

May 17, 1960

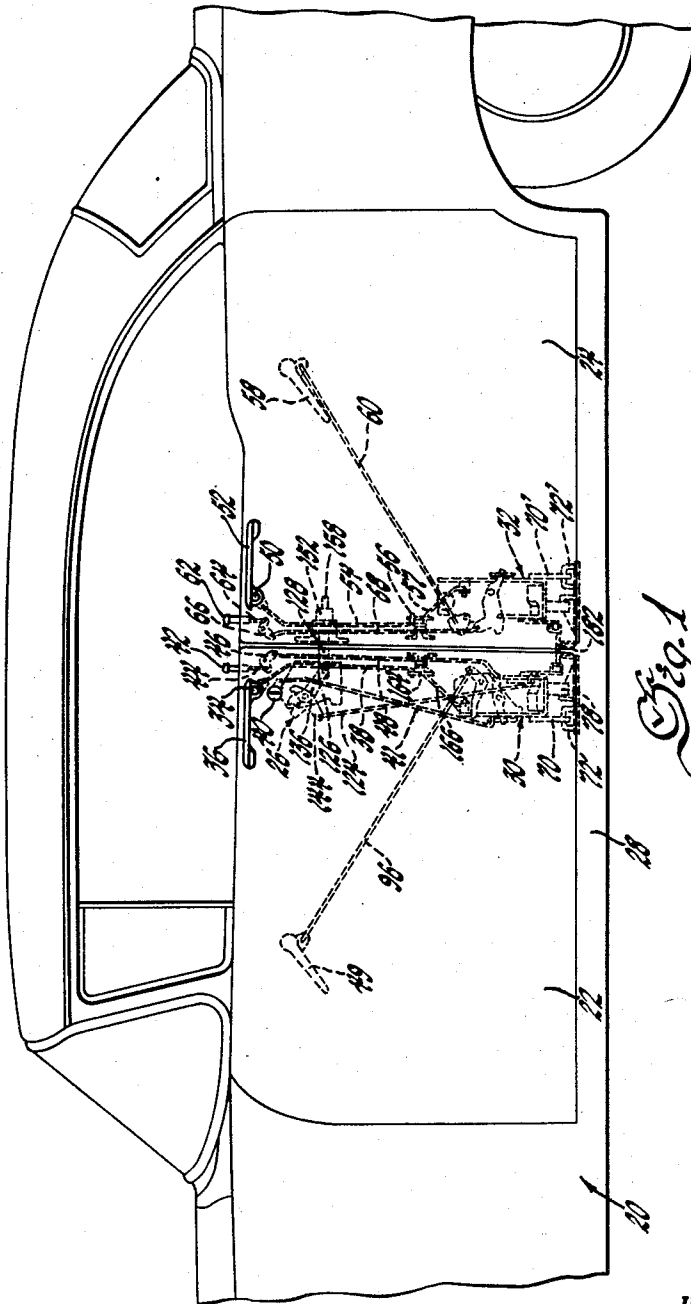
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2,937,043

MECHANICAL DOOR LATCH FOR A PILLARLESS AUTOMOBILE

Filed Jan. 10, 1958

6 Sheets-Sheet 1



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6 Sheets-Sheet 2

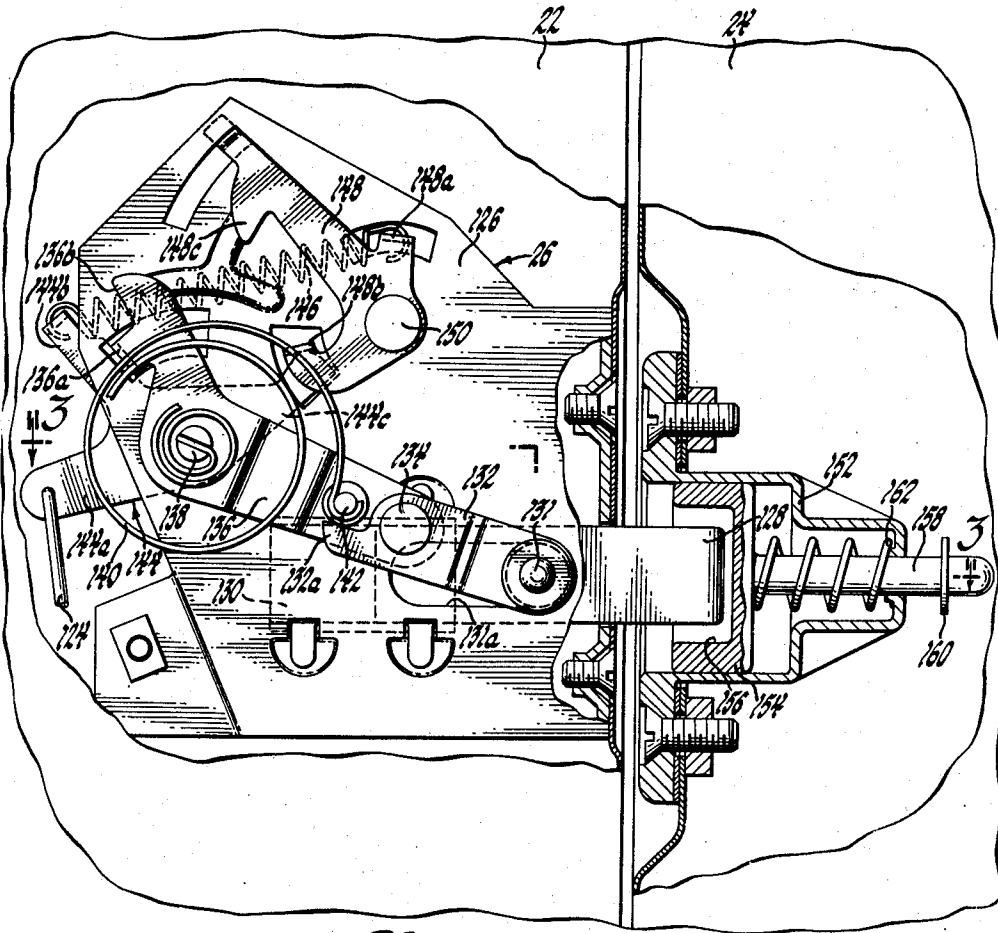


Fig. 2

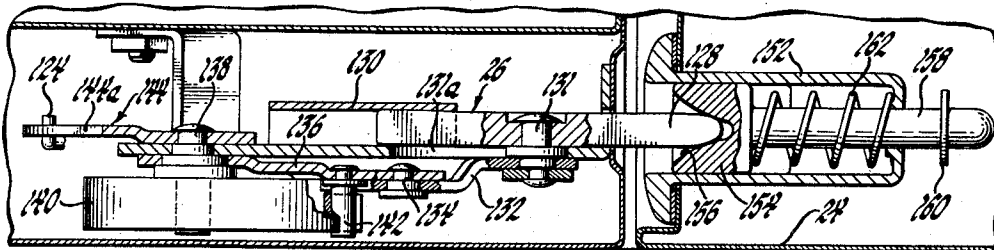


Fig. 3

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6 Sheets-Sheet 3

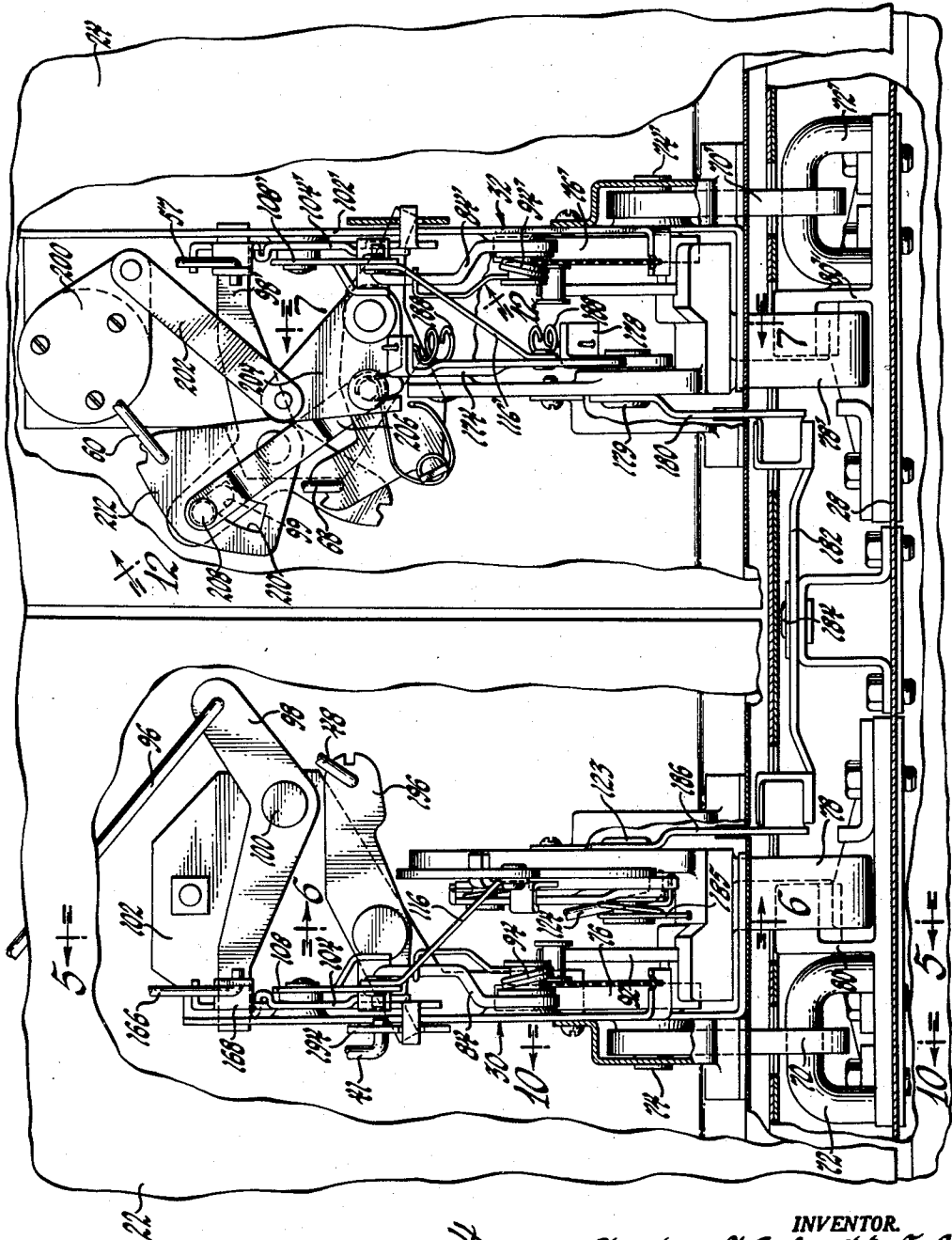


Fig. 4

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6 Sheets-Sheet 4

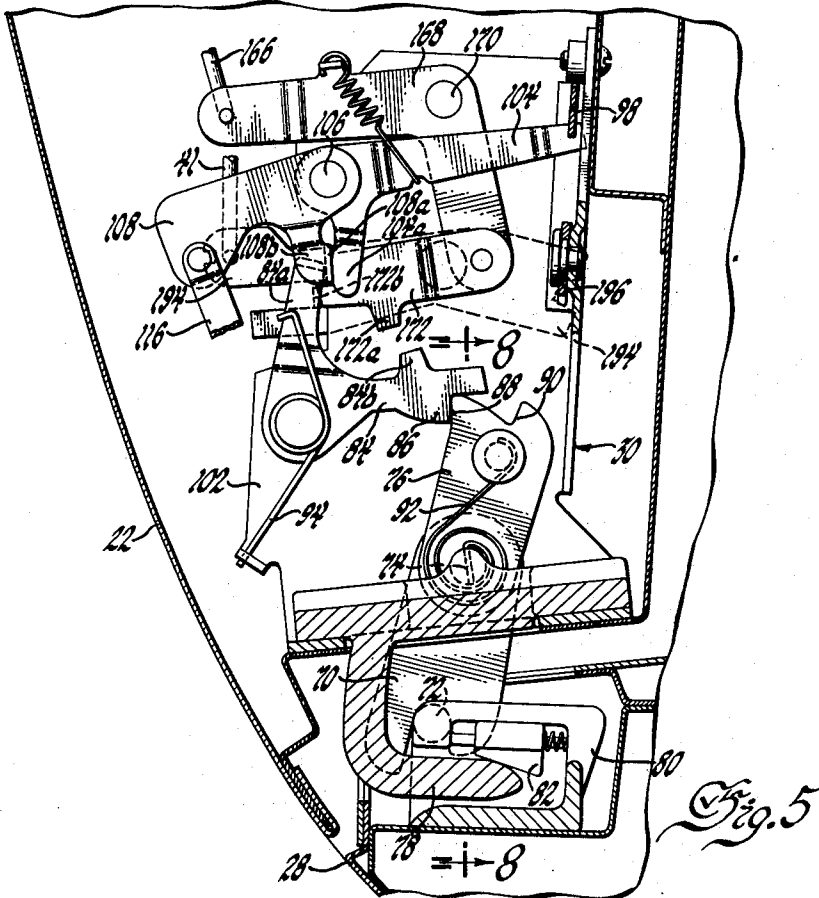


Fig. 5

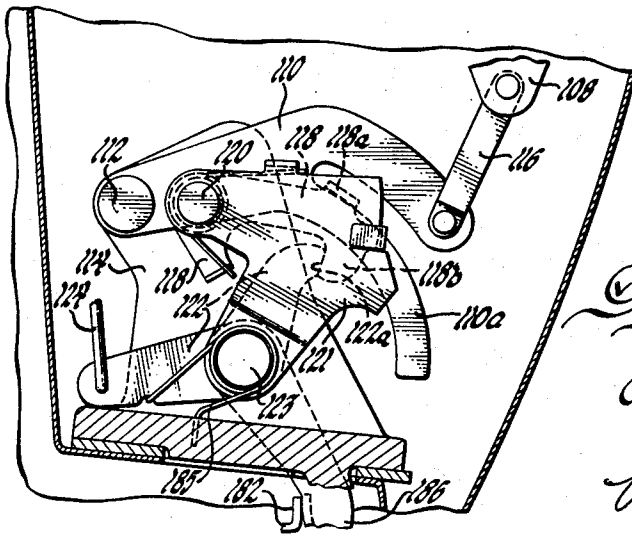


Fig. 6

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6 Sheets-Sheet 5

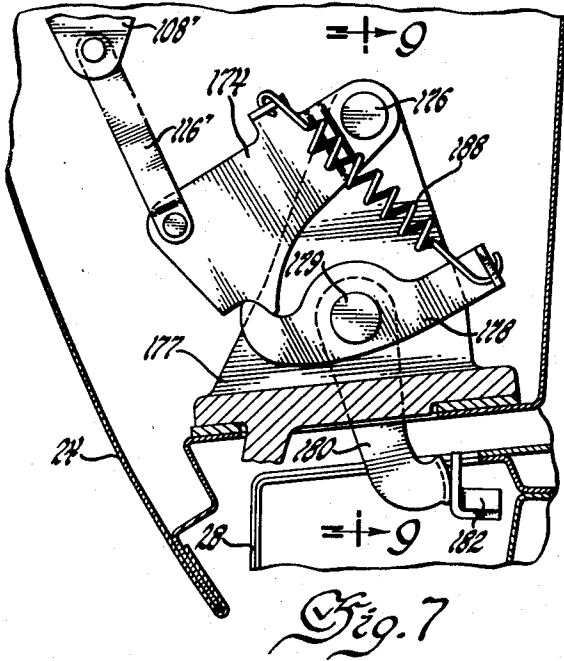


Fig. 7

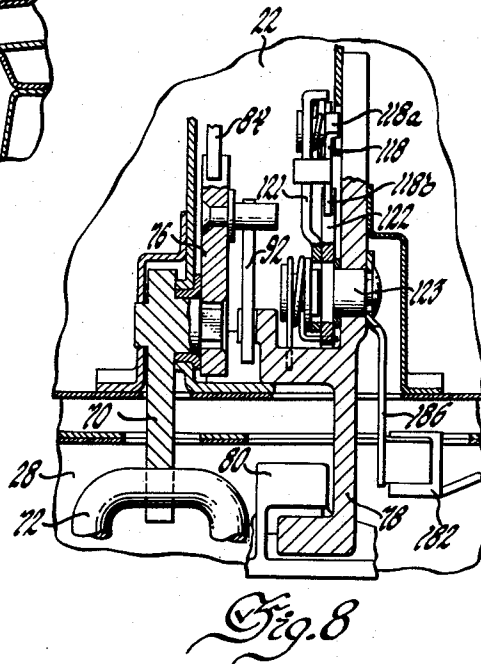


Fig. 8

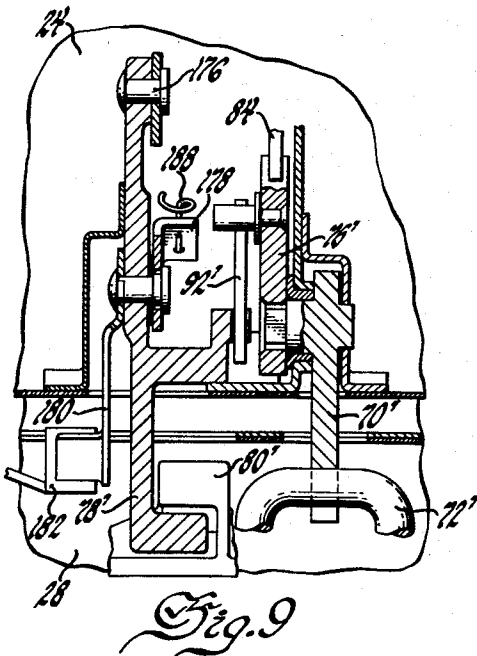


Fig. 9

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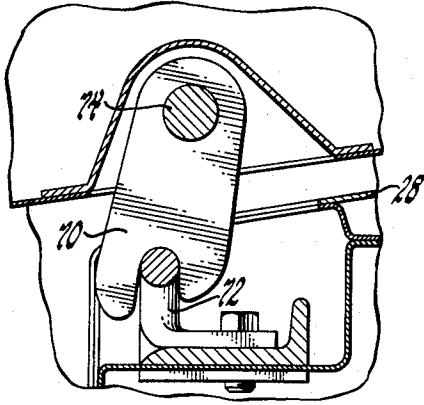
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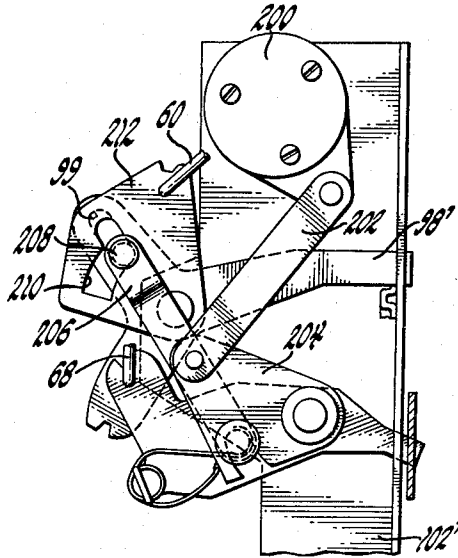
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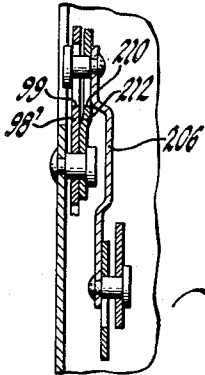
6 Sheets-Sheet 6



*Fig. 10*



*Fig. 11*



*Fig. 12*

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**MECHANICAL DOOR LATCH FOR A PILLARLESS  
AUTOMOBILE**

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poration, Detroit, Mich., a corporation of Delaware

Application January 10, 1958, Serial No. 708,236

8 Claims. (Cl. 292-5)

This invention relates to an automobile door latching means, and more particularly to a mechanical latching arrangement for the doors of a pillarless four-door automobile.

One feature of the invention is that it provides improved door latching means; another feature of the invention is that it provides an improved mechanically operated latch for a pillarless automobile having front and rear doors, the free edges of which lie closely adjacent each other when the doors are closed; another feature of the invention is that it provides a bolt slidably mounted on one door for latching engagement with a keeper carried by the other door and means on each of said doors for releasing the bolt through a chain of mechanically operated elements; still another feature of the invention is that it provides a novel bolt and keeper arrangement for automatically aligning the doors and for eliminating rattles; yet another feature of the invention is that it provides novel means for moving the bolt to projected position in response to closing movement of either door when the other door is closed; yet a further feature of the invention is that it provides a mechanically actuated latching system for a four-door pillarless automobile including means for locking either door from the outside without the use of a key; and yet a further feature of the invention is that it provides a latching system as above described including means for unlocking the latch when either door is closed in a normal manner to prevent the operator from inadvertently locking himself out of the car.

Other features and advantages of the invention will be apparent from the following description and from the drawings, in which:

Fig. 1 is a fragmentary side elevation of an automobile having the improved latching means, parts of the latching structure which underlie the outer panels of the automobile doors and body being shown in broken lines;

Fig. 2 is an enlarged view in vertical longitudinal section showing the main latch of the structure of Fig. 1;

Fig. 3 is a horizontal section taken along the line 3-3 of Fig. 2;

Fig. 4 is an enlarged view in vertical section showing the subsidiary sill latches of the latching system of Fig. 1;

Fig. 5 is a vertical transverse section through a portion of the front door latching means of Fig. 4 taken along the line 5-5 of Fig. 4;

Fig. 6 is a vertical section through a portion of the front door latching means of Fig. 4 taken along the line 6-6 of Fig. 4;

Fig. 7 is a view in vertical section of a portion of the rear door latching means of Fig. 4 taken along the line 7-7 of Fig. 4;

Fig. 8 is a detail section showing a portion of the front door latching means of Fig. 4 on line 8-8 of Figure 5.

Fig. 9 is a detail section showing a portion of the rear door latching means of Fig. 7 taken along the line 9-9 of Fig. 7;

Fig. 10 is a vertical detail section showing a portion of

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the front door latching means of Fig. 4 taken along the line 10-10 thereof;

Fig. 11 is a detail view of a portion of the rear door latching means of Fig. 4 showing the parts in a different position than shown in Fig. 4; and

Fig. 12 is a section taken along the line 12-12 of Fig. 4.

This door latch is particularly designed for a pillarless four-door automobile of the type designated generally as 20 in Fig. 1. The automobile has a front door 22 hingedly mounted at its front side on the body in conventional manner and a rear door 24 hingedly mounted at its rear side on the body in conventional manner, the free edge of the doors lying closely adjacent each other when closed. These doors are of the so-called convertible type which do not have a window frame; consequently, there is no means for latching the top edge of the doors to the side roof rail of an automobile, since the automobile does not have a center pillar, the adjacent free edges of the doors are latched to each other and the lower edge of each door is latched to the body sill or rocker panel.

Doors 22 and 24 are latched to each other adjacent the belt line of the automobile by a main latch designated generally as 26 carried by the front door, and the front door 22 is latched at its lower rear corner to the automobile sill or rocker panel 28 by a subsidiary sill latch designated generally as 30. The rear door 24 carries a keeper cooperating with the main latch 26 and the rear door is latched at its lower front corner to the rocker panel 28 by a subsidiary sill latch designated generally as 32. The front door 22 may be opened from the outside by means of a push button 34 mounted in a fixed front door gripping handle 36 and connected to the sill latch 30 through a chain of elements including a rod 38, a lever 164 which changes the direction of the push button force and a rod 166. The front door may be locked from outside the automobile through a conventional key cylinder device 40 which is connected to the sill latch by a rod 41, or it may be locked from inside the automobile through a conventional garnish molding button 42 which is connected by a rod 44 to a bell crank 46, the bell crank in turn being connected through a rod 48 to the sill latch 30. The front door may be opened from the inside by means of a conventional inside remote handle 49 connected to the sill latch 30 by a rod 96.

The rear door may be opened from the outside by means of a push button 50 mounted in a fixed rear door gripping handle 52 and connected through a rod 54, a direction changing lever 56 and a rod 57 to the sill latch 32. For opening the rear door from the inside there is an inside remote handle 58 connected through a rod 60 to the rear door sill latch 32. As is conventional in four-door automobiles, there is no key lock for the rear door, but the rear door may be locked from the inside through a garnish molding button 62 connected through a rod 64 to a bell crank 66 which in turn is connected to the rear door sill latch 32 by a rod 68.

As described above, the inside and outside operators for each door are not connected directly to the main latch 26 but instead are connected to the respective subsidiary sill latches 30 and 32. The front door sill latch is mechanically connected through a connecting means to the main latch so that operation of the main latch occurs simultaneously with operation of the sill latch. The rear door sill latch 32 includes transfer apparatus connecting this latch to the connecting means above mentioned so that the main latch 26 is operated simultaneously with the rear door sill latch when the rear door is opened.

The sill latches and the means connecting them to the main latch are shown in Figs. 4 through 12. The front

door sill latch comprises a bifurcated bolt 70 adapted to engage a U-shaped keeper 72 which is bolted to the body rocker or sill 28. The bolt is pivotally mounted on a stud 74 which also carries a ratchet 76. The bolt and ratchet are both fixed to the stud 74 and swing as a unit. In order to prevent the bolt from being shaken out of engagement with the keeper, there is an interlock guide member 78 extending down through the lower edge of the door and engageable in a guide housing 80 which carries an outwardly biased spring-pressed shoe 82 for engagement with the interlock member 78 to hold the door firmly in position.

A detent 84 has an operating foot 86 engageable with a latching shoulder 88 on the ratchet 76 to hold the bolt in latched position, and a safety latch shoulder 90 is also provided on the ratchet in conventional manner. A spring 92 yieldably urges the bolt toward unlatched position and a spring 94 yieldably urges the detent 84 into engagement with the ratchet.

The front door may be opened from the inside as described below. The lower end of the rod 96 which runs from the remote handle 49 is connected to a remote lever 98 pivotally mounted intermediate its ends at 100 on a flange portion of the sill latch frame 102, as shown in Fig. 4. The free arm of the lever 98 overlies the free end of a bell crank 104 which is pivoted at 106 on the base part of the frame 102. The free arm 104a of this bell crank lies adjacent a flange 108a projecting at right angles from an arm 108b of an intermittent lever 108 which is pivoted at 106 coaxially with the bell crank 104. The detent has an upwardly extending arm 84a terminating adjacent and on the other side of the flange 108a so that the intermittent lever 108 picks up the detent and swings it in a counterclockwise direction in Fig. 5 to release the ratchet 76, and consequently to permit the bolt 70 to swing in a counterclockwise direction in Fig. 5 to its unlatched position out of engagement with the keeper 72. The spring 92 assists the bolt in swinging to its unlatched position, as does the pressure of the conventional door weatherstrip. As appears from Fig. 5, the door must swing out away from the rocker panel to permit the bolt to become disengaged from the keeper.

Figs. 4 and 6 show the connecting means which connects the sill latch 30 to the main latch 26 so that the main latch is released simultaneously with the sill latch to permit the door to open under the force provided by the usual sealing weatherstrip. Referring to Fig. 6, there is a transfer lever 110 pivotally mounted at 112 on a subframe 114 and connected by a link 116 to the lower end of the intermittent lever 108 so that upon swinging movement of the intermittent lever to release the detent, the transfer lever swings in a counterclockwise direction in Fig. 6. As the transfer lever swings, its arm 110a picks up a flange 118a on a hook lever 118 which is pivoted at 120 on a lever 121. The lever 121 is carried on a stud 123. Swinging movement of the hook lever in a counterclockwise direction moves its hook portion 118b out of engagement with the holding end 122a of a cam lever 122 which is carried on the stud 123 and which is connected to a rod 124 extending up to the main latch 26. When the sill latch is in its normal latched position and the cam lever is engaged by the hook portion 118a of the hook lever, the rod 124 is held against upward movement.

The main latch 26 comprises a frame 126 having a bolt 128 slidably mounted in a housing 130 on one surface thereof. The bolt is pivotally connected by a stud 131 which extends through a slot 131a in the latch frame to one end of a first toggle link 132, the other end of which is connected at 134 to a second toggle link 136 formed as a bell crank. The toggle link 136 is pivoted intermediate its ends on a stud 138 mounted on the frame 126 and a coil spring 140 is mounted on this stud and has its inner end anchored thereto. The outer end of the spring is anchored on a pin 142 which projects from

the second toggle link 136 so that the spring 140 tends to straighten the toggle links and urge the bolt to the projected position shown in Figs. 2 and 3. An integral projection 132a on the first toggle link 132 abuts the pin 142 when the bolt is in projected or latched position to prevent the toggle linkage from throwing overcenter.

The rod 124, which extends from the sill latch transfer mechanism to the main latch, is connected at its upper end to an arm 144a of a multi-armed lever 144 which is pivoted coaxially with the second toggle link 136 on the stud 138. An upwardly extending arm 144b on the multi-armed lever is connected to a tension spring 146, the other end of which is connected to a flange 148a of a holding bell crank 148 which is pivoted on the frame 126 on a stud 150. A third arm 144c of the multi-armed lever 144 underlies a second flange 148b on the holding bell crank 148.

When the hook lever 118 (Fig. 6) in the sill latch connecting means releases the cam lever 122 to free the rod 124 for upward movement, the tension spring 146 swings the multi-armed lever 144 in a clockwise direction in Fig. 2, raising the rod 124 and at the same time breaking the toggle through engagement of the arm 144b of the multi-armed lever with a right angle flange 136a on the free arm of the second toggle link 136. At the same time, the arm 144c of the lever 144 moves away from the flange 148b on the holding lever 148, permitting the spring 146 to swing the lever 148 counterclockwise so that a hook 148c on lever 148 is in position to engage a shoulder 136b on the toggle lever 136 to hold the bolt retracted. As the toggle breaks, the first toggle link 132 is drawn down and to the left in Fig. 2, retracting the slidable bolt 128. Because of the chain of connections between the remote handle 49, the sill latch and the main latch, both latches are released simultaneously. The hook 148c holds the bolt 128 retracted after the other elements of Figs. 2 and 6 have returned to the positions illustrated.

With reference to Figs. 2 and 3, it will be noted that the slidable bolt 128 is formed with a blunt chisel pointed nose. The striker on the rear door comprises a striker housing 152 in which a striker block 154 is movably mounted. The outer face of the striker block is formed with a V-shaped bolt receiving opening 156 having outwardly curved sloping sides for engagement by the blunt chisel nose of the bolt. The striker block is carried on a shaft 158 which projects out through an opening in the rear side of the striker housing and which carries a collar 160 for abutment with the rear face of the striker housing to limit outward movement of the striker block. A compression spring 162 surrounds the shaft 158 in the striker housing and seats between the base of the striker housing and the end of the striker block 154 and yieldably urges the striker block outwardly in the housing 152. When the bolt is projected into the striker, it compresses the spring 162 and forces the striker block part-way back into the housing so that the striker block constantly is urged into firmer engagement with the bolt. The yieldable mounting of the striker block in combination with the wedging engagement of the blunt tapered striker nose in the V-shaped striker opening aligns the free edge of the doors and prevents rattle.

In the front door latching system, the outside push button 34 is connected through a conventional lever arrangement to the rod 38 which, at its lower end, is connected to a lever 164 which is pivotally mounted in the door intermediate its ends and which at its other end is connected to the sill latch 30 by means of a rod 166. The lever 164 reverses the direction of the push button force. The lower end of the rod 166 is connected to one arm of a bell crank 168 (Figs. 4 and 5) pivoted at 170 on the sill latch frame. The other end of the bell crank is pivotally connected to an intermittent link 172, the free end of which is adapted to abut the flange 108a on the intermittent lever 108. Operation of the



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outside push button 34 shifts the intermittent link 172, which picks up lever 103 and detent 84, and the door is opened through the same chain of elements as above described in connection with opening by means of the remote handle.

The rear door does not carry any main or bolt latch but instead carries the striker described above to cooperate with the main latch which is on the front door. The rear door has a sill latch 32 which is similar in construction and operation to the front door sill latch 30. In addition, the rear door has a transfer mechanism for releasing the main latch in the front door simultaneously with the release of the rear door sill latch 32.

Operation of either the rear door inside remote handle 58 or the outside push button 50 releases the sill latch 32 in the same manner as described above in connection with the front door, and in order to simplify the disclosure the latching parts in the rear door sill latch are identified by the same reference characters as similar parts in the front door sill latch with the addition of a prime (').

In order to release the main latch in the front door simultaneously with the release of the bolt in the rear door sill latch, there is a transfer mechanism to transmit force from the rear door inside or outside operator to the front door main latch. The rear door sill latch 32 has an intermittent lever 108' similar to the lever 108 in the front door latch and operation of either the remote handle 58 or the push button 50 causes pivotal movement of the intermittent lever 108'. Referring to Fig. 7, the intermittent lever 108' is connected through a link 116' to a detent 174 which is pivoted at 176 on a subframe 177 in the rear door so that the detent is rotated in a clockwise direction when the latch is released against the force of a biasing spring 188. This clockwise movement moves the hook lever out of engagement with a cam lever 178 so that the cam lever is released for swinging movement about its pivot stud 179 against the force of a spring 188 which is connected between the levers 174 and 178. The cam lever is keyed to a pawl lever 180 which also is mounted on the pivot stud 179 and the lower end of which normally is in blocking abutment with one end of a rocker arm 182 which is pivoted at 184 on the rocker panel and which bridges the mechanisms in the front and rear doors as shown in Fig. 4. Release of the rear door end of the rocker arm permits it to swing about its pivot 184. The other end of the rocker arm abuts a lever mechanism in the front door so that swinging movement of the rocker arm carries with it a lever assembly in the front door including a pawl lever 186 mounted on the stud 123. When the rocker arm 182 is freed for rotation, it is permitted to swing and carry with it the entire assembly consisting of levers 186, 118, 121 and 122 which move about a common axis 123. The motivating force is a spring 185 and spring 146 acting through the rod 124 which extends to the main latch 26.

When the door is closed, the pawl 180 which is rigidly held by the cam 178 and detent 174 swings the rocker arm 182 back to its initial position ready to trigger the slidable bolt 128.

When the front door is closed, assuming the rear door to be already closed, the pawl lever 186 will be engaged by the rocker arm 182 which is held in its rear door closed position by the pawl 180 in the rear door. The rocker arm 182 swings the pawl 186 to rotate cam lever 122 and the hook lever 118, which action pulls downward on the connector rod 124. Referring now to Fig. 2, it will be seen that downward movement of the rod 124 rotates the multi-armed lever 144 counterclockwise to wind or load the coil spring 140. The arm 144c of the multi-armed lever 144 picks up the flange 148b of the holding bell crank 148 and swings the bell crank out of holding engagement with the free end

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136a of the toggle link 136. Since this action is initiated only when the door approaches its fully closed position, at which time the rocker arm 182 engages the pawl 186, the slidable bolt 128 is projected in properly timed relation to closing movement of the door. When the toggle link 136 is released by the hook lever 148, the spring 140 projects the bolt.

Since the bolt 128 engages a striker on the rear door, the bolt, of course, cannot be projected into the striker if the rear door is open. If the bolt 128 were projected while the rear door was open, closing the rear door would cause the inside surface of the striker to smash against the projected bolt and the door could not be closed without breaking the cam latch. Since the rocker arm 182 is not held in position by the pawl 180 to initiate the projection of the bolt 128 unless the rear door is closed, the bolt is not projected when the front door is closed unless the rear door is at that time also closed.

When the rear door is closed and assuming that the front door is already closed, it will be seen from Fig. 7 that the pawl 180 is held by the hook arm 174 so that when the pawl 180 is engaged by the rocker arm 182 as the door is closed, it rotates the rocker arm which in turn picks up the pawl lever 186 in the front door and initiates projection of the slidable bolt 128 in the main latch as above described.

In order to lock the front door, there is a locking lever 194 mounted on the subsidiary latch frame base 102 and connected by rod 41 to the key cylinder 40. At its other end, the locking lever 194 has a notch which receives the free end of a lever 196 which is connected through the rod 48 to the garnish molding button 42. By either turning the key or pushing the garnish molding button, locking lever 194 is shifted downwardly. Locking lever 194 is movably connected to intermittent link 172 by means of an elongated slot in the locking lever receiving a turned flange 172b of the intermittent link so that the intermittent link is swung down when the locking lever is shifted, whereby in its path of longitudinal or shifting movement, the intermittent link does not pick up the flange 108a on the intermittent lever so that the outside push button merely free wheels when operated and does not release the latch. Since the inside remote front door handle does not operate through the intermittent link 172 but instead operates through pivoted intermittent lever 108, the inside handle remains operative when the door is locked.

In the event the latch parts are placed in locked position when the front door is open, when the door is slammed shut, the latch will be automatically undogged or moved back to unlocked condition. This is accomplished through interengagement of a downwardly depending ear 172a on the intermittent link 172 with an upwardly projecting ear 84b on the detent 84. This interengagement is accomplished because the detent is swung upwardly as it is cammed over the teeth of the ratchet 76 when the door is closed and the bolt 70 cams over the striker. In the event it is desired to lock the door without the use of a key, the door may be opened and the garnish molding button may be depressed to swing the intermittent link 172 downwardly to its locked position. Now while the door is being closed, if the outside push button 34 is depressed to shift the intermittent link to the left in Fig. 5, the undogging ears 84b, 172a will not abut when the detent is cammed upwardly as the bolt rides over the striker and the latch will remain in locked condition.

The rear door may be locked in substantially the same manner except that, as explained above, there is no key locking. Depressing the rear door garnish molding button 62 shifts the intermittent link in the sill latch to an uncoupled or locked position. In the case of the rear door, however, the inside remote handle also free wheels.

In order to avoid inadvertent opening of the rear door

when the car is in motion, there is a rotary solenoid 200 which is connected in a circuit so that it is energized when the automobile gear shift lever is placed in any drive position. Energization of the solenoid 200 shifts link 202 downwardly causing counterclockwise rotation of a lever 204 which carries a connector link 206 downward and locates a stud 208 on this link in the long arcuate portion of an L-shaped slot 210 in a second remote lever 212 as shown in Fig. 11 so that the remote lever is uncoupled from the remote lever 98' and merely free wheels when the inside handle is turned. Stud 208 projects through a straight slot 99 in the remote link 98' as well as through the L-shaped slot 210 and, when in unlocked position, the connector link ties remote lever 98' to the second remote link 212.

Reference may be had to the copending application of Adams et al. entitled "Automobile Door Latching System" and filed on March 25, 1957, as Serial No. 648,209 for a disclosure of suitable switches and operating connections for a solenoid safety arrangement of this type.

While we have shown and described one embodiment of our invention, it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

We claim:

1. A door latching system for a pillarless automobile with a body having front and rear doors, the free edges of which lie closely adjacent each other, including: a main latch on one door, a striker on the other door, said latch engaging in said striker to latch the doors together when the doors are closed, a subsidiary latch on each of said doors for latching each door to the body, first control means on one door including a common actuator for the main latch and the subsidiary latch on said one door, said actuator being connected to said subsidiary latch and said control means including connecting means from the subsidiary latch to the main latch, second control means on the other door including a common actuator for the main latch and subsidiary latch on said other door, said last mentioned actuator being connected to said other subsidiary latch, and mechanical transfer apparatus connecting said other subsidiary latch to the connecting means between the first mentioned subsidiary latch and the main latch.

2. A door latching system for a pillarless automobile with a body having front and rear doors, the free edges of which lie closely adjacent each other, including: a main latch on the front door comprising a slidable bolt movable between retracted and projected positions and means for moving said bolt, a striker on the rear door, said bolt engaging in said striker to latch the doors together when the doors are closed, a subsidiary latch on each of said doors for latching each door to the body, first control means on the front door including a common actuator for the main latch and the front door subsidiary latch, said actuator being connected to said front door subsidiary latch and said control means including connecting means from the subsidiary latch to the main latch, second control means on the rear door including a common actuator for the main latch and the rear door subsidiary latch, said rear door actuator being connected to the rear door subsidiary latch, and mechanical transfer apparatus connecting said rear door subsidiary latch to the connecting means between the front door subsidiary latch and the main latch.

3. Apparatus of the character claimed in claim 2, wherein said transfer apparatus includes an arm rockably mounted on said body and means in both doors engageable by said rocker arm for transferring force from the rear door actuator to the main latch on the front door.

4. A door latching system for a pillarless automobile with a body having front and rear doors, the free edges of which lie closely adjacent each other, including: a main

latch on the front door including a bolt which is slidable between retracted and projected positions and means for sliding the bolt, a striker on the rear door, said bolt engaging in said striker to latch the doors together when the doors are closed, a subsidiary latch on each of said doors for latching each door to the body, first control means on the front door including inside and outside actuators common to the main latch and the front door subsidiary latch, said actuators each being connected to said front subsidiary latch and said control means including connecting means from the subsidiary latch to the main latch, second control means on the rear door including inside and outside actuators common to the main latch and the rear door subsidiary latch, said rear door actuators being connected to the rear door subsidiary latch, and transfer apparatus including a rockable arm connecting said rear door subsidiary latch to the connecting means between the front door subsidiary latch and the main latch.

5. Apparatus of the character claimed in claim 4, wherein each subsidiary latch comprises a bolt engageable with the striker on the body, a detent for holding the bolt in latched position and an intermittent link for moving the detent out of holding engagement with the bolt, said intermittent link being movable between latched and unlatched positions, said intermittent link and said detent having cooperating abutment shoulders adapted to engage when the door is closed to move the intermittent link from locked to unlocked position.

6. Apparatus of the character claimed in claim 5, including means operable through at least one of said actuators for shifting said intermittent link to a position where it will not be moved to unlocked position by said abutment shoulders when the door is closed.

7. A door latching system for a pillarless automobile with a body having front and rear doors, the free edges of which lie closely adjacent each other, including: a main latch on one door, a striker on the other door, said latch engaging in said striker to latch the doors together when the doors are closed, a subsidiary latch on each of said doors for latching each door to the body, each subsidiary latch comprising a bolt engageable with a striker on the body, a detent for holding the bolt in engagement with the striker and an intermittent link normally coupled to the detent for moving the detent out of holding engagement with the striker, said intermittent link being movable to a locked position in which it is uncoupled from said detent, means comprising abutment shoulders on said intermittent link and detent for moving said intermittent link from uncoupled into coupled relation with said detent when the door is closed, first control means on the front door including a common actuator for the main latch and the front door subsidiary latch, said actuator being connected to said subsidiary latch and said control means including connecting means from the subsidiary latch to the main latch, second control means on the rear door including a common actuator for the main latch and the rear door subsidiary latch, said rear door actuator being connected to the rear door subsidiary latch, and transfer apparatus connecting said rear door subsidiary latch to the connecting means between the front door subsidiary latch and the main latch.

8. Apparatus of the character claimed in claim 7, including means operable through said outside actuator for shifting said intermittent link to a position wherein it is not moved from uncoupled position to coupled position with said detent upon closing movement of the door.

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