(No Model.)

L. B. ATKINSON.

SAFETY DEVICE FOR ELECTRIC CIRCUITS.

No. 482,433. Patented Sept. 13, 1892.

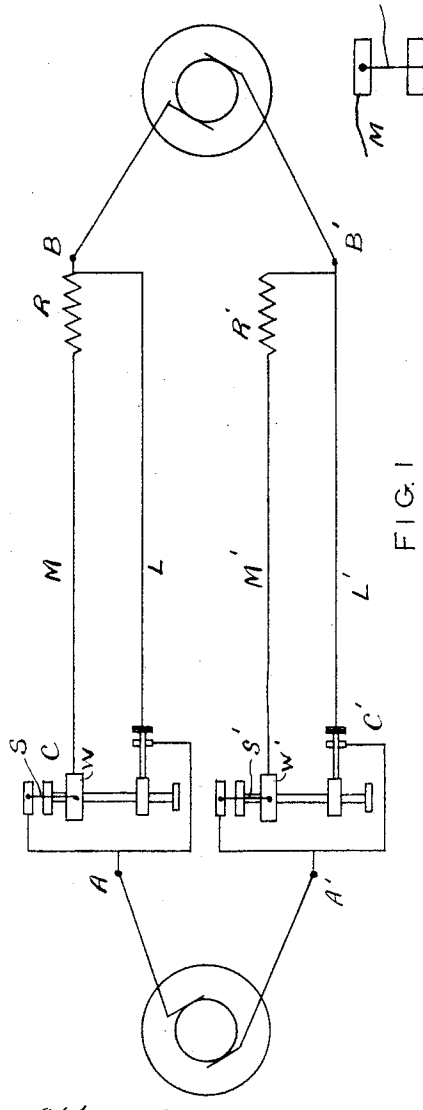

FIG. 1.

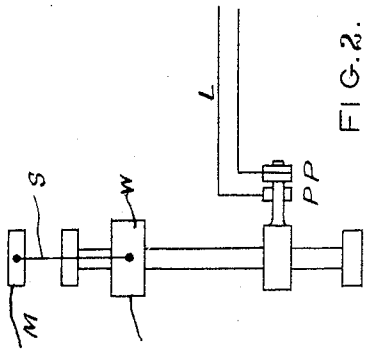

FIG. 2.

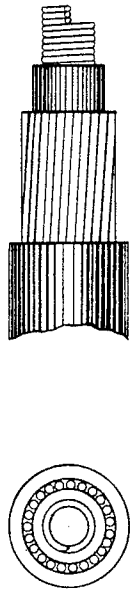

FIG. 3.

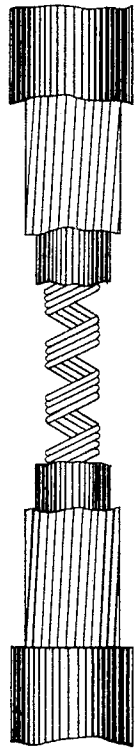

FIG. 4.

Attest
Walter Dewey
Wm. T. Hall

Inventor
L. B. Atkinson
by Richards & Co
attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LLEWELYN B. ATKINSON, OF LONDON, ENGLAND.

SAFETY DEVICE FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 482,433, dated September 13, 1892.

Application filed September 12, 1891. Serial No. 405,488. (No model.)

To all whom it may concern:

Be it known that I, LLEWELYN BIRCHALL ATKINSON, residing at London, England, have invented an Improved Means for Distributing Electric Currents, of which the following is a specification.

My invention relates to an improved means for distributing electric currents in order to obviate the occurrence of accidents or fire resulting from fracture or damage to electric conductors, giving rise to sparking or arcing at the point of damage.

My invention consists in the combination, with the main conductor, which may or may not be protected by fuses or cut-outs in the usual manner, of a subsidiary circuit insulated except at its extremities from the main conductor, the subsidiary circuit being protected by a fuse or cut-out operating with less than the normal current carried by the main conductor.

It is important, where electric conductors are carried in close proximity to inflammable material or where they are used for underground electrical operations, where they may be surrounded by an inflammable atmosphere, or where being carried overhead, as there is danger to life or property, to prevent the violent sparking or arcing of such an electric conductor carrying an electric current should the electric conductor be broken by any accident. I effect this prevention by laying a subsidiary electric conductor, either in conjunction with the main conductor, but insulated from it or quite independent and separate from the main conductor, which is normally intended to carry only a fractional part of the main current and which is provided with a safety-fuse or cut-out which readily operates when loaded with a current such as that which is normally conveyed by the main conductor. The protective action of this subsidiary conductor is as follows: Should the main conductor be suddenly broken, the current finds for the moment a closed circuit through the subsidiary conductor, which prevents the sparking or arcing of the main conductor across a moderate interval, while the broken ends of the main cable are in close proximity to one another. The subsidiary conductor then carries the whole normal current and the fuse or cut-out will be operated and completely break the circuit. The only spark or arc which occurs under the circumstances is that which takes place at the aforesaid safety-fuse or cut-out, which may easily be covered and protected against the possibility of firing any inflammable substance or gas.

In cases where, as with conductors carrying high electro-motive forces, especially in the case of overhead conductors, when it is desirable to totally disconnect the main conductors from the source of electric current an automatic cut-out is provided, such that when the subsidiary cut-out is operated the main cut-out also operates, thus totally disconnecting the circuit. Convenient forms of construction for these main and subsidiary conductors to effect my purpose, may be, first, a perfectly independent laying of two cables apart from one another, the subsidiary circuit being connected as a shunt-circuit to each extremity of the outgoing or return main circuits, respectively; second, the insertion within or application without the ordinary stranded or solid portion of the main conducting-cable of a spirally closely-twisted extensible (elastic) subsidiary conductor arranged as a shunt-circuit, connected at each end of the outgoing or return circuits, respectively, and insulated from the said main conductor, and should the main conductor break in this case the extensible elastic character of the internal or external twisted subsidiary conductor will allow the broken ends of the main cable to spring apart to a considerable distance while the subsidiary conductor remains intact; third, the insertion within or application without a double concentric outgoing and return cable of spirally closely-twisted subsidiary conductor or conductors connected as a shunt-circuit to the ends of the said outgoing or return circuits insulated from the main conductors. Should one or both of the lead and return conductors of this combined cable break, the spirally-twisted subsidiary conductor will allow the broken ends to spring apart, while remaining intact itself.

Where it is necessary to prevent the possibility of a spark even should the cable be cut by a sharp instrument, this may be effected as follows: In the circuit of the subsidiary elastic conductor at the end remote from the generator is a resistance. The re-

sult of this is that instead of the fall of potential along the subsidiary conductor being the same as that in the main conductor per units of length it is less. When, therefore, by cutting the cable through the subsidiary and main conductors are put in contact, the fall of potential in each cable becomes the same, the result being an increase of current which fuses the fuse of the subsidiary circuit as before.

In order that my invention may be the better understood, I now proceed to describe the same in relation to the drawings hereunto annexed, reference being had to the letters marked thereon.

Figure 1 shows the general arrangement of the circuits in this invention. A A′ are the terminals of the source of supply, such as a dynamo; B B′, the terminals of the recipient device, such as a motor. L L′ are the outgoing and return main conductors. C C′ are the protected main fuses or cut-outs. S S′ are the protected fuses in the subsidiary circuit M M′.

Fig. 2 shows an automatic switch or cut-out for totally disconnecting the outgoing circuit on the occurrence of a break. A weight W is held up on a sliding bar by means of a fusible wire S. At the lower part of the bar is a slider carrying a switch-tongue, which connects two plates P P, thus completing the main circuit L. The fusible wire S is in circuit with the subsidiary wire M, and when fused, as described, by the breaking of the outer conductor L the weight W drops and breaks the main circuit L at the contacts P P, which are protected.

Fig. 3 shows one form of the cable as constructed with a spiral flexible core having an outer insulating-layer, a conductor of stranded wire, then a light insulating-layer, and finally the inner concentric spiral conductor, which may be made of one wire, but which is preferaly composed of several wires laid parallel.

Fig. 4 shows such a cable broken, with the inner conductor intact and expanding.

Fig. 1 also shows the arrangement of circuits where it is desired to allow for the cutting of the cable by means of a sharp instrument, which is provided for, as explained, by the insertion of resistances R R in each subsidiary conductor M M.

Having now particularly described my invention, what I claim is—

1. In a system of distributing electric currents, the combination of a main outgoing and return conductor having in circuit with the outgoing conductor an automatic covered or protected circuit-breaker close to the generator, a subsidiary conductor connected as a shunt from each extremity of the said outgoing and return conductors, and a covered or protected fuse in circuit with the said subsidiary conductor controlling the circuit-breaker on the main conductor, disconnecting both circuits from and at specially covered or protected points close to the source of electric supply should the main cable be broken, substantially as set forth.

2. A compound electric conductor consisting of a main conductor of stranded wires taking the longitudinal tension of the cable and containing a protected automatic cut-out in its circuit, in combination with the subsidiary closely-coiled conductor of single or multiple parallel wires adapted to readily extend its coils under longitudinal tension without breaking, connected as a long shunt to the main conductor and having a protected fuse in its circuit and surrounding or surrounded by and insulated from the said main conductor, substantially as set forth.

3. The combination, with a main outgoing and return conductor and a subsidiary conductor connected as a shunt from each extremity of the said outgoing and return conductors, of a resistance in the said subsidiary conductor at the end farthest from the generator and a covered or protected fuse at the end nearest to the generator, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LLEWELYN B. ATKINSON.

Witnesses:
RICHARD A. HOFFMANN,
CHARLES H. CARTER.