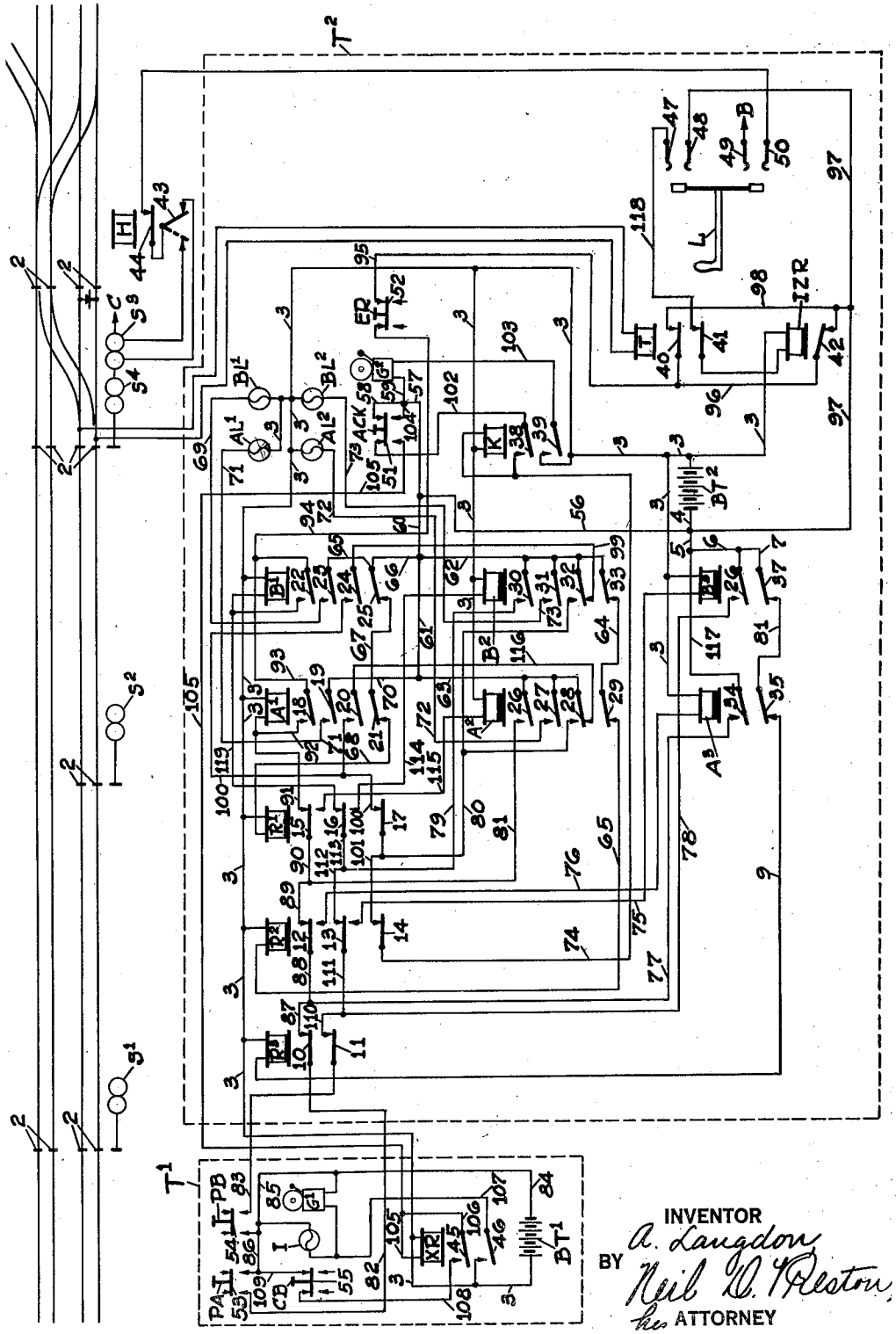
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TRAIN DESCRIBING SYSTEM

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TRAIN-DESCRIBING SYSTEM

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This invention relates to apparatus for indicating at a particular point on a railway system how many trains are approaching in an approach section and in what order trains of various classes are approaching, which for convenience may be called a train describer.

In railroading, although the interlocking man of a particular interlocking plant has a general idea of what trains will be coming into the plant and at what time they will arrive, it is quite common for trains to pass each other just before they enter the interlocking plant, and for this reason the interlocking operator should be specifically informed as to which train is next entering his interlocking territory. Similarly, in railway passenger stations of large size it is important that the train caller be informed of what train is approaching, so that he may call the approach and departure of such train.

In view of the foregoing and other important considerations, it is proposed to provide a large number of indicators arranged in series of vertical rows, in which the location of the indicator in a row indicates the order of the train, and the particular row itself indicates the class of the train, to provide suitable means controlled from a distant tower, over a comparatively few line wires, suitable for controlling these indicators, to provide means associated with said indicators for transferring an indication from one series of indicators to the next proceeding series of indicators, in the event that the indication of the proceeding series is cancelled because the train which it represented has already entered the interlocking yard. Other characteristic features of the present invenion reside in the provision of audible signalling means at the interlocking tower sounded each time that a train enters the approach zone in response to manual manifestation of such entrance of the train by an operator at said distant tower, an audible signal means at said distant tower sounded each time that the interlocking operator in said distant tower, together with means for discontinuing such audible signal by manual acknowledgment manifesting that the operator has observed a change in the signal indication. Another characteristic feature of the present invention resides in the provision of automatic means for cancelling a particular indication and for transferring the indications in each of the successive indicating banks to the next proceeding indicating bank.

Other objects, purposes and characteristic features of the invention will in part be apparent from the accompanying drawing and will in part be more fully described in the specification hereinafter.

In describing the invention in detail reference will be made to the single accompanying drawing illustrating an embodiment of the invention including signals, various devices, and the circuit arrangement in which they are connected.

Referring to the drawing, the invention has been shown applied to the east bound track of a double track railroad entering an interlocking plant. The entrance to the interlocking plant is defined by the location of the main signal S^3 and the diverging route signal S^4, the next signal in the rear being designated S^2 and the second signal in the rear being designated S^1. This railway track system has been shown divided into track sections by insulating joints 2.

The interlocking plant shown to the right of the signals S^3 and S^4 is preferably controlled from a suitable interlocking tower, which tower has been conventionally illustrated by the dotted rectangle T^2.

In the interlocking tower shown, a large number of vertically arranged banks of indicators are provided, of which for convenience only two banks have been shown, designated A and B respectively, and each of these banks preferably contain sufficient indicators to indicate all of the approaching trains in the approach section between the signal S^1 and the signal S^3, which in practice may require as many as 6 or 7 indicators, of which only the indicators AL^1 and AL^2 for the bank A, and indicators BL^1 and BL^2 of the bank B have been conventionally shown. Although these indicators may be of any suitable construction, lamps have for convenience been illus-

trated. The interlocking tower apparatus also includes a group of class and order relays A^1, A^2, A^3, B^1, B^2, B^3, in which the letter of the reference character designates the class of a train that a given relay represents, and the exponent of this reference character designates the order in which such train is approaching with respect to other trains. This same theory of designation has also been carried into the reference characters of the lamps. This interlocking tower apparatus also includes routing relays R^1, R^2, R^3, a lever L, a track relay T, a signal repeating relay IZR, a bell G^2, the emergency release push button ER, the acknowledging push button ACK, the audible indication stick relay K, and the source of energy, battery BT^2.

Referring now to the extreme left hand part of the drawing illustrating the tower T^1, this tower includes a push button PA, push button PB, cancelling push button CB, an audible signal G^1, a visual signal I, a stick relay XR, and the source of energy, battery BT^1. It is believed that the system in question is most readily understood by considering the operation of the system.

Operation

Normal conditions

With no trains in the approach section under the supervision of this train describing indication system, the condition of the circuits and control apparatus is virtually as shown in the accompanying drawing. The routing relays R^1, R^2 and R^3 must be energized so that the control wires from the tower T^1 shall be routed to the class relays of the first order. These routing relays are normally energized and their circuits will now be considered.

Circuit for R^1 begins with positive battery at BT^2, through wires 4, 56, 60, 66, back contact 25, wire 67, back contact 21, wire 68, through relay R^1 to the common wire 3, back to negative of battery BT^2.

Circuit for R^2 begins with positive battery at BT^2, through wires 4, 56, 60, 62, back contact 33, wire 64, back contact 29, wire 65, through relay R^2 to the common wire 3, back to negative battery of BT^2.

Circuit for R^3 begins with positive battery at BT^2, through wires 4, 5, 6, 7, back contact 37, wire 8, back contact 35, wire 9, through relay R^3 to the common wire 3 back to negative battery BT^2.

It will be noted here that the common negative wire extends from the battery BT^1 to battery BT^2, hence circuits will be traced from either positive battery BT^1 or BT^2 through to the common wire only.

The track relay T is energized by its own track battery and is really a part of the standard signal system.

First train in order—a Class "A" train

The operator at the tower T^1 notes the class of the train just as it accepts the signal S^1 and depresses the push button corresponding to that class. As the indication system is so designed that it will indicate as many trains as the supervised approach section may contain at any one time, the operator has to register the class only, which in this case is class "A", which he registers on push button PA. Pressure on push button PA closes contact 53, so that positive current flows from battery BT^1 through wires 84, 85, 86, contact 53, wire 82, front contact 10, wires 87, 88, front contact 12, wires 89, 90, front contact 15, wire 91, through relay A^1 to common wire 3, thus picking up the relay A^1. With relay A^1 in its attracted position a stick circuit to connect positive current to said relay A^1 is completed as follows:—from battery BT^2 through wires 4 and 97, back contact 42, wires 96, and 95, contact 52, wire 94, wire 93, front contact 18, wire 92, through relay A^1 to common wire 3. With relay A^1 energized, there is a circuit made through front contact 19, which connects positive current to the lamp AL^1 as follows:—from battery BT^2 through wires 4, 56, 60, 61 and 70, front contact 19, wire 71, through lamp AL^1 to common wire 3.

With relay A^1 energized there is also a circuit made through front contact 20, which allows positive current to flow to the relay K as follows:—from battery BT^2, through wires 4, 56, 60, 61, 63, back contact 28, wire 116, front contact 20, wire 100, front contact 17, wire 101, front contact 14, wire 74, through relay K to common wire 3, thus energizing relay K. With relay K in its attracted position it closes its stick circuit through front contact 38 by obtaining positive current from battery BT^2 through wires 4, 56, 57, 58, contact 51, wire 102, front contact 38, through relay K to common wire 3.

The front contact 39 of relay K thus closes the following circuit for bell G^2:—from battery BT^2 through wires 4, 56, 57, 59, bell G^2, wire 103, front contact 39, to the common wire 3, thus causing bell G^2 to ring and calling the attention of the operator of interlocking tower T^2 to the indication given by lamp AL^1.

The operator at tower T^2 now acknowledges the indication by depressing push buttons ACK, which breaks the stick circuit of relay K by opening normally closed contacts 51. Depression of this push button ACK also closes the normally open contacts 51, thus energizing the relay XR in tower T^1 through the following circuit:—from battery BT^2 through wires 4, 56, 57, 104, normally open contact 51, wire 105, through relay XR to the common wire 3.

When the stick circuit of the relay K breaks, the relay K is de-energized, opening

the circuit of bell G^2 which ceases to ring. The momentary energization of relay XR picks it up, thus closing its stick circuit as follows:—from the battery BT^1 through the wires 84, 85, 86 and 109, normally closed contact 55, wire 108, front contact 45, wires 106, 105, through relay XR to the common wire 3. This stick circuit holds the relay XR picked up thus causing the flow of current to the bell G^1 from the battery BT^1, through the wires 84, the bell G^1, wire 107, front contact 46 to the common 3, thus ringing the bell and lighting the lamp in multiple therewith through the wires 84, 85, the lamp I, wire 107, front contact 46 to the common wire 3. Hence, as soon as the operator in tower T^1 recognizes that the operator in tower T^2 has acknowledged the indication given by indicator AL^1, he depresses push button CB, which opens the stick circuit of the relay XR, drops the contacts 45 and 46, and causes the indications of bell G^1 and lamp I to cease.

The energization of relay A^1 by the depression of push button PA as heretofore explained, also caused back contact 21 to open the energizing circuit of the relay R^1. This causes the back contacts of relay R^1 to route the control wires to the class A^2 and B^2, so that as the first train in order accepts the signal S^2, or even before then, a second train in order which is accepting the signal S^1 may be indicated at the tower T^2 by manual operation of one of the push buttons PA or PB at the tower T^1 depending upon the class of the next train as presently pointed out.

Second train in order—a Class "B" train

When the operator notes that the second train in order is of the class "B", he immediately depresses the push button PB, which completes the circuit for the relay B^2 as follows:—from the battery BT^1 through the wires 84 and 85, normally open contact 54, wire 83, front contact 11, wires 110, and 111, front contact 13, wire 112 and 113, back contact 16, wire 14, through the relay B^2 to the common wire 3. This causes the relay B^2 to be energized through its stick circuit, as soon as it picks up, the stick circuit comprising:—starting from the battery BT^2, through the wires 4, 56, 60, and 62, front contact 30, wires 79, 113, back contact 16, wire 114, through the relay B^2 to the common wire 3. With the relay B^2 held up through its stick circuit, the lamp BL^2 receives positive current from the battery BT^2 as follows:—through wires 4, 56, 60 and 62, front contact 31, wire 73, through the lamp BL^2 to the common wire 3. Also, the stick relay K received positive current from the battery BT^2 as follows:—through wires 4, 56, 60 and 62, front contact 32, wires 80 and 101, front contact 14, wire 74, through relay K to the common wire 3. With relay K picked up it closes its front contact 38 thereby sticking it up, as heretofore described. The relay K causes the bell G^2 to ring, which will notify the operator at tower T^2 to acknowledge the indication given by indicator BL^2, as heretofore described.

With the class relay B^2 in its energized position, it also opens the energizing circuit of relay R^2 by opening back contact 33 which de-energization of relay R^2 routes the control wires to the class relays A^3 and B^3, and thereby making it possible for a train, third in order, to be registered by the operator in tower T^1, although it is not immediately indicated in tower T^2. That is, when the number of trains in transit between towers T^1 and T^2 exceeds the number of horizontal rows of indicators by one, such indication is stored, so to speak, in the relays A^3 and B^3.

The train first in order is now just west of signals S^3 and S^4, with the train second in order just west of signal S^2 and the train third in order just west of signal S^1.

Third train in order—a Class "A" train

When the operator notes that the third train in order is a class "A" train, he immediately depresses the push button PA, which completes the circuit for the relay A^3 as follows:—from the battery BT^1, through the wires 84, 85 and 86, through the normally open contact 53, wire 82, front contact 10, wires 87 and 88, back contact 12, wire 76, through relay A^3 to the common wire 3. This energizes relay A^3 through its stick circuit as soon as it closes its front contact 34 with said circuit traced as follows:—from the battery BT^2 through wires 4, 5 and 117, front contact 34, wires 77, 88, back contact 12, wire 76, through relay A^3 to the common wire 3. With the relay A^3 held up through its stick circuit back contact 35 opens the circuit of routing relay R^3 as is obvious from the drawing.

It will be noted that the breaking of the energizing circuits of the routing relays, has been mentioned last in the list of functions accomplished by the class and order relays. This has been done because it is necessary that the class and order relays be picked up before the routing relays may drop away in order that the stick circuits of the class and order relays may be completed. To obtain this result, the routing relays have been designed to be slow dropping and have been designated as slow release relays. The class and order relays, except those of the first order, are slow release relays also, for reasons to be brought out hereinafter.

Cancellation and transposition of indications

As a train passes signal S^3 and S^4, a circuit arrangement so functions that, the train originally of the first order will cancel the indication representing it, and will transpose the indications representing the following

trains each to the next proceeding order. This is accomplished by having the stick circuits of the class and order relays A^1 and B^1 broken momentarily as the train passes signals S^3 and S^4, which sets up a series of successive movements of the class and order relays cooperating with the routing relays. When the interlocking plant operator clears the signals S^3 by means of lever L, contacts 47 and 48 are closed so that relay IZR is energized. Now, when the train of the first order passes signal S^3, the track relay T is de-energized opening front contact 40, which breaks the stick circuit of relay A^1 (also B^1 if it were energized instead) also opening front contact 41 so that the slow-releasing relay IZR drops away to make contact 42, thus closing the stick circuit of the relay A^1 the same as if the track relay had again been energized, but not before the relay A^1 has fully dropped away, opening said stick circuit at its stick contact 18. With the relay A^1 in its de-energized position, the relay R^1 is energized, which opens the circuit of relay B^2, but relay B^2 does not drop away before it has given a momentary energizing impulse to the relay B^1, which picks up said relay so that front contact 22 closes its stick circuit. Thus with relay B^1 energized, the relay R^1 again drops away. The de-energizing of relay B^2 picks up relay R^2, which opens the stick circuit of relay A^3, but as relay A^3 is a slow-releasing relay, it does not drop away before it has given a momentary energizing impulse to relay A^2, which immediately picks up and remains energized through its stick circuit. With the relay A^2 energized, the relay R^2 is de-energized. As relay R^2 is a slow-releasing relay, it has remained in an energized position simultaneously with the relay A^2, which has completed the energizing circuit for the relay K, thus giving an indication to the interlocking plant operator in tower T^2 that an indication has been given him, which, when acknowledged, will give the operator in tower T^1 an indication, that he may record another approaching train, as relay R^3 is energized with relay A^3 de-energized.

It will be noted that a momentary depression of push button ER opens contact 52, which has the effect of opening the stick circuits of the class relays of the first order, with the same resulting effect as the de-energizing of the track relay T in the cancelation of an indication, so that the operator if he so desires may cancel the indication of the first order and allow transposition of the remaining indications each, to the next lower order.

There are several major circuits set up during the successive operations of the above described sequence of conditions, which, if described, will render the successive operations plainly obvious.

It should be remembered that under the conditions assumed, the relays A^1, B^2, and A^3 were up and relays R^1, R^2 and R^3 were down; that the signal S^3 was cleared by movement of lever L toward the right also picking up relay IZR, and that treading of the first train upon the detector track circuit containing relay T caused momentary breaking of the stick circuit for relay A^1 thus de-energizing this relay A^1 which in turn effected energization of the relay R^1.

With relay A^1 in a de-energized position and with relay R^1 just assuming its energized position, the relay B^2 is deenergized and is dropping away, but as it is slow-releasing, the following circuit is momentarily made:—from battery BT^2 through wires 4, 56, 60, 62, front contact 30, wires 79, 113, front contact 16, wire 119, through relay B^1 to the common wire 3; thus picking up relay B^1 and closing the stick circuit of relay B^1 through front contact 22, and closing front contact 23 to light indicator BL^1. The relay R^1 is again de-energized as soon as relay B^1 is energized.

With relay B^2 in a de-energized position, due to relay R^1 having been momentarily energized, this relay B^2 being slow dropping and not having dropped until after the intervening action of relays B^1 and R^1, and with relay R^2 in an energized position, due to relay B^2 being de-energized, then relay A^3 is de-energized and is dropping away, but as it is slow releasing, the following circuit is momentarily made:—from battery BT^2 through wires 4, 5, and 117, front contact 34, wires 77, 88, front contact 12, wires 89, 90, back contact 15, wire 115, through relay A^2 to the common wire 3, thus closing the stick circuit of relay A^2 through front contact 26, and closing front contact 27 to light indicator AL^2. The relay R^2 is again de-energized as soon as the relay A^2 is energized.

With relay A^3 in a de-energized position, due to relay R^2 having been momentarily energized the relay R^3 is energized, thus the successive operations of the transposition of indications has been completed, leaving the class relays of the third order ready for further storing of indications.

It will be noted from the above description that as soon as relay R^2 has picked up, the relay A^2 is immediately energized, which again de-energized the relay R^2, but before the slow release relay R^2 can drop away, the relay K is momentarily energized through the following circuit:—from battery BT^2 through wires 4, 56, 60, 61, 63, front contact 28, wires 80, 101, front contact 14, wire 74, through relay K to the common wire 3, thus picking up this relay and closing the stick circuit of said relay through its front contact 38, and also closing front contact 39, which gives an indication to the operator of tower T^2 that an indication representing a train has been

given which he has not heretofore acknowledged. The acknowledgment of this last indication informs to the operator in tower T^1 that he now may record another train as soon as it passes his tower. The pick-up circuit of relay K is so arranged that the above mentioned momentary energizing impulse is given to said relay only, when the stored indication is transferred to constitute an active indication, no matter how many class and order relays there may be.

Summary of transposition of indications

With relays A^1, B^2 and A^3 energized, and relays R^1, R^2 and R^3 de-energized, the indication of the first order is cancelled either by the de-energization of relay T or by manual operation of push button ER, each of which opens the stick circuit of relay A^1. The de-energization of relay A^1 starts the automatic operations of transposition which may be tabulated as in the following table. The tabulation gives the twelve positions which the relays assume, grouped under four heads to show the sequential positions taken by the relays.

First group

(a^1) Relay A^1 de-energized (circuit opened BT^2, 4, 97, 42, 96, 95, 52, 94, 93, 18, 92, A^2 and 3).

(b^1) Relay R^1 energized (circuit closed BT^2, 4, 56, 60, 66, 25, 67, 21, 68, R^1 and 3).

(c^1) Relay B^2 de-energized but not dropped for a time (circuit opened BT^2, 4, 56, 60, 62, 30, 79, 113, 16, 114, B^2 and 3).

Second group

(a^2) Relay B^1 energized (circuit closed BT^2, 4, 56, 50, 61, 30, 79, 113, 16, 119, B^1 and 3).

(b^2) Relay R^1 de-energized (circuit opened same as under b^1.

(c^2) Relays B^2 drops in response to de-energization under C^1.

Third group

(a^3) Relay R^2 energized (circuit closed BT^2, 4, 56, 60, 62, 33, 64, 29, 65, R^2 and 3).

(b^3) Relay A^3 deenergized but not dropped for a time (circuit opened BT^2, 4, 5, 117, 34, 77, 88, 12, 76, A^3 and 3).

(c^3) Relay A^2 energized (circuit closed BT^2, 4, 5, 117, 34, 77, 88, 12, 89, 90, 115, A^2 and 3).

Fourth group

(a^4) Relay R^2 de-energized (circuit opened same as under a^3).

(b^4) Relay A^3 drops in response to de-energization under b^3).

(c^4) Relay R^3 energized (circuit closed BT^2, 4, 5, 6, 7, 37, 8, 35, 9, R^3 and 3).

The first and third groups each give the position of the relays when the transposition circuits are closed. The third group also gives the position of the relays when the indication circuit of the relay K is completed for notifying the operator of tower T^2 of the showing of a stored indication, while the fourth group gives the final position of the relays with two trains still within the approach section and with the relays of the third order ready for storing another indication. With the above mentioned transposition having taken place the relays R^3, B^1 and A^2 have assumed the energized position.

The class and order relays, except the relays of the first order, must have a longer releasing period than the routing relays. This is necessary to eliminate the possibility of (as in the above outlined example) the relay B^2 being in a de-energized position, and energizing relay R^2 before relay R^1 has dropped away, as this would result in the energization of the relay A^1, thus giving two indications of the first order, which would obviously be very undesirable, making the system impractical.

The function of the relay R^3 is to prevent more than one indication of the third order to be stored or to prevent a fourth order indication to be made a third order, by error of operator in remembering the limits of the system. It should be understood that certain auxiliary features, and as the audible signals and the acknowledging push buttons and their functions, may be dispensed with, if desired, without departing from the invention.

Having thus shown and described one specific embodiment of the present invention and having described its operating characteristics, it is desired to be understood that the particular apparatus and circuit arrangements illustrated have been selected for the purpose of describing the nature of the invention, rather than its scope or the specific arrangement preferably employed in practicing the invention, that various changes and modifications may be made to adapt the invention to the particular problem encountered in practicing the same, all without departing from the spirit of the invention or the idea of means underlying the same, except as demanded by the scope of the following claims.

What I claim is:—

1. A train describing system of the type described, comprising a plurality of indicators positioned so that the location of an active indicator indicates both the order of an approaching train and the class of such train, a stick relay for each of said indicators, a front contact for each of said stick relays included in the circuit of the corresponding indicator for rendering the indicator active, means for energizing a particular stick relay to render a particular indicator active and means for transposing an indication of a certain order

to the next lower order when the indication of the lowest order is cancelled.

2. A train describing system comprising, a large number of indicators arranged in horizontal and vertical rows, in which the particular horizontal row in which is located an indicator rendered active indicates the order in which the train it represents is positioned with respect to other trains on a particular track and in which the particular vertical row in which such indicator is found signifies the class to which such train belongs, a stick relay for each of said indicators, a front contact for each of said stick relays included in the energizing circuit of the corresponding indicator, and means effective when the stick relay of the first order is de-energized for causing the stick relay of each of the higher orders to be de-energized and the corresponding stick relay for the next lower order to be energized.

3. A train describing system comprising, a large number of indicators arranged in horizontal and vertical rows, in which the particular horizontal row in which is located an indicator rendered active indicates the order in which the train it represents is positioned with respect to other trains on a particular track and in which the particular vertical row in which such indicator is found signifies the class to which such train belongs, a stick relay for each of said indicators, and a supplemental stick relay for each vertical row of indicators for storing an additional indication, an energizing circuit for each of said indicators including a front contact of the corresponding stick relay, and means effective when a stick relay of the first order is de-energized for de-energizing each of the other stick relays and effecting energization of the stick relay of the next lower order corresponding to each of the de-energized stick relays, so that cancellation of the indication of the lowest order causes the indication of each of the higher orders to be transferred to the next lower order and causes the indication stored in the supplemental stick relay to be transferred to the indication of the highest order.

4. A train describer of the class described comprising a plurality of indicators arranged in horizontal and vertical rows, in which the vertical rows designate different classes of trains and in which the particular indicator of a vertical row indicates the order in which such train is moving with respect to other trains; a stick relay for each of said indicators; a routing relay for each train of the trains that may approach in succession; said routing relays being normally energized and the first routing relay is de-energized upon the entrance of one train, the second routing relay is de-energized upon the entrance of a second train and the third routing relay is de-energized upon the entrance of a third train into an approach section; circuits for causing the entrance of a train when all of the said routing relays are energized to be registered in the first horizontal row, to cause the entrance of a train when only the second and third routing relays are energized to cause the indication to be entered into the second horizontal row and to cause the entrance of a train into said approach section when only the third routing relay is energized to register an indication in the third horizontal row of said indicators.

5. A train describing system of the type described, comprising a plurality of indicators wherein each active indicator indicates both the order of an approaching train and the class of such train, a stick relay for each of said indicators, a front contact for each of said stick relays being included in the circuit of the corresponding indicator for rendering the indicator active, means for energizing a particular stick relay to render a particular indicator active and means for automatically canceling and transposing an indication of a certain order to the next lower order when the indication of the first order is cancelled.

6. A train describing system comprising, a large number of indicators arranged in horizontal and vertical rows in which the particular horizontal row in which is located an indicator rendered active indicates the order in which the train it represents is positioned with respect to other trains on a particular track and in which the particular vertical row in which such indicator is found signifies the class to which such train belongs, a stick relay for each of said indicators, a front contact for each of said stick relays included in the energizing circuit of the corresponding indicator, means effective when the stick relay of the first order is de-energized for causing the stick relay of each of the higher orders to be de-energized and the corresponding stick relay for the next lower order to be energized, and means for sounding an alarm for each change of indication.

7. A train describing system comprising, a large number of indicators arranged in horizontal and vertical rows, in which the particular horizontal row in which is located an indicator rendered active indicates the order in which the train it represents is positioned with respect to other trains on a particular track and in which the particular vertical row in which such indicator is found signifies the class to which such train belongs, a stick relay for each of said indicators, and a supplemental stick relay for each vertical row of indicators for storing an additional indication, an energizing circuit for each of said indicators including a front contact of the corresponding stick relay, and means effective when a stick relay of the first order is de-energized for de-energizing each of the other stick relays and effecting energization of the stick relay of the next lower order in the same vertical row, so that upon cancella-

tion of the indication of the lowest order causes the indication of each of the higher orders to be transferred to the next lower order and causes the indication stored in the supplemental stick relay to be transferred to the indication of the highest order.

8. A train describer of the class described comprising a plurality of indicators arranged in horizontal and vertical rows, in which the vertical rows designate different classes of trains and in which the particular indicator of a vertical row indicates the order in which such train is moving with respect to other trains; a stick relay for each of said indicators; a routing relay for each train of the trains that may approach in succession; said routing relays being normally energized and manually operable means for causing the first routing relay to be de-energized upon the entrance of one train, the second routing relay to be de-energized upon the entrance of a second train and the third routing relay to be de-energized upon the entrance of a third train into an approach section; circuits for causing the entrance of a train when all of the said routing relays are energized to be registered in the first horizontal row, to cause the entrance of a train when only the second and third routing relays are energized to cause the indication to be entered into the second horizontal row; and means for transferring an indication of a certain order to the next lower order when the indication of the first order is cancelled.

9. A train describing system of the type described, comprising a plurality of indicators wherein each active indicator indicates both the order of an approaching train and the class of such train, a stick relay for each of said indicators, a front contact for each of said stick relays included in the circuit of the corresponding indicator for rendering the indicator active, means for energizing a particular stick relay to render a particular indicator active, means for transposing an indication of a certain order to the next lower order when the indication of the first order is cancelled, and means for sounding an alarm when a change in the indications occurs.

10. A train describing system for transmitting indications from a local to a distant tower comprising a large number of indicators arranged in horizontal and vertical rows, the particular indicator rendered active in one of the vertical rows indicates the order in which the train it represents is positioned with respect to other trains on a particular track and in which the particular vertical row in which such indicator is found signifies the class to which such train belongs, a stick relay for each of said indicators, a front contact for each of said stick relays included in the energizing circuit of the corresponding indicator, means effective when the stick relay of the first order is de-energized for causing the stick relay of each of the higher orders to be de-energized and the corresponding stick relay for the next lower order to be energized, and means whereby an operator at such distant tower may inform an operator at said local tower that a change in indications has been received.

11. A train describing system of the type described, comprising a plurality of indicators positioned so that the location of an active indicator indicates both the order of an approaching train and the class of such train, a stick relay for each of said indicators, a front contact for each of said stick relays included in the circuit of the corresponding indicator for rendering the indicator active, means for energizing a particular stick relay to render a particular indicator active, traffic controlled means for cancelling the indication of the lowest order, and means for transposing an indication of each order to the next lower order respectively when the indication of the lowest order is cancelled.

12. A train describing system comprising, a number of indicators arranged in horizontal and vertical rows in which the particular horizontal row in which an active indicator is located indicates the order in which the train it represents is positioned with respect to other trains on a particular track, and in which the particular vertical row in which such indicator is located indicates the class to which such train belongs, a relay for each of said indicators, a front contact of each of said relays included in an energizing circuit of the corresponding indicator, means for de-energizing the relay of the lowest order, and means effective upon de-energization of said lowest order relay to shift the energizations of each of the other relays to the corresponding relays of the next lower order.

13. A train describer of the class described comprising, a plurality of indicators arranged in horizontal and vertical rows in which the vertical rows designate different classes of trains and the particular indicator of a vertical row indicates the order in which such train is moving with respect to other trains, a stick relay for each of said indicators, a supplemental stick relay for each vertical row of indicators for storing up an additional indication, a routing relay for each train of the trains that can approach in succession, said routing relays being normally energized, and means whereby only the first routing relay can be de-energized upon the entrance of one train, only the second routing relay can be de-energized upon the entrance of a second train if the first routing relay has been de-energized, and only the third routing relay can be de-energized upon the entrance of a third train if the second routing relay has been de-energized, circuits for causing the entrance of a train when all of the routing relays are energized to be reg-

istered in the first horizontal row of indicators, to cause the entrance of a train when only the second and third routing relays are energized to be registered in the second horizontal row of indicators and to cause the entrance of a train when only the third routing relay is energized to store up an indication in the supplemental stick relays.

14. A train describing system of the type described, comprising a plurality of indicators wherein each active indicator indicates both the order of an approaching train and the class of such train, a relay at each of said indicators, a front contact of each of said relays being included in the circuit of the corresponding indicator and rendering such indicator active, means for energizing a particular relay to render its indicator active, means for cancelling the indication of the first order, and means for automatically transposing each indication to the next lower order indication when the indication of the first order is cancelled.

15. A train describer of the class in question comprising a plurality of indicators arranged in horizontal and vertical rows wherein the vertical row designates the class of a train and the particular indicator of a vertical row indicates the order in which such train is positioned with respect to other trains, a stick relay for each of said indicators, a row of indication storing relays, a routing relay for each train of the trains that can approach in succession, said routing relays being normally energized, and manually operable means for causing the first routing relay to be de-energized upon the entrance of a first train, the second routing relay to be de-energized upon the entrance of a second train and the third routing relay to be de-energized upon the entrance of a third train into an approach section, circuits for causing the entrance of a train when all of said routing relays are energized to be registered in the first horizontal row of indicators, to cause the entrance of a train when only the second and third routing relays are energized to be registered in the second horizontal row of indicators and to cause the entrance of a train into said approach section when only the third routing relay is energized to store an indication in the storing relays, means for cancelling the indication of the lowest order, and means for transferring each indication to the corresponding indication of the next lower order, and for transferring the stored indication to the corresponding indication of the highest order, when the indication of the lowest order is cancelled.

In testimony whereof I affix my signature.

ANDREW LANGDON.