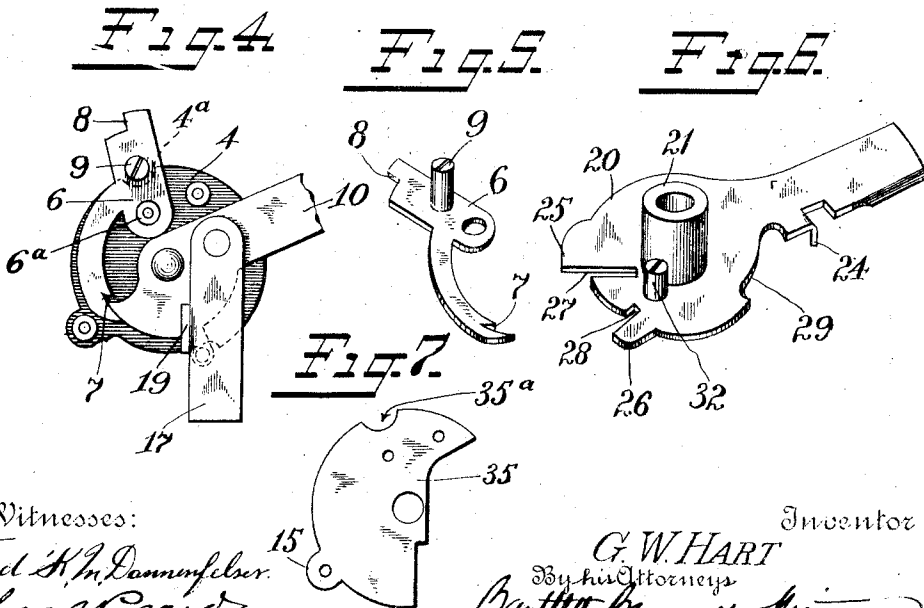
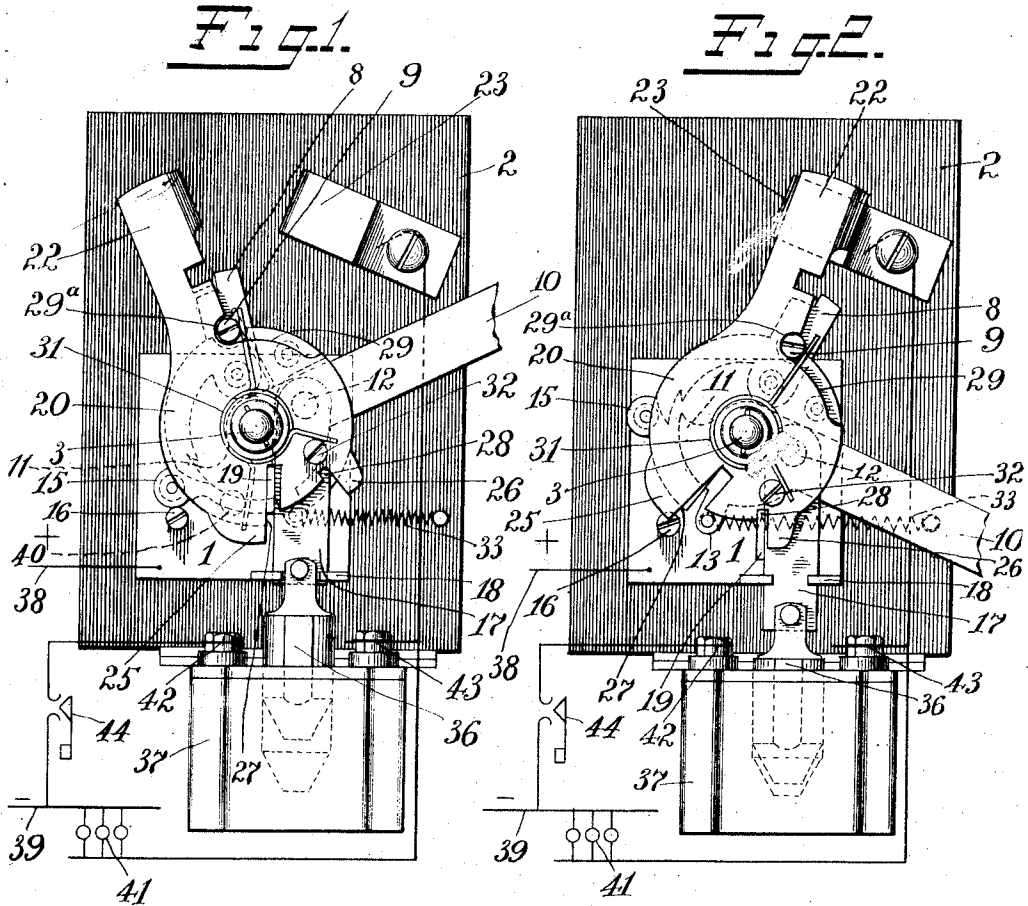


SWITCH.

987,984.

2 SHEETS—SHEET 1.



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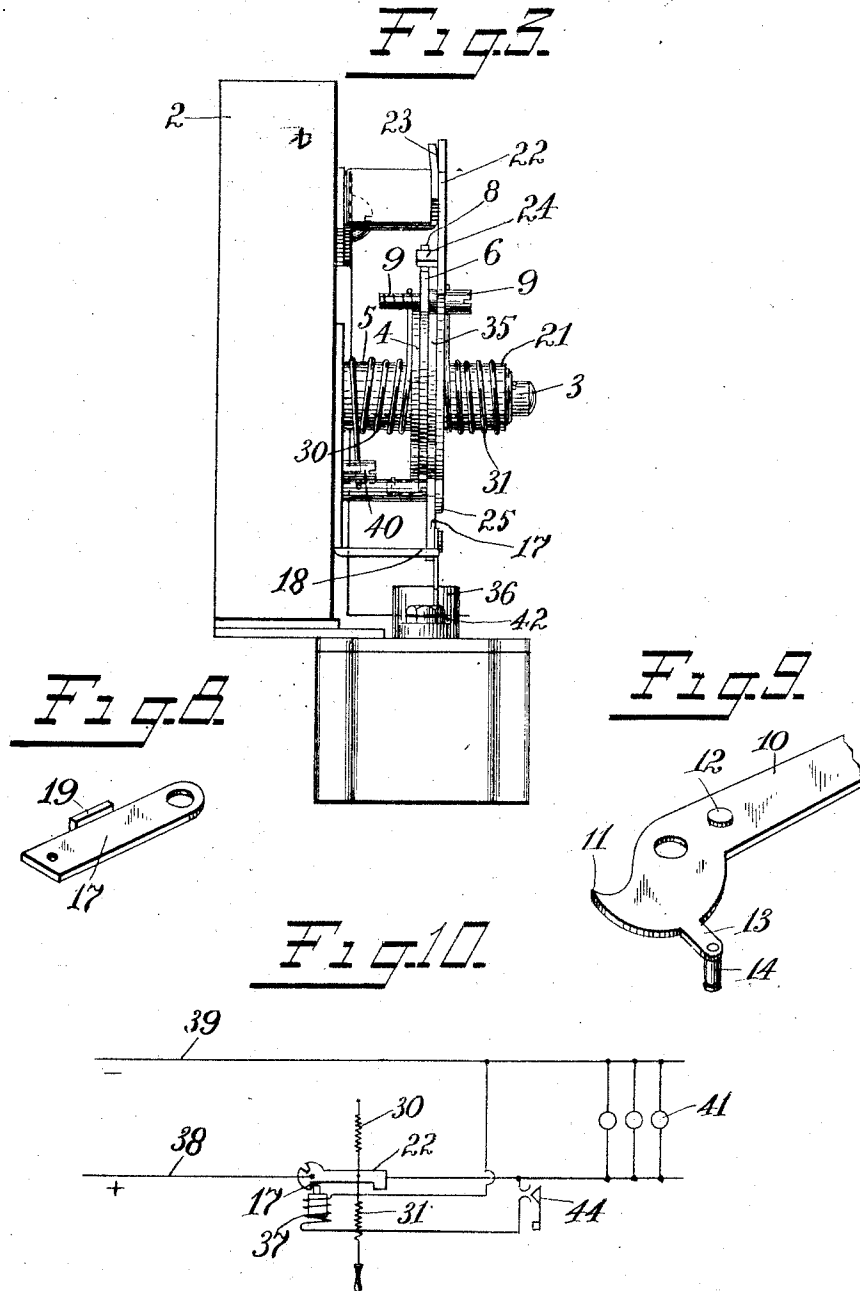
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SWITCH.

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987,984.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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SWITCH.

987,984.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed February 21, 1910. Serial No. 545,157.

To all whom it may concern:

Be it known that I, GERALD W. HART, a citizen of the United States, residing at West Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Switches, of which the following is a full, clear, and exact description.

My invention relates to switches, and has for its object to produce a switch having a quick or snap action on both opening and closing and also electro-magnetic means for controlling the opening of said switch, said electro-magnetic means being independent of the means for moving the switch arm of said switch to open position. Heretofore switches have been made in which the switch arm was actuated by a spring put under tension by electro-magnetic means. By my invention the electro-magnetic means is relieved of the work of putting this spring under tension, and at the same time a snap action on both opening and closing of the switch is obtained.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which—

Figure 1 shows a front elevation of the device with the switch open. Fig. 2 shows a similar view with the switch closed. Fig. 3 shows an end elevation of Fig. 1. Figs. 4, 5, 6 and 7 are details of the mechanism. Fig. 8 shows the detent in perspective. Fig. 9 shows the actuating member in perspective. Fig. 10 shows a diagram of circuits.

Referring more particularly to the drawings, 1 is the base plate mounted on a suitable support 2.

3 is a pin or shaft mounted on the base plate 1.

4 is a spring-actuated frame in the form of a plate having a projecting hub 5 rotatably mounted upon the pin 3.

6 is a pawl pivoted at 6^a to the spring plate 4. At the end of the pawl 6 is preferably formed a notch 7 and at the opposite end is a nose or projection 8.

9 is a pin or stud mounted upon the pawl 6 between the pivotal support and its nose 8 and projecting on both sides of said pawl. The edge of the plate 4 has a notch 4^a formed in its periphery for receiving the projection 9, the notch being of such dimensions as to

permit a slight movement of the pawl 6. In the same plane with the pawl 6 is mounted a lever arm 10 constituting a manual actuating member of the switch. This actuating member is rotatably mounted upon the pin 3 and carries a projection or hook 11 adapted, at the proper time, to engage said pawl 6 and also to be freed therefrom at another time, for the purpose hereinafter described. This operating part 10 carries a stud 12 and has a projection 13 to which a pin 14 is connected. The spring frame 4 has a stop projection 15, which engages a post 16 carried by the plate 1, limiting the movement of the spring frame 4 in one direction.

17 is a sliding latch or detent, one end of which is mounted upon the stud 12, while the other end projects into a suitable bearing 18 on the base plate 1.

19 is a shoulder on the detent 17 for the purpose hereinafter described.

20 is a rotating carrier mounted upon the pin 3 and having a hub 21. This part 20 carries a switch arm 22 adapted to engage and disengage a contact 23 carried by the support 2, so as to close and open the circuit. A shoulder 24 is formed on the carrier 20 for engaging with the nose 8 as herein-after described.

25 and 26 are stops formed upon the carrier 20.

27 and 28 are notches in the carrier 20. The upper portion of the carrier 20 is cut away at 29, so as to form a space in which the stud 9 may move.

30 is a retracting spring.

31 is a driving spring. The retracting spring 30 is a spiral spring loosely mounted upon the hub 5, the ends of said spring being extended so that one end will engage with the rear end of the stud 9, while the other will engage a stationary stud 40 mounted upon the base plate 1. The driving spring 31 is a coil spring loosely mounted upon the hub 21 and having its ends extended so that one of them will engage with the outer end of the stud 9 while the other end will engage with the stud 32 mounted on the carrier 20. If it is desired to automatically return the operating lever 10 to its initial position a third spring 33 is connected to the pin 14 and to the support 2.

35 is a spacer plate between the pawl 6 and the member 20, which may be used if desired.

This spacer plate has a notch 35^a corresponding to the notch 4^a in plate 4.

The apparatus thus far described is the apparatus described in my Patent No. 631,304, granted August 22, 1899, and constitutes one of the several forms of switch mechanism which is adapted for use in carrying out my present invention.

To the lower end of the detent 17 is connected an armature 36 of an electro-magnet 37. The electro-magnet is preferably in the form of an iron-clad solenoid, the armature 36 constituting a core which moves into and out of the coil of the solenoid.

38 and 39 are the terminals of the circuit controlled by the switch.

41 are translating devices adapted to be cut in and out of circuit by the switch. The winding of the solenoid is connected by its terminals 42 and 43 in shunt to the translating devices 41 on the translating device side of the switch.

44 is a local circuit controller in the shunt circuit of the electro-magnet 37. The circuit connections are shown in simple diagrammatic form in Fig. 10.

The operation of the device is as follows: When the switch is open, the parts are as shown in Fig. 1, the switch arm 22 being then in its initial position. In this position the action of the springs 30 and 31 causes the inner end of the pawl 6 to be pressed so as to bring its inner end or notch 7 into the path of movement of the hook 11. To close the switch, the part 10 is moved downward so as to cause the hook 11 to rise. The hook 11 then engages the pawl 6 and causes the pawl and the frame 4, by which it is carried, to rotate. During this rotation the carrier 20 is restrained from movement by the engagement of the projection 19 of the latch 17 with one side of the notch 27. The movement of the part 10, however, serves to gradually move the shoulder 19 of the detent out of said notch 27 until it is entirely free therefrom. During this movement of the part 10, the spring 31 is being put under tension by the movement of the pin 9, so that when the shoulder 19 is freed from the notch 27 said driving spring 31, by pressing against the stud 32, causes the carrier 20 to rotate quickly into the position shown in Fig. 2, in which position further movement is checked by the stop 26, which strikes against the shoulder 19. This movement causes the switch arm 22 to engage the contact 23 and close the circuit. Upon releasing the part 10, the springs 30 and 31 cause said part to move slightly in a reverse direction, retracting the latch 17 so that the shoulder 19 enters the notch 28, locking the carrier and holding the switch arm 22 in the "on" position. After the shoulder 19 engages the notch 28 of the carrier 20, preventing the return movement of said carrier,

the spring frame 4 carrying the pawl 6 continues to move backward under the influence of the springs 30 and 31, the nose 8 being in engagement with the shoulder 24 until the pawl 6 is tilted and released from further engagement with the hook 11. When the stud 9 engages the surface 29^a upon the carrier, further backward movement is prevented and the parts come to rest, being locked in the "on" position. When the switch is thus closed, the local circuit can be completed through the windings of the electro-magnet 37 by closing the local circuit controller 44. When this is done, the electro-magnetic device is energized, and the core 36, together with the detent 17, is drawn downward so that the projection 19 is withdrawn from the notch 28, at which instant the retracting spring 30 retracts the switch arm 22, together with all the rotating parts except the lever 10. The disengagement of the switch arm 22 with the contact 23 interrupts the circuit through the windings so that it is deenergized and permits the part 10 and detent 17 to be retracted by the spring 33 to their initial position shown in Fig. 1. If desired, the detent 17 when the switch is closed, can be withdrawn by actuating the part 10 manually.

It is to be noted that when the switch is opened electro-magnetically, the electro-magnetic device does not have to put under tension any actuating spring, but simply has to move the detent, overcoming the slight spring 33 if present. The switch can thus be closed manually and opened electro-magnetically without causing the electro-magnetic means to do any considerable amount of work. The power is stored up by the initial manual operation of the part 10 in closing the switch, which part, in its initial movement from the position shown in Fig. 1, also acts to put the spring 30 under sufficient tension to retract the spring arm when the restraining detent 17 is withdrawn. By this arrangement a snap action is preserved on both the opening and closing of the switch, and yet the opening of the switch is controlled electro-magnetically without compelling the electro-magnetic device to exert any power upon the means for throwing the switch arm.

It is to be noted that in the particular embodiment shown, the core 36, when the switch is closed, is in a different position relatively to the windings of the electro-magnet from its position when the switch is open, as shown in Fig. 1, and that when the switch is closed, the core 36 is in a position to be more strongly attracted by the field of the windings than when the switch is open, that is, the closing of the switch moves the core into a position such that the electro-magnetic device will act more advantageously whenever it is called upon to act. The

circuit for the electro-magnetic device can not be maintained closed for any considerable period since when the switch is open it is broken at the switch and when the switch is closed the closing of the local circuit at the controller 44 causes the switch to act so as to immediately open the local circuit at the contact 23.

The parts of the mechanism hereinbefore described may be varied in form and proportions without departing from the invention claimed, as will be obvious to those skilled in the art.

What I claim is:

1. In a switch, the combination of a switch arm and contact therefor, means for causing said switch arm to engage said contact with a snap action, means tending to withdraw said switch arm from said contact when in engagement therewith, a detent preventing such withdrawal, electro-magnetic means for releasing said detent, a local shunt

circuit for said electro-magnetic means, and a local circuit controller in said local circuit.

2. In a switch, the combination of a switch arm and contact therefor, means for causing said switch arm to engage said contact with a snap action, means tending to withdraw said switch arm from said contact when in engagement therewith, a detent preventing such withdrawal, electro-magnetic means comprising a winding and armature for releasing said detent, a local shunt circuit for said electro-magnetic means, and a local circuit controller for said local circuit, the armature of said electro-magnetic device being in a different position relative to said winding when said switch arm engages said contact from its position when said switch arm is out of engagement with said contact.

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Witnesses:

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