March 21, 1944. E. D. DALL 2,344,806

AUTOMOBILE DOOR LOCK

Filed Feb. 19, 1943 4 Sheets-Sheet 1

Fig-1.

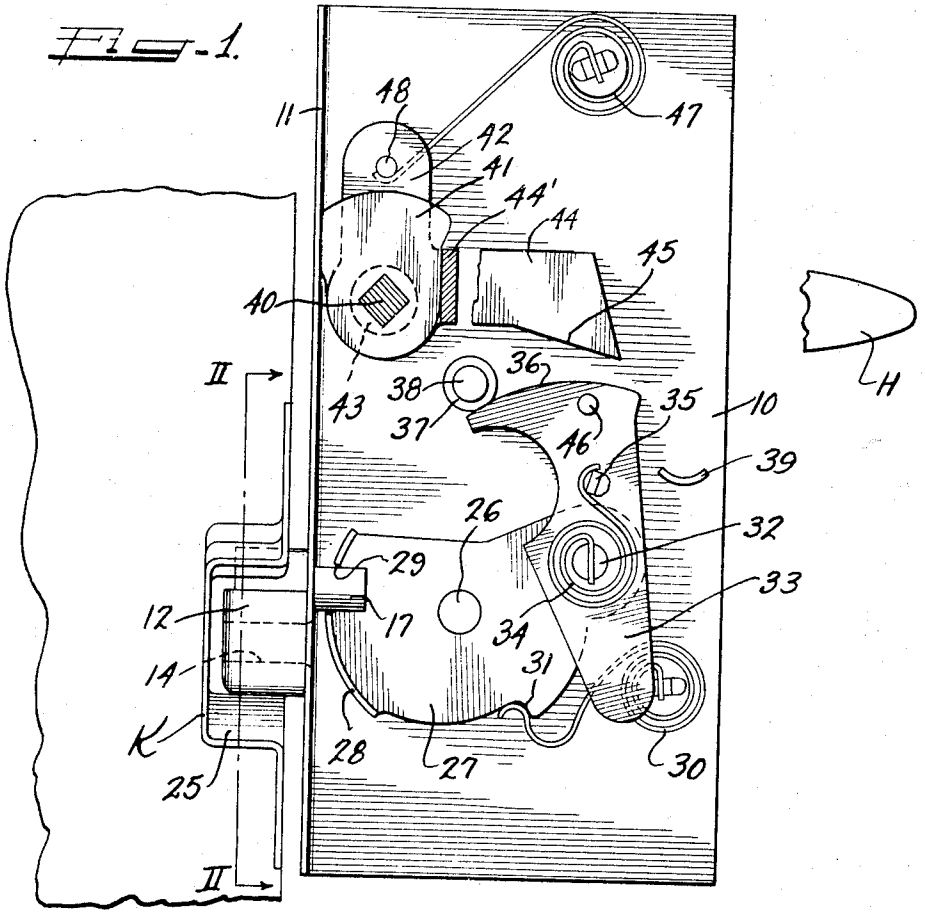
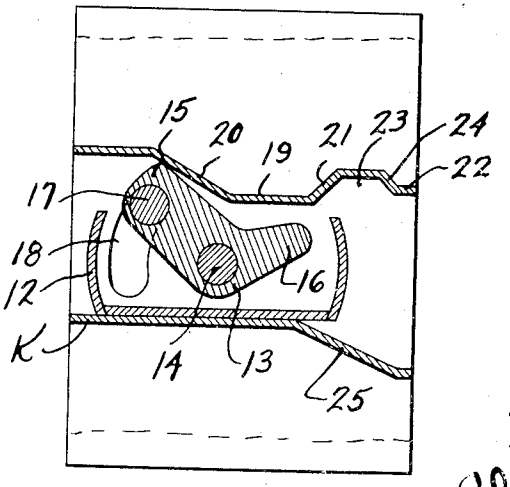


Fig-2.



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Fig. 3.

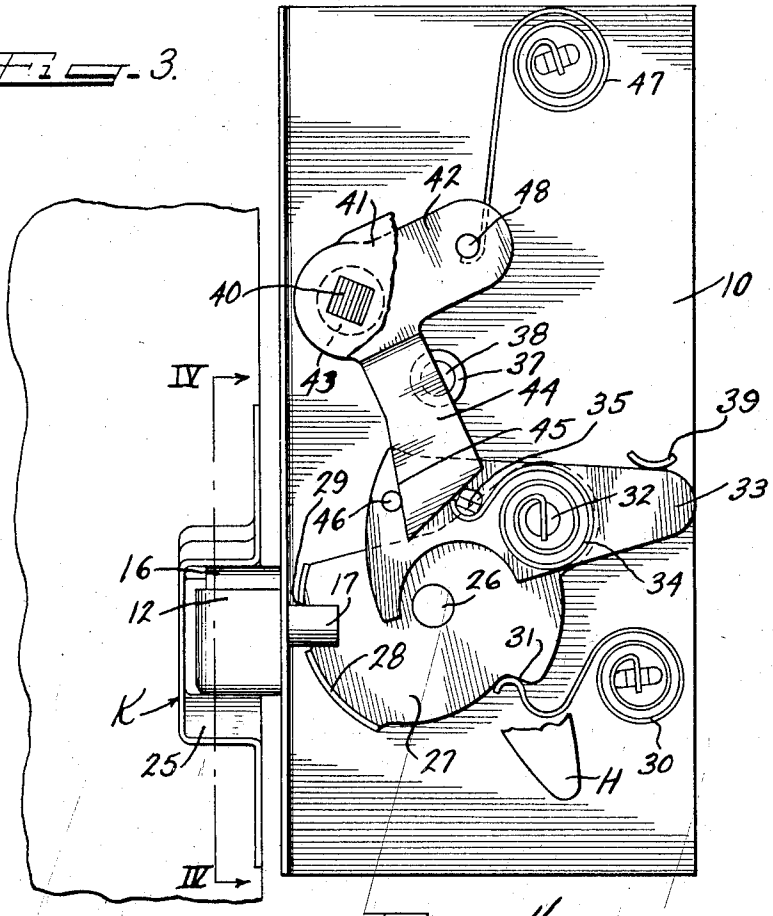
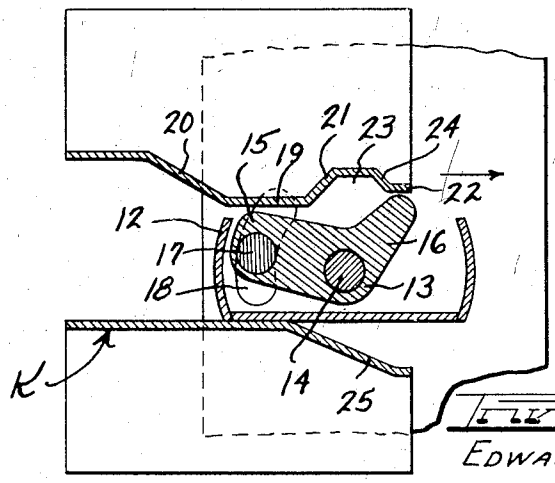


Fig. 4.



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Fig. 5.

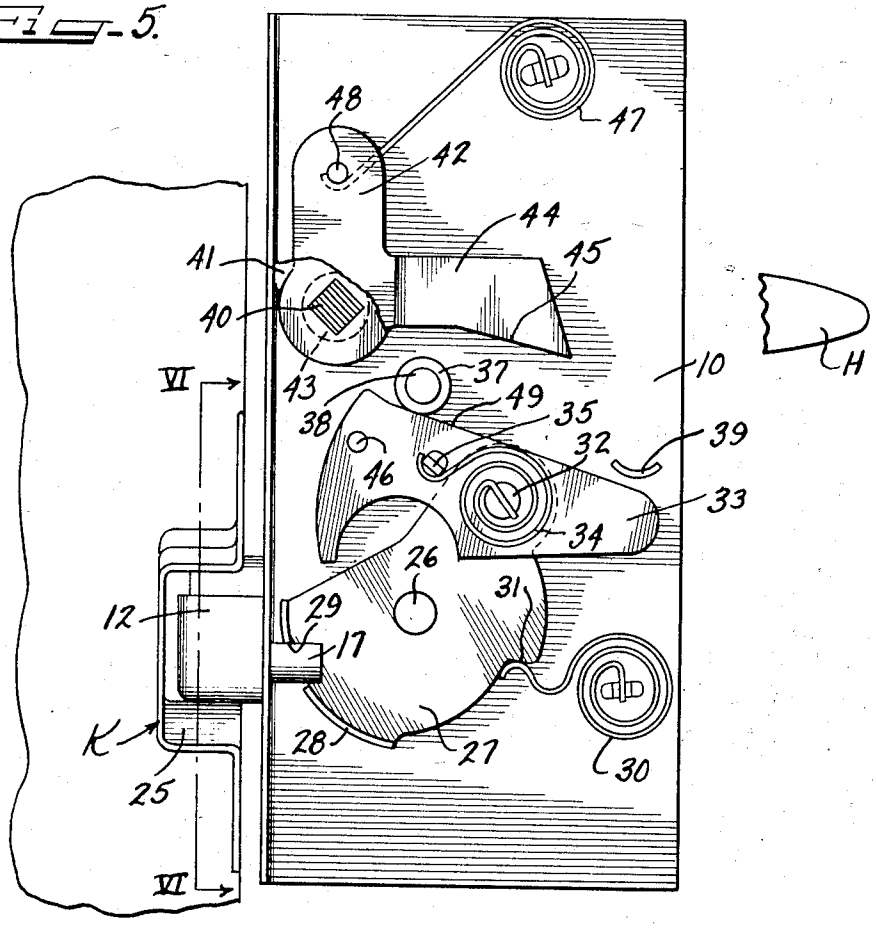
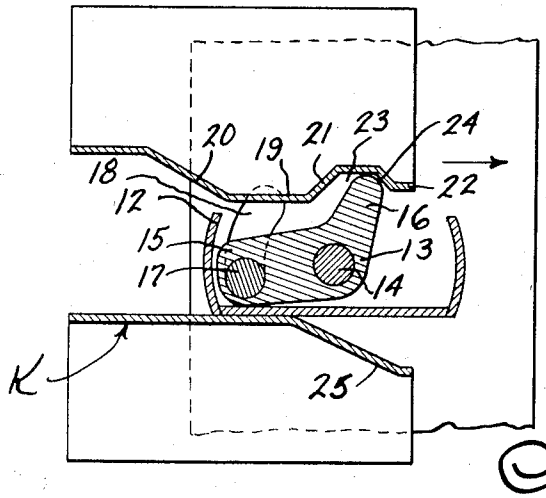


Fig. 6.



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AUTOMOBILE DOOR LOCK

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Fig. 1.

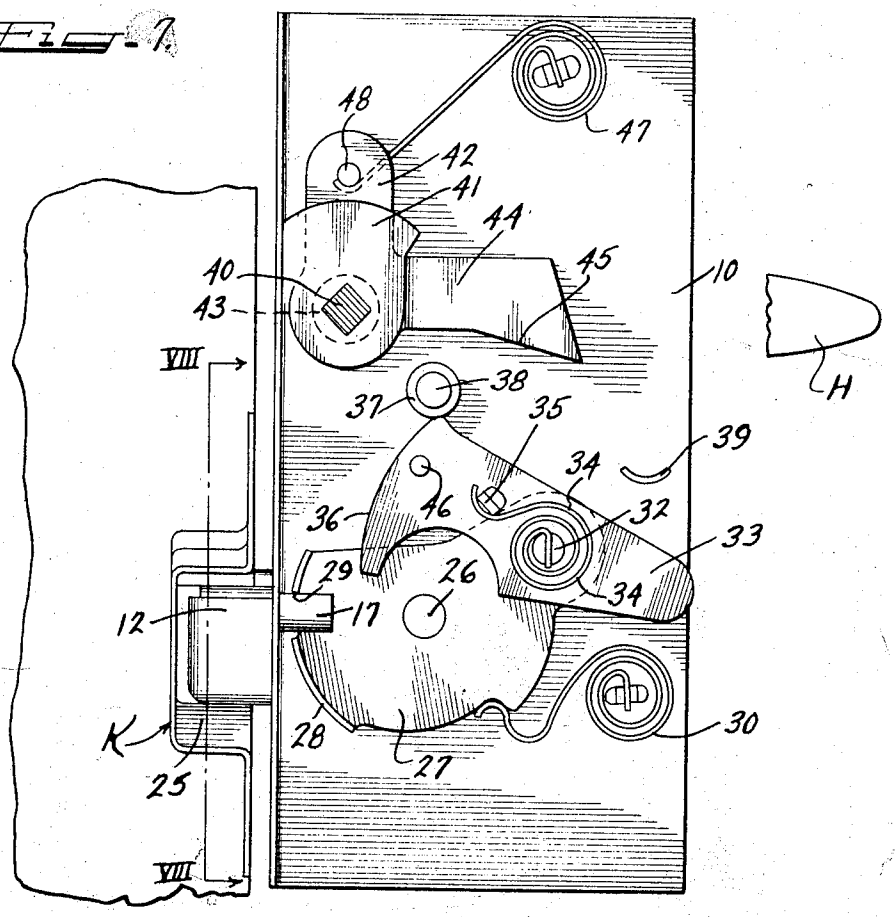
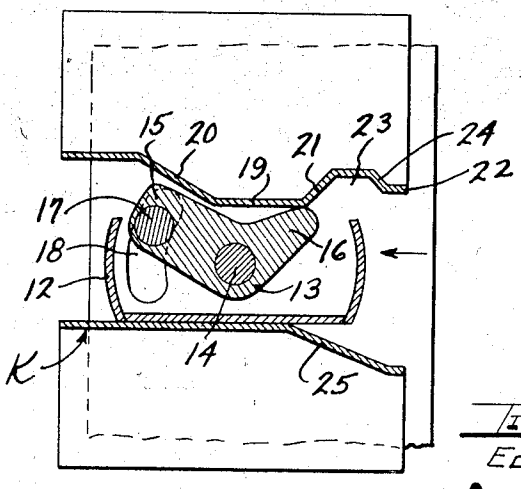


Fig. 8.



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by

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Patented Mar. 21, 1944

2,344,806

UNITED STATES PATENT OFFICE

2,344,806

AUTOMOBILE DOOR LOCK

Edward D. Dall, Detroit, Mich., assignor to Houdaille-Hershey Corporation, Detroit, Mich., a corporation of Michigan

Application February 19, 1943, Serial No. 476,405

7 Claims. (Cl. 292—198)

My invention relates to locks, particularly to locks of the rocking bolt type for automobile doors. In locks of this type camming or wedging members have been employed under comparatively heavy spring pressure for the final forcing of the lock bolt into full locking position as the door is being closed. Due to jarring, as a vehicle is running, the camming or wedging members tend to creep to build up static friction and to become more or less stuck so that it will require unnecessary pressure effort on the door handle to overcome such friction before the door is unlocked for opening.

An important object of my invention is to provide a lock structure of a small number of simple parts in which any built-up static friction can be easily overcome by ordinary pressure on the door handle for unlocking and opening of the door.

The various features of my invention are embodied in the structure shown on the drawings, in which

Figure 1 is a front or outside elevation of the lock structure on the door and the keeper structure on the door frame, with the parts in door locking position;

Figure 2 is a section on plane II—II of Figure 1;

Figure 3 is a view similar to Figure 1 for showing the movement of the parts for unlocking of the door;

Figure 4 is a section on plane IV—IV of Figure 3;

Figure 5 is a view similar to Figure 1 showing the position of the locking parts when the door is fully open or in safety catch position;

Figure 6 is a section on plane VI—VI of Figure 5;

Figure 7 is a view similar to Figure 1 showing the parts about to perform their final movements for final setting of the bolt into locking position; and

Figure 8 is a section on plane VIII—VIII of Figure 7.

The supporting frame for the latch structure comprises the base wall 10 to be secured to the side wall of a door, and the flange 11 which extends across the edge of the door. On the outer side of the flange, near the bottom thereof, is secured the cup-shaped frame or housing 12 for the latch bolt 13. This latch bolt is of V or angular shape and is mounted for rocking movement on the pin 14 which is secured at its ends in the outer wall of the housing 12 and the flange 11. The bolt has the locking arm 15 and the setting arm 16, a stud 17 extending from the locking arm inwardly through the arcuate slot 18 in the flange 11.

The keeper element K, mounted on the door frame, is of U shape cross-section, its upper wall having the downward deflected part 19 presenting the inner inclined abutment 20 and the outer inclined abutment 21. At the outer end of the keeper upper wall is the lip 22 which is higher than the wall part 19. Between the wall part 21 and the lip is the safety recess 23 and the safety abutment 24. The outer end of the bottom wall of the keeper is deflected downwardly to form the incline 25 for guiding the housing 12 with the bolt therein into the keeper when the door is swung into closed position.

Extending forwardly from the base 10 is a stud 26 on which is fulcrumed the bolt actuating lever 27, shown in the form of a plate, a forwardly extending flange 28 at the outer end of the lever having the slot 29 through which the bolt stud 17 extends. A coil spring 30 connected to the base 10 engages the abutment 31 on the lever 27 and tends to rotate this lever in counterclockwise direction.

A stud 32 extends forwardly from the inner end of the lever 27, a locking lever 33 being fulcrumed intermediate its ends on the stud, a coil spring 34 anchored on the stud engaging an abutment 35 on the lever and tending to rotate the lever in clockwise direction. The head end of the lever terminates in the cam edge or surface 36 engageable with an abutment roller 37 journalled on an abutment stud 38 extending forwardly from the base 10. An abutment 39 extends forwardly from the base 10 for engagement by the tail end of the lever 33 when the lever is rotated in counterclockwise direction.

Extending through the base 10 is the spindle 40 of polygonal cross-section to the outer end of which is secured a door handle H. A roll back 41 is mounted on the spindle to rotate therewith, and between the roll back and the base 10 is a setting lever 42 which is journalled on a collar 43 on the spindle. The lever 42 has the extension or wing 44 thereon which is deflected forwardly from the plane of the lever in order that, when the lever is rotated clockwise, the wing will clear the roller 37 and stud 38. Upon downward swing of the handle H and rocking of the roll back, engagement of the roll back with the base 44' of the wing 44 will rotate the lever in clockwise direction for engagement of the lower edge 45 of the wing with a pin 46 on the lever 33. A coiled spring 47 anchored to the base 10 engages a pin 48 on the lever 42 and tends to hold the lever and the roll back in normal position with the roll back abutting the flange 11 of the lock structure frame.

Figure 1 shows the various levers in door locking position, the lever 33 having been rocked by its spring 34 to the end of its clockwise movement with the high end of the cam surface 36 in engagement with the roller 37, the lever 27 being urged in clockwise direction with its flange abutting the lower side of the bolt stud 17 to hold

the bolt rocked with its locking arm 15 against the locking abutment 20 of the keeper, as shown on Figure 2, to hold the door securely closed. It is evident that the cam surface 36 could engage directly with the abutment stud 38, but with the roller 37 interposed there will be less friction and load on the spring 34.

Figure 3 shows the movement of the various levers for unlocking of the door. When the handle H is swung down the wing 44 on the setting lever 42 engages with its edge 45 against the pin 46 on the locking lever 33 to exert combined downward pressure and rotating effort on the lever 33, so that any static friction which has been built up between the cam surface 36 on lever 33 and the roller 37, will be readily broken, and the lever 33 will be rotated counterclockwise toward horizontal position, and this movement of the lever 33 by the setting lever 42 is accompanied by counterclockwise rotation of the bolt actuating lever 27 by the spring 30, to bring the tail-end of the lever against the abutment 39. Upon rotation of lever 27, its flange 28 engages against the top of the bolt stud 17 for rocking of the bolt to the position shown in Figure 4, so that while the door handle is being held down, the door may be swung open for withdrawal of the bolt from the keeper. After the door has been fully opened, the handle is released for release of the setting lever 42 from the lever 33, and then the spring 30 becomes effective to rock the actuating lever 27 in counterclockwise direction for rocking of the bolt to carry its stud 17 down to the bottom of the slot 18, as shown on Figure 6, when the bolt is entirely out of the keeper. The rocking of the lever 27 also carries the lever 33 bodily upwardly for engagement of its rear edge 49 against the roller 37 as shown on Figure 5. Thus, when the door is fully opened, with the bolt entirely withdrawn from the keeper, the various locking levers will be in their unlocking positions and the bolt will be in its unlocked or cocked position. If the door handle after downward swing thereof for setting the lock parts to unlocking position, is released before the door had been swung open sufficiently to withdraw the bolt outwardly with the end of its setting arm 16 clear of the keeper recess 23, then the bolt will be rocked with its setting arm 16 projected into the safety recess 23 and the safety abutment 24 will then prevent full opening of the door and will hold it in its partially opened position. To then fully open the door, the handle must again be swung down to move the levers and the bolt to the position shown in Figures 3 and 4, and the handle then held down until the door has been fully opened with the bolt entirely out of the keeper.

The door may be closed by slamming or pushing it shut. In either case, as the bolt housing 12 enters the keeper, the setting end 16 of the bolt will first wipe along the keeper lip 22 and then along the keeper wall 19, as shown on Figure 8. As the bolt is thus rocked clockwise by engagement with the keeper, its stud 17 will be moved upwardly in the slot 18 and the actuating lever 27 will be rotated clockwise from the position shown in Figure 5, to the position shown in Figure 7, the locking lever 33 being carried bodily down and toward the right until the low end of its cam surface 36 engages the roller 37, and then the spring 34 will become effective to rock the lever 33 clockwise for travel of the cam edge 36 along the roller from the low end of the cam edge to the high end thereof, this travel of the lever 33 effecting further clockwise rotation of the lever 27 and swing of the locking bolt with its locking arm 15 intimately into engagement with the locking abutment 20 of the keeper, the position of the parts being then that shown in Figures 1 and 2, the door being fully locked.

If the slam effort or push on the door is not sufficient to cause the end of the setting arm 16 of the bolt to come into engagement with the keeper wall 19, the bolt will not be rocked sufficiently in clockwise direction to effect release of the back edge 49 of the lever 33 from the roller, and the spring 30 will then rock the lever 27 counterclockwise to carry the lever 33 back to the position shown on Figure 5 and the bolt to the safety catch position shown on Figure 6, with the end of the setting arm 16 of the bolt within the safety recess 23 behind the safety abutment 24. Sufficient inward push on the door will then bring the bolt into engagement with the keeper wall 19 for sufficient rocking of the lever 27 and disengagement of the lever 33 from the roller 37 for engagement of the cam edge of the lever with the roller so that the bolt may be rocked into its final locking position shown on Figures 1 and 2.

I have thus produced an automobile door lock structure of comparatively few and simple parts which can be readily stamped from sheet metal and which cooperate to efficiently force the latch bolt into its final locking position when the door is closed, and which can readily be released, by operation of the door handle without undue pressure, for unlocking and opening of the door.

I do not desire to be limited to the exact construction, arrangement and operation shown and described as changes and modifications may be made without departing from the scope of the invention.

I claim as follows:

1. An automobile door lock structure comprising a housing on the door, a rockable latch bolt on the housing for cooperation with a keeper on the door frame, an actuating lever fulcrumed intermediate its ends on said housing and having connection at its outer end with said bolt for movement therewith, a spring tending to hold said actuating lever for setting of the bolt to unlocking position, a cam lever fulcrumed on the inner end of said actuating lever and terminating in a cam surface, an abutment stud on said housing, and a spring for said cam lever tending to move said lever for engagement of its cam surface with said abutment stud whereby to move said actuating lever for setting of said bolt to locking engagement with the keeper when the door is closed.

2. An automobile door lock structure comprising a housing on the door, a rockable latch bolt on the housing for cooperation with a keeper on the door frame, an actuating lever fulcrumed intermediate its ends on said housing and having connection at its outer end with said bolt for movement therewith, a spring tending to hold said actuating lever for setting of the bolt to unlocking position, a cam lever fulcrumed on the inner end of said actuating lever and terminating in a cam surface, an abutment on said housing, and a spring for said cam lever tending to move said lever for engagement of its cam surface with said abutment whereby to move said actuating lever for setting of said bolt to locking engagement with the keeper when the door is closed, and a setting lever on said housing separate from said abutment and operable by the door handle to engage with said cam lever for movement thereof

for disengagement of its cam surface from said abutment to permit said actuating lever spring to move said actuating lever for setting of the bolt to unlocking position so that the door may be opened.

3. A door lock comprising a housing on the door, a rockable latch bolt on said housing for cooperation with a keeper on the door frame, an actuating lever fulcrumed intermediate its ends on said housing and having connection at its outer end with said bolt for movement therewith, a spring tending to move said actuating lever for setting of the bolt to unlocking position, a cam lever fulcrumed intermediate its ends on the inner end of said actuating lever, the head end of said cam lever terminating in a cam surface, a roller on said housing, a spring for said cam lever tending to rotate said lever in one direction for engagement of its cam surface with said roller for movement of said actuating lever to set the bolt in locking engagement with the keeper when the door is being closed, an abutment on said housing engageable by the tail end of said cam lever when said lever is rotated in the opposite direction, and a setting lever on said housing operable by the door handle for engagement with said cam lever to rotate said lever for disengagement of its cam surface from said roller and for engagement of its tail end with said abutment whereby said actuating lever will be moved to set said bolt for release thereof from the keeper for opening of the door.

4. A door lock structure comprising a housing for mounting on the door, a rockable latch bolt on said housing for cooperation with a keeper on the door frame, an actuating lever fulcrumed on said housing and having connection with said bolt for movement therewith, a spring for holding said actuating lever in position for setting of the bolt in its unlocking position when the door is opened, a cam lever fulcrumed on said actuating lever, an abutment roller on said housing, said cam lever having a cam surface thereon, a spring holding said cam lever against said abutment roller with its cam surface displaced therefrom, engagement of said bolt with the keeper when the door is moved to closed position causing setting of the bolt for movement of said actuating lever to carry said cam lever into position for engagement of its cam surface with said abutment roller whereby said cam lever spring may then rotate said lever with its cam surface in engagement with the abutment roller whereby to move said actuating lever for setting of the bolt in door locking engagement with the keeper when the door has been closed.

5. An automobile door lock comprising a housing for mounting on the door, a rockable latch bolt on the housing for cooperation with the keeper on the door frame, an actuating lever fulcrumed intermediate its ends on said housing and having connection at its outer end with said bolt for movement therewith, a spring for said actuating lever tending to hold it in position for setting of the bolt to unlocking position when the door is opened, a cam lever fulcrumed on the inner end of said actuating lever and terminating in a cam edge, a roller on said housing, a spring for said cam lever for holding it with its back against the roller and with its cam surface displaced from the roller, engagement of said bolt with the keeper when the door is swung to closed position causing rocking of said bolt for rotation of said actuating lever and bodily movement of said cam lever to bring the low end of its cam edge into engagement with said roller whereby said cam lever spring may then rotate said lever for rotation of said actuating lever for final setting of said bolt into locking engagement with the keeper.

6. An automobile door lock comprising a housing for mounting on the door, a rockable latch bolt on the housing for cooperation with the keeper on the door frame, an actuating lever fulcrumed intermediate its ends on said housing and having connection at its outer end with said bolt for movement therewith, a spring for said actuating lever tending to hold it in position for setting of the bolt to unlocking position when the door is opened, a cam lever fulcrumed on the inner end of said actuating lever and terminating in a cam edge, a roller on said housing, a spring for said cam lever for holding it with its back against the roller and with its cam surface displaced from the roller, engagement of said bolt with the keeper when the door is swung to closed position causing a rocking of said bolt for rotation of said actuating lever and bodily movement of said cam lever to bring the low end of its cam edge into engagement with said roller whereby said cam lever spring may then rotate said lever for rotation of said actuating lever for final setting of said bolt into locking engagement with the keeper, and a setting lever on said housing operable by the door handle for engagement with said cam lever to release it from said roller and to move it into position for operation of said actuating lever to set the bolt for release from the keeper for door opening.

7. An automobile door lock comprising a housing on the door, a rockable latch bolt on said housing for cooperation with the keeper on the door frame, an actuating lever fulcrumed intermediate its ends in said housing and having connection at its outer end with said bolt for movement therewith, a spring for said actuating lever tending to move it into position for setting of said bolt to unlocking position when the door is opened, a cam lever fulcrumed intermediate its ends on the inner end of said actuating lever, the head end of said cam lever terminating in a cam edge, a roller on said housing, a spring for said cam lever for holding said lever with its back edge in engagement with said roller and its cam edge displaced from the roller when the bolt is in unlocking position, engagement of the bolt with the keeper when the door is moved to closed position causing setting of said bolt and rotation of said actuating lever to carry said cam lever into position for engagement of the lower end of the lever cam edge with said roller whereby said cam lever spring may rotate said lever in one direction for engagement of its cam edge along the roller and for corresponding rotation of said actuating lever for setting of the bolt into locking engagement with the keeper for final locking of the door, an abutment on said housing for the tail end of said cam lever, a setting lever on the housing operable by the door handle for rotating said cam lever in the opposite direction for release of its cam end from said roller and for fulcrum engagement of said lever with said abutment, whereby said actuating lever will be rotated for setting of the bolt for release thereof from the keeper whereby the door may then be opened.

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