

Jan. 13, 1925.

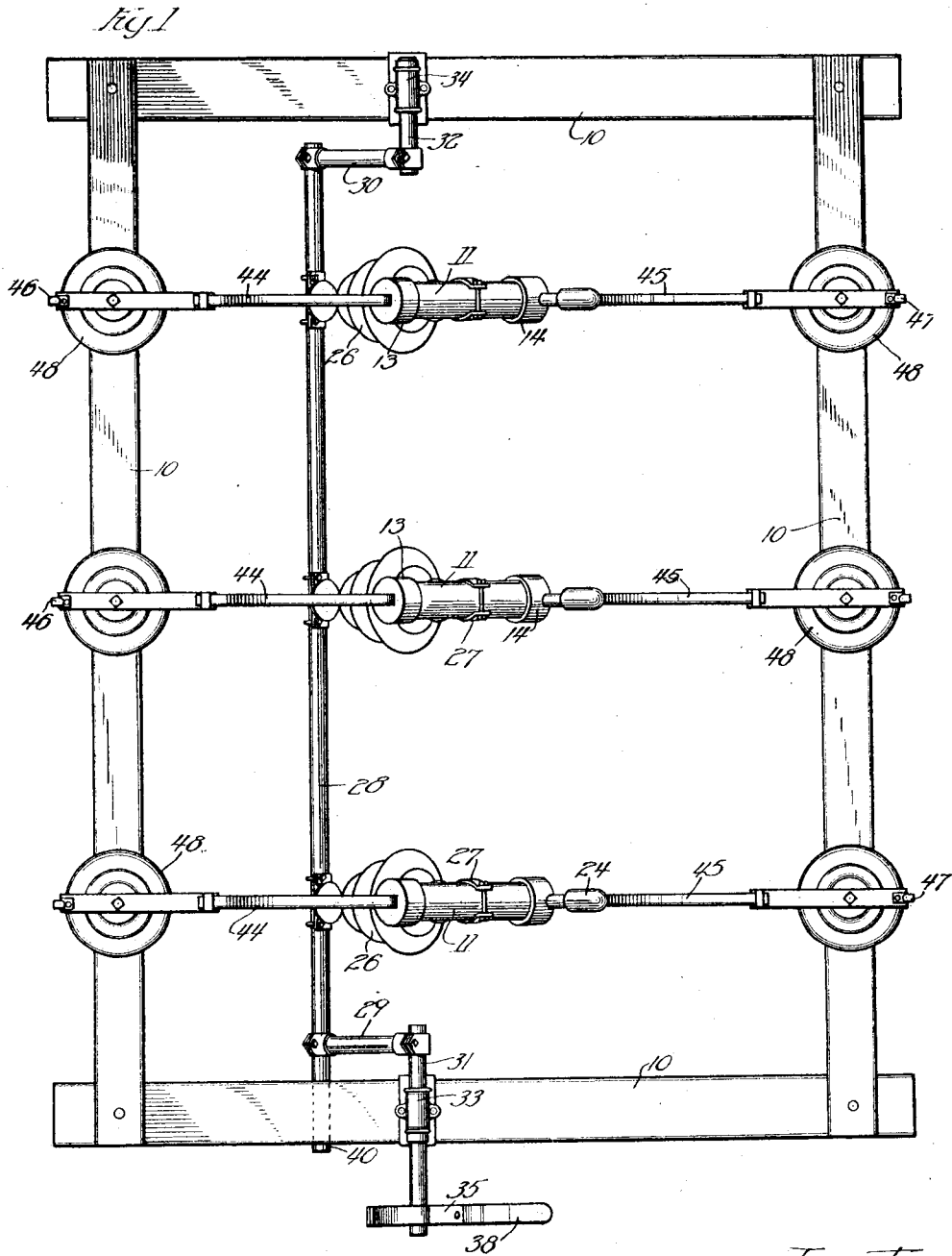
N. J. CONRAD

1,522,498

SWITCH

Filed July 10, 1920

3 Sheets-Sheet 1



Inventor
Nicholas J. Conrad
by Jakob Mueller
Att'y.

Jan. 13. 1925.

N. J. CONRAD

1,522,498

SWITCH

Filed July 10, 1920

3 Sheets-Sheet 2

Fig. 2

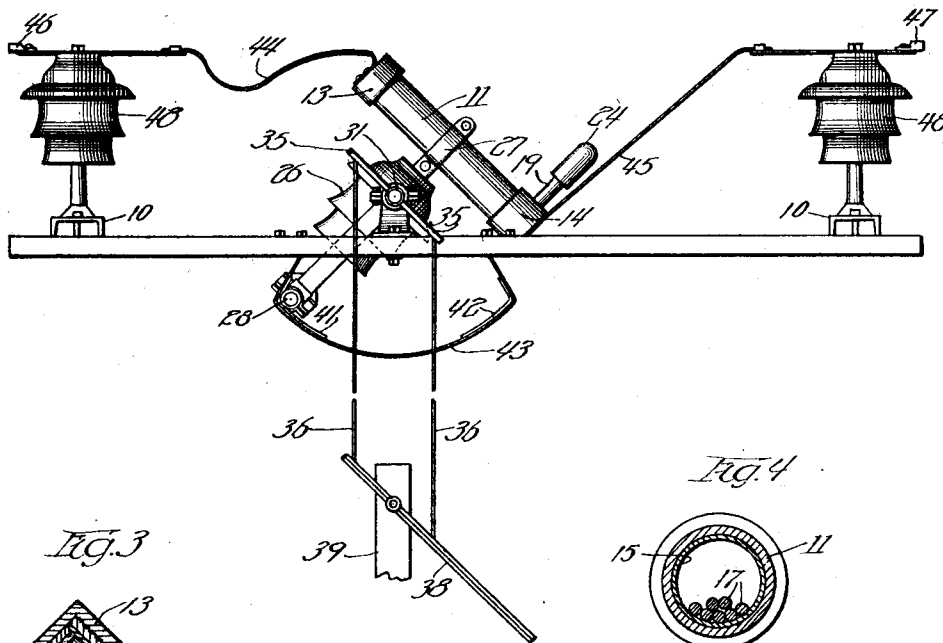


Fig. 3

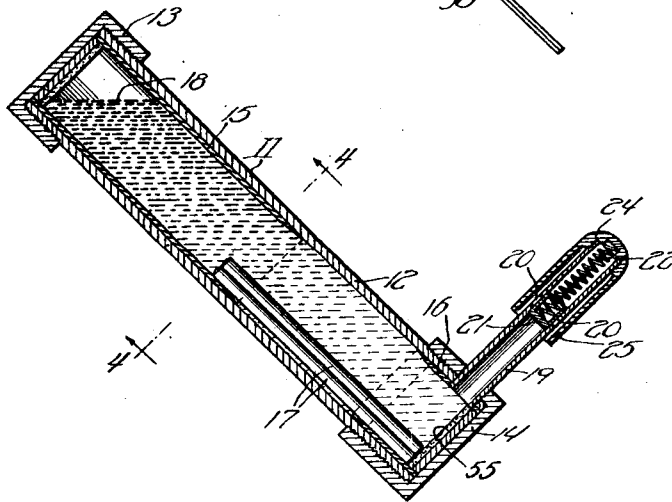
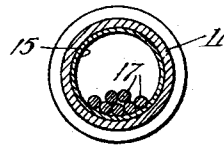


Fig. 4



Inventor
Nicholas J. Conrad
by *Fabel & Mueller*
Attys.

Jan. 13. 1925.

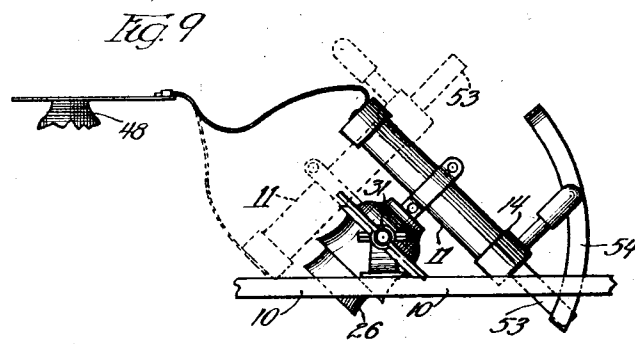
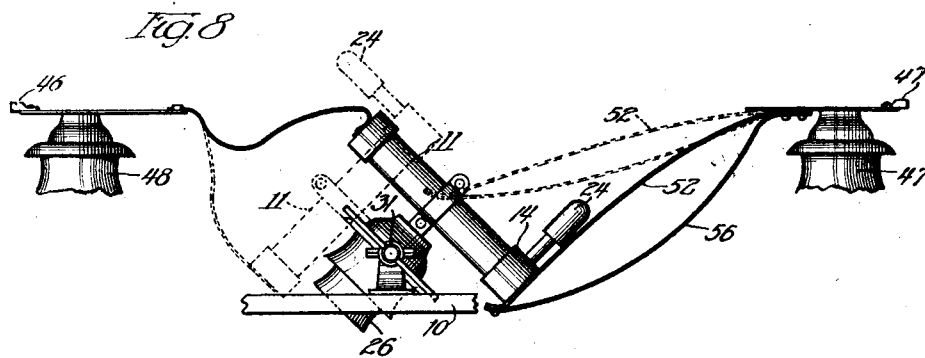
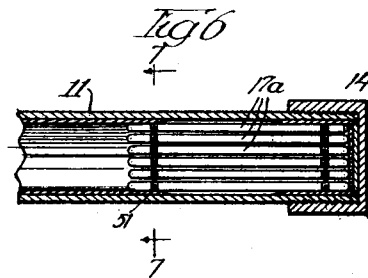
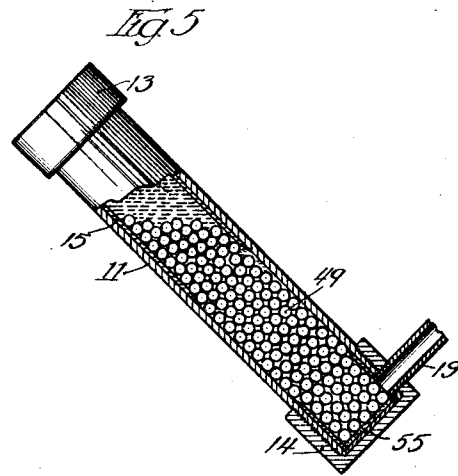
1,522,498

N. J. CONRAD

SWITCH

Filed July 10, 1920

3 Sheets-Sheet 3



Inventor
Nicholas J. Conrad
by Gabriel Mueller
Attys

UNITED STATES PATENT OFFICE.

NICHOLAS J. CONRAD, OF WILMETTE, ILLINOIS, ASSIGNOR TO SCHWEITZER & CONRAD,
OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SWITCH.

Application filed July 10, 1920. Serial No. 395,275.

To all whom it may concern:

Be it known that I, NICHOLAS J. CONRAD, a citizen of the United States, residing at Wilmette, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to circuit controlling devices and is designed to provide a device of this character in which the circuit controlling elements are carried by a suitable movable container adapted to occupy alternative positions, the whole structure so arranged that the open circuit or closed circuit condition of said circuit controlling elements depends upon the particular position occupied by the container; in other words, if the container is moved into one position, the device is in circuit closing condition, whereas if the container is in the alternative position, the device is in the open circuit condition.

The device is designed more particularly for high voltage systems and in its preferred form, the container is provided with arc extinguishing fluid, thus to adapt the device for high voltage use. An important feature of the device resides in the provision of circuit controlling elements which slide or roll from one alternative position to the other, thus to insure proper contact as distinguished from devices in which two circuit controlling elements are merely brought face to face into abutting condition.

The device is also of such character that it lends itself readily to an increase or decrease of the gap between the contact elements when they are in their open circuit condition. If the device is used, for instance, for circuits of from 2,000 to 2,400 volts, then a gap of two inches or thereabouts may be sufficient and this is considered a relatively low pressure high voltage system and it is frequently necessary to provide a gap up to twenty-four inches in length.

The device of my invention is of such a character that it can be easily adapted for any size of gap by primarily increasing certain linear dimensions.

My invention also has various other fea-

tures among which may be mentioned the provision of an air-break in addition to the circuit control within the device. All of these features, together with others which will be apparent, will now be described as to certain particular forms which these devices may take, more in detail by referring to the accompanying drawings, in which—

Fig. 1 is a plan view of a device constructed in accordance with my invention;

Fig. 2 is a side view thereof;

Fig. 3 is a sectional view of my improved circuit controlling device;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a view similar to Fig. 4 showing a modified form of the invention;

Fig. 6 is a fragmentary view of a portion of the device shown in Fig. 3 but illustrating a modification in the arrangement of the movable circuit controlling element;

Fig. 7 is a fragmentary sectional view on line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 2 showing as an addition, the air-break; and

Fig. 9 is a view similar to Fig. 8 of a modified form of structure.

Referring more particularly to Figs. 1, 2, 3 and 4, I show a framework 10 which, in the form illustrated, is designed for pole top use. The device as illustrated in these figures is designed for out-door use and is so arranged that it is weather proof.

I show three circuit controlling devices, respectively the devices 11, 11, 11, which, in this instance, control a three phase high potential circuit. Each conductor of the three phase circuit system serially includes one of the devices 11. These devices are in the form of a container having an insulating shell 12 and metallic caps 13 and 14. The metallic cap 13 is in electrical contact with an inner annular sleeve 15 of conducting material. The cap 14 is in electrical contact with an inner annular sleeve 16 made of conducting material. The elements 15 and 16 serve for contact making purposes and contact between them is established by a plurality of slidable rods 17 carried by the container.

By referring to Fig. 3, it will be noted that when the device 11 is in the position there shown, that the rods 17 are in circuit making condition, that is, for uniting the contacts 15 and 16. Should the device 11

be shifted into its alternative position as shown, for instance in dotted lines in Fig. 8, then the rods 17 would slide to the left and break the circuit, these rods under such conditions, contacting merely with the sleeve contact 15. The container is provided with an arc extinguishing fluid here shown as a liquid, the level being indicated as at 18. The device is also provided with a vent which permits egress of gases formed when the circuit is broken, thus to relieve the interior of the device of excessive pressure. The arc extinguishing liquid does not flow into the vent tube as a general proposition, although it may be forced into it at times when a discharge is caused by excess pressure. The vent consists of a tube 19 having four vent openings 20. These vent openings are normally closed by a piston 21 which is backed by the spring 22. The spring is held in place by the cap 24 which cap has an encircling hood or petticoat 25 so as to cover the vents 20 and make the device weather proof.

The arrangement is such that if under certain conditions arc extinguishing liquid is forced into the tube 19, then this excess pressure is sufficient to cause the piston 21 to travel considerably beyond the vent openings 20 so that the liquid, as a general proposition, remains in the tube 19, merely the gases escaping through the vents 20. Upon the subsidence of the excessive pressure, the liquid normally falls back into the container 12. This container 12 may be, if desired, made of transparent or translucent material so that the operator may know by a visual inspection whether the elements 17 are in open circuit or closed circuit condition.

In order to prevent fusing of the contacts or other impairment of the metallic circuit controlling parts of the device, I have found it desirable to make the sliding rods 17 of a copper graphite mixture known under various trade-names as "metite", "bronze kolite" and "copper morganite". Under certain conditions the rods might be satisfactory if made of brass. The rods 17 might also desirably be made of electrographite or other low resistance graphite compositions.

It will be noted from what has been described that the length of the break may be varied merely by increasing the length of the container 12 and the rods 17 and possibly the sleeve 15. The structure, for this reason, is very flexible and permits adapting the device for any desired voltage. The devices 11 are desirably carried upon insulators 26, suitable straps 27 being provided for this purpose. The insulators themselves are fixedly carried upon a pipe or tube 28 which tube has crank extensions 29 and 30, each provided with a stub shaft, respectively the stub shafts 31 and 32. The shafts 31 and 32

are respectively carried by bearing 33 and 34 mounted upon the framework 10. The stub shaft 31 has a two armed bracket 35 which is connected by means of cords 36 to an operating handle 38 pivotally mounted upon a support 39 carried by the pole or other device which may support the framework 10. Thus, when it is desired to change the position of the device 11 from circuit closed to circuit opening position, the handle 38 (Fig. 2) is swung contra-clockwise so that the device 11 is swung through an arc of approximately 90 degrees to occupy its alternative position. Thus a remote control is provided and the operator need not be adjacent to the device when operating it.

The tube 28 has an extension 40 which co-operates with two brake elements 41 and 42 suitably held in position by the curved bracket 43. Whenever the device is in either limiting position, the extension 40 co-operates with either the element 41 or the element 42 as the case may be, and these elements act as a brake as the structure is moving into its limiting position and thereafter act as a holding means to maintain the device in the position into which it was last moved. In order to include the device in circuit, I provide flexible conducting extensions 44 and 45 fastened respectively to the metallic caps 13 and 14 and these conductive extensions associate the device with the terminals 46 and 47 respectively. The terminals are desirably carried upon insulators 48 as can be readily seen. These conductive extensions 44 and 45 are preferably in the form of metallic straps.

In Fig. 5, I show a modified form of the device in which I utilize balls 49 instead of the rods 17.

In Figs. 6 and 7, I show a modified form in which the rods 17 are united by a flexible element 50 suitably pinned to each rod by the screws 51. The advantage of thus enforcing a united action of the rods 17 resides in the fact that the entire weight of all of the rods is instrumental in carrying each individual rod to its complete limiting position so that no single rod may lag behind the others for any reason whatsoever. The flexible connection between the rods, however, provides that degree of freedom of motion and facility of contact which may be necessary to insure proper operation of the device.

In Fig. 8, I show a modified form of connection to the cap 14. In this instance, I omit the flexible conductor 45 but provide in its place, a spring 52 which normally engages the cap 14 to complete the circuit connection from the terminal 46 to the terminal 47 when the device is in circuit closed position. Now whenever the element 11 is swung to its alternative position as shown in dotted lines, then the spring 52 will follow and maintain contact with the cap 14 until the

circuit is actually broken by the elements 16 and 17. The further contra-clockwise movement of the device then carries the cap 14 away from the spring 52, thus to indicate to a person not in position to see the interior of the device, that the circuit is open because an actually definite air-break exists between the circuit terminals 46 and 47. A lead cushion 55 is provided at each end of the shell 12 to prevent recoil of the rods. A flexible conductor 56 may be connected in parallel with the spring 52 to carry the current.

Fig. 9 shows a modified form for carrying out the functions performed by the structure of Fig. 8 and in this instance, the cap 14 is provided with a switch tongue 53 which engages a switch quadrant 54 which quadrant is associated with the terminal 47 although not so shown in the illustration. When the device of Fig. 9 is moved contra-clockwise from the position shown in full lines to the position shown in dotted lines, the circuit is completely broken between the elements 16 and 17 whereafter the switch tongue 53 leaves the switch quadrant 54 to again indicate a definite air-break in the circuit.

From what has thus been shown and described, my invention will be readily clear to those skilled in the art and it will also be apparent that many modifications may be made within the scope of the appending claims without departing from the spirit of my invention.

Having thus described my invention in some of its various forms, what I now claim and desire to secure by Letters Patent is:

1. A device of the character described, comprising a movable container adapted to occupy alternative positions, movable solid circuit controlling means therein, stationary contact means providing contacts spaced in the direction of movement of said circuit controlling means, said circuit controlling means occupying either an open circuit or closed circuit position relative to said contacts depending upon the position of said container, and shock absorbing means for cushioning the shock of said circuit controlling means at both ends of the movement thereof.

2. A device of the character described, comprising a tiltable container, a plurality of individual contact elements mounted in said container and means with which said contacts engage to close the circuit through said device, said contacts moving either into or out of engagement with said means as said container is tilted from one position to another and being constrained to move substantially in parallelism.

3. A device of the character described, comprising a movable container, a circuit closing device comprising fixed contact means carried by said container and means carried by said container and means

movable by gravity in said container into either open or closed circuit relation to said fixed contact means as said container is moved, said means comprising a plurality of individual contact elements and means electrically connecting said elements.

4. A device of the character described comprising a movable container, loosely carried connected metallic circuit controlling means therein adapted to occupy either an open-circuit or closed-circuit position depending upon the position of said container, and an arc extinguishing fluid within said container.

5. A device of the character described comprising a movable container, connected slidable circuit controlling means therein adapted to occupy either an open-circuit or closed-circuit position depending upon the position of said container, and an arc extinguishing fluid within said container.

6. A device of the character described comprising a movable container, loosely carried solid circuit controlling means therein adapted to occupy either an open-circuit or closed-circuit position depending upon the position of said container, and an arc extinguishing fluid within said container and venting means for said container to permit the escape of gases formed therein from said fluid.

7. A device of the character described comprising a movable container, slidable solid connected circuit controlling means therein adapted to occupy either an open-circuit or closed-circuit position depending upon the position of said container, and an arc extinguishing fluid within said container and venting means for said container to permit the escape of gases formed therein from said fluid.

8. A device of the character described comprising a movable container, loosely carried solid connected circuit controlling means therein adapted to occupy either an open-circuit or closed-circuit position depending upon the position of said container, and an arc extinguishing fluid within said container and weatherproof venting means for said container to permit the escape of gases formed therein from said fluid.

9. A device of the character described comprising a movable container, a plurality of loosely carried yieldingly united circuit controlling means therein adapted to occupy either an open-circuit or closed-circuit position depending upon the position of said container, and an arc extinguishing fluid within said container.

10. A device of the character described, comprising a movable container, a circuit closing device comprising fixed contact means carried by said container and means movable by gravity in said container into either open or closed circuit relation to

said fixed contact means as said container is moved, said means comprising a plurality of contact elements having a limited relative movement.

5 11. A device of the character described comprising a movable container, solid connected circuit controlling means therein responsive to the position of said container, and flexible current conducting means extending to said container for including said
10 circuit controlling means in circuit.

12. A device of the character described comprising a movable container, circuit controlling means therein responsive to the position of said container, and current conducting means associated with said container for including said circuit controlling means in circuit, said current conducting means being constructed to effect circuit rupture subsequent to circuit rupture by said circuit
20 controlling means.

13. A device of the character described comprising a movable container, solid connected circuit controlling means therein responsive to the position of said container, a support adapted to occupy alternative positions upon which said container is mounted, and remotely controlled means for shifting said support.

30 14. A device of the character described comprising a movable container, circuit controlling means therein responsive to the position of said container, a support adapted to occupy alternative positions upon which said container is mounted, means for exerting a braking action on said support when moving to a limiting position, and remotely controlled means for shifting said support.

40 15. A device of the character described comprising a movable container having conducting and insulating portions, a plurality of rigid, connected conducting members loose within said container, and means for moving said container to a plurality of different positions to move said members to
45 circuit opening or closing position.

16. A device of the character described comprising a movable container having conducting and insulating portions, a plurality

of conducting members loose within said
60 container, and means for moving said container to a plurality of different positions to move said members to circuit opening or closing position, said members being provided with means whereby substantially all
55 of said members reach their circuit opening or closing position simultaneously.

17. A device of the character described comprising a movable container having conducting and insulating portions, a plurality
60 of conducting members loose within said container, and means for moving said container to a plurality of different positions to move said members to circuit opening or closing position, said members being provided with connecting means whereby substantially all of said members reach their
65 circuit opening or closing position simultaneously.

18. A device of the character described, comprising a movable container, a circuit closing device comprising fixed contact means carried by said container, and means movable by gravity in said container into either open or closed circuit relation to said
70 fixed contact means as said container is moved, said means comprising a plurality of individual contact elements and means connecting said elements electrically and
80 mechanically.

19. A device of the character described, comprising a movable container adapted to occupy alternative positions, movable elongated solid circuit controlling means therein, a pair of stationary contact members mounted in said container, said contact members being spaced in the direction of movement of said circuit controlling means, and an arc extinguishing liquid in said container, said
85 circuit controlling means being in closed circuit position in one alternative position of said container with relation to said contacts and being in open circuit position in the other alternative position of said container.

In witness whereof, I hereunto subscribe
95 my name this 6th day of July, A. D., 1920.

NICHOLAS J. CONRAD.