Jan. 6, 1953 T. C. DINGMAN ET AL 2,624,606

DOOR LOCK

Filed May 11, 1951 2 SHEETS—SHEET 1

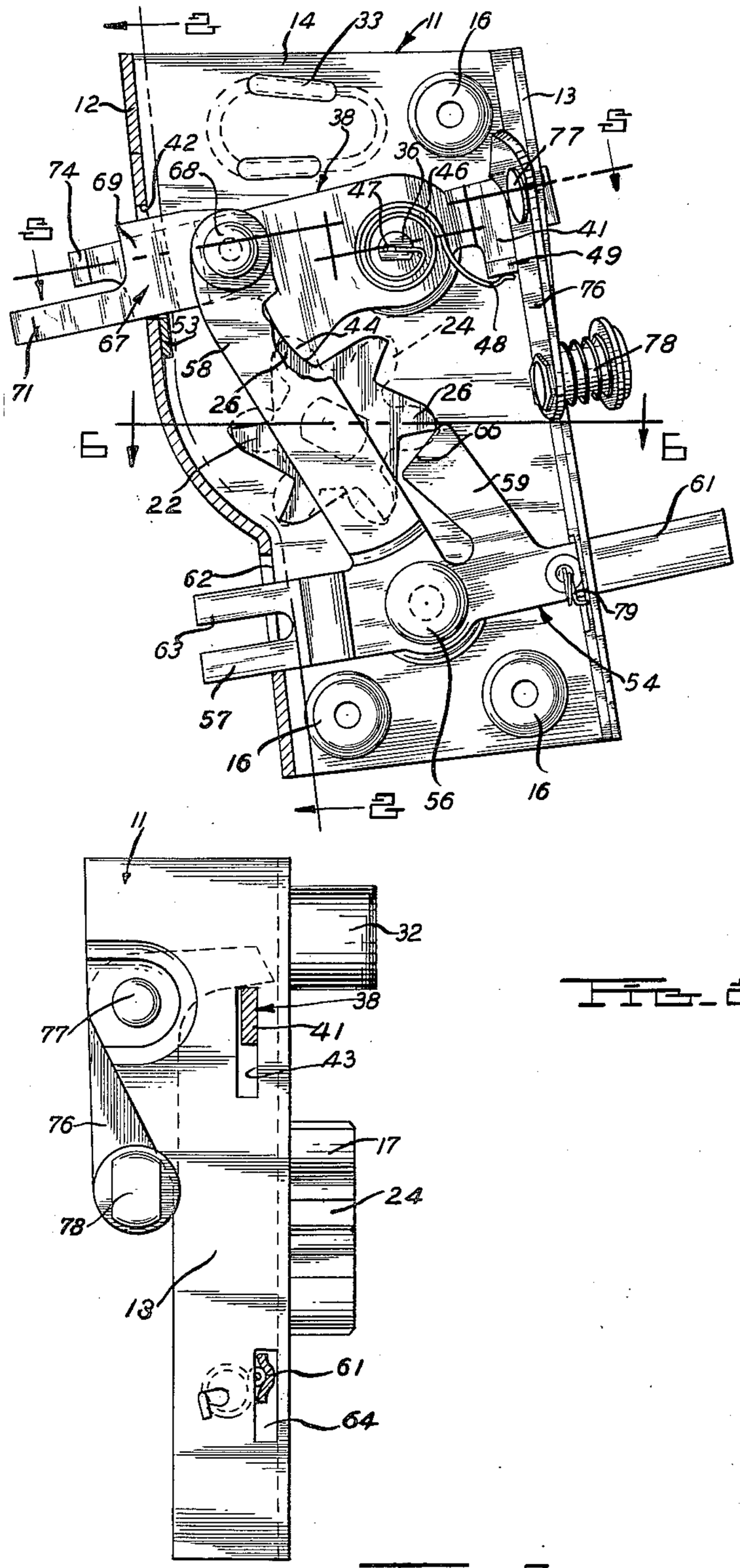

Fig. 1

Fig. 3

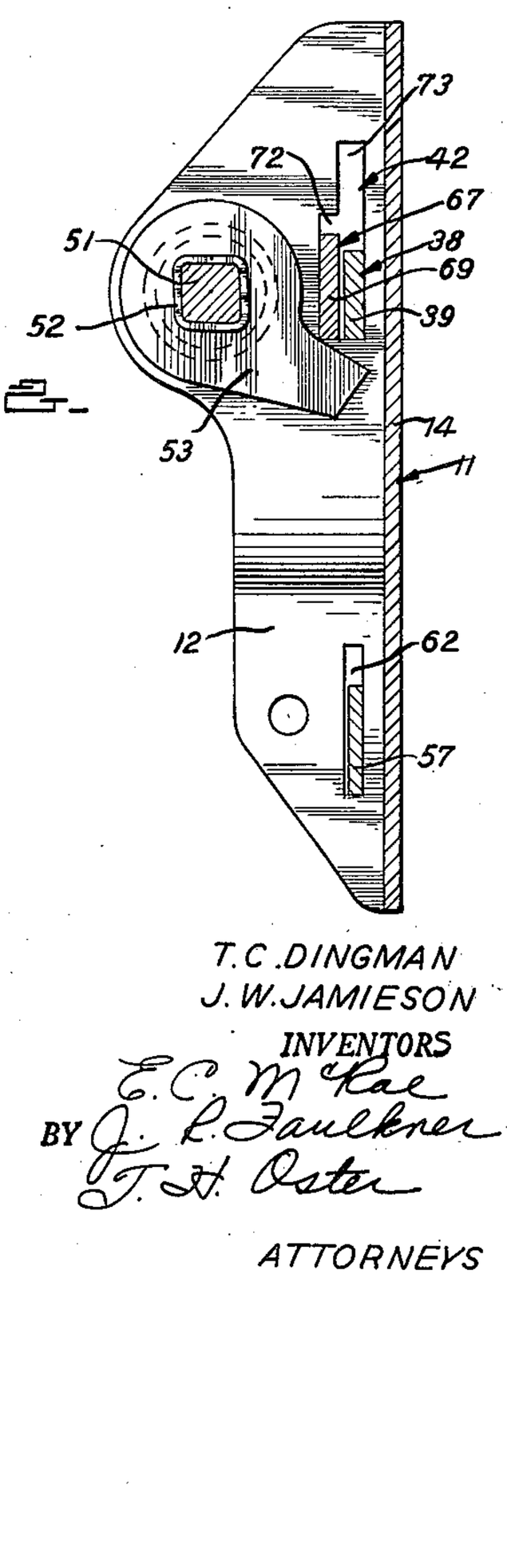

Fig. 2

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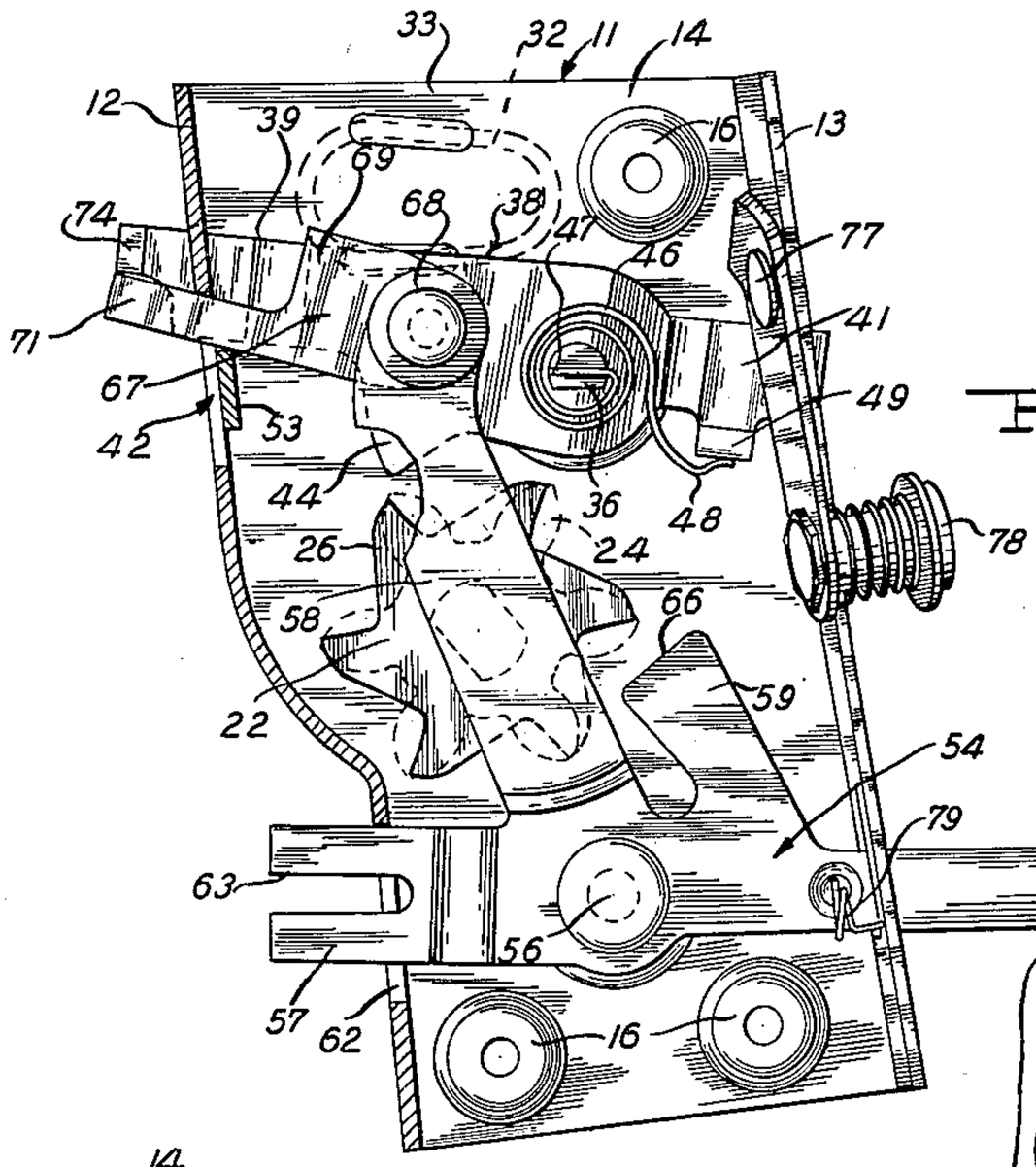

FIG. 4

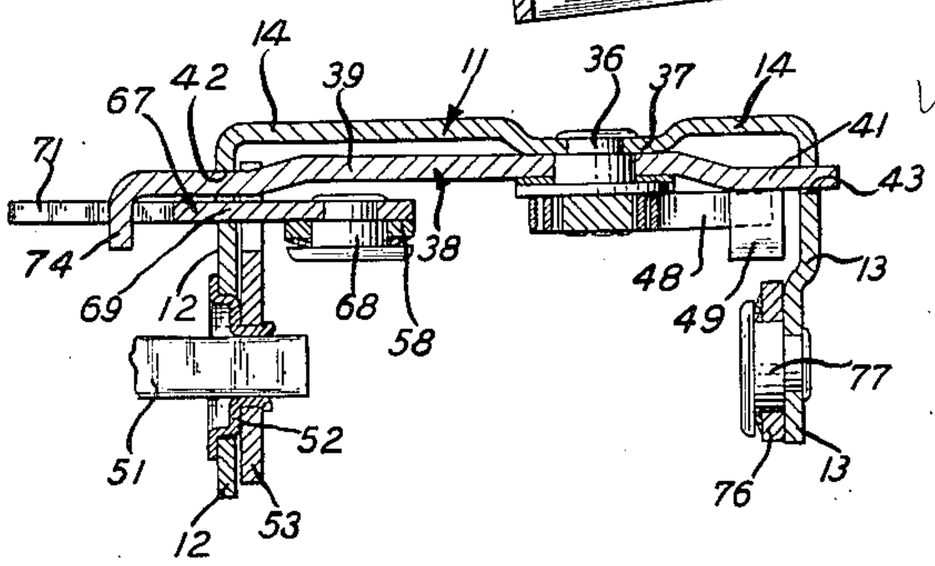

FIG. 5

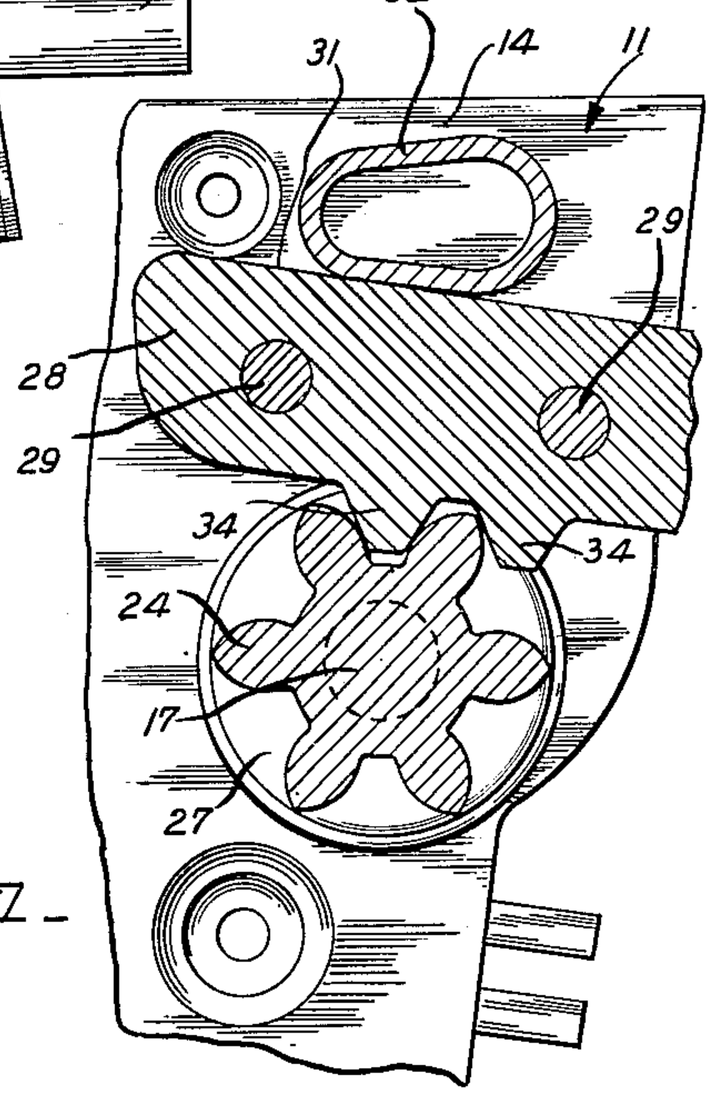

FIG. 7

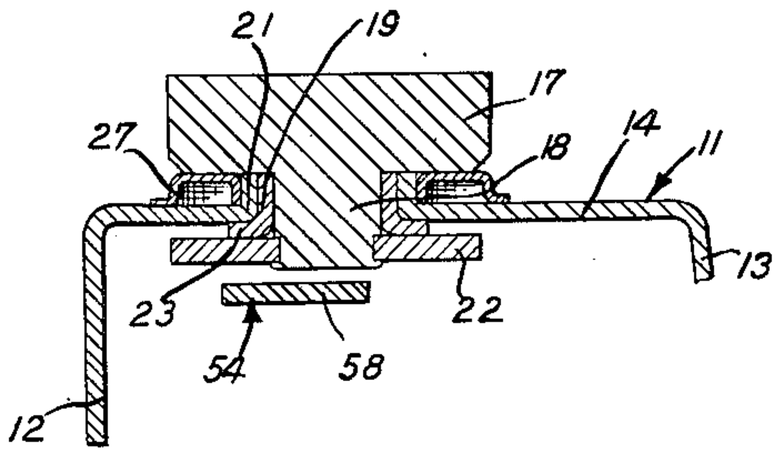

FIG. 6

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DOOR LOCK

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4 Claims. (Cl. 292—280)

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This invention relates generally to latch mechanisms for doors and particularly to latch mechanisms of the rotatable bolt type for motor vehicle doors.

An object of the present invention is to provide an improved vehicle door latch mechanism employing a rotatable bolt and a rotatable ratchet and capable of performing the required functions of a vehicle door lock with a minimum of parts. The door lock of this invention is particularly adapted for use in connection with a turn type door handle, and incorporates simplified means for effecting the locking and unlocking of the latch mechanism and the control thereof from both the exterior and interior of the vehicle. The simplified construction results in an economy of manufacture and in a compact door latch mechanism having a minimum thickness as measured from the jamb face of the door.

Other objects and advantages of this invention will be made more apparent as this description proceeds, particularly when considered in connection with the accompanied drawings, wherein:

Figure 1 is an elevational view of the door lock looking toward the plate adapted to be mounted upon the door jamb, showing the parts in their locked position.

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a side elevational view of the structure shown in Figure 1 as viewed from the right side thereof, or from the interior of the door.

Figure 4 is an elevational view similar to Figure 1 but showing the parts of the door lock in their unlocked and unlatched position.

Figure 5 is a horizontal cross sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a horizontal cross sectional view taken on the line 6—6 of Figure 1.

Figure 7 is an elevational view of the opposite side of the door lock from that shown in Figure 1, and showing the keeper therefor.

The door illustrated in the drawings is designed for the right front door of a motor vehicle, and is mounted upon a U-shaped mounting plate 11 having side flanges 12 and 13 extending at right angles to the base 14 of the plate. Three screw bosses 16 are provided on the base to enable the plate to be secured to the inner side of the jamb face of a motor vehicle door. Flange 12 is adjacent the outer side of the vehicle door while flange 13 is adjacent the inner side thereof.

The lock is provided with a rotatable toothed

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latch or rotor 17, Figures 6 and 7, having an integral shank 18 rotatably mounted in a bushing 19 carried in an angular flange 21 struck out from the base 14 of the lock plate 11. The end of the shank 18 is flattened and extends through a correspondingly shaped opening in a rotatable toothed ratchet 22, being riveted thereto. It will be noted that the bushing 19 has a flange 23 forming a bearing surface for the ratchet 22.

The rotatable toothed rotor 17 is formed with six equally spaced peripheral teeth 24 and the ratchet 22 is likewise formed with an equal number of teeth 26. It will be noted that the rotor and ratchet are mounted on opposite sides of the base 14 of the lock plate 11 and rotate together as a unit. A sheet metal shield 27 is loosely mounted between the base 14 of the plate and the rotor 17.

As best seen in Figure 7, the rotor 17 is adapted to be engaged by a keeper 28 rigidly mounted on the jamb face of the adjacent door pillar by means of a pair of bolts 29. The upper edge of the keeper is formed with an inclined surface 31 adapted to engage a sheet metal dovetail 32 mounted upon the base 14 of the plate 11 by tongues 33. The lower edge of the keeper 28 has two integral teeth 34 adapted to engage the teeth 24 of the rotor 17 to hold the vehicle door in either a locked or a safety position.

Referring now to Figures 1 and 5, a shoulder rivet 36 is mounted upon the base 14 of the plate centrally of an embossment 37 formed thereon. The shoulder rivet forms a pivotal mounting for a pawl 38 having arms 39 and 41 extending in opposite directions from the shoulder rivet 36. Arm 39 extends through an opening 42 formed in the side flange 12 of the lock plate, and arm 41 extends through an opening 43 formed in the side flange 13 of the lock plate. The lower edge of arm 39 of pawl 38 is formed with an integral tooth 44 adapted to engage the teeth 26 of the ratchet 22 to hold the ratchet and the rotor 17 against rotation in a clockwise direction as used in Figure 1. A coil spring 46 is secured at its inner end in a slot 47 formed in the shoulder rivet 36. The outer end 48 of the spring bears against a flange 49 struck out from the arm 41 to constantly urge the pawl in a counterclockwise direction as viewed in Figures 1 and 4.

Referring now to Figures 2 and 5, the pawl 38 is adapted to be actuated from outside the vehicle by means of a conventional turn type handle (not shown) having a generally square shank 51 extending through a corresponding square shaped opening in a rotatable retainer 52 mounted in

an opening in the side flange 12 of the lock plate. A release lever 53 is nonrotatably mounted upon the inner end of the retainer 52 and is thus adapted to be rotated as the turn handle is operated. Upon reference to Figure 2 it will be seen that upon counterclockwise rotation the release lever 53 engages the arm 39 of the pawl 38 to raise the latter. When the lock mechanism (to be described more in detail hereinafter) is in the unlocked position this operation of the release lever 53 by the outside turn handle is effective to disengage the depending projection 44 of the pawl from the adjacent tooth 26 of the ratchet 22, thus permitting the door to be readily opened.

A control arm 54 is pivotally mounted upon the base 14 of the lock plate by means of a shoulder rivet 56. The control lever is formed with four arms 57, 58, 59 and 61. Arm 57 extends outwardly through an elongated slot 62 in the side flange 12 of the lock plate and is slotted as at 63 to receive the operating member of a conventional lock cylinder (not shown) mounted in the outer panel of the vehicle door. Arm 61 extends through an elongated slot 64 formed in the side flange 13 of the lock plate 11 and is adapted to be operated from the interior of the vehicle. Arm 59 extends upwardly and has a marginal end portion 66 adapted to be engaged by the adjacent tooth 26 of the rotatable ratchet 22 for a purpose to be described more in detail hereafter. Arm 58 extends upwardly and at its upper end supports a locking lever 67 which is pivotally secured to the arm 58 by means of a shoulder rivet 68. The locking lever 67 has a portion 69 adjacent its inner end having a width substantially greater than the width of its outer portion 71.

Referring now to Figure 2, it will be noted that the slot 42 in the side flange 12 of the lock plate is generally L-shaped, having a shallow portion 72 at one side for receiving the locking lever 67 and a deeper portion 73 at the opposite side for receiving the arm 39 of the pawl 38. When the parts of the lock are in the position shown in Figure 1 the wider portion 69 of the locking lever 67 is in alignment with the shallow portion 72 of the slot 42 in the plate 12 and it will be apparent that only a small vertical movement of the locking lever is permitted since the slot is but slightly greater in dimension than the corresponding dimension of the wider portion 69 of the lever. Counterclockwise rotation of the release lever 53, Figure 2, by the outside turn handle is accordingly prevented and the release lever is inoperative to raise the arm 39 of the pawl 38. Under these conditions, the door cannot be unlocked by the outside turn handle.

The latch mechanism can be readily unlocked either by actuation of the outer arm 57 of the control lever by means of the key lock or by a manual operation of the inner arm 61 of the control lever to swing the control lever in a clockwise direction from the locked position shown in Figure 1 to the unlocked position shown in Figure 4. This movement of the control lever 54 in a clockwise direction shifts the locking lever 67 pivotally connected to the upper end of arm 58 to a position in which the relatively narrow outer portion 71 of the locking lever is in alignment with the portion 72 of the slot 42. Adequate clearance is thus provided between the upper edge of the narrow portion 71 of the locking lever and the upper end of the shallow portion 72 of the slot to permit the portion 71 to

be raised as the release lever 53 is operated by the outside turn handle. The latch mechanism is thus unlocked, and the pawl 38 can be swung to the position shown in Figure 4 in which the integral projection 44 on the pawl is withdrawn from engagement with the teeth 26 of the ratchet 22. Upon release of the outside turn handle the pawl 38 is returned to its initial position by means of the coil spring 46. The locking lever 67 is likewise returned to its initial position by reason of engagement of the outer end portion 71 of the locking lever by a marginal end arm 74 formed at the outer end of the flange 39 of the pawl 38 and engaging the portion 71 of the locking lever.

A bell crank lever 76 is pivotally mounted by means of a shoulder rivet 77 to the side flange 13 of the lock plate. One end of the bell crank lever 76 carries a stud 78 which may be connected by a conventional linkage to a remote control interior handle (not shown). The opposite end of the bell crank lever is adapted to engage the arm 41 of the pawl 38 to swing the latter from its locked position in engagement with the ratchet 22 to an unlocked position. It will be apparent that the door can be unlocked at any time by means of the interior handle regardless of whether or not the locking lever 67 is in its locked position since the pawl is free to operate independently of this locking lever.

The arm 59 of the control lever 54 is adapted to be engaged by the adjacent teeth 26 of the ratchet 22 to automatically move the control lever to its unlocked position whenever the vehicle door is opened. With this arrangement it is impossible to leave the car in a locked position except by locking the mechanism with the key after closing the door from the exterior.

A toggle type over center spring 79 holds the control lever 54 in either its locked or its unlocked position.

The lock mechanism described above performs the desired functions of present day motor vehicle door locks and yet comprises a relatively few parts. Lock operation and durability is improved by the reduction of a number of levers, springs, rivets, studs, arms, and so forth, and a compact efficient lock construction is thus obtained.

It will be understood that the invention is not to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. In a latch mechanism for a motor vehicle door, a support mounted upon said door adjacent an edge thereof and having a side flange extending at a right angle to said support adjacent the outer side of said door, a toothed rotor rotatably mounted upon said support at one side thereof, a toothed ratchet on the opposite side of said support from said rotor and mounted for rotation with said rotor as a unit, said rotor and said ratchet having the same number of teeth, a pawl mounted upon said support on the same side as said ratchet and adapted to engage one of the teeth of said ratchet to hold said ratchet and rotor against rotation in one direction, the flange of said support being provided with an L-shaped slot having a relatively shallow portion at one side and a relatively deep portion at the opposite side of the slot, said pawl having an extension extending through the relatively deep portion

of said slot with the width of the pawl extension and the depth of the relatively deep portion of the slot being such as to permit sufficient movement of the pawl to withdraw the latter from engagement with the teeth of the ratchet, a control lever pivotally mounted upon said support on the same side of said ratchet, said control lever having an arm extending therefrom and terminating adjacent said pawl, a locking lever pivotally connected to the extremity of said arm and extending through the relatively shallow portion of the slot in the side flange of the support, said locking lever having a relatively wide portion adjacent its pivotal connection with said arm and a relatively narrow portion at its outer end with said relatively wide portion corresponding generally to the depth of the shallow portion of the slot and with its relatively narrow portion considerably smaller than the depth of the slot, said control lever being swingable from a locked position in which the wide portion of the locking lever is in alignment with the slot to an unlocked position in which the narrow portion of the locking lever is in alignment with said slot, and a manually operable release lever pivotally mounted upon the side flange of said support adjacent the slot formed therein and engageable with the adjacent edges of said pawl and said locking lever and effective when operated to swing said pawl out of engagement with the teeth of said ratchet only when said locking lever is in its unlocked position with the narrow portion thereof in alignment with said slot.

2. The structure defined by claim 1 which is further characterized in that said support has a second flange extending from its inner side and formed with an elongated slot for receiving said pawl, a manually operated inner lever pivotally mounted upon said second flange and having an end portion engageable with said pawl to swing the latter about its pivotal mounting upon said support to unlock the latch mechanism regardless of the position of said locking lever.

3. The structure defined by claim 1 which is further characterized in that spring means are provided constantly urging said pawl toward said ratchet, the extension of said pawl having a flange at its outer extremity overlapping the relatively narrow outer portion of said locking lever to engage and automatically move the latter when the pawl is rotated by said spring means.

4. The structure defined by claim 1 which is further characterized in that said support is mounted generally vertically in said door and said pawl is pivotally mounted upon said support above said rotor and ratchet and said control lever is pivotally mounted upon said support vertically below said rotor and ratchet, said control lever having a second arm extending outwardly through a slot in the outer flange of said support for engagement by outer locking means and a third arm extending inwardly for manual operation from the interior of the vehicle.

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