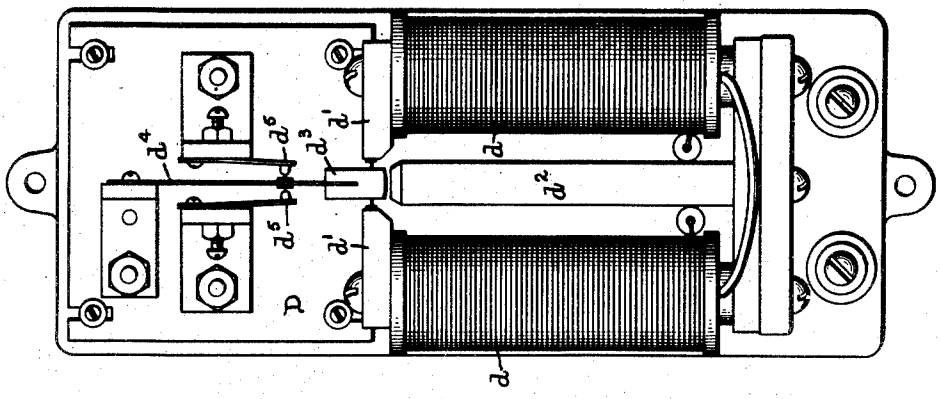
E. F. BLISS.

SIGNAL SYSTEM.

APPLICATION FILED MAY 6, 1909.

928,021. Patented July 13, 1909.

Fig. 2



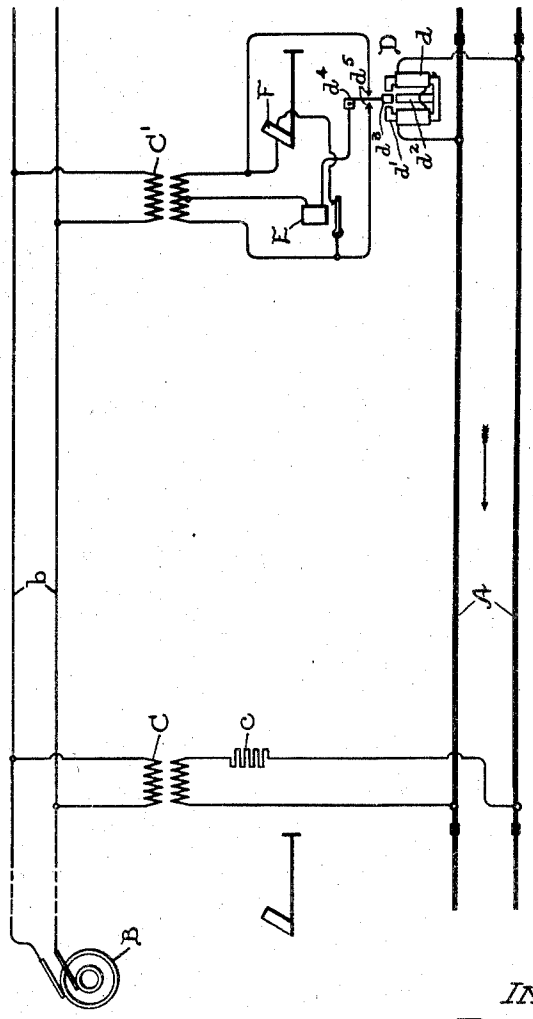


Fig. 1

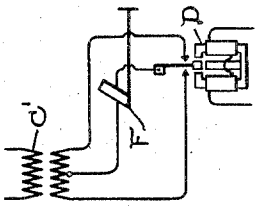


Fig. 3

WITNESSES:

Lester H. Pulmer.

J. Ellis Ellen

INVENTOR

ELMER F. BLISS.

BY Albert G. Davis

ATT'Y.

UNITED STATES PATENT OFFICE.

ELMER F. BLISS OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SIGNAL SYSTEM.

No. 928,021. Specification of Letters Patent. Patented July 13, 1909.

Application filed May 6, 1909. Serial No. 494,291.

To all whom it may concern:

Be it known that I, ELMER F. BLISS, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Signal Systems, of which the following is a specification.

My invention relates to block signal systems, and its object is to provide a novel arrangement of a system such that the apparatus will not be affected by any current other than that intended to operate it.

My invention consists in using as the track relay, and in arranging the signal circuits to permit of its use, a device having a construction similar to that which has been proposed heretofore for use as a rectifier for alternating currents, comprising a winding energized by alternating current, a polarized vibrating member subjected to the action of the alternating current in the winding and vibrated by it, said member being tuned to a natural period of vibration corresponding to the current in the winding, and contacts actuated by the vibration of said member. Because of the tuning of the vibrating member it is effectively operated only by an alternating current of a certain frequency.

My invention will be best understood by reference to the accompanying drawings, in which—

Figure 1 shows diagrammatically a block signal system arranged in accordance with my invention; Fig. 2 shows, in elevation, the device which I employ as the track relay; and Fig. 3 shows a modification of circuit connections.

In Fig. 1, A represents the track rails which I have indicated as divided into blocks by insulated joints, as in the usual steam road practice. It will be understood, however, that my invention is applicable to electric railways having any of the several forms of track circuits heretofore proposed. In such a case the power current may be either direct current or alternating current of a frequency different from that supplied to the signal circuits. B represents the alternating current generator which supplies the current for the signal circuits through the line wires *b*. C represents a transformer having its primary connected to the line wires and its secondary connected across the track rails through a resistance or impedance *c*, serving to limit the flow of current when the transformer secondary is short-circuited by a car. D represents the track relay, the construction of which is best shown in Fig. 2. It comprises a winding formed of coils *d* on a magnetic core having pole pieces *d'* *d'*. d^2 is a permanent magnet which at its lower end joins the yoke of the core on which the coils *d* *d* are mounted and at its upper end extends in close proximity to the pole pieces *d'* *d'*. A magnetic member d^3 is supported between the pole pieces *d'* *d'* near the pole of the permanent magnet d^2 and is polarized by that magnet. If alternating current flows through the coils *d* *d* the polarity of the pole pieces *d'* *d'* will be reversed with each alternation of the current, so that the member d^3, polarized by the permanent magnet d^2, will be attracted first to one pole piece *d'* and then to the other. The member d^3 is supported on a flexible strip or flat spring d^4, the length of which is adjusted to give the member d^3 a natural period of vibration corresponding to the frequency of the alternating current to which the device is to respond. Contacts d^5 d^5 are placed on each side of the spring d^4 and are engaged alternately by the spring when the member d^3 is in vibration. When current of a frequency other than that on which the device is designed to operate flows through the winding, the vibration of the member d^3 which is produced is not sufficient to cause the spring d^4 to engage the contacts d^5.

As shown in Fig. 1, the spring d^4 is connected through the winding of a relay E to the central point on the secondary of a transformer C'. The contacts d^5 are connected to the terminals of the secondary winding so that as the member d^3 vibrates the lower terminal of the winding E is connected alternately to the terminals of the transformer secondary, but this reversal of connections corresponds to the alternations of the current, so that the relay E is supplied with pulsating direct current. The contacts of relay E control the signal F which is held clear as long as current of the proper frequency is supplied relay D; that is, so long as the block is not occupied. A train entering the block, or broken rail, cuts off the current from transformer C, so that the relay D is deënergized and the vibration of the member d^3 ceases, deënergizing relay E, and causing signal F to go to stop. Power current or leakage current from any source of a frequency

different from that of generator B cannot operate relay D so as to clear the signal.

With the arrangement of Fig. 1 the mechanism of signal F is supplied with alternating current. If it is desired to use direct current mechanism, the arrangement of Fig. 3 may be resorted to, in which the intermediate relay is omitted and the signal F is controlled directly by relay D. The connections of the mechanism in Fig. 3 are the same as those of relay E in Fig. 1, so that a pulsating direct current is supplied to the signal mechanism.

I do not desire to limit myself to the particular construction or connections shown and described, but aim in the appended claims to cover all modifications which are within the scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In a block signal system, a source of alternating current connected to the track rails, a track relay comprising a winding supplied with current from said source through the track rails and a vibrating polarized magnetic member disposed in the magnetic field produced by current in said winding and tuned to a natural period of vibration corresponding to the frequency of the current normally delivered by said source, and a signal controlled by the vibration of said member.

2. In a block signal system, a source of alternating current connected to the track rails, a track relay comprising a winding supplied with current from said source through the track rails and a vibrating polarized magnetic member disposed in the magnetic field produced by current in said winding and tuned to a natural period of vibration corresponding to the frequency of the current normally delivered by said source, contacts actuated by the vibration of said member, and a signal controlled by said contacts.

3. In a block signal system, a source of alternating current connected to the track rails, a track relay comprising a winding supplied with current from said source through the track rails and a vibrating polarized magnetic member disposed in the magnetic field produced by current in said winding and tuned to a natural period of vibration corresponding to the frequency of the current normally delivered by said source, contacts actuated by the vibration of said member, and a circuit including said contacts, signal controlling means, and a source of alternating current of the same frequency as the first-mentioned source, said contacts being connected to rectify the current delivered by said source to said signal controlling means.

4. In a block signal system, a source of alternating current connected to the track rails, a track relay comprising a winding supplied with current from said source through the track rails and a member adapted to be vibrated by an alternating current in said winding and tuned to a natural period of vibration corresponding to the frequency of the current normally delivered by said source, and a signal controlled by the vibration of said member.

In witness whereof, I have hereunto set my hand this 5th day of May, 1909.

ELMER F. BLISS.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.