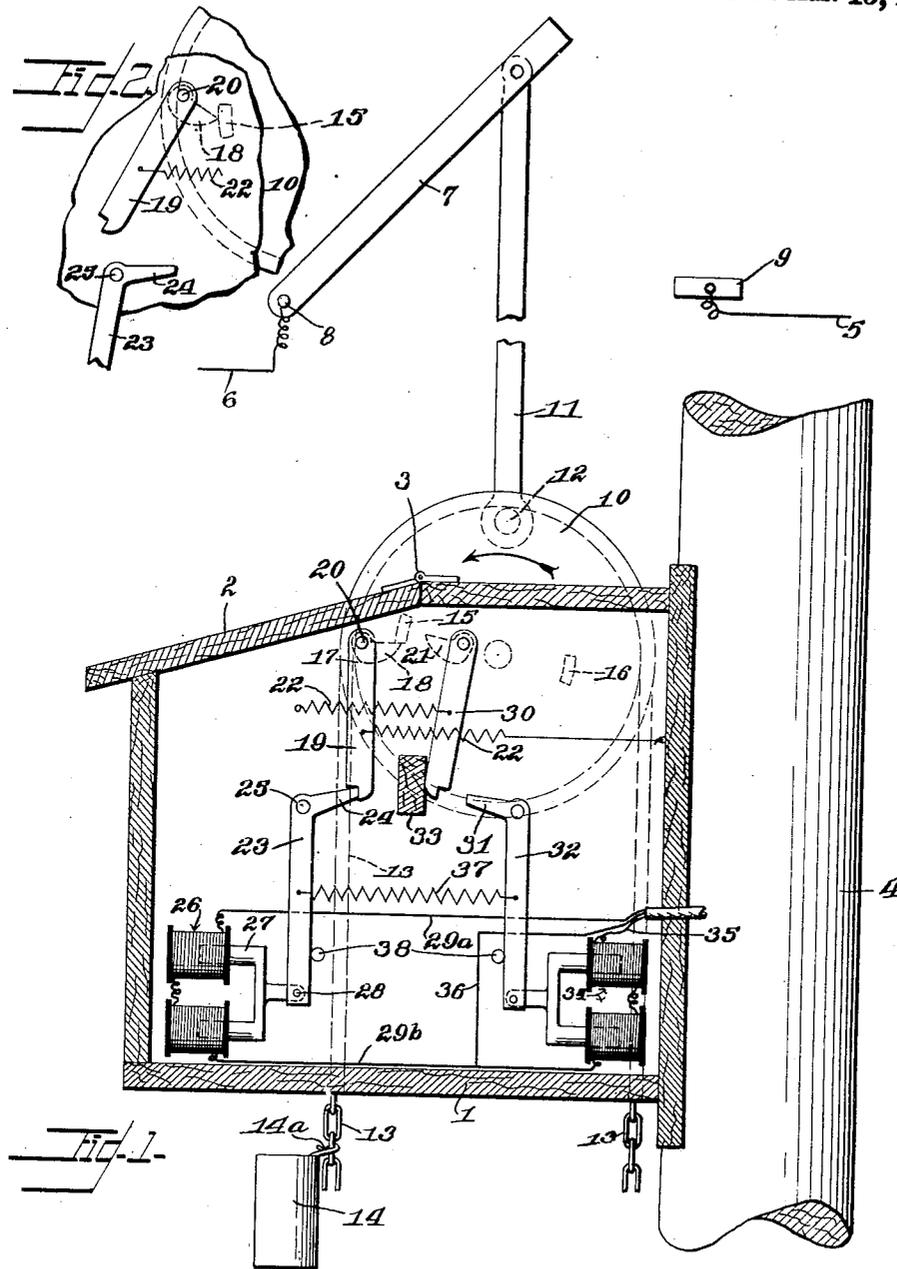


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 REMOTE CONTROLLED SWITCH FOR HIGH TENSION TRANSMISSION LINES.
 APPLICATION FILED OCT. 24, 1919.

1,371,379.

Patented Mar. 15, 1921.



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UNITED STATES PATENT OFFICE.

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REMOTE-CONTROLLED SWITCH FOR HIGH-TENSION TRANSMISSION-LINES.

1,371,379.

Specification of Letters Patent.

Patented Mar. 15, 1921.

Application filed October 24, 1919. Serial No. 332,947.

To all whom it may concern:

Be it known that we, WILLIAM H. SYMONS and LAURENCE M. KLAUBER, citizens of the United States, residing in the city of New York, State of New York, and in the city of San Diego, county of San Diego, California, respectively, have invented new and useful Improvements in Remote-Controlled Switches for High-Tension Transmission-Lines, of which the following is a specification.

This invention relates to switches, and it is especially applicable to the switches employed on high-tension transmission lines.

The general object of the invention is to provide simple means for effecting the opening and closing of the switch from a distance. To accomplish this we provide a very simple motive force for moving the switch, which will effect the movement of the switch, and which will cooperate with simple and reliable means for positively controlling the operation of this motive force from a distance.

The invention consists in the novel features, and in the general combination of parts to be particularly described hereinafter, all of which contribute to produce a simple and efficient remote-controlled switch for high-tension transmission lines. A preferred embodiment of our invention will be particularly described in the following specification, while the broad scope of our invention will be pointed out in the appended claims.

In the drawing,

Figure 1 is a vertical section through an apparatus embodying our invention, the switch proper, however, being indicated diagrammatically; and

Fig. 2 is a fragmentary view further illustrating the mode of operation of the apparatus.

The controlling parts of the apparatus are most conveniently housed within a box 1, which, if desired, may have a lid 2, hinged at 3, so as to give access to the interior of the box. This box may be attached to the side of a pole 4, carrying a transmission line or lines indicated by the conductors 5 and 6, between which there is located the switch which may include a movable switch-member

or lever 7, the pivot 8 whereof being connected with the line-wire 6, the other end of the lever cooperating with a contact 9 connected with the line-wire 5.

We provide a rotatable member which may consist of a simple wheel 10 rotatably mounted on the side of the box 1, and this member is connected by suitable means with the lever 7, in such a way that when the rotatable member or wheel 10 rotates, it will hold the switch alternately open and closed. The means illustrated for connecting the wheel and the switch lever, consists of a link 11 which is pivotally attached to the switch-lever 7, and similarly attached by a pivot connection 12 to the wheel.

We provide means tending to rotate this rotatable member or wheel and we also provide means for holding the wheel in two positions, in one of which, as illustrated in Fig. 1, the pivot connection 12, is disposed adjacent to the switch-lever; the other position of the wheel is substantially diametrically opposite to that illustrated, in which case the pivot connection 12 would lie remote from the switch.

Any suitable means may be provided which will tend to rotate the wheel. This may consist simply of a cable or chain 13 which passes around the periphery of the wheel, it being understood that the wheel is held in a vertical plane. On this chain we provide a detachable weight 14 which tends to rotate the wheel in the direction indicated by the arrow in Fig. 1. We provide means cooperating with the wheel which operates to permit the weight to descend, and each time the weight descends it produces a half revolution in the wheel. In other words, we provide means for letting the weight 14 "run down" producing a step-by-step movement in the wheel, and alternately holding the switch open and closed.

In order to accomplish this we prefer to provide stop means on the wheel, preferably consisting of two stops or lugs 15 and 16 which project toward the box and which are carried on the face of the wheel but at different distances from the axis of the wheel. Cooperating with these stops we provide a detent-mechanism which is controlled from a distance preferably by an electric circuit

or circuits which may be closed by a push button or similar means located at a remote point. The detent-mechanism is preferably constructed in duplicate, one-half of the mechanism coöperating with the stop 15, while the other half coöperates with the stop 16.

In Fig. 1 the left-hand portion of the detent-mechanism is coöperating with the stop 15 to detain the wheel 10 in a position to maintain a switch in its open position.

Coöperating with the stop 15 we provide a detent 17 having a toe 18 and a depending arm 19, both rigidly attached to a pivot or stub-shaft 20, so that the detent is freely movable. A similar detent, but in a reverse position is provided opposite to the detent 17, that is to say, its toe 21 projects toward the left instead of toward the right, and this toe 21 is in the path of the stop 16.

Associated with each detent we provide a coil-spring 22, and these springs tend to hold the detents projecting into the paths of the stops 15 and 16. In the operation of the device, when the stop 15 comes against the toe 18, it rocks the pivot 20 and swings the depending arm 19 toward the left. This swinging movement would eventually swing the detent away and cause it to withdraw from the path of the stop which would permit the stop to pass, but such a complete movement is prevented by means of a trigger 23 which has a pawl 24 to engage a notch in the lower end of the arm 19. This trigger 23 is pivoted at 25 and we provide electrical means for controlling it to disengage it when desired. For this purpose, we prefer to provide an electro-magnet in the form of a double solenoid 26 having a double core 27 pivotally attached at 28 to the lower end of the trigger. The coils of the solenoid 26 are connected in an electric circuit passing through conductors 29^a and 29^b, and when this circuit is closed at a remote point by means of a switch or push-button, the core 27 is attracted and the trigger 23 is rocked in a clockwise direction about the pivot 25. Fig. 2 shows the relation of the parts at such a time, and indicates the manner in which the motive force of the weight 14 will operate through the stop 15 to push the toe 18 out of its path so as to permit the stop to pass. The rotation of the wheel 10 will continue until the substantially diametrically opposite stop 16 comes against the toe 21 of the right hand detent, whereupon this detent will be rocked in an anti-clockwise direction until the lower end of this detent arm 30 comes against the end of a pawl 31, similar to the pawl 24 and forming a part of the right hand trigger 32.

Between the arms 19 and 30, we provide means such as a bar 33 for limiting the movement of the detents by their springs.

The trigger 32 is controlled by a solenoid 34 similar to the solenoid 26, which is energized by an electric circuit passing through conductors 35 and 36. Both the circuits referred to above can employ the same return wire 36. The triggers 23 and 32 are preferably connected by a spring 37 which holds them up against their corresponding stops 38 and returns them to the position in which they are illustrated, after they have been actuated by their corresponding solenoids.

The mode of operation of the apparatus will now be briefly stated:—

In the position shown in Fig. 1, the action of the weight 14 tends to rotate the wheel 10 in the direction indicated by the arrow, that is to say, the weight holds the stop 15 against the toe 18 of the detent 17. However, the detent cannot swing out of the way to permit the stop to pass on account of the pawl 24 of the trigger 23; however, when it is desired to close the switch 7, this is accomplished simply by closing the circuit through the conductors 29^a and 29^b and the solenoid 26, whereupon the solenoid rotates or rocks the trigger 23 in a clockwise direction, thereby disengaging the pawl 24 from the arm 19. This permits the arm to swing toward the left, (see Fig. 2), thereby permitting the stop 15 to pass. The wheel then rotates through a half-revolution, that is to say, it rotates until its rotation is arrested by the stop 16 striking the toe 21 of the right hand detent. When this occurs, the shock of the contact is taken up somewhat by the corresponding detent spring 22 which becomes extended as the arm 30 swings toward the right until it engages the end of the pawl 31. This will hold the wheel 10 in a position to maintain the switch closed, and the switch will remain closed until the circuit through the conductors 35 and 36 is closed; the closing of that circuit excites the solenoid 34 and this will operate to release the trigger 32 in the same manner as that described in connection with the detent 17. When the weight 14 arrives at a point near the lower loop of the endless chain 13, it is simply disengaged and re-attached by means of its hook 14^a to the chain at an elevated point.

It will be observed that the mechanism of this apparatus is very simple and not likely to get out of order. It is also evident that in the present instance the electric current is not employed to provide the motive force for actuating the switch, but simply controls the motive force which opens and closes the switch at the will of the operator.

It is understood that the embodiment of the invention described herein is only one of the many embodiments our invention may take and we do not wish to be limited in the practice of our invention nor in our

claims, to the particular embodiment set forth.

What we claim and desire to secure by Letters Patent is:

5 1. In a switch-controlling apparatus, the combination of a switch, a rotatable member, means connecting the same with said switch, means tending to rotate said rotatable member, detent mechanism coöperating with said rotatable member and operating to detain the same in one position to maintain the switch open, and in a second position to maintain the switch closed, and electrical means for controlling the detent-mechanism from a distance.

2. In a switch-controlling apparatus, the combination of a switch, a wheel, a link pivotally connecting said wheel with said switch, detent mechanism coöperating with said wheel to maintain the same alternately in two substantially diametrically opposite positions, in one of which the wheel maintains the switch open, and in the other of which it maintains the switch closed, and electrical means for controlling the detent-mechanism from a distance.

3. In a switch-controlling apparatus, the combination of a switch including a movable switch-member, a wheel connected therewith, detent-mechanism coöperating with said wheel and operating to detain the same in one position to maintain the switch open and in a substantially diametrically opposite position to maintain the switch closed, and electrical means for controlling the detent-mechanism from a distance.

4. In a switch-controlling apparatus, the combination of a switch, a rotatable member, a chain attached thereto, a weight carried by said chain and tending to rotate said rotatable member, a detent-mechanism coöperating with said rotatable member to detain the same in one position to maintain the switch open and in a second position to maintain the switch closed, and electrical means for controlling the detent-mechanism from a distance.

5. In a switch-controlling apparatus, the combination of a switch including a pivoted switch lever, a wheel, a link pivotally attached to said wheel and said lever, means tending to rotate said wheel, and electrically controlled means for detaining the wheel successively in one position in which the pivot connection of the link and the wheel is disposed remote from the switch, and in a second position in which the said pivot connection is disposed on the side of the wheel adjacent to said switch.

6. In a switch-controlling apparatus, the combination of a switch, a wheel connected with said switch, means tending to rotate said wheel, stop-means carried by the wheel, a pair of movable detents adapted to project into the path of said stop-means to arrest the

wheel at each half-revolution, and thereby hold the switch alternately open and closed, and electrically controlled means for releasing said stop-means from said detents to permit the wheel to rotate.

7. In a switch-controlling apparatus, the combination of a switch, a wheel connected with said switch, means tending to rotate said wheel, a stop carried by the wheel, a movable detent adapted to project into the path of said stop to arrest the wheel in one position, a second stop carried by the wheel, a second movable detent adapted to project into the path of the latter stop to arrest the wheel in a second position substantially diametrically opposite to the first named position, said wheel operating in one position to maintain the switch open, and in the other position to maintain the switch closed, and electrically controlled means for releasing said stops from said detents to permit the wheel to rotate successively through half-revolutions.

8. In a switch-controlling apparatus, the combination of a switch, a rotatable member connected with said switch to maintain the switch alternately open and closed, means tending to rotate said rotatable member, a stop carried by the rotatable member, a movable detent adapted to project into the path of the stop to arrest the rotatable member, a trigger for holding the detent against withdrawing from the path of the stop, a second stop carried by the rotatable member, a second detent coöperating therewith, a trigger coöperating with said second detent for holding the same against withdrawing from the path of the second named stop, and electro-magnets for controlling said triggers to permit the stops to pass the detents.

9. In a switch-controlling apparatus, the combination of a switch, a wheel connected with said switch, means tending to rotate said wheel, a stop carried by the wheel, a movable detent adapted to project into the path of the stop to arrest the wheel, a trigger for holding the detent against withdrawing from the path of the stop, a second stop carried by the wheel, a second detent coöperating therewith, a trigger coöperating with said second detent for holding the same against withdrawing from the path of the second named stop, and electro-magnets for controlling said triggers from a distance.

10. A switch-controlling apparatus, constructed as specified in claim 8, in combination with a spring associated with each detent tending to hold the detents projecting into the paths of their corresponding stops, each stop operating as it engages its corresponding detent, to extend the spring and move the detent into engagement with its corresponding trigger.

11. In a switch-controlling apparatus, the

combination of a switch, a rotatable member connected with said switch to maintain the switch alternately open and closed, means tending to rotate said rotatable member, a stop carried by the rotatable member, a movable detent, a spring tending to hold said detent projecting into the path of said stop, a second stop carried by the rotatable member, a detent cooperating therewith, a spring tending to hold said second detent projecting into the path of the second named stop, said stops operating to engage their corresponding detents alternately so as to move the detent and extend the corresponding detent spring, a trigger cooperating with each detent for limiting its movement by the stop and thereby holding the same against withdrawing from the path of its corresponding stop, and electro-magnets for controlling said triggers to move the same and thereby permit the stops to pass the detents.

12. In a switch-controlling apparatus, the combination of a switch, a wheel connected with said switch, a chain running over said wheel, a weight detachably carried by said chain tending to rotate said wheel and there-

by open and close said switch, a pair of stops carried by said wheel, and electrically controlled detents cooperating with said stops alternately to permit the descent of said weight to open and close the switch.

13. In a switch-controlling apparatus, the combination of a switch, a wheel connected to said switch for opening and closing the same, means tending to rotate said wheel, a pair of stops carried by said wheel, a pair of pivotally mounted detents, a detent-spring cooperating with each detent tending to hold each detent in the path of its corresponding stop, each stop operating when in engagement with its corresponding detent to extend the detent-spring, means for limiting the movements of the detents under the action of their springs, and a trigger corresponding to each detent for holding the same against withdrawing from the path of its corresponding stop, and electrical means for controlling the triggers from a distance.

In testimony whereof, we have hereunto set our hands.

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