April 27, 1965

I. V. SINERVO

3,180,120

DOOR LOCK

Filed Dec. 18, 1962

2 Sheets-Sheet 1

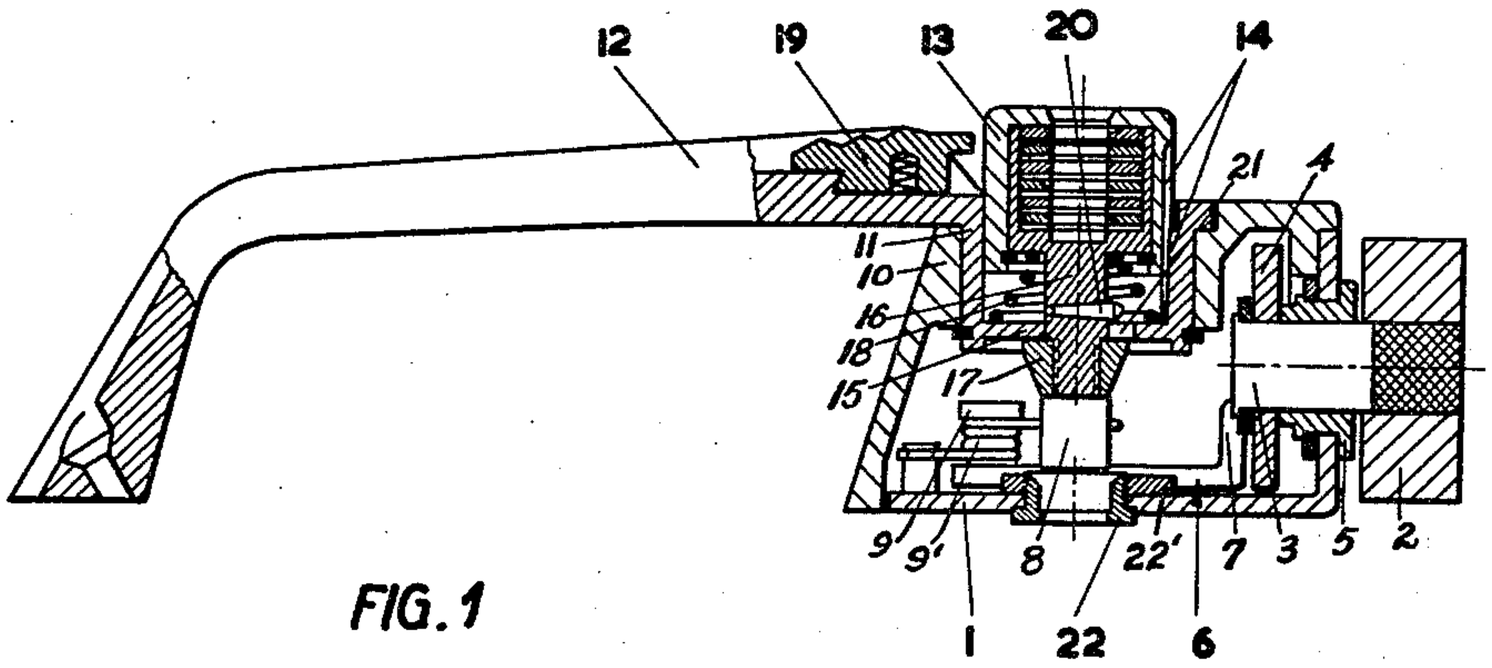

FIG. 1

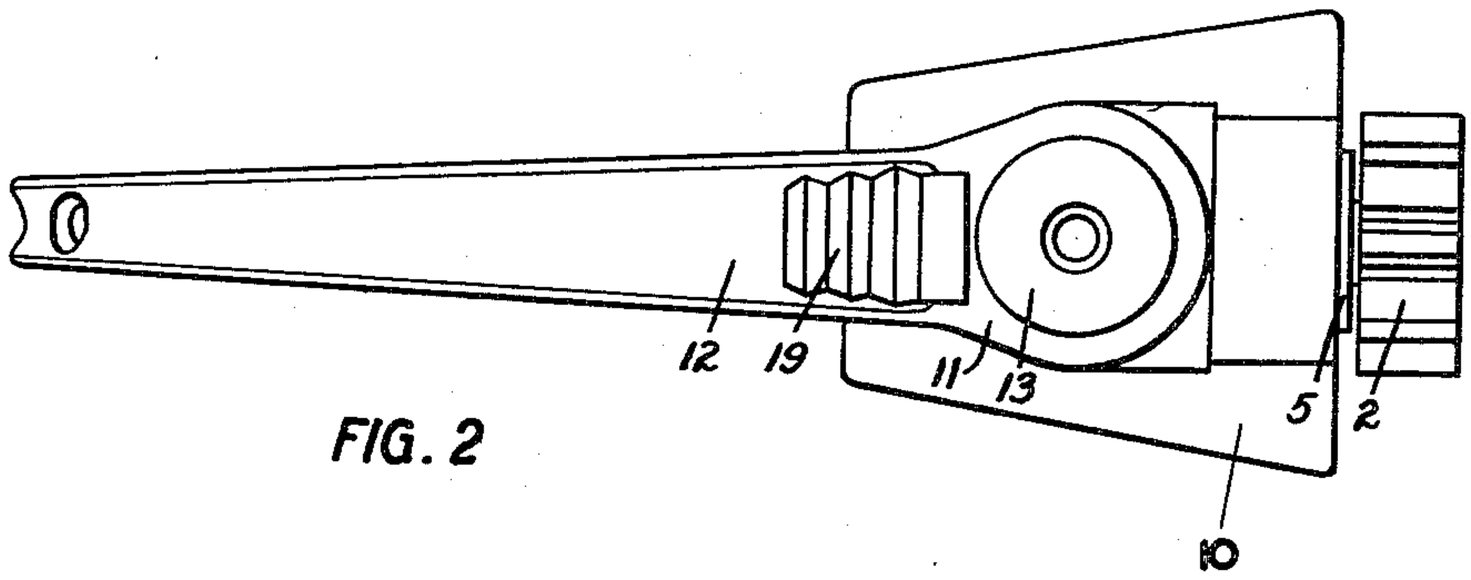

FIG. 2

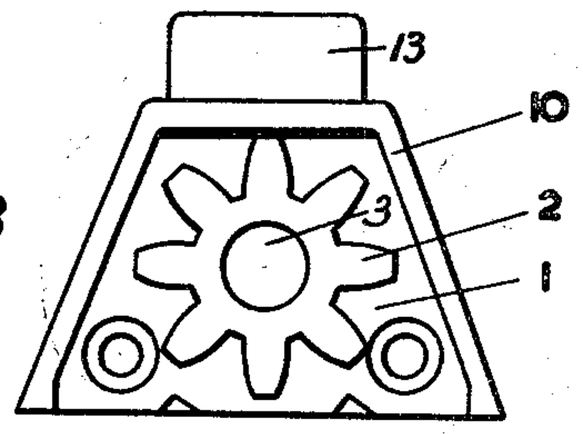

FIG. 3

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2 Sheets-Sheet 2

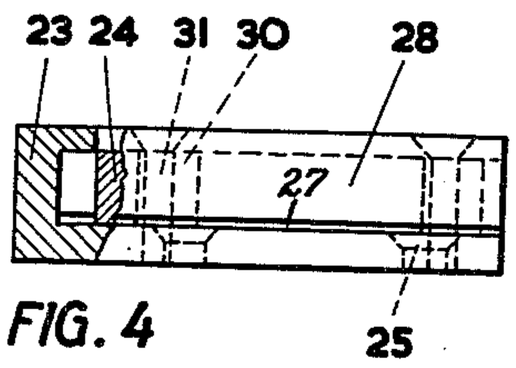

FIG. 4

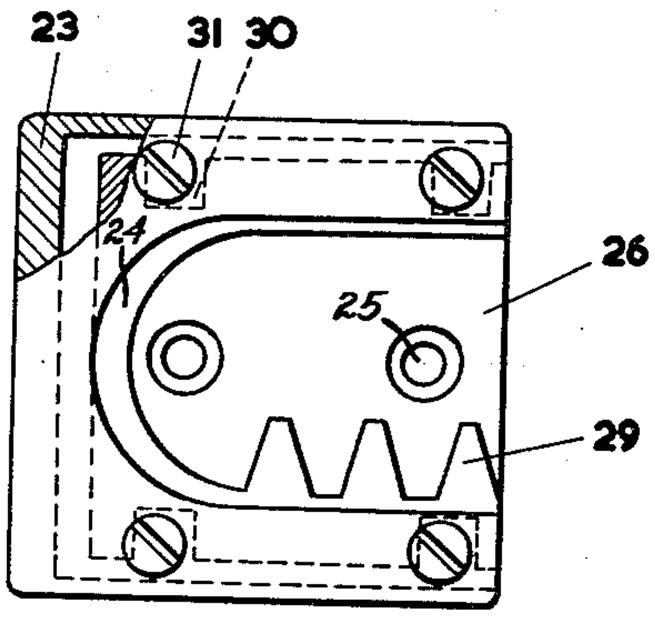

FIG. 5

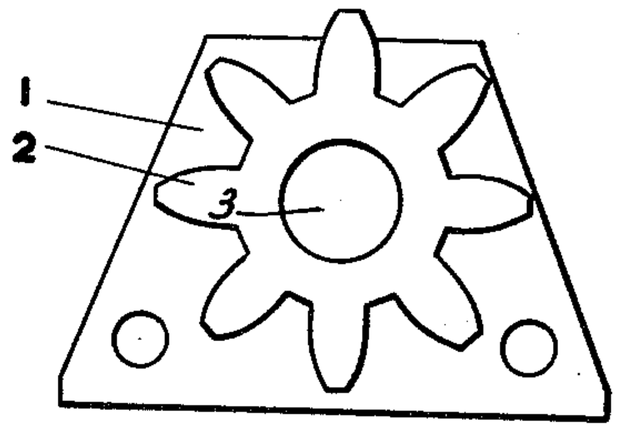

FIG. 8

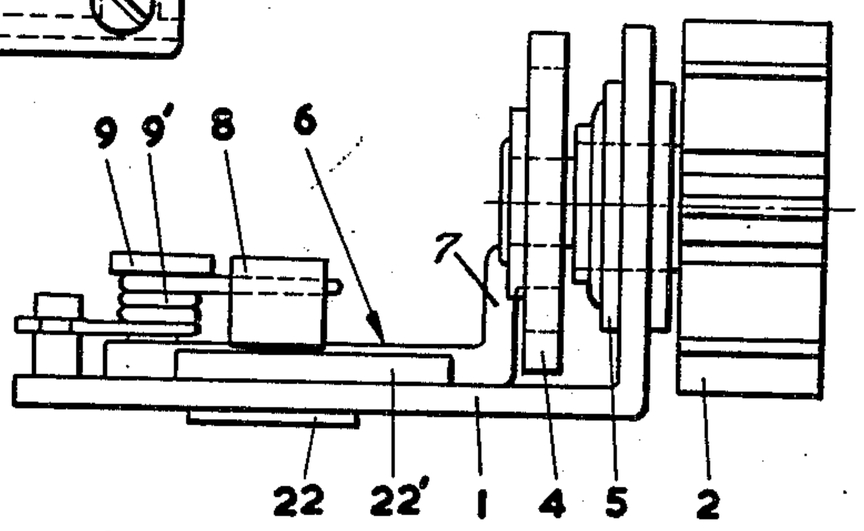

FIG. 6

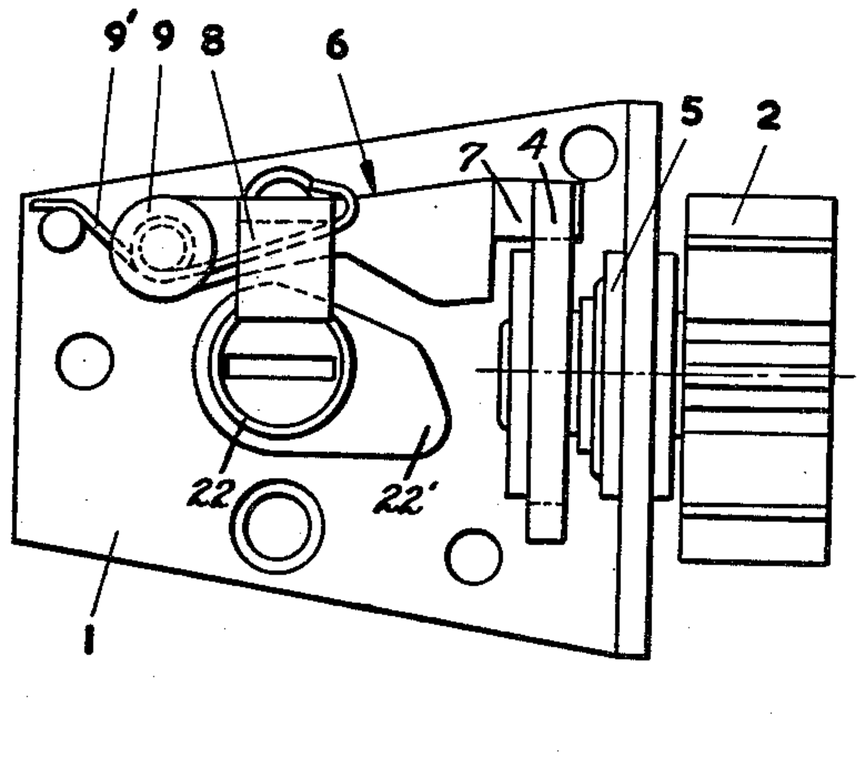

FIG. 7

United States Patent Office

3,180,120
Patented Apr. 27, 1965

3,180,120

DOOR LOCK

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Filed Dec. 18, 1962, Ser. No. 245,531
Claims priority, application Finland, Dec. 19, 1961, 2,241/61
6 Claims. (Cl. 70—135)

The invention relates to door locks of the rotary bolt type combined with cylinder locks and to latch mechanisms therefor. More particularly the invention relates to a lock for doors and the like, comprising a cogwheel or pinion which is rotatable about an axis aligned with the plane of the door and a mating keeper formed as a toothed rack with which the cogwheel meshes. The toothed rack is mounted on the frame of the door. The lock housing is provided with means for allowing the cogwheel to run along the toothed rack in the closing direction of the door and for preventing the cogwheel from rotating in the opposite direction. The lock further includes means for releasing the cogwheel from its barred position.

Heretofore known locks functioning in accordance with the above stated principle are used for the locking of doors in a motor car. In locks used in car doors, the parts functioning as locking and unlocking means are comparatively complicated since the real lock device must be fitted inside the door edge. Furthermore the devices for opening the door both from outside and inside must be mounted separately, in the external and internal faces of the door. Accordingly, such a lock with its opening devices cannot be made as a single, unitary structure.

An object of the present invention is to improve on such locks and provide ordinary door locks, mainly for use in apartment doors. In particular, according to the invention the latch used in ordinary door locks is replaced by a cogwheel. There accrues therefrom several notable advantages. For example there is avoided the fairly complicated construction which is necessary for changing the turning motion of the key of the turning screw in conventional latch locks into the back and forth linear motion of the latch. Further, there is no necessity for the door to be fully closed, because the door is locked as soon as one of the teeth in the cogwheel engages a respective part of the toothed rack on the door frame. This is of importance especially when the door has been carelessly pushed or pulled shut by children, for example, entering or leaving the room. Since the lock has no turning knob, the same cannot be opened, for example, by means of a strap through the opening under the letter-flap or through some such similar aperture. Neither is it possible to open the lock with a pick or similar object through an opening between the door and its frame.

The lock according to the present invention is mainly characterized in that the lock housing, which is mounted on the inside plane of the door, is provided with a press or push button arranged to operate together with a pivotally mounted locking arm acting in cooperation with a latch wheel which operates together with the cogwheel of the lock in such a way that the press button while being pressed releases the locking arm from its engagement with the latch wheel and thus also releases the cogwheel in the lock.

According to the above invention there can be produced a lock of very simple construction since all of its latching and releasing elements are centralized in the lock housing. There is thus provided a unitary construction without any extra opening and transmitting elements. By this means the lock according to the invention is most reliable and can in a most easy manner be mounted in place as one combined unit.

According to another embodiment of the invention the

lock further includes a pin which is secured to the axle in the lock housing which is arranged to cooperate with a stop in such manner that when a press button is brought to its outward limit position, the axle pin is turned over the top of the stop. Accordingly, the pressing in of the press button is prevented. This renders it possible to prevent opening of the lock from inside.

According to still another embodiment of the invention the lock is characterized in that the pin, secured to the axle, and the stop in the lock housing are further arranged so that in locking the pressing action while the press button is in its pushed-in position, the pin is turned to move under the stop, thus preventing the button from moving up. This again renders it possible to set the lock into a continuous open position, by which means the door is kept unlocked.

The invention is more fully described in the following specification with reference to the accompanying drawings illustrating one of the embodiments of the invention. In the drawings:

FIGURE 1 shows a section of a lock housing for mounting on the inner side of the door;

FIGURE 2 shows a top view of the lock housing according to FIGURE 1;

FIGURE 3 shows an end view of the lock housing of FIGURE 1;

FIGURE 4 shows a section of the counter part for mounting on a door frame;

FIGURE 5 shows a front view of the counter part;

FIGURE 6 shows a side view of the base plate of the lock housing with its mounted parts;

FIGURE 7 shows a top view of the base plate with its mounted parts; and

FIGURE 8 shows an end view of the base plate with its mounted parts.

The construction of the lock according to the drawings is defined as follows:

To one of the bent sides of the L-shaped base plate **1**, which is to be fastened to the inner side of the door, is secured a bearing **5**. Mounted on bearing **5** is a freely turnable axle pin **3** whose axis is in line with the other bent side of the base plate **1**. To one of the ends of the axle pin **3** is fastened a pinion or cogwheel **2** and to its opposite end likewise a ratchet wheel **4**. The pawl or locking arm **6** which limits the turning motion of the ratchet wheel **4** is fastened from its other end by means of a pin **9**. Pin **9** is secured vertically to the flange of the base plate **1** in such a way that the locking arm **6** can rotate about pin **9** in line with the plane of the base plate **1**. The opposite end of locking arm **6** is provided with an extending locking part **7**, which engages the teeth of ratchet wheel **4** under the influence of spring **9'**. The teeth of the ratchet wheel **4** are formed so that while the cogwheel **2** is turning the ratchet wheel **4** in one direction (counterclockwise in FIGURE 3), its cogs can urge the locking part **7** to the side, thus enabling the ratchet wheel **4** to turn in the same direction. However, when the ratchet wheel **4** is turned in the opposite direction, the cogs press against the locking part **7** without moving it to the side. Thus the ratchet wheel **4** is prevented from turning. The pawl or locking arm **6** is further provided with a lug **8**, extending to the central part of the base plate **1**, the action of which is described later.

To the lock housing **10**, covering the base plate **1** and the mounted parts, is pivoted a handle **12**. The other end of handle **12** is formed as a guiding housing **11** which allows the handle to be turned parallelly with the plane of the base plate **1**. Mounted on the housing **11** is a push button **13**. Button **13** can move vertically against the base plate **1** but is stopped from turning relative the handle **12** by means of a tongue and groove arrangement **14**. The push button **13** is provided with an axle pin

16, mounted inside the lock housing 10 so that it protrudes through an opening in plate 15 located on the bottom of the housing 11. A conical part 17 is secured to the end of the axle-pin 16. Between the push button 13 and plate 15 is fitted a pressure spring 18, which keeps the button 13 in its outward position. The pushing part 17 limits its outward projection range. The pushing part 17 of the push button 13 and the lug 8 of the locking arm 6 act together so that when the push button 13 is pushed in, its pushing part 17 contacts the pushing lever, and when the push button 13 is pressed further in, the pushing part 17 will slide along the surface of the pushing lever, thus pushing the lever away from its track. This action causes the locking arm 6 to turn on its axis and thus release the locking part 7 from its engagement with the ratchet wheel 4 which now is free. Accordingly, the cogwheel 2 can turn freely. Since the pushing part 17 of the push button 13 has a conical shape, the mutual action of the pushing part 17 and the pushing lever is by this means transferred to the lock handle 12 in any of its positions relative the lock housing 10. In order to cause the push button 13 to remain in its pressed-in-position, the lock handle 12 is provided with a sliding catch 19, which can be shifted over button 13. By returning the catch 19 again into its starting position, the button 13 is automatically returned to its outwards extended position.

According to one of the embodiments of the invention, pushing assembly of elements 13, 16, 17 is formed into a cylinder-lock in which the push button 13 forms the non-rotatable part of the key-housing and the axle pin 16 and the pushing part 17, together with a locking mechanism, forms the movable part of the key housing. To the axle pin 16 is secured a locking pin 20 which extends from axle pin 16, such that the same lies directly atop plate 15 located on the bottom of housing 11, when the push button 13 is in its outward extending position. The plate 15 is provided with a slot 21, through which, after the button 13 is pressed, the pin 20 can move to the opposite side of the plate 15 such that it lies underneath the plate 15. When the key (not shown) is turned in its housing, the axle pin 16 turns relative the push button 13, at which moment, while the push button 13 is not depressed, the locking-pin 20 is shifted from its position at the slot 27 on top of plate 15. Accordingly, the push button 13 cannot be depressed. However, by turning the key in its housing while the push button 13 is in its pushed-in position and the locking pin 20 has shifted itself through the slot 21 to the bottom side of the plate 15, after which it again moves away from its position at the slot 21 but is still under the plate 15 while the push button 13 is depressed, the latter cannot be pushed out. The pushing part 17 now keeps the locking arm 6 out of engagement with the ratchet wheel 4. When releasing the push button 13 with the key, the locking pin 20 is shifted to its normal position at the slot 21.

A complete door lock comprises a conventional cylindrical lock mechanism, which is to be fastened to the outer side of the door, by aid of which the door lock can be opened with a key. Accordingly, there is pivotably mounted to the housing a transmitting member 22 which is turnable in line with the plane of the base plate 1. In the central part of the transmitting member 22 is a slit for engaging the end of the so-called "turning-iron". The transmitting member 22 is provided with a cam 22' which operates in cooperation with the locking arm 6 so that when the cam 22' is turned by means of the turning-iron and the key, cam 22' is brought into contact with the locking arm 6, and while the turning motion of the transmitting member 22 continues, the cam 22' releases the arm 6 from its engagement with ratchet wheel 4 so that ratchet wheel 4 and cogwheel 2 can turn freely. When the key is turned back again in the cylindrical lock device, the cam 22' returns to its starting point and likewise locking arm 6.

The keeper of the door lock, which is to be mounted

on the door frame, is shown in FIGURES 4 and 5. The keeper comprises two parts, viz., the frame 23 and the toothed rack 24. The frame 23 is sunk into the frame of the door and fastened to it by screws passed through the holes 25. The frame 23 of the keeper is rectangular and a portion around its centre is hollowed out to provide space for rack 24. Both sides of the frame 23 in the keeper have slits 27 which engage two tongues 28, one on each side of the frame. The tongues 28 are fastened to the frame 23 only from one of their ends. The rack 24 consists of a U-shaped part fitted in the frame 23 and includes teeth 29. The edge of the U-shaped part has a notch 30, through which passes a screw 31 by which it is fastened to the frame. The notch is of a size which allows shifting of the rack 24 somewhat towards either of the sides of the frame 23 or towards its base part.

When the lock housing and its keeper are mounted on the door, the cogwheel 2 engages the rack 24 in closing the door. Since the ratchet wheel 6 is locked by means of the locking arm 6, the cogwheel 2 is permitted to turn along the rack 24 only in the closing direction of the door, but the wheel cannot turn in the opposite direction. By disengaging the locking arm 6 from its grip with the ratchet wheel 4 in the above stated manner, the cogwheel 2 is permitted to turn also in the opposite direction, in which case the door can be opened.

The drawings and the specification relative to these are of course only intended as an illustration of the invention. The different details of the lock may thus vary quite considerably within the limits of the inventive idea. Thus, it is not important that the acting direction of the press button is exactly vertical to the fastening plane of the base plate, as the same may even be placed at an angle which renders the best possible engaging grip between the lock handle and the push button. Even the push button need not be constructed so that the locking is performed with a key, and in such case it need not be provided with any locking mechanism.

What I claim is:

1. A door lock comprising a rotary bolt including a pinion at one end of said bolt and a ratchet wheel at the other end of said bolt, a keeper including a toothed rack for engagement by said pinion, a pivotably mounted pawl for engaging said ratchet wheel when said pawl is in a first position and clearing said ratchet wheel when said pawl is in a second position, spring means for urging said pawl to said first position, a press button, an axle extending from said press button for engaging said pawl and moving the latter to said second position when said press button is depressed, a slotted plate disposed about said axle, a pin in said axle, said pin being normally opposite the slot in said plate, and means for rotating said axle so that when said axle is rotated prior to depression of said press button said pin moves from opposite said slot blocking the depression of said press button and said pawl remains in said first position and when said axle is rotated while said press button is depressed said pin passes through said slot and moves from opposite the latter and said pawl is locked in said second position.

2. For use with a door and door post, a door latch comprising a rack in said door post, a housing secured to said door, a first axle journaled in said housing, a toothed wheel secured to one end of said axle for engaging said rack, a ratchet wheel secured to the other end of said axle, a spring biased pawl for engaging said ratchet wheel, a cam rotatably mounted in the housing for moving said pawl out of engagement with said ratchet wheel and adapted to be rotated by a first cylinder lock, a handle including a hub rotatably mounted on said housing, a press button slidably mounted in said hub and restrained from rotational movement, spring means for biasing said press button against depression, a second axle extending from said press button for contacting said pawl to disen-

gage the latter from said ratchet wheel when said press button is depressed.

3. The latch of claim 2 wherein the end of said second axle extending from said press button is conical and a portion of said pawl has a sloped surface for contacting said conical end.

4. The latch of claim 2 wherein said press button includes a recess for accommodating a lock cylinder.

5. The latch of claim 2 wherein said press button includes a rotary means in said recess, said second axle extending from said rotary means and rotatably movable thereby, a pin extending from said second axle and an apertured and slotted plate disposed in said housing about said second axle with said pin opposite the slot to permit said pin to pass through said slot only when said second axle is in a first rotational position and said press button is depressed so that when said second axle is rotated to a second rotational position before the depression of said press button said second axle is blocked from engaging

said pawl and when said second axle is rotated to said second rotational position when said press button is depressed said second axle is maintained in engagement with said pawl.

6. The latching means of claim 5 wherein said rotary means is a lock cylinder.

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