No. 615,388. Patented Dec. 6, 1898.

C. HARTDEGEN.

APPARATUS FOR OPERATING ELECTRIC SWITCHES.

(Application filed July 30, 1897.)

(No Model.) 3 Sheets—Sheet 1.

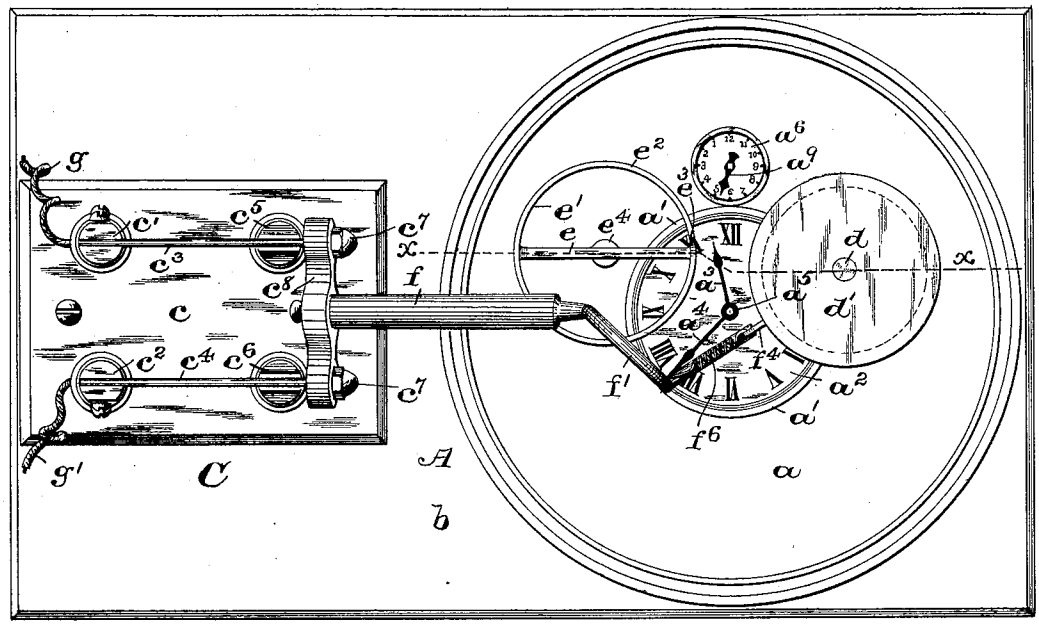


FIG. 1

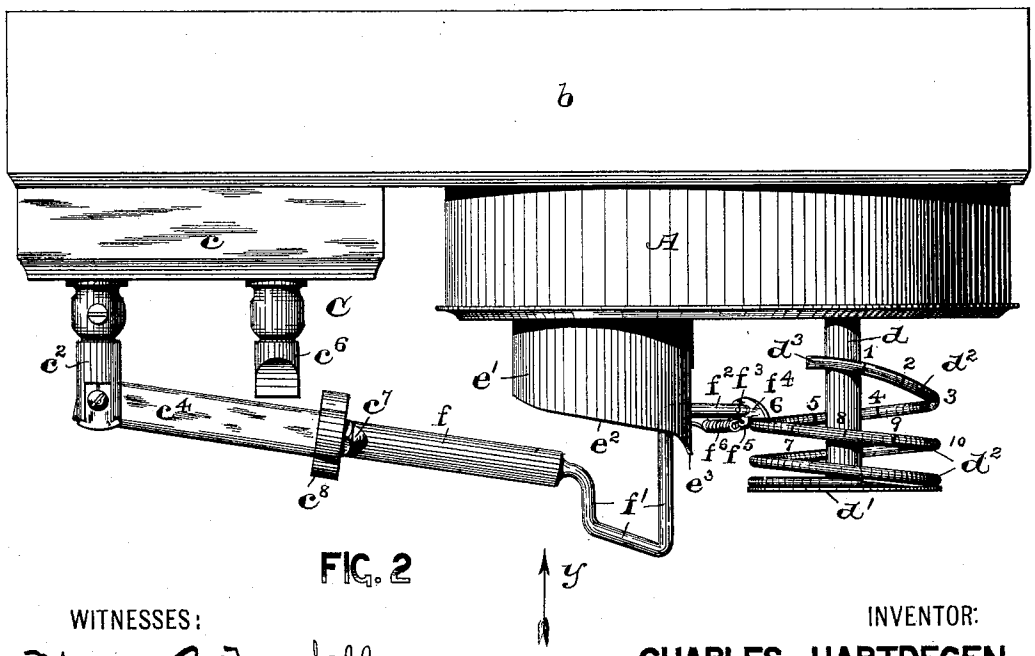


FIG. 2

WITNESSES:

Marcy F. Trusdell

Wm. H. Canfield Jr.

INVENTOR:

CHARLES HARTDEGEN,

BY

Fred C. Fraentzel,

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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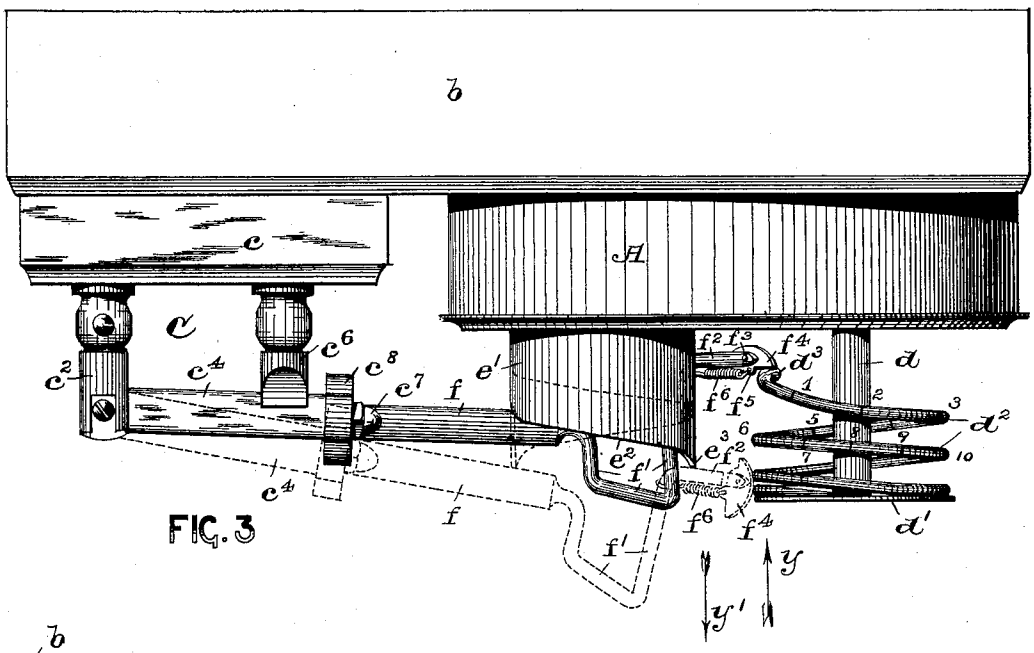


FIG. 3

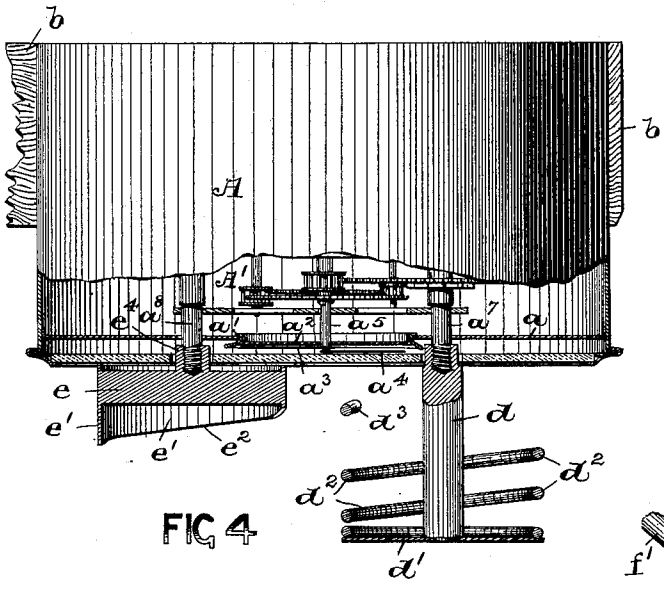


FIG. 4

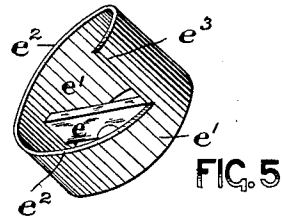


FIG. 5

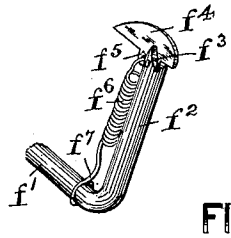


FIG. 6

WITNESSES:

Marcy E. Trusdell

Wm. H. Caulfield Jr.

INVENTOR:

CHARLES HARTDEGEN,

BY

Fred'k C. Fraentzel,

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,388. Patented Dec. 6, 1898.

C. HARTDEGEN.

APPARATUS FOR OPERATING ELECTRIC SWITCHES.

(Application filed July 30, 1897.)

No Model. 3 Sheets—Sheet 3.

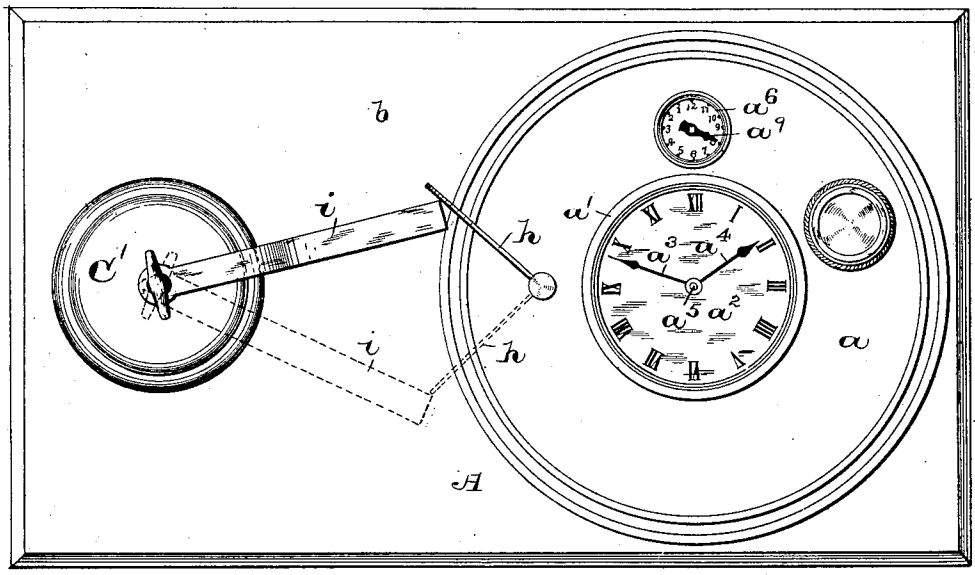


FIG. 7

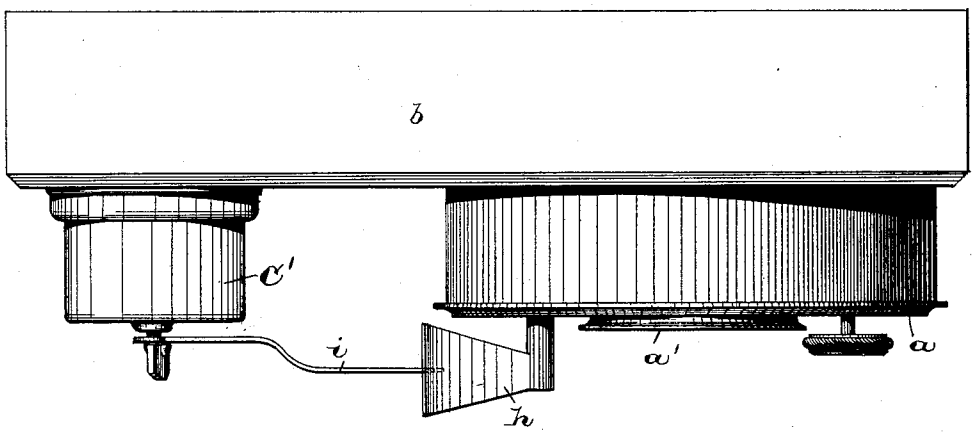


FIG. 8

WITNESSES:

Marcy L. Trumbull

Wm. H. Canfield Jr.

INVENTOR

CHARLES HARTDEGEN,

BY

Fred C. Fraentzel,

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES HARTDEGEN, OF NEWARK, NEW JERSEY.

APPARATUS FOR OPERATING ELECTRIC SWITCHES.

SPECIFICATION forming part of Letters Patent No. 615,388, dated December 6, 1898.

Application filed July 30, 1897. Serial No. 646,442. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HARTDEGEN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Operating Electric Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention has reference to a novel means for automatically operating an electric switch either to make or break the circuit at any previously-determined time; and the main object of my invention is to construct an electric switch controlling or operating mechanism provided with a suitable timepiece and its train of gear mechanism or movement by means of which the electric switch may either be automatically closed at any desired hour during the day to complete an electric circuit and said switch again automatically opened at a later time to break the electric circuit or said mechanism may be made to simply complete a circuit through the switch, the circuit being afterward broken by hand; or, if so desired, said mechanism may be arranged and operated to break the circuit by causing said switch to be automatically opened at the time desired.

The purpose of the device or apparatus is to enable a storekeeper to properly set the clock mechanism during any hour of the day, and by means of the apparatus automatically close an electric switch in a lamp or other electric circuit to light the lights, and later on at any desired hour to automatically open the switch in said electric circuit, whereby the lights are extinguished. It will thus be seen that by this means a storekeeper can leave his store before dark and in the evening the lights will be turned on and out without requiring the presence of any person, which is of great benefit to the storekeeper, especially on holidays, when the store is closed, but the windows, as is the custom, are to be lighted in the evening. The apparatus will also greatly reduce the consumption of electricity for lighting purposes, and hence there will be a great saving in cost, for instead of necessitating the burning of the lights during the entire night when the storekeeper desires to have his display-windows illuminated after the store is closed for the day the lights can safely be left burning and the apparatus set to turn them out at any previously-fixed hour during the night.

The invention therefore consists in such novel arrangements and combinations of parts and the minor details of construction, all of which will be fully described in the accompanying specification and finally embodied in the clauses of the claim.

The several features of the invention and the various advantages resulting therefrom will be more fully set forth hereinafter.

The invention is fully illustrated in the accompanying sheets of drawings, in which—

Figure 1 is a face view of an apparatus embodying the principles of my invention. Fig. 2 is a side view of the same with the several parts of the switch-operating mechanism and the switch-lever in their operative positions, showing the switch open; and Fig. 3 is a similar view illustrating the several parts of the switch-operating mechanism and the switch-lever in their operated positions, showing the switch closed. Fig. 4 is a cross-section of the clock or timepiece and mechanism connected therewith, said section being taken on line x in Fig. 1. Fig. 5 is a perspective view of a cam sleeve or hub for operating the switch-lever and causing the switch to be opened; and Fig. 6 is a similar view of the forward end of said lever. Fig. 7 is a face view of an apparatus embodying the principles of my present invention, but which can only be used to open the switch; and Fig. 8 is a side view of the same.

Similar letters of reference are employed in all of the above-described views to indicate corresponding parts.

In said drawings, A indicates the ordinary clock-casing, which is secured in a suitable opening or directly upon a baseboard b, carrying any desirable construction of electric switch, as C. As will be seen from an inspection of Fig. 4, the train of gear-wheels, together with the lever and balance, is of the usual clock construction and is indicated by

the reference-letter A'. Said casing A is preferably provided with a suitable disk a, having a central opening in which is suitably secured a frame a' and dial a^2, provided, as will be seen from Figs. 1 and 7, with the hour-numerals and the hour and minute hands a^3 and a^4, respectively, both of which are secured in the usual manner upon the arbor a^5. In said plate or disk a is also a small dial a^6, and a^7 is the winding-arbor, on which is the barrel containing the mainspring of the clock and the wheel for setting the train of gears in motion, while a^8 indicates a similar arbor for winding a spring and is actuated by the usual devices connected with the small pointer a^9 on the dial a^6, so that whatever figure on said dial is made to come opposite the small pointer, set as a tail to the hour-hand, an alarm mechanism of the clock is let off at that hour and operates said arbor a^8 until the spring connected therewith runs down. Secured upon said winding arbor or stem a^7, by being screwed thereon or in any other well-known manner, is a winding-key d, having at its free end a disk-like head or plate d', from which extend from its lower surface and encircle said key-stem d a number of helical coils d^2, the purpose of which will be more fully set forth hereinafter. Secured in a like manner upon the alarm arbor or stem a^8 of the clock mechanism is a disk or plate or bar e, having an annular edge or rim e', which is made in the manner of a cam, as at e^2, and is provided with an offset e^3, substantially as illustrated more particularly in Fig. 5. In the present construction said plate or bar e is provided with a screw-threaded socket e^4 for securing it upon the threaded end of the said arbor a^8. From an inspection of the several figures of the drawings it will be seen that said cam-shaped hub formed by said plate or bar e and its annular edge or rim e' is used in place of the ordinary winding-key or finger-piece for winding the spring and alarm mechanism connected with said arbor a^8.

The electric switch C may be of any well-known construction, that illustrated in Figs. 1, 2, and 3 comprising a base c and a pair of binding-posts c' and c^2, with which are respectively connected the circuit-wires g and g'. Pivotally attached to said posts c' and c^2 are the respective contact plates or arms c^3 and c^4, adapted to be brought down into the slotted end portions of a pair of contact-posts c^5 and c^6, whereby a complete circuit is established through wire g, post c', plate c^3, post c^5, post c^6, plate c^4, post c^2, and circuit-wire g' when the switch C is closed. Connected with the free ends of said plates or arms c^3 and c^4, by means of bolts c^7 or in any other suitable manner, is a cross-bar c^8, made of a non-conducting material. Said bar c^8 has secured thereto in any well-known manner a forwardly-projecting bar or arm f, provided with the bent part f' and a finger portion f^2, which is slotted in the end and has pivotally arranged in said slotted end on a suitable pin f^3 a movable dog or pawl f^4. Said dog or pawl is provided with a perforated ear or lug f^5, to which is attached a spring f^6, substantially as illustrated in the several figures of the drawings. The opposite end f^7 of said spring is secured to the part f' of said arm f, and when said dog or pawl f^4 is not in operative engagement with one of the coils d^2, connected with the plate d', as indicated in Figs. 2 and 3, then said spring will cause it to stand in the position represented in Fig. 6 or in the dotted outline in Fig. 3, and said arm f and the parts connected therewith can be moved back and forth to close or open the electric switch C by hand, as will be clearly evident. To cause the automatic closing of said switch, the clock mechanism is wound up by means of the plate d', connected with the key or stem d, in the usual manner of winding a clock and the dog or pawl f^4 caused to engage with one of said coils d^2, as clearly shown. If the clock is wound at or near twelve o'clock and it is desired that the switch shall be closed at six o'clock in the evening, to complete the circuit and start the lights said disk d' and its coils in winding the clock are turned into such a position that the dog or pawl f^4 will rest at a mark indicated by the numeral "6" on one of said coils, as indicated in Fig. 2, which means that it will take six hours for said disk and coils to turn in sliding contact with the dog or pawl f^4 until the end d^3 of the last coil is reached, as represented in Fig. 3. This sliding engagement between the said dog or pawl f^4 and the slowly-turning coils d^2 causes the arm f and parts connected therewith to move toward the base-board b in the direction of arrow y, (see Figs. 2 and 3,) and at the expiration of the six hours the contact plates or arms c^3 and c^4 will have been brought into positive contact with the posts c^5 and c^6, as represented in said Fig. 3, and a complete circuit through the light-wire is established by this automatic closing of the switch C. As soon as the end d^3 of the last coil has passed over the dog or pawl f^4 the spring f^6 will cause the said dog or pawl to assume its inactive position, (indicated in said Fig. 6;) but the switch C will still remain closed and the lights still burn. Said coils d^2 are provided with other marks, as indicated at "1," "2," "3," "4," "5," "7," "8," "9," &c., with which the said dog or pawl f^4 can be brought in contact according to the time of the winding of the clock mechanism and the number of hours it has to run before it is intended that the switch C shall be automatically closed. Thus it will be evident that the operator can properly set the pawl or dog f^4 in contact with one of the coils according to the time of winding of the clock mechanism and the hour when it is intended that the lights shall be lighted.

In order that the switch shall be again

opened and the lights in the circuit automatically extinguished—say, for example, at eleven o'clock—the small pointer a^9 is set to the number "11" on the dial a^6 of the ordinary alarm mechanism and the arbor a^8 wound by means of a turn or two of the plate or bar e and its cam-shaped rim e', causing it to stand in the position indicated in Figs. 2 and 3. At the proper time the alarm mechanism is set off in the usual manner and the arbor a^8 set in rotation. This action will also cause the rotation of the plate or bar e and bring its cam edge e^2 of the rim e' in forcible engagement with the under surface of the arm f, whereby the latter and its parts connected therewith will assume the dotted positions indicated in said Fig. 3, and by the movement of said parts in the direction of the arrow y' (see said Fig. 3) the contact plates or bars c^3 and c^4 will be withdrawn from the slots in the contact-posts c^5 and c^6, whereby the switch is again opened, the circuit broken, and the lights are extinguished, as will be clearly understood.

Thus it will be evident that by setting the small index-hand a^9 opposite any figure on the dial a^6 the contact-switch C can be operated at any other desired hour and the lights extinguished without necessitating the presence of a person at the time.

From the above description it will be evident that the switch C can be operated by hand, if desired, or by means of the apparatus can be automatically closed at any predetermined hour, or by not causing the engagement of the dog or pawl f^4 with one of said coils d^2 the switch can be closed during the night, or the apparatus may be used to automatically close the switch at one time and after the lapse of some time said mechanism operating to again open the switch.

In Figs. 7 and 8 I have illustrated another modified form of construction of operating device h, which is secured on the arbor a^8 of the alarm mechanism of the clock and which can be made to engage with a suitable switch lever or arm i, connected with any one of the well-known forms of electric switches, as C', for breaking the circuit. The operation of these parts will be clearly evident and understood from an inspection of said Figs. 7 and 8.

It will be evident that my novel form of apparatus for automatically controlling or operating electric switches can be put to many other uses, and owing to the simplicity of the construction of the several parts of the mechanism the device is cheaply made and cannot get out of order, being perfect in its operation for automatically closing or opening the electric switch with which it is connected.

I am fully aware that many changes may be made in the several arrangements and combinations of the parts comprised in the several mechanisms herein set forth, as well as in the details of the construction thereof. Hence I do not limit my invention to the exact arrangements and combinations of the parts and the construction thereof as herein described and illustrated in the accompanying drawings.

Having thus described my invention, what I claim is—

1. The combination, with an electric switch, of a timepiece, its train of gear mechanism, its winding-arbor, and a helix on said arbor and means connected with said switch in engagement with said helix for automatically actuating the switch mechanism and closing the same, substantially as and for the purposes set forth.

2. The combination, with an electric switch having a contact-plate and an arm extending therefrom, of a timepiece, its train of gear mechanism, its winding-arbor, and a helix on said arbor engaging with said arm on the contact-plate to actuate the same to close said switch, substantially as and for the purposes set forth.

3. In an electric switch, the combination, with a contact-plate, an arm extending therefrom, and a spring-actuated dog or pawl on the said arm, of a timepiece, its train of gear mechanism, its winding-arbor, and coils d^2 connected with said arbor engaging with said dog or pawl to actuate said arm and contact-plate to close said switch, substantially as and for the purposes set forth.

4. In an electric switch, the combination, with a contact-plate, and an arm extending therefrom, of the winding-arbor of a clock mechanism, and a helix on said arbor and means on said arm in engagement with said helix to actuate said arm and contact-plate to close the switch, substantially as and for the purposes set forth.

5. In an electric switch, the combination, with a contact-plate, and an arm extending therefrom, of a winding-arbor of a clock mechanism, and means connected with said arbor for actuating said arm and contact-plate to close the switch, consisting, essentially, of coils d^2 connected with said arbor and a spring-actuated pawl or dog on said arm of the contact-plate in engagement with said coils, substantially as and for the purposes set forth.

6. The combination, with an electric switch, of a timepiece, and its alarm mechanism, the winding-arbor of said mechanism, and a helix on said arbor and means connected with said switch in engagement with said helix for automatically actuating the switch mechanism and opening the same, substantially as and for the purposes set forth.

7. The combination, with an electric switch having a contact-plate and an arm extending therefrom, of a timepiece, its alarm mechanism, the winding-arbor of the clock mechanism, and a helix on said arbor in engagement with said arm on the contact-plate to actuate the same and close said switch, and a cam-shaped hub on the arbor of said alarm mechanism in engagement with said arm to

open said switch when the alarm mechanism is released, substantially as and for the purposes set forth.

8. In an electric switch, in combination, with a contact-plate, an arm extending therefrom, of a timepiece, its alarm mechanism, the winding-arbor of said clock mechanism, and a cam-shaped hub on the arbor of said alarm mechanism in engagement with said arm and a helix on said winding-arbor to open said switch, substantially as and for the purposes set forth.

9. In an electric switch, the combination, with a contact-plate and an arm extending therefrom, of a timepiece, its alarm mechanism, the winding-arbor of said clock mechanism, a helix on said arbor, a winding-arbor of the alarm mechanism of a clock, and means connected with said arbor, consisting, essentially, of a plate or bar *e* on said arbor, and a cam-shaped rim thereon, engaging with said arm to actuate said contact-plate to open said switch, substantially as and for the purposes set forth.

10. The combination, with an electric switch, of a timepiece and its train of gear mechanism, a helix connected with said mechanism and means connected therewith and engaged by said helix for automatically closing said switch, and means connected with the alarm mechanism of said timepiece, acting independently to open said switch, substantially as and for the purposes set forth.

11. The combination, with an electric switch, of a timepiece, its train of gear mechanism, its winding-arbor, a helix on said arbor and means connected therewith and engaged by said helix to actuate the switch mechanism to close the switch, the alarm mechanism of said timepiece, the winding-arbor of said alarm mechanism, and means connected therewith acting independently to actuate the switch mechanism and open the same, substantially as and for the purposes set forth.

12. The combination, with an electric switch, having a contact-plate and an arm extending therefrom, of a timepiece, its train of gear mechanism, its winding-arbor, a helix on said arbor engaging with said arm on the contact-plate to actuate the same to close said switch, the alarm mechanism of said timepiece, the winding-arbor therefor, and means connected with said arbor adapted to engage with said arm on the contact-plate and actuate the same to open said switch, substantially as and for the purposes set forth.

13. In an electric switch, the combination, with a contact-plate, an arm extending therefrom, and a spring-actuated dog or pawl on said arm, of a timepiece, its train of gear mechanism, its winding-arbor, coils d^2 connected with said arbor engaging with said dog or pawl to actuate said arm and contact-plate and close the switch, the alarm mechanism of said timepiece, the winding-arbor thereof, and a cam-shaped hub on said arbor, engaging with said arm to open said switch, substantially as and for the purposes set forth.

14. In an electric switch, the combination, with a contact-plate and an arm extending therefrom, of the winding-arbor of a clock mechanism, means connected with said arbor for actuating said arm and contact-plate to close the switch, consisting, essentially, of coils d^2 connected with said arbor and a spring-actuated pawl or dog on said arm of the contact-plate engaging with said coils, the winding-arbor of the alarm mechanism of the clock, and means connected with said arbor, consisting, essentially, of a plate or bar *e* on said arbor, and a cam-shaped rim thereon, engaging with said arm to actuate the contact-plate to open said switch, substantially as and for the purposes set forth.

15. In a clock, for the purposes stated, the combination, with the arbor a^7, of a winding-stem *d* having coils d^2, a switch mechanism, and means connected with said switch mechanism in engagement with said coils to actuate said mechanism, substantially as and for the purposes set forth.

16. In a clock, for the purposes stated, the combination, with the arbor a^7, of the winding-stem *d*, a winding-disk d' and coils connected with said disk and encircling said stem, a switch mechanism, and means connected with said switch mechanism in engagement with said coils to actuate said mechanism, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 24th day of July, 1897.

CHARLES HARTDEGEN.

Witnesses:

FRED K. C. FRAENTZEL,

WM. H. CAMFIELD, Jr.