

Feb. 17, 1931.

O. HARDERS

1,793,440

LOCK

Filed April 23, 1929

3 Sheets-Sheet 1

Fig. 9

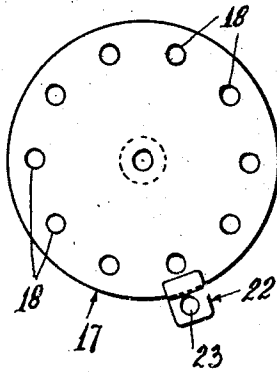


Fig. 10

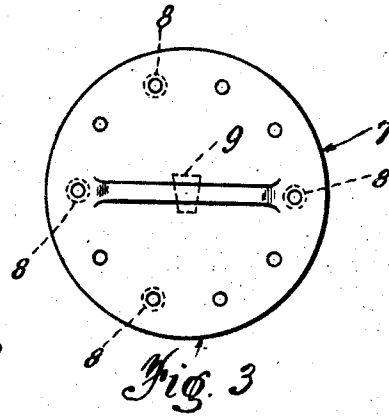
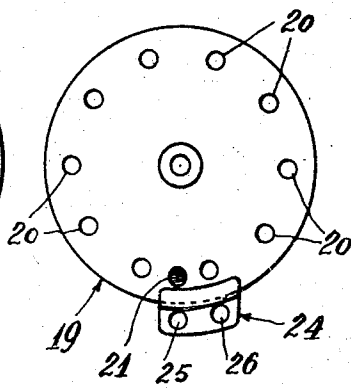


Fig. 8

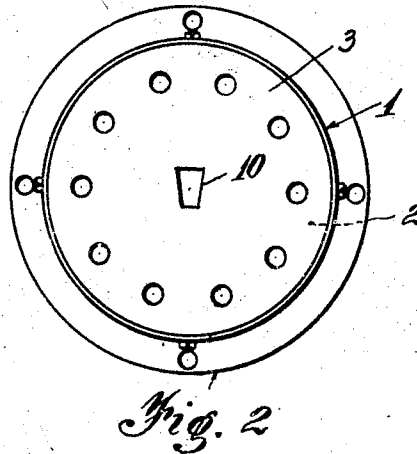
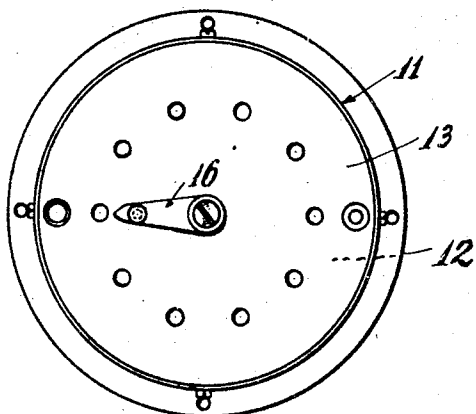
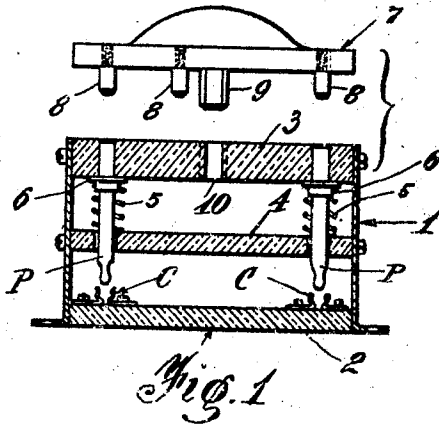
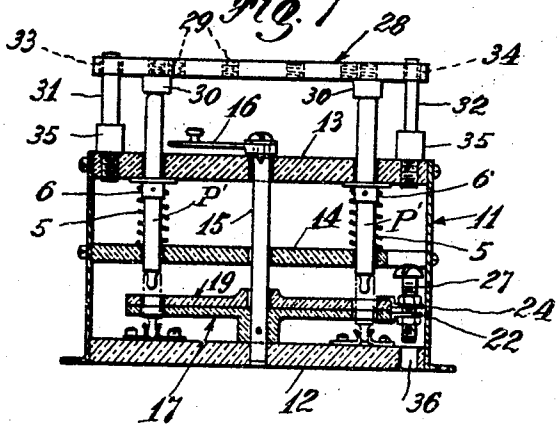


Fig. 7



Otto Harders
INVENTOR.
BY *Ralph Smith*
Paul Purchard.
ATTORNEYS.

Feb. 17, 1931.

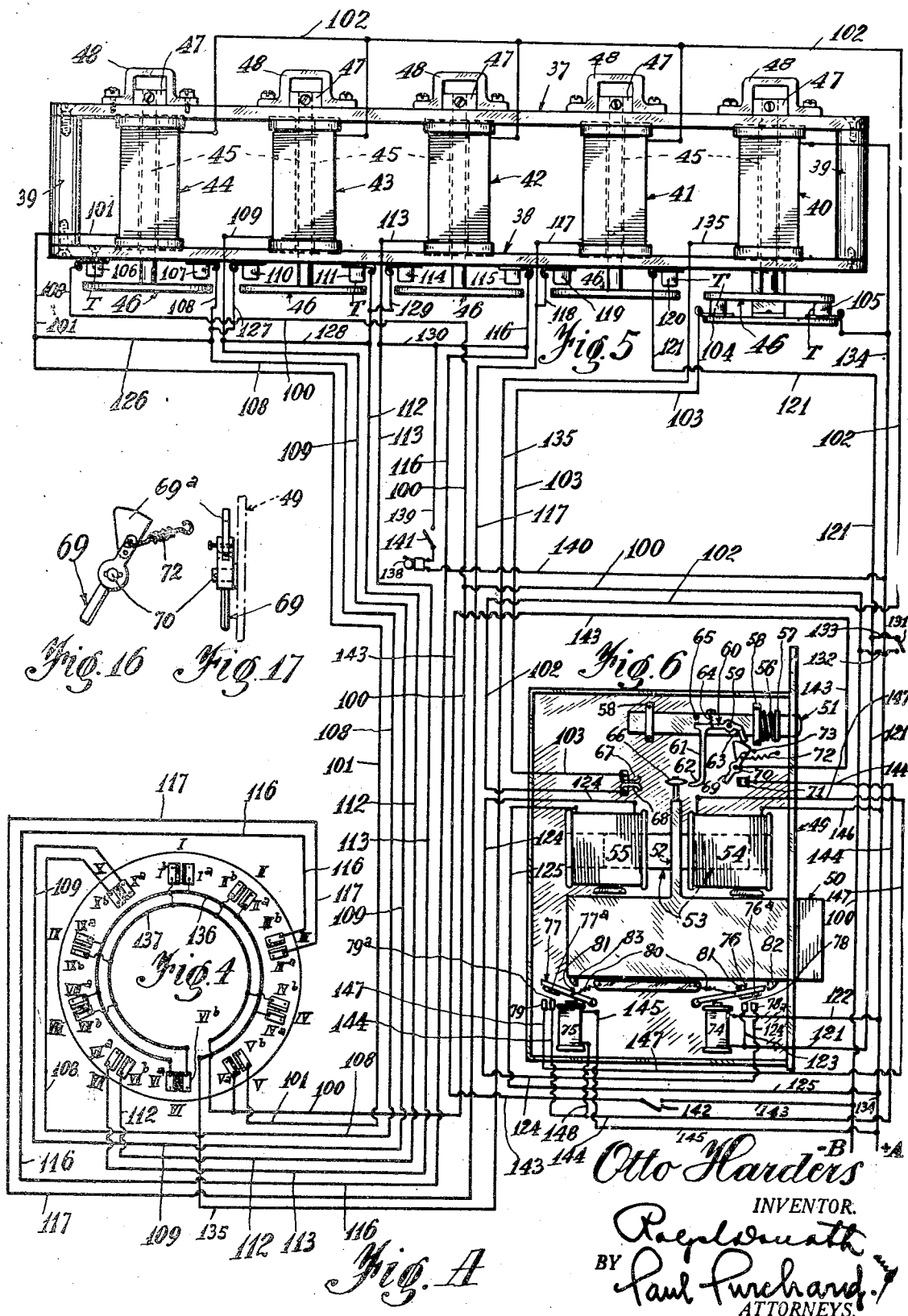
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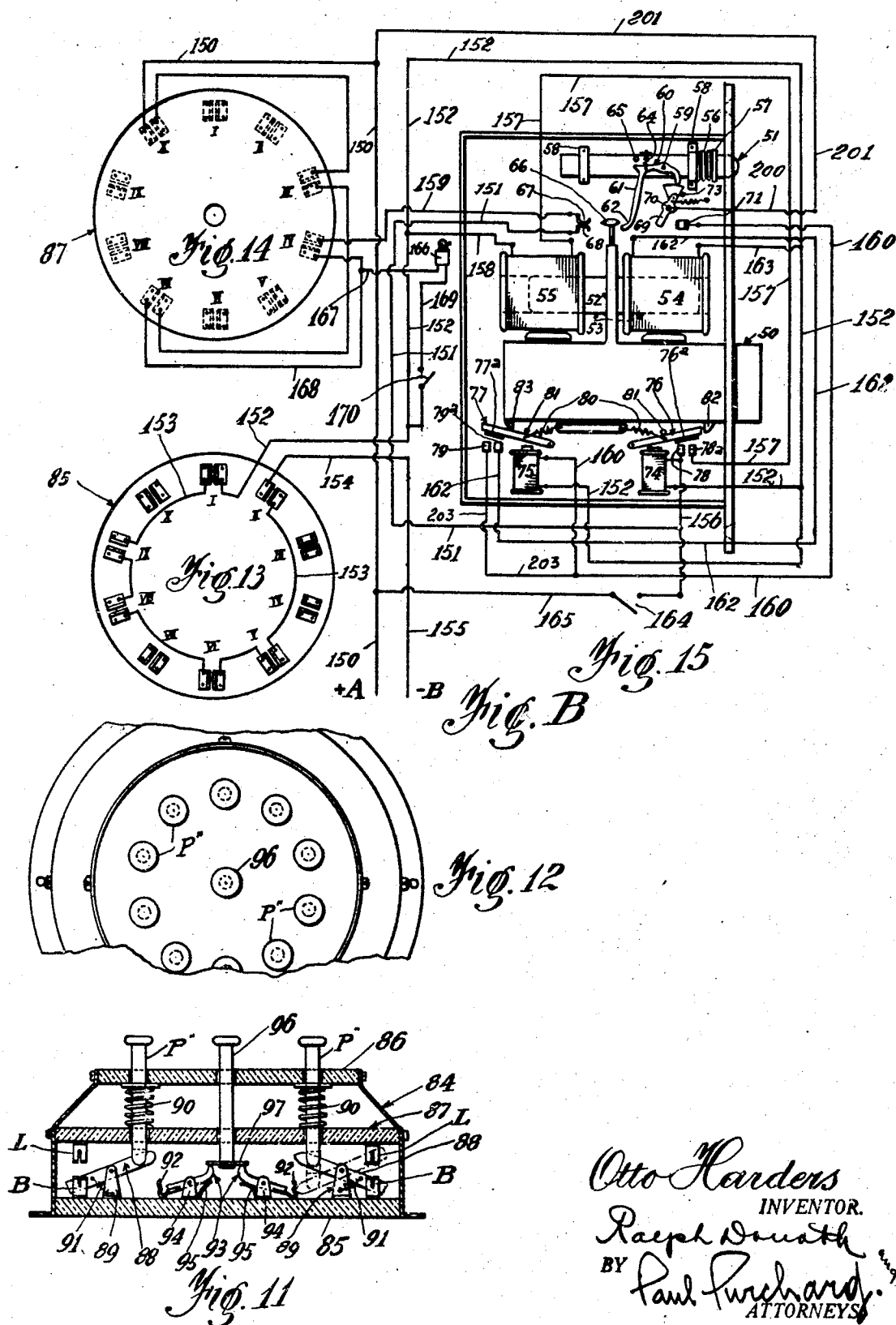
O. HARDERS

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UNITED STATES PATENT OFFICE

OTTO HARDERS, OF WILKINSBURG, PENNSYLVANIA

LOCK

Application filed April 23, 1929. Serial No. 357,391.

This invention relates to locks and more in particular to methods and means for operating locks electrically.

One of the primary objects of this invention is to devise a lock which may be closed or opened electrically, without the use of an ordinary key. Another object is to provide with a lock of this character a master switch having several contacts which must be closed in a pre-established sequence before the lock may be operated, and in which the sequence of operation of said contacts and the numbers thereof may be varied by the owner whenever found desirable. Yet another object of this invention is to provide a system of electrical connections for a lock of this character which may be controlled from one or more points distant from the door or doors to which the lock is applied. Additional features and advantages of this invention will appear from the following description considered in connection with the accompanying drawings forming a part of this application and in which:—

Fig. 1 is a sectional elevation taken through the median line of a master-switch adapted to be used in connection with an electric lock intended especially for residences, stores, banks, etc. This figure also includes a side elevation of a special master key which may be used, if desired, in connection with the master switch.

Fig. 2 is a top plan view of Fig. 1, the master-key being omitted.

Fig. 3 is a top plan view of the master key.

Fig. 4 is a plan view of the contact base of the master key shown in Fig. 1.

Fig. 5 is a side elevation showing a group of five electromagnets used for making and breaking certain electric circuits, to be described later.

Fig. 6 is a view showing the interior of the electric lock used in this invention.

Fig. 7 is a sectional elevation showing a modified construction for a master-switch to be used in place of the one shown in Fig. 1; a master key being also shown in elevation.

Fig. 8 is a top plan view of Fig. 7, the master key being omitted.

Figs. 9 and 10 are top plan views respec-

tively of the lower and upper safety discs used of the master-switch, Fig. 7.

Fig. 11 is another modified construction of a master-switch, intended especially for use on private closed automobiles, ambulances or police patrol wagons, etc., provided with my invention.

Fig. 12 is a fragmentary top view of Fig. 11.

Fig. 13 is a top plan view of the lower contact base shown in Fig. 11; the various contact-levers being omitted.

Fig. 14 is a top plan of the upper contact base.

Fig. 15 is a replica of Fig. 6.

Fig. 16 is a plan view of a switch-lever used in the electric lock.

Fig. 17 is an end elevation of Fig. 16.

Fig. A is an inclusive view showing the electrical wiring connections used preferably for house installations.

Fig. B is a similar view showing the electrical wiring connections in the application of my invention to closed automobiles and the like.

The master-switch shown in Figs. 1 to 3 comprises a housing 1, preferably cylindrical, having a base 2, a top 3 and an intermediate guide-plate 4 all preferably made of electric insulating material.

In the master-switch are mounted several switches (ten in the present embodiment) indicated diagrammatically in Fig. 4 by the roman numerals I to X, each switch comprising a longitudinally movable contact plug "P" adapted to engage terminals "C" consisting each of two contact clips fastened on the base 2 and indicated by the suffixes "a" and "b" applied to their corresponding switch numbers. The contact plugs are normally held into raised position, away from their terminals, by springs 5 resting on the plate 4 and acting on collars 6 fastened to each plug.

To operate a lock, it is necessary, in the present embodiment to press down in the proper sequence or simultaneously a certain number of contact-plugs (four in the illustrated example).

If desired, the master-switch may be supplied with a master key 7, in which four suitably spaced and insulated pins 8 are secured

to engage simultaneously the four predetermined contact plugs required for completing the electrical circuits necessary for operating the lock. To insure the proper insertion of the master key, the latter is preferably fitted with a central extension 9, of non-symmetrical shape, engaging a correspondingly shaped aperture 10 provided in the top 3.

In the modified construction shown in Figs. 7 to 10, the master-switch, consists of a housing 11 having a contact base 12, a top 13 and an intermediate guide-plate 14 of insulating material. Ten contact-plugs P¹ are also used which are normally held in non-operative position by the coil springs 5, inserted between the plate 14 and the flange collars 6 on the plugs. These plugs are guided for longitudinal movement in suitable apertures provided in the intermediate plate 14 and the top 13. Mounted for rotation in the center of the master-switch is a spindle 15 having secured at the top an indicator-hand 16 pointing toward the various contact plugs, which, of course, are numbered consecutively from I to X.

At the bottom end of the spindle and secured thereto is the lower safety disc 17 having ten apertures 18 suitably spaced to be engaged by the contact-plugs when depressed. Freely mounted about the spindle and resting on the lower safety disc is the upper safety disc 19 in which are provided ten apertures 20 spaced to register with the apertures 18 in the lower disc and an extra aperture 21 spaced half-way between two apertures 20.

On the lower disc 17 is fastened a tab 22 having an aperture 23 and on the upper disc 19 is secured a wider tab 24 having two apertures 25 and 26 respectively disposed in radial alignment with the aperture 21 and the next adjacent aperture 20 on the upper disc, and each adapted to register with the aperture 23.

The purpose of the two safety discs is to enable pressing the number of contact plugs required to operate the electric lock (four in the present embodiment) either one at a time in the proper sequence, or all four simultaneously by means of a master key. Thus, when the upper and lower safety discs are clamped together by inserting the clamping screw 27 through the apertures 26 and 23 in the tabs 22, 24, the ten evenly spaced holes 20 in the upper disc will register with the holes 18 in the lower disc and a master key may be used to press down simultaneously the four required operating contact plugs. On the other hand by inserting the clamping screw 27 through the apertures 25 and 23, the top disc will be shifted around so that only the aperture 21 in the top disc and one aperture 18 in the lower disc will register, the other nine apertures 18 being then covered by the top disc. This will allow the pressing of but one contact-plug at a time by moving the indicator hand consecutively and in the proper sequence toward the four operative contact-plugs.

It will be noted in Fig. 7 that the contact-plugs are normally held, by their coil springs 5, above the top of the upper safety disc 19 to permit of the free rotation of the hand 16 and discs 17, 19.

The master-key for this switch comprises a plate 28 having ten threaded apertures 29 in four of which are inserted the press-pins 30 suitably located to act on the four predetermined operating contact-plugs. This master-key is guided by means of two guide-studs 31, 32 of different diameter and engaging corresponding apertures 33, 34 provided in the plate 28. Shoulders 35 are provided on the guide-studs to limit the downward push of the master-key.

The clamping screw 27 is made sufficiently long to engage, when desired, an aperture 36 drilled in the base 12. Thus, if the master-switch is to be operated by a master-key alone, the safety discs 17, 19 may be held permanently in proper register by screwing the clamping screw in the hole 36, in this case the indicator hand 16 would be removed, as useless. Also, by inserting the clamping screw through the holes 25, 23 and 36, the master-switch can be locked into inoperative position, since only one of the ten contact-plugs could be pressed down.

When the electric lock is to be operated, as in this embodiment, by four contact plugs, a battery comprising four circuit closing electro-magnets and one circuit breaking electro-magnet is used. As shown in Fig. 5 these magnets are mounted, preferably, on a common frame composed of a top bar 37 and a bottom bar 38 held in proper distance by the posts 39. The first electromagnet 40 is the circuit breaking magnet and 41, 42, 43 and 44 are the four circuit closing electro-magnets.

Each magnet has an iron plunger 45 having at the bottom a cross piece 46 adapted to electrically connect together the contact terminals "T". At the upper end of each plunger is secured a collar 47 having two parallel sides slidably engaging the walls of a stirrup 48 mounted on the top bar 37. The purpose of this collar is to prevent the rotation of each plunger within the solenoid of the electro-magnet and to limit the travel thereof.

The electric lock shown in Fig. 6 consists of a housing 49, a lock-bolt 50 suitably guided for longitudinal movement, and a sliding plunger 51 having a rounded end adapted to engage the jamb of the door which causes this plunger to be pushed in. The bolt has a lateral extension 52 to which is centrally secured a magnetic core 53 extending on both sides into the solenoids 54, 55 suitably fastened to the housing.

The plunger 51 is normally pushed outwardly of the housing by a coil spring 56 placed intermediate a collar 57 formed on

the plunger and the outer guide stirrup 58. Upon this plunger is rockably mounted about the fulcrum pin 59 a bell-crank lever 60 having at the rear a long arm 61 terminating with an angularly disposed finger 62 and at the front another arm 63. This lever is held in normal position by a spring 64 and its clockwise rotation is limited by a stop-pin 65 fastened on the plunger. The finger 62 is engaged by a lenticular shaped wedge 66 mounted on the extension 52 when the bolt is forced out. When the bolt is forced in by the solenoid 55 the wedge 66 will separate the contact clips 67, 68 which normally touch each other. The wedge 66 is made of any suitable insulating material.

The arm 63 of the bell-crank lever is adapted to engage the insulated end 69^a of a switch-lever 69 (Figs. 16, 17) fulcrumed at 70 and cause the same to engage a contact 71. This lever is normally held away from said contact by a spring 72 and its rotation in a clockwise sense is limited by a pin 73. The purpose of providing the insulated end on the switch-lever is to prevent any electric current passing through the lever 60.

At the lower end of the housing are suitably fastened and spaced the electro-magnets 74, 75 provided respectively with the hinged armatures 76, 77 upon which are secured insulated switch blades 76^a, 77^a adapted to engage their corresponding contacts 78, 78^a and 79, 79^a. The armatures, therefore, carry no current; they are normally held into lifted position by coil springs 80 and bear then against stop pins 81. On the under side of the lock-bolts are two lugs 82, 83 adapted to be engaged respectively by the armatures 76, 77, to prevent the bolt, when in locking position, to be pushed in, and also to prevent its flying out by centrifugal force when the door is swung about rapidly, and the bolt is in retracted position.

As stated, the master-switch shown in Fig. 11 is intended especially for use on closed automobiles. This switch consists of a housing 84 a base 85, a cover 86 and an intermediate plate 87. Ten contact-plugs (P'') are also used.

Each contact-plug acts upon a switch-blade 88 fulcrumed on brackets 89 mounted on the base and is adapted to engage the so called "blind" terminals B also mounted on the base 85. The contact-plugs are normally held in raised position by springs 90 mounted as shown, whereas the switch-blades are normally held in engagements with their corresponding blind terminals by springs 91.

When pressed down, each contact-plug will cause its switch blade to engage an upper terminal L which is the operating or "live" contact by means of a suitably shaped resilient catch 92 provided at the outer end of a lever 93 fulcrumed in a stand 94 and

normally held in the lowered position shown in the drawing by a spring 95.

When all the contact-plugs required to complete the necessary connections to operate the lock (four in this case) have been pushed in, the switch-blades may be brought simultaneously back into inoperative position by pressing on the centrally disposed push-rod 96 having at its lower end a disc 97 acting on the raised inner ends of the levers 93. This will cause the catches 92 to release said switch-blades after having broken their engagements with the live contacts. It will, of course, be understood that this switch could be modified to be operated by a master-key, in a same manner as was done with the above described master-switches.

In Figs. 13 and 14 the terminals are numbered in Roman figures from I to X.

The electric lock shown in Fig. 15 is a replica of the one already described, and all the principal parts are marked with the same reference numerals.

Having described the various principal parts of my invention, its operation may be best explained by reference to the diagrammatic Figs. A and B.

Assuming that the invention be applied to a residence, as per Fig. A, and that the master-switch be connected for the combination of contact-plugs at V, X, VII and III operated successively, the operator will first press the contact-plug at V, whereby the following circuit will be established: From the pole -B of any suitable and desired source of electrical energy, via wire 100 to the contact-clips V^a, V^b, wire 101, solenoid 44, wire 102, contact clips 68 and 67, wire 103 terminal 104 of solenoid 40 cross-piece 46, terminal 105, down wire 134 and to the pole +A of the supply circuit. The solenoid 44 is, therefore, energized, thus connecting the terminals 106, 107 by its cross-piece 46. From 107 a wire 108 leads to the clip X^b of the master-switch.

The contact-plug at X is then pressed down and another circuit is established, viz: From the contact-clips X^b, X^a, via wire 109 through the solenoid 43, wire 102, contact-clips 68 and 67, wire 103, terminal 104 cross-piece 46, terminal 105, wire 134 and to the pole +A of the supply circuit. Hence the solenoid 43 is energized and its cross-piece 46 connects the terminals 110, 111. From 111 a wire 112 goes to the clip VII^b on the master-switch.

Contact-plug at VII is now pushed in and the following circuit is set up: From the contact-clips VII^b, VII^a, via wire 113, solenoid 42, wire 102, contact-clips 68 67 wire 103, terminal 104, cross-piece 46, terminal 105, wire 134 and to the pole +A of the supply system. The energized solenoid 42, by its cross-piece 46, connects the terminal 114, 115, and from the latter a wire 116 is connected to the clip III^b.

The contact-plug at III is the last to be

pushed in and it establishes the following connections: From III^b, III^a, by way of the wire 117 to solenoid 41, wire 102, contact-clips 68, 67, wire 103, terminal 104, cross piece 46, terminal 105, wire 134, to the pole +A. This energizes the solenoid 41. From wire 117 branches off a wire 118 which leads to the terminal 119 and the latter is connected by the cross-piece 46 to the terminal 120. Thence, a wire 121 leads to the electro-magnet 74 in the electric lock (Fig. 6) and from 74 a wire 122 goes to the pole +A. This magnet is thus energized and attracts its armature 76 which engages the contacts 78 and 78^a. The contact 78 is connected by a wire 123 to the wire 121 and the contact 78^a is connected by the wire 124 to the solenoid 55 of the lock-bolt. Another wire 125 connects the solenoid to the pole +A.

The solenoid 55 is now energized; it pulls in the lock-bolt 50 and the door may be opened. The insulated wedge 66 has now engaged the contact clips 67, 68 and separated them, thereby interrupting the current through the solenoids 41, 42, 43, 44, and the master switch is again ready for operation.

As stated before, as soon as the contact-plugs at V, X, VII and III are released after having been pushed in, they will be forced up into inoperative position by their coil-springs 5. With the wiring conditions so far described, the electric lock could not be operated unless all the active contact-plugs were kept down. Provision is, however, made to maintain their corresponding magnets 44, 43, 42 and 41 in an energized state, even after the rising of the contact-plugs, in the following manner:

To maintain the solenoid 44 energized when its corresponding contact-plug V is released, a cross wire 126 is connected to the wires 101 and 108. This will enable a current to flow from the pole -B, via wire 100, terminal 106, cross-piece 46, terminal 107, wire 108, wire 126, through the solenoid 44, the wire 102 and, in the manner repeatedly described, to the pole +A of the supply line, without passing through the contacts V^a, V^b of the master switch.

When the contact-plug at X is released, its electro-magnet 43 will remain energized by a current passing from line 108, through a wire 127, to the terminals 110, 111, wire 112, cross-wire 128, to wire 109, solenoid 43, wire 102, and thence to the pole +A.

Similarly for the contact-plug at VII; by connecting terminals 111 and 114 by a wire 129 and connecting wires 113 and 116 by the cross-wire 130 current will flow from the pole -B through the solenoid 42, wire 102, and finally back to the supply system at +A.

Of course, as soon as the last contact-plug at III is pressed down, the door-bolt will be operated; it will remain in its assumed posi-

tion, and will not be affected by the return of the contact-plug at III into inoperative position.

It is not possible to operate the lock unless the four contact-plugs be pressed down in the exact sequence for which the master-switch is wired. Thus for instance, if one should press the contact plug at VII before (instead of after) the contact-plug at X, the latter's solenoid would not be energized and, therefore, its cross-piece 46 would not establish the electric communication between the terminals 111 and 114 (via wire 129) necessary to energize the solenoid 42 which corresponds to the contact-plug at VII.

The purpose of the circuit-breaking solenoid 42 is to deenergize the four circuit-making solenoids 41 to 44 in case a wrong contact-plug of the master-switch is pressed down.

For instance, if an unauthorized person should, by good luck, press down in the right sequence, the first three contact-plugs at V, X and VII, and then erroneously press the contact-plug at I (instead of the one at III), the following circuit would be established: From the pole +A, wire 134, through solenoid 40, wire 135, circular wire 136, contacts I^a, I^b, circular wire 137, wire 100, and to the pole -B. Hence the solenoid 40 would be energized, its cross-piece 46 pulled up and the connection between the terminals 104, 105 would be broken, with the result that the electric circuits through the three, already energized, solenoids would be destroyed, and the whole process of pressing the control-plugs would have to be repeated.

As an additional safety, I have introduced in the wiring system an alarm-bell 138 (or other desired electric signalling device) which gives a warning signal as soon as the third contact-plug VII has been pressed down. This bell is connected by a wire 139 to the cross-wire 130, which connects in the manner already described to the pole -B, and by the wires 140, 134, down to the pole +A. Therefore, when the solenoid 42 is energized, the bell rings. During day time when the door is frequently opened, such as in a store in which attendants are present, it may not be necessary to make use of the signal bell, and the latter may be disconnected by opening the switch 141.

The house-switch 131, which is connected by wires 132, 133 to the poles -B and +A is used to open the electric lock from within the house, independently of the master-switch. When closing this house-switch, the path of the electric-current to the electric lock will be as follows: From the pole -B, via wires 100, 132, through switch 131, wire 133, wire 121, through the electro-magnet 74, wire 122 to the pole +A; whereby the electromagnet 74 is energized. This establishes another circuit, as follows: From the

pole +A, via wire 125, to solenoid 55, wire 124, contacts 78^a, 78, switch-blade 76^a, wires 123, 121, 133, through switch 131, wires 132 and 100 to the pole -B. Hence the energized solenoid 55 will pull in the door bolt 50 and the door may be opened.

The door may also be locked from within the residence, provided it has first been closed manually, or by means of any type of commercial door-check. The closing of the door pushes the sliding-plunger 51 of the electric lock inwardly, whereby the lever 69 engages the contact 71, being acted upon by the arm 63 of the bell-crank lever 60.

A hand switch, (or any type of automatic time switch) 142 is connected to the pole -B by a wire 143. The closing of this switch establishes the following circuit: From the pole -B, via wire 143, switch 142, switch-lever 69, contact 71, wire 144, wire 148, through the solenoid 75 and wire 145 to the pole +A. This energizes the solenoid 75 and its armature 77 engages the contacts 79, 79^a, thus closing another circuit which runs as follows: From +A, wires 134, 146, through the solenoid 54, wire 147, contacts 79, 79^a, wire 144, contact 71, lever 69, and wire 143, switch 142 to the pole -B. The solenoid 54 is energized and the door-bolt 50 is forced out by it into locking position. At thus instant, the wedge 66 presses on the finger 62 of the bell-crank lever 60 which turns counterclockwise, thus releasing the switch-lever 69 and breaking its engagement with the contact 71. Hence, the current passing through the solenoid 54 is interrupted.

When the bolt is in locking position, the armature 76 of the solenoid 74, by the action of its spring 80 will assume a position in back of the lug 82, thus preventing the backward forcing of the door-bolt.

My invention as applied to automobiles differs from the embodiment just described in that the operative contact-plugs of the master-switch remain in their pushed-in position until the push-rod 96 has been depressed, and the wiring is considerably simplified.

Referring to Figs. 11 to 15 and the diagram Fig. B, it has been assumed that the door is locked and that the combination of the contact-plugs to be operated to open the lock be X, III, VII and IV, which contact-plugs may be, in this case, operated in any desired sequence, since they are all connected directly in series.

When all four contact-plugs are pressed down, the electric current runs as follows: From the pole +A of any source of electricity, such as a storage battery, through wire 150, the contact-plugs at X, III, VII and IV, wire 159, contacts 67, 68, wire 151, wire 156, solenoid 74, wire 152, ring-wire 153 (Fig. 13) through the blind contacts at I, IX, VIII, VI, V and II, and wires 154, 155

to the pole -B. The solenoid 74 is energized; its armature 76 is attracted and engages the contacts 78 and 78^a, thereby establishing the following circuit: From the pole +A, via wires 150, 165, switch 164, wire 156, contacts 78, 78^a, wire 157, bolt solenoid 55, wire 158 to wire 152, through the six blind contacts, wires 154, 155 and to the pole -B. Therefore, the energized solenoid 55 pulls in the door bolt 50 and unlocks the door.

When the door is shut close, it is automatically bolted or locked by the agency of the sliding plunger 51 which is pushed in. As explained before, the switch lever 69 then engages the contact 71 and closes a new circuit, as follows: From the pole +A, wires 150, 201, 200, switch 69, contact 71, wire 160, solenoid 75, wires 152, 153, the six blind-contacts wires 154, 155 to the pole -B.

The solenoid 75 is energized and the attracted armature 77 closes another circuit, to wit: From +A, wires 150, 201, 200, switch 69, contact 71, wires 160, 203, contacts 79, 79^a, switch-blade 77^a, wire 162, through the solenoid 54, wire 163, wire 152, and the pole -B. Solenoid 54 is energized and the bolt 50 attracted by it locks the door. When the bolt is forced out, the wedge 66 engages the bell-crank lever 60, thus breaking the engagement between the switch-lever 69 and the contact 71 and interrupting the current passing through the solenoid 54.

As soon as the four operative contact-plugs P'' have been pushed in and the door bolt shifted, the operator of the master-switch will press on the center push-rod 96 to bring said contact-plugs back into normal inoperative position and in engagement with their respective blind-contacts.

To open the lock from the inside of the closed automobile, a normally open switch 164 is closed. The latter is in line 165 which connects the wires 150 and 151, via wire 156. The closing of this switch sets up the following circuit: From the pole +A, via wires 150, 165, switch 164, wire 156, solenoid 74, wire 152, the blind contacts, wires 154 and 155 and finally to the pole -B of the battery. Therefore, the solenoid 74 is energized, its armature 76 closes on the two contacts 78, 78^a and creates another electrical circuit which runs in the following manner: From the pole +A, via wires 150, 165, switch 164, wire 156, contacts 78, 78^a, wire 157, solenoid 55, wires 158, 152, through the six blind contacts, wire 155 and to the pole -B. The solenoid 55, therefore, attracts the bolt 50 and the door may be opened.

The use of switch 164 is especially recommendable for police patrol wagons, where it would be installed in some recondite place known only by one of the accompanying police guards. Should a criminal be able to overpower his guard or guards, he would not be able to make his escape from the patrol

wagon, on account of his ignorance regarding the location or existence of said switch.

An alarm signal, such as the bell 166 is also shown to sound a warning as soon as the third active contact-plug has been depressed. The positive pole of this bell is connected by a wire 167 to the wire 168 which starts from the third contact (at VII) and leads to the pole +A. The negative pole is directly connected by a wire 169 to the wire 152 and the pole -B. A switch 170 is also placed in line 169, to disconnect the bell, whenever desired.

It is, of course, understood that the various contacts and contact-levers, etc., in the electric lock must be properly insulated from the housing of the lock to establish the several electric circuits described above. The insulation of said contacts, etc., may be obtained by securing into the lock-housing one or more plates of insulating material (not shown) upon which the contacts, etc., would be mounted.

In the aforesaid it has been assumed that a single electric lock be fitted to a door. However, if desired, two or more such locks might be placed on each door and operated simultaneously from one master switch. The electrical connections required for this arrangement will be readily conceived by those versed in the art, assisted by the description given hereinabove.

As will be understood, as suggested herein, there may be slight changes made in the construction and arrangement of the details of my invention without departing from the field and scope of the same, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which only two specific forms of my invention have been disclosed.

I claim:

1. In combination with an electric lock having a bolt operable by electro-magnets, a plurality of preliminary electric circuits; a circuit-closing solenoid in each preliminary circuit; a switch means in each of said preliminary circuits adapted to close the electric circuit of its corresponding solenoid, and electric connections between said solenoids and electro-magnets; one of said electro-magnets being energized after the closing of all circuit-closing solenoids.

2. In combination with an electric lock having a bolt operable by electro-magnets, a plurality of preliminary circuits; a circuit closing solenoid in each preliminary circuit; a switch means in each of said preliminary circuits adapted to close the electric circuit of its corresponding solenoid; means to normally hold each switch means in open position; electrical connections between said solenoids and electro-magnets adapted to energize one electro-magnet after the closing of all circuit-closing solenoids, and electric con-

nections adapted to maintain the solenoids energized after their corresponding switch means resume their normal open position.

3. In a system for actuating an electric lock operated by electro-magnets, a master-switch comprising a plurality of switch means disposed concentrically in spaced relation; means for normally holding said switch means into open position, and unitary means for closing simultaneously a plurality of switch means.

4. In a master-switch for operating an electric lock, the combination of a plurality of contact-plugs; contact-clips therefor; means to guide said plug for longitudinal movement; means adapted to normally hold said contact-plugs distant from their corresponding contact-clips, and unitary means to connect simultaneously several contact-plugs with their corresponding contact-clips.

5. In a master-switch for operating an electric lock, a housing; a top and bottom therefor; a guide-plate positioned intermediate said top and bottom; a plurality of contact-plugs disposed concentrically and guided for longitudinal movement by the top and said guide-plate; a plurality of contact-clips mounted on the base and adapted to be engaged by their corresponding contact-plugs; means for normally holding said plugs distant from their contact-plugs; a centrally disposed rotatable spindle; a lower safety disc secured to said spindle and an upper safety disc freely engaged by the spindle, bearing on the lower disc and rotatable thereon, said safety discs having evenly spaced apertures adapted to be engaged simultaneously by the contact-plugs and the upper safety disc having an additional aperture disposed intermediate two of said aforementioned apertures and registerable with either one of the apertures in the lower disc, and means to secure said safety discs into selected relative position.

6. In an electric lock, a door-bolt having a lateral extension; a magnetic core fastened to said extension and extending on both sides thereof; a solenoid positioned on each side of said extension and engaged by its corresponding portion of said core, and an electric system comprising electro-magnets and contact-making and breaking means adapted to close an electric circuit through said bolt actuating solenoids.

7. In a master-switch for operating an electric lock, a housing; a top and bottom therefor and an intermediate plate; a plurality of contact-plugs disposed concentrically and guided for longitudinal movement by said top and intermediate plate; a plurality of rockable switch-blades mounted on the base each adapted to be operated by a contact-plug; a plurality of lower contact-clips also mounted on the base; means to normally hold the switch blades into engagement with said

lower contact-clips; a plurality of upper contact-clips mounted on the intermediate plate and each adapted to be engaged by a switch-blade when actuated by its corresponding contact-plug; means to hold each switch-blade in engagement with its upper contact-clip, and unitary means for simultaneously returning the switch-blades engaging the upper contact-clips into engagement with their lower contact-clips.

10 n testimony whereof I affix my signature.
OTTO HARDERS.

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