

Dec. 3, 1929.

G. W. WELLS

1,738,338

LATCH FOR DOORS

Filed Sept. 2, 1925

2 Sheets-Sheet 1

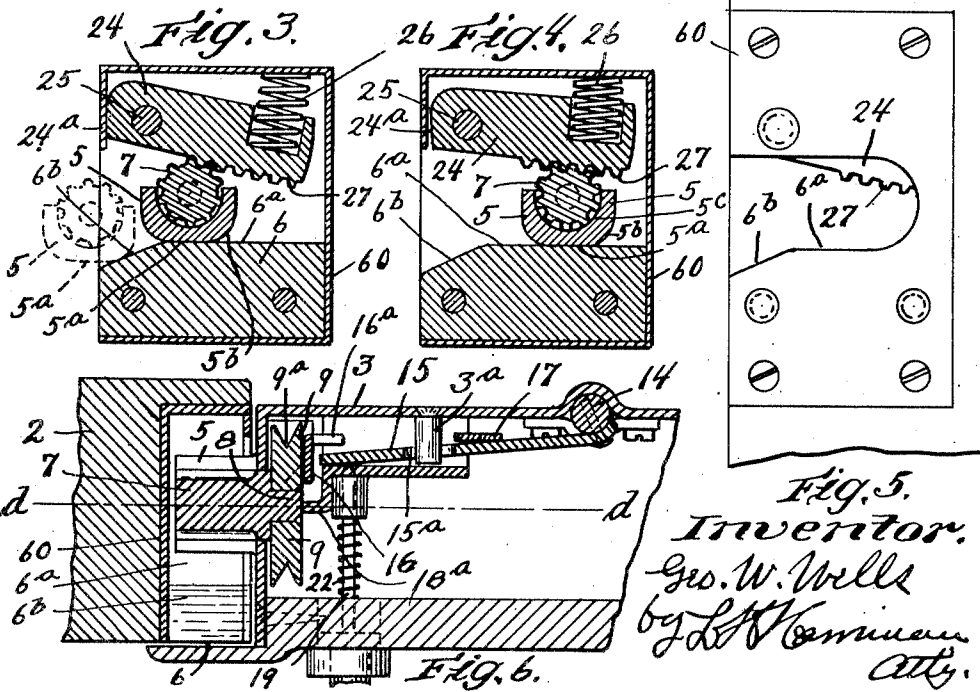
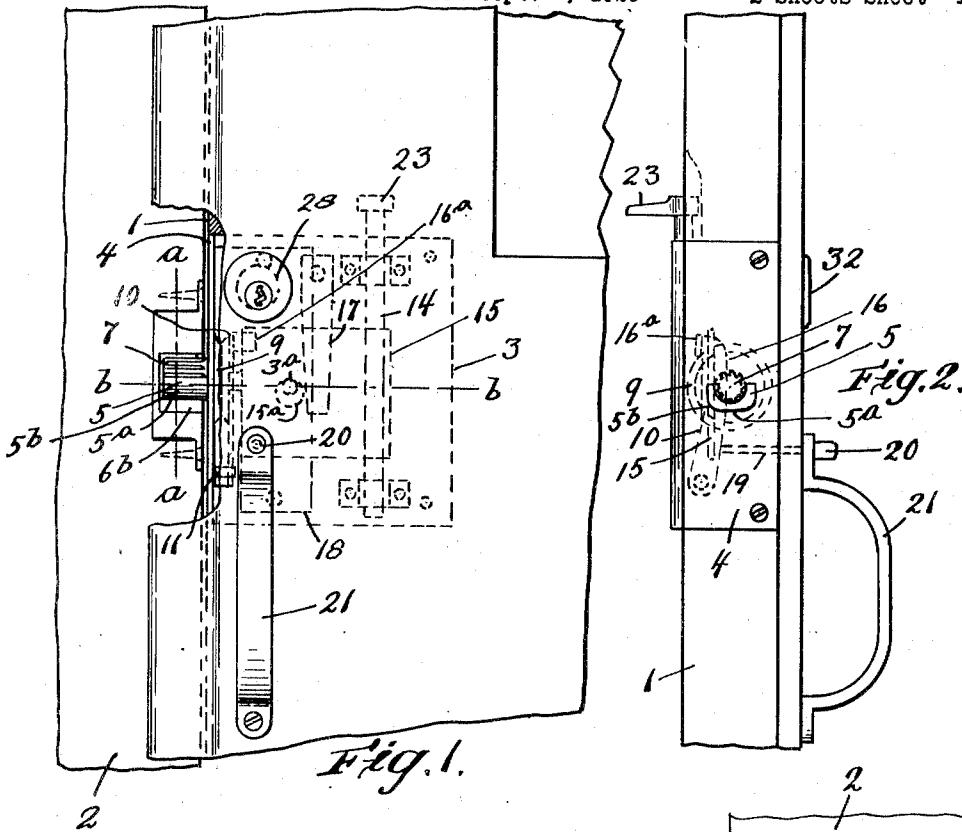


Fig. 5.
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LATCH FOR DOORS

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2 Sheets-Sheet 2

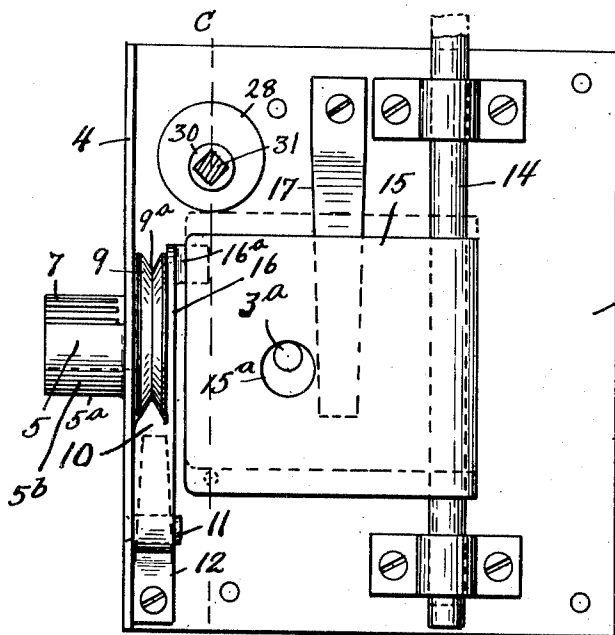


Fig. 7.

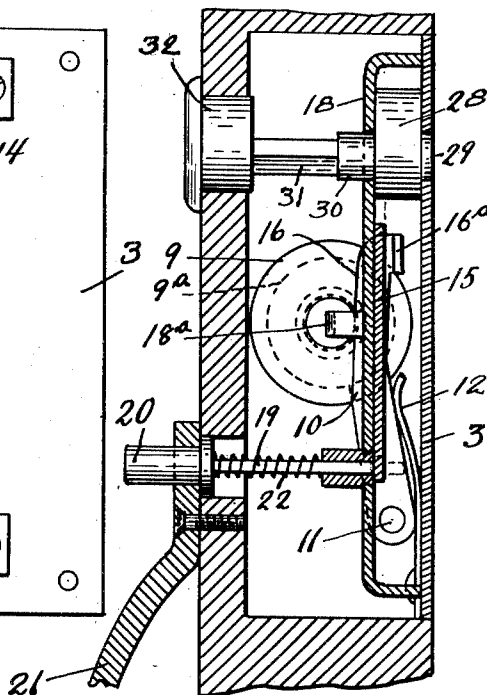


Fig. 8.

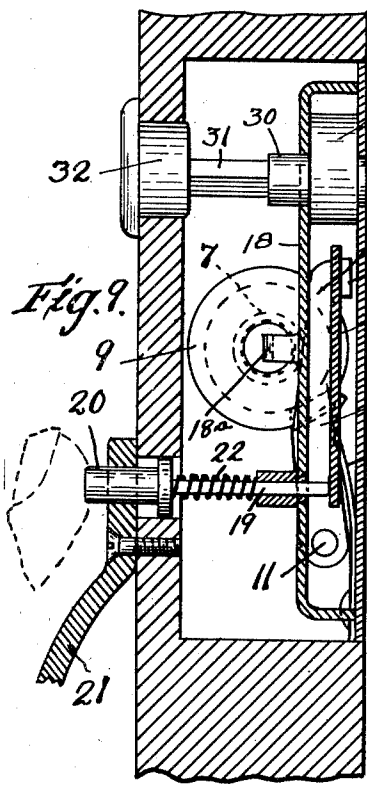


Fig. 9.

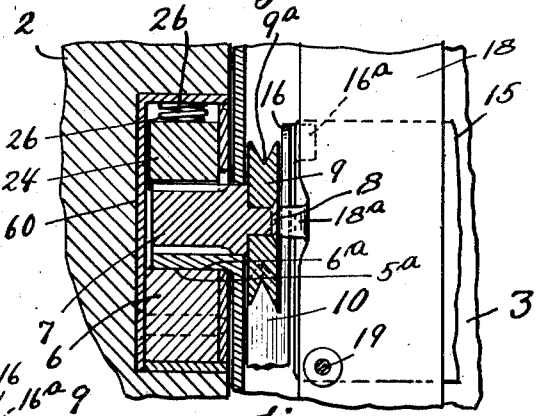


Fig. 10.

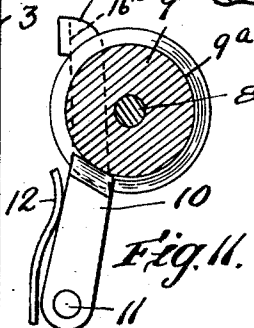


Fig. 11.

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UNITED STATES PATENT OFFICE

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LATCH FOR DOORS

Application filed September 2, 1925. Serial No. 54,008.

This invention relates to that class of latches which are primarily designed for use in connection with the doors of closed body automobiles, and are adapted to be released from either side of the door and to be locked, so that they may only be unlocked either from the inside or from the outside with a key.

An objection to many of the locks or latches of this type, which are in general use, is that they are complicated and are, therefore, expensive to manufacture. Also that while many latches are arranged to catch at two points, one when the door has been swung into the jamb to a slight extent and the other when the door is closed to the fullest extent, this arrangement is objectionable in that, at the first catching point, the door is not usually securely locked and will usually rattle unless it is fully closed. Consequently it frequently happens that automobile body doors have to be closed with considerable force in order that they may be securely locked and held so as to prevent rattling. Moreover it is common practice to employ, in connection with the latch, various forms of door-holding devices, frequently called "dove-tails," and "anti-rattlers" which provide a rigid support for the door when it is fully closed and practically relieve the hinges from all strain at that time, and these devices, when used make a substantial addition to the expense of installation of the door.

A form of latch which may be released from the outside by a mere push button which operates a push rod is considered desirable, and while I have previously produced several devices of this character, as shown by certain patents issued to me, yet none of these have been considered sufficiently satisfactory to justify extensive use.

The objects of my invention are to provide a latch, of the general type above referred to, which shall be of simple and durable construction and capable of being manufactured at a substantially less cost than other devices of like character now in general use, which will securely lock the door in practically any position to which it may be moved between a point where it has been swung partly into the jamb and where it is closed to the fullest

extent possible, so that the door may be securely held against opening even when closed with a slight pressure, and which combines therewith all the functions of the door-holding devices or "dove-tail," which have been employed, so that such devices are not only rendered unnecessary, but the door is securely held against rattling and all strain on the door hinges is relieved in all latched positions of the door. Another object is to provide a latch which may be conveniently and easily unlatched by a push button arranged in conjunction with a simple form of pull handle.

I accomplish these objects in the manner hereinafter described and as illustrated in the accompanying drawings, in which:—

Fig. 1 is a front elevation illustrating a latch mounted in a door and its jamb and embodying a preferred form of my invention.

Fig. 2 is an edge view of the door with the latch device mounted therein.

Figs. 3 and 4 are detail sectional views, on an enlarged scale, of the latch and catch members, at line *a—*a** of Fig. 1.

Fig. 5 is a detail view of the catch member.

Fig. 6 is a sectional view, at line *b—*b** of Fig. 1, on an enlarged scale.

Fig. 7 is front elevation of the latch member.

Figs. 8 and 9 are sectional views at line *c—*c** of Fig. 7.

Fig. 10 is a sectional view at line *d—*d** of Fig. 6.

Fig. 11 is a detail view of the friction pawl.

In the drawing 1 indicates an ordinary horizontally swinging door and 2 its jamb or casing, the particular formation of the door and jamb which carry the latch members being unimportant. The door is chambered from its edge to receive the latch casing, which comprises a metal back plate 3, which extends into the door from its edge and a face plate 4, which extends at right angles to the back plate and is integral therewith, said face plate being set flush with the edge surface of the door, and both being of sufficiently heavy metal to form a rigid supporting means for the parts which they carry. The face plate 4 is provided with a horizontally pro-

jecting lug 5, which is rigidly connected thereto by brazing or other suitable means, and is provided with a horizontal bearing face 5^a on its under side and an upwardly inclined face portion 5^b at its inner side which is formed continuously with the bearing face. A supporting member consisting of a metal block 6 is fixed in a metal casing 60, which is mounted in the door jamb with its outer side flush with the side of the jamb, so that it will be close to the face plate 4 when the door is closed, and said block 6 is provided with a horizontal supporting face 6^a on its upper side and a downwardly inclined deflecting face 6^b which extends outwardly therefrom and is continuously formed therewith, the arrangement being such that, when the door is closed, or nearly closed, the face 5^a of the lug 5 will rest on the face 6^a and practically relieve all strain or weight of the door on its hinges, so that, when the door is being closed, the inclined faces 5^b and 6^b will engage, as indicated in the dotted line position of Fig. 3, and there will be a slight lifting action on the door until the under surface of the lug passes on to the horizontal surface 6^a, the action being the same as with certain forms of door holding devices, or "dove-tails" in general use, which are usually fittings entirely separate from the locks or latches which hold the door closed.

The upper side of the lug 5 is provided with a semi-cylindrical recess 5^c in which a pinion 7 is supported, said pinion having its inner end portion provided with a bearing surface which is journaled in the face plate 4, so that the pinion rotates about a horizontal axis perpendicular to said plate. The end of the teeth of the pinion 7 are formed cylindrically to correspond to the surface of the recess 5^c, and the pinion is so arranged that the ends of its teeth engage said surface and rotate in contact therewith, so that the lug 5 acts to support the pinion in a manner to resist both downward and transversely horizontal strains thereon and practically prevent all strain on the bearing of the pinion in the face plate. A friction wheel 9 is fixed on a shaft 8 at the inner end of the pinion with its outer side in engagement with the inner side of the face plate 4, so that the shaft is held against outward longitudinal movement therein. Said wheel is provided with a peripheral V-shaped groove 9^a, and a friction pawl 10, having a correspondingly V-shaped end, is pivoted on pin 11 in face plate 4 and arranged to engage in said groove at a point slightly in the rear of a perpendicular line through the axial line of the wheel, the pointed end portion of the pawl being of substantial thickness and the edge of its pointed end being adapted to engage the wheel in the bottom of its groove, as shown in Fig. 11. Said pivot pin 11 is arranged slightly in the rear of a perpendicular from

the point at which the pawl engages the wheel, so that, when the pawl is in position of engagement with the wheel, its point of engagement is slightly in the rear of a straight line from the axis of the wheel 9 to the pivotal center of pin 11, thereby preventing the pawl from being swung past said line, but causing it to be firmly engaged with the wheel, so as to lock the same against clockwise rotation, when looking at Figs. 8 or 9. A spring arm 12 is mounted on the back plate 3 directly in the rear of the pawl with its end in engagement with the latter, and normally holds it in engagement with the wheel, so that it is normally adapted to lock the wheel against clockwise rotation at any point. The pinion 7 is thus free to rotate counter-clockwise at all times, but will be positively locked against opposite rotation at any point when the pawl is engaged therewith. Clockwise rotation of the pinion will however be permitted when the pawl is swung rearwardly to a slight extent. Means for disengaging the pawl from the wheel 9 are provided, which comprise a vertical rod 14, mounted to permit both oscillatory and longitudinal movement on the front side of the back plate 3, and a flat arm 15 is secured thereto, said arm preferably consisting of a rectangularly shaped flat metal plate, which is extended horizontally to a point adjacent the pawl 10. An arm 16 is rigidly secured to the pawl 10 and extends upwardly to a point some distance above the upper end of the pawl and is provided with a laterally extending projection 16^a at its upper end, which is arranged to be engaged with the rear side of the arm 15 at a point remote from the rod 14, so that, when the rod is turned in the direction to force the arm 15 against the arm 16, the pawl 10 will be disengaged from the wheel 9, which will then be free to rotate in either direction. A spring arm 17 is mounted on the back plate 13 and arranged to engage the arm 15 and normally hold the same out of operative engagement with the arm 16 and in engagement with a stop bracket 18, which is secured at its ends to the back plate 3, the intermediate portion thereof extending in parallel with the back plate, as shown in Fig. 8. The bracket 18 is provided with a lug 18^a which engages the hub 8 of the pinion at its center and acts to hold the pinion against inward longitudinal movement. A push rod 19 is slidably mounted in the bracket 18 and in the door in a position perpendicular thereto and a push button 20 is mounted on the outer end of the rod 19 and preferably at the upper end of a D-form of handle 21, which is secured to the door, the arrangement being such that the handle may be grasped by the fingers and the button may be pressed inward by the thumb, so that the rod may be pushed in and the door pulled out at the same time. A light spring 22 may

be employed on the rod 19 to hold a shoulder on the button against the handle 21. The rod 14 is arranged to slide longitudinally to a sufficient extent to carry the arm 15 laterally between the full line and dotted positions of Fig. 7, and the relative arrangement of the push rod 19 and the arm 15 is such that, when the rod 14 is pushed downward to its fullest extent, the lower portion of the arm 15, at its outer end is opposite the inner end of the push rod, so that when the latter is pushed inward the arm 15 will be swung inward, as shown in Fig. 9. Also, that, when the arm 15 is raised to the dotted line position of Fig. 7, the lower edge of the arm 15 will be above the level of the push rod, so that it will not be engaged thereby when the rod is pushed inward.

The rod 14 is provided with a handle 23 at its upper end, by means of which the rod may be operated either to swing the arm 15, or to move it vertically, and means for limiting the up and down movement thereof is provided, which consists of a stop pin 3^a mounted in the back plate 3 and extending through a relatively enlarged aperture 15^a in the arm 15.

The catch device, which is employed to cooperate with the mechanism above described, comprises a rack bar 24, which is mounted to swing vertically on a pivot 25 within the casing 60 secured on the jamb, said bar being arranged directly over the supporting block 6 and extending inwardly from the outer side of the jamb in a nearly horizontal, but preferably slightly declining position from its pivot, which is located adjacent the front side of the casing. A coiled spring 26 is arranged between the upper side of the casing 60 and the inner end of the bar 24 and the opposite end of the bar is provided with an abutting shoulder 24^a which is arranged to engage the front side of the casing and limit the extent to which the bar may be swung downwardly.

A series of teeth 27 are formed on the under side of the bar, which depend therefrom in a position to be engaged by the uppermost teeth of the pinion 7, when the lug 5 is resting on the horizontal face 6^a. That is, the arrangement is such that, as the door is closed and the lug 5 rides onto the face 6^a, the pinion will be engaged in the outermost teeth of the rack bar, as shown in the full line position of Fig. 3, and, on further inward or closing movement of the door the pinion will mesh with the teeth of the rack bar, causing counter-clockwise rotation of the pinion and, at the same time, a slight upward swinging movement of the bar and consequent compression of spring 26, so that, by the time the door is fully closed, the parts will have moved approximately to the position of Fig. 4. During this movement rotation of the pinion will be permitted by the pawl 10, but any

counter rotation thereof will be prevented thereby, so that, as soon as the door has been closed sufficiently to cause the teeth of the rack and pinion to mesh and the pinion to be rotated even to a slight extent, the door will be positively locked against opening movement and this will, obviously, be the fact as to any more nearly closed position of the door. If, however, the push rod 19 is forced inwardly, or the rod 14 is turned so as to cause inward swinging movement of the arm 15 and consequent disengagement of the pawl 10 with the wheel 9, then the pinion will be free to rotate in the opposite direction, so that free opening movement of the door will be permitted. While the pinion is being swung by the door during all the time it is in mesh with the rack, its teeth will be so nearly in parallel with the teeth of the rack that a slight looseness between the teeth will permit any necessary relative angularity, or lateral play. As the rack will be forced to swing upwardly by the pinion during the greater portion of the closing movement of the door, during which the rack and pinion are in engagement, the rack will be pressed against the pinion with increasing force, as the door is closed, and the spring 26 is made stiff and placed under substantial tension when the stop shoulder of the rack is engaged with the casing, so that, in all positions of the door in which it is locked against opening, the lug 5, on which the pinion directly bears will be firmly pressed against the supporting block 6, so that all up and down vibration of the door, when closed, will be prevented. It will be apparent that if the rack were fixed in a horizontal position, the locking action above described would take place but, with the above described construction, all possibility of vibration between the rack and pinion, or between the lug 5 and supporting block 6, is prevented.

It has been noted that, when the operating arm 15 is in the raised position, the push rod 19 will not engage said arm on inward movement thereof to cause the pawl 10 to be disengaged from the wheel 9, so that, to lock the door against opening from the outside, it is merely necessary to pull up the rod 14 until the arm 15 is out of position to be engaged by the push rod, then, if the door is closed, it can only be unlocked from the inside by turning the rod 14. Means may, however, be conveniently provided for unlocking the door from the outside by means of a key, which merely consist of key operated means for pushing the arm 15 downwardly into position to be engaged by the push rod. The particular means shown comprise a cam 28 mounted on trunnions 29 and 30 in the back plate 3, and stop bracket 18, respectively, and in position to be engaged with the upper edge of the arm 15. The trunnion 30 has a centrally located hole therein into which a square shaft

31 is extended, said shaft being also extended into a lock barrel 32 in the front side of the door; so that the shaft may be rotated by means of a key in a well known manner. The arrangement will be such that the key may only be inserted or removed when the cam is in the position of Fig. 7, and when the cam is rotated a half turn by the key, if the arm 15 is in the dotted line position of Fig. 7, said arm will be pushed downward by the cam, so that the latching device may then be released by pressing the push pin 19 inwardly. Before the key is remove, the cam will be returned to the position of Fig. 7, so that, when it is necessary to lock the door again the rod 14 will be pulled upwardly.

From the foregoing description it will appear that the above described construction possesses various important advantages, in that it is of simple and durable construction and may be manufactured at low cost; that the door will be securely locked in any position in which the rack and pinion mesh, so that it is immaterial whether the door is completely closed or nearly closed, as in any of its closed positions it will be both securely latched and will be securely held against either up or down movement in the jamb, and the use of an independent door holding means will be avoided. The lug 5 performs the double function of a support for the door and a support for the pinion, being arranged to resist all strains to which the pinion may be subjected, and, by forming the pinion of hardened steel and the rack of softer steel the pinion will cut the teeth in the rack more deeply as its teeth tend to become worn, so that the device will be durable and unlikely to get out of order.

I claim:

1. In combination with a horizontally swinging door and its jamb, a supporting member mounted on the jamb having an upwardly facing bearing surface, a lug rigidly mounted on the door and arranged to engage said surface and to be rigidly supported thereon when the door is in a closed position, a depending catch device mounted on the jamb directly above said supporting member and an upwardly projecting latch device mounted on the door directly over said lug and arranged to be engaged by said catch device when the lug is engaged with said bearing surface.

2. In combination with a horizontally swinging door and its jamb, a supporting member mounted on the jamb and having an upwardly facing bearing surface, a horizontally projecting lug rigidly mounted on the door and having a face on its under side arranged to be engaged with said bearing surface, to support the door when in a closed position, a catch device mounted on the jamb and arranged to depend therefrom directly over said bearing surface, and a latch device

mounted on the door and supported by said lug in position to engage said catch device when said lug is engaged with said bearing surface.

3. In combination with a horizontally swinging door and its jamb, a supporting member mounted on the jamb and having an upwardly facing bearing surface, a horizontally projecting lug rigidly mounted on the door and having a face on its under side arranged to be engaged with said bearing surface, to provide a rigid support for the door during the latter portion of its closing movement, a catch device mounted on the jamb and having a horizontally disposed series of teeth, a latch device mounted on the door above said lug and arranged to engage said teeth successively as the door moves the lug along said bearing surface during its closing movement, and means normally preventing disengagement of the latch device from the teeth on opposite movement of the door and movable to permit disengagement thereof.

4. In combination with a horizontally swinging door and its jamb, a horizontally projecting lug rigidly mounted on the door, a supporting member mounted on the jamb and having a supporting face on its upper side arranged to be engaged by the under side of the lug during the latter portion of the closing movement of the door, to support the same in a predetermined position during said movement, a catch device mounted on the jamb and having a horizontally disposed series of depending teeth directly over said supporting face, a latch device mounted on the door and supported by said lug in position to be successively engaged with said teeth during said movement, and means to prevent disengagement of said latch device with said catch device when in said positions of engagement.

5. In combination with a horizontally swinging door member and a jamb member, a catch device mounted on one of said members and having a horizontally disposed series of vertically projecting teeth, a latch device mounted on the other of said members and having means projecting oppositely to said teeth in position to be successively engaged therewith as the door is closed, said means being arranged to yield to permit closing movement of the door member and having means associated therewith normally preventing opposite yielding thereof when in engaging relation to prevent opening movement of the door member and coacting means on said members arranged to provide a rigid support for the door at its vertical edge in the different positions of engagement of said catch and latch device.

6. In combination with a horizontally swinging door member and a jamb member, a horizontally disposed rack mounted on one of said members, a pinion rotatably mounted

on the other member and having its teeth arranged to mesh with the teeth of the rack and to be rotated thereby in one direction during the latter portion of the closing movement of the door, a pawl arranged to permit rotation of said pinion in said direction and to prevent opposite rotation thereof, a push rod, an actuator normally arranged to be moved by said push rod to disengage said pawl from the pinion to permit opposite rotation thereof, and means for moving said actuator out of position to be operated by said push rod.

7. In combination with a horizontally swinging door member and a jamb member, a horizontal disposed rack mounted on one of said members, a pinion rotatably mounted on the other member and having its teeth arranged to mesh with the teeth of the rack and to be rotated thereby in one direction during the latter portion of the closing movement of the door, a locking device arranged to permit rotation of the pinion in said direction and to prevent opposite rotation thereof, a push rod, an actuator movable to hold said locking device in an operative position, and normally arranged to be engaged by said push rod to operate the same, and means independent of the push rod for operatively moving the actuator and for moving said actuator out of position to be operated by the push rod.

8. In combination with a horizontally swinging door member and a jamb member, a horizontally disposed rack mounted on one of said members, a pinion rotatably mounted on the other member and having its teeth arranged to mesh with the teeth of the rack and to be rotated thereby in one direction during the latter portion of the closing movement of the door, a locking device permitting rotation of the pinion in said direction and normally arranged to prevent opposite rotation thereof, an unlocking device arranged in the door for exterior operation, an operating rod arranged therein for interior operation, an arm on said operating rod normally arranged to be actuated by said unlocking device, and by said operating rod on rotation thereof, to move said locking device to an inoperative position, and means permitting longitudinal movement of said operating rod to move said arm out of position to be engaged by said unlocking device.

9. In combination with a horizontally swinging door and its jamb, a catch device mounted on the jamb, a latch device mounted on the door and arranged to yield to permit engagement thereof with said catch device on closing movement of the door, a locking device having means for normally holding the same in position to prevent disengagement of said latch device from the catch device, to lock the door in closed position, a push rod in the door arranged to be forced inwardly from the

outer side thereof, an actuator normally arranged to be engaged by said push rod and to be moved thereby to move said locking device to permit disengagement of the latch device from the catch device and a single operating device arranged to be operated from the inner side of the door to operate said actuator and to move the same out of position to be operated by said push rod.

10. In combination with a horizontally swinging door and its jamb, a catch device mounted on the jamb, a latch device mounted on the door and arranged to yield to permit engagement thereof with said catch device on closing movement of the door, a locking device having means for normally holding the same in position to prevent disengagement of said latch device from the catch device to lock the door in closed position, an unlocking device arranged to be operated from the exterior of the door, an actuator normally arranged to be engaged by said unlocking device and to be moved thereby to move said locking device to permit disengagement of the latch device from the catch device, and an operating rod arranged for operation from within the door and rotatably movable to operate said actuator and longitudinally movable to move the actuator into and out of position to be operated by said unlocking device.

11. In combination with a horizontally swinging door and its jamb, a catch device mounted on the jamb, a latch device mounted on the door and arranged to yield to permit engagement thereof with said catch device and closing movement of the door, a locking device having means for normally holding the same in position to prevent disengagement of said latch device from the catch device to lock the door in closed position, an unlocking device arranged to be operated from the exterior of the door, an actuator normally arranged to be engaged by said unlocking device and to be moved thereby to move said locking device to permit disengagement of the latch device from the catch device, means arranged to be operated from within the door to operate said actuator to move said locking device into an inoperative position and to move the actuator from and to a position for operation by said unlocking device, and a key-controlled device for moving said actuator into the position for operation by the unlocking device.

12. In combination with a horizontally swinging door and its jamb, a catch device mounted on the jamb, a latch device mounted on the door and arranged to yield to permit engagement thereof with said catch device on closing movement of the door, a locking device having means for normally holding the same in position to prevent disengagement of said latch device from the catch device to lock the door in closed position, an unlocking device arranged to be operated from the exterior of the door, a slidably and

rotatably mounted operating rod arranged for operation from within the door, and an arm on said operating rod arranged to be engaged with said locking device to move it to an inoperative position when the rod is moved rotatably and to be moved laterally upon longitudinal movement of the rod into and out of a position in which the arm will be operatively engaged by the unlocking device.

13. In combination with a horizontally swinging door and its jamb, a catch device mounted on the jamb, a latch device mounted on the door and arranged to yield to permit engagement thereof with said catch device on closing movement of the door, a locking device having means for normally holding the same in position to prevent disengagement of said latch device from the catch device to lock the door in closed position, an unlocking device arranged to be operated from the exterior of the door, a slidably and rotatably mounted operating rod arranged for operation from within the door, an arm on said operating rod arranged to be engaged with said locking device to move it to an inoperative position when the rod is moved rotatably, and to be moved laterally upon longitudinal movement of the rod into and out of a position in which the arm will be operatively engaged by the unlocking device, and a key controlled means arranged to move said arm into position to be operatively engaged by said unlocking device.

14. In combination with a horizontally swinging door and its jamb, a rack mounted on the jamb with its teeth depending therefrom, a pinion mounted on the door and projecting horizontally therefrom in position to mesh with said rack and to be rotated thereby in opposite directions at the end of the closing movement and beginning of the opening movement of the door, a rigid lug projecting horizontally from the door beneath said pinion and having a face on its upper side on which the ends of the teeth of the pinion bear to resist downward strain on the pinion, and means permitting rotation of the pinion in a direction to permit closing movement, and normally preventing opposite rotation thereof to prevent opening movement of the door.

15. In combination with a horizontally swinging door and its jamb, a rack mounted on the jamb with its teeth depending therefrom, a pinion mounted on the door and projecting horizontally therefrom in position to mesh with said rack and to be rotated thereby in opposite directions at the end of the closing movement and beginning of the opening movement of the door, a rigid lug projecting horizontally from the door beneath said pinion and having a transversely concave recess therein in which the pinion is located with the ends of its teeth bearing

on the sides of the recess, to resist horizontal strain on the pinion, and means permitting rotation of the pinion in a direction to permit closing movement of the door and normally preventing opposite rotation thereof.

16. In combination with a horizontally swinging door and its jamb, a rack mounted on the jamb with its teeth depending therefrom, a pinion mounted on the door and projecting horizontally therefrom in position to mesh with said rack and to be rotated thereby in opposite directions at the end of the closing movement and beginning of the opening movement of the door, a rigid lug projecting horizontally from the door beneath said pinion and having a longitudinally extending recess in its upper side corresponding to the circumferential formation of the ends of the teeth of the pinion and in which the pinion is located with the ends of its teeth engaged with the surface of the recess to support the pinion and resist horizontal strain thereon, and means permitting rotation of the pinion in a direction to permit closing movement of the door and normally preventing opposite rotation thereof.

17. In combination with a horizontally swinging door and its jamb, a rigid lug mounted on the door and projecting horizontally from the vertical edge thereof, and having a bearing face at its under side and transversely concave recess in its upper side, a supporting member mounted on the jamb having an upwardly facing surface arranged to be engaged by the under side of said lug as the door is swung to closed position, a pinion rotatably mounted at one end in the door and fitted within said recess in position to be supported therein by said lug, a horizontally disposed rack mounted on the jamb with its teeth depending therefrom in position to mesh with the pinion when the lug is resting on said bearing face, to cause rotation of the pinion in one direction at the end of the closing movement of the door and opposite rotation at the beginning of its opening movement and manually controllable locking means normally preventing rotation of the pinion to permit opening of the door and permitting opposite rotation thereof.

18. In combination with a horizontally swinging door and its jamb, a horizontally projecting pinion rotatably mounted on the door, an upwardly yieldable, downwardly spring actuated rack bar having its teeth on its under side and normally supported to decline from the front towards the rear of the jamb in position to permit the pinion to mesh therewith before the door is fully closed, and to be swung upwardly by the pinion and cause simultaneous rotation thereof during the further closing movement of the door, and means for normally locking said pinion against rotation in a direction to permit

opening of the door and permitting opposite rotation thereof.

19. In combination with a horizontally swinging door and its jamb, a pinion rotatably mounted on the door and projecting horizontally therefrom, a lug rigidly mounted on the door and arranged to engage the under portion of the pinion to support the same, door-supporting means on the jamb arranged to engage the under side of the lug in a closed position of the door, an upwardly yielding, downwardly spring actuated rack bar mounted on the jamb with its teeth depending from its under side and extending at a downward inclination from the front side of the jamb in position to mesh with the pinion and to be lifted thereby as the door is closed and means normally locking the pinion against rotation in a direction to permit opening movement of the door and permitting opposite rotation thereof.

20. In combination with a horizontally swinging door and its jamb, a pinion rotatably mounted on the door and projecting horizontally therefrom, a lug rigidly mounted on the door and arranged to engage the under portion of the pinion to support the same, door-supporting means on the jamb arranged to engage the under side of the lug in a closed position of the door, a rack bar pivotally mounted on the jamb adjacent the front side thereof and having its teeth on its under side, an abutment for limiting the downward swinging movement of the bar, a spring for normally holding the rack against said abutment, said parts being so arranged that, as the door is closed, said pinion will be carried into mesh with the rack and will be rotated thereby and will cause the rack to be swung upward against the action of the spring during the further closing movement of the door and means normally preventing rotation of the pinion in a direction to permit opening of the door and permitting opposite rotation thereof.

21. In combination with a horizontally swinging door and its jamb, a bearing member mounted on the door having a downwardly facing bearing surface, a supporting member mounted on the jamb having an upwardly facing supporting surface arranged to be engaged by said bearing surface during the latter portion of the closing movement of the door, to provide a rigid support for the door when in or adjacent its fully closed position, an upwardly yieldable, downwardly spring actuated rack mounted on the jamb above said supporting member and having its teeth depending from its under side, a pinion mounted on the door at its vertical edge and arranged to project therefrom directly over said bearing member and to be supported thereby in position and to mesh with the teeth of the rack when said surfaces become engaged and during the subsequent closing

movement of the door and means permitting rotation of the pinion in a direction to permit closure of the door and locking the same against opposite rotation.

22. In combination with a horizontally swinging door member and a jamb member, a horizontally disposed rack mounted on one of said members, a pinion rotatably mounted on the other member and having its teeth arranged to mesh with the teeth of the rack and to be rotated thereby in one direction during the latter portion of the closing movement of the door, a pawl arranged to permit rotation of said pinion in said direction and to prevent opposite rotation thereof, an unlocking device arranged for operation exteriorly of the door, an actuator normally arranged to be moved by said device to disengage said pawl from said pinion to permit opposite rotation thereof, and means for moving said actuator out of the position in which it may be operatively engaged by said unlocking device.

23. In combination with a horizontally swinging door and its jamb, a bearing member rigidly mounted on the door at its vertical edge and having a downwardly facing bearing surface, a supporting member mounted on the jamb and having an upwardly facing supporting surface arranged for engagement with said bearing surface to cause a slight lifting action on the door at its edge as the door is moved into its jamb and to support the door in lifted position during the further closing movement thereof, a downwardly spring pressed and upwardly yieldable rack supported on the jamb and having a horizontally disposed series of teeth on its under side, a pinion mounted on the door and arranged to be engaged with the rack and to cause upward movement thereof during said portion of the closing movement of the door and means permitting rotation of the pinion in one direction by the rack during said closing movement and arranged to lock the pinion against opposite rotation.

24. In combination with a horizontally swinging door and its jamb, a bearing member rigidly mounted on the door at its vertical edge and arranged to project horizontally therefrom, said member having faces on its upper and under sides, a supporting member mounted on the jamb and having a face on its upper side arranged to be engaged by the under face of said bearing member and to support the door during the latter portion of its closing movement, a pinion mounted on the door for rotation about a horizontal axis with the ends of its teeth in engagement with the upper face of the bearing member, a rack mounted on the jamb having a horizontally disposed series of depending teeth arranged to mesh with the teeth of said pinion while said bearing member is engaged with said supporting member, and means permitting

rotation of the pinion in the direction to permit closing movement of the door and prevent opposite rotation thereof.

25. In combination with a horizontally swinging door and its jamb, a bearing member rigidly mounted on the door at its vertical edge in a position to project horizontally therefrom and having a transversely concave recess in its upper side, a pinion rotatably mounted within said recess, with the ends of its teeth bearing on the surface thereof, a rack mounted on the jamb and having its teeth depending from its under side in position to mesh with the teeth of the pinion during the latter portion of the closing movement of the door, a wheel secured to the inner end of the pinion and located within the door at the inner end of said recess and a pawl arranged to engage said wheel and permit rotation of the pinion in the direction to permit closing movement of the door and normally to prevent opposite rotation thereof.

26. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, an actuator arranged when operated to move said locking element to an inoperative position, separate operating means arranged for operation exteriorly and interiorly of the door, respectively, to operate said actuator, and means permitting movement of the actuator to an abnormal position to render said exteriorly operated means ineffective.

27. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, an actuator arranged when operated to move said locking element to an inoperative position, separate operating means arranged for operation exteriorly and interiorly of the door, respectively, to operate said actuator, and means permitting movement of said interiorly operated means to move said actuator out of position to be operated by said exteriorly operated means.

28. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, an actuator arranged when operated to move said locking element to an inoperative position, separate operating means arranged for operation exteriorly and interiorly of the door, respectively, to operate said actuator, means per-

mitting movement of the actuator out of position to be operated by said exteriorly operated means, and a key controlled means arranged to be operated exteriorly of the door to return the actuator to its position to be operated by said exteriorly operated means.

29. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, an actuator arranged when operated to move said locking element to an inoperative position, separate operating means arranged for operation exteriorly and interiorly of the door, respectively, to operate said actuator, means permitting movement of said interiorly operated means to move said actuator out of position to be operated by said exteriorly operated means, and key-controlled means arranged to be operated exteriorly of the door to return the actuator to its position for operation by said exteriorly operated means.

30. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, an actuator arranged to be moved in one direction to move said locking element to an inoperative position, an inner handle and an outer handle on the door each having means arranged to be separately actuated thereby to operatively move said actuator in said direction and means permitting movement of said actuator in a different direction and out of position to be operated by said outer handle.

31. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, a pivotally mounted actuator arranged when swung to move said locking element to an inoperative position, an inner handle and an outer handle on the door each having means arranged to be separately operated thereby to swing said actuator operatively, and means permitting said actuator to be moved axially to shift it out of position to be operated by said outer handle.

32. In combination with a swinging door and its jamb, a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, a pivotally

mounted actuator arranged when swung to move said locking element to an inoperative position and axially movable between a normal and an abnormal position, means arranged for operation from within the door and effective to swing said actuator operatively when the latter is in either of its said positions and means arranged for operation exteriorly of the door and effective to swing the actuator operatively when the latter is in its normal position and ineffective to operate the same when in its abnormal position.

33. In combination with a swinging door and its jamb a catch device on the jamb, a latch device on the door arranged for movement into interengaging relation with said catch device as the door is closed, a locking element normally operative to prevent disengagement of said devices, an actuator arranged for swinging movement to move said locking element to an inoperative position and for axial movement between a normal and an abnormal position, means arranged for operation from within the door and effective to swing the actuator operatively when the latter is in either of its said positions, means arranged for operation exteriorly of the door and effective to swing the actuator operatively when the latter is in its normal position and ineffective to operate the same when in its abnormal position and key operated means arranged to shift the actuator from its abnormal to its normal position.

34. In combination with a horizontally swinging door and its jamb having catch and latch devices respectively mounted thereon and arranged to lock the door against opening movement in a multiplicity of positions during the latter portion of its closing movement, a bearing member mounted on the door and having a downwardly facing bearing surface, and a supporting member on the jamb having an upwardly facing supporting surface arranged for engagement by said bearing surface to cause the door to be lifted into position for operative engagement of said catch and latch devices and to sustain it in such position during the whole of said portion of said closing movement.

35. In combination with a horizontally swinging door and its jamb, a supporting member on the jamb having a horizontally disposed supporting face on its upper side arranged to extend in the direction of the swinging movement of the door, a bearing member mounted on, and projecting from the edge of the door and having a bearing face on its under side and means to cause a slight lifting action on the door, to engage said faces and provide a rigid support for the door in its lifted position during the latter portion of its closing movement, a rack mounted in the jamb directly over said supporting face with its teeth depending from its under side, a pinion

mounted on the door above said bearing member and arranged to mesh with the rack in said supported positions of the door and means permitting rotation of the pinion in a direction to permit closing movement of the door and preventing opposite rotation thereof.

In testimony whereof, I have signed my name to this specification.

GEORGE W. WELLS.

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