H. W. CHENEY.

HIGH POTENTIAL RELAY.

APPLICATION FILED APR. 3, 1909.

1,023,503. Patented Apr. 16, 1912.

Fig. 1

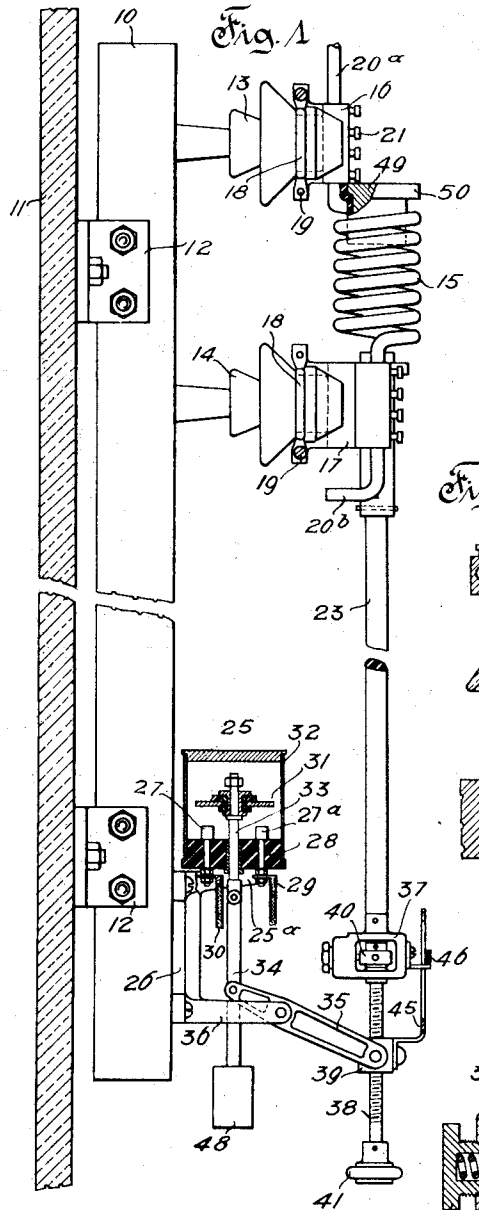


Fig. 2

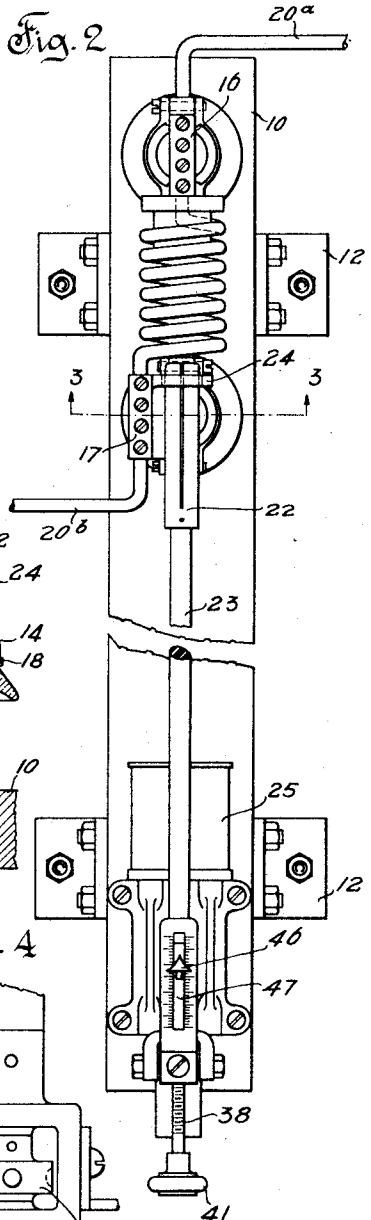


Fig. 3

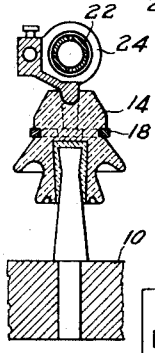
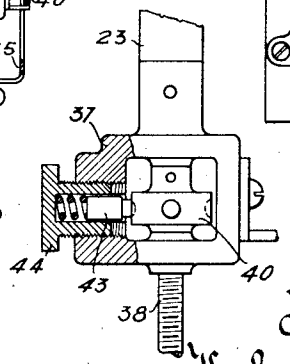


Fig. 4



Witnesses

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HIGH-POTENTIAL RELAY.

1,023,503. Specification of Letters Patent. Patented Apr. 16, 1912.

Application filed April 3, 1909. Serial No. 487,730.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in High-Potential Relays, of which the following is a full, clear, and exact specification.

This invention relates to relays such as are employed in connection with circuits of high voltage for controlling low voltage circuits which operate large capacity switches located in the high voltage mains.

The object of the invention is a provision of a relay which is so arranged and constructed that the parts of high potential are spaced from and well insulated from the low voltage circuit or other metallic parts of the relay or surrounding apparatus, and, which is so constructed that the relay may be adjusted so as to operate at different current values in the relay coil without any danger of injury to the operator.

My invention may be briefly summarized as consisting in certain novel details of construction and combination and arrangements of parts which will be described in the specification and set forth in the appended claims.

Reference is had to the figures of the accompanying sheet of drawings, in which—

Figure 1 is a side view of a relay constructed in accordance with my invention, parts being broken away and in section; Fig. 2 is a front view of the same; Fig. 3 is a partial transverse view substantially along the line 3—3 of Fig. 2 looking in the direction indicated by the arrow; and Fig. 4 is an enlarged detailed view of part of the core adjusting mechanism.

In the figures of the drawing wherein I have shown my invention embodied in an overload relay, 10 represents the supporting base for the relay mechanism, this base being preferably made of wood or other insulating material and being secured to the wall or other supporting member 11 by short angles 12. This supporting base 10, which will be preferably arranged in a vertical position, has secured thereto, one vertically over the other, two spaced insulators 13 and 14 which support an open high voltage relay coil 15 of the solenoid type, the axis of the coil being vertical. This coil 15 is not supported directly by the insulators, but has its ends secured to two terminal or connector blocks or members 16 and 17 formed of good conducting material, such as cast brass, these two blocks being received in slots in the outer ends of the insulators 13 and 14 respectively and being secured to the latter by straps 18 which extend about the insulators and have their ends clamped to the ends of the blocks by means of transverse screws 19. These connector blocks 16 and 17 have sockets which receive the ends of the coil 15 and also the ends of a high voltage main or conductor of which the coil 15 forms a part, and portions of which are shown at 20^a and 20^b respectively. The ends of the conductor and of the coil are secured in the sockets by means of a plurality of set screws 21. The portion of the upper connector block 16 having the sockets is preferably located centrally of the insulator 13, but the portion of the lower connector block having the sockets is located at one side of the insulator 14, as shown clearly in Figs. 2 and 3, so as not to interfere with the vertical movement of the plunger or core of the solenoid. This core, which is shown at 22, is preferably in the form of a tube which is slotted to eliminate eddy currents and which is secured to an operating rod 23 extending vertically downward a considerable distance below the coil 15 as will be explained presently. When the core 22 is in its normal position, it is supported below, or at least partially below the coil 15, and is guided in its movement by a ring 24 which is integral with the lower terminal or connector block 17 and is located below the coil 15 with its axis coincident with the axis of the latter.

At 25 is shown a low voltage switch, or the switch which controls the low voltage circuit and which is operated by the solenoid. This switch is located below the solenoid and a considerable distance therefrom, the distance being sufficient in any case to insure proper insulation from the coil and the high potential conductor so as to prevent communication of an arc or of the establishment of a circuit between the high and low voltage conductors. The switch 25 which is supported on upper horizontal arms 25^a of a bracket 26 secured to the lower end of the base 10, is in this case designed to be closed when the core 22 is drawn upwardly, or when the current in the solenoid rises to a predetermined value, and includes a pair of

stationary contacts 27 and 27ª supported by an insulating base 28 and connected respectively to the ends or terminals of the low voltage conductors 29 and 30, and includes also a movable bridging contact 31, the three contacts being preferably inclosed within a cylindrical casing 32. The movable bridging contact 31 is secured to a plunger 33 which extends downward through the insulating base 28 and is connected by a link 34 to the inner end of a lever 35 which is pivoted between arms 36 extending horizontally from the lower end of the bracket 26.

The outer end of the lever 35 is operatively connected to the insulating rod 23, and is preferably connected in a manner such that the rod 23 and core 22 may be adjusted so that the core will be drawn upwardly and the low voltage switch 25 closed at different current values in the solenoid coil 15. In this case this is accomplished in the following manner: Secured to the lower end of the insulating rod 23 is a box-like member 37 to which is swiveled a threaded rod 38 on which is mounted a nut 39 having a swivel connection with the outer end of lever 35 previously referred to. The rod 38 has secured to its upper end a head 40 which may turn freely between the top and bottom of the member 37, and which therefore permits the rod 38 to turn freely relative to the rod 23. At the lower end of the rod 38 is a knob 41 which is preferably formed of insulating material. It will be seen that when the rod 38 is turned by turning the handle or knob 41, rod 38, rod 23, and core 22 will be moved downwardly or upwardly relative to the nut 39 and relative to the coil 15 so that an adjustment of normal position of the core can be readily effected. The rod 38 may be held in any adjusted position by means of a small spring-pressed pin or plunger 43 which is mounted in a hollow plug 44 extending through the side of the member 37, and the inner end of which is adapted to engage in any one of a series of recesses or depressions in the head 40.

The nut 39 and the member 37 in this case are provided with two coöperating members of an indicating or calibrating device, the nut 39 having an upwardly extending scale plate 45 which is provided on its face with suitable graduations, and the member 37 having an indicator 46 which extends in this case through a slot 47 in the scale plate 45. The graduations of the scale plate 45 will, of course, be provided with suitable characters which will indicate the values of the current in the coil necessary to operate the low voltage switch when the core is in different adjusted positions.

In order that the relay may be operated and the switch 25 closed with a small expenditure of energy in the solenoid, the weight of the parts which move upwardly when the relay is operated is partly counterbalanced by means of a counter-balancing weight 48. If desired also to increase the density of the flux in the coil 15, a stationary core such as a plug 49 may be inserted in the upper part of the coil. This plug will be insulated from the coil by a collar 50 of insulating material.

It will be seen from the above described construction that because of the manner of supporting the high voltage coil all grounding or leakage of current from the coil or from the conductors connected to the coil is prevented, and because of the arrangement and construction of the operating parts between the solenoid and the low voltage switch, the latter may be located any distance below the former so that regardless of the difference of potential between the coil and the switch, an ample insulating space may be provided to avoid any danger of a circuit being established between the high and low voltage conductors.

I do not desire to be confined to the exact details shown and described, but aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of my invention.

What I claim as new, and desire to secure by Letters Patent is:

1. In a relay, a pair of insulators, a pair of connectors carried thereby, a high voltage coil secured to said connectors, a movable core for said coil, one of said connectors having a guide for said core, a low voltage switch, and means for operating said switch by a movement of said core.

2. In a relay, a pair of insulators, a pair of connectors carried thereby, a high voltage coil having its ends secured to said connectors, a movable core for said coil, the lower connector having a guide for said core, a low voltage switch below said coil, and means including a member associated with said core for operating said switch by a movement of said core.

3. In combination, a pair of insulators, terminal members secured to said insulators, one of said terminal members having a guide portion, a high voltage coil having its ends secured to said terminal members, a core for said coil, said core being guided by the guide portion of said terminal member, a low voltage switch located below the coil at a distance therefrom sufficient to insulate the high voltage coil from the switch, and means for operating said switch by a movement of the core comprising a rod extending downwardly from the core and operatively connected to the switch.

4. In combination, an insulating base, a pair of insulators secured thereto, connector blocks secured to the ends of the insulators,

an open high voltage coil having its ends secured to said connector blocks respectively, a core for said coil, one of said connector blocks having a guide for said core, a switch supported by said base at a distance from the coil sufficient to prevent current leakage between the coil and switch, and means for operating said switch by a movement of said core comprising a rod extending downwardly from the core and operatively connected to the switch.

5. In combination, terminal connector blocks, one of which has a guiding portion, a high voltage coil secured to said blocks, a core for said coil, said core being guided by said guiding portion in one of said blocks, a low voltage switch, and an operating mechanism between said core and said switch.

6. In a relay, a pair of insulators arranged one vertically over the other, a pair of connectors carried by said insulators, a high voltage coil having its ends secured to said connectors, a vertically movable core for the coil, the lower connector having a guide for the core, a low voltage switch below said coil, and means for operating said switch by a movement of said core.

7. In combination, an insulating base, a pair of insulators supported by said base one above the other, connectors secured to the outer ends of the insulators, a high voltage open solenoid coil having its ends secured to and supported by said connectors, a vertically movable core, the lower connector having a guide for the core, a low voltage switch secured to said base at a distance below said coil sufficient to insure insulation space between the coil and the switch, a pivoted lever connected to the switch, and an insulating rod extending downwardly from the core and operatively connected to the lever.

8. In a relay, insulators, connectors carried by said insulators, a coil secured to said connectors, a core movable in said coil and the normal position of which may be adjustable, one of said connectors having a guide for said core, a low voltage switch, and means associated with said core for operating said switch.

Milwaukee, Wis., March 31, 1909.

In testimony whereof I affix my signature, in the presence of two witnesses.

HERBERT W. CHENEY.

Witnesses:

H. C. CASE,

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