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LOCKING SYSTEM AND LOCKS USED THEREWITH

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This invention relates to a locking system, and locks used therewith. It is primarily intended for use on automobiles, though it will be apparent that it is susceptible of use in any relation where the lock is to be electrically controlled from a distant point, and especially where such control is through a key actuated master lock.

Further objects and advantages of the invention will be more fully set forth in the detailed description based upon the accompanying drawing, wherein Fig. 1 is a diagrammatic elevation of an associated key controlled master lock, and its electrically controlled secondary lock, and Fig. 2 is a fragmentary view showing some of the parts of the secondary lock in another position.

The master lock A is of the well-known and conventional type, of which hundreds of thousands are in use upon automobiles at this time, a lock of this general character being shown, for example, in U. S. Patent No. 2,184,350 of December 26, 1939. The outstanding characteristic of these well-known locks is that instead of merely positively locking their main bolts, and the actuating handles thereof, against movement, the locking of the door is effected by disconnecting the handle from the bolt, so that the handle may move through its usual range, but without moving the bolt.

Referring now to the drawing, the main bolt 5 of the master lock may be moved under the influence of a handle 6, the shank of which is shown in section, whenever a pawl 7 is elevated so that its end engages shoulder 8 on the main bolt. With the parts in the position illustrated in Fig. 1, the door is locked, because a lever 9, that is pivoted at 10, to the metallic shell 11 of the lock, has previously been moved by the action of the key, not shown, upon thrust pin 12, to the position shown in said figure.

This action resulted in drawing the pawl 7 downwardly through the tail extension 13, said extension engaging the slot 14 of lever 9. Consequently, when the handle 6 is turned to the right to move its attached crank arm 15 to the right to thrust against the lower end of lever 16, the end of the bolt moves toward the right, but in a plane below the shoulder 8, and the bolt 5 is not retracted. The pawl 7 is pivotally connected at 11 to lever 15. My addition to the main lock resides only in providing an electric circuit closing contact mechanism comprising a spring arm 18, which moves with lever 9, and a binding post 19, supported from the lock shell, and suitably insulated therefrom.

The circuit is closed at this point when the key is used to throw the right-hand end of lever 9 upwardly to move the pawl to such position that its end will engage shoulder 8. The handle shank 20 of the secondary lock carries a crank extension 21, which, when moved toward the left, acts upon the tail 22 of a lever 23. This lever is pivotally connected to the main bolt 5 of the secondary lock.

A stud 25 carried by the lower end of lever 23 constitutes a pivotally mounting for a bolt engaging pawl 26 and an arm 27. A spring 28 tends to move pawl 26 and arm 27 toward each other, or so that they will lie side by side.

The arm 27 carries an electro-magnet 28, and when this magnet is energized its core attracts a foot 30, which is rigidly attached to pawl 26. Thus, if the magnet be not energized, the spring 28 will hold the end of the pawl 26 in such position that when said pawl is thrust toward the left by the movement of the lower end of lever 23, the end of the pawl will not engage the shoulder 8 of bolt 5. If, however, the magnet be energized, then the foot 30 will be attracted to move the pawl to the position illustrated in Fig. 1. That is to say, at this time, the pawl lies at such an angle, with respect to arm 27, that when said arm 27, pawl 26, and magnet 28 all move bodily toward the left, the end of the pawl will engage shoulder 8, to retract the bolt 5, against the tension of the usual spring 31.

A flange 32 is provided in the standard lock construction, upon the upper end of lever 23, to provide a portion against which the free end of spring 31 may thrust, and I utilize the upper end of this flange as the actuating means for another circuit-closer, comprising a relatively stiff arm 33, and a resilient contact arm 34, the latter carrying a contact point 35. A binding post 36, suitably insulated from the metallic shell 37 of the lock, carries a complementary contact point 38.

A metallic post 39, in electrical communication with the metallic base 31, supports the members 33 and 34.

A source of electric current, which may be the battery of an automobile, is indicated at 40. One side of this battery is connected by a conductor 41 with binding post 19, the current passing, at the proper time, through arm 18 and conductor 42, to binding post 43 on arm 37. One side of the winding of magnet 29 is connected to binding post 43 by conductor 44. The other end of the magnet winding is grounded upon the metallic lug 45, said lug constituting a part of arm 27, and serving to support the magnet upon said arm,
so that the magnet will partake of the bodily forward motion said to be imparted to the handle, and the pawl 25. The circuit is completed through the metallic lock shell 37, post 39, contact arm 34, binding post 36, and a conductor 45, to the battery.

The throw of the parts is such that the very first part of the movement of handle 20 results in closing the circuit of contact arm 34. This, while the circuit is normally open at this point, and consequently the secondary lock is normally in locked position, current is supplied momentarily to the magnet upon initial movement of handle 20.

This supply of current lasts long enough for the pawl to be held in the position shown in Fig. 1 until its end is further elevated, and engaged with shoulder 8° under the action of the inclined slot 41 formed in the outer end of arm 21, and in which is engaged the shank of a stud 46 that is carried by the shell 37.

Immediately after the end of the pawl engages the shoulder 8° flange 32 in its movement toward the right, rides off the hump 33 of arm 33, thus interrupting the circuit through 35. Consequently it may be seen that the secondary door or doors are normally locked, but that they use no current, except at the time of unlocking, and then only momentarily.

A feature of the invention to which I attach great importance is the fact that the magnet which moves the pawl to locking position is mounted to travel bodily with the pawl and the parts associated therewith. In some prior devices magnets fixed to the lock body have been used, but by arranging the parts so that the magnet moves with the armature (in this case the foot 30), armature and magnet may always be kept in such relationship as to insure effective attraction of the armature. This is important because of the very short effective range of action of the ordinary electro-magnet. Since the force exerted decreases so rapidly as the distance between magnet core and armature increases, it follows that the arrangement of parts which insures movement of magnet and pawl and armature together will give highly efficient results with great simplification of structure. It may include a conventional thermostatic cut-out as indicated to prevent overheating if the handle of the rear door be held in circuit closing position an unnatural length of time.

It is to be understood that the invention is not limited to the precise construction shown, but includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention, I claim:

1. A lock comprising a main bolt, a handle, a pawl actuated bodily laterally by said handle, said bolt having a part adapted to be engaged by said pawl, means tending to move the pawl out of engagement with the main bolt, and a magnet mounted to move bodily with the pawl in its lateral movement and acting upon said pawl when the magnet is energized to move the pawl into position to engage the main bolt, after which movement of the pawl under the influence of the handle effects unlocking movement of the main bolt.

2. In combination a master lock for one closure and a secondary lock for another closure, the master lock comprising a main bolt, a handle, a member the movement of which effects connection between the main bolt and handle, a key-controlled element adapted to engage and move said member to locked and unlocking position, a circuit closing means associated with said member arranged to be closed when the key-controlled element is moved to move the said member to unlocked position, the secondary lock also comprising a main bolt and a handle, a movable bodily laterally by said handle capable of lying in either of two positions, in one of which it is adapted to engage its main bolt to move said bolt under the influence of the handle, and in the other of which it is adapted to be moved by the handle in a path in which it does not engage said bolt, spring means tending to move the pawl to the last-named position, a magnet bodily movable with the pawl in its lateral travel, acting, when energized, to move the pawl to bolt energizing position, and an electric circuit which includes both the magnet and the circuit closing means of the main lock.

3. A structure as recited in claim 2 comprising an additional circuit closing means in said circuit located in the secondary lock in a position to be engaged by a moving part of said lock to close the circuit upon initial movement of the handle of the secondary lock.

4. A structure as recited in claim 2 comprising an additional circuit closing means in said circuit located in the secondary lock in a position to be engaged by a moving part of said lock to close the circuit upon initial movement of the handle of the secondary lock and to break said circuit after the pawl engages the bolt and before the bolt has been moved to unlocked position.

5. In a lock construction a bolt mounted for endwise movement, a pawl likewise mounted for bodily endwise movement and also pivoted so that its free end may move toward and from the bolt, said pawl serving when engaged with said bolt to thrust the bolt endwise when the pawl is moved endwise, a magnet, means for mounting the magnet to move bodily with the pawl in the endwise movement of said pawl, and a member carried by the pawl and arranged to be attracted by the magnet to thereby move the pawl into bolt-engaging position.

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