Figs. 22 and 23 the bolt 17 is provided with a half round or semi-cylindrical portion 80 which slidably engages a half round or semi-cylindrical face 81 of an opening in the socket 4 through which the bolt slidably projects. The half round portion 80 cooperates with the arcuate surface 81 to prevent lateral movement between the bolt and the socket member 4 when the bolt interengages the striker 5. This feature obviates rattles which would otherwise be set up by relative lateral movement between the bolt and the opening for the same through the socket member 4.

The end of the bolt is also provided with a taper 82 and steps 83 of the keeper member 5 are correspondingly tapered. This taper preferably is about 10°. The tapered surfaces 82 and 83 cooperate when the bolt is projected to cam the door toward closed position.

In Figs. 24 through 26 the dovetail socket 84 is formed separately from the lock frame 85 but in other respects is the same as the striker 5 above described. With this type of dovetail socket, the lock may be secured in position with the latch bolt 17 projecting through the bolt opening in the door lock pillar 8 and thereafter the socket member 84 secured to the door pillar by the bolts 86. In this form of socket the upper wall of the same takes the form of a yieldable shoe 87 which is backed up by a block of rubber 88.

I claim:

1. In a door having outer and inner panels and a lock pillar connecting said panels along corresponding outside edges of the said panels, a door lock comprising a retractable bolt mounted for up and down movement adjacent one of said panels, a socket in said pillar inset from the outer face of said lock pillar, said bolt having a head portion adapted to engage a keeper in said

inset socket in the door lock pillar, and a body portion positioned inwardly of the door from said pillar, and bolt retracting means actuatable from without the said other panel including a portion positioned between the said pillar and the body portion of the bolt operatively connected to said bolt and a portion extending across the door adjacent said pillar and including a member positioned without said other panel.

2. In a door having spaced outer and inner panels and a lock pillar connecting the said panels along the edge of the door, a door lock comprising a retractable bolt mounted within the door for up and down movement adjacent the inner face of one of the said panels, a socket in said lock pillar inset from the outer face of said pillar, said bolt having a head portion projecting into said socket and adapted to engage a keeper with said socket in the door lock pillar, said bolt also having a body portion extending inwardly of the door and diverging from said lock pillar, a rollback positioned within the door adjacent the said panel and between the said pillar and the body portion of the bolt adapted for operative connection with the said bolt, a manually operatable member positioned on the outside of the door adjacent the other panel, and means extending through the door adjacent the inside face of the door lock pillar for connecting said manually operatable member and the said rollback whereby the said member can be operated from without the door to rotate the rollback and retract the said bolt.

3. In a door having spaced outer and inner panels and a lock pillar connecting the said panels along the edge of the door, a door lock comprising a retractable bolt mounted within the door for up and down movement adjacent the inner face of one of the said panels, a socket in said lock pillar inset from the outer face of said pillar, said bolt having a head portion with a horizontal edge projecting into said socket and adapted to engage the bottom side of a keeper in said socket in the door lock pillar, said bolt also having a body portion extending inwardly of the door and diverging from said lock pillar, a rollback positioned within the door adjacent the said panel and between the said pillar and the body portion of the bolt adapted for operative connection with the said bolt, a rotatable door handle positioned on the outside of the other panel and a shaft rigidly connected at one end to the said handle and connected at the other end to the said rollback, said shaft extending through the door adjacent the inside face of said lock pillar whereby the said outside handle can be swung to rotate the rollback and retract the bolt.

4. In a door having spaced outer and inner panels and a lock pillar connecting the said panels along the vertical edge of the door, a door lock comprising a retractable bolt mounted for angular up and down movement within the door adjacent the inside panel, a socket in said lock pillar inset from the outer face of said pillar, said bolt having a head portion adapted to project into said socket and engage a keeper in said socket of the door lock pillar and a body portion extending inwardly of the door in diverging relation with the said pillar, a rollback positioned within the door adjacent the inside panel and between the body of the said bolt and the pillar, a shaft connected to the said rollback and extending across the said door adjacent the inside face of the pillar, and a handle fixed to the said shaft on the outside of the door adjacent the other panel whereby the said handle can be turned to retract the bolt.

5. In a door having a lock pillar provided with a notch extending inwardly from the inner vertical edge of the pillar, a lock comprising a frame and dovetail socket adapted to receive a combined striker and dovetail male member and also adapted to be secured to the door with the socket portion positioned on the inside of the said pillar in alignment with the notch in the said pillar, the said socket having an opening extending through its lower face, a retractable bolt slidably mounted on the latch frame for rectilinear up and down movement at an angle of less than 45° to said pillar, the said bolt having a head portion slidably supported in the opening in the said socket and adapted to project into the said socket for engagement with said striker, the said bolt also having a body portion extending inwardly of the door in diverging angular relation with the door lock pillar, a rollback positioned within the door between the body of the bolt and the pillar and adjacent the inner face of the said pillar, a shaft connected to the said rollback and extending across the door adjacent the inside face of the pillar, and a handle fixed to the shaft on the outside of the door for rotating the rollback to retract the bolt.

EMORY GLENN SIMPSON.