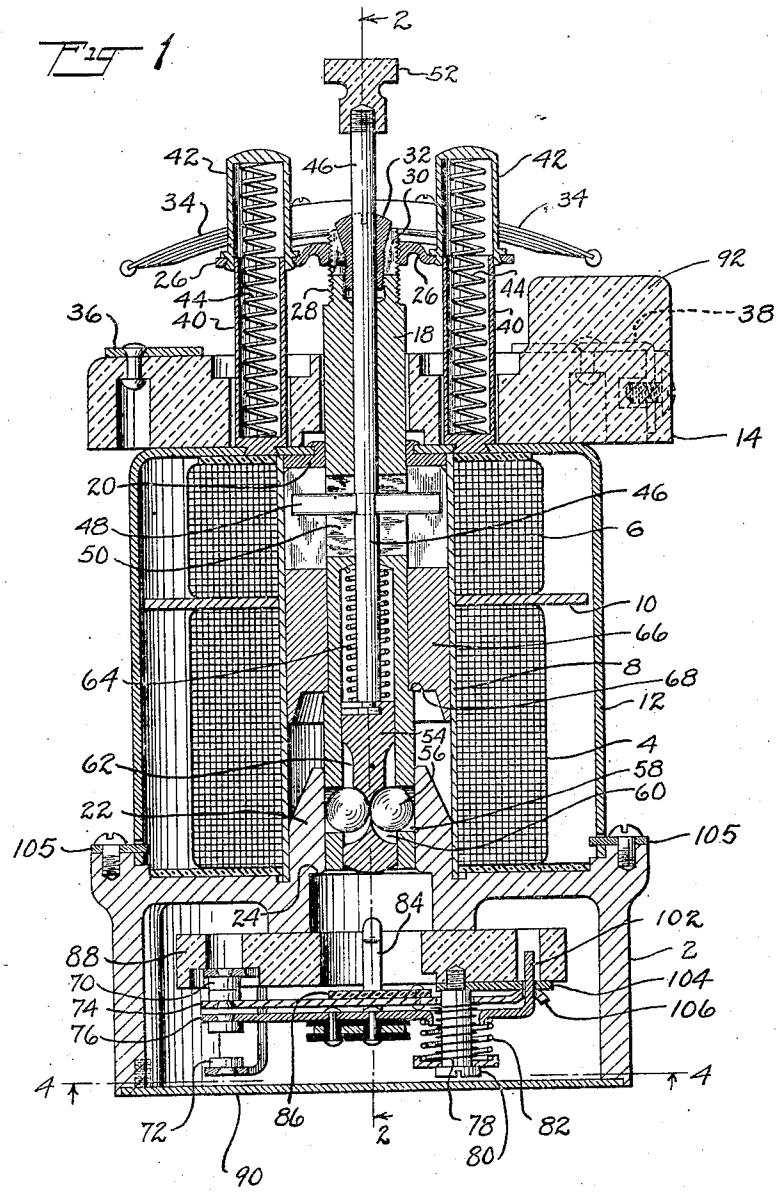
May 4, 1926. 1,582,987

G. W. HART

REMOTE CONTROL ELECTRIC SWITCH

Filed Dec. 6, 1924 4 Sheets-Sheet 1

Fig 1



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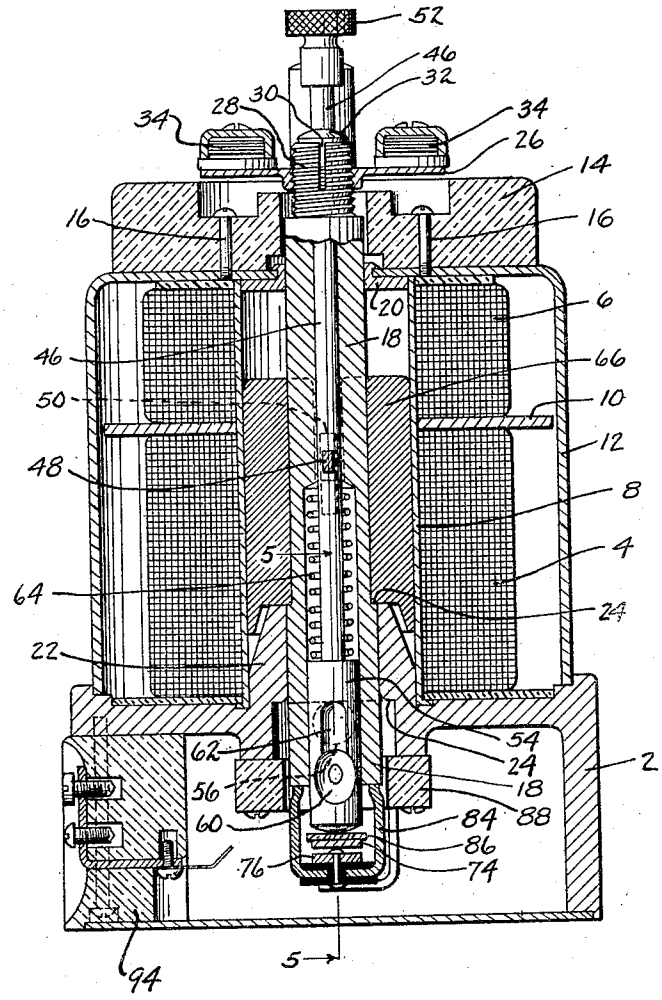
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REMOTE CONTROL ELECTRIC SWITCH

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Fig 2



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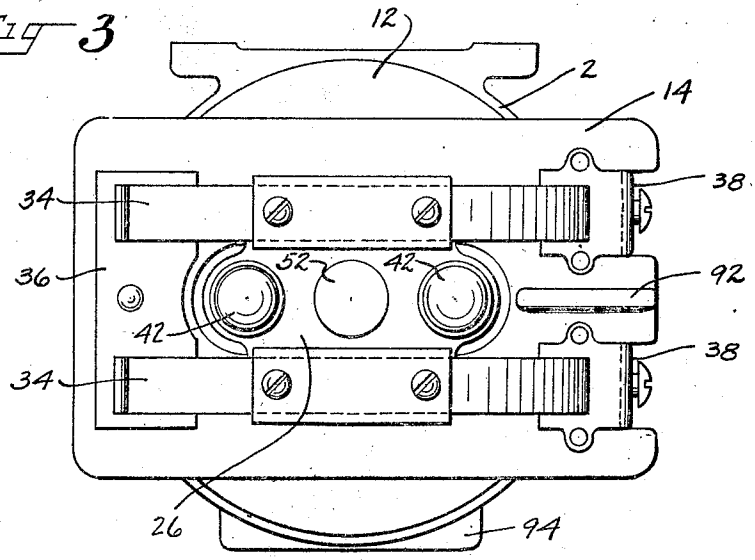
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Filed Dec. 6, 1924 4 Sheets-Sheet 5

Fig 3



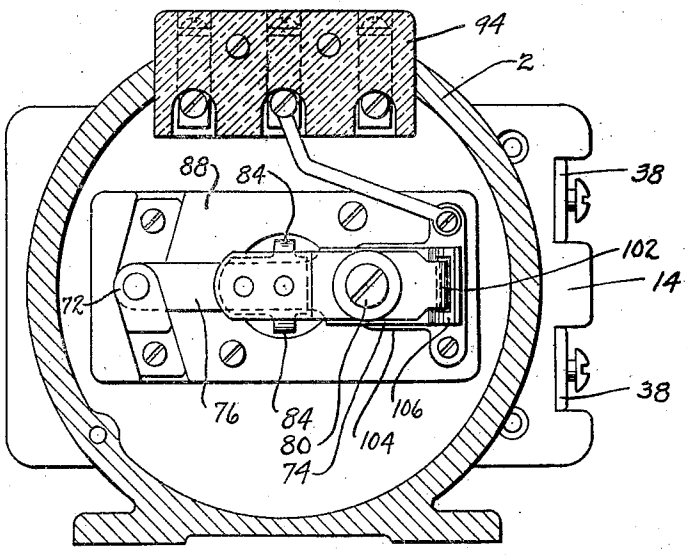


Fig 4

G. W. Hart
INVENTOR

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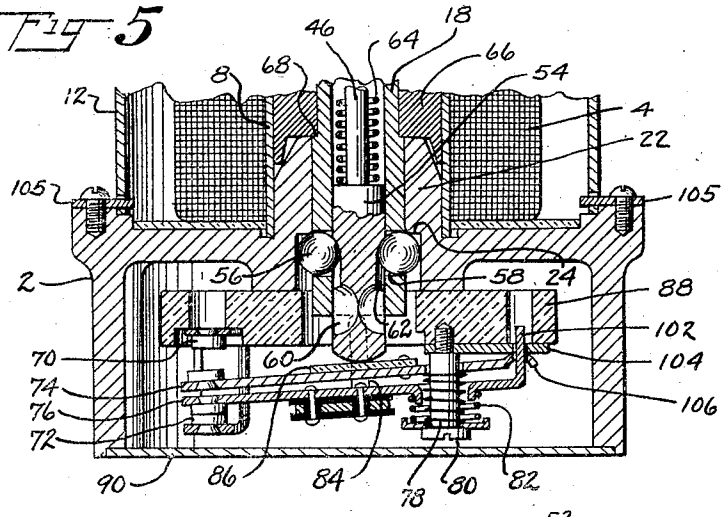
May 4, 1926. 1,582,987

G. W. HART

REMOTE CONTROL ELECTRIC SWITCH

Filed Dec. 6, 1924 4 Sheets-Sheet 4

Fig 5



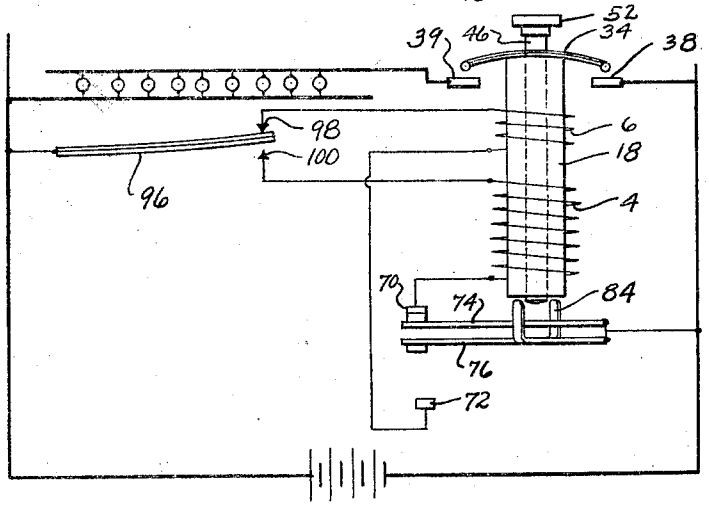


Fig 6

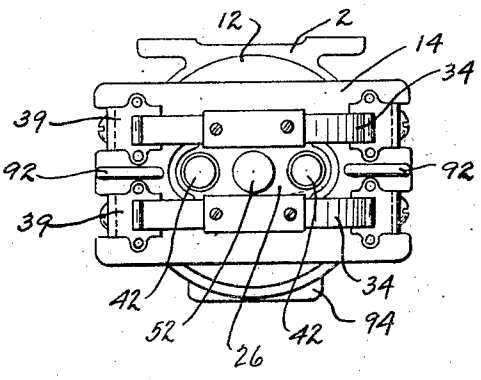


Fig 7

G. W. Hart INVENTOR

BY Bartlett Brownell ATTORNEY

Patented May 4, 1926. 1,582,987

UNITED STATES PATENT OFFICE.

GERALD W. HART, OF WEST HARTFORD, CONNECTICUT.

REMOTE-CONTROL ELECTRIC SWITCH.

Application filed December 6, 1924. Serial No. 754,275.

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 a certain new and useful Improvement in Remote-Control Electric Switches, of which the following is a full, clear, and exact description.

My invention relates to remote control electric switches and has for its object to produce a new and improved remote control switch having an opening coil and a closing coil whose axes are in alinement with one another. It further has for its object to produce a switch of the character described having means for locally interrupting the circuit of each coil after it has performed its intended function. It further has for its object to produce a new and improved remote control switch which shall be compact and durable and accurate in its operation. It further has for its object to produce a new and improved automatic means for causing the switch to locally open and close the controlling circuits. It further has for its object to produce a new and improved means for adjusting the throw of the switch arm.

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

Figure 1 shows a vertical section of a single pole remote control switch embodying my invention on a plane parallel to the switch arms, the switch being in open position;

Fig. 2 shows a similar section on a plane at 90° from the plane of Fig. 1, with the switch arm in closed position;

Fig. 3 is a plan view of the switch;

Fig. 4 is a sectional view on the line 4—4, Fig. 1, looking upwards;

Fig. 5 is a sectional view on the line 5—5, Fig. 2, showing the parts with the switch in closed position;

Fig. 6 is a diagram of circuits;

Fig. 7 is a plan view on a reduced scale showing the arrangement for a double pole switch.

Referring more particularly to the drawings 2 is a switch base of magnetic material upon which is mounted a switch closing coil 4 and a detent releasing coil 6, said coils surrounding a brass tube 8. 10 is a magnetic plate separating the two coils and forming a part of their magnetic circuits. 12 is a magnetic housing surrounding the two coils and forming a part of their magnetic circuits. 14 is a top plate of insulating material secured to the housing by screws 16. 18 is a switch arm plunger of brass or other non-magnetic material whose upper portion is guided by a bushing 20 and whose lower portion is within and guided by a perforated boss 22 integral with the base 2. Below this boss is a circular shoulder 24 forming a locking abutment for the locking means hereinafter described. 26 is a plate screwed upon the upper end 28 of the switch plunger 18, the upper end of said plunger being slotted as shown at 30. 32 is a screw threaded plug which enters a correspondingly screw-threaded recess in the upper end of the switch arm plunger and expands said upper end so as to lock the plunger against rotary movement relatively to the plate 26. 34 are switch arms carried by the plate 26 and insulated therefrom, said switch arms being adapted when depressed to engage contact plates 36 and 38 so as to close the main circuit to be controlled. 40 are spring casings secured to the housing 12 and telescoping within spring casings 42 secured to the plate 26 and enclosing springs 44 which tend to move the switch arms 34 together with the plate 26 to open position as shown in Fig. 1.

Within the spring arm plunger is a detent plunger 46 having a pin 48 passing through a slot 50 in the switch arm plunger and adapted to move to and fro therein so as to permit lost motion between the two plungers. This plunger is provided with a knob 52 for manually operating it to release the detent. 54 is a detent plunger head engaging detent balls 56 located in holes 58 in the switch arm plunger, said detent plunger being provided with recesses 60 which when the detent plunger is in the position shown in Fig. 1 relatively to the switch arm plunger permits the balls to be retracted as shown in Fig. 1. The detent plunger is also provided with surfaces 62 which when the switch arm plunger is depressed forces the balls outward to the position shown in Fig. 5 so that they lie partially beneath the shoulder 24 so as to hold the switch arm plunger in depressed position with the switch closed. The parts are so proportioned that the centers of the balls when the parts are in the position shown in Fig.

2 are beyond the shoulder 24 and when the parts are in the position shown in Fig. 1 are beyond the vertical planes passing through the shoulders formed at the bottom of the recesses forming the surfaces 62. 64 is a compression spring surrounding the detent plunger and bearing against the head thereof and also engaging an abutment formed on the switch arm plunger so as to tend to move the detent plunger downward relatively to the switch arm plunger. 66 is a magnetic armature slidingly mounted upon the switch arm plunger and in its downward position engaging a shoulder 68 thereon and in its upper position adapted to engage the shoulders formed by the pin 48. This armature when the switch is in open position lies within the switch opening coil 6 and extends partially into the coil 4 so that when the closing coil is energized the armature is drawn into it sufficiently to depress the switch arm plunger and move the switch arm to closed position. When the switch is in closed position, the major part of the armature lies within the closing coil 4 and partially extends into the detent releasing coil 6 so that when the detent releasing coil is energized the armature is raised sufficiently to engage the detent plunger pin 48 and lift the detent plunger until the cavities 60 are opposite the balls 56 permitting the balls to be retreated relatively to the switch arm plunger under the influence of the spring 44 to the position shown in Fig. 1 whereupon the springs 44 raise the switch arm plunger and connected parts to the position shown in Fig. 1.

70 is a contact in series with the switch closing coil 4, and 72 is a contact in series with the detent releasing coil 6. 74 and 76 are two movable local-circuit-controlling contacts electrically connected together and to the source of current supply for locally making and breaking the control circuits through the coils 6 and 4. The member 74 is engaged by a spring 78 mounted upon a headed pin 80 which tends to hold the contact 74 in engagement with the contact 70. 82 is a second spring surrounding said headed pin and engaging the movable contact 76 and tending to hold said contact out of engagement with the contact 72. 84 are upward projections connected to, but insulated from, the contact 76 which lie in the path of the end of the switch arm plunger 18 so that when the switch arm plunger is moved to the end of its throw where it will be locked, as shown in Fig. 5, the end of the plunger engaging the projections 84 will have forced the contact 76 downward and hold it in engagement with the contact 72. The contact 74 lies in the path of the detent plunger head 62 and, after the switch arm plunger has been moved downward and during the subsequent throw of the detent plunger which moves the balls 56 to locking position, the head of the detent plunger engages a plate of insulation 86 carried by the contact 74 and forces the contact 74 out of engagement with the contact 70, the result being that engagement is made with the contact 72 before disengagement is made with the contact 70 thereby insuring the proper positive sequence for the desired action. Conversely, the detent plunger permits the contact 74 to engage the contact 70 before the switch arm plunger permits the contact 76 to disengage the contact 72.

88 is an insulating plate upon which the contacts 70 and 72 and double contact 74, 76 are mounted so as to be insulated from each other and from other parts. 90 is a bottom plate for the switch.

In the one pole switch, the terminals of the circuit to be controlled are connected to the plates 38—38, 36 being a bridge plate which is engaged by the corresponding ends of both switch arms 34. When it is desired to have a two-pole switch, the two separate plates 39 provided with proper binding screws are substituted for the plate 36, as shown in Fig. 7. The main contact plates 38—38 and 39—39 are separated by the usual barrier 92. The base is provided with a contact block 94 having terminals to which the control circuits through the coils 6 and 4 are connected.

Fig. 6 shows a diagram of circuits indicating the means for controlling the current through the coils 6 and 4, the same consisting of a switch arm 96 adapted to engage and disengage the terminals 98 and 100 connecting and disconnecting them from the source of current. This member 96 can be actuated manually or may be a thermostat as indicated in Fig. 6 so that it may be also actuated thermostatically. This device 96 never acts to interrupt the current passing through the coils 6 or 4 such interruption taking place at the contacts 70 and 72, so that there is no sparking at the contacts 98 or 100, thus making the arrangement one which is particularly adapted for control by thermostatic means.

The contact 76 has an upwardly turned arm 102 which plays loosely in a plate 104 and is surrounded by an eyelet 106 in the rear end of the contact 74. This construction permits the rear portion of the contacts 74 and 76 to move independently of their other ends so that after its front end engages the contact 72 the rear end of the contact 76 can be further depressed at its front end. The housing 12 is held to the base by clamping plates 105 secured to the base by screws.

Assuming that the switch is in open position, as shown in Fig. 1 and the circuit through the coil 4 is thereafter closed, that

coil acts to move the armature 66 downward carrying with it the switch arm plunger 18 together with the switch arms connected thereto. When the switch arm has reached its lowermost position, where the balls 56 are adapted to be forced beneath the shoulder 24, the spring 64 forces the detent plunger downward and forces the balls 56 to pass beneath said shoulders 24 thus locking the switch arms in closed position, the switch arm plunger having acted to close a local circuit at the contact 72 and the detent plunger acting to open a local circuit at the contact 70 as above described, leaving the parts as shown in the position in Figs. 2 and 5. When the parts are in the position shown in Figs. 2 and 5 and the coil 6 is energized the armature 66 is raised so as to engage the pin 20 and lift the detent plunger sufficiently to permit the balls 56 to be disengaged from the shoulders 24, this disengagement being brought about by the action of the springs 44 lifting the switch arm plunger. After this disengagement the springs 44 lift both the switch arm plunger and the detent plunger to the position shown in Fig. 1.

When the detent plunger is first raised it permits the contact 74 to move toward the contact 70 and to come into engagement therewith, and when the switch arm plunger is sufficiently raised it permits the contact 74 to move away from the contact 72 and locally break the circuit through the coil 6 at that point.

As will be evident to those skilled in the art my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature surrounding said switch arm plunger and adapted to move said plungers in opposite directions, and two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, and locking means adapted to be moved into and released from locking position by said detent plunger when said switch arm plunger is depressed.

2. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arms, a detent plunger, an armature surrounding said switch arm plunger and adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, locking means adapted to be moved into and released from locking position by said detent plunger when said switch arm plunger is depressed, and means controlled by said detent plunger for opening the circuit through the switch arm actuating coil after that circuit has been energized and performed its function.

3. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature surrounding said switch arm plunger and adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, locking means adapted to be moved into and released from locking position by said detent arm plunger when said switch arm plunger is depressed, means controlled by said detent plunger for opening the circuit through the switch arm actuating coil after that circuit has been energized and performed its function, and means actuated by said switch arm plunger for closing the circuit through the other coil after the switch arm actuating coil has been energized.

4. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature surounding said switch arm plunger and adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, locking means adapted to be moved into and released from locking position by said detent plunger when said switch arm plunger is depressed, said detent plunger being within said switch arm plunger, and a spring tending to move said detent plunger relatively to said switch arm plunger.

5. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature surrounding said switch arm plunger and adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, locking means adapted to be moved into and released from locking position by said detent plunger, said detent plunger being within said switch arm plunger, and a spring tending to move said detent plunger relatively to said switch arm plunger, said plungers having lost motion relatively to one another and to said armature and acting as opposed stops for said armature.

6. In a remote control switch, the combi-

nation of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature surrounding said switch arm plunger and adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, locking means adapted to be moved into and released from locking position by said detent plunger, said coils being surrounded by a magnetic casing and being separated by a magnetic member common to the magnetic circuits of said coils.

7. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said armature and acting respectively to move said armature in opposite directions, locking means adapted to be moved into and released from locking position by said detent plunger when said switch arm plunger is depressed, and means controlled by said plungers and interrupting and closing the circuits of said two coils alternately at local points and maintaining each of said circuits closed at said points until it has completed its function.

8. In a remote control switch, the combination of a switch arm, contacts adapted to be engaged thereby, a switch arm plunger connected to said switch arm, a detent plunger, an armature surrounding said switch arm plunger and adapted to move said plungers in opposite directions, two coils having their axes in alinement with the axis of said switch arm plunger and acting respectively to move said armature in opposite directions, and locking means adapted to be moved into and released from locking position by said detent plunger when said switch arm plunger is depressed, said switch arm engaging its contacts when said switch arm plunger is in locked position.

GERALD W. HART.