

Aug. 7, 1923.

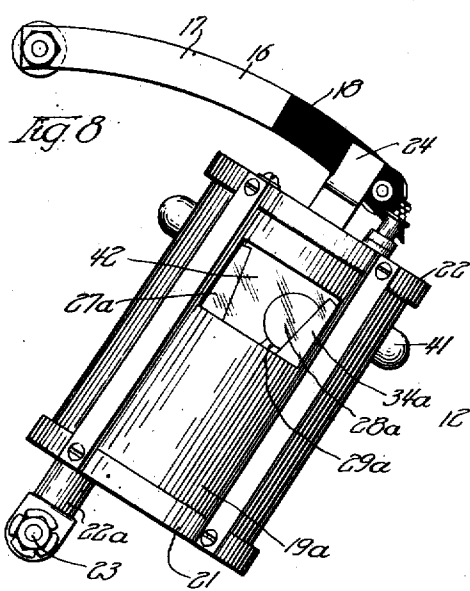
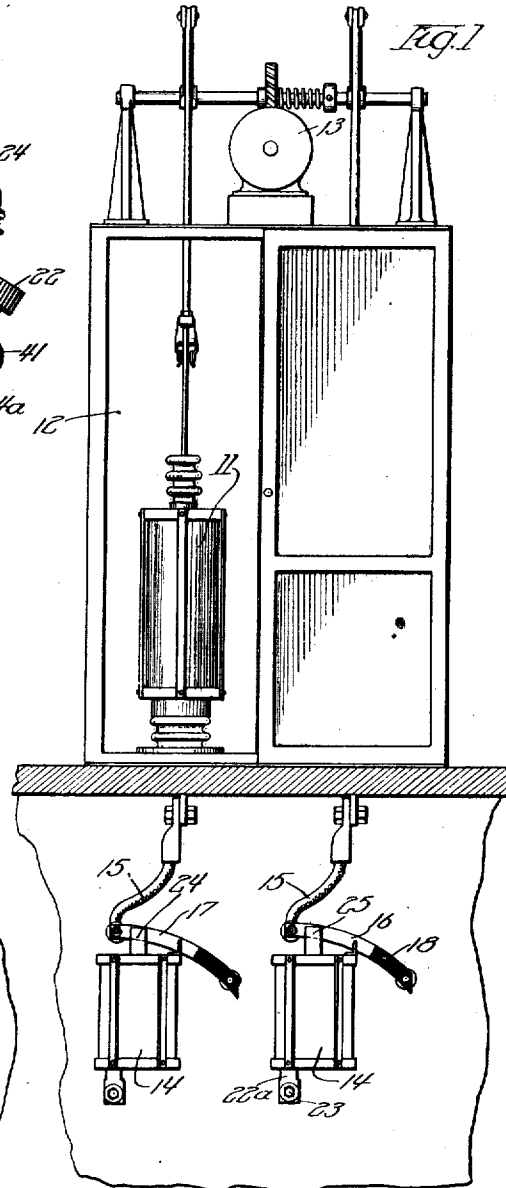
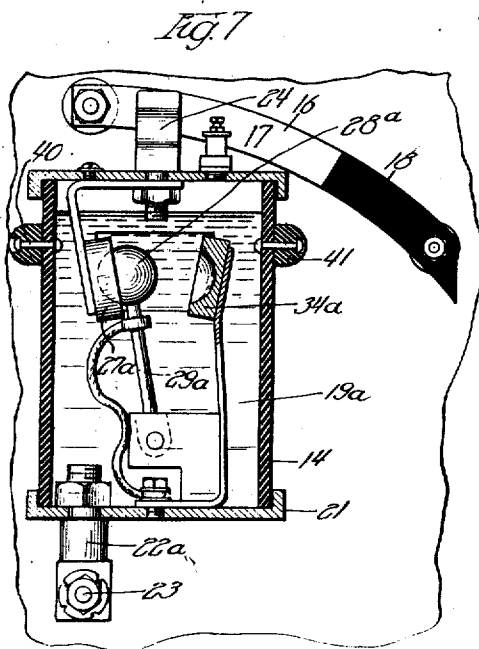
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E. O. SCHWEITZER

CURRENT CONTROLLING DEVICE

Filed April 29, 1920

3 Sheets-Sheet 1



Inventor
Edmund O. Schweitzer
by Gabel & Mueller Attys

Aug. 7, 1923.

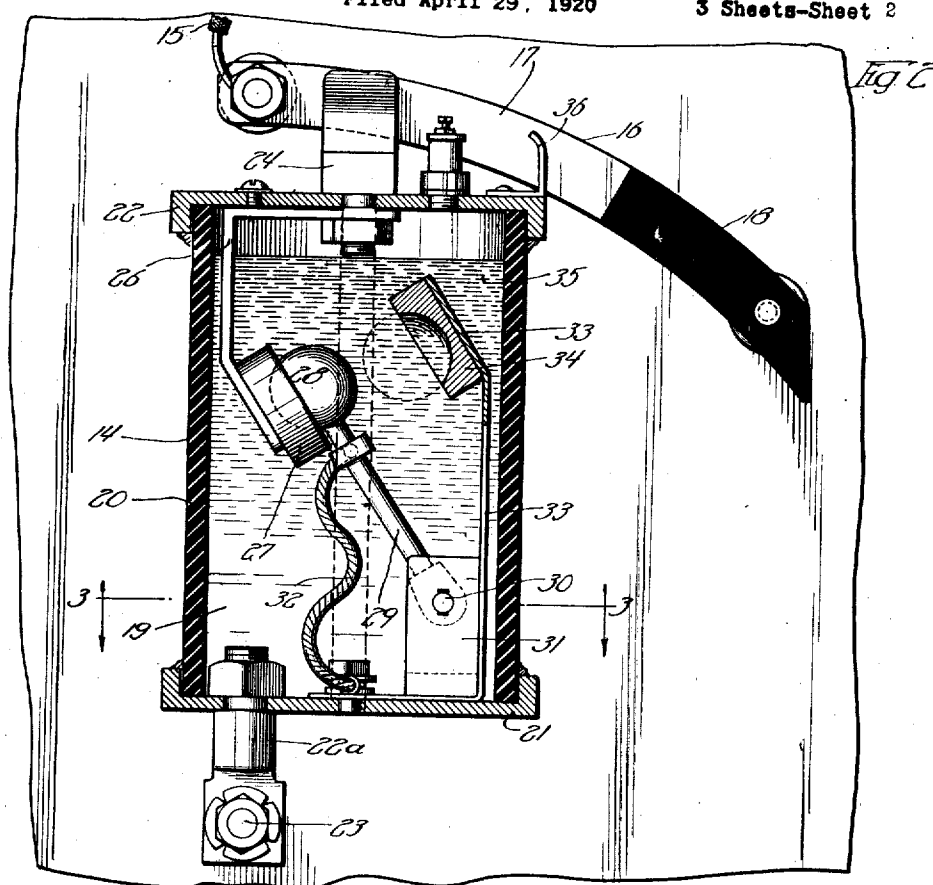
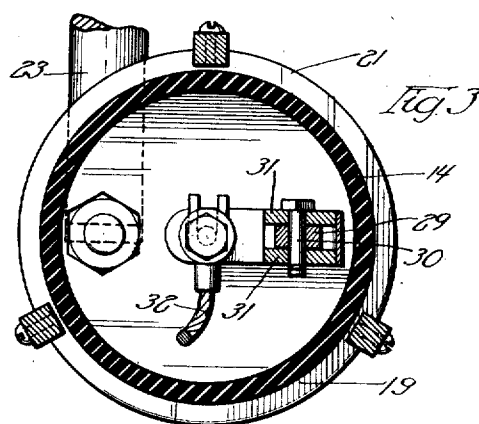
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3 Sheets-Sheet 2



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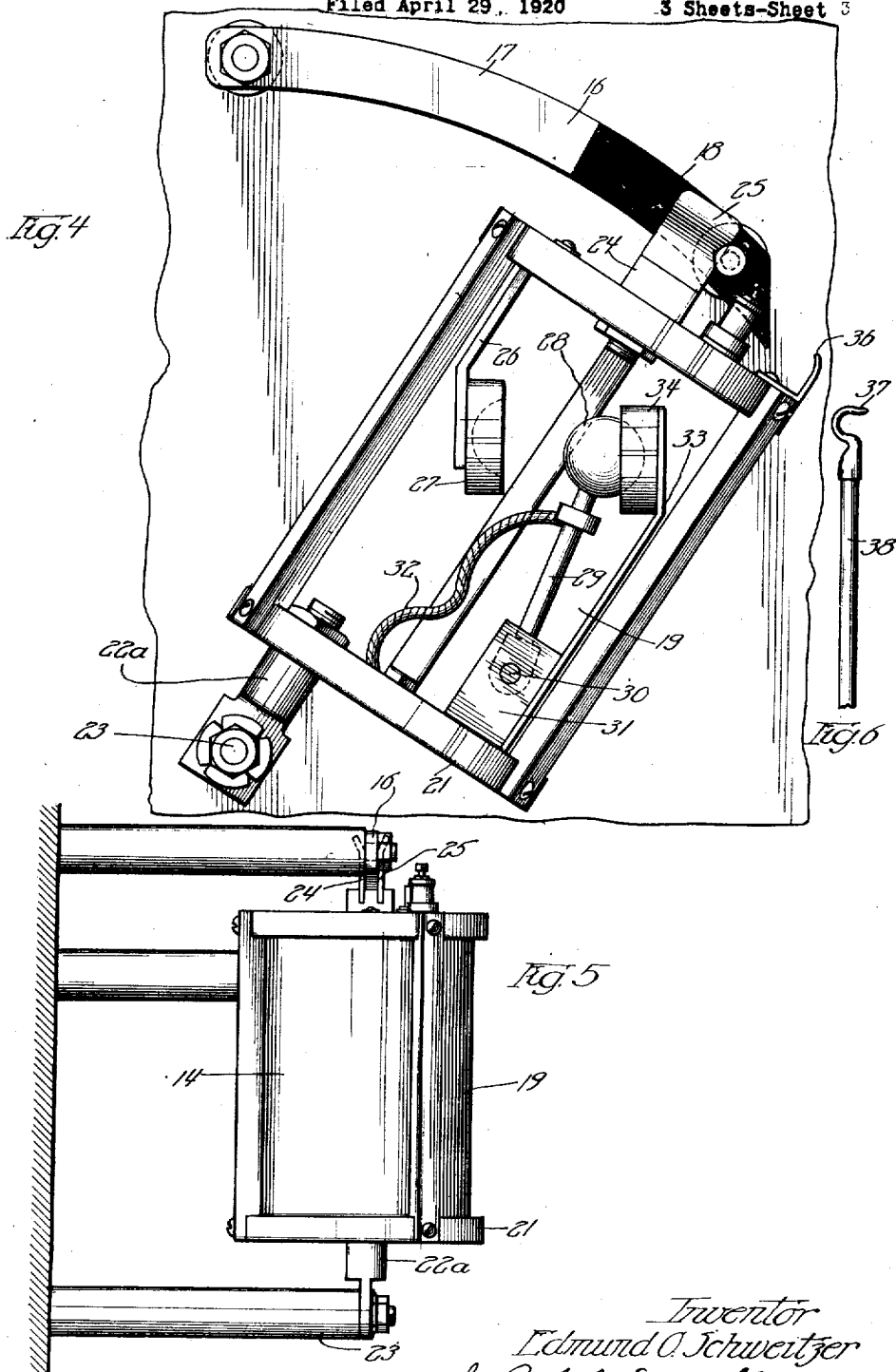
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CURRENT CONTROLLING DEVICE

Filed April 29, 1920

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

EDMUND O. SCHWEITZER, OF CHICAGO, ILLINOIS, ASSIGNOR TO SCHWEITZER & CONRAD, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CURRENT-CONTROLLING DEVICE.

Application filed April 29, 1920. Serial No. 377,581.

To all whom it may concern:

Be it known that I, EDMUND O. SCHWEITZER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Current-Controlling Devices, 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 current controlling devices and more particularly to that type of device which has come to be known as a disconnect switch. By this I mean that I have adapted my invention for use particularly in connection with disconnect switches, but I do not wish thereby to be understood as limiting my invention to such use; as the features of my invention are applicable in other connections. In the present application however I am describing my invention as applying particularly to disconnect switches. The term "disconnect switch" as used herein means an auxiliary switching mechanism which forms part of a high potential switch mechanism such for instance as an oil-break; the ordinary disconnect switch itself furnishes an auxiliary air-break so as to indicate to the operator that the high potential circuit through the oil switch with which the disconnect switch is connected is open should the disconnect switch be in such a position as to show an air-break. A switch of this general nature is shown in Patent No. 1,247,842 dated Nov. 27, 1917.

I have devised a switching mechanism which is of particular utility as a disconnect switch although as before stated the switching mechanism of my invention has other uses as will be readily apparent from the detailed description thereof which will be given in connection with the drawings.

In the form herein disclosed my improved disconnect switch mechanism is designed to effect a double circuit rupture, there being two separate and distinct mechanisms for this purpose. In the particular form which I am using as a basis for this application one of the switching mechanisms is visible

and the other is not. Suitable means are provided so that the switching mechanism which is not visible may operate automatically in accordance with certain conditions. I will describe this particular form which my invention may take more in detail by referring to the accompanying drawings illustrating the same, in which—

Fig. 1 is a general view illustrating a high potential switch mechanism in cooperation with my improved disconnect switch;

Fig. 2 is a vertical sectional view of my improved disconnect switch;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 is a view similar to that of Fig. 2 showing the switch in its alternative position;

Fig. 5 is a front view of the disconnect switch in its circuit closing position;

Fig. 6 shows the operating handle;

Fig. 7 is a vertical sectional view of a modified form of the invention; and

Fig. 8 is a side view of a further modified form.

Referring more particularly to Fig. 1, I show a plurality of the customary forms of oil circuit breakers 11 mounted in suitable compartments 12, the movable contacts of which are operated by a suitable motor 13. The oil circuit breakers 11 are of course designed to break the circuit whenever occasion requires and they are constructed for that purpose. My improved disconnect switches 14 are serially associated with the oil circuit breakers and are designed to provide a visible break in the circuit which shall be indicative of the fact that the main oil circuit breakers 11 have had the circuit therethrough opened. Accidents have been fatal by reason of the enclosed nature of the oil circuit breakers. Normally and prior to the introduction of my invention, knife switches have been provided serially with the oil circuit breakers, which knife switches operators were required to open prior to doing any work on the apparatus. These knife switches were supposed to indicate by visible means whether or not the particular circuit was open or closed. Fatal accidents

have been frequent by reason of operators opening these knife switches when through some mistake or imperfections in the apparatus the oil circuit breaker associated with the knife switch was still in its closed condition contrary to expectations. If the operator attempted to open the knife switch under those conditions with the circuit breaker still in its closed condition a fatal accident was liable to result.

My improved disconnect switch has switching means which are visible, but also has enclosed switching means which operate prior to the visible switching means in opening the circuit. If the operator opens my improved disconnect switch, even though the main oil circuit breaker is still in its closed condition, then the mechanism within the disconnect switch, and which is not visible, will open the circuit without the attendant fatal results should an operator merely open an ordinary knife switch under similar circuit conditions.

In accordance with my invention I provide a suitable movable container for my improved disconnect switch within which suitable circuit controlling elements are mounted and which automatically move into circuit closing or circuit opening position depending upon the position occupied by the container. The container itself also carries visible switch mechanism which may be either in circuit opening or circuit closing position.

In Figs. 2, 3, 4 and 5 I have shown my improved disconnect switch mechanism and in the particular form herein shown the conductor 15 which extends downwardly from the oil circuit breaker 11 is connected to a segment 16 fixedly mounted in place, which segment is partly of conducting material as at 17 and partly of insulating material as at 18.

My improved disconnect switch includes a container 19 having a circular wall 20 of insulating material which is closed at its ends by the metallic caps 21 and 22 suitably cemented together. The cap 21 is fixedly mounted upon a conducting lug 22^a, which conducting lug is pivotally mounted upon a conducting stem 23. The metallic cap 22 has fixedly mounted thereon suitable switch blades 24 and 25 which hug the sides of the segment 16. Whenever the container 19 is in the position shown in Fig. 2 then the switch blades 24 and 25 are in contact with the metallic portion 17 of the segment 16, whereas if the container 19 is in the position shown in Fig. 4 then the switch blades 24 and 25 are in association with the insulating portion 18 of the segment 16. It will thus be seen that the container may occupy either the circuit closing position of Fig. 2 or its alternative circuit opening position of Fig. 4. The metallic cap 22 also

supports a downwardly extending contact bracket 26 supporting a cup-shaped circuit terminal 27. This cup-shaped circuit terminal is designed to cooperate with a cooperating movable contact element 28 carried upon the swinging arm 29. This swinging arm is pivoted by means of the bolt 30 as shown upon supports 31, secured to the cap 21. A flexible conductor 32 connects the arm 29 with the metallic cap 21. It will thus be seen that when the container 19 is in the position of Fig. 2 that the circuit extends from the stem 23 to the lug 22^a, cap 21, flexible conductor 32, contact element 28, cup-shaped contact element 27, bracket 26, metallic cap 22, switch blades 24 and 25, conducting element 17 of the segment 16 to the conductor 15 leading to the oil circuit breaker. It will of course be understood that the circuit is continued in any suitable manner from the stem 23. The container also is provided with another bracket 33 which carries a suitable cup-shaped stop 34 to limit the movement of the circuit controlling element 28 as will be apparent from Fig. 4. The elements 28 and 29 are so proportioned that the movement of the container from one alternative position to the other automatically through the influence of gravity causes a movement of the element 28 from one alternative position to the other. The shell or wall 20 of the container is of opaque material so that the elements within the container are not visible normally. The container 19 is also provided with oil 35 so that the contacts 27 and 28 operate under oil. The proportion of the elements 17 and 18 is likewise such that the circuit between the elements 27 and 28 is opened before the switch blades 24 and 25 leave the conducting portion 17. The container is likewise provided with a finger 36 which is to be engaged by corresponding finger 37 provided upon a handle 38 shown in Fig. 6. The operator is not supposed to move the container 19 from one alternative position to the other except by the aid of the handle 38. It will be seen from this that I have provided a disconnect switch having the visible circuit controlling elements 17, 24, and 25, and having the hidden circuit controlling elements 27 and 28. The circuit controlling elements 27 and 28 operate under oil and it will be understood that should the operator open the disconnect switch, even though the oil circuit breaker is still in its closed condition, that the opening of the circuit between the elements 27 and 28 under oil will prevent injury to the operative, even though under certain conditions it may be that the elements 27 and 28 or other parts connected therewith, are destroyed if the circuit is opened under such conditions. It is of course desirable if the disconnect switch is operated under these conditions where the oil circuit

breaker was in its closed condition that the disconnect switch be taken apart and thoroughly examined before being used a second time. The operative is, of course, never to work on the apparatus associated with any particular circuit breaker unless the visible air-break between the elements 17 and 24 indicates that the circuit is opened.

By virtue of my improved disconnect switch the operator is safe guarded even though he should attempt to open the circuit with the oil circuit breaker in its closed condition. My improved disconnect switch so called herein is, of course, of use in other connections and under other conditions, and I do not intend to limit myself to the use thereof herein set forth or to the particular arrangement or construction of parts as shown herein, as many modifications and variations may be made without departing from the spirit of my invention.

In Fig. 7 I show the switch mechanism arranged in such manner that the container 19^a is rigidly although slightly yieldingly mounted. The arm 29^a is pivoted so as to be balanced and may as a condition of repose rest either against the cup 27^a or the stop 34^a. The switch blades of Fig. 2 may be retained if desired. In the operation of the device, the container is merely struck a blow against the resilient bumpers 40 or 41 whereby the ball 28^a due to the impact flies in the direction of the impact to its alternative position on account of its balanced character. To then move the ball 28^a into its alternative position the container 14^a is struck a blow on its opposite side. Windows 42 are provided so that the position of the ball 28^a can be seen. In Fig. 8 a similar structure is shown in which, however, the container 14 is pivotally mounted and which is moved into and out of circuit breaking position by striking the bumpers 40 and 41.

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

1. A device of the character described, comprising a movable container adapted to occupy alternative positions, switch mechanism within said container adapted to automatically assume alternative positions corresponding to the positions of said container, and additional switch mechanism movable between alternative positions with said container.

2. A device of the character described comprising a movable carrier adapted to occupy alternative positions, switch mechanisms comprising a member movable with said carrier to circuit opening or closing position, and additional switch mechanism carried by said carrier automatically movable into circuit opening or closing position to correspond with the alternative positions occupied by said first mentioned switch mechanism.

3. A device of the character described, comprising a swingingly mounted movable container adapted to occupy alternative positions, switch mechanism within said container adapted to automatically assume alternative positions of rest corresponding to the positions of said container, and additional switch mechanism movable between alternative positions with said container.

4. A device of the character described comprising a movable carrier adapted to occupy alternative limiting positions, switch mechanism comprising a member movable with said carrier to circuit opening or closing position, and additional switch mechanism carried by said carrier automatically movable into circuit opening or closing position in accordance with the alternative limiting positions occupied by said carrier, said switch mechanisms moving to corresponding positions upon movement of said carrier.

5. A device of the character described, comprising a container movable between two limiting positions, switch mechanism within said container adapted to automatically assume limiting circuit opening or closing positions corresponding to the limiting positions of said container, and additional switch mechanism movable between alternative positions with said container.

6. A device of the character described comprising a movable carrier adapted to occupy alternative limiting positions, exposed switch mechanism comprising a member movable with said carrier to circuit opening or closing position, and concealed switch mechanism carried by said carrier automatically movable into circuit opening or closing position in accordance with the alternative limiting positions occupied by said carrier, said switch mechanisms moving to corresponding circuit opening or closing positions upon movement of said carrier.

7. A device of the character described comprising a movable container adapted to occupy alternative limiting positions, exposed switch mechanism comprising a member mounted on said container to move therewith, and switch mechanism concealed within said container comprising a member movable into circuit opening or closing position in accordance with the alternative limiting positions occupied by said carrier, said first mentioned member moving toward circuit opening position when said container moves in a direction to open said concealed switch and toward circuit closing position when said container moves in a direction to close said concealed switch.

8. A device of the character described comprising a swingingly mounted container adapted to occupy alternative limiting positions, exposed switch mechanism comprising a fixed member having conducting and in-

insulating portions and a member slidable thereon mounted on said container to move therewith, and switch mechanism concealed within said container comprising a member movable into a circuit between opposite opening and closing positions in accordance with the alternative limiting positions occupied by said carrier, said first mentioned member moving toward circuit opening position when said container moves in a direction to open said concealed switch and toward circuit closing position when said container moves in a direction to close said concealed switch.

9. A device of the character described, comprising a container movable between two limiting positions, concealed switch mechanism within said container adapted to automatically assume limiting circuit opening or closing positions corresponding to the limiting positions of said container, and visible switch mechanism movable between alternative positions with said container.

10. A device of the character described comprising a swingingly mounted container adapted to occupy alternative positions, exposed switch mechanism comprising a fixed member having conducting and insulating portions, a member mounted on said container to move therewith, and switch mechanism concealed within said container comprising a member movable into circuit opening or closing position in accordance with the alternative positions occupied by said carrier, said first mentioned member moving toward circuit opening position when said container moves in a direction to open said concealed switch and toward circuit closing position when said container moves in a direction to close said concealed switch, said fixed contact member serving as a guide for said container.

11. A device of the character described comprising a swingingly mounted container adapted to occupy alternative positions, exposed switch mechanism comprising a fixed member having conducting and insulating portions, a member mounted on said container to move therewith, and switch mechanism concealed within said container comprising a member movable into circuit opening or closing position in accordance with the alternative positions occupied by said carrier, said first mentioned member moving toward circuit opening position when said container moves in a direction to open said concealed switch and toward circuit closing position when said container moves in a direction to close said concealed switch, said fixed contact member serving as a guide for said container, said concealed switch mechanism opening before said visible switch mechanism is opened.

12. A device of the character described comprising a movable container adapted to

occupy alternative positions, switch mechanism within said container automatically selectively responsive in accordance with the alternative positions occupied by said container, said container being provided with an arc extinguishing liquid, and additional switch mechanism movable between alternative positions by said container, said switch mechanism in said container opening prior to said last mentioned switch mechanism.

13. A device of the character described comprising a swingingly mounted container adapted to occupy alternative positions, switch mechanism within said container automatically selectively responsive in accordance with the alternative positions occupied by said container, said container being provided with an arc extinguishing liquid, and additional switch mechanism movable between alternative positions by said container, said switch mechanism within said container closing subsequent to said additional switch mechanism.

14. A device of the character described comprising a movable container adapted to occupy alternative limiting positions, a switch mechanism within said container, an arc extinguishing liquid surrounding said switch mechanism, and an air brake switch mechanism exteriorly of said container, both said switch mechanisms being in open position when said container is in one limiting position and both said switch mechanisms being in closed position when said container is in the alternative limiting position.

15. A device of the character described switch mechanism within said container, adapted to occupy alternative positions, a switch mechanism within said container, an arc extinguishing liquid surrounding said switch mechanism, and an air break mechanism exteriorly of said container, both said switch mechanisms being in open position when said container is in one position and both said switch mechanisms being in closed position when said container is in the alternative position, the switch within said container moving into open position prior to and into closed position subsequent to said air break switch mechanism.

16. A device of the character described, comprising a container movable between two limiting positions, switch mechanism within said container adapted to automatically assume limiting circuit opening or closing positions corresponding to the limiting positions of said container, and additional switch mechanism movable between alternative positions with said container, said switch mechanisms being connected in series.

17. A device of the character described, comprising a container movable between two limiting positions, switch mechanism within said container adapted to automatically assume limiting circuit opening or closing

positions corresponding to the limiting positions of said container, and additional switch mechanism movable between alternative positions with said container, said switch mechanisms being connected in series and moving successively into said alternative positions.

18. A device of the character described comprising a carrier, two switch mechanisms controlled thereby, and means whereby one of said switch mechanisms is submerged in an arc extinguishing fluid, said switch mechanisms being connected in series and being so mounted that said last mentioned switch mechanism opens prior to said other switch mechanism.

19. An oil switch mechanism having two sets of circuit breaking members connected in series, one of said sets of members being movable by gravity into and out of a limiting circuit closing position and the other of said sets being operable by positioning of a movable contact relative to a fixed contact.

20. In a combined air break and oil break switch, a sealed chamber containing an arc extinguishing liquid, a circuit opening and closing mechanism in said chamber and a circuit opening and closing mechanism providing an air break, initiation of the opening movement of said air break mechanism causing said mechanism in said sealed chamber to open.

21. In a switch the combination a chamber containing an arc extinguishing liquid, and circuit opening and closing members immersed in said liquid adapted to assume open or closed positions responsive to a sharp impulse applied externally of said chamber.

22. In a combined air break and oil break switch, a sealed chamber containing an arc extinguishing liquid, a circuit opening and closing mechanism in said chamber and a circuit opening and closing mechanism providing an air break, initiation of the opening movement of said air break mechanism causing said mechanism in said sealed chamber to open and the closing of said air break mechanism causing the mechanism in said sealed chamber to move toward closing position.

23. In a switching mechanism the combination of open or air break circuit opening and closing members and an arc extinguishing liquid immersed switch mechanism, the latter mechanism being operated automatically by the operating movement of the air break mechanism, said mechanisms operating successively.

24. A hermetically sealed container provided with suitable terminal electrodes, circuit opening and closing means within said container, said terminal electrodes arranged so that when the axis of the container is shifted said terminal electrodes maintain the circuit closed while the circuit opening and

closing means within the container move to an open circuit or closed circuit position depending upon the relative position of the said hermetically sealed container.

25. In an oil switch the combination of suitable mechanism permitting oscillatory movement of a sealed container, and swingingly mounted spherical contact means movable between a limiting circuit opening and closing position within the sealed container.

26. In a switching mechanism, an externally visible circuit opening and closing means and an internal and invisible circuit closing and opening means, said latter means inclosed in a sealed container and opening prior to and closing subsequent to said visible circuit opening and closing means.

27. A device of the character described, comprising a movable container adapted to occupy alternative positions, switch mechanism within said container, comprising a pair of stops, and a member movable between said stops upon movement of said container, and additional switch mechanism comprising a contact member movable with said container electrically connected with one of said stops and a member with which said movable member engages.

28. A device of the character described, comprising a movable container adapted to occupy alternative positions, switch mechanism within said container, comprising a pair of stops, and a member movable between said stops upon movement of said container, and additional switch mechanism comprising a contact member movable with said container electrically connected with one of said stops and a member with which said movable member engages, said last mentioned member comprising a conducting portion and an insulating portion.

29. A device of the character described, comprising a movable container adapted to occupy alternative positions, switch mechanism within said container, comprising a pair of stops, and a member movable between said stops upon movement of said container, and additional switch mechanism comprising a contact member movable with said container electrically connected with one of said stops and a member with which said movable member engages, said last mentioned member comprising a conducting portion and an insulating portion, said container member being in engagement with said conducting portion during the movement of said movable member into and out of engagement with the stop with which said contact member is connected.

30. A device of the character described, comprising a movable container adapted to occupy alternative positions, switch mechanism within said container, comprising a pair of stops, and a member movable between said stops upon movement of said container, and

additional switch mechanism comprising a contact member movable with said container electrically connected with one of said stops and a member with which said movable member engages, said last mentioned member comprising a conducting portion and an insulating portion, said contact member en-

gaging said insulating portion, when said movable member engages with said other stop.

In witness whereof, I hereunto subscribe my name this 22nd day of April, A. D., 1920.

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EDMUND O. SCHWEITZER.