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CUT-OUT FOR ELECTRIC CIRCUITS.

APPLICATION FILED JUNE 4, 1917.

1,254,886.

Patented Jan. 29, 1918.

2 SHEETS—SHEET 1.

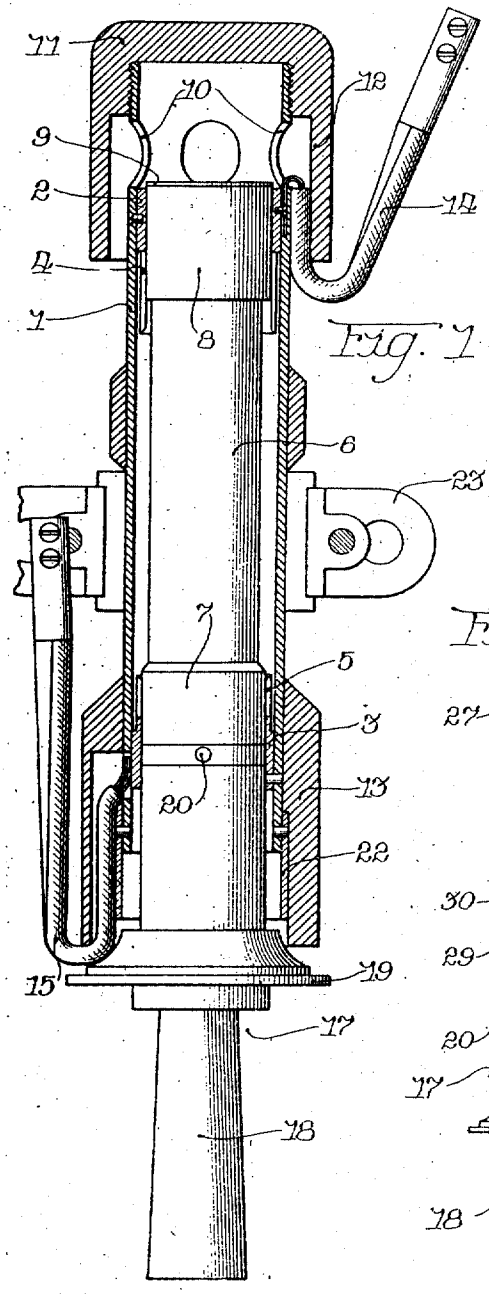


Fig. 1

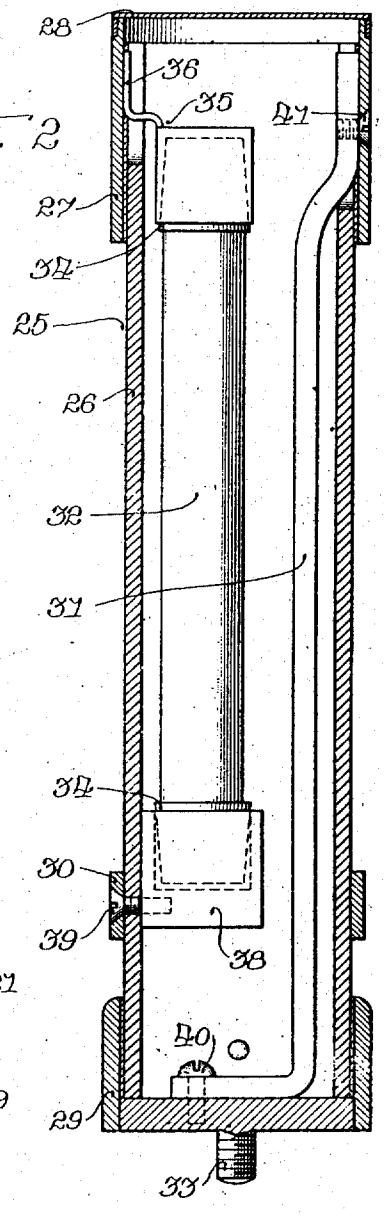


Fig. 2

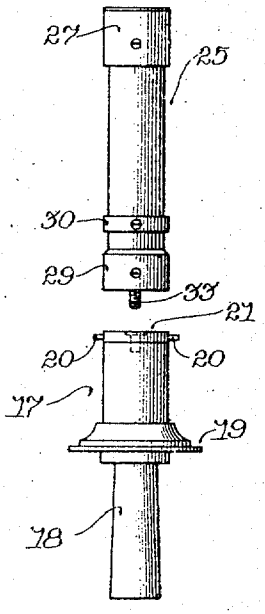


Fig. 3

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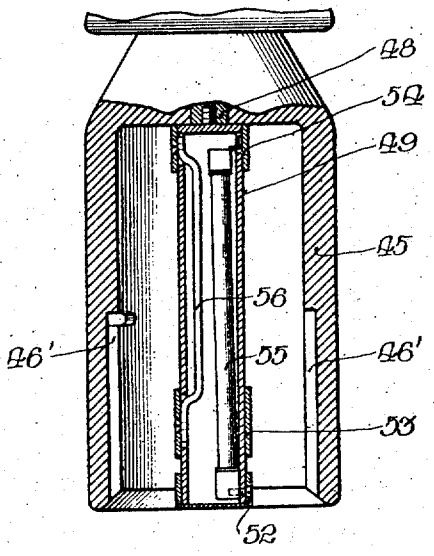
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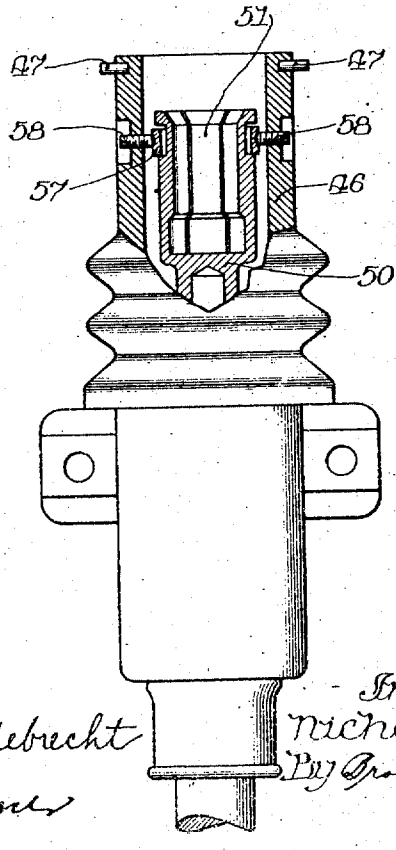
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2 SHEETS—SHEET 2.

Fig. 4





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UNITED STATES PATENT OFFICE.

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CUT-OUT FOR ELECTRIC CIRCUITS.

1,254,886. Specification of Letters Patent. Patented Jan. 29, 1918.

Application filed June 4, 1917. Serial No. 172,624.

To all whom it may concern:

Be it known that I, NICHOLAS J. CONRAD, 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 Cut-Outs for Electric Circuits, 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 cut-outs for electric circuits.

The disconnection of transformers or circuits carrying load, especially where the same are of considerable capacity, has always been a difficult problem. On systems operating on a voltage as low as 1000 volts, disconnection is difficult and dangerous.

My invention aims to provide a form of cut-out or disconnect which will decrease the difficulty of opening a circuit by inserting a resistance in series with the circuit to be disconnected before actually breaking the circuit.

In the accompanying drawings I have illustrated the manner in which my invention may be embodied in a practical operative construction.

Figure 1 is a longitudinal cross section of a fused cut-out;

Fig. 2 is a longitudinal section of a disconnecting plug which is adapted to take the place of the fuse shown in Fig. 1;

Fig. 3 is a front elevational view of the disconnecting plug and the mounting or handle for the same; and

Fig. 4 is a front elevation partly in section illustrating the application of my invention to a pot head.

The fused cut-out shown in Fig. 1 is of the type shown in my copending application, Serial No. 56,177, filed October 16th, 1915. According to my present invention I substitute for the fuse in this device a special disconnecting link as will now be described in detail. The cut-out shown in Fig. 1 comprises a main sleeve of insulation 1 which is provided on its interior with an upper stationary contact 2 and a lower stationary contact 3. These contacts are annular and fit against the inside wall of the tube. The annular contacts 2 and 3 are provided with spring fingers 4 and 5 respectively, as shown in Fig. 1. These spring fingers are formed by reducing the outer diameter of the annular contacts 2 and 3 and slotting the same axially. A fuse 6 of the type developed jointly by myself and Mr. Edmund O. Schweitzer is adapted to cooperate with the contacts 2 and 3. This fuse has a lower annular terminal 7 and an upper annular terminal 8. When the fuse is violently blown the top 9 is adapted to relieve the pressure within. Such pressure is adapted to escape through suitable holes 10 formed in the upper walls of the main sleeve 1. The upper end of the tube or sleeve 1 is covered by a cap 11 which provides a petticoat 12 over the openings 10.

At the lower end of the sleeve 1 a petticoat member 13 is mounted and flexible conductors 14 and 15 having suitable terminals are connected to the contacts 2 and 3 and let out under the petticoats 12 and 13. A mounting member 17 having a handle 18 and a shield 19 is connected to the lower end of the fuse 6 by a short stud and screw thread as is apparent from Fig. 3, and a pair of pins 20 are connected to a metal facing or cap 21. These pins 20 are adapted to enter bayonet slots which are formed on the inner walls of the reinforcing ring 22 and the sleeve 1 as is explained in detail in my previous application above referred to.

A suitable bracket which clamps the shaft of the sleeve 1 is provided as shown at 23 for mounting the cut-out upon a cross arm or any desired support.

According to my present invention I provide a link 25 as shown in Figs. 2 and 3 which is adapted to take the place of the fuse 6 where the cut-out is made non-fusible but is to be employed as a cut out or disconnect for opening circuits. The link 25 is formed in the shape of a short cylinder or plug having a body constructed of a sleeve 26 of insulation, preferably fiber impregnated with bakelite.

At the upper end of the sleeve 26 a metal ring or contact 27 is provided. This ring is closed off by a suitable lid member 28 which, as shown, may be soldered in place after the interior connections are completed. The opposite end of the sleeve 26 is closed off by a metallic cap 29 which forms another terminal. A metallic ring 30 is mounted on the outside of the sleeve 26 and forms another terminal, as will be explained later.

The terminal 27 is connected by a heavy

conductor of low resistance preferably a copper bar 31 to the cap 29 at the other end of the sleeve. The ring 30 is connected to the terminal 27 through the medium of a resistance rod 32. This rod comprises a high resistance of relatively great capacity. It is preferably formed of clay and carbon. Such resistances are well known in the art and may be purchased in the market. The lower terminal 29 is provided with a stud 33 for securing the plug upon the mounting 17.

The operation of the device is as follows:

The plug 25 is secured to the mounting 17 and is inserted into the stationary member of the cut-out, as shown in Fig. 1. The ring 30 engages the terminal 3 as the plug is inserted and the terminal 27 then engages the stationary contact 2 so that the circuit is first made through the resistance rod 32. As the plug is then farther inserted and the mounting is secured by means of the pins and the bayonet slot, not shown, the circuit will be closed from contact 2, terminal 27, through the copper bar 31, terminal 29 and the contact 3. When it is desired to open the circuit even though the same is carrying current, the handle 18 is turned to release the pins 20 from the bayonet slot and the plug 25 is then withdrawn. As the plug is withdrawn the terminal 29 moves out of the contact 3 leaving the ring 30 and the terminal 27 in engagement with the stationary terminals 3 and 2 respectively, so that current flows through the resistance rod 32.

As the plug is further withdrawn the circuit is broken so that any current which goes to form an arc is limited by the resistance 32. Such arc may be easily broken and disconnection is relatively easy.

The resistance rod 32 has a metallic cap or terminal 34 at each end. The upper cap is connected to the terminal 27 by means of a spring clip 35 which has a lug extending from the edge thereof through an aperture 36 in the side walls of the sleeve 26 into contact with the terminal 27. The lower cap 34 rests in a metallic socket 38 which is connected to the ring 30 by means of a screw 39 which passes through the side wall of the sleeve 26.

The copper rod 31 is connected at its lower end to the metallic cap 29 as by means of the screw 40 and at its upper end this rod passes through an opening in the side walls of the shell and is connected to the terminal 27 by means of the screw 41.

In Fig. 4 I have shown the coöperating parts of a pot-head embodying my invention.

A pot-head of this type comprises in general a separable cable connection and is used for instance where a lead covered cable joins another cable, either another lead covered cable or an aerial cable, or where a piece of apparatus such as a transformer is connected to a line or bus. A pot-head may also be employed for disconnecting or sectionalizing a line, as is well understood by those skilled in the art.

The connection that I have shown comprises an outer member of insulation 45, and an inner member of insulation 46, which is adapted to enter the outer member. The outer member 45 is provided with bayonet slot 46′ and the inner member 46 is provided with pins 47 coöperating with the bayonet slot 46′ to hold the two parts together.

The outer member 45 contains the terminal 48 which is connected to the disconnecting plug 49 of substantially the same construction as the plug 25 shown in Figs. 2 and 3. The inner member 46 contains a terminal 50 having a spring contact socket 51 adapted to engage the lower terminals 52 and 53 of the link or disconnecting unit 49. The upper terminal 54 of the disconnecting unit or link 49 is connected to the terminal 48. This terminal 54 is connected through a resistance rod 55 to the lower terminal 52, and is connected through the copper bar 56 to the ring 53. The terminal socket 51 is made resilient by slotting the same axially, as is shown, and this socket is held against axial displacement by a ring 57 which is held by the screws 58. It can be seen that when the two members, namely, the outer member 45 and the inner member 46, are brought together, the lower terminal 52 will first make contact with the socket terminal 51 so that the initial flow of current will be through the resistance rod 55. Thereafter the terminal socket 51 will engage the ring 53 and circuit will be made through the copper bar 56. When the two parts are disconnected, the ring 53 will be disengaged from the socket 51 and the terminal 52 will remain in contact with said terminal socket 51 so that the flow of current is reduced by the resistance 55. When these parts are then completely separated, any arc which might be drawn will be limited by the resistance 55 and will be readily extinguished.

It will be understood by those skilled in the art that the particular arrangement of parts to get this effect, namely, the insertion of the resistance in circuit, just prior to and at the time of breaking the connection, may be varied without departing from my invention. In the form shown in Figs. 1 to 3 the plug 25 moves with respect to both stationary terminals 2 and 3 while in the form shown in Fig. 4 the resistance plug 49 moves only with respect to the spring socket terminal 51. Both of these forms are but different expressions of the same inventive idea.

I claim:

1. In a cut-out, a tubular member of insulation having a relatively stationary contact therein for connecting to one side of the line, a coöperating plug member having a pair of

relatively movable contacts for engaging said relatively stationary contact means on said plug for connecting to the other side of the line, a conductor of low resistance between said means and one of said pair of relatively movable contacts and a high resistance conductor connected between said means and the other of said pair of relatively movable contacts.

2. In combination, a socket member and a coöperating plug member, said socket and plug members having contacts for making connection between parts of a line, said plug member comprising a hollow sleeve having a pair of circular contacts, a conductor of low resistance connected between one of said contacts and the line, and a relatively high resistance connected between the other of said pair of contacts and said line, said high resistance being connected in circuit between said parts of the line at the moment that the line is disconnected or connected.

3. In a cut-out, a disconnecting plug comprising a sleeve of insulation, a terminal at one end adapted to be connected to one side of a line, a pair of terminals at the other end of said sleeve, a relatively stationary contact adapted to be connected to the other side of line for engaging said pair of terminals, a resistance connected in said sleeve and extending between said first terminal and one of said pair of terminals, and a conductor of low resistance between said first terminal and the other of said pair of terminals.

4. In combination, a sleeve of insulation, a metallic terminal at each end of said sleeve, a metallic ring lying on the outside surface of said sleeve between said terminals, a metallic conductor of low resistance connected between the terminals and a conductor of relatively high resistance connected between one terminal and said ring.

5. A tubular sleeve of insulation, a circular metallic terminal at each end of said sleeve, a circular metallic terminal lying on said sleeve between said end terminals, a low resistance connection between one end terminal and another terminal and a high resistance connection between said one end terminal and the remaining terminal.

In witness whereof I hereunto subscribe my name this 1st day of June, A. D. 1917.

NICHOLAS J. CONRAD.