

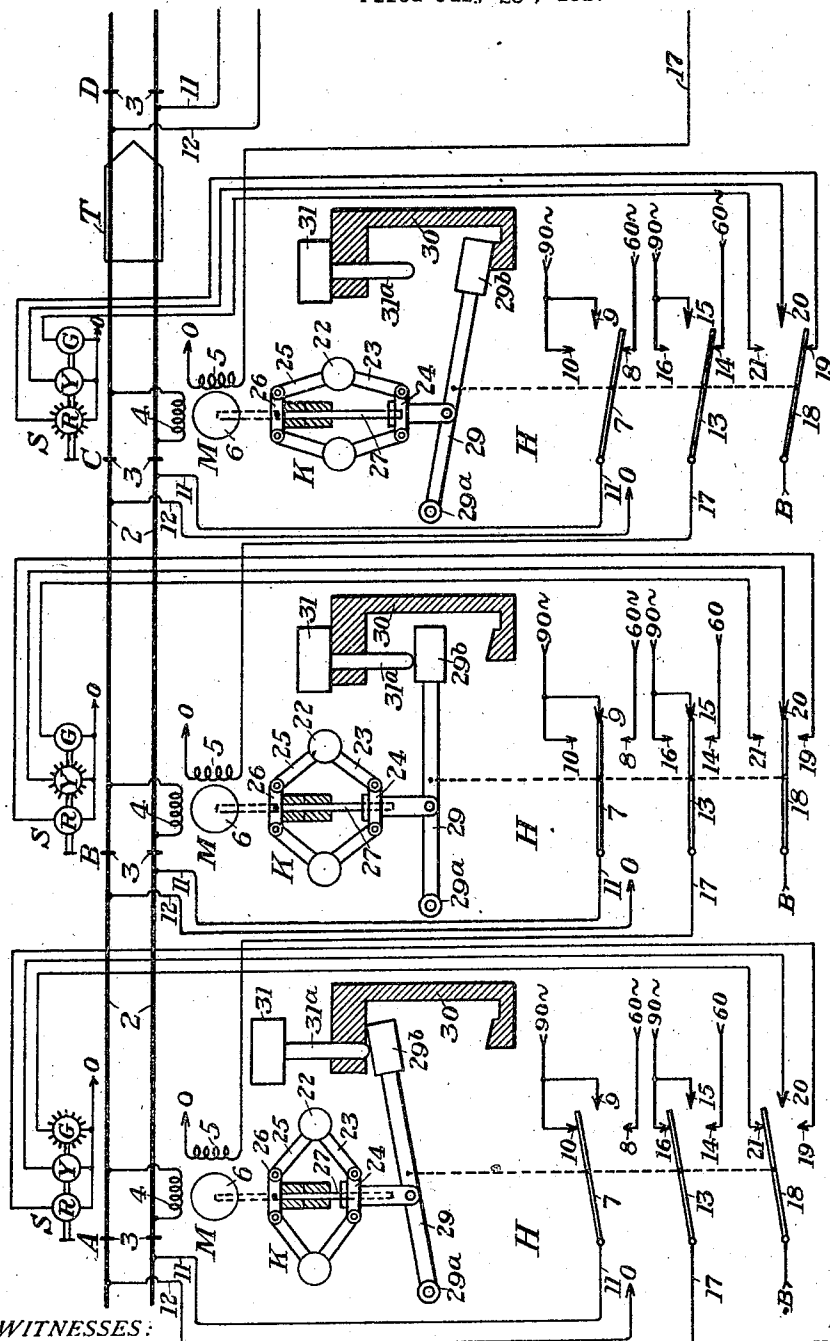
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L. V. LEWIS

RAILWAY SIGNALING

Filed July 25, 1917



WITNESSES:

A. Herman Wagner,
A. R. Brown

INVENTOR.

L. V. Lewis
BY *A. T. Venable*
His ATTORNEY.

UNITED STATES PATENT OFFICE.

LLOYD V. LEWIS, OF EDGEWOOD BOROUGH, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RAILWAY SIGNALING.

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To all whom it may concern:

Be it known that I, LLOYD V. LEWIS, a citizen of the United States, residing at Edgewood Borough, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Railway Signaling, of which the following is a specification.

My invention relates to railway signaling and particularly to signaling involving alternating current track circuits.

I will describe one form of signaling system embodying my invention and will then point out the novel features thereof in claims.

The accompanying drawing is a view showing diagrammatically one form of signaling system embodying my invention.

Referring to the drawing the reference character 2 designates the track rails of a railway which rails are divided by means of insulated joints 3 into a plurality of successive block sections A—B, B—C, C—D, etc. Each track section is provided with a track circuit comprising the track rails themselves, means for supplying alternating signaling current to the rails, and a relay H having a winding receiving energy from the rails. For each track section I provide two sources of alternating current, differing in frequency, one or the other of which sources is connected with the rails of the section according to traffic conditions in advance of the section. Each relay is selectively responsive to the frequency of the current by which it is energized; that is, it responds to one frequency by closing one contact or set of contacts, and to the other frequency by closing another contact or set of contacts. As here shown, these relays are of a centrifugal type, but I do not wish to limit myself to relays of any particular character.

Each relay H comprises an induction motor M having a rotor 6 and two stator windings 4 and 5. The winding 4, which I will term the track winding, is connected directly to the track rails of the section, while the other winding 5, which I will term the line winding, is supplied with alternating current by means which I will explain hereinafter. The induction motor operates a centrifuge K which in turn actuates the contacts of the relay. This cen-

trifuge is of a usual type comprising arms carrying weights 22 which tend to fly outwardly when the centrifuge is rotated. The upper arms 25 are pivotally connected to a yoke 26 which is fixed to a shaft 27 connected with the rotor of motor M. The lower arms 23 are pivotally connected to a yoke 24 which slides freely on the shaft and to which is also connected a lever 29 pivotally mounted at point 29^a and provided on its opposite end with a weight 29^b. When the centrifuge is at rest, lever 29 rests with its weight 29^b against the lower arm of a fixed stop 30 (see relay for section C—D). When the motor M is supplied with current of a certain frequency, which I will herein assume to be 60 cycles, the force exerted on lever 29 by the centrifuge K is sufficient to raise this lever 29 to an intermediate position wherein it engages with a stem 31^a mounted for vertical movement in stop 30 and carrying a weight 31 at its upper end, but at this speed the action on lever 29 is not sufficient to cause the lever to raise this weight (see relay for section B—C). When motor M is supplied with current of a higher frequency, which I will herein assume to be 90 cycles, the force exerted on lever 29 by the centrifuge is sufficient to cause this lever to raise the weight 31, so that the lever then rises until arrested by the upper arm of stop 30 (see relay for section A—B). It will be seen, therefore, that lever 29 occupies any one of three positions, depending on whether the motor M is deenergized or is energized by 60 or 90 cycle current.

Operatively connected with the lever 29 are three contact fingers 7, 13 and 18. When the lever 29 occupies its lowest position, finger 7 engages with a fixed contact 8; when the lever occupies its intermediate position, this finger engages with a fixed contact 9; and when the lever occupies its highest position, finger 7 engages with a fixed contact 10. The other contact fingers co-act with their fixed contacts in the same manner as finger 7.

Two sources of alternating signaling current are provided for each track section, these sources being in the case here shown, 60 cycles and 90 cycles, respectively, corresponding to the two frequencies for which the relays are adjusted. In order to sim-

plify the drawing I have omitted the sources of current and the transmission lines by which these currents are distributed to the several sections, and have illustrated only the parts of the circuits which pass through the apparatus actually shown in the drawing. The wires which are connected with one terminal of a source of current are marked "60 ~" or "90 ~" designating the frequency of such source, while the wires which are connected with the other terminal of the source are marked "O", it being understood that the latter terminals of the two sources are connected together.

The relay for each section controls the frequency of the current which is supplied to the track rails of the section in the rear, and also to the line winding 5 of the relay for such section in the rear. When any relay H is deenergized, that is, when its centrifuge is at rest (see relay for section C—D), 60 cycle current is supplied to the track circuit of the section in the rear, the circuit being from the 60 cycle source through relay contact 8—7, wire 11, one rail of the section in the rear, the track winding 4 of the relay for such section in the rear, the other rail, and wire 12 to the common return wire. At the same time, 60 cycle current is supplied to the line winding of the relay for the section in the rear, the circuit being from the 60 cycle source through relay contact 14—13, wire 17, relay winding 5 to the common return wire. The relay for such section in the rear is then energized by 60 cycle current in both windings, so that contacts 7—9, 13—15, and 18—20 are closed (see relay for section B—C).

When any relay is energized by 60 cycle current, it supplies 90 cycle current to the rails of the section in the rear, and also to the line winding 5 of the relay for such section in the rear. The track circuit for such section in the rear is then from the 90 cycle source through relay contact 9—7, thence as before. The circuit for the line winding 5 is from the 90 cycle source through relay contact 15—13, thence as before.

When any relay is energized by 90 cycle current, it supplies 90 cycle current to the track rails of the section in the rear, and also to the line winding of the relay for such section in the rear, these currents being supplied through relay contacts 10—7, and 16—13.

For each section I provide a signal S which is adapted to indicate "stop," "caution" and "proceed." Each signal is controlled by the relay H for the same section in such manner that the signal indicates "stop" when the relay is de-energized, "caution" when the relay is energized by 60 cycle current, and "proceed" when the relay is energized by 90 cycle current. As here shown, each signal comprises three electric

lamps R, Y and G, indicating when illuminated "stop," "caution" and "proceed" respectively, and these lamps are provided with circuits controlled by contact finger 18 of the corresponding relay. As will be obvious from the drawing, lamp R is illuminated when contact 18—19 is closed; that is, when the relay is de-energized; lamp Y is illuminated when contact 18—20 is closed, that is, when the relay is energized by 60 cycle current; and lamp G is illuminated when contact 18—21 is closed, that is, when the relay is energized by 90 cycle current. In order to simplify the drawing I have omitted the source of current for the lamps of signal S and have shown only the portions of the circuits of these lamps which pass through the apparatus actually illustrated. It is understood that the wire marked "B" is connected with one terminal of a suitable source of current and that the wire marked "O" is connected with the other terminal of the same source. It is further understood that lamps G, Y and R of each signal are provided with colored lenses or colored screens, so that the light emanating from these lamps are differently colored; for example, the light from lamp R may be red, the light from Y may be yellow, and the light from lamp G may be green.

As shown in the drawing, section C—D is occupied by a car or train T, so that relay H for this section is de-energized and the signal S for this section indicates "stop." By virtue of the positions of contacts 7 and 13 of the relay for section C—D, both windings of the relay for section B—C are supplied with 60 cycle current, so that the contacts of this latter relay occupy their intermediate positions. Signal S for section B—C consequently indicates caution, and both windings of the relay for section A—B are supplied with 90 cycle current. The contacts for this latter relay are therefore in their upper positions so that signal S for section A—B indicates proceed. Both windings of the relay for the section in the rear of section A—B are, of course, energized with 90 cycle current, so that the signal (not shown) for such latter section likewise indicates proceed. As the train T passes out of section C—D into the next section in advance, relay H for this section will become energized by 60 cycle current so that signal S for this section will indicate caution. The relay for section B—C will then become energized by 90 cycle current so that the signal for this latter section will change to proceed. It is thought that the operation of the system will be obvious without further explanation.

One important feature of the present invention is that the relay operating mechanism passes consecutively from the "cau-

tion" to the "proceed" position and vice-versa without passing through the "stop" position, so that no special means are necessary to prevent momentary closure of the "stop" contact, and so to prevent blinking of the stop lamp, during such change.

When the relay is used to control a semaphore signal, the contacts may be so adjusted that when the relay is changing from the "caution" to the "proceed" position, or vice-versa, contact 20 will not open until contact 21 has closed, or vice-versa, thus avoiding momentary opening of the holding clear circuit and so avoiding the necessity for a slow-acting intermediate relay or a slow-acting holding magnet in the signal.

Although I have herein shown and described only one form of signaling system embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. A railway signaling system comprising a plurality of track sections, a relay for each section having a track winding receiving energy from the rails of the section and a line winding, each relay responding selectively to alternating currents of two frequencies in its windings, means controlled by the relay of each section for supplying current of one of said frequencies or the other to the rails of the section in the rear, means also controlled by the relay of each section for supplying to the line winding of the relay for the section in the rear alternating current of the same frequency as is supplied to the rails of said section in the rear, and signals controlled by said relays.

2. A railway signaling system comprising a plurality of track sections, a relay for each section having a track winding receiving energy from the rails of the section and a line winding, each relay responding selectively to alternating currents of two frequencies in its windings, means controlled by the relay of each section for supplying current of one of said frequencies to the rails of the section in the rear when the relay is de-energized and for supplying current of the other frequency to said rails when the relay is energized by current of either of said frequencies, means also controlled by the relay of each section for supplying to the line winding of the relay for the section in the rear alternating current of the same frequency as is supplied to the rails of said section in the rear, and signals controlled by said relays.

3. A railway signaling system comprising a plurality of track sections, a relay for

each section comprising a motor having a track winding receiving energy from the rails of the section and a line winding, said motor rotating at different speeds according as its windings are supplied with alternating current of one frequency or another, each relay also comprising a centrifuge operated by said motor and a plurality of contacts closed selectively according as the centrifuge is operated at one speed or the other, means controlled by the relay of each section for supplying alternating current of one of said frequencies or the other to the rails of the section in the rear, means also controlled by the relay of each section for supplying to the line winding of the relay for the section in the rear alternating current of the same frequency as is supplied to the rails of said section in the rear, and signals controlled by said relays.

4. A railway signaling system comprising a plurality of track sections, a relay for each section having a track winding receiving energy from the rails of the section and a line winding, each relay responding selectively to alternating currents of two characteristics in its windings, means controlled by the relay of each section for supplying current of one of said characteristics or the other to the rails of the section in the rear, means also controlled by the relay of each section for supplying to the line winding of the relay for the section in the rear alternating current of the same characteristic as is supplied to the rails of said section in the rear, and signals controlled by said relays.

5. A railway signaling system comprising a plurality of track sections, a relay for each section having a track winding receiving energy from the rails of the section and a line winding, each relay responding selectively to alternating currents of two characteristics in its windings, means controlled by the relay of each section for supplying current of one of said characteristics to the rails of the section in the rear when the relay is de-energized and for supplying current of the other characteristic to said rails when the relay is energized by current of either of said characteristics, means also controlled by the relay of each section for supplying to the line winding of the relay for the section in the rear alternating current of the same characteristic as is supplied to the rails of said section in the rear, and signals controlled by said relays.

In testimony whereof I affix my signature in presence of two witnesses.

LLOYD V. LEWIS.

Witnesses:

A. HERMAN WEGNER,
E. P. CRUM.