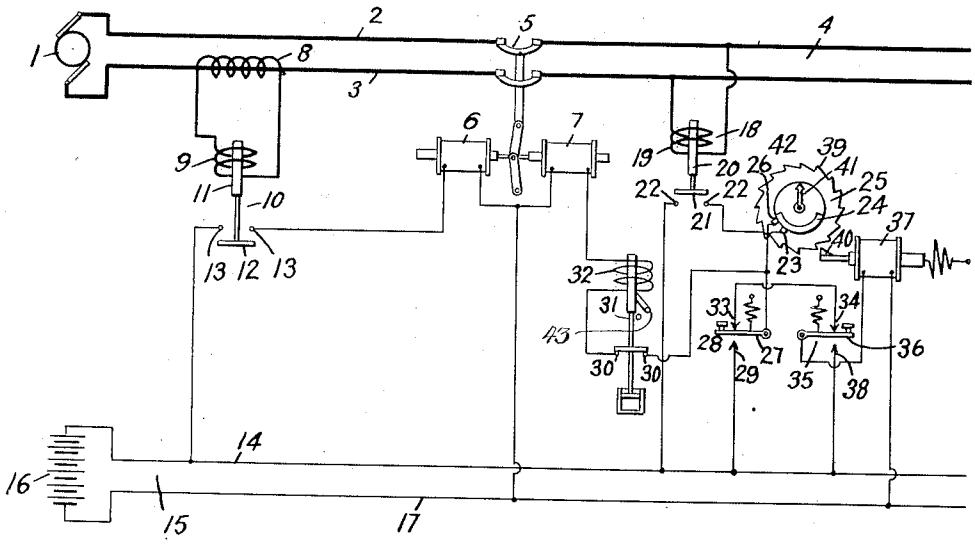
P. MacGAHAN.

ARC EXTINGUISHING DEVICE.

APPLICATION FILED AUG. 7, 1916.

1,308,249.

Patented July 1, 1919.



WITNESSES:

Fred K. Miller

J. A. Procter

INVENTOR

Paul MacGahan

BY

Wesley G. Carr

ATTORNEY

UNITED STATES PATENT OFFICE.

PAUL MACGAHAN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ARC-EXTINGUISHING DEVICE.

1,308,249. Specification of Letters Patent. Patented July 1, 1919.

Application filed August 7, 1916. Serial No. 113,462.

To all whom it may concern:

Be it known that I, PAUL MACGAHAN, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Arc-Extinguishing Devices, of which the following is a specification.

My invention relates to electrical systems of distribution and particularly to apparatus for extinguishing arcs that occur in such systems without disturbing the operation of the apparatus connected thereto.

One object of my invention is to provide a device of the above indicated character that shall alternately open and close a circuit interrupter to so reduce the voltage of the circuit that the arc will be extinguished without causing the apparatus connected to the circuit to fall out of synchronism.

Another object of my invention is to provide a device of the above indicated character that shall have a controller which is adapted to be actuated, each time that the voltage of the circuit decreases to a predetermined value, for the purpose of limiting the number of times that the interrupter may be reclosed.

A further object of my invention is to provide a device of the above indicated character that shall have means for indicating the number of times that the circuit interrupter has been tripped.

My copending application Serial No. 114,162, filed on even date herewith, discloses means for tripping an interrupter when an overload occurs upon the same, means for automatically reclosing the interrupter when the voltage on the load side thereof is reduced to substantially zero and a time-limit overload relay for precluding the automatic reclosing of the interrupter after the overload has existed for a predetermined period of time.

In my present invention, I provide means for tripping the interrupter when an overload occurs upon the circuit, means for automatically reclosing the interrupter when the voltage on the circuit is reduced substantially to zero and a notching-up controller adapted to be actuated each time the interrupter is opened and having means for limiting the number of times that the interrupter can be reclosed and also for indicating the number of times the interrupter is tripped.

The single figure of the accompanying drawing is a diagrammatic view of a distributing system that is provided with an arc-extinguishing means embodying my invention.

A generator 1 supplies energy to conductors 2 and 3 of a distributing circuit 4 that is provided with an interrupter 5 for the purpose of reducing and restoring the voltage impressed upon the circuit when an overload occurs thereon. The circuit interrupter 5 is provided with a tripping electromagnet 6 and a closing electromagnet 7.

A series transformer 8 is operatively connected to the circuit 4 and to the winding 9 of an overload relay 10. The relay 10 comprises a movable core member 11 and a movable bridging contact member 12 that is adapted to engage stationary contact members 13. One of the stationary contact members 13 is operatively connected to one conductor 14 of a circuit 15 comprising a source 16 of electromotive force. The other stationary contact member 13 is operatively connected to one terminal of the electromagnet 6, the other terminal of which is operatively connected to the conductor 17 of the circuit 15. Thus, when an overload occurs upon the circuit 4, the relay 10 will cause the electromagnet 6 to be energized and the circuit interrupter 5 to be tripped.

A no-voltage relay 18 is operatively connected to the conductors 2 and 3 and comprises a winding 19, a movable core member 20, a bridging contact member 21 and stationary contact members 22. One of the stationary contact members 22 of the relay 18 is operatively connected to the conductor 14 and the other stationary contact member 22 is connected to the collector brush 23 of a notching-up controller 42. The connector brush 23 is adapted to engage a conducting segment 24 that is mounted on a rotatable member 25, and a second collector brush 26, which is also adapted to engage the segment 24, is operatively connected to a movable contact member 27 of a double-throw switch 28, the stationary contact member 29

of the switch 28 and the stationary contact member 30 of a time-limit relay 31. The other stationary contact member 30 of the relay 31 is operatively connected to one terminal of the winding 32 of the relay 31 the other terminal of which is connected, through the electromagnet 7, to the conductor 17.

The stationary contact member 33 of the switch 28 is operatively connected to the stationary contact members 34 of a second double-throw switch 35 and the movable contact member 36 of the switch 35 is operatively connected to one terminal of an electromagnet 37, the other terminal of which is connected to the conductor 17. The stationary contact member 38 of the switch 35 is operatively connected to the conductor 14.

The rotatable member 25 of the notching-up controller 42 is provided with a series of notches or teeth 39 at its outer edge that are adapted to be engaged by a pawl that is mounted on the movable core member 40 of the electromagnet 37 for the purpose of turning the segment 24 a predetermined distance each time the electromagnet 37 is energized. A pointer 41 is mounted on the movable member 35 and is adapted to coöperate with a scale (not shown) for the purpose of indicating the number of times the member 25 has been actuated.

When an overload occurs upon the system 4, the relay 10 operates to cause the electromagnet 6 to trip the interrupter 5. After the interrupter 5 is opened, the voltage impressed upon the winding 19 of the relay 18 is reduced substantially to zero and its bridging contact member 21 engages its stationary contact members 22. Thus, current will traverse the electromagnets 7 and 37, the interrupter 5 will be reclosed and the member 25 will be turned a predetermined distance. If the reduction in voltage is not sufficient to extinguish the arc that caused the overload, the interrupter 5 will again be tripped and the operation of the relay 18 will cause the reënergization of the electromagnets 7 and 37. Thus, the interrupter will be reclosed and the movable member 25 will be turned a predetermined distance.

Since the conducting segment 24 is of such length as to disengage the collector brushes 23 and 26 after the member 25 has been turned a predetermined distance, it will be understood that, after the interrupter has been reclosed a predetermined number of times, the operation of the relay 18 will not cause it to be reclosed again because of the interruption of the circuit between the collector brushes 23 and 26. The pointer 21 will indicate the number of times the interrupter has been tripped and reclosed.

If the voltage of the generator 1 fails at any time and such failure persists for a time sufficiently long to permit the relay 31 to operate, it will open the circuit of the electromagnet 7 and thus preclude the reclosing of the interrupter 5. A latch 43 may be provided for holding the relay 31 in its open position after it has operated.

The switch 27 is provided for the purpose of manually reclosing the interrupter 5, under predetermined conditions, and the switch 35 is provided for manually actuating the electromagnet 37 for the purpose of so turning the member 25 as to reset the member 24 and the pointer 41 to their initial positions with respect to the brushes 23 and 26.

I do not limit my invention to the particular arrangement illustrated, as it may be variously modified without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim as my invention:

1. In a system of distribution, the combination with a circuit interrupter and means for tripping the same when an overload traverses the system, of means for closing the interrupter, means dependent upon the drop in the voltage of the system for controlling the closing means, and means dependent upon the number of times the voltage drops to a predetermined value on the system to limit the number of times the reclosing means is permitted to operate.

2. In a system of distribution, the combination with a circuit interrupter and means for tripping the same when an overload traverses the system, of means for reclosing the interrupter when the voltage on the system drops substantially to zero, and means controlled by the number of times the voltage drops substantially to zero for limiting the number of times the interrupter may be reclosed.

3. In a system of distribution, the combination with a circuit interrupter, and means for tripping the same when an overload traverses the system, of means for immediately reclosing the interrupter after the voltage on the system has dropped to a predetermined value, and means actuated when the voltage drops to a predetermined value for limiting the number of times the interrupter may be reclosed.

4. In a system of distribution, the combination with a circuit interrupter and means for tripping the same when an overload traverses the system, of means for immediately closing the interrupter after the voltage on the system has dropped to a predetermined value, means actuated when the voltage drops to a predetermined value for limiting the number of times the interrupter may be reclosed and means for indicating the number of times the interrupter is tripped.

5. In a system of distribution, the com-

bination with a circuit interrupter and means for tripping the same when an arc occurs on the system, of means for reclosing the interrupter, means dependent upon the drop in voltage on the system for controlling the reclosing means, a controller for limiting the number of times the reclosing means may operate, and means controlled by the means that is dependent upon the drop in voltage on the system for actuating the controller.

In testimony whereof, I have hereunto subscribed my name this 28th day of July, 1916.

PAUL MacGAHAN.