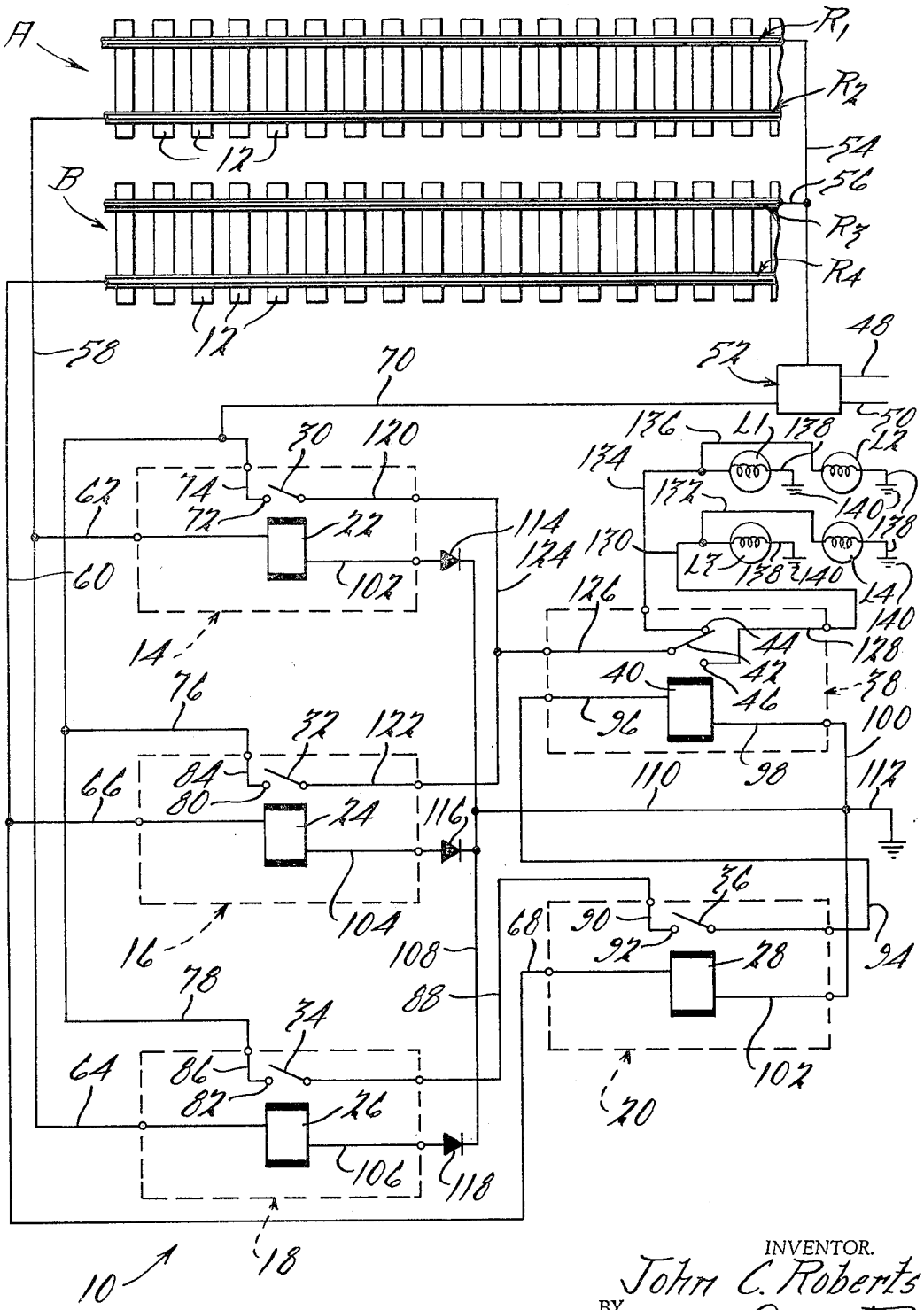
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SIGNALING DEVICE

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SIGNALING DEVICE

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ABSTRACT OF THE DISCLOSURE

A signaling device for indicating the presence of a single train traveling along one of a plurality of railroad tracks and, alternatively, indicating the presence of a plurality of trains traveling one along each of the tracks; the device comprising first and second indicating means, a source of electrical power for energizing the indicating means, first switch means normally disposed in a first position communicable with the first indicating means and actuable in response to an electrical signal to move to a second position communicable with the second indicating means, second switch means actuable in response to the presence of a train on any one of the tracks to a closed position communicating the source of electrical power with the first switch means, and third switch means actuable in response to the presence of a plurality of trains on the tracks to produce an electrical signal for actuating the first switch means from the first position to the second position.

BACKGROUND OF THE INVENTION

The dangers attendant the intersection of highways, streets and the like with railroad roadways comprising two or more railroad tracks are almost universally known. In particular, such dangers have resulted from pedestrians and automotive, as well as other type vehicle operators, prematurely crossing the roadways after a train has crossed the intersection, with such pedestrians and vehicle operators being unaware of the presence of another train traveling along another of the railroad tracks of the roadway.

The present invention is directed toward a new and improved signaling device which is adapted to provide one type of signal, either visual or audible, indicating the presence of a single train traveling along one of a plurality of tracks, and provide another type of signal at such time as two or more trains are traveling along the tracks of the roadway, whereby to provide ample warning for motorists and pedestrians of the presence of either a single or multiple trains crossing the intersection. More particularly, the signaling device of the present invention comprises first and second indicating means which may be in the form of indicating lights, bells or like devices. In the event a single train is traversing one of a plurality of tracks, the first indicating means will be energized, whereby to provide a warning of the presence of such train. In the event a plurality of trains are traversing two or more tracks at an intersection, the second indicating means will be energized so that motorists or pedestrians will have warning that even though one of the trains has passed through the intersections, one or more additional trains are crossing or are about to cross the intersection so that such persons will not prematurely cross the intersection.

The signaling device of the present invention is of an extremely simple design and therefore is intended to be economically manufactured and easily installed. Moreover, the present invention is constructed of readily available component parts which may be in the form of conventional electro-mechanical relays, or alternatively, comprise well known electronic components such as vacuum tubes, transistors and the like, thereby providing for universality of construction and application.

SUMMARY OF THE INVENTION

This invention relates generally to means for indicating the presence of a train on a railroad track and, more particularly, to a new and improved signaling device for indicating the presence of a single train on one of a plurality of tracks and the presence of a plurality of trains on each of the tracks.

It is accordingly a general object of the present invention to provide a new and improved signaling device for indicating the presence of a train on a railroad track.

It is a more particular object of the present invention to provide a new and improved signaling device of the above character which is adapted to energize a first indicating means when a single train is on one of a plurality of tracks, or alternatively, energize a second indicating means when a train is on each of the plurality of tracks.

It is another object of the present invention to provide a new and improved signaling device of the above character which is of an extremely simple design, easy to assemble and economical to commercially manufacture.

It is a further object of the present invention to provide a signaling device of the above type which may be constructed of conventional mechanical components such as relays and the like, or alternatively, of electronic components such as vacuum tubes, transistors and the like.

Other objects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The figure illustrates a schematic representation of the signaling device of the present invention as shown in operative association with a pair of conventional railroad tracks.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referrng now in detail to the drawing, a signaling device **10**, in accordance with a preferred embodiment of the present invention, is shown in operative association with a pair of conventional railroad tracks A and B comprising rails R_1, R_2 and R_3, R_4 respectively, which are mounted in the usual manner on suitable cross ties, representatively designated by the numeral **12**. The signaling device **10** is adapted to selectively energize suitable indicating means, herein illustrated as a pair of signal lights **L1**, **L2** and **L3**, **L4** at such time as one or more trains are traveling along the tracks A and/or B, whereby to warn pedestrians, motorists and the like of the presence of such trains, as will hereinafter be described in detail.

The signaling device **10** is shown as comprising a plurality of electro-mechanical relays **14**, **16**, **18** and **20** which comprise suitable relay coils **22**, **24**, **26** and **28**, respectively. The relay coils **22**, **24**, **26** and **28** are adapted to actuate associated armatures **30**, **32**, **34** and **36**, respectively, upon proper energisation and deenergization thereof, whereby the armatures **30**, **32**, **34** and **36** are selectively biased between their respective opened and closed positions, as will be described. The signaling device **10**

also comprises a combination relay-switch mechanism, generally designated **38**, comprising a relay coil **40** adapted to selectively actuate an armature or switch element **42** between a pair of termianls **44** and **46**.

Electrical power is adapted to be supplied to the signaling device **10** from a suitable source of AC current by means of a pair of suitable conductors **48** and **50** which are communicable with a transformer-rectifier, generally designated **52**, which converts the AC current transmitted thereto to DC current. The transformer-rectifier may be of any suitable conventional construction of the type well known in the art and hence no further description thereof is necessary.

It will be seen that the signaling device **10** is connected to each of the rails R_1, R_2 and R_3, R_4 of the tracks A and B. More particularly, the rails R_1 and R_3 are connected through suitable conductors **54** and **56** with the output section of the transformer-rectifier **52**, while the rails R_2 and R_4 are connected through conductors **58** and **60** with the signaling device **10** in a manner hereafter to be described. It will be noted that when a train traverses the tracks A or B, the rails R_1, R_2 and R_3, R_4 thereof are connected in an electrical sense by virtue of the fact that the trains complete an electric circuit between the rails R_1, R_2 and R_3, R_4.

As shown in the drawing, the conductor **58** is connected to the relays **14** and **18** by means of conductors **62** and **64** which are communicable with the relay coils **22** and **26**, respectively. Similarly, the conductor **60** is connected to the relays **16** and **20** through conductors **66** and **68** which are communicable with the relay coils **24** and **28**, respectively. The transformer-rectifier **52** is connected to the relay **14** through a conductor **70** which is in turn connected to a terminal **72** associated with the armature **30** by means of a conductor **74**. The conductor **70** is also connected to the relays **16** and **18** through conductors **76** and **78**, respectively, which conductors **76**, **78** are connected to terminals **80** and **82** associated with the armatures **32** and **34** through conductors **84** and **86**, respectively. The armature **34** of the relay **18** is connected through a conductor **88** with another conductor **90** and terminal **92** associated with the armature **36** of the relay **20**, whereby when the armature **34** is in its closed position, a circuit is completed between the terminals **82** and **92** of the relays **18** and **20**. The armature **36** of a relay **20** is connected through a conductor **94** to a conductor **96** of the relay-switch **38** which is in turn connected with the relay coil **40** thereof. The relay coils **28** and **40** of the relay **20** and relay-switch **38** are connected through conductors **98**, **100** and **102**.

It will be seen that the relay coils **22**, **24**, **26** are connected through conductors **102**, **104** and **106**, respectively, with a common conductor **108** which is in turn connected through a conductor **110** to the conductor **100** and a suitable ground, as illustrated at **112** in the drawing. Interposed between the relays **14**, **16** and **18** and the common conductor **108** is a plurality of diodes **114**, **116** and **118** which are adapted to function in a conventional manner in controlling the flow of current between the relay coils **22**, **24**, **26** and the conductors **108**, **110** and the ground **112**. The armatures **30** and **32** of the relays **14** and **16** are connected through conductors **120** and **122** to a common conductor **124** which is in turn connected through a conductor **126** with the armature **42** of the relay-switch mechanism **38**, and the terminal **46** of said mechanism **38** is connected through a conductor **128** and conductors **130** and **132** to the indicating lights L3 and L4. Similarly, the terminal **44** of the switch **38** is connected through conductors **134** and **136** to the indicating lights L1 and L2. It will be seen that the indicating lights L1, L2, L3 and L4 are connected through suitable conductors, generally designated **138**, to suitable grounds, generally designated by the numeral **140**.

In order to facilitate a clear understanding of the function of the various operational parts of the signaling device **10** of the present invention, a brief description of a typical operational cycle thereof will now be given.

It will be appreciated that the following train traffic conditions may exist on the railroad tracks A and B: that no trains are traveling along either of the tracks A or B; that a train is traveling along track A only; that a train is traveling along track B only, and that two trains are traveling along tracks A and B simultaneously. In describing the operation of the signaling device **10** of the present invention under the above described train traffic conditions, the various armatures **30**, **32**, **34** and **36** should be considered to be normally disposed in the open positions shown in the drawing. Likewise, the armature **42** of the relay-switch **38** should be considered to be normally in contact with the terminal **44**.

Assuming the initial conditions that there are no trains traveling along either of the tracks A or B, the circuit between conductors **54** and **58** will be opened due to the fact that no train is passing along track A, and similarly, the circuit between the conductors **56** and **60** will be opened since no train is passing along track B. Accordingly, the relay coils **22**, **24**, **26** and **28** will be deenergized since no electric current can be communicated thereto, with the result that the armatures **30**, **32**, **34** and **36** are disposed in their respective open positions shown in the drawing. With the armatures **30**, **32**, **34** and **36** thus opened, electric current cannot be communicated from the transformer-rectifier **52** to the indicating lights L1–L4 with the result that said lights will not be illuminated during such time as no trains are traveling along the tracks A and B.

In the event a train is traveling along track A, such train will complete a circuit between the conductors **54** and **58**, whereby electric current will be communicated from the transformer-rectifier **52** to the relay coils **22** and **26** of the relays **14** and **18**, thereby causing the armatures **30** and **34** to be biased to a closed position. When the armatures **30**, **34** are thus closed, electric current will flow from the transformer-rectifier **52** through the conductors **70** and **74**, the terminal **72** and armature **30** to the conductor **120** in the relay **14**. From the conductor **120**, current will be communicated through the conductors **124** and **126**, through the armature **42** and terminal **44** to the conductors **134** and **136**, resulting in energization or illumination of the indicating lights L1 and L2. Although the armature **34** is biased to its closed position due to energization of the relay coil **26**, the armature **36** will remain in its normally open position since the coil **28** is not energized. After the train has passed the circuit between the conductors **54** and **58** will be opened, thereby causing the coils **22** and **26** to be deenergized at which time the indicating lights will be deenergized, as will be apparent.

Assuming the condition that a train is traveling along the track B, the electric circuit between the conductors **56** and **60** will be completed, resulting in current being communicated from the conductor **60** to the conductors **66** and **68** and hence to the relay coils **24** and **28** of the relays **16** and **20**. When the coils **24** and **28** are thus energized, the armatures **32** and **36** of the relays **16**, **20** will be biased to their respective closed positions, i.e., in contact with the terminals **80** and **92**. When the armature **32** is thus closed, electric current will be communicated from the transformer-rectifier **52** through the conductors **70**, **76** and **84** and the armature **32** to the conductors **122**, from where the current will flow through the conductors **124** and **126**, through the armature **42** and conductors **134** and **136** to the indicating lights L1 and L2, resulting in energization of said lights. Although the armature **36** is biased to its closed position upon energization of the relay coil **28**, electric current will not be communicated therethrough due to the fact that the armature **34** is disposed in its normally open position when there is no train traveling along track A. It will be noted, of course, that the armatures **30** and **42** will remain in the positions illustrated in the drawing when a train is on

track B. When the train has passed, the lights L1, L2 will be deenergized due to the opening of the circuit between the conductors **56** and **60**.

It will thus be seen that whenever a train is traveling along either track A or track B, the indicating lights L1 and L2 will be illuminated, thus indicating the presence of a train on either of these tracks.

At such time as a pair of trains are traveling along tracks A and B simultaneously, electric circuits between the conductors **54** and **58** will be completed due to the train on track A, while the electric circuit between conductors **56** and **60** will be completed due to the train on track B. As above described, when the circuit between the conductors **54** and **58** is completed, electric current will be communicated from the transformer-rectifier **52** to the relay coils **22** and **26**, resulting in actuation of the armatures **30** and **34** of the relays **14** and **18**, whereby said armatures **30, 34** will be biased to their respective closed positions. Similarly, completion of the circuit between the conductors **56** and **60** results in electrical power being communicated from the transformer-rectifier **52** to the relay coils **24** and **28** of the relays **16** and **20**, whereby the armatures **32** and **36** will be baised to their respective closed positions. Normally, when the armatures **30** and **32** are closed, electric current will be communicated from the conductors **70, 74** and **120**, to the conductor **124** in the relay **14**, and from the conductors **70, 76, 84** and **122** to the conductor **124** in the relay **16**. This current would then be communicated from the conductor **124** to the conductor **126** and then to the armature **42** which is in its normal position in contact with the terminal **44**. However, it will be seen that the relays **18** and **20** function as an and-gate and thus when both of these relays are actuated, i.e., the armatures **34, 36** thereof are closed, electric current will be communicated from the conductor **70** to the conductors **78** and **86**, through the armature **34** of the relay **18** and to the conductor **88**. From the conductor **88**, this current is transferred through the conductor **90**, terminal **92** and armature **36** of the relay **20**, and finally through the conductors **94** and **96** to the relay coil **40** in the relay-switch **38**, resulting in energization of the relay coil **40**. It will be seen that when the relay coil **40** is thus energized, the armature **42** will be biased from its normal position engaged with terminal **44** to a position in contact with the terminal **46**, whereby to complete an electrical circuit between the conductor **126** and the conductor **128** which is connected to the conductors **130** and **132** associated with the indicating lights L3 and L4. By virtue of the fact that the relays **14** and **16** have been actuated, as previously described, electric current will therefore be communicated from the transformer-rectifier **52** through the relays **14, 16** and relay-switch **38** to the lights L3 and L4, resulting in illumination of the same. Therefore, it will be seen that when a train is on each of the tracks A and B, the indicating lights L3 and L4 will be energized.

At such time as the train on one of the tracks A or B travels a predetermined distance from the positions of the tracks A, B with which the signaling device **10** is operatively associated, the electric circuit between the rails of said vacated track will be opened and the indicating lights L3 and L4 will be deenergized and simultaneously, the lights L1 and L2 will be energized. For example, in the event the train on track A moves away from the location of the signaling device **10**, the electric circuit between conductors **54** and **58** will be opened, resulting in deenergization of the relay coils **22** and **26**. Upon deenergization of the relay coil **26**, the armature **34** of relay **18** will be opened, thereby opening the circuit between the transformer-rectifier **52** and the relay **20**, with the result that the relay coil **40** will be deenergized, causing the armature **42** to be biased to its normal position in contact with the terminal **44**. When this occurs, the lights L3 and L4 will be deenergized and electric current will be communicated through the relay **16** to the conductors **124, 126** and armature **42** to the conductors **134** and **136**, resulting in illumination of the indicating lights L1 and L2.

It will be seen from the foregoing that the signaling device **10** of the present invention provides a novel means for indicating the presence of a train on either of a pair of associated railroad tracks, and for providing a different type of indicating signal when a train is on both of the tracks, thereby giving a motorist or pedestrian ample warning of the presence of the exact traffic conditions on the tracks and prevent him from prematurely crossing the tracks in the presence of an approaching train.

Although the construction hereinabove described is considered to be a preferred method of carrying out the principles of the present invention, it will be noted that the various relays **14, 16, 18** and **20**, as well as the relay-switch **38**, may be replaced by the appropriate electronic equivalents in the form of vacuum tubes, transistors and the like. For example, the relays **18** and **20** function as an and-gate and therefore may be replaced by a simple transistor circuit of the type well known in the art, and the relays **14** and **16** essentially function as an or-gate and likewise may be replaced by a transistor or vacuum tube circuit of the type well known in the art. Accordingly, although the signaling device **10** of the present invention has been illustrated and described herein as incorporating the various electro-mechanical relays **14–20** and relay-switch **38**, the scope of the present invention is not intended to be limited to this specific construction. It will also be noted that although the indicating means described herein is in the form of the plurality of indicating lights L1–L4, it will be readily apparent that virtually any other type of indicating means, either audible or visual, may be used. For example, a system of audible signals of different degrees of loudness or frequency may be readily used to indicate the presence of a train on either of the tracks A or B and the presence of trains on each of said tracks.

It will be appreciated from the foregoing description of the present invention that the signaling device **10** is of an extremely simple design and therefore may be easily assembled and economically manufactured. It may be noted that the signaling device **10** is not intended to be limited in use with only a pair of associated railroad tracks, but instead may find ready application in use where a larger number of tracks are located close to one another, whereby to provide a visual or audible indication of the number and location of trains on each of said tracks.

While it will be apparent that the preferred embodiment illustrated herein is well calculated to fulfill the objects above stated, it will be appreciated that the present invention is susceptible to modification, variation and change without departing from the scope of the invention.

I claim:

1. In a signaling device for indicating the presence of a train on either one or both of a pair of railroad tracks each comprising a pair of rails, the improvement comprising,

first and second indicating means,

a source of electrical energy for energizing said indicating means,

first switch means normally disposed in a first position and movable to a second position in response to an electrical signal,

first circuit means connecting said first switch means when in said first position with said first indicating means and second circuit means connecting said first switch means when in said second position with said second indicating means,

second switch means normally disposed in a first position and movable to a second position upon completion of a circuit between said energy source and said second switch means,

third circuit means including the rails of one of the tracks for communicating said energy source with said second switch means and fourth circuit means

connecting said second switch means when in said second position with said first switch means,

third switch means normally disposed in a first position and movable to a second position upon completion of a circuit between said energy source and said third switch means,

fifth circuit means including the rails of the other of the tracks for communicating said energy source with said third switch means and sixth circuit means connecting said third switch means when in said second position with said first switch means, whereby

said first indicating means is energized when a train is present on either one of said railroad tracks and said second indicating means is energized when a train is present on each of said tracks.

2. A signaling device as set forth in claim **1** wherein said third switch means comprises an and-gate.

3. A signaling device as set forth in claim **1** wherein said second switch means comprises an or-gate.

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