March 30, 1943. C. L. STUTSMAN ET AL 2,315,231

LOW VOLTAGE SELF-SUSTAINING REMOTE CONTROL SWITCHING DEVICE

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Fig. 1.

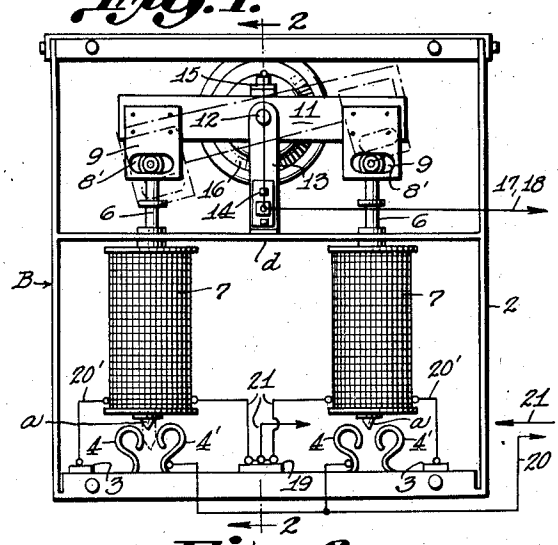


Fig. 2.

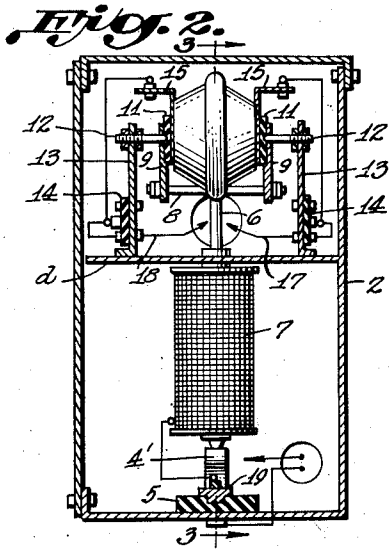
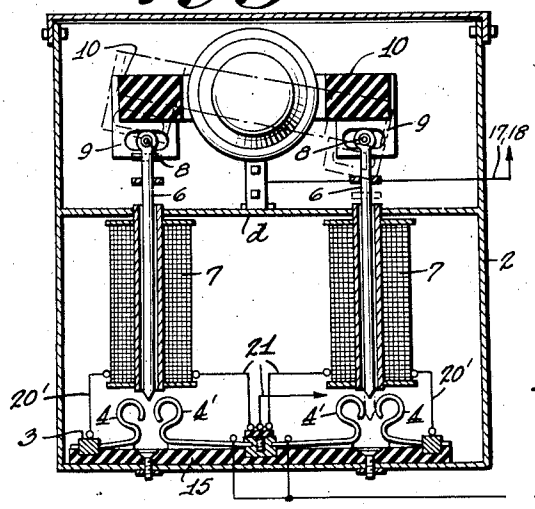


Fig. 3.



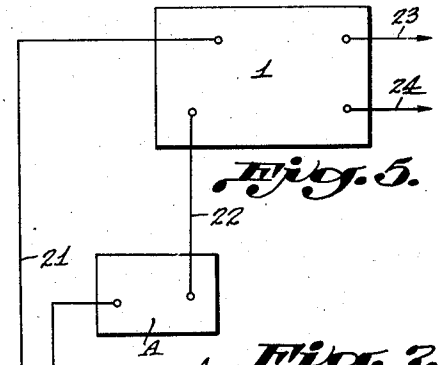


Fig. 5.

Fig. 7.

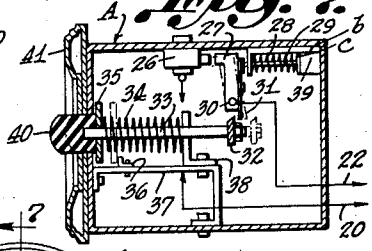
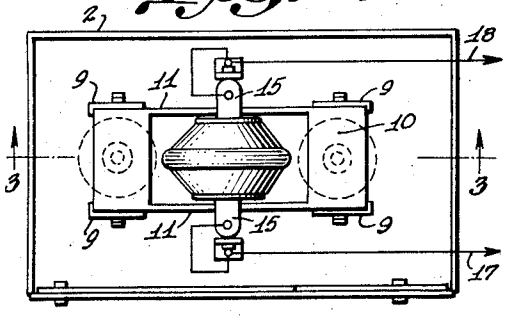


Fig. 4.



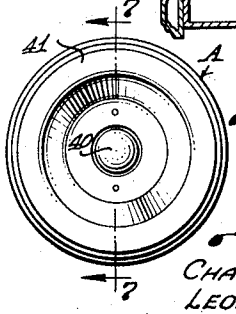


Fig. 6.

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LOW VOLTAGE, SELF-SUSTAINING, REMOTE CONTROL SWITCHING DEVICE

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6 Claims. (Cl. 175—375)

Our invention relates to a low voltage self-sustaining remote control switching device in which solenoids or magnets are used to operate the switches after a manual manipulation of the primary operating circuit.

Our invention also relates to improvements in switching devices in which low voltage wires control solenoids or magnets which in turn operate a high voltage switch, either a mercury or contact switch so as to reduce the potential voltage that may be carried to the operator from a high voltage to a low voltage.

Another object is to provide a novel switch whereby in the event an electrical circuit is to be controlled, will not, in the event the same is short circuited to the operator, cause injury by reason of such short circuit.

Another object is to provide a novel switch that will attain the above objects and which will be silent in operation.

A still further object is to provide a novel switch of the above character which will be self-sustaining and which will momentarily be energized.

A still further object is to provide a novel switch of the above character which may be incorporated in an electric circuit either singly in association with each particular electric unit or in multiple in connection with electrical units to be energized.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detail description and the appended claims.

The accompanying drawing illustrates our invention in a form we at present deem preferable.

Figure 1 is a front view of our novel switching device, with the front cover plate removed, and wiring associated therewith indicated more or less diagrammatically, and with the solenoid rods and associated parts in a neutral position for purposes of clearer illustration. Dotted lines indicate one normal position of the parts.

Fig. 2 is a cross sectional view taken on line 2—2, Fig. 1, looking in the direction of the arrows, and with the parts in the same position as shown in Fig. 1. Dotted lines indicate another position of the device as compared to Fig. 1.

Fig. 3 is a transverse sectional view taken on line 3—3, Figs. 2 and 4, and looking in the direction of the arrows, and with the parts in a neutral position as shown in Figs. 1 and 2.

Fig. 4 is a top plan view of our novel switching device with the top cover plate removed.

Fig. 5 is a more or less diagrammatic wiring diagram of our device associated with an electric circuit and associated devices.

Fig. 6 is a front view of a make and break contacting button used in our novel switching device.

Fig. 7 is an axial sectional view taken on line 7—7, Fig. 6 showing more or less diagrammatically the interior construction of our novel make and break contacting button.

The transformer 1 shown in Fig. 5 is of any usual construction or type interposed in the main high voltage line 23, 24 that are connected to the primary side of the transformer. The transformer 1 is preferably designed to step down the voltage of the high voltage lines to approximately a voltage of 24 volts or less.

A quick make and break button A is interposed in the secondary side of the transformer between the lead lines 20 and 22 for manual operation of the switching device B, and which make and break button A is more particularly shown in Figs. 6 and 7 and will be more particularly hereinafter described and claimed.

The other lead of the secondary side of transformer 1 is connected through lead 21 to the switching device B, as will be more particularly hereinafter described.

The switching device B comprises a case 2 which surrounds the enclosed mechanism and also separates the high voltage line entering the case from the low voltage lines which emanate therefrom.

In the base of the case 2 is an insulating block 5 which has secured thereto, lead terminals 3, 3'. A plurality of contact points 4, 4' are connected to the insulating block 5 and the contacts points 4 are connected to the lead terminals 3 and 3' and the contact terminals 4' are connected to a terminal block 19 which in turn is connected to the lead line 20 that is connected to the secondary side of the transformer 1 through the button A.

The lead line 21 is connected to a terminal block insulated from and secured to block 19 and is connected to one side of each solenoid 7 by wires 21'.

The other side of each solenoid 7 is connected by a lead 20 connected to lead terminals 3, 3' and thence connected to its respective contact point 4.

Slidably mounted in solenoids 7 are rods 6 approximately the upper half of which is of any suitable non-conductive material and the lower half of which is of magnetic material, and the lower extremities thereof being tapered as at *a* and adapted to make and close the circuit between its associated low voltage contact points 4, 4', and for easy insertion therein.

The upper ends of the rods 6 are connected to pivot pins 8 which in turn extend through slots 8' in brackets 9 that are connected to the ends of a tilting frame 11, which is spaced apart at each end by an insulating block 10. The tilting frame 10 and 11 is pivoted as at 12 to an upright bracket 13 which is secured to and extends upwardly from an insulating block 14. Mounted upon the tilting frame and preferably between the ends thereof adjacent the axis 12 is a switching device such as a mercury switch 16 or any other suitable contacts, so that upon tilting of the frame 10, 11 will complete or break the high voltage circuit through leads 15 that are connected to the hot side of the high voltage line and the leads 17 and 18 that are connected to the light or power to be controlled by our device.

The make and break button A comprises a housing member or case 25 and a plate covering or escutcheon 41 through which a button 40 extends from the push rod 33, that has a flange 35 fixed thereon. A bracket 37 is mounted in housing 25 and carries a guide member 38 as well as a stop 36, between which and the plate 41, the flange 35 operates. A coil spring 34 operates between guide 38 and flange 35 to normally urge the rod 33 and button 40 outwardly. The inner end of rod 33 is provided with a collar 32 that is adapted to contact and trip the arm 31, one end of which is pivoted at 30 to the housing and the other of which carries a contact 27 that engages with the contact block 26 which in turn is connected to lead 22.

The upper end of arm 31 is connected to a rod 29 slidably mounted in a suitable bracket *b*, and rod 29 has a head *c* on its inner end and between which and one leg of bracket *b*, a spring 28 operates to normally hold contact 27 in open position. The head *c* abuts against an adjusting block 39 so that contact 27 may be adjusted relative to contact block 26.

In operation, as by way of example or illustration to explain the reversing operation of the solenoids 7, when the right hand solenoid 7 is energized by closing the circuit thereto by pushing button 40 it will complete a circuit through the right hand contacts 4, 4' causing rod 6 to move in an upward direction, thereby tilting frame 10, 11 and forcing the rod 6 in the left hand solenoid downwardly into contact with its associated contacts 4, 4' thereby positioning the parts for the next operation upon pushing the button 40.

In following the circuit, assuming that the rod 6 is down as indicated in dotted lines in Fig. 3, upon pushing the button 40 the circuit from line 24 will pass through transformer 1, button A, line 20, to contact point 4', thence through rod 6 to contact point 4, right hand line 20' to one side of the solenoid 7, the other side of which is connected through lead line 21 and its central terminal block, thence to the other side of transformer 1 and lead line 23. The rod 6 on the right hand solenoid is then pulled upwardly and the left hand solenoid, rod 6 pushed downwardly into contact with its associated contact points 4 and 4', and the operation may be reversed by closing circuit *a* and the electric energy will follow through line 20, contact block 19, points 4', rod 6, contact point 4, left lead line 20' to one side of the solenoid, the other side of which is connected through line 21 and its associate terminal block 2 through the other side of transformer line 1 and power line 23.

In the switching device B the solenoids 7 and the mercury switching device or other switching device are separated by a partition *d* as more clearly shown in Figs. 1, 2, and 3 thereby definitely insulating the switching mechanism from the electrical operating mechanism and definitely separating the high voltage line from the low voltage line so as to eliminate any likelihood of a person operating the switch from receiving an electrical shock of a high voltage character in the event of any short circuit.

It will be seen from the foregoing in our device the switch is wholly self-sustaining and is momentarily energized after which the operation is complete thereby also reducing to a minimum the likelihood of the operator receiving an electrical shock from the operation of the device, and making it possible for installation of low voltage wiring, rather than be required to install the more expensive wiring required by law and ordinances in connection with the wiring of premises in conjunction with high voltage wiring.

It will be appreciated that by being enabled with the use of our device that a material saving on costs on all types of wiring will be obtained because all controlling switch buttons are and may be wired by means of low voltage wiring, thereby safeguarding lives and property and furthermore giving silent operation. Our device may be installed singly with respect to each unit or in multiple as shown by the lead lines in Figs. 1, 3, and 4.

The device may be made very small and compact so that it may be even associated with electric lighting fixtures of the overhead type or installed in a very small unnoticeable niche.

It will also be seen from the foregoing that our device may be used in place of a master switch circuit to operate electrical devices and which master circuits are expensive in installation due to their being required to conform to various laws and ordinances whereas with our low voltage remote control circuit such costs are eliminated.

We claim:

1. A remote control switching device comprising in combination a divided housing having in one side a low voltage operating mechanism, and on its other side a high voltage operating switch; an insulating partition separating said mechanisms; and an operating switch connected to said low voltage operating mechanism.

2. A remote control switching device comprising a movable switch member including a pivoted frame; a rod connected to each end of said frame; a solenoid surrounding each rod, said solenoid being connected to a high voltage circuit through a switch and a transformer which reduces said high voltage to a low voltage; and said frame having associated therewith switching means to make and break a high voltage circuit to a device to be operated by said high voltage circuit.

3. A remote control switching device comprising a movable switch member including a pivoted frame; a rod connected to each end of said frame; a solenoid surrounding each rod, said solenoid being connected to a high voltage circuit through a switch and a transformer which reduces said high voltage to a low voltage; said frame having associated therewith switching means to make and break a high voltage circuit to a device to be operated by said high voltage circuit; and remote control switching means to close a circuit to said solenoids.

4. A remote control switching device compris-

ing a movable switch member including a pivoted frame; a rod connected to each end of said frame; a solenoid surrounding each rod, a circuit including a transformer which reduces said high voltage to a low voltage, said solenoid being connected in said low voltage circuit; and said frame having associated therewith switching means to make and break a high voltage circuit to a device to be operated by said high voltage circuit; remote control switching means to close the low voltage circuit to said solenoids; and contact points connected to said low voltage circuit and adapted to be contacted by said rods so as to reverse the current to said solenoids to alternately move said frame from one position to another position to make and break the high voltage electrical circuit.

5. A remote control switching device comprising a movable switch member; a high voltage circuit; switching means associated with said switch member and connected to said circuit to make and break said high voltage circuit; electroresponsive means for moving said switch member between two positions to open and close said circuit; a low voltage circuit connected to said electroresponsive means; and a remote control switching means to close said low voltage circuit to said electroresponsive means to operate said movable switch member.

6. A remote control switching device comprising a movable switch member; a high voltage circuit connected through said member to a device to be operated by said circuit; electroresponsive means to operate said switch member; a low voltage circuit connected to said electroresponsive means; and a remote switch to close said low voltage circuit to cause said means to operate said movable switch member.

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