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L. F. HOWARD

INDICATION MEANS FOR LIGHT SIGNALS

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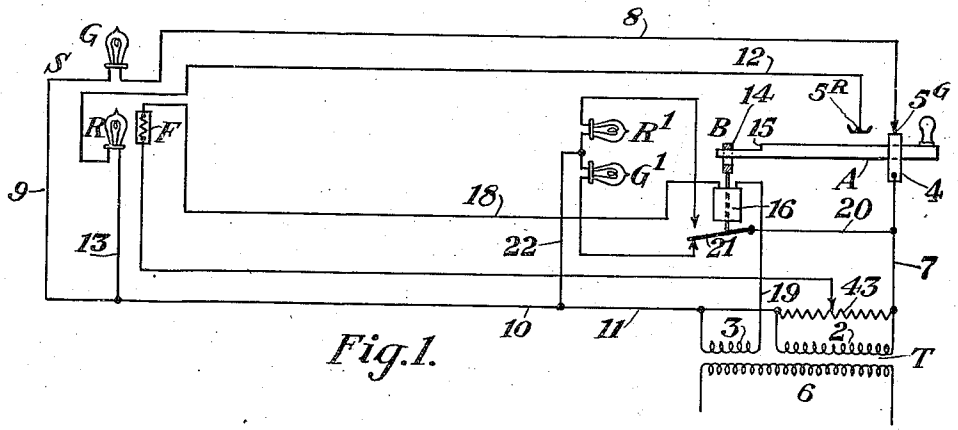


Fig. 1.

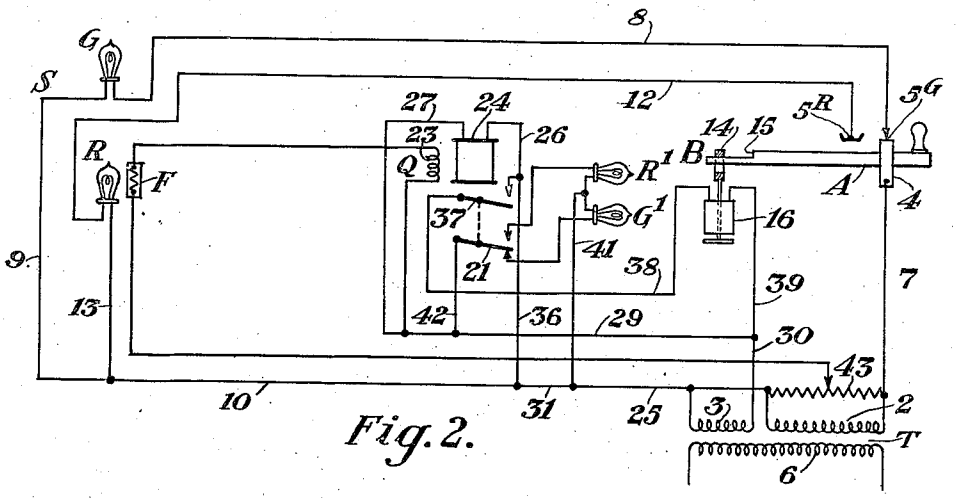


Fig. 2.

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UNITED STATES PATENT OFFICE.

LEMUEL F. HOWARD, OF EDGEWOOD BOROUGH, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

INDICATION MEANS FOR LIGHT SIGNALS.

Original application filed March 2, 1921, Serial No. 449,144. Patent No. 1,429,141, dated September 12, 1922. Divided and this application filed August 11, 1922. Serial No. 581,102.

To all whom it may concern:

Be it known that I, LEMUEL F. HOWARD, 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 Indication Means for Light Signals, of which the following is a specification.

My invention relates to signals of the type comprising lamps, and has for an object the provision of means for indicating illumination of the lamp at a point remote from the lamp.

Apparatus embodying my invention is particularly well adapted for use in connection with railway signals which are controlled by the levers of interlocking machines. In systems of this character the lever is usually provided with a lock which is known as an "indication device." One feature of my invention is the provision of means for controlling this lock in accordance with the light which is actually emitted by one of the lamps in the signal governed by such lever.

The present application is a division of my co-pending application filed on the 2nd day of March, 1921, Serial No. 449144, for indication means for light signals, now Patent No. 1,429,141, Sept. 12, 1922.

I will describe two forms of apparatus embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings, Fig. 1 is a diagrammatic view showing one form of apparatus embodying my invention, the lever lock being controlled directly by a light responsive cell which is exposed to the light from one of the signal lamps. Fig. 2 is a view showing a modification of the apparatus shown in Fig. 1, the lever lock in this instance being controlled by a relay which in turn is governed by the light responsive cell.

Similar reference characters refer to similar parts in each of the views.

Referring first to Fig. 1, the reference character S designates a signal comprising two electric lamps G and R, which lamps when illuminated are adapted to indicate "proceed" and "stop," respectively. These lamps are at times supplied with current from the secondary 2 of a transformer T, and the supply of this current is controlled by a manually operable lever A. The primary 6 of the transformer T is constantly supplied with alternating current from a suitable source which is not shown in the drawing.

The supply of current to the signal lamps G and R is controlled by a contact 4 which is attached to lever A, and which engages with a contact 5^G or with a contact 5^R, according as the lever is in one position or another. As shown in the drawing, the lever A is in the right hand extreme position wherein contact $4—5^G$ is closed. Lamp G is then supplied with current through a circuit which passes from the right hand terminal of transformer secondary 2, through wire 7, contact $4—5^G$, wire 8, lamp G, and wires 9, 10 and 11 to transformer secondary 2. When the lever A is shifted to the left, the stop lamp R becomes illuminated by virtue of a circuit which passes from transformer secondary 2, through wire 7, contact $4—5^R$, wire 12, lamp R and wires 13, 10 and 11 to secondary 2.

The lever A will usually be one of a plurality of similar levers in an interlocking machine, and, as is well understood, in apparatus of this nature the various levers are usually inter-controlled by what is known as "mechanical locking." For this reason it is desirable that a complete movement of the lever A to its extreme left hand position should be prevented until an indication is given at the lever that the stop lamp R has become illuminated. To accomplish this the lever is provided with a lock or indication device B comprising a shoulder 15 on the lever, a dog 14 normally in position to engage with this shoulder, and a magnet 16 arranged when energized to lift the dog 14 out of the path of the shoulder 15. The parts are so proportioned that when the lever is shifted to the left the shoulder 15 engages the dog 14 after contact $4—5^R$ is closed, and that this contact remains closed after the movement of the lever has been completed to the extreme left hand position.

The magnet 16 of the lever lock B is controlled by a light responsive cell F, which is exposed to the light emitted by the stop

lamp R. The cell F has the characteristic that its electrical resistance varies in accordance with changes in the intensity of the light to which it is exposed. A cell having this characteristic may be made, for example, of selenium, stibnite, or copper oxide, or may what is known as a photoelectric cell in which the active material is an alkali metal. The precise nature of this cell and the substance of which it is composed, form no part of my present invention. The only essential feature of construction is that this cell shall be so located as to receive light from the lamp R but not from any other source.

Magnet 16 is controlled by the cell F through the medium of a potentiometer system of connections comprising a resistance 43 connected across the terminals of secondary 2 of transformer T. The light responsive cell F is included in circuit with a transformer secondary 3, and with the magnet 16. One terminal of this circuit is connected with one terminal of secondary 3, whereas the other terminal of the circuit is connected with such a point on resistance 43 that when the cell F is dark, no current flows in magnet 16. When cell F is exposed to light, however, due to the illumination of the stop lamp R, the resistance of the circuit including this cell is lowered so that current of considerable amplitude flows through magnet 16 with the result that this magnet then operates to elevate dog 14 so that the movement of lever A to its left hand extreme position may be completed.

If desired, a visual indicator may be provided at the lever A to show the operator whether the lamp G or the lamp R of signal S is illuminated. This indicator, as here shown, comprises two incandescent lamps G′ and R′, which are supplied with current from the transformer secondary 2, through a contact 21 which is operated by the armature of magnet 16. When signal lamp G is illuminated, the contact 21 is in its lowest position, so that current is supplied to indicator lamp G′ through wires 7 and 20, contact 21, lamp G′ and wires 22 and 11 to transformer secondary 2. When signal lamp R becomes illuminated, the consequent elevation of the armature of magnet 16 raises contact 21 to its highest position wherein the indicator lamp R′ becomes energized through a circuit which will be obvious from the drawing.

Referring now to Fig. 2, the apparatus shown herein is similar to that shown in Fig. 1, except that the magnet 16 of the lever lock B is controlled by a relay Q, which in turn is governed by the light responsive device F.

The relay Q comprises two windings 23 and 24. The winding 24 is constantly connected across transformer secondary 3, the circuit being from this secondary through wires 25, 31, 36 and 26, winding 24, wires 28, 29 and 30 to secondary 3.

Winding 23 of relay Q is controlled by cell F in the same manner as magnet 16 is controlled in Fig. 1. That is to say, this winding is included in series with cell F and transformer secondary 3, the terminals of the circuit being connected with two points on resistance 43 so chosen that when the cell is dark no current flows in winding 23. Relay Q and the circuits associated with its windings are so designed and proportioned that when the cell F is dark, contact 37 is open, but that when the cell F is exposed to light rays from the lamp R this contact 37 is closed. As is well understood, the relay Q may be so designed that the greater part of the energy required for operating this relay is furnished by the winding 24 and that winding 23 need supply only a comparatively small amount of controlling energy. It follows that the light responsive cell F need carry only a comparatively small amount of current, and that this current can be considerably weaker than the current which must be transmitted through the cell F in Fig. 1.

Magnet 16 is controlled by contact 37 of relay Q, the circuit for this magnet being from transformer secondary 3, through wires 25, 31 and 36, contact 37, wire 38, magnet 16 and wires 39 and 30 to secondary 3.

The operation of the apparatus shown in Fig. 2 will be apparent from the foregoing without further explanation. If desired, a visual indicator may be provided at the lever A, and as here shown, this indicator comprises two lamps, G′ and R′. These lamps are controlled by an additional contact 21, operated by relay Q. The circuit for these lamps is from transformer secondary 3, through wires 25, and 41, lamp G′ or R′, contact 21, and wires 42, 29 and 30 to secondary 3. It will be apparent that indicator lamp G′ will be illuminated when signal lamp G is illuminated, and that similarly the indicator lamp R′ will be illuminated when the signal lamp R is illuminated.

Although I have herein shown and described only two forms of apparatus 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. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, a lever for con-

trolling the illumination of said lamp, a lock for governing said lever, a winding for controlling said lock, and a potentiometer circuit network including said cell and said winding.

2. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, a lever for controlling the illumination of said lamp, and means including a potentiometer circuit network controlled by said cell for governing said lever.

3. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, a lever for controlling the illumination of said lamp, a lock for governing said lever, and means including a potentiometer circuit network controlled by said cell for releasing said lock when said lamp is lighted.

4. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, a lever for controlling the illumination of said lamp, a relay comprising two windings, means including a potentiometer circuit network controlled by said cell for supplying current to one of said windings, means for supplying current to the other winding, and means governed by said relay for controlling said lever.

5. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, and means including a potentiometer circuit network controlled by said cell for indicating illumination of said lamp at a distant point.

6. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, a relay comprising two windings, means including a potentiometer circuit network controlled by said cell for supplying current to one of said windings, means for supplying current to the other winding, and means controlled by said relay for indicating illumination of said lamp at a distant point.

7. In combination, a railway signal comprising a lamp, a cell exposed to the light emitted by said lamp and having the characteristic of varying in electrical resistance with variations in the intensity of light to which it is exposed, a winding, a resistance connected across a source of current, a second source of current having one terminal connected with one point in said resistance, a connection from the other terminal of said second source to another point in said resistance and including said cell and said winding, and means controlled by said winding for indicating illumination of said lamp at a distant point.

In testimony whereof I affix my signature.

LEMUEL F. HOWARD.