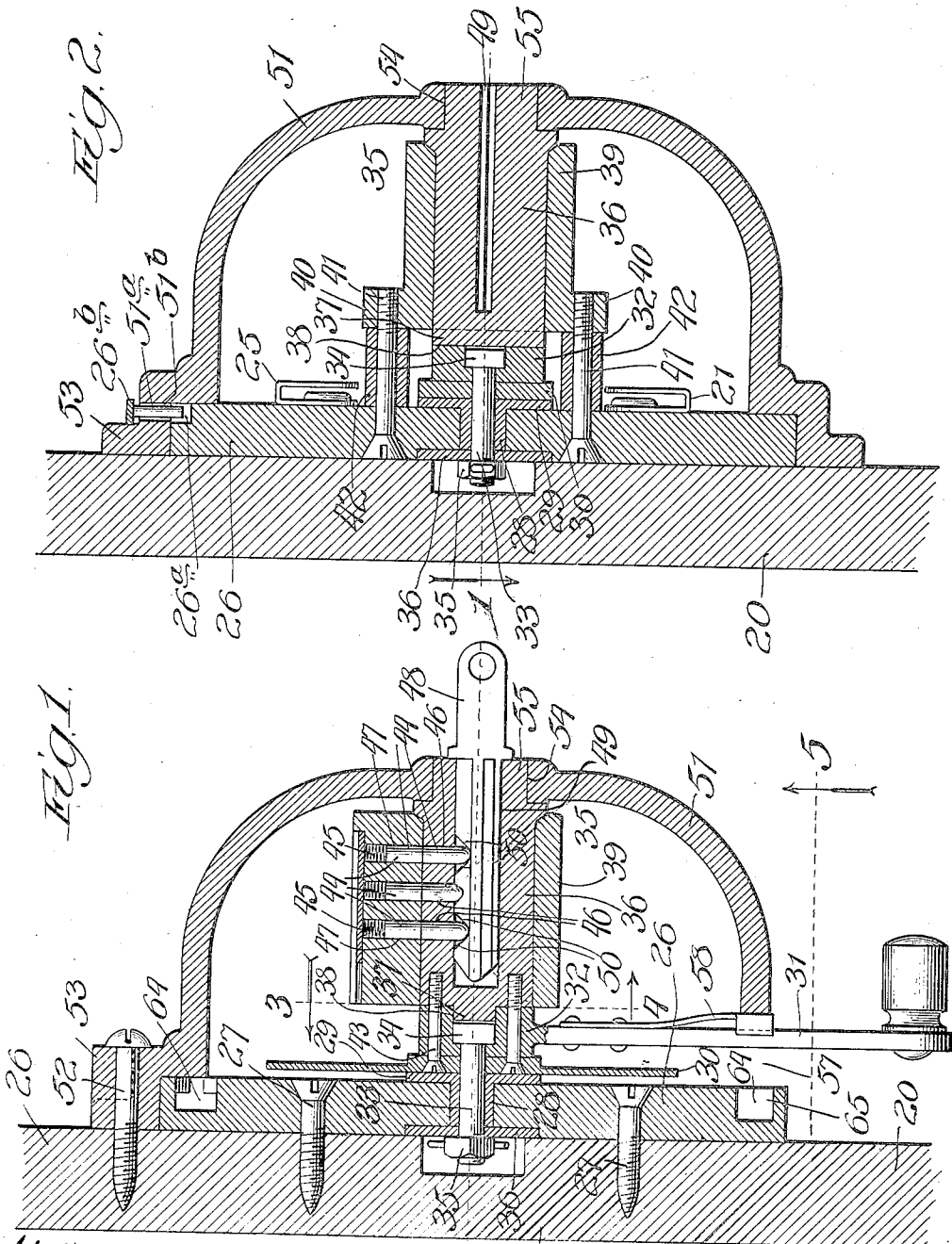


E. R. HAMILTON.
ELECTRIC SWITCH.
APPLICATION FILED DEC. 29, 1911.

1,055,035.

Patented Mar. 4, 1913.

6 SHEETS—SHEET 1.



Witnesses:
Chas. Gaylord
Chas. A. Bull.

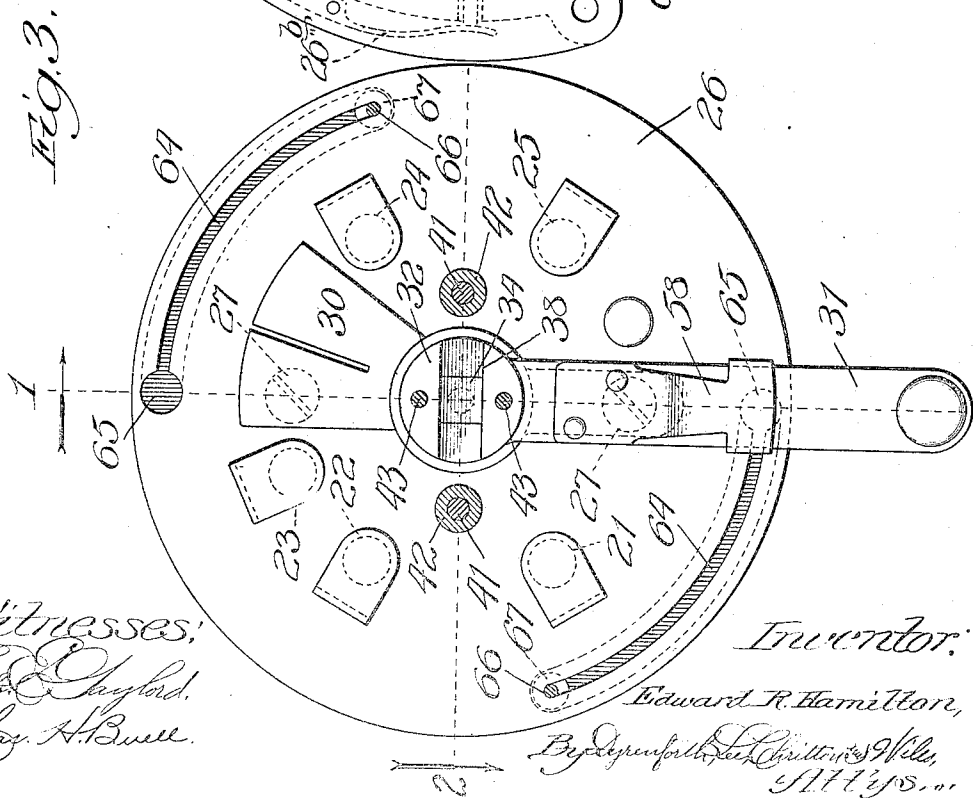
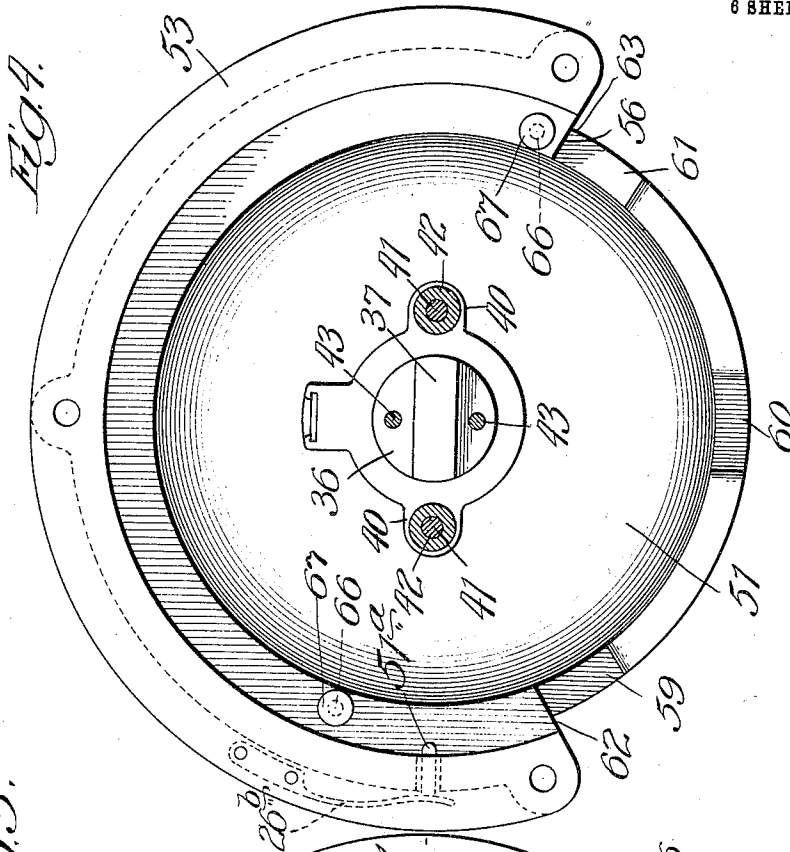
Inventor:
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By *Adams, Peck, Crittton & Miles*
ATTY'S

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6 SHEETS—SHEET 2.



Witnesses:
Chas. H. Buel.
Chas. H. Buel.

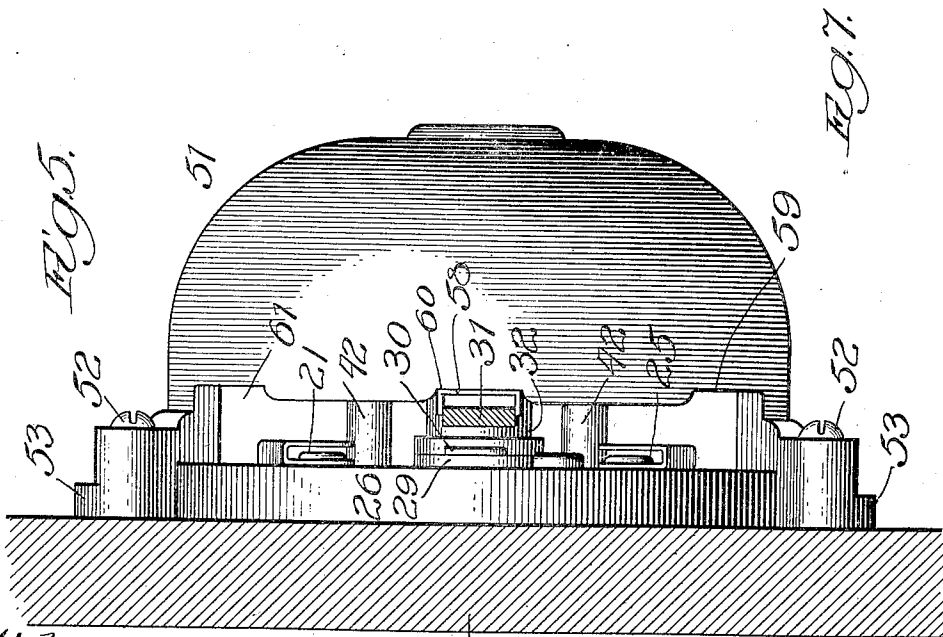
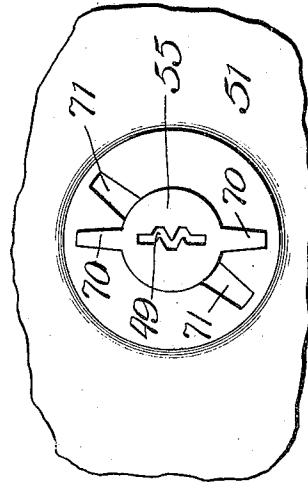
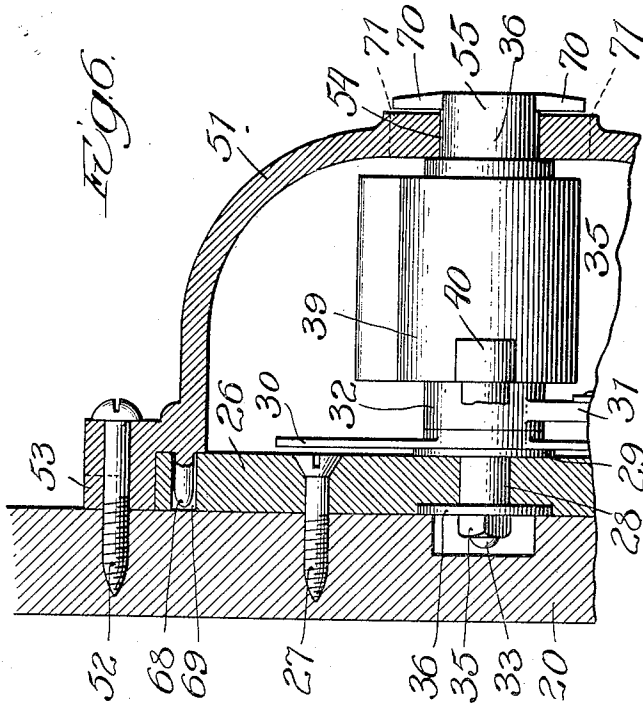
Inventor:
Edward R. Hamilton,
By *Edmund S. Hamilton*,
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1,055,035.

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6 SHEETS—SHEET 3.



Witnesses:

Ed. J. Gaylord,
Chas. A. Burr.

Inventor

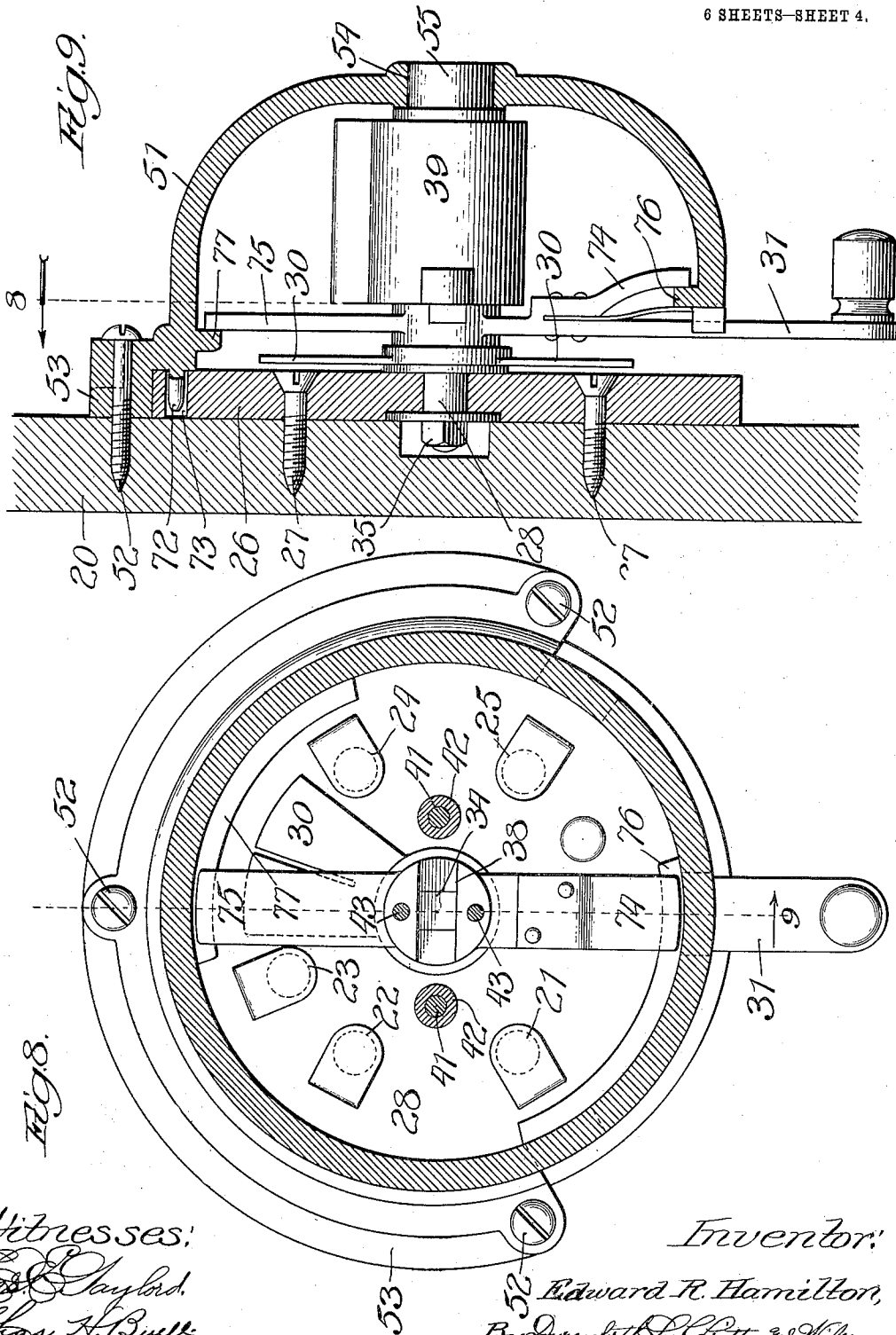
Edward R. Hamilton,
By Dymally, Roe, Christman & Miller,
Attys.

E. R. HAMILTON.
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APPLICATION FILED DEC. 29, 1911.

1,055,035.

Patented Mar. 4, 1913.

6 SHEETS—SHEET 4.



Witnesses:
Chas. H. Buell
Chas. H. Buell

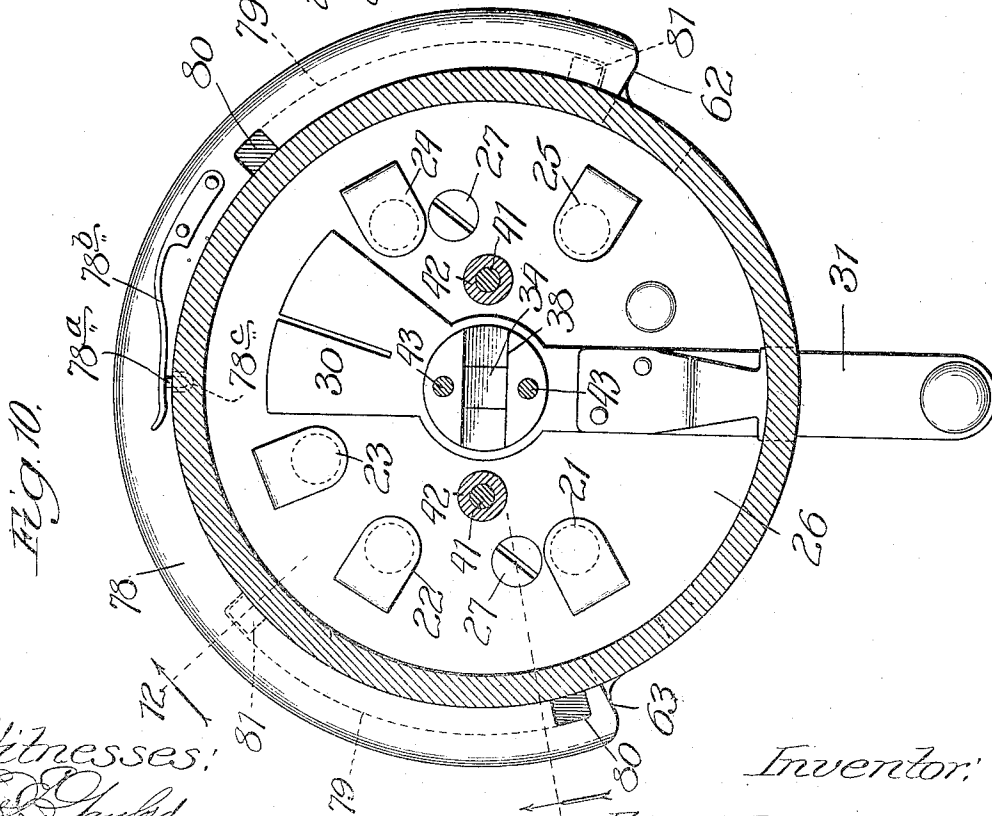
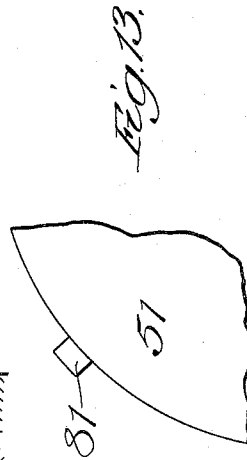
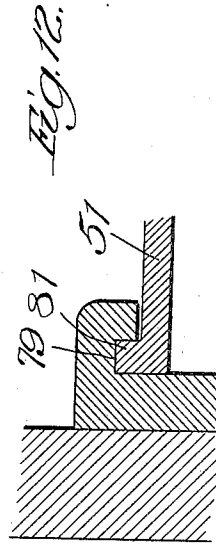
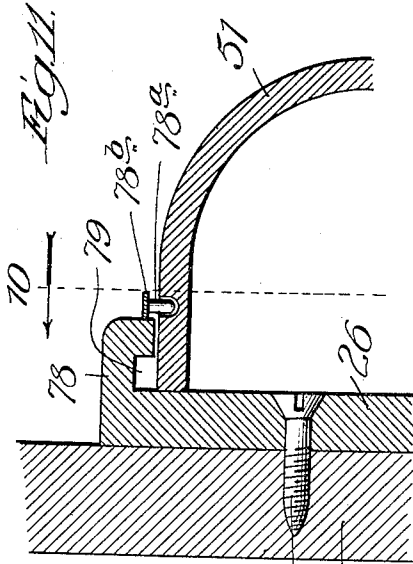
Inventor:
Edward R. Hamilton,
By *Dugan, Smith, & Co.* Attorneys

E. R. HAMILTON.
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APPLICATION FILED DEC. 29, 1911.

1,055,035.

Patented Mar. 4, 1913.

6 SHEETS—SHEET 5.



Witnesses:
Chas. H. Bull.

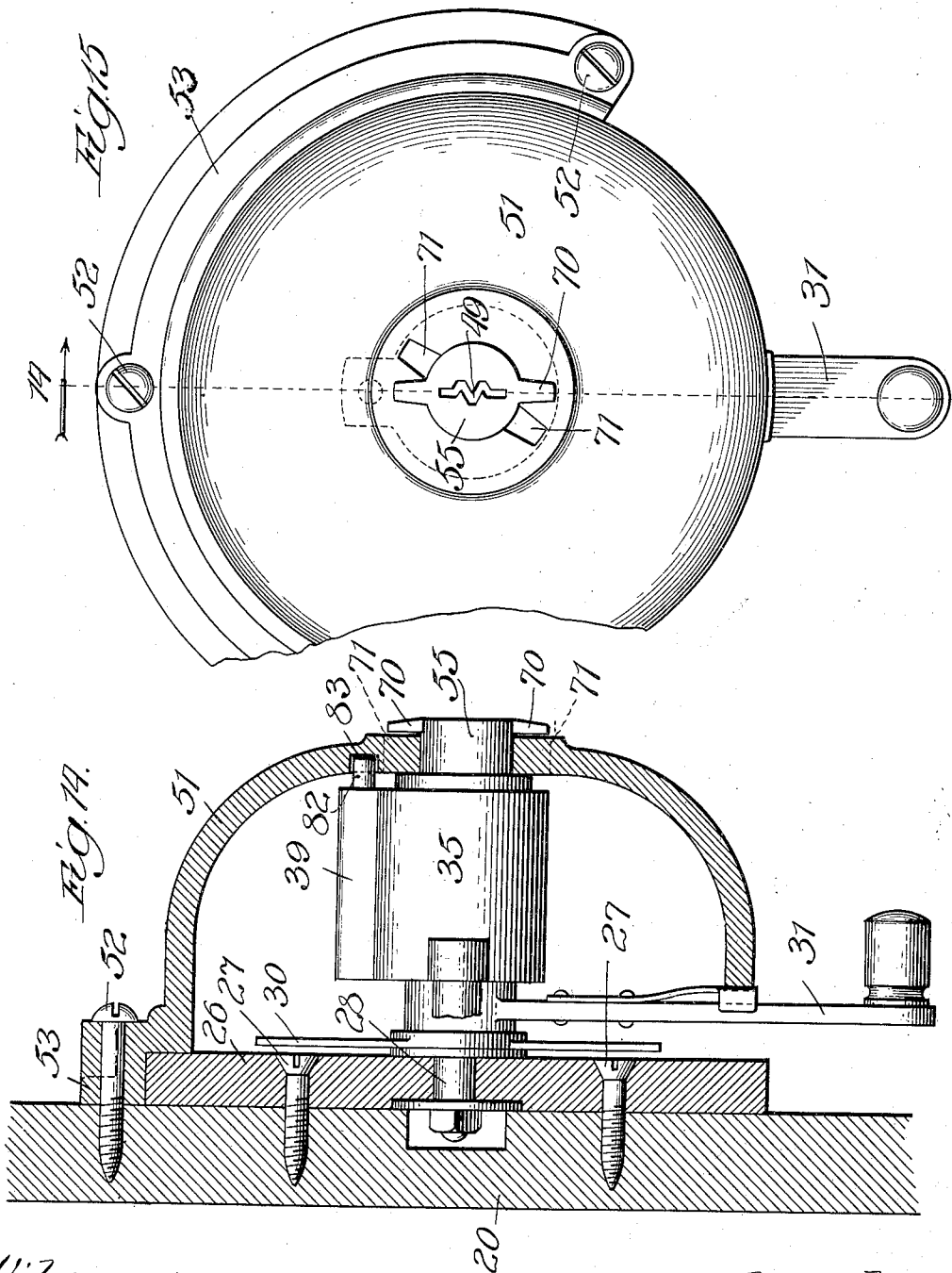
Inventor:
Edward R. Hamilton,
By Deane & Co., Attorneys

E. R. HAMILTON.
ELECTRIC SWITCH.
APPLICATION FILED DEC. 29, 1911.

1,055,035.

Patented Mar. 4, 1913.

6 SHEETS—SHEET 6.



Witnesses:
Ed. C. Gaylord,
Chas. H. Bull,

Inventor:
Edward R. Hamilton,
By J. D. G. Smith, Sec., Clinton & Wilcox,
Attys.

UNITED STATES PATENT OFFICE.

EDWARD R. HAMILTON, OF CHICAGO, ILLINOIS.

ELECTRIC SWITCH.

1,055,035.

Specification of Letters Patent.

Patented Mar. 4, 1913.

Application filed December 29, 1911. Serial No. 668,562.

To all whom it may concern:

Be it known that I, EDWARD R. HAMILTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric Switches, of which the following is a specification.

It is desirable in many situations where electric switches are employed that provision be made for the locking of the movable members of the switches in any given position, either on or off, against actuation by any other than an authorized person, and to prevent the switch-contacts from being accessible when the switch is locked, it being more especially desirable that such locking-means be employed in connection with switches used for controlling the ignition circuits of internal-combustion engines on automobiles, lighting circuits and circuits for power devices.

My object is to provide improved locking-mechanism for switches which shall operate to prevent actuation of the switch and access to the switch terminals, excepting by one having authority.

Referring to the accompanying drawings, in which I have illustrated some of the various forms in which my invention may be embodied, the variety of switch illustrated being that used for controlling the circuits of ignition systems of internal-combustion engines as commonly used on automobiles, Figure 1 is a view in vertical sectional elevation of a switch-device shown as secured to the dash-board of an automobile and constructed in accordance with my invention, for controlling the ignition system of the internal-combustion engine of an automobile, the section being taken at the lines 1 on Figs. 2 and 3. Fig. 2 is a section taken at the lines 2 on Figs. 1 and 3 and viewed in the direction of the arrow. Fig. 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow. Fig. 4 is a section taken at the line 4 on Fig. 1 and viewed in the direction of the arrow. Fig. 5 is a view in elevation of the switch-mechanism of Fig. 1, this view being taken at the line 5 on Fig. 1. Fig. 6 is a broken section taken at a line corresponding to the line 1 on Fig. 2, of a modification of the construction shown in the preceding figures. Fig. 7 is a broken view in elevation of the construction illustrated in Fig. 6, this view being taken from the right-hand side of Fig. 6.

Figs. 8 and 9 are sections taken at the lines 8 and 9 on Figs. 9 and 8 respectively, and viewed in the direction of the arrows of another modification of my invention. Fig. 10 is a view in sectional elevation of still another modification of my invention, the section being taken at the line 10 on Fig. 11, and viewed in the direction of the arrow. Figs. 11 and 12 are sections taken at the lines 11 and 12 respectively on Fig. 10 and viewed in the direction of the arrows. Fig. 13 is a broken view of a portion of the removable cover for the switch-mechanism of Fig. 10. Fig. 14 is a view in vertical sectional elevation of another modification of my invention, this view being taken at the line 14 on Fig. 15 and viewed in the direction of the arrow; and Fig. 15, a broken view in front elevation of the construction illustrated in Fig. 14.

In the accompanying drawings, a support, as for example the dash-board of an automobile, is represented at 20 to which the switch-mechanism, hereinafter described, are secured.

Referring particularly to Figs. 1 to 5 inclusive, the plate of insulating material which is equipped with the electric contacts 21, 22, 23, 24 and 25 to which the wires (not shown) of the ignition system of an engine are connected, is represented at 26, as secured to the dash-board 20 through the medium of screws 27. The plate 26 contains a bushing 28 provided at its outer end with an annular flange 29 which seats against the outer face of the plate 26. The movable brush-member, represented at 30, of the switch is provided with an actuating-handle 31 having a head 32. A bolt 33 extends through the head 32, the member 30 and bushing 28, and fits at its square head in a similarly-shaped recess 34 in the head 32, this bolt being journaled in the bushing 28 and provided with a nut 35 at its opposite screw-threaded end which screws against a washer 36 surrounding the bolt 33 and bearing against an end of the bushing 28. The member 30 and handle 31 are secured together by means hereinafter described, whereby the member 30 may be rotated through the medium of the handle 31 for causing the ends of the member 30 to engage with opposed ones of the contacts 21 and 25 inclusive on the plate 26. Coöperating with the lever 31 is locking mechanism 35 for releasably locking this lever in a predeter-

mined position, in the construction illustrated the locking mechanism 35 operating to releasably lock the lever 31 in neutral position illustrated in Fig. 3, in which the switch is open. The locking-means illustrated comprise a lock-barrel 36 provided on its inner end with a tongue 37 which fits into a groove 38 in the head 32 extending transversely of the latter; a lock-casing 39 in which said barrel is rotatably confined, said casing being provided with lugs 40 at which it is secured to the plate 26 as through the medium of machine-screws 41, which carry spacers 42; and key-actuated tumbler-mechanism, hereinafter described, which operates to releasably lock the barrel 36 to the casing 39 and consequently said brush-member 30 and lever 31 against rotation, the member 30, handle 31 and lock-barrel 36 being connected together through the medium of machine-screws 43 as illustrated in Fig. 1.

The type of lock shown is that commonly known as the Yale lock, each tumbler of which, represented at 44, is divided transversely into two sections, these sections being longitudinally movable in slots 46 and 47 in the barrel 36 and casing 39, respectively, the tumbler-sections 44 in the slots 47 being backed up by springs 45. The relative positions of the slots 46 and 47 and the relative length of the tumbler-sections 44 are such as to cause these tumbler-sections to be moved against the action of the springs 45 to a position in which the dividing lines between the tumbler-sections 44 will be coincident with the dividing line between the barrel 36 and the casing 39, when a key such as that represented at 48 is introduced into the key-way 49 and engages at its serrations 50 with the ends of the tumbler-sections 44 extending into the key-way 49, as illustrated in Fig. 1. With the tumblers 44 in the position referred to, the barrel 36, actuating lever 31 and member 30 may be swung back and forth, but when the key 48 is removed from the key-way 49, the springs 45 will cause the tumbler-sections 44 to be shifted from the position illustrated in Fig. 1 to a position in which the joints between them will be non-coincident with the dividing line between the barrel 36 and the casing 39, the tumblers thereby locking the barrel against movement.

The operative parts of the switch are housed within a cover 51 which may be secured to the dash 20 as through the medium of screws 52 extending through openings in a flange 53 on the cover; said cover containing a central opening 54 into which the reduced outer end 55 of the barrel 36 extends. A segmental section of the cover is cut away through the body-portion of the cover and the flange 53, as represented at 56, to afford a slot 57 through which the switch-arm 31 extends as represented in Fig. 1, the switch-

arm being provided with a spring-detent 58 which yieldingly bears against an edge of the cover and is adapted to spring into any one of the recesses 59, 60 or 61 therein for holding the switch-arm in position against accidental displacement when the latter extends opposite these recesses, the detent 58 springing out of said recesses upon the act of manually swinging the arm 31, the shoulders represented at 62 and 63 on the cover and located at the ends of the cut-away portion 56 thereof extending adjacent to the extreme end-walls of the recesses 59 and 61. The plate 26 contains in its outer face diametrically-opposed arc-shaped slots 64 which throughout a greater portion of their length are of T-shape in cross-section, as represented in Fig. 1, each of said slots 64 containing an enlargement 65 at one end, one of these enlargements extending into a position in which it will be covered by the switch-arm 31 when the latter is in neutral position as illustrated in Fig. 3. The cover 51 is equipped with diametrically-opposed pins 66 having heads 67 which are adapted to be introduced into the slots 64 at the enlarged portions 65 thereof when the arm 31 is swung to the right in Fig. 3, and interlock at their heads 67 with the contracted portions of these slots when the cover 51 is rotated on the plate 26 to the right in Fig. 3, the position to which the cover 51 should be rotated to properly position it on the plate 26 being that illustrated in Fig. 3, in which the recess 60 opposes the arm 31 when the latter is in neutral position and the shoulders 62 and 63 lie in such positions as will permit the arm 31 to be swung into engagement with any of the contacts 21 to 25 inclusive.

It will be understood from the foregoing that the cover 51 may be applied to the plate 26 only when the switch-arm 31 is moved, after being unlocked, to a position in which the enlarged portion 65 of the slot 64 adjacent to this arm in Fig. 3 is uncovered, as by swinging the arm 31 to the right in said figure. Thus when the arm 31 is in the position illustrated in Fig. 3, namely neutral position, in which it is locked by the locking mechanism described, the cover 51 can not be rotated on the plate 26 sufficiently far to cause the heads 67 of the pins 66 to register with the slot enlargements 65, because the shoulder 63 on the cover 51 will strike the switch-arm 31 before the heads 67 are moved into registration with the slot enlargements 65, and the switch-arm 31 being locked against actuation the cover 51 can not be removed and access be gained to the interior mechanism of the switch or the electrical terminals thereof, excepting by the insertion into the key-way 49 of a key 48 suitable for unlocking the barrel 36 from its casing 39. If desired, the screws 52 may be omitted,

in which case locking means are, by preference, provided for holding the cover 51 against turning on the plate 26, under vibrations, to a position in which its heads 67 will register with the openings 65, when the arm 31 is moved out of the position illustrated in Fig. 1 to the right in this figure, the locking means shown comprising a pin 51^a reciprocally mounted in a slot 51^b in the cover 51 and adapted to yieldingly project into a recess 26^a in the plate 26 under the action of a spring 26^b on this plate when the cover 51 is in a position in which the pins 66 occupy the positions in the slots 64 represented in Fig. 3. By withdrawing the pin 51^a from the recess 26^a, the cover 51 may be turned to a position in which it may be removed from the plate 26 when the arm 31 is swung to the right in Fig. 3.

The construction illustrated in Figs. 6 and 7 is the same as that illustrated in the preceding figures excepting as to the feature of securing the cover 51 to the switch-mechanism for preventing its removal therefrom. In this construction instead of providing the slot and cooperating pin feature of the preceding figures, I provide on the cover a pin 63 which, when the cover 51 is applied to the dash-board 20, extends into a slot 69 in the plate 26, and form the outer end of the barrel 36 with oppositely-extending fingers 70 adapted to overlap the front side of the cover 51 as illustrated in Figs. 6 and 7. In the cover 51, slots 71 are formed which open into the aperture 54 in the cover and extend at angles to the fingers 70 when the cover 51 is secured in position on the dash 20, as described, and the barrel 36 of the lock 35 is locked to the lock-casing 39, in which condition the switch-arm 31 is in the neutral position illustrated in Fig. 3. As the slots 71 are out of registration with the arm 70, when the key 48 for operating the locking-mechanism is withdrawn and the cover 51 is held against rotation by the pin 63, access can not be gained to the switch until the operator inserts the proper key into the lock 35 and turns the barrel 36 thereof to a position in which the fingers 70 register with the slots 71.

The construction illustrated in Figs. 8 and 9 is the same as that illustrated in Figs. 1 to 5 inclusive, excepting as to the feature of locking the cover 51 in place. In this construction, a pin 72 fits into an opening 73 in the plate 26 when the cover is applied to the dash 20, as explained of the construction illustrated in Figs. 5 and 6. To prevent the removal of the cover 51 from the switch-mechanism, except when the barrel 36 of the lock 35 is unlocked from the casing 39 thereof, I provide on the switch-arm 31 oppositely-extending fingers 74 and 75 which are adapted to engage with inwardly-projecting flanges 76 and 77 provided on the cover 51.

The flanges 76 and 77 are of arc-shape, as illustrated in Fig. 8, and are so arranged relative to the switch-arm 31, as illustrated, as to cause the cams 74 and 75 to overlap these flanges when the arm 31 is in the neutral position (Fig. 8), in which condition the locking mechanism locks the barrel 36 to the casing 39, and can only be unlocked by the insertion of the key 48 into the key-way of the lock, the flanges 76 and 77 being so disposed as to permit the arms 74 and 75 of the switch-arm 31 to be moved out of overlapping position relative thereto only when the arm 31, after being unlocked, is moved to the right in Fig. 8. When the arms 74 and 75 are disengaged from the flanges 76 and 77, the cover 51 may be readily removed and replaced as desired.

The construction illustrated in Figs. 10 to 13 inclusive, is the same as that illustrated in Figs. 1 to 5 inclusive, excepting as to the feature of locking the cover 51 in position. In this construction, the plate 26 is formed with a forwardly-extending segmental flange 78 corresponding in length to the flange 53 of the construction illustrated in Figs. 1 to 5 inclusive and containing arc-shaped slots 79 which communicate with openings 80 in the flange 78, the cover 51 being provided with laterally-extending lugs 81 which are so disposed relative to the shoulders 62 and 63, as to permit the lugs 81 to be introduced into the grooves 79 through the openings 80, for interlocking the cover 51 with the plate 26, only when the switch-arm 31 is moved to the right in Fig. 10, which movement of the arm 31 can only be effected when the barrel 36 of the locking mechanism 35 is unlocked from the casing 39 by the insertion of the proper key into the key-way 49 of the barrel 36. Thus when the cover 51 is interlocked with the plate 26 as described, it can not be rotated on this plate sufficiently far to cause the lugs 81 to register with the openings 80, for removing the cover, while the arm 31 is in locked neutral position (Fig. 10). In order that the cover 51 be releasably held against accidental movement on the plate 26 to a position in which the lugs 81 register with the openings 80, I provide locking means, those shown comprising a pin 78^a carried on the end of a spring 78^b secured to the flange 78 and adapted to project into a recess 73^a on the cover 51 when the lugs 81 on this cover occupy the positions illustrated in Fig. 10. Thus vibration of the switch will not disarrange the position of the cover 51.

The construction illustrated in Figs. 14 and 15 is the same as that illustrated in Figs. 6 and 7, excepting that the means, other than the screws 52, for holding the cover 51 against rotation, instead of being formed of a pin carried by the cover and fitting into a slot as illustrated in Fig. 6, are formed of

a pin 82 secured to the casing 39 of the lock 35 and extending into a recess 83 on the cover 51, when the latter is positioned on the dash 20, this pin, by extending into the slot 83, preventing the cover 51 from being rotated for moving the slots 71 therein into registration with the arms 70, which latter occupy a position at angles to the slots 71 as illustrated in Fig. 15 and described of the construction illustrated in Fig. 6, when the barrel 36 of the lock is locked to the casing 39 thereof, in which position of the lock the switch-arm 31 is in neutral position.

It will be observed that in each of the constructions illustrated, the switch-arm 31 is locked in neutral position through the medium of the lock 35, and can not be swung either to the right or to the left to rotate the brush 30 of the switch until a key having the proper formation is inserted into the key-way 49 of the lock-barrel 36 for moving the lock-tumblers 44 to a position in which the barrel 36 of the lock is released from the casing 39 thereof, this being a desirable feature, as each lock constructed may be so formed as to require a key 48 of different formation for operating it. Furthermore, it will be noted that in each of the constructions illustrated, the cover 51 for the switch mechanism, which must be removed in order that access be gained to the terminals of the switch, is locked against removal and can not be separated from the switch-mechanism until the lock 35 has been operated to move the tumblers 44 to a position in which the barrel 36 may be turned in the casing 39.

It will be understood that, if desired, the arrangement of the locking mechanism relative to the movable switch-member, as for example, the brush 30, may be varied as desired to lock the movable switch-member in any other desired position relative to the electric contacts 21 to 25 inclusive of the switch, instead of locking the switch-member 30 in neutral position in which the current is shut off, such modified arrangement, as will be manifest to those skilled in the art, being apparent and desirable where the switch is used for controlling electric lights or power devices where it is desired to either lock the current on or off or supply to a power device a certain amount of current. Under such conditions, if it is desired that the cover of the switch be locked against removal when the switch is locked, the position of the interlocking devices for holding the cover against removal would be altered, as will be manifest, to effect such required locking of the cover.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an electric switch, the combination with its rotatable member and a cover for the switch, of a lock, separate from said

cover, for releasably locking said rotatable member of the switch in a predetermined position, the stationary member of said lock being carried by the body of said switch, an actuating device for said rotatable member secured thereto and extending beyond said cover, and means for locking said cover against removal when the rotatable member of said switch is locked.

2. In an electric switch, the combination with its rotatable member and a cover for the switch, of an actuating device for said rotatable member secured thereto and extending beyond said cover, and a lock mounted on the body of the switch and separate from said cover for locking said cover against removal when said rotatable member of the switch is in a predetermined position.

3. In an electric switch formed of relatively movable members one of which is rotatable, the combination of a lock for releasably locking the rotatable member of the switch in a predetermined position, the stationary member of said lock being carried by the body portion of said switch, a cover for the switch, an actuating device for said rotatable member secured thereto and extending beyond said cover, and means for releasably locking said cover against removal when said rotatable switch member is locked, said first-named lock being separate from said cover.

4. In an electric switch formed of relatively movable members one of which is rotatable, and a cover, of an actuating device for said rotatable member secured thereto and extending beyond said cover, a lock, separate from said cover, for releasably locking the movable member of said switch in a predetermined position, and means for releasably locking said cover against removal, the stationary member of said first-named lock being carried by the body of said switch.

5. In an electric switch formed of relatively rotatable members and a cover, of a lock on the body of the switch and separate from said cover, for releasably locking the rotatable member of said switch in a predetermined position, and means for releasably locking said cover against removal when the rotatable member of the switch is locked.

6. In an electric switch formed of relatively movable members, the combination of means on the body of the switch for releasably locking the movable member of said switch in a predetermined position, a cover for the switch separate from said means and releasably interlocking with the stationary member of the switch, and means operating to prevent removal of said cover from said switch when the movable member of the latter is in locked condition.

7. In an electric switch formed of relatively movable members, the combination of means on the body of the switch for releasably locking the movable member of said switch in a predetermined position, a cover for the switch, means for interlocking said cover with the stationary member of said switch when said movable switch member is moved out of locked position, and means, co-
 10 operating with said movable switch member, for preventing said cover from being moved out of interlocking condition relative to the switch when said movable switch member is in said predetermined position.

15 8. In an electric switch, the combination of a cover therefor, means on the body of the switch for releasably locking the movable member of said switch in a predetermined position, means for releasably interlocking said cover in position on the switch
 20 releasable upon rotating said cover to a predetermined position, and means separate from said first-named means for preventing said cover from being rotated to a position
 25 in which said interlocking means disengage.

9. In an electric switch, the combination of a cover therefor, means for releasably locking the movable member of said switch in a predetermined position, means for releasably interlocking said cover in position
 30 on the switch releasable upon rotating said cover to a predetermined position, and means coöperating with the movable member of said switch for preventing said cover
 35 from being rotated to a position in which said interlocking means disengage when the said movable switch-member is in locked condition.

10. In an electric switch, the combination of a cover therefor, means for releasably locking the movable member of said switch in a predetermined position, means for releasably interlocking said cover in position
 45 on the switch releasable upon rotating said cover to a predetermined position, and means on said cover for engagement with the movable member of said switch for preventing said cover from being rotated to a
 50 position in which said interlocking means disengage when said movable switch-member is in locked condition.

11. In an electric switch, the combination of a cover therefor means for releasably locking the movable member of said switch
 55 in a predetermined position, means for releasably interlocking said cover in position on the switch releasable upon rotating said cover to a predetermined position, means coöperating with the movable member of
 60 said switch for preventing said cover from being rotated to a position in which said interlocking means disengage when the said movable switch-member is in locked condi-

tion, and means for holding said cover against accidental rotation on said switch. 65

12. In an electric switch, the combination of a cover therefor, means for releasably locking the movable member of said switch in a predetermined position, means for releasably interlocking said cover in position
 70 on the switch releasable upon rotating said cover to a predetermined position, means on said cover for engagement with the movable member of said switch for preventing
 75 said cover from being rotated to a position in which said interlocking means disengage when said movable switch-member is in locked condition, and means for holding
 80 said cover against accidental rotation on said switch.

13. In an electric switch, the combination of a cover therefor, relatively-overlapping interlocking parts on said cover and switch movable into overlapping interlocking condition by rotating said cover on the switch, 85
 means for releasably locking the movable member of said switch in a predetermined position, and means coöperating with the movable member of said switch for preventing
 90 said cover from being rotated to a position in which said overlapping parts disengage while said movable switch-member is in locked condition.

14. In an electric switch, the combination of a cover therefor, relatively-overlapping
 95 interlocking parts on said cover and switch movable into overlapping interlocking condition by rotating said cover on the switch, means for releasably locking the movable
 100 member of said switch in a predetermined position, and means on said cover and coöperating with the movable member of said switch for preventing said cover from being
 105 rotated to a position in which said overlapping parts disengage while said movable switch-member is in locked condition.

15. In an electric switch, the combination of a cover therefor containing an opening, an operating arm connected with the movable member of said switch and extending
 110 through the opening in said cover, means for releasably locking the movable member of said switch and said arm in a predetermined position, means for releasably interlocking
 115 said cover in position on the switch releasable upon rotating said cover to a predetermined position, and means adjacent to an end of said opening in the cover
 120 for preventing said cover from being rotated to a position in which said interlocking means disengage when said movable switch-member is in locked condition.

EDWARD R. HAMILTON.

In presence of—

A. U. THORIEN,
 R. A. SCHAEFER.