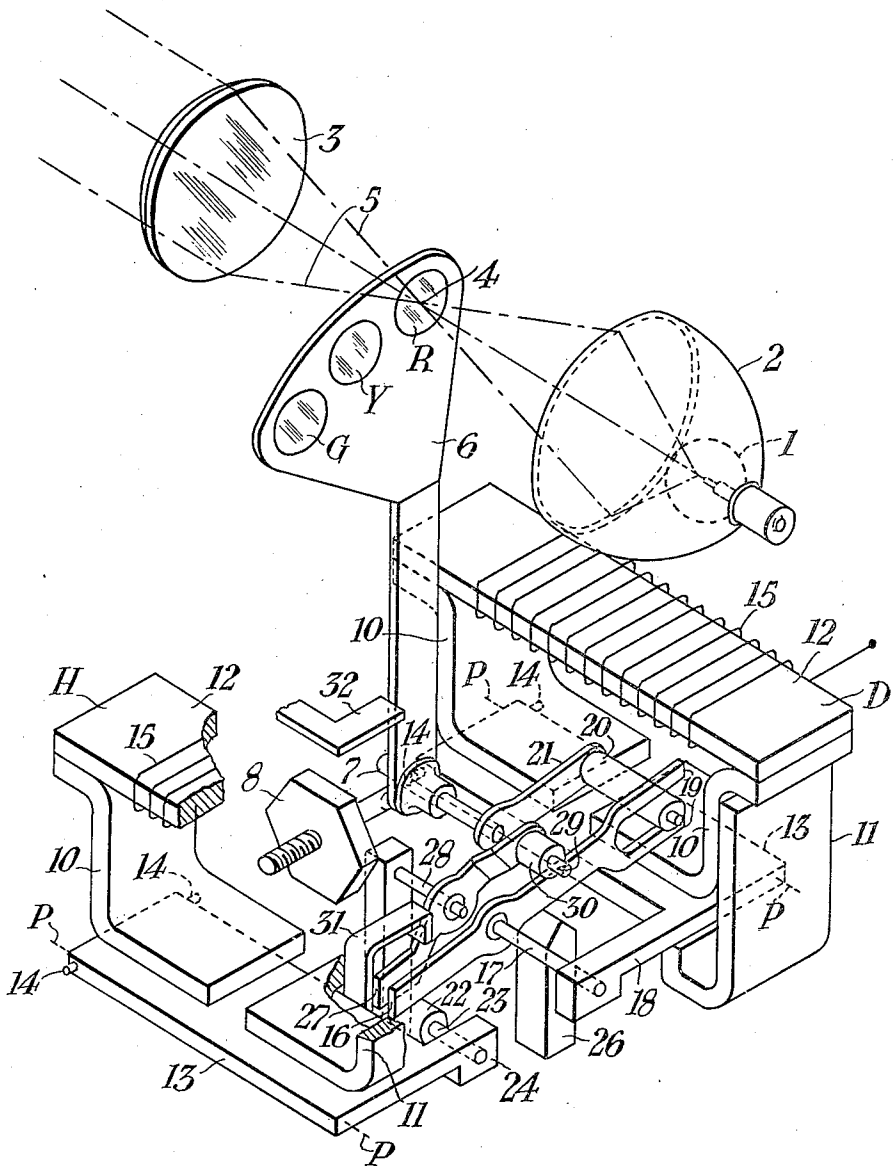
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LIGHT SIGNAL

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LIGHT SIGNAL

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My invention relates to light signals, and particularly to light signals which are capable of selectively projecting a plurality of beams of light of different colors from a single light source.

More particularly, my present invention relates to searchlight signals employing a spectacle arm provided with red, yellow, and green color filters adapted to be selectively interposed in the signal beam to cause the signal to display stop, approach, and clear indications, and has for an object the provision of novel three position operating mechanism for the spectacle arm employing two tractive type electromagnets, and capable of operating the spectacle arm from its approach to its clear position or vice versa without passing through the stop position.

According to my invention, a vane carrying the color filters is biased by a counterweight to one extreme position in which the red filter is disposed in the path of the light beam, and is arranged to be moved from this position to the approach and clear positions by means of a crank provided with a laterally projecting roller. This roller extends between and cooperates with bifurcations formed on one end of a first operating lever. This first operating lever is pivoted intermediate its ends on a first pivot pin carried by a first arm attached to the armature of a first tractive type electromagnet, and overlies at the end opposite to the bifurcations a second roller mounted on a second pivot pin carried by a second arm attached to the armature of a second tractive type electromagnet. A stop is disposed underneath said operating lever between said first pivot pin and said bifurcated end and when said first armature is in its released position cooperates with said operating lever to limit its rotation about said first pivot pin to a position in which said lever acts through said crank to locate said spectacle arm in its approach position. Said second roller also cooperates with the underside of one end of a second lever which is pivoted intermediate its ends on a fixed pivot pin disposed in axial alignment with said first pivot pin when said first armature is in its released position and which second lever is provided at the other end with a laterally projecting pin carrying a third roller which overlies said first operating lever above said stop. A second stop is attached to the armature of said second electromagnet and cooperates with said two levers above said second roller. The parts are so proportioned that if said second armature moves to its attracted position when said first armature is released, said second roller will cause said first operating lever to rotate about said first pivot pin to the position in which it engages said first stop, thereby moving said spectacle arm to its approach position. This rotation will also rotate said second lever along with said first lever to such a position that if said first armature moves to its attracted position while said second armature occupies its attracted position, said first lever will be caused to fulcrum about said third roller to the position in which it engages said second stop. When said first lever is moved to this latter position it acts through said first roller and said crank to move said spectacle arm to its clear position. When both magnets are released, said counterweight moves said spectacle arm to its stop position.

Other objects and characteristic features of my invention will become apparent as the description proceeds.

I shall describe one form of light signal embodying my invention, and shall then point out the novel features thereof in claims.

The accompanying drawing is an isometric view showing one form of light signal embodying my invention.

Referring to the drawing, the signal in the form here shown comprises a suitable optical assembly consisting of an electric lamp 1, a reflector 2, and an objective lens 3 so disposed that the reflector 2 will collect a large percentage of the rays of light emitted by the lamp 1 and will cause them to converge at a focal point 4, and then diverge in order to cover the surface of the objective lens 3 as indicated by the dot and dash lines 5. The various parts of the optical assembly are all of well known construction, and are illustrated in the drawing in diagrammatic form in order to simplify the disclosure.

Associated with the optical assembly is a spectacle arm 6, the upper end of which is provided with three differently colored screens or filters R, Y and G. The spectacle arm is secured at its lower end to a pivoted shaft 7, and is capable of being moved from a stop position in which it engages a fixed stop 32 and in which the filter R is interposed in the path of the light rays adjacent to the focal point 4, to an approach position in which the filter Y is interposed in the path of the light rays adjacent to the focal point 4, and a clear position in which the filter G is interposed in the path of the light rays adjacent to the focal point 4. It will be apparent that when one of the filters is located in the path of the light rays, the light rays will pass through the filter so that only the light rays of the color which are not filtered out can emerge from the signal. Since the filters are differently colored,

it follows that the signal is capable of displaying three different aspects depending upon which one of the color filters is disposed at the focal point 4. In the practical application of a light signal embodying my invention to railway signaling, the spectacle arm is biased by its own weight, and by the weight of a counterweight 8 which is secured to the shaft 7, to the stop position, and the filter R is colored red so that when the spectacle arm occupies its stop position, the projected beam will be red indicating "stop." Furthermore, the filter Y is colored yellow and the filter G is colored green so that when the arm occupies its approach position, the beam will be yellow, indicating "approach," and when the arm occupies its clear position, the geam will be green indicating "clear."

The spectacle arm is arranged to be moved from its stop to its approach and clear positions by means of three position operating mechanism embodying my invention, which mechanism I shall now describe. As here shown, this mechanism comprises two electromagnets H and D which I shall term for convenience home and distant electromagnets. The two electromagnets H and D are of well known construction, and each comprises a pair of magnetizable pole pieces 10 and 11 connected together at one end by a magnetizable backstrap 12, and cooperating at their opposite ends with a tractive type armature 13 pivotally mounted at 14 for swinging movement toward and away from the pole pieces 10 and 11. Each backstrap 12 is provided with an energizing winding 15, and the parts are so proportioned that each armature 13 will be picked up or released according as the associated winding 15 is energized or deenergized.

An operating lever 16 is pivoted intermediate its ends on a pin 17 carried by an arm 18 attached to the free end of the armature 13 of the distant magnet D, and is provided at one end with bifurcations 19 which straddle a laterally projecting roller 20 provided on an operating crank 21 secured to the spectacle arm shaft 7. The operating lever 16 at the end opposite to the bifurcations 19 overlies and cooperates with a second roller 22 mounted on a second pivot pin 23 carried by a second arm 24 attached to the free end of the armature 13 of the home magnet H. A stop 26 is disposed underneath the operating lever 16 between the pivot pin 17 and the bifurcations 19, and cooperates with the operating lever to limit its rotation about the pivot pin 17, when the armature 13 of the home magnet H is picked up and the armature 13 of the distant magnet D is released, to a position in which it acts through said crank to locate said spectacle arm in its approach position. The roller 22 also cooperates with the underside of one end of a second lever 27 which is pivoted intermediate its ends on a fixed pivot pin 28, and which is provided at the other end with a pivot pin 29 carrying a third roller 30 which overlies the operating lever 16 directly above the stop 26. The fixed pivot pin 28 is so disposed that it aligns axially with the pivot pin 17 when the armature 13 of the distant magnet D is in its released position, and it will be seen, therefore, that movement of the armature 13 of the home magnet H with the armature 13 of the distant magnet D in its released position will cause the second lever to rotate in unison with the operating lever 16. A second stop 31 is attached to the armature 13 of the home magnet H and cooperates with the levers 16 and 27 above said second roller 22.

As shown in the drawing, both electromagnets are deenergized, and under these conditions, the spectacle arm 6 is held in its stop position by means of the counterweight 8. With the spectacle arm in this position, the lever 16 is rotated by engagement of the roller 20 on the crank 21 with the upper bifurcation 19 in a counterclockwise direction to a position where it just touches roller 22, and the lever 27 is rotated in the same direction by engagement of roller 30 with lever 16 to the position in which it just clears the roller 22.

With the parts in the positions shown, if magnet H becomes energized and magnet D remains deenergized, as will be the case when it is desired to cause the signal to display its approach indication, the resultant picking up of armature 13 of magnet H will act through arm 24, pivot pin 23 and roller 22 to rotate the levers 16 and 27 in unison in a clockwise direction to the position in which the lever 16 engages stop 26, and this rotation of lever 16, in turn will act through roller 20, crank 21 and shaft 7 to rotate spectacle arm 7 to its approach position. In this position of the spectacle arm filter Y will be disposed in the signal beam, and the signal will therefore display its approach indication.

If now with the parts in these latter positions magnet D becomes energized, as will be the case when it is desired to cause the signal to display its proceed indication, armature 13 of magnet D will pick up and will thus act through arm 18 to move pivot pin 17 upwardly from the position shown to an upper position. When pivot pin 17 moves upwardly, it raises lever 16, and due to the fact that lever 27 is now held stationary by engagement of the left-hand end of this lever with roller 22, the raising of the lever 16 causes it to rotate about the roller 30 as a fulcrum in a clockwise direction to the position in which its left-hand end engages the stop 31. This latter rotation of the lever acts through the upper bifurcation 19, roller 20 and crank 21 to rotate the spectacle arm 6 in the same direction to the position in which the green filter G is disposed in the light beam and hence causes the signal to display its proceed indication.

If the armature 13 of magnet D should become picked up for any reason when the armature 13 of magnet H is released, the lever 16 will again be rotated in a clockwise direction about the roller 30 as a fulcrum, but the rotation under these conditions will only move the spectacle arm to its approach position.

It will be seen, therefore, that with the linkage arranged as just described the signal will display its stop aspect when both magnets are deenergized, its approach aspect when either magnet is energized and the other magnet is deenergized, and clear only when both magnets are energized.

The magnets will ordinarily be controlled over a polarized control circuit in such manner that the winding 15 of magnet H will be supplied with current of the same polarity whenever this circuit is supplied with current of either polarity, while the winding 15 of magnet D will only be supplied with energizing current when this circuit is energized by current of a particular polarity. The means for controlling the magnets forms no part of my present invention and may, for example, be similar to that described and claimed in my prior application, Serial No. 425,263, filed on January 1, 1942, for Light signals.

As shown in the drawing, the pivot pins 14 about which the armatures pivot are in axial

alignment so that the armatures operate parallel to each other. However, the operating mechanism will operate equally as well when the armatures are arranged to rotate about pivots disposed at the locations indicated by the dotted lines P—P.

Although I have herein shown and described only one form of light signal 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 a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of a lever pivotally attached intermediate its ends to one armature and operatively connected with said arm, means attached to the other armature and cooperating with one end of said lever to rotate said lever from a first position to a second position if said other armature picks up when said one armature is released, and means actuated to an operative position by the picking up of said other armature for causing said lever to rotate from its second position to a third position in response to the subsequent picking up of said one armature.

2. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of a lever pivotally attached intermediate its ends to one armature and operatively connected with said arm, means attached to the other armature and cooperating with one end of said lever to rotate said lever from a first position to a second position if said other armature picks up when said one armature is released, and means actuated by said other armature and cooperating with said lever for causing said lever to rotate from its second position to a third position if said one armature picks up when said other armature is picked up.

3. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of a lever pivotally attached intermediate its ends to one armature and operatively connected with said arm, means attached to the other armature and cooperating with one end of said lever to rotate said lever from a first position to a second position if said other armature picks up when said one armature is released, and means operatively connected with said other armature and with said lever for causing said lever to rotate from its first position to its second position or from its second position to a third position according as said other armature is released or picked up when said one armature picks up.

4. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of means biasing said arm to a first position, a lever pivotally attached intermediate its ends to one armature and operatively connected with said arm, means attached to the other armature and cooperating with one end of said lever to rotate said lever from a first position to a second position if said other armature picks up when said one armature is released, and means actuated to an operative position by the picking up of said other armature for causing said lever to rotate from its second position to a third position in response to the subsequent picking up of said one armature, the connection between said lever and said arm being such that said arm will occupy its first position or will be moved to a second or a third position according as said lever occupies its first, second or third position.

5. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of means biasing said arm to a first position, a lever pivotally attached intermediate its ends to one armature and operatively connected with said arm, means attached to the other armature and cooperating with one end of said lever to rotate said lever from a first position to a second position if said other armature picks up when said one armature is released, and means actuated by said other armature and cooperating with said lever for causing said lever to rotate from its second position to a third position if said one armature picks up when said other armature is picked up, the connection between said lever and said arm being such that said arm will occupy its first position or will be moved to a second or a third position according as said lever occupies its first, second or third position.

6. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of means biasing said arm to a first position, a lever pivotally attached intermediate its ends to one armature and operatively connected with said arm, means attached to the other armature and cooperating with one end of said lever to rotate said lever from a first position to a second position if said other armature picks up when said one armature is released, and means operatively connected with said other armature and with said lever for causing said lever to rotate from its first position to its second position or from its second position to a third position according as said other armature is released or picked up when said one armature picks up, the connection between said lever and said arm being so arranged that said arm will occupy its first position or will be moved to a second or a third position according as said lever occupies its first, second or third position.

7. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of means biasing said arm to a first position, a lever pivotally attached intermediate its ends to one armature and operatively connected at one end with the other armature by means which causes said lever to rotate from a first position to a second position about its pivotal axis if said other armature picks up when said one armature is released and operatively connected at the other end with said arm, and means cooperating with said lever for causing said lever to rotate from its second position to a third position if said other armature picks up when said one armature is picked up, the connection between said lever and said arm being so constructed that said arm will occupy its first

position or will be moved to a second or a third position according as said lever occupies its first, second or third position.

8. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of means biasing said arm to a first position, a lever pivotally attached intermediate its ends to one of said armatures and operatively connected at one end with said arm, a roller attached to the other armature and underlying the other end of said lever in such manner that movement of said other armature to its attracted position when said one armature is released will rotate said lever from a first to a second position, and means operated by said roller in response to movement of said other armature to its picked-up position for causing said lever to fulcrum about a point disposed on the opposite side of its pivotal connection to said one armature from said roller when said one armature picks up.

9. In a three position operating mechanism for operating an arm to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the arm of means biasing said arm to a first position, a roller carried by the one armature, a first lever pivotally attached intermediate its ends to the other armature and having one end overlying said roller and the other end provided with spaced bifurcations, a crank operatively connected with said arm and carrying a roller extending between and cooperating with said bifurcations, the parts being so proportioned that movement of said one armature to its attracted position when said other armature occupies its released position will act through said first lever, said roller and said crank to move said arm from its first position to a second position, a second lever pivoted intermediate its end about a fixed pivot in axial alignment with the pivotal axis of said first lever when said other armature occupies its released position and having one end overlying said first roller, and a third roller attached to the free end of said second lever and overlying said first lever between its pivotal axis and said bifurcation, the parts being so proportioned that if said other armature is moved to its attracted position when said one armature occupies its attracted position said first lever will rotate about said third roller as a fulcrum and will act through said second roller and said crank to move said arm from its second position to a third position.

10. In a three position operating mechanism for moving a member to different positions in accordance with the positions of the armatures of two electromagnets, the combination with the armatures and the member of a first arm attached to the one armature, a first lever pivoted intermediate its ends on a first pivot pin attached to said first arm and operatively connected with said member, a second arm attached to the other armature and carrying a first roller underlying one end of said first lever, a second lever pivotally mounted intermediate its ends on a fixed pivot which aligns axially with said first pivot pin when said one armature is released, said second lever having one end overlying said first roller and provided at the other end with a second roller which overlies said first lever on the side of said first pivot pin opposite to said first roller, the parts being so proportioned that movement of either armature to its attracted position when the other armature is released will rotate said lever from a first to a second position and that movement of said one armature to its attracted position when said other armature occupies its attracted position will move said first lever from its second position to a third position, and stops for preventing said first lever from moving past its second and third positions.

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