

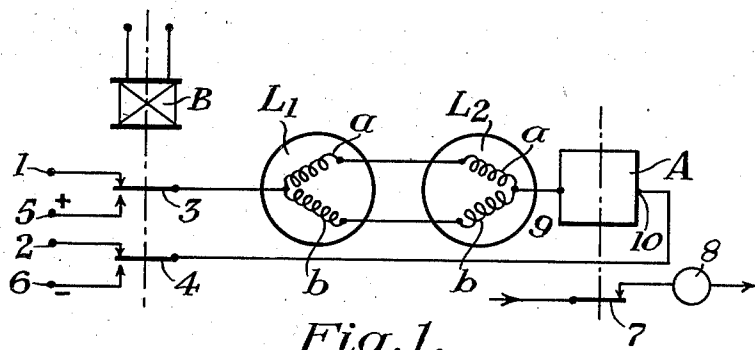
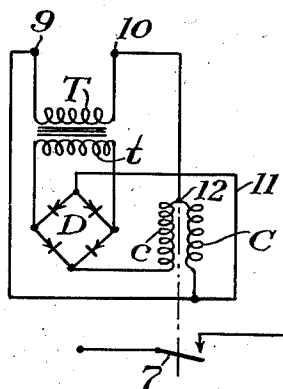
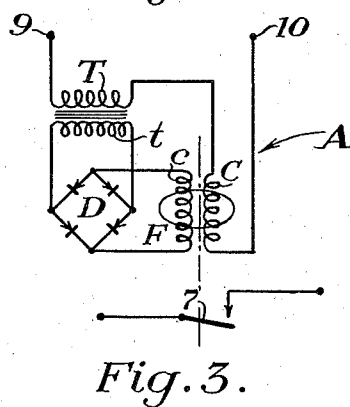
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SIGNALING APPARATUS MORE PARTICULARLY FOR RAILWAYS

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SIGNALING APPARATUS MORE PARTICULARLY FOR RAILWAYS

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1 Claim. (Cl. 177—311)

Light signals employed for example in signaling installations for railways generally comprise as a luminous source electric incandescent lamps having two filaments, one of which serves as an emergency filament in case of failure of the other.

In many cases, the lamps are normally supplied with alternating current but are arranged to be supplied in an emergency by direct current which is automatically supplied when the source of alternating current fails. It is always of advantage and sometimes even essential to enable a notification to be given at a suitable control point of the failure of one of the filaments, by means of a device which will function regardless of whether at the time of failure of the filament the latter is being supplied with direct or alternating current.

The invention has as its object the provision of signaling apparatus of this character operating whatever the nature of the current supplied and with the same efficiency for either.

In the accompanying drawing, Fig. 1 is a diagrammatic view showing one form of apparatus embodying my invention. Fig. 2 is a view showing one form of device A which may be used in the apparatus shown in Fig. 1. Fig. 3 is a view showing a modification of the device A and also embodying my invention.

The present application is a continuation-in-part of my co-pending application filed April 20, 1934, Serial No. 721,484, insofar as the subject matter common to the two is concerned.

In the example represented in Figure 1, the device A, according to the invention, is arranged to indicate the failure of one or other of the filaments *a* and *b* of the two lamps L^1 and L^2 . These lamps are connected in a circuit normally supplied with alternating current from the two terminals 1 and 2 through contacts 3 and 4 of a relay B which is energized from the same source of alternating current as the terminals 1 and 2. When the alternating current fails, the relay B is deenergized and the contacts 3 and 4 complete a connection to the two direct current terminals 5 and 6.

The device A, according to the invention, is arranged to enable an indication to be given of the failure of one of the filaments *a* or *b* whether the lamps L^1 and L^2 are supplied from the terminals 1 and 2 or from the terminals 5 and 6.

The device A comprises essentially a relay actuating a contact 7 closing the circuit of an indication device such as an indication lamp 8 for example.

The device A illustrated more particularly in

Fig. 2 is constituted by a transformer the primary winding T of which is joined to the terminals 9 and 10 of the apparatus. Connected in parallel with this primary is the thick wire coil C of an electromagnet, which when energized maintains the contact 7 closed.

The secondary winding *t* of the transformer is connected to the input terminals of a full wave rectifier D for example, of the dry copper oxide type. The output terminals of the rectifier are connected respectively to one end of the coil C through a conductor 11 and to one end of a fine wire coil *c* cooperating with the coil C to actuate the contact 7 under conditions which will be specified hereinafter, the coil *c* being connected at 12 so as to be in parallel with the coil C.

The operation of the device is as follows:

When the lamps L^1 and L^2 are supplied by direct current, since this current traverses the winding T, the coil *t* is not energized. Current is supplied from the terminals 9 and 10 to the coil C which, by suitable design of the resistances of T and C, is normally energized like a direct current electromagnet and closes the contact 7. In consequence of the high resistance of the coil *c* the shunt current flowing in this coil is very small. In the event of failure of one of the filaments of the lamps L^1 and L^2 there is evidently produced a change in the strength of the current flowing through the terminals 9 and 10 and consequently of the current flowing in the electromagnet coil C. This current variation is indicated by the release of the contact 7 and the action of the indication device 8.

When the lamps L^1 and L^2 are supplied with alternating current, the current traversing the primary T of the transformer is transformed by the winding *t* into current of lower strength, which, after having been rectified in the rectifier D supplies in series the coils C and *c*, normally causing the energization of the electromagnet and the closure of contact 7.

The impedance of the coil C is designed to be much greater than the impedance of the primary T so that an alternating current of only very small value flows in the coil C which is not capable of disturbing the operation of the coils C and *c* under the effect of the rectified current.

Referring now to Fig. 3, it will be seen that the primary winding T of the transformer is connected to the terminals 9, 10 of the apparatus in series with the main or thick wire coil C of the electromagnet of the relay device, the auxiliary or thin wire coil *c* of the electromagnet being connected directly to the output terminals of the

full wave rectifier D the input terminals of which are connected to the secondary winding *t* of the transformer. The relay device is arranged to operate a relay contact 7 as in Fig. 2.

5 The advantage of the form shown in Fig. 3 is that when the relay device is being operated with direct current this current traverses the primary winding T of the transformer in series with the coil C instead of traversing the winding T only
10 in which its effect would be lost under these conditions. The arrangement also enables the action of the coils to be more conveniently adjusted as regards their difference in resistance for the purpose of attaining the desirable results of the
15 invention.

The magnetic circuit or core of the electromagnet is provided with a short-circuited conductor indicated at F preferably comprising a copper loop or ring which serves to prevent vibration
20 of the core of the electromagnet in the well known manner when the main coil C is supplied with alternating current. The conductor F acts as the short-circuited secondary winding of a transformer and thus not only reduces vibration
25 but also reduces the impedance of the main coil C under alternating current conditions and the impedance offered by this coil is thus rendered more nearly that corresponding to its ohmic resistance.

30 The application of the devices is not, as will be understood only limited to the case above described but may be utilized for the indication on the same principle, of any circuit supplied

either by direct current or alternating current.

Although I have herein shown and described only two forms of signaling apparatus embodying my invention, it is understood that various changes and modifications may be made therein
5 within the scope of the appended claim without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

10 In combination with an electrical device, an indicating lamp, a direct current indicating relay which has two windings and is non-responsive to alternating current, a transformer, a circuit
15 including in series said device, one winding of said relay and the primary of said transformer, a switching relay, means effective when said switching relay is in one position to supply alternating current to said circuit to energize said
20 device and said transformer, means effective when said switching relay is in another position to supply direct current to said circuit to energize said device and said indicating relay, a
25 circuit including the other winding of said indicating relay, the secondary of said transformer and a rectifier for energizing said indicating relay when alternating current is supplied to the
30 primary of said transformer, and a contact operated by said indicating relay for controlling said lamp to indicate a predetermined reduction in the current supplied to said device, irrespective of the position of said switching relay.

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