L. NEU.

MEANS FOR PROTECTING HIGH TENSION OVERHEAD ELECTRIC CONDUCTORS.

APPLICATION FILED APR. 3, 1906.

899,127. Patented Sept. 22, 1908.

Fig. 1.

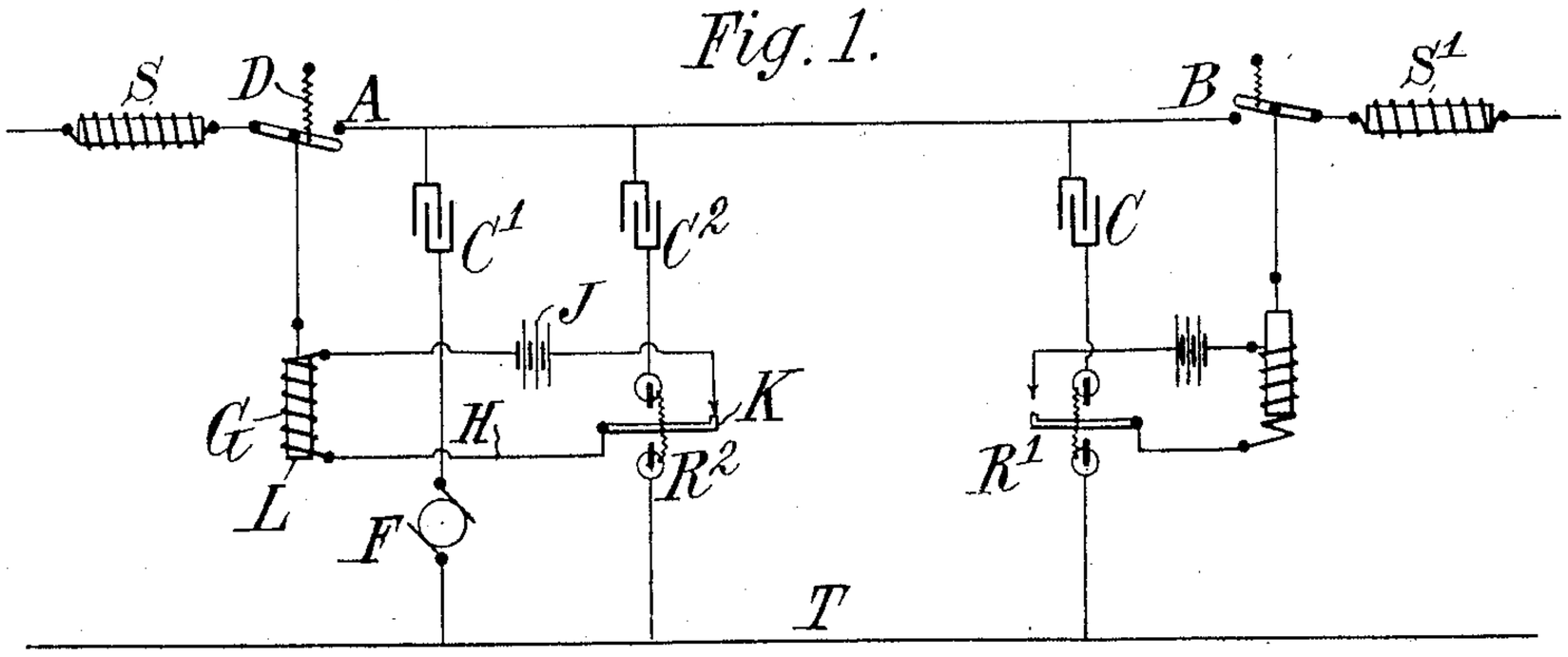


Fig. 2.

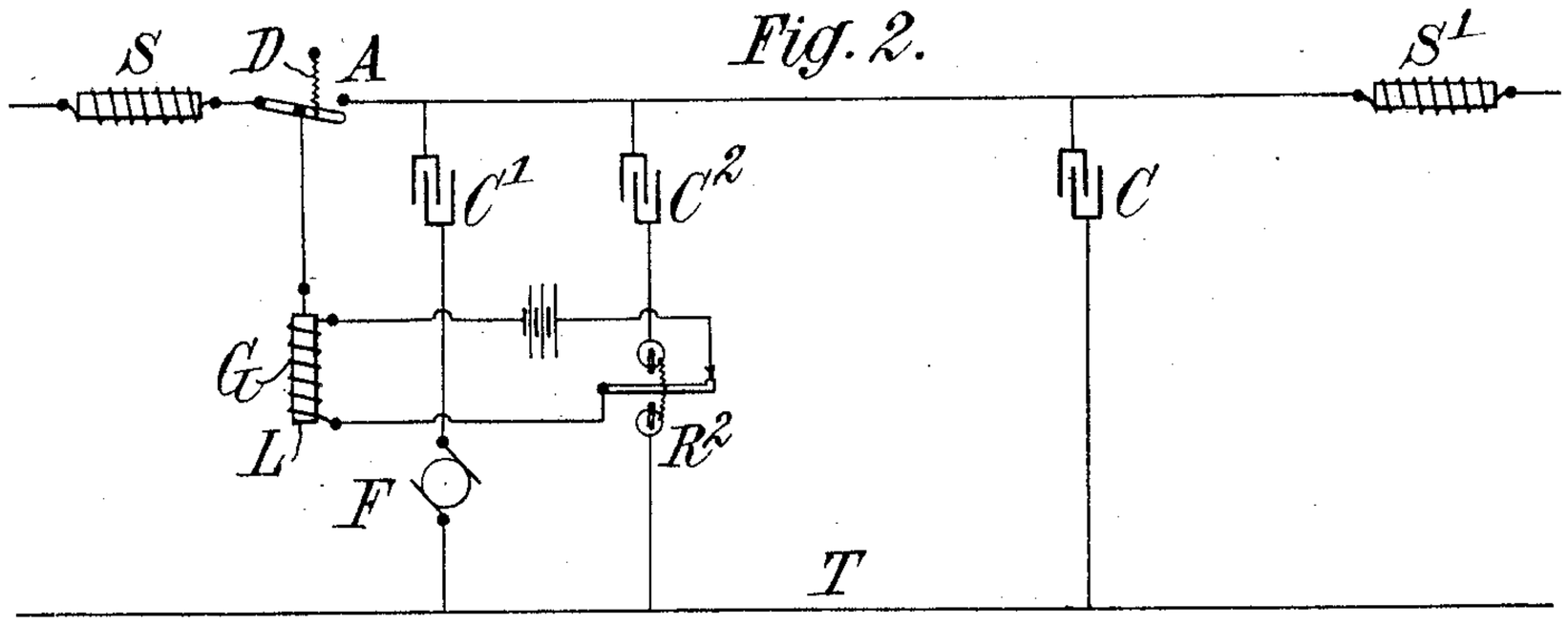
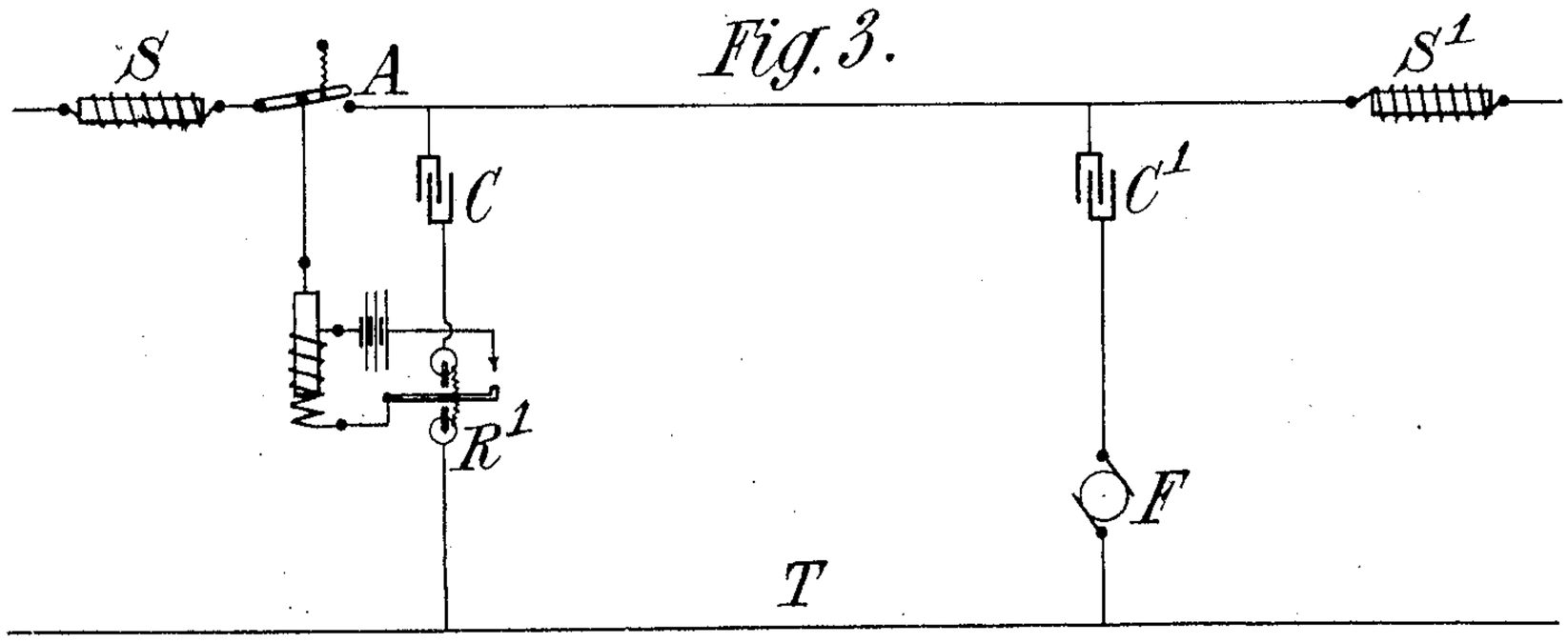


Fig. 3.



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MEANS FOR PROTECTING HIGH-TENSION OVERHEAD ELECTRIC CONDUCTORS.

No. 899,127. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed April 3, 1906. Serial No. 309,685.

To all whom it may concern:

Be it known that I, LUCIEN NEU, a citizen of the Republic of France, residing at Lille, Nord, in the Republic of France, have invented new and useful Improvements in Means for Protecting High-Tension Overhead Electric Conductors, of which the following is a specification.

One of the most serious objections to overhead high tension electric conductors chiefly consists in the possibility of a rupture bringing the conductors into contact with persons in the roadway. Such ruptures, which are little to be feared with main conductors of large diameter, are more frequent with shunt wires of less power and consequently smaller section.

The protective insulating windings are inconvenient, heavy, and cumbersome. Their employment is necessarily limited to a small section of the line such as to the crossings of the roads or tracks.

An automatic earthing arrangement to be placed on each post has by reason of the large number of apparatus to be installed, been found to be costly, difficult to maintain and consequently inefficient.

This invention relates to a means of protection which, by its use, considerably decreases the chances of accident.

It consists in providing the line with disconnectors coming automatically into action in case of a breakage of one of the conductors.

This new system is based on the employment of an auxiliary source of high frequency alternating currents, which have, as is well known, the property of passing with difficulty through very inductive circuits, but on the contrary of easily passing through circuits of a certain capacity.

This system consists essentially in actuating disconnectors placed at suitable points of the line to be protected, by means of relays which are subjected to the action of a source of alternating current of high frequency, the said relays and the source of current of high frequency being branched in shunt on to the line to be protected, condensers being interposed between the line to be protected and a suitable conductor or the earth.

In order to enable the invention to be clearly understood I will first describe it as applied to the most complex, that is to say the most general, case which is that of a section of line fed at both ends.

Let A and B be the two ends of a conductor of the said section; they are provided with a disconnector placed at A and with a disconnector placed at B, these two disconnectors opening automatically in case of breakage of the conductor between A and B.

Between A and its connection to the general system is interposed a self induction coil S simply composed of spiral wires; such a coil will have no sensible action upon a continuous or alternating current of low frequency, but will constitute an almost insurmountable obstacle to a current of high frequency.

A similar self induction coil S^1 is placed between B and its connection to the general system.

In the vicinity of A a high frequency current is sent into the conductor connecting A and B directly, with the intervention of condensers or by induction, the return of this current taking place to earth or through another line wire.

Near B is placed a condenser C of large capacity with relation to that of this section of line; this condenser is connected, on the one hand to the conductor and on the other hand to earth or to another line wire. On one of these connections is interposed a first relay actuated by the current of high frequency.

Near A is placed a second relay for current of high frequency interposed either between the high frequency source and the conductor, or between the said source and the earth or, as shown in Figure 3 on a shunt of the high frequency current obtained by a conductor branched between the line and the earth, or the line and a second line wire.

The two relays, when they come into action, are arranged so as to bring about the opening of the disconnectors placed at A and B. These relays are arranged so as to come into action as follows, namely, the first when it is deprived of high frequency current, and the second when the high frequency current passing through it decreases if it is placed on the main current of high frequency, or increases if it is placed on a shunt of this current. As long as the line is intact, the two relays remain inactive. If the line breaks, the first relay will be deprived of high frequency current and will then cause the disconnector placed at B to open; then the second relay will cause the disconnector placed at A to open. In this arrangement the condensers can be replaced by induction coils.

By way of example the accompanying drawing shows diagrammatically in Figs. 1, 2 and 3, three different arrangements.

In the drawing A and B are the two disconnectors placed at the two ends of the line to be protected; S and S^1 are the self induction coils, C a condenser of large capacity; T the earth or the second line wire, F a source of current of high frequency, R^1 and R^2 the relays for current of high frequency, C^1 a condenser and C^2 a condenser of much smaller capacity than C. As long as the line is intact, the major portion of the current of high frequency traversing C^1 passes through C and R^1, and little current of high frequency passes through C^2 and R^2.

Should the conductor break between A and B, R^1 is deprived of current and causes B to open; at the same time there is an increase of current passing through C^2 and R^2; it follows that R^2 causes A to open. If the line is only fed at the side A the disconnector B and the relay R^1 can be dispensed with, the other parts of the arrangement remaining. Fig. 2 shows this modification: A is the disconnector placed at the beginning of the line to be protected, S and S^1 the self induction coils, C a condenser of large capacity, C^1 and C^2 condensers of less capacity and R^2 a single relay.

At ordinary times the high frequency current passes entirely through the high frequency condenser and in insufficient quantity through the relay R^2, while if the wire A B becomes broken the whole of the said current passes through the said relay which acts and causes the disconnector A to operate. Or in cases where the line is only fed at the side A I can, as shown at Fig. 3, place the source of current of high frequency at the other end B of the line; the relay R^1 acts upon the disconnector A when the high frequency current fails, which it is caused to do when the line becomes broken.

The operative relation between the relays R^1 and R^2, and the corresponding disconnectors B and A, may be established in a variety of ways. For example, the disconnectors may be moved in one direction by springs D, and in the opposite direction by cores F of solenoids G the circuit H of which, containing a battery or other generator J, is established or broken by means of a switch K whose movements are effected by the relays in a well known way.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A means of protection in case of rupture of a line carrying electric current, including inductive resistances introduced at opposite ends of the section of the line to be protected, a shunt between the ends of said section including condensers and a source of current of high frequency, means for interrupting the circuit, and a relay controlled by said high-frequency current and having a movable part operating the means for interrupting the circuit.

2. A means of protection in case of rupture of a line carrying electric current, including inductive resistances introduced at opposite ends of the section of the line to be protected, a shunt between the ends of said section, including condensers and a source of current of high frequency, means for interrupting the circuit at each end of said section, a pair of relays controlled by said high-frequency current, the first having a movable part operating the means for interrupting the circuit at one end of said section, and the second having a movable part operating the means for interrupting the circuit at the opposite end of said section.

3. A means of protection in case of rupture of a line carrying electric current, including inductive resistances introduced at opposite ends of the section of the line to be protected, a shunt between the ends of said section, including condensers and a source of current of high frequency, means for interrupting the circuit at one end of said section, and a relay controlled by said high-frequency current and having a movable part operating said means, one of said condensers being of greater capacity than the other.

In witness whereof I have hereunto signed my name this 20th day of March, 1906, in the presence of two subscribing witnesses.

LUCIEN NEU.

Witnesses:
EMILE LECLERC,
GUSTAVE DAYBERT.