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ELECTRICALLY ACTUATED DOORLOCK

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Fig. 1.

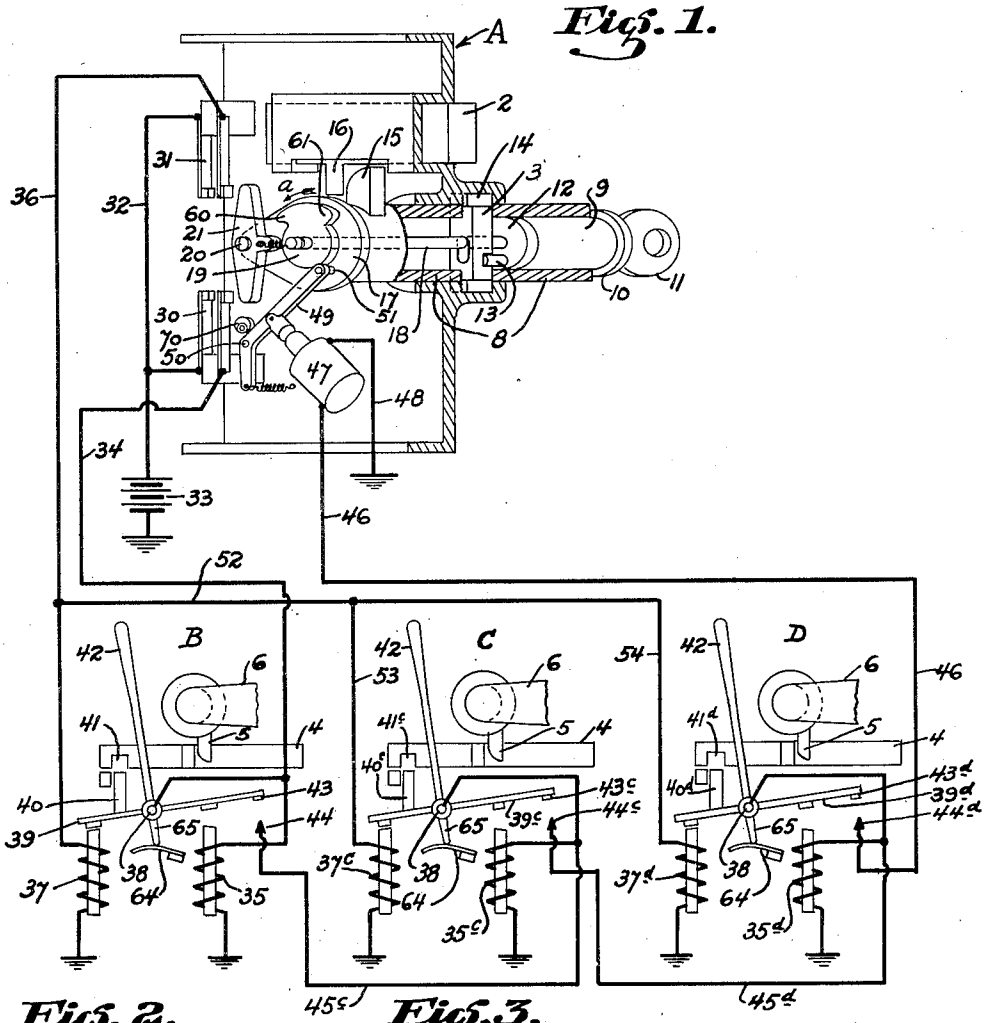


Fig. 2.

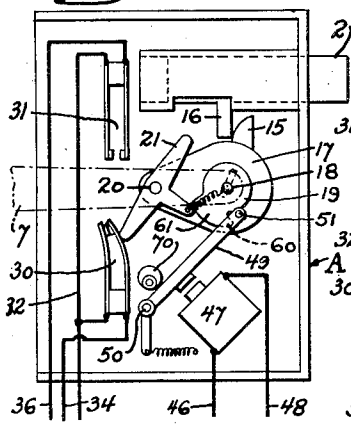
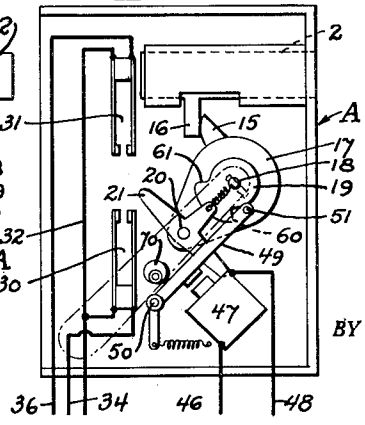


Fig. 3.



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ELECTRICALLY ACTUATED DOORLOCK

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4 Claims. (Cl. 70—50)

This invention relates to door locks and especially to means whereby a plurality of door locks may be electrically locked or unlocked.

The object of the present invention is to generally improve and simplify the construction and operation of locks of the character described; to provide a locking mechanism embodying a key actuated lock and one or more knob or handle actuated locks and in conjunction therewith means actuated by the key lock for automatically releasing or dogging the handle actuated locks against operation; to provide a dogging mechanism which is electrically operated and controlled by the key lock; to provide means for rendering the key lock inoperative if the electric current supply or any circuit actuating the dogging mechanism fails; and further, to provide means for manually releasing the dogging mechanism in the event of current or circuit failure.

The invention is shown by way of illustration in the accompanying drawing, in which—

Fig. 1 is a diagrammatic view showing the key actuated locks and the handle operated locks, together with the dogging mechanism actuated by the key lock.

Fig. 2 is an end view of the key actuated lock showing how the switch arm is operated by the key mechanism.

Fig. 3 is an end view of the key actuated lock showing the position assumed by the switch arm when the lock is actuated by the knob or handle.

Referring to the drawing in detail, and particularly Fig. 1, A indicates the housing of a key actuated lock, and B, C and D indicate a plurality of knob or handle actuated locks. The key actuated lock is provided with a latch bolt 2 and a locking bolt 3; the locking bolt 3 being actuated by a key mechanism only and the latch bolt 2 by a rollback member and a handle for imparting a rotary movement to the rollback member. The locks indicated at B, C and D are each provided with a single latch bolt, such as indicated at 4, and these latch bolts are operated by rollback members, such as indicated at 5, through means of knobs or handles 6.

For the purpose of description let it be assumed that the four locks illustrated are installed in an automobile, or like vehicle, and that it is desired to lock or unlock all the doors by means of one lock. If that is the case, the lock indicated at A will be installed in the door opposite to the driver's seat, while the doors B, C and D will be arranged one at the side of the driver's seat and the other two rearwardly of the driver or forwardly of the rear seat. The lock A, as already stated, is key actuated and the key mechanism is employed for the purpose of locking or releasing a rollback member and, when this is released, the door may be opened by means of a handle indicated in dotted lines at 7, see Figs. 2 and 3. The handle 7 is suitably secured on a spindle member generally indicated at 8, see Fig. 1. The spindle is tubular in form and the outer end contains a key actuated pin tumbler or similar mechanism generally indicated at 9. The outer end of this mechanism is closed by a plate 10 but said plate has a keyhole formed therein to permit the insertion of a key 11, and when such a key is inserted and rotated, rotary motion will be transmitted to a cam or crank pin disc 12 secured at the inner end. This disc is provided with a crank pin 13 engaging a cross slot formed in one face of the locking bolt 3, hence when disc 12 is rotated by the key mechanism the locking bolt will be either projected or retracted with relation to a keeper 14 formed in the lock housing. If it is projected into the keeper the spindle 8 will be locked against rotation; conversely, if the locking bolt is retracted as shown in Fig. 1, the spindle will be free to rotate and as such may be rotated by means of the handle 7, and when the handle is rotated a rollback member or lug 15 will engage a retractor lug 16 on the latch bolt 2 and as such will retract or project said latch bolt as the case may be. The key mechanism and the latch bolt mechanism just described may be of any standard construction.

One of the features of the present invention is to provide means whereby operation of the key mechanism 9 may be utilized to release or dog the latch bolts 4 of the locks indicated at B, C and D. This is accomplished as follows: Secured on the inner end of the spindle 8 is a plate 17. Extending through said plate and through the spindle and the locking bolt 3 and secured to the disc 12 of the key actuated mechanism is a rod 18, and secured on the outer end of the rod is a cam disc 19. Pivotally mounted, as at 20, at one end of the plate 17 is a T-shaped switch arm 21. The leg of the T is adapted to be engaged by the cam disc 19, and when so engaged, the arm 21 will rock about the pivot and will either engage a pair of contacts indicated at 30, or a second pair of contacts indicated at 31. One arm of each pair of contacts is connected through a wire 32 with a battery 33, or any other suitable source of current supply. The other arm of the pair of contacts 30 is connected through a wire 34 and this is connected with the upper terminal of a mag-

netic coil generally indicated at 35. The other contact member of the pair of contacts 31 is connected through a wire 36 with the upper terminal of a second magnetic coil indicated at 37. Hence, if the T-shaped switch arm engages the contacts 30 a circuit will be closed through the coil 35 as the opposite terminal thereof is grounded and so is the opposite terminal of the battery 33. Conversely, if the contacts 31 are closed by the switch arm a circuit will be closed through the coil 37 as the opposite terminal thereof is grounded. Pivotally mounted between the magnetic coils 35 and 37, as at 38, is an armature arm 39 on which is fixed a pair of armature members which cooperate with the coils 35 and 37. If the coil 35 is energized the armature arm will swing about its pivot and engage the core of the coil 35, the opposite end of the armature arm has a lug 40 formed thereon and this will enter a notch or recess 41 formed in the latch bolt 4. The latch bolt 4 will thus be dogged against operation by means of the handle 6 or the rollback member 5 and it will be impossible to open that particular door except by manipulation of a lever 42 mounted on the inside of the door. This lever is attached to the armature 39 and provides a means whereby the armature may be locked manually without energization of either of the coils 35 and 37. It is, however, only employed if the doors should happen to be locked and the key actuated mechanism has been rendered inoperative for some reason or another or some circuit has failed as will hereinafter be described.

By referring to Fig. 1 it will be noted that the armature arm 39 is provided at one end with a contact 43, which is adapted to engage a contact 44, and that this contact is connected through wire 45c with the next armature 39c and also with the upper terminal of the magnetic coil 35c. The armature arm 39c is also provided with a contact 43c and this is adapted to engage a contact 44c which is connected with wire 45d, this wire being connected with the armature arm 39d. The armature arm 39d is also provided with a contact 43d engageable with a contact 44d and this contact is connected through a wire 46 with one terminal of a magnetic coil 47 mounted in the lock A, the other terminal of said magnetic coil being connected through wire 48 with a ground. The magnetic coil 47 actuates an armature arm 49 pivoted at the point 50. The free end of the armature arm carries a pin 51 which lies in the path of the cam 19 and the function of the pin will hereinafter be described.

It has already been shown that when a circuit is closed through the coil 35 of the lock B, circuits will also be closed through 35c and 35d of the locks C and D so that the latch bolt 4 of each lock will be dogged. It may also be stated that when a circuit is closed through the magnetic coil 37 that the magnetic coils indicated at 37c and 37d will also be energized, this being due to the fact that the wire 36 is connected through wires 52, 53 and 54 with the upper terminals of the magnets 37, 37c and 37d and the lower terminals being grounded.

In actual operation if a driver is about to leave an automobile equipped with a locking mechanism here shown, all he has to do is to see that the doors B, C and D are closed and then to close the door A. After this has been closed he will insert the key 11 in the key actuated lock 9 and will rotate the key one-half revolution. In so doing the locking bolt 3 is moved into the keeper 14 and the spindle 8 is thus locked against rotation. Simultaneously with the projection of the locking bolt 3 into its keeper rotary movement will be transmitted through pin 18 to the cam member 19 and this will, accordingly, rotate in the direction of arrow *a*. A hook-shaped shoulder 60 on the cam will, during rotation of the cam disc, engage the leg of the T-shaped switch arm and will thus bring the T-shaped switch arm into engagement with the contacts 30. The moment these contacts engage a circuit is instantly established through the magnetic coils 35, 35c and 35d and also through the magnetic coil 47. Energization of the coils 35, 35c and 35d causes the cooperating armature arms to assume positions opposite to those shown in Fig. 1, and will thus cause the lugs 40 to enter the respective latch bolts 4 and dog them against operation by the rollback member 5 of the handles or similar means indicated at 6. Simultaneous with the energization of these magnetic coils, coil 47 will also be energized and armature 49 will be attracted. The pin 51 carried by the armature arm normally lies in the path of the lug 60 but when coil 40 is energized the armature and pin will be retracted and the disc can thus make a complete one-half revolution. An opposite shoulder 61 will, at this point, ride free of the switch arm and this will return to normal position by means of the spring shown. The circuit through the several coils is thus broken and all of the locks are dogged and locked. When this is accomplished the key may be removed and it will not be reinserted until it is desired to open the locks.

The amount of current consumed is of no consequence as the several magnetic coils are only momentarily energized. There is no chance of the dogging members 40 releasing as the armature arms are held in dogging position by springs 64 and the arms 65 cooperating therewith. That is, arm 65 forming a portion of each armature arm rides to one side or another of the center of the spring, and as such holds the dogging member either in dogging or released position.

The locking of the key actuated lock and energization of the magnetic coils in the locks B, C and D by the key actuated mechanism has been described. In conjunction with the operation of dogging or locking the same, if it is desired to open the lock A and simultaneously to release the dogs in the locks B, C and D it is only necessary to insert the key and rotate it back to normal position. In doing so locking bolt 3 is retracted and the cam member 19 is returned to the position shown in Fig. 1. During such rotation shoulder 61 engages the T-shaped switch arm 21 and it is rocked in a direction opposite to that previously described. In other words the contact members 31 will be engaged and a circuit will be closed therethrough. This circuit can be traced from the battery through wire 32, contact arms 31, and wire 36 which is connected with the magnetic coil 37 and the ground and it can also be traced through wires 52, 53 and 54 to the coils 37c and 37d and the ground connections formed therewith. Thus in unlocking the door, coils 37, 37c and 37d are energized, the armature arms 39, 39c and 39d are now swung to the full line position shown in Fig. 1, the dogs 40 are retracted and the latch bolts 4 are free to be retracted by the rollback members and the handles actuating the same. The retraction of locking bolt 3 leaves the spindle 8 free for rotation and this may accordingly be rotated by the handle 7 and the latch bolt 2 will be retracted by the rollback member 15 and the door may be

opened. The other doors, being already undogged or released, may be opened as desired. When spindle 8 is rotated by means of the handle 7 to retract the latch bolt 2, plate 17 carrying the switch arm and the cam plate 19 will rotate with the spindle and will assume the position shown in Fig. 3. Such rotation takes place without engaging the contacts 30 or 31 and nothing is accomplished but that of retracting the latch bolt 2.

One of the important features of the present invention is to prevent actuation of the key mechanism 9 of the lock A and dogging of the latch bolts in the locks indicated at B, C and D if the source of current supply or any circuit should fail. That is, the battery may be dead or one or more wires short circuited, chafed, or broken. If that is the case, means are provided for preventing locking of the door A by means of the key and dogging of the locks B, C and D. If an attempt is made to lock the door A if anything is wrong, such as already described, when key 11 is inserted and rotated cam 19 will rotate with the key but if anything is wrong with the circuits or the current supply has failed, and so on, magnetic coil 47 will not be energized as that is at the very end of the circuit, and if this coil is not energized armature arm 49 will not be attracted. Hence, pin 51 will lie in the path of the lug 60, which is hook-shaped, and the lug will engage the pin and it will engage the pin at a point before the key has been rotated a one-half revolution. Locking bolt 3 is thus not fully projected, nor can the key be removed. The driver or owner will know the moment he or she finds that the key cannot be fully rotated that something is wrong and he or she will immediately reverse the direction of rotation so that the key may be removed. When first rotating the key to lock the mechanism a circuit was closed through the contacts 30 and one or more of the locks indicated at B, C and D may, during such movement, have been energized and dogged but when the operator found that the key could not be fully rotated or turned to the point where the key can be removed the direction is reversed and shoulder 61 will then engage the switch arm 21 and close a circuit through the contacts 31, thus releasing one or more of the locks B, C and D which may have been dogged. When this operation has been completed the driver or owner will know that something is wrong and will naturally at the first opportunity take the car to the proper place for inspection and repair. In the meantime it may be necessary to lock the door A and also the other doors and this can be manually accomplished first by closing the doors B, C and D and then manually locking them by means of the levers 42, then depressing the armature arm 49 by means of a turn knob or the like mounted on the inside of the door. This turn or knob rotates an eccentric 70 and this, in turn, depresses the armature arm 49. Then by closing the door and inserting the key 11 the door can be locked and it may be unlocked at any time by the same key and the other locks may be unlocked from the inside by means of the levers 42. It should be understood that the spacing between the shoulders 60 and 61 of the cam disc is such that before the shoulder 60 engages the pin 51 of the armature arm 49 the opposite or cooperating shoulder 61 will move to a position where it releases the switch arm 21, thus permitting it to assume neutral or inoperative position. If this spacing was not provided one or more of the locks indicated at B, C and D might remain in locked position unknown to the driver or owner when current or circuit failures of any character were encountered, but this cannot happen where the switch arm is released as described as shoulder 61 will engage the switch arm 21 and close the circuit through the contacts 31 upon return movement of the cam disc 19, thus releasing any locks that may have been dogged or locked.

While the invention has been described as applied to automobile doors, it is obvious that they can be applied to a multiple number of doors, whether they are installed in an automobile or otherwise, and while the locking mechanism and dogging mechanism disclosed has been more or less specifically described and illustrated, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a locking system employing a plurality of locks and one of said locks being a master lock, manually operated means for actuating the master lock, means operated by said manual means for locking the other locks, and means for rendering said manual means inoperative if any lock fails to operate.

2. In a locking system employing a plurality of locks and one of said locks being a master lock, key actuated means for actuating the master lock, means actuated by the key mechanism for operating the other locks, and means for rendering the key mechanism inoperative if any lock fails to operate.

3. The combination with a plurality of locks, each provided with a latch bolt, one of said locks being key actuated and the others handle operated, a dogging means for releasing or dogging each latch bolt, electrically operated means for moving the dogging members to release or dog the latch bolts, a switch in the key actuated lock, wires connecting the switch with a source of electric current supply and with the electrically operated dogging means in the respective locks, means operative by the key mechanism for actuating the switch to establish electric circuits to energize the electrically operated dogging means in the respective latch bolts, and means for rendering the key mechanism inoperative upon current or circuit failure.

4. In a locking system employing a plurality of locks and each lock having a latch bolt, dogging means cooperating with each lock to dog the latch bolts against retraction when projected, manually actuated means for simultaneously releasing or dogging the several latch bolts, and means for rendering said manual means inoperative if one of the latch bolts assumes a retracted position.

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