No. 751,442. PATENTED FEB. 9, 1904.

L. ANDREWS.

REVERSE CURRENT CUT-OUT.

APPLICATION FILED JUNE 25, 1903.

NO MODEL.

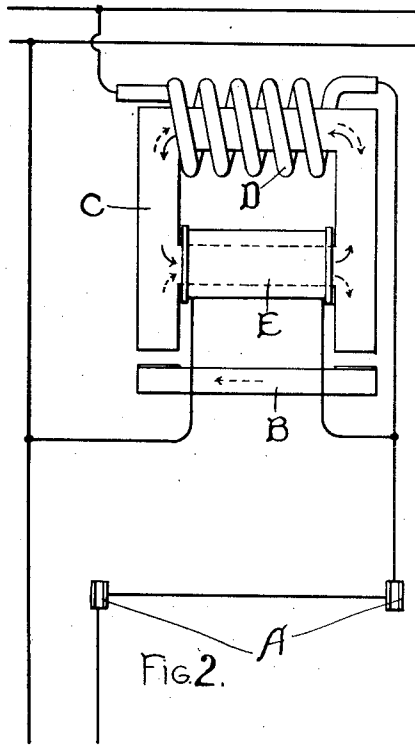


Fig. 2.

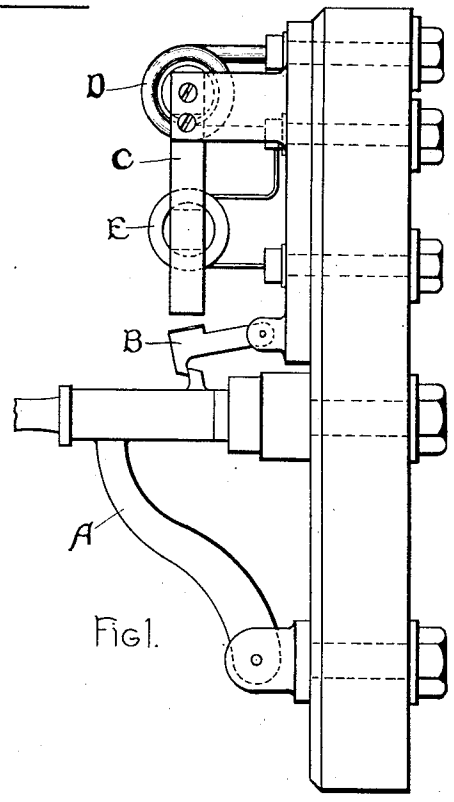


Fig. 1.

WITNESSES:

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No. 751,442. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

LEONARD ANDREWS, OF MANCHESTER, ENGLAND, ASSIGNOR TO STANLEY ELECTRIC MANUFACTURING COMPANY, OF PITTSFIELD, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

REVERSE-CURRENT CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 751,442, dated February 9, 1904.

Application filed June 25, 1903. Serial No. 163,011. (No model.)

To all whom it may concern:

Be it known that I, LEONARD ANDREWS, a subject of the King of England, and a resident of Manchester, England, have invented certain new and useful Improvements in Reverse-Current Cut-Outs, of which the following is a specification.

My invention relates to devices for the protection of electric apparatus against reversal of current-flow. In many of the devices that have been heretofore constructed for this purpose there are serious defects. In some devices in which iron is used if the reversal is sudden and the reverse-current flow is heavy the device will be locked in position by the strong flux generated by the heavy reverse current and will be held inoperative. On the other hand, in cut-outs in which this difficulty has been avoided by the omission of iron the device is bulky and expensive to construct.

The object of my invention is to provide a cut-out which shall operate immediately upon the reversal of current whether the reverse-current flow is large or small, which shall be applicable for either alternating or direct currents, and which shall be simple in arrangement and economical in construction.

Referring to the drawings, Figure 1 shows a side elevation of a structure embodying my invention. Fig. 2 shows diagrammatically the arrangement of circuits and a front elevation of the cut-out magnet.

In the drawings, A represents a switch which is normally held closed by a latch carried by the movable armature B.

C represents the core of the cut-out magnet. This core is preferably laminated if used with alternating currents and made solid if used with direct currents. On the core C are mounted the series coil D and the potential-coil E. The shape of the core is shown in Fig. 2. It will be seen that core C forms a closed magnetic circuit carrying the series and shunt coils and also that there is an open magnetic circuit including the movable armature B, which shunts both parts of core C, on which are mounted the series and potential coils. The direction of the flux of core C under normal conditions is indicated by the arrows in full lines in Fig. 2. The flux passes around the closed magnetic circuit through coils D and E, and there is little tendency for any of the flux to leak through movable armature B. Hence there is not sufficient attraction to raise the armature. Now if the current through coil D reverses the direction of flux will be that shown by the dotted arrows. It will be seen that the fluxes produced by coils D and E are in opposition in the closed circuit, and thus the entire flux is shunted through the open magnetic circuit of which movable armature B is a part. Armature B will thus be drawn up, releasing switch A and opening the circuit.

I do not desire to limit myself to the particular construction and arrangement of parts here shown, since changes therein which do not depart from the spirit of my invention and which are within the scope of the appended claims will be obvious to those skilled in the art.

Having thus fully described my invention, I claim as new and desire to protect by Letters Patent—

1. In combination, an electric circuit, a closed magnetic circuit, two coils wound on said magnetic circuit one in series with and the other in shunt to said electric circuit, an open magnetic circuit including a reciprocating member and shunting both parts of said closed circuit on which are wound said coils, and a switch operated by the movement of said reciprocating member.

2. In combination, a closed magnetic circuit, two coils wound thereon, an open magnetic circuit including a reciprocating member and shunting both parts of said closed circuit on which are wound said coils, and a switch operated by the movement of the reciprocating member.

3. In combination, an electric circuit, a series coil, a shunt-coil, a closed magnetic circuit adapted to be magnetized by said coils conjointly when the currents in said coils are in the same relative direction, an open magnetic circuit including a movable member and

adapted to be magnetized by said coils conjointly when the currents in said coils are in relatively opposite directions, and a switch operated by the movement of said movable member.

4. In combination, an electric circuit, a series coil, a shunt-coil, magnetic cores for said coils, end pieces magnetically connecting the ends of said cores, a reciprocating armature magnetically shunting said cores, and a switch operated by the movement of said armature.

5. In combination, an electric circuit, a series coil, a shunt-coil, a core forming a closed magnetic circuit through said coils with projecting pieces between said coils, a reciprocating armature adjacent to said projecting pieces, and a switch operated by the movement of said armature.

6. In combination, an electric circuit, a closed magnetic circuit, an open magnetic circuit including a movable armature, two coils in series with and in shunt to said electric circuit respectively, said coils being arranged normally to magnetize said closed circuit and on reversal of current-flow to magnetize said open circuit, and a switch operated by the movement of the armature.

7. In combination, a closed magnetic circuit, an open magnetic circuit including a movable armature, two coils arranged to magnetize conjointly said closed circuit when the currents in said coils are in the same relative direction and to magnetize said open circuit when the currents in said coils are in relatively opposite directions, and a switch operated by the movement of the armature.

8. In combination, a magnetic circuit of low reluctance, a magnetic circuit of high reluctance including a movable armature, two coils arranged to magnetize conjointly said low-reluctance circuit and on the relative reversal of current in one coil to magnetize conjointly the high-reluctance circuit, and a switch operated by the movement of the armature.

9. In combination, a magnet-coil, an open magnetic circuit comprising the core of said coil and a reciprocating armature, a second magnet-coil, a core for said second coil shunting the core of the first coil and forming a closed magnetic circuit therewith, and a switch operated by the movement of the reciprocating armature.

10. In combination, an electric circuit, a magnet-coil in series with said circuit, an open magnetic circuit comprising the core of said coil and a reciprocating armature, a magnet-coil in shunt to said electric circuit, a core for said shunt-coil shunting the core of said series coil and forming a closed magnetic circuit therewith, and a switch operated by the movement of the reciprocating armature.

11. In combination, a closed magnetic circuit, two coils wound thereon, an open magnetic circuit including a movable member and shunting both parts of said closed circuit on which are wound said coils, said movable member being adapted to close said open circuit by its movement, and a switch adapted to be operated by the movement of said movable member.

12. In combination, a closed magnetic circuit, two coils wound thereon, a second magnetic circuit shunting those parts of the first circuit on which said coils are wound and including a movable member and an air-gap, said movable member being adapted to vary said air-gap by its movement, and a switch operated by the movement of said movable member.

13. In combination, a magnetic circuit of low reluctance, coils wound thereon, a magnetic circuit of high reluctance in shunt to the first, a movable member included in the high-reluctance circuit and adapted to vary the reluctance thereof by its movement, and a switch operated by the movement of said movable member.

14. In combination, a closed magnetic circuit, two coils wound thereon, an open magnetic circuit including a movable member and shunting both parts of said closed circuit on which are wound said coils, a switch, and means operated by the movement of said movable member adapted to open said switch.

15. In combination, an electric circuit, a series coil, a shunt-coil, magnetic cores for said coils, end pieces magnetically connecting the ends of said cores, a movable armature magnetically shunting said cores, a switch in said electric circuit, and means operated by the movement of said armature for opening said switch.

Signed at Pittsfield, Massachusetts, this 16th day of June, 1903.

LEONARD ANDREWS.

Witnesses:

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R. E. HAYNES.