H. W. CHENEY.

OIL SWITCH.

APPLICATION FILED AUG. 30, 1905.

925,994.

Patented June 22, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

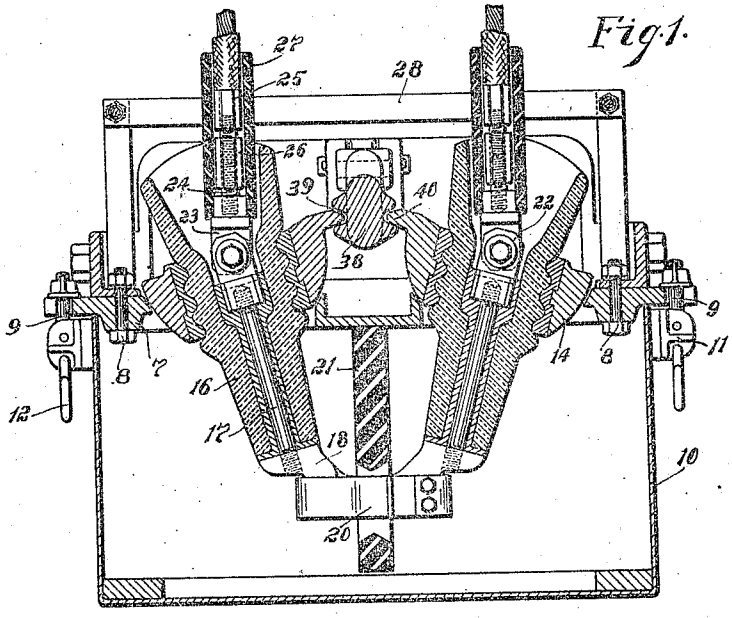


Fig. 2.

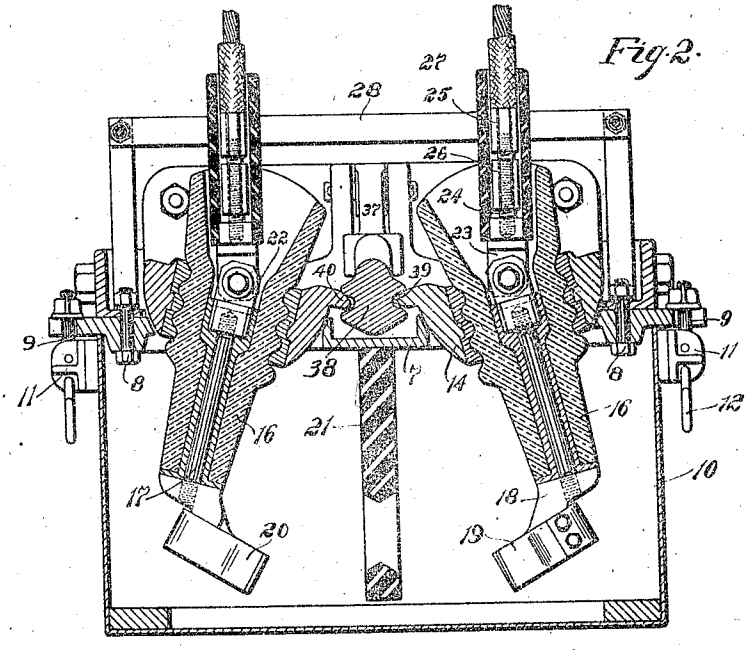
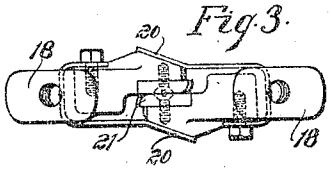


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 5.

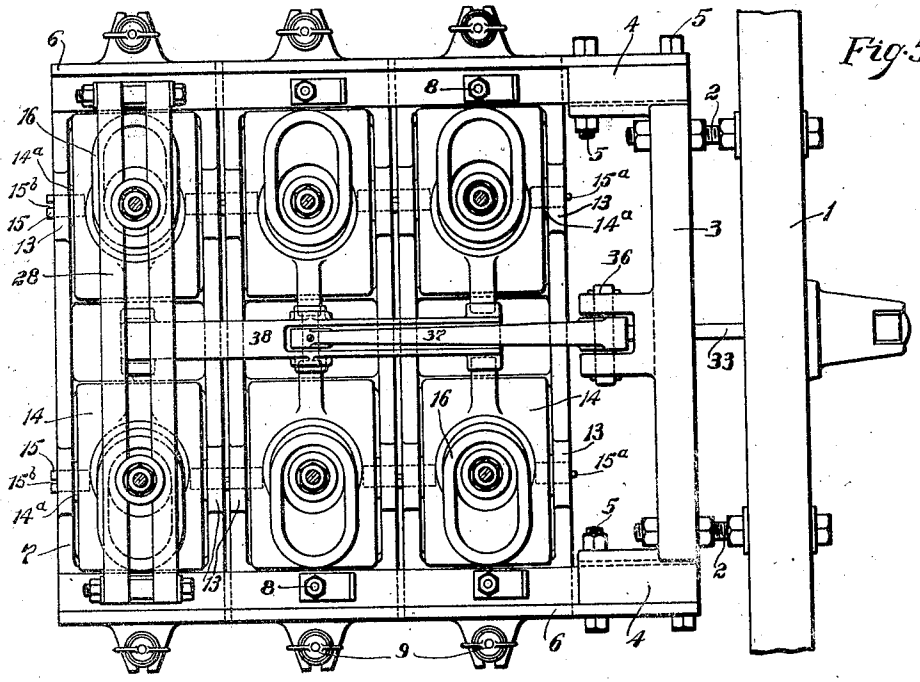


Fig. 6.

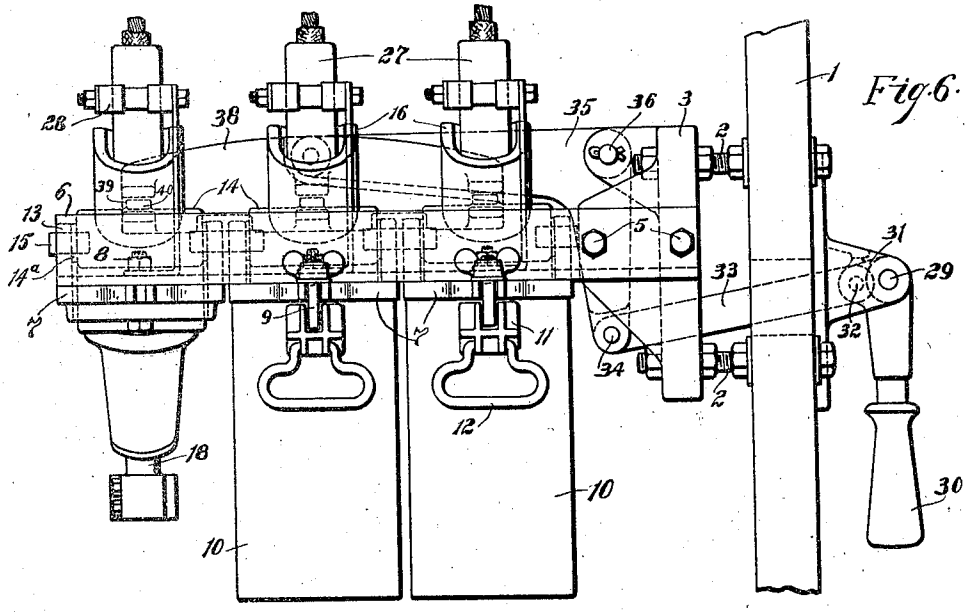
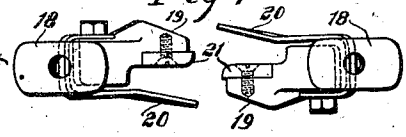


Fig. 4.



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UNITED STATES PATENT OFFICE.

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OIL-SWITCH.

No. 925,994. Specification of Letters Patent. Patented June 22, 1909.

Application filed August 30, 1905. Serial No. 276,364.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Oil-Switches, of which the following is a full, clear, and exact specification.

My invention relates to switches or circuit breakers and particularly to oil switches for circuits of high voltage.

In nearly all previous construction of oil switches, either there is a single stationary contact and a single movable contact adapted to be swung toward and away from the stationary contact as in the ordinary form of single-break switch, or there are two stationary contacts and a movable, bridging contact adapted to be moved toward and away from the stationary contacts by a reciprocating or rotary movement, as in the common forms of double-break switch. In the latter type of switch, as the circuit is broken at two points, the arc at each contact is much reduced. Now the object of my invention is to provide an improved single-break switch in which the sparking at the contacts will be reduced to a minimum.

In carrying out my invention, I provide a switch with a pair of contacts, both of which are movable, so that when the circuit is broken the contacts will be quickly separated.

More specifically considered my invention consists of a multiple switch composed of any desired number of single pole switches, each having a pair of movable contacts mounted in supports for oscillatory movement toward and away from each other, the contact supports of all the switches being engaged by a horizontally extending, vertically movable arm, which arm is adapted to be operated by a switch handle to open or close the multi-pole switch.

My invention still further consists in certain novel details of construction and combination of elements described in the specification and set forth in the appended claims.

For a more complete understanding of my invention reference is had to the accompanying drawings forming a part of this application, in which—

Figure 1 is a longitudinal section of my improved switch showing the switch contacts in the closed position; Fig. 2 is a similar section showing the switch contacts separated or in the open position; Fig. 3 is a plan of my switch contacts showing the same in engagement; Fig. 4 is a similar view showing the contacts separated or out of engagement; Fig. 5 is a plan view of a group of three single-pole switches attached to a switch-board panel; and Fig. 6 is an elevation of the same, parts being removed for the sake of clearness.

I have shown at 1, a portion of a switch-board panel to the rear of which is secured by bolts 2, a switch supporting bracket 3. This bracket has two side lugs 4 to which are secured by bolts 5 two rearwardly extending arms 6, the latter being preferably of angle iron, as is here shown. Between these rearwardly extending arms any number of single-pole or unit-pole switches are adapted to be supported. The length of the arms depends on the number of switches. In this case I have shown three unit-pole switches forming a three-pole switch, but I desire it to be understood that my invention is not confined to this type of switch. In fact each unit-pole switch is entirely independent of the others and is complete in itself except for the operating mechanism, and my unit-pole switches are therefor especially adapted for arrangement in groups of any number to form compound switches of any desired numbers of poles.

Each unit-pole switch is supported on a rectangular frame 7, preferably of cast-iron, which in turn is secured to the undersides of the angle irons by bolts 8. Each frame supports by bolts 9 an oil tank 10. These bolts which are pivoted to lugs 11 engage slots in the opposite sides of the frame. Each lug is also provided with swinging handles 12 for convenience in moving the tank.

Extending upward from the top of each frame are four lugs 13, arranged in pairs, the lugs of each pair being on opposite sides of the frame. Each of the lugs is perforated and the perforations in the corresponding pairs of lugs in all the unit-pole switches are arranged in a line for purposes explained later. These perforated lugs form bearings for the oscillatory or rotary cast-metal rockers or cradles 14, which are provided with oppositely extending arms or journals 15 seated in the said perforations. The journal

arms in the several switches are alternately provided with engaging tongues 15^a and grooves 15^b so that when the unit switches are assembled all the rockers are intimately connected and will oscillate in unison. I interpose between each cradle 14 and lug 13 on the frame 7, a yielding collar or washer 14^a which allows a slight lateral movement to the contact supporting porcelain tubes or bushings, and insures proper engagement of the arcing tips while the main contacts are in engagement and also after they have separated before final break.

Into each of the rockers or cradles are secured preferably by cement or Babbitt metal, porcelain tubes or bushings 16. Into each of these bushings is held by cement or other suitable means a contact rod 17, to the lower end of which is secured one of the contact members of the switch. Each rectangular frame 7 is suitably hollowed out and the sides of the rockers or cradles 14 are suitably curved so that at all positions of the said rockers, the latter fit closely within the frame. Each switch contact member consists of a copper or brass block 18, having an inclined contact face 19 and a yielding contact jaw or spring-finger 20. Each engaging pair of contacts are alike in construction, but with parts oppositely arranged so that the inclined contact face 19 of each contact member engages the inclined spring contact member 20 of the other. The contact blocks are provided with sparking tips 21, which take the arc when the circuit is broken. Located centrally of each tank is a transverse plate or barrier of insulating material 21, to lessen the danger of injurious sparking and to assist in rupturing the arc between contacts.

The contact rods 17 extend up into the porcelain bushings and are provided at their upper ends with screw-threaded terminal members 22, to each of which is pivoted a second terminal member 23, the pivotal center being exactly in line with the axis of movement of the corresponding cradle 14. The members 23 are provided with threaded studs 24, which are connected to threaded terminals 25 on the main leads by collars 26. The connection is surrounded by an insulating tube or sleeve 27 which rests securely on the member 23 and is adapted to be slipped at will along the main lead to expose the connection.

The insulating tubes and all the parts above the pivotal centers of movement are held stationary by holding frames 28 which are secured to the supporting arms 6 by the bolts 8. Each unit-pole switch is provided with one of these frames which extends over the switch and on each side of the insulating tubes holding the same in a fixed position. The upper ends of the movable porcelain tubes or bushings 16 are enlarged or are provided with flaring sides so that the latter will not strike the stationary members extending therein.

The operating means for swinging the contacts into and out of engagement will now be described. Pivoted on the front of the switch-board at 29 is the operating handle 30. The handle has a short toggle arm 31 to which is pivoted at 32 a link 33. The link 33 is pivoted at 34 to the arm of the bell-crank lever 35. The bell-crank lever is pivoted at 36 to the supporting bracket 3, as is shown in Fig. 5. The outer end of the long arm 37 of the bell-crank is pivoted to the middle of the vertically reciprocating, horizontal arm 38. This arm 38 in its vertical movement engages the rocking cradles and swings the switch contacts toward or away from each other. In this case the arm 38 is provided with longitudinal grooves 39 into which extend the lips 40 of the cradles. As is seen from the drawings when the handle is swung down to the closed position the arm 38 will be raised and the contacts will be brought together, and when the handle is swung upward the contacts will be quickly separated a considerable distance. By mounting both the contacts for movement in opposite directions when the switch is opened, the contacts will be separated substantially twice the distance in the same space of time as in the ordinary single-break switches. Thus sparking at the contacts will be greatly reduced.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is—

1. In an oil switch, an oil tank having a cover, a pair of contacts therein, contact rods on which said contacts are supported extending out of said tank through the cover and supported thereon, means for connecting said contact rods to the main line leads, and means for rocking said rods to swing the contacts into and out of engagement.

2. In an oil switch, an oil tank, a pair of contacts therein, contact rods carrying said contacts, said rods being supported from a point above the tank and extending downward through the cover thereof, hinged means for connecting the contact rods with the main line leads, and means for rocking the contact rods about the hinged centers whereby the contacts will be swung into and out of engagement.

3. In an oil switch, a horizontal supporting member, an oil tank secured to the lower side thereof, a pair of contacts in said tank, insulated contact rods on which the contacts are supported, rocking cradles in which the insulated rods are secured, said cradles being mounted on said supporting member, and means for rocking said cradles to swing the contacts into and out of engagement.

4. In an oil switch, a horizontal support,

an oil tank, a pair of contacts therein, contact rods to which the contacts are secured, insulating bushings in which the contact rods are embedded extending through the tank cover, cradles for supporting the bushings journaled on said support, means for pivotally connecting the contact rods to the main leads and means for rocking the cradles to swing the contacts into and out of engagement.

5. In an oil switch, an oil tank, a frame to which the tank is secured, cradles mounted in journal bearings on said frame, porcelain bushings supported in said cradles and extending down in said tank, contact rods extending through the said bushings, contacts secured to the lower ends of said rods, stationary main leads connected to the contact rods by hinged joints, the axis of each of which is on a line with the axis of the corresponding journal bearing, and means for rocking said cradles to swing the contacts into and out of engagement.

6. In an oil switch, an oil tank, cradles mounted on journal bearings over said tank, porcelain tubes or bushings having flaring upper ends, extending through the cradles into the oil tank, contact rods extending through the porcelain tubes, contacts on the lower ends of the rods, stationary line terminals extending into said flaring ends of the tubes and connected by hinged members to the contact rods, the centers of movements of the hinged members and journal bearings being coincident, and means for rocking the cradles to swing the contacts into and out of engagement.

7. In combination, in a plurality of single pole switches, a main horizontal supporting member, a pair of movable co-acting contacts for each of the switches, supports for said contacts extending through said main supporting member and mounted on bearings thereon, all the corresponding supports of the several switches being connected together, a movable device connected to all said supports and means for operating said movable device to swing the contacts into and out of engagement.

8. In a multipole switch composed of a plurality of single-pole switches, a support therefor, a pair of movable co-acting contacts for each of said switches, an oscillatory supporting means for each of said contacts, a horizontal, vertically movable arm engaging all said supports, and means for reciprocating the arm to swing the contacts toward or away from each other.

9. In a multipole switch consisting of a plurality of single-pole switches, a horizontal supporting member, a pair of movable contacts for each switch mounted in supports for oscillatory movement toward and away from each other, said supports for the contacts extending downward through said horizontal supporting member a movable arm extending over the switches and engaging all the contact supports, and means for moving said arm in a plane at right angles to the planes of movement of the contacts.

10. In a switch, a pair of relatively movable contact members having oppositely disposed solid contacts and spring contact fingers, and separate arcing tips or contacts secured to the adjacent faces of the solid contacts, the spring contact finger of each contact member engaging the solid contact of the other and the arcing contacts engaging each other when the switch is closed.

11. In a multipole oil switch, a plurality of unit-pole switches each having a pair of contacts movable toward and away from each other, a separate rocking support for each contact, conductors connected to the contacts and extending through the rocking supports, the latter being electrically independent of the conductors, means engaging all said supports for moving the contacts to operate the switch, and means for constraining said rocking supports so that they will all move in unison, said means for moving the contacts being separate from said rocking supports.

12. In a multipole oil switch, a plurality of unit-pole switches, each having a pair of movable contacts, terminal members connected to said contacts and adapted to be connected to the line terminals, separate insulated rocking supports for said contacts and the terminal members connected thereto, and means engaging the rocking supports to move the contacts toward and away from each other, said supports being connected together so that all the unit-pole switches will be operated simultaneously.

13. In an oil switch, an oil tank having a cover, a pair of contacts therein, contact rods on which said contacts are supported extending out of said tank through the cover and supported thereon, means for connecting said contact rods to the main line leads, a stationary barrier or plate of insulating material mounted between said contacts, said barrier having an opening in which said contacts are adapted to engage each other, and means for rocking said rods to swing the contacts into and out of engagement.

14. In a switch, a plurality of contacts, contact terminals connected to said contacts, insulating bushings through which said contact terminals extend, rocking holders through which said bushings extend and in which they are rigidly mounted, separate bearings for each rocking holder, and an operating member engaging all said holders to open and close the switch.

15. In a switch, a pair of movable insulators carrying contact members, said contact members having rigid contacts provided with inclined contact faces, yielding contact

fingers adapted to engage the inclined faces of the rigid contacts, and separated arcing tips secured to the adjacent faces of the rigid contacts and adapted to engage each other.

16. In a switch, a horizontal supporting member, a plurality of contacts, contact terminals secured thereto and adapted to be connected to line terminals, insulating bushings surrounding said terminals, rocking supports in which said bushings are rigidly secured, each support having intermediate its ends separate supporting bearings, and means engaging all of said supports to open and close the switch.

17. In an oil switch, a frame, an oil tank, a pair of oscillatory supporting members mounted on said frame independently of each other, contact rods carried by said oscillatory members and extending downward into the tank, means for connecting the upper ends of said contact rods to line terminals, cooperating contacts at the lower ends of said contact rods, and means engaging both said oscillatory members to rock the same toward and away from each other so as to swing the contacts into and out of engagement.

18. In an oil switch, a horizontal support, an oil tank, a pair of contacts therein, contact rods on which the contacts are supported, bushings pivotally supported intermediate their ends on said support, said bushings carrying the contact rods hinged means for connecting the contact rods with the main line leads, and means for rocking the contact rods about their hinged centers whereby the contacts will be swung into and out of engagement.

19. In an oil switch, an oil tank, a pair of contacts in said tank, insulated contact rods on which the contacts are supported, insulating bushings extending into the tank, and in which the contact rods are mounted, pivoted cradles to which the insulating bushings are secured, and means for rocking said cradles to swing the contacts into and out of engagement.

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

HERBERT W. CHENEY.

Witnesses:

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FRED J. KINSEY.