No. 756,541. PATENTED APR. 5, 1904.

P. SORENSEN.

ELECTRIC SWITCH.

APPLICATION FILED NOV. 23, 1900.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

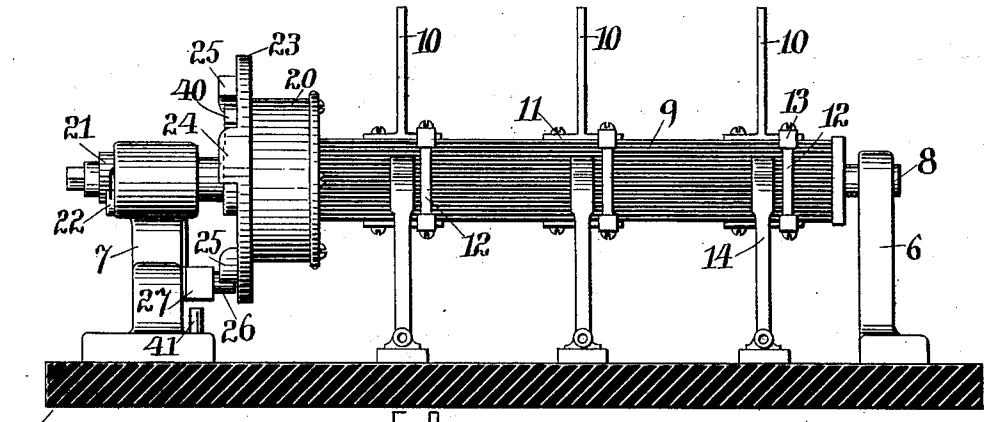
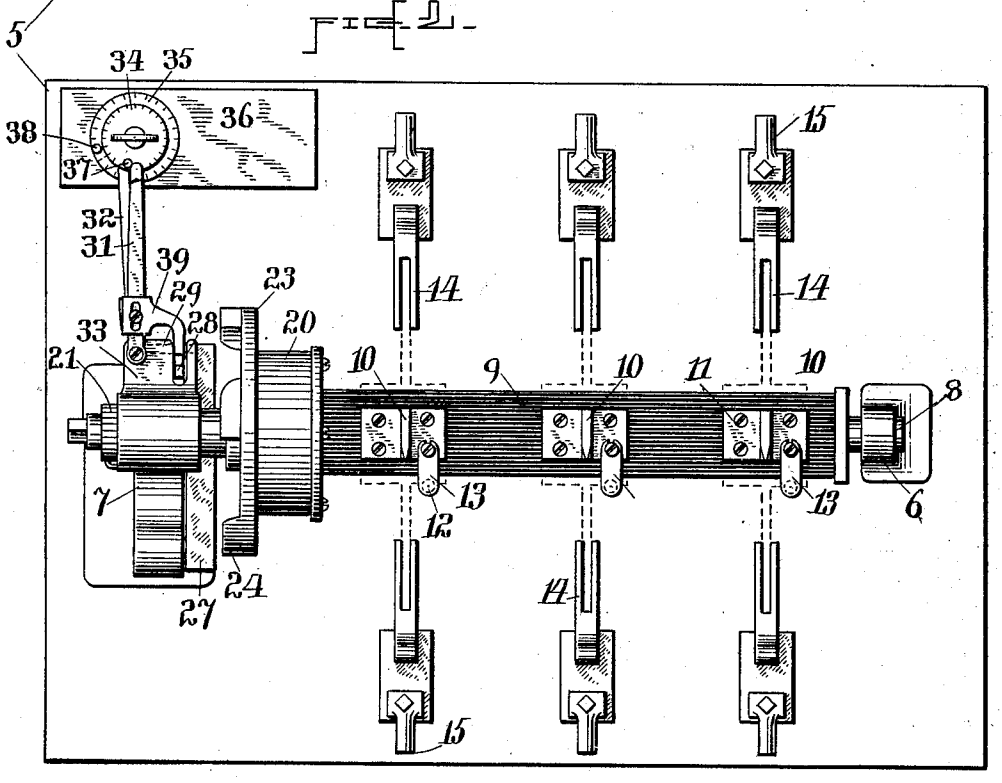


FIG. 2.



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ELECTRIC SWITCH.

APPLICATION FILED NOV. 23, 1900.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

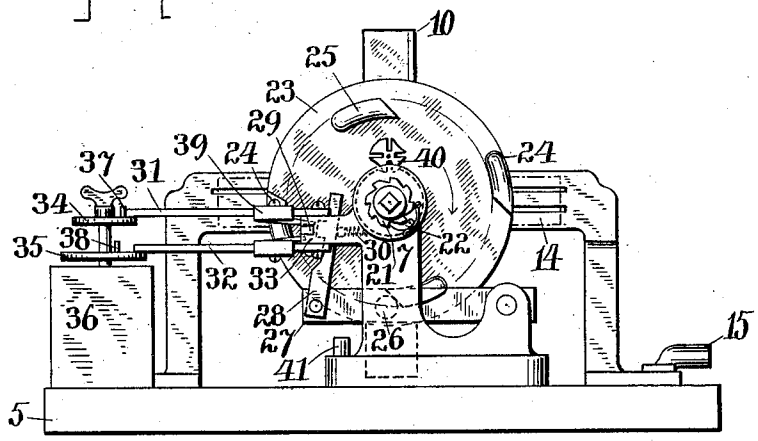


Fig. 4.

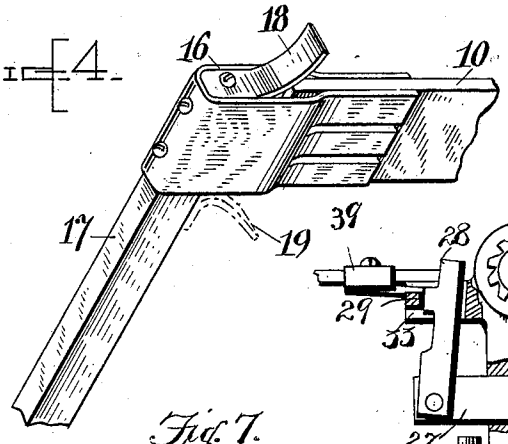


Fig. 5.

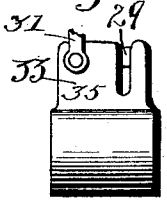


Fig. 6.

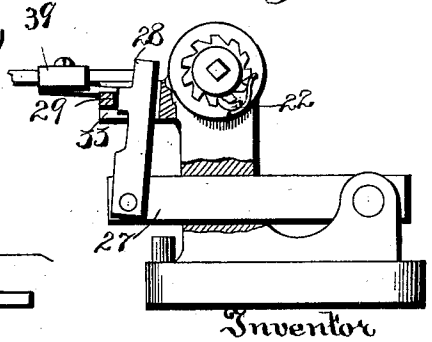
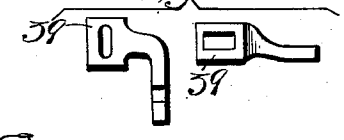


Fig. 7.



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No. 756,541. Patented April 5, 1904.

UNITED STATES PATENT OFFICE.

PETER SORENSEN, OF BROOKLYN, NEW YORK.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 756,541, dated April 5, 1904.

Application filed November 23, 1900. Serial No. 37,424. (No model.)

To all whom it may concern:

Be it known that I, PETER SORENSEN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

This invention relates to an electric switch, and particularly to that class designed for time control.

One object of the invention is the production of a switch for the above purpose, which may be of any desired capacity.

Another object is to make a switch for this purpose on the plan of a clock-actuated switch which shall be capable of a quick break and a quick make and a double break.

With these objects in view the invention consists in the construction, combination, and arrangement of parts hereinafter fully described and claimed.

In the accompanying drawings, which form a part of this specification, Figure 1 represents in side elevation one form of switch embodying my invention. Fig. 2 represents the same in plan. Fig. 3 is an end elevation of said switch. Fig. 4 is a view in perspective, showing a modification of one of the contacts. Figs. 5 and 6 are detail views of parts of the controlling apparatus for the step-by-step mechanism. Fig. 7 shows in plan and end view, on an enlarged scale, one of the fingers for tripping the catch which holds the step-by-step detent in place.

My invention is best embodied in a switch of the rotary sort, and such a switch is illustrated in the accompanying drawings.

Therein 5 indicates a base-board of suitable insulating material, such as slate. Upon this are mounted bearings, as 6 and 7, in which is journaled a rotary shaft 8. The middle portion of this shaft is preferably made of or covered by insulating material, (represented at 9,) to which the switch-arms 10 are connected in any suitable manner. They are here shown as provided with base-pieces, through which screws, as indicated at 11, are passed into the insulation 9 of the rotary shaft. This mode of attachment of the contact-arms is particularly designed for the adaptation of fuses to the switch, such fuses being indicated at 12. These fuses may be simple bare metallic fuses, or they may be inclosed in glass tubes, as occasion may require. They are here shown as connected to clips 13, which in turn are secured to the bases of the contact-arms 10.

The contact-jaws with which the arms 10 engage are indicated at 14. They are suitably secured to the base 5 and are provided with connections 15 for the conductors leading to and from the switch. These jaws may be made in any of the well-known ways, but are preferably of the form shown in Fig. 4 at 16. Herein the jaw consists of one piece of metal folded upon itself and screwed or otherwise suitably secured to the standard 17. This improved form of jaw has the engaging portions thereof brought closer together than the portions by which it is attached to the standard, as clearly shown in Fig. 4. These approximated portions of the jaw are preferably split, as represented and as is common in switch-jaws.

In connection with the improved form of jaw I also preferably use a spark-drawing device consisting of a spring 18, removably secured to the standard 17, and formed, preferably, of some non-arcing material. This device is especially designed to draw to itself what sparking there might be between the arm 10 and the jaw 16 upon the two separating. In this manner deterioration of the jaws and arms due to sparking is avoided, at least upon their engaging surfaces, such sparking taking place only between the end of the arm and the spring 18 if at all. In Fig. 4 the spark-drawing device 18 is shown to take the spark as the arm 10 moves upwardly from the jaws. On the opposite jaw from which the arm 10 would leave in a downwardly direction the spark-drawing device would obviously be located below the jaw, as indicated in dots at 19.

The details of the contacts of the switch having now been disclosed, I will describe the construction by which the switch is made to operate automatically under time control.

The shaft 8 may be made to rotate either by spring power or through the agency of a weight, or by hand, as may be desired. A

spring, however, is preferable. For this purpose a spring-barrel, as 20, is secured to the shaft 8, it being secured to the insulated portion thereof in the form of switch illustrated. Within this barrel the motor-spring is attached to the barrel and to the arbor in the usual and well-known manner, said arbor constituting that portion of the shaft 8 journaled in the bearing 7, and which of course is detached within the barrel from the remainder of the shaft 8. Upon the arbor end of shaft 8 is mounted a ratchet-wheel 21, controlled by the pawl 22, mounted upon the bearing 7, the end of the arbor being squared, as indicated, for the reception of a key to wind up the spring. To the face of the spring-barrel is secured a disk 23, bearing upon the face thereof stops, as 24 and 25, with which a detent 26, carried by the lever 27, engages. This lever 27 is shown pivoted to the base of the bearing-post 7, and has upon its free end a catch, as 28, said catch having a lug, as shown in Fig. 3, for engagement with a bar 29, lying in the path of said lug and supported upon a projection 33 from the bearing 7, said catch playing in a slot formed in said projection, as indicated in Fig. 2, wherein said bar or ledge 29 is indicated in dotted lines. When the motor-spring is wound up, it is prevented from running down by the engagement of one of the lugs 24 or 25 with the stop 26, carried on said lever 27. In Fig. 3 the stop 26, is shown in transition from engagement with one of the stops 25 to a position to engage the succeeding stop 24, it being noted that stops 24 and 25 are arranged in concentric circles. Stop 26 being in transit, as above stated, means that catch 28 has been disengaged from the cross-bar or ledge 29, as is seen in end view in Fig. 3.

The faces of the stops 24 and 25 are made oblique for the purpose of forcing the pin 26 out of their path upon the disengagement of the catch 28 from the ledge 29, and a spring 30 is seated back of the catch 28 to force the lug of said catch either under or over the ledge 29, as the position of the detent 26 shall determine. The disengagement of the catch from this ledge may be effected in any desired manner. It may be disengaged by hand or magnetically or automatically by clockwork mechanism. The latter mode is preferred and is that illustrated. This mode consists, preferably, in providing tripping-levers, as 31 32, which are pivoted to the projection 33 from the bearing 7. These levers extend to disks, such as 34 35, actuated by a clock-train, (represented in a suitable casing at 36.) These disks 34 35 may carry one or more pins, as indicated at 37 38, for tripping the levers 31 32. In the form shown these levers have upon them adjustable fingers 39, with which to engage the catch 28. The disk 37 may be set to trip the lever 31 at a predetermined time and cause the switch to open or close. The pin 38 may be set to engage the lever 32 to cause the switch to operate at a predetermined time following the first operation. In this manner current may be turned on automatically at one hour and turned off automatically at a subsequent hour, as the needs of the service may require.

To avoid the possibility of an attendant winding the actuating-spring too tightly, the usual form of stop-gearing commonly employed in clock-trains may be added, as indicated at 40. The one here shown permits of the spring being tightened by three turns and unwound by the same number of turns.

The operation of the switch is substantially as follows: The spring having been wound and the disks 34 and 35 set with their pins in the desired positions, the clock-train is wound and started. When the hour arrives for the switch to be closed, the pin 37, say, will engage the tripping-lever 31 and force the catch 28 off its ledge 29, when the pressure of the spring against the pin 26 through the stop 25 will, because of the obliquity of the face of said stop, force the pin 26 downwardly out of the path of said stop and into position to be engaged by the succeeding stop 24. Before said succeeding stop strikes the pin, however, the catch will have been forced under the ledge 29 by means of spring 30, a suitable lug, as 41, having been provided to limit the downward movement of the lever 27. Then when the time has arrived for the switch to be opened the pin 38 will engage the lever 32 and force the catch 28 from under the ledge 29, whereupon the pressure of the switch-spring through the oblique face of stop 24 will force the pin 26 upwardly into the path of the succeeding stop 25. Said catch having, however, passed the ledge 29, the impingement of the oblique face of stop 25 upon the pin 26 cannot force the pin down again, and therefore the switch stops in open position, as shown in the drawings.

The opposed contact-arms 10 may be extended through the shaft 9 as one piece or conductor or otherwise made continuous without the fuse 12, and small switches are so constructed, and for the ratchet-disk 23 and lever 27 may obviously be substituted a hand-operated step-by-step ratchet mechanism of well-known pattern.

Other changes in construction and modifications in form aside from those already mentioned may be made without departing from the spirit of this invention.

I claim—

1. In an automatic quick-action power-driven switch, the combination with rotary contact-arms and coöperating fixed contacts of a disk having thereon staggered projections provided with oblique engaging faces, a detent-pin in the path of said projections and adapted to be forced out thereof by said oblique faces, and means for temporarily hold-

ing the pin against displacement by said projections.

2. In an automatic switch, the combination with rotary contact-arms, of a spring for rotating them, a disk rotating with said arms and provided with projections arranged in concentric circles, a detent-lever carrying a pin for engagement with said projections, a catch for holding said pin in such engagement, tripping-levers for releasing said catch, and a time mechanism for operating said levers.

3. A rotary switch comprising in combination a rotary shaft carrying radially-projecting contact-arms, contact-jaws in the path of said arms and with which engagement is simultaneously made, a spring connected to said shaft, a step-by-step disk connected to said spring and shaft, a detent coöperating with said disk, a catch controlling said detent, tripping-levers for throwing said catch, and a time mechanism for operating said levers substantially as set forth.

4. In an automatic quick-action switch, the combination with a rotary contact-carrying shaft and a driving-spring therefor, of a stop-disk rotating with said shaft and provided with stops or lugs arranged in concentric circles, a detent-lever adapted to engage alternately with the stops in said circles, a catch for holding the detent in position of engagement and means for releasing said catch to permit the detent to reverse its position and allow rotation of the disk one step.

5. In an automatic switch, the combination with a rotary contact-bearing shaft and a driving power therefor, of a stop-carrying disk rotating with said shaft and having the stops arranged in concentric circles as described, a detent-lever engaging with said stops by surfaces of engagement adapted to force the detent out of locking position, a catch for holding the detent in locking position, means for holding the catch in position to cause the detent to lie in either of the said concentric circles, and tripping devices for releasing said catch in either of its positions.

6. In an automatic switch, the combination with the rotary contact-bearing shaft and its driving power, of a disk having thereon staggered projections provided with inclined engaging faces, a detent in the path of said projections and adapted to be forced out of said path by the engaging face, a catch for temporarily holding the detent against displacement and means for freeing the catch, as and for the purpose described.

7. In an automatic switch, the combination of a power-actuated rotary switch device, a detent-lever, stops carried by the rotary structure of the switch and adapted to engage and reverse the position of said lever, a catch for locking said lever in either of its positions, two tripping-levers for releasing said catch in its two positions respectively, and a time mechanism having independently-adjustable actuating-pins for operating on said levers at predetermined times.

Signed at New York, in the county of New York and State of New York, this 21st day of November, A. D. 1900.

PETER SORENSEN.

Witnesses:

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ETHEL L. LAWLER.