June 28, 1938. W. T. POWELL 2,122,229

TRAIN DESCRIBER SYSTEM

Filed Nov. 21, 1935 2 Sheets-Sheet 1

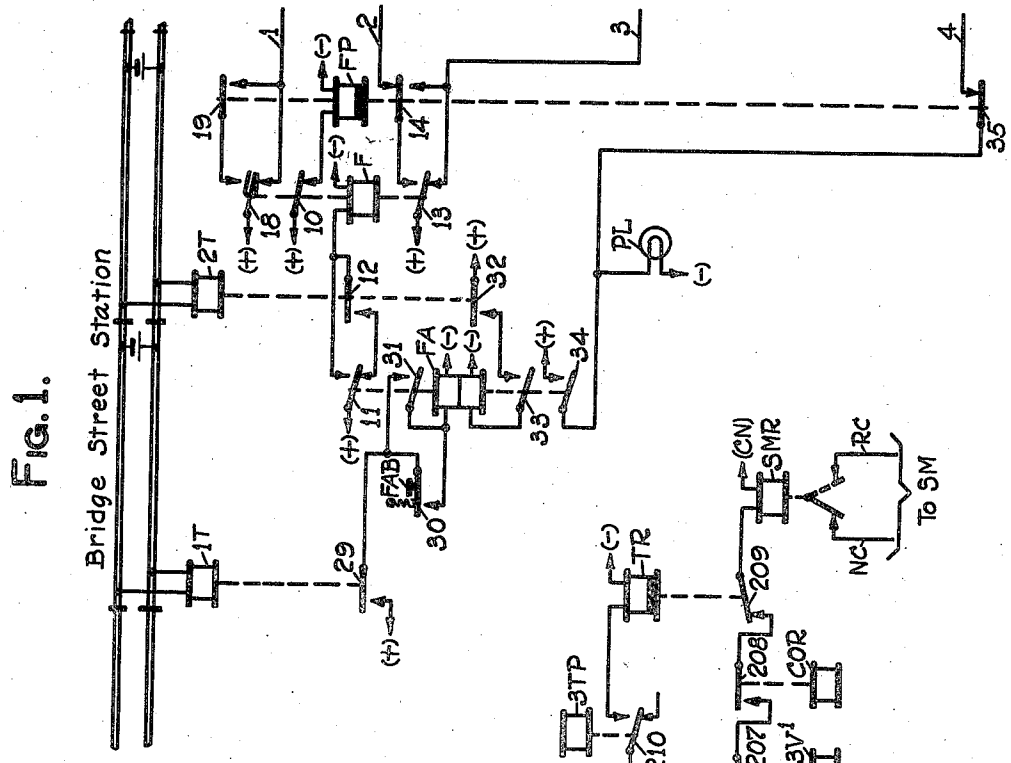


FIG. 1.

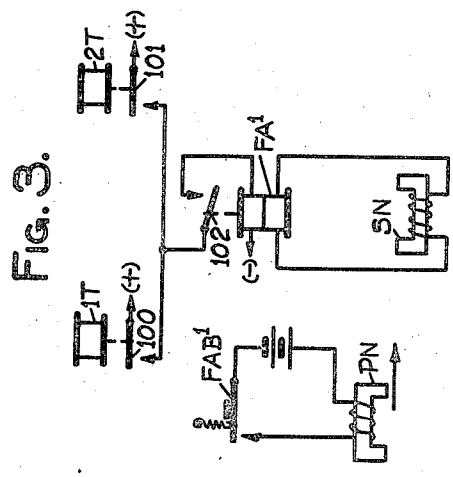


FIG. 3.

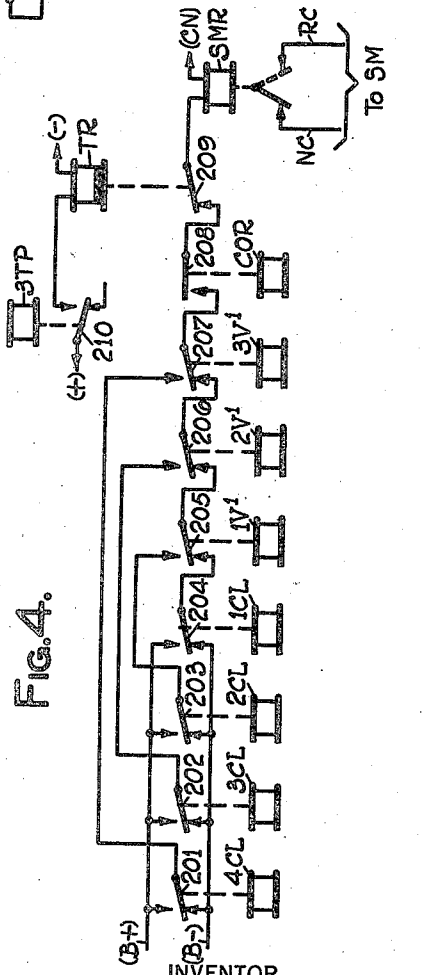


FIG. 4.

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TRAIN DESCRIBER SYSTEM

Filed Nov. 21, 1935 2 Sheets-Sheet 2

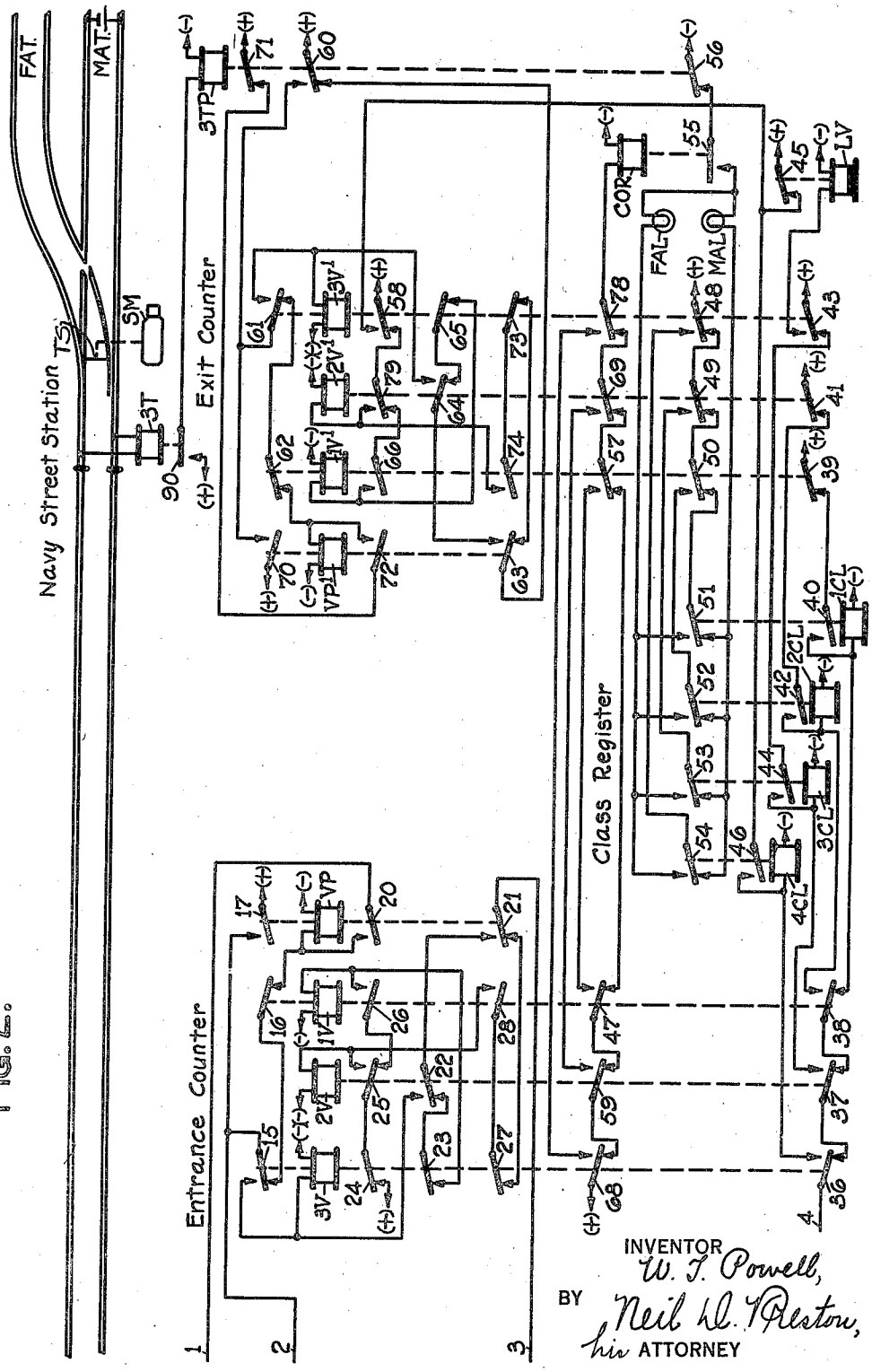


FIG. 2.

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2,122,229

UNITED STATES PATENT OFFICE

2,122,229

TRAIN DESCRIBER SYSTEM

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Application November 21, 1935, Serial No. 50,910

18 Claims. (Cl. 246—2)

This invention relates to train describing or announcing systems and it more particularly pertains to such systems in which trains of different classes are announced and identified by the lighting of a particular lamp in accordance with the class of the approaching train.

In accordance with the present invention it is proposed to indicate at a distant platform or station the kind or class of the next car or train that is approaching, such as local or express trains, or the destination of such car or train and to wipe out these indications automatically as the train enters the station.

Other features of the present invention reside in the provision of means for automatically storing the identity of a plurality of trains which pass a first station and for displaying at a second station an indication manifesting the identity of the trains one at a time in the order of their passing the first station, with each succeeding indication being displayed as the preceding train leaves the second station.

Another feature of the present invention is the provision of an entrance counter which counts the trains that enter a particular stretch of track, an exit counter which counts the trains that leave this stretch of track and circuits cooperating with these counters for lighting a lamp at a platform or station when these counters are out of correspondence.

A further feature of the present invention resides in the provision of a plurality of class register relays which register and store the class of a plurality of trains which pass the first station as counted by the entrance counter, with an arrangement for energizing the class identifying lamp at the second station in accordance with the class registered on the class register relays as selected by the exit counter.

Still another feature of the present invention is the provision of a circuit arrangement for registering on the class register relays the successive trains that pass the first station and maintaining each registration on the class register until the corresponding train clears out of the second station.

An additional feature of the present invention is the provision of means for automatically registering the class of each of a plurality of trains on the class register, with an optional arrangement wherein a train of one class is automatically registered, while a train of another class requires a manual operation of a push button or the like, either located in the cab or on the platform of the first station.

Other objects, purposes and characteristic features of the present invention will be in part obvious from the accompanying drawings and in part pointed out as the following description progresses.

The present invention is in the nature of an improvement over prior application Ser. No. 49,792 filed Nov. 14, 1935.

In describing the invention in detail reference will be made to the accompanying drawings in which:—

Figs. 1 and 2 when placed end to end in the order named and with correspondingly identified lines in alignment, show the invention applied to a section of track over which trains of two classes travel from west to east (left to right), with traffic routed over two separate routes at the second station.

Fig. 3 illustrates a modification of the train registering device in which a train carried inductor effects the registration of a train of a particular class on the class register, this registration being accomplished either automatically or in response to the operation of a push button or the like located in the cab.

Fig. 4 illustrates a circuit arrangement applied to the class register and the exit counter for automatically operating the track switch at the second station to set up the proper route for an approaching train.

For convenience in describing the present invention, it will be assumed that Myrtle Avenue trains and Fifth Avenue trains pass through the Bridge Street station illustrated in Fig. 1 and are routed by way of track switch TS (and corresponding signals not shown) in Fig. 2 to Myrtle Avenue track MAT and Fifth Avenue track FAT at the Navy Street station.

It will also be assumed that any number of trains up to four may have their identity stored on the class register before one is cleared out of the Navy Street station. It will be understood that this number can be increased by increasing the number of counting relays in the entrance counter and in the exit counter. It will also be understood that trains of more than two classes may be registered on the class register by providing additional class register relays similar to those shown in Fig. 2 and operated in response to impulses supplied by a separate F and FP relay similar to those shown in Fig. 1.

The symbols (+) and (—) are employed to indicate the positive and negative terminals respectively of suitable sources of current and the circuits with which these symbols are used always

have current flowing in the same direction, that is from (+) to (—). The symbols (B+) and (B—) represent the positive and negative terminals respectively of a suitable source of current having a center tap (CN) and the circuits with which these symbols are used have current flowing from the (B+) terminal to center tap (CN) when such a circuit is completed and from center tap (CN) to the (B—) terminal when this circuit is completed.

It is believed that the features of the present invention may be best understood by considering the detailed operation of the system.

Operation

Normal conditions.—With no trains in the sections of track illustrated in Figs. 1 and 2, track relays 1T, 2T and 3T are normally energized in the usual manner by current from the usual track batteries. Relay FP of Fig. 1 is normally energized over an obvious circuit through back contact 10 of relay F.

Relay COR is normally energized over a circuit extending from (+), back contacts 68, 59, 47, 57, 69 and 78 of relays 3V, 2V, 1V, $1V^1$, $2V^1$ and $3V^1$ respectively and winding of relay COR to (—).

In the following description it will be understood that relays FP, TR and LV, having heavy base lines, are relays of the slow releasing type.

Operation of entrance counter.—It will be assumed that four trains successively enter the Bridge Street station (Fig. 1) and a description of the operation of the entrance counter for counting these four trains will first be given. After this description it will be explained how the class register registers the class of these four trains, after which a discussion will be given of the operation of the indicators and the exit counter.

Assuming for example that the first train is a Myrtle Avenue train, then when relay 2T is dropped in response to this train entering the second insulated track section illustrated in Fig. 1, a circuit is closed for picking up relay F which extends from (+), back contact 11 of relay FA, back contact 12 of relay 2T and winding of relay F to (—).

The picking up of relay F de-energizes relay FP, but, since this relay is slow to release, an impulse is applied to conductor 2 for operating relay VP. The circuit for operating relay VP may be traced from (+), front contact 13 of relay F, front contact 14 of relay FP, conductor 2, back contact 15 of relay 3V, back contact 16 of relay 1V and winding of relay VP to (—).

The picking up of relay VP closes a first stick circuit for itself extending from (+), front contact 17 of relay VP, back contact 15 of relay 3V, back contact 16 of relay 1V and winding of relay VP to (—), which stick circuit is effective to maintain relay VP energized after relay FP releases and opens the above described circuit through front contact 14.

When relay FP is released, a second stick circuit is closed for relay VP which extends from (+), front contact 18 of relay F, back contact 19 of relay FP, conductor 1, front contact 20 and winding of relay VP to (—). The dropping of relay FP closes a circuit for picking up relay 1V extending from (+), front contact 13 of relay F, back contact 14 of relay FP, conductor 3, front contact 21 of relay VP, back contact 22 of relay 2V, back contact 23 of relay 3V and winding of relay 1V to (—). The second stick circuit for relay VP is therefore effective to maintain this relay energized after relay 1V picks up and opens its back contact 16. Relay 1V closes a stick circuit for itself extending from (+), back contact 24 of relay 3V, back contact 25 of relay 2V, front contact 26 and winding of relay 1V to (—).

When the first train leaves the section of track with which track relay 2T is associated, this relay picks up and de-energizes relay F. The dropping of relay F closes a circuit at make-before-break back contact 18 for maintaining relay VP stuck up and at its back contact 10 it closes a circuit for energizing relay FP.

It will be assumed that the second train entering the Bridge Street station is a Myrtle Avenue train which causes relay F to again be energized in response to the dropping of relay 2T. The picking up of relay F again releases relay FP and in the interval between the operation of relay F and the release of relay FP, (+) energy is removed from conductor 1 because of open back contacts 18 and 19, which de-energizes the second stick circuit of relay VP and allows this relay to release.

The dropping of relay FP closes a circuit for picking up relay 2V which extends from (+), front contact 13 of relay F, back contact 14 of relay FP, conductor 3, back contact 21 of relay VP, back contact 27 of relay 3V, front contact 28 of relay 1V and winding of relay 2V to (—). The picking up of relay 2V drops relay 1V by opening the above described stick circuit at back contact 25. A stick circuit is closed for relay 2V which extends from (+), back contact 24 of relay 3V, front contact 25 and winding of relay 2V to (—). When the second train leaves the section of track with which relay 2T is associated, relay F is de-energized and relay FP is picked up as previously described, but this time the stick circuit for relay VP is not energized because of open front contact 20.

In response to the entrance of a third train into the Bridge Street station (assuming this train also to be a Myrtle Avenue train), relay 2T drops and again effects the picking up of relay F which in turn drops relay FP. During the interval between the operation of relay F and the release of relay FP, relay VP is energized over a circuit extending from (+), front contact 13 of relay F, front contact 14 of relay FP, conductor 2, back contact 15 of relay 3V, back contact 16 of relay 1V and winding of relay VP to (—). Relay VP again establishes its first stick circuit previously described.

The dropping of relay FP closes a circuit at its back contact 14 for applying (+) energy to conductor 3, which picks up relay 3V over a circuit extending through front contact 21 of relay VP, front contact 22 of relay 2V and winding of relay 3V to (—).

The picking up of relay 3V causes relay 2V to drop because its stick circuit is opened at back contact 24 of relay 3V. Relay 3V closes a stick circuit for itself extending from (+), front contact 17 of relay VP, front contact 15 and winding of relay 3V to (—). When the third train leaves the section of track with which relay 2T is associated, relay F is deenergized, relay FP is picked up as previously described and make-before-break contact 18 again sticks relay VP.

Assuming that the fourth train to enter the Bridge Street station is a Myrtle Avenue train, the dropping of relay 2T again picks up relay F which in turn releases relay FP. Since the first stick circuit for relay VP is open at back contact 15 of relay 3V and its second stick circuit is open at back contact 18 of relay F, relay VP is dropped.

Relay 3V is now dropped because its above described stick circuit, including front contact 17, is open and also because conductor 2 is de-energized at open front contact 14 of relay FP. When the fourth train leaves the track section with which relay 2T is associated, this relay is picked up, relay F is dropped and relay FP is picked up.

From the above description it will be seen that the entrance counter operates to count the entrance of four trains into the Bridge Street station, with relay 1V being picked up in response to the entrance of the first train, with relay 2V being picked up and relay 1V being dropped in response to the entrance of the second train, with relay 3V being picked up and relay 2V being dropped in response to the entrance of the third train and with relay 3V being dropped in response to the entrance of the fourth train. In other words counting relays 1V, 2V and 3V assume four different conditions in response to the passing of four trains through the Bridge Street station and it will now be explained how the class register is conditioned in response to the class of each train which enters this station.

Class registration.—It was assumed in the previous description that four Myrtle Avenue trains passed through the Bridge Street station and that button FAB was not actuated during the passage of any one of these trains through the station. Therefore relay FA was not picked up and conductor 4 was not energized, so that none of the class relays illustrated in the lower portion of Fig. 2 were picked up. It will be later described how the Myrtle Avenue lamp MAL is lighted to indicate the approach of each Myrtle Avenue train as determined by the class register relay corresponding to the number of each train being de-energized.

In the event that the first train is a Fifth Avenue train, then button FAB is actuated which closes a circuit for picking up relay FA extending from (+), back contact 29 of relay 1T, contact 30 of button FAB and upper winding of relay FA to (—). It is thus obvious that button FAB is only effective when the first track section is occupied, because of contact 29 of relay 1T. Relay FA closes a stick circuit for itself which maintains this relay energized as long as relay 1T is down, which stick circuit extends from (+), back contact 29 of relay 1T, front contact 31 and upper winding of relay FA to (—). When the train enters the section of track with which relay 2T is associated, the dropping of this relay closes a second stick circuit for relay FA extending from (+), back contact 32 of relay 2T, front contact 33 and lower winding of relay FA to (—). This second stick circuit maintains relay FA energized until the first train leaves the section of track with which relay 2T is associated.

The picking up of relay FA closes a circuit for picking up the first class register relay 1CL extending from (+), front contact 34 of relay FA, front contact 35 of relay FP, conductor 4, back contacts 36, 37 and 38 of relays 3V, 2V and 1V respectively and winding of relay 1CL to (—). Relay 1CL closes a stick circuit for itself extending from (+), back contact 39 of relay $1V^1$, front contact 40 and winding of relay 1CL to (—). The circuit including conductor 4 is de-energized when relay FP is dropped in response to the picking up of relay F. Relay F picks up over an obvious circuit including front contact 11 of relay FA, so that relays F and FP operate as previously described to effect the energization of relays VP and 1V except of course in this case they are picked up before the dropping of relay 2T because button FAB has been actuated.

When the first train leaves the track section with which relay 2T is associated, relay FA is de-energized because of open back contact 32 of relay 2T and because of open back contact 29 of relay 1T. The circuit including relay F is de-energized which causes relay F to drop and relay FP to pick up.

When the second train enters the Bridge Street station (assuming this to be a Fifth Avenue train), relay FA is again energized in response to the actuation of button FAB and relay F is picked up and relay FP is dropped. In brief, the passage of Fifth Avenue trains through the Bridge Street station effect the operation of the entrance counter in response to the operation of relays F and FP as previously described. The picking up of relay FA to mark the second train as a Fifth Avenue train again applies (+) potential to conductor 4 and since relay 1V is picked up at this time, an energizing circuit extends through front contact 38 of relay 1V and winding of relay 2CL to (—). Relay 2CL picks up and closes a stick circuit for itself extending from (+), back contact 41 of relay $2V^1$, front contact 42 and winding of relay 2CL to (—). If the third train is a Fifth Avenue train, the closure of front contact 34 of relay FA applies (+) potential to conductor 4, which in this case extends through front contact 37 of relay 2V and winding of relay 3CL to (—). Relay 3CL picks up and establishes a stick circuit for itself extending from (+), back contact 43 of relay $3V^1$, front contact 44 and winding of relay 3CL to (—).

If the fourth train is a Fifth Avenue train, the closure of front contact 34 of relay FA applies (+) potential to conductor 4 for energizing relay 4CL over a circuit including front contact 36 of relay 3V. Relay 4CL closes a stick circuit for itself extending from (+), back contact 45 of relay LV, front contact 46 and winding of relay 4CL to (—).

From the above description it will be seen that the passage of a first, second, third and fourth Myrtle Avenue train through the Bridge Street station (before any of these trains clears out of the Navy Street station as will be later explained), results in relays 1CL, 2CL, 3CL and 4CL remaining down, while the passage of a first, second, third and fourth Fifth Avenue train through the Bridge Street station effects the picking up of relays 1CL, 2CL, 3CL and 4CL. It will be understood that any other order of passage of these trains through the Bridge Street station will cause the class relays to be picked up or not in accordance with the class of train passing through the station.

Train indication.—When the first train registers itself on the entrance counter by picking up relay 1V, the normal energizing circuit for relay COR is opened at back contact 47 of relay 1V. This drops relay COR and closes a circuit for lighting the indication lamp corresponding to the first train and determined by the condition of relay 1CL. If the first train is a Myrtle Avenue train, lamp MAL is energized over a circuit extending from (+), back contacts 48, 49 and 50 of relays $3V^1$, $2V^1$ and $1V^1$ respectively, back contact 51 of relay 1CL, lamp MAL, back contact 55 of relay COR and back contact 56 of relay 3TP to (—). In the event that the first train is a Fifth Avenue train, then relay 1CL will be picked up and the above described circuit extends

through front contact 51 of relay 1CL, lamp FAL, back contact 55 of relay COR and back contact 56 of relay 3TP to (—).

When the first train enters the section of track in the Navy Street station with which relay 3T is associated, the dropping of this relay closes an obvious circuit at its back contact 90 for energizing relay 3TP. Relay 3TP de-energizes the particular indication lamp which is lighted by opening back contact 56.

As will be later described the exit counter relays 1V¹, 2V¹, and 3V¹ are successively operated and released in response to the clearing of the four trains out of the section of track with which relay 3T is associated. Therefore when the first train clears out of this station relay 1V¹ is picked up and relay 1CL is dropped because its stick circuit is de-energized at open back contact 39. The switching of contact 50 of relay 1V¹ from its back to its front point extends the above described energizing circuit for the indicator lamps through contact 52 of relay 2CL in either its dropped-away or picked up position, as determined by the class of the second train, to light either lamp MAL or FAL.

The clearing of the second train out of the Navy Street station effects the picking up of relay 2V¹, which de-energizes the stick circuit of relay 2CL at open back contact 41 and at contact 49 the energizing circuit for the indicator lamps is switched to contact 53 of relay 3CL, which contact either extends this circuit to lamp MAL or FAL as determined by the class of the third train.

When relay 3V¹ is picked up in response to the clearing of the third train out of the Navy Street station, the stick circuit of relay 3CL is de-energized at open back contact 43 and at front contact 48 the energizing circuit for the indicator lamps is extended to contact 54 of relay 4CL, at which point lamp MAL or FAL is selected in accordance with the class of the fourth train.

The picking up of relay 3V¹ in response to the clearing of the third train out of the Navy Street station closes an obvious circuit at its front contact 43 for energizing relay LV. Relay 3V¹ energizes the stick circuit of relay 4CL at front contact 58 before relay LV de-energizes this stick circuit at open back contact 45. When the fourth train clears out of the Navy Street station relay 3V¹ will be de-energized (as later described) and the stick circuit for relay 4CL is de-energized because front contact 58 and back contact 45 are open. Shortly after the dropping of relay 3V¹ and the opening of its front contact 43, relay LV is dropped and (+) potential is applied to the stick circuit of relay 4CL at back contact 45 but during this interval relay 4CL was released if picked up.

The circuit including relay COR registers correspondence between the entrance and exit counters for the purpose of de-energizing the indicator lamps when there is no train to be announced at the Navy Street station. Since the entrance counter relays 1V, 2V and 3V are positioned in any one of four different combinations in accordance with whether there are 1, 2, 3 or 4 trains to be announced at the Navy Street station and since relays 1V¹, 2V¹ and 3V¹ are positioned to any one of four corresponding positions in accordance with whether 1, 2, 3, or 4 of these trains have cleared out of the Navy Street station, it will be apparent that these counting relays of the entrance and exit counters, when in corresponding positions, indicate that there is no train to be announced.

For example, when one train is to be announced, relay 1V will be picked up and when this train clears out of the Navy Street station relay 1V¹ will be picked up. If there are two trains to be announced, relays 1V and 2V will be picked up and when both of these trains are cleared out of the Navy Street station relays 1V¹ and 2V¹ will be picked up.

When the first train effects the picking up of relay 1V, the opening of back contact 47 of this relay de-energizes relay COR for completing the circuit to the indicator lamps. When this first train is cleared out of the Navy Street station the closure of front contact 57 of relay 1V¹ completes an energizing circuit for relay COR through front contact 47 of relay 1V, which circuit effects the picking up of relay COR to de-energize the indicator lamp circuits. If this correspondence arrangement were not provided, the lamp circuits would be energized when the train cleared out of the Navy Street station (when no other train was approaching), due to the circuit being completed through back contact 56 of relay 3TP and the contacts of the class and exit counter relays.

When the second train is to be announced the opening of back contact 59 of relay 2V de-energizes the circuit extending to relay COR and back contact 55 of relay COR completes the energizing circuit for the selected lamp. When the second train clears out of the Navy Street station the closure of front contact 59 of relay 2V¹ completes the circuit for the correspondence relay and the lamp circuit is de-energized. When the third train is to be announced the opening of back contact 68 of relay 3V de-energizes relay COR and when the third train clears out of the Navy Street station the closure of front contact 78 of relay 3V¹ again energizes relay COR.

When the fourth train is to be announced the opening of front contact 68 of relay 3V de-energizes relay COR and when the fourth train clears out of the Navy Street station the closure of back contact 78 of relay 3V¹ energizes relay COR, which is the normal condition illustrated in the drawings.

Operation of exit counter.—When the first train of the four effects the dropping of relay 3T and the consequent picking up of relay 3TP, a circuit is closed for picking up relay VP¹ which extends from (+), front contact 60 of relay 3TP, back contact 61 of relay 3V¹, back contact 62 of relay 1V¹ and winding of relay VP¹ to (—). Relay VP¹ closes a first stick circuit for itself extending from (+), front contact 70 of relay VP¹, back contact 61 of relay 3V¹, back contact 62 of relay 1V¹ and winding of relay VP¹ to (—).

When the first train clears out of the Navy Street station the dropping of relay 3TP energizes the second stick circuit for relay VP¹ extending from (+), back contact 71 of relay 3TP, front contact 72 and winding of relay VP¹ to (—). Relay 1V¹ is picked up over a circuit extending from (+), back contact 60 of relay 3TP, front contact 63 of relay VP¹, back contact 64 of relay 2V¹, back contact 65 of relay 3V¹ and winding of relay 1V¹ to (—). Relay 1V¹ closes a stick circuit for itself extending from (+), back contact 58 of relay 3V¹, back contact 79 of relay 2V¹, front contact 66 and winding of relay 1V¹ to (—).

When the second train enters the Navy Street station and picks up relay 3TP, relay VP¹ is dropped because its first stick circuit is open at back contact 62 of relay 1V¹ and its second stick

circuit is open at back contact 71 of relay 3TP. When the second train clears out of the Navy Street station relay 2V1 is picked up over a circuit extending from (+), back contact 60 of relay 3TP, back contact 63 of relay VP1, back contact 73 of relay 3V1, front contact 74 of relay 1V1 and winding of relay 2V1 to (—). Relay 2V1 is stuck up over a circuit extending from (+), back contact 58 of relay 3V1, front contact 79 and winding of relay 2V1 to (—). The opening of back contact 79 drops relay 1V1 by de-energizing its stick circuit.

When the third train enters the Navy Street station the picking up of relay 3TP closes a circuit for picking up relay VP1 which extends from (+), front contact 60 of relay 3TP, back contact 61 of relay 3V1, back contact 62 of relay 1V1 and winding of relay VP1 to (—). The first stick circuit of relay VP1 is established as before and when relay 3TP is dropped in response to the clearing of the third train out of the Navy Street station, the second stick circuit of relay VP1 is established as before.

Relay 3V1 is picked up in response to the clearing of the third train out of the Navy Street station over a circuit extending from (+), back contact 60 of relay 3TP, front contact 63 of relay VP1, front contact 64 of relay 2V1 and winding of relay 3V1 to (—). Relay 3V1 closes a stick circuit for itself extending from (+), front contact 70 of relay VP1, front contact 61 and winding of relay 3V1 to (—). The opening of back contact 58 of relay 3V1 de-energizes the stick circuit of relay 2V1 and this relay is released.

When the fourth train enters the Navy Street station the picking up of relay 3TP effects the dropping of relay VP1 because its first stick circuit is open at back contact 61 of relay 3V1 and its second stick circuit is open at back contact 71 of relay 3TP. When the fourth train enters the Navy Street station relay 3V1 is stuck up over a circuit including front contact 60 of relay 3TP and front contact 61 of relay 3V1, before the stick circuit of relay 3V1 is interrupted by the opening of front contact 70 of relay VP1.

The dropping of relay 3TP in response to the clearing of the fourth train out of the Navy Street station effects the de-energization of relay 3V1 because of open front contact 60 of relay 3TP.

From the above explanation it will be observed that the exit counter counts the trains that clear out of the Navy Street station by the consequent operations of relay 3TP in the same manner that the entrance counter counts the trains that enter the Bridge Street station in response to the operations of relays F and FP.

Fig. 3 modification.—In accordance with the modification illustrated in Fig. 3 it is proposed to operate the class register in exactly the same manner as described in connection with Fig. 1. In this modification it is proposed to actuate relay FA1 for registering Fifth Avenue trains on the class register by means of a train carried inductor PN. This train carried inductor (when energized) energizes a wayside inductor SN when these two inductors are brought into cooperative relationship for linking the coils magnetically. It will be obvious that a current will be generated in the coil of inductor SN when inductor PN passes over the wayside coil if push button contact FAB1 is closed for energizing the train carried inductor.

Current flowing in the winding of inductor SN flows through the lower winding of relay FA1 and this relay is picked up and stuck up over a circuit including either back contact 100 of relay 1T or back contact 101 of relay 2T, front contact 102 and upper winding of relay FA1 to (—). It is well known to those skilled in the art that the windings of a relay, such as relay FA1, may be so proportioned that the magnetic flux produced by the current in the upper winding may be of such a large value compared with the magnetic flux produced by the lower winding, that there will be no tendency for the relay to be kicked down by any reversal of current through the lower winding after the stick circuit of the relay is closed.

It will be apparent that the class register can be automatically operated by providing Fifth Avenue trains with an inductor PN which is permanently energized instead of being energized through push button FAB1. Since Myrtle Avenue trains have no such inductor, the discrimination is made by picking up or not picking up relay FA1 in accordance with the class of train entering the Bridge Street station. In the event that semi-automatic operation is required, with the Fifth Avenue trains registered by a manual operation in the cab, then even though inductor PN is provided on these trains it becomes necessary to manually actuate button FAB1 to register this class of train.

Fig. 4 modification.—The circuit arrangement illustrated in Fig. 4 shows how the switch machine SM of Fig. 2 may be automatically operated to the proper position for routing Myrtle Avenue and Fifth Avenue trains over track switch TS in accordance with the class of the approaching train registered on the class register relays.

It will be obvious that relay SMR will be selectively actuated at the different steps of the exit counter in accordance with the position of the class register relay, which has the class of the next approaching train stored thereon. This selection is made through contacts 201 to 207 inclusive of the exit counter and of the class relays over obvious circuits.

When relay 3TP is picked up in response to the entrance of a train into the Navy Street station, an obvious circuit is closed at its front contact 210 for picking up repeater relay TR. Relay TR opens the circuit to relay SMR at back contact 209 and does not again complete this circuit for a short interval of time after the train clears out of the Navy Street station. This time is to allow the selection of the next class of train to be made before closing the circuit to relay SMR. When there is an approaching train to be routed over the track switch controlled by relay SMR, as indicated by relay COR being down to close its back contact 208, (B+) or (B—) energy is applied to relay SMR for controlling switch machine SM over its reverse conductor RC or its normal conductor NC as determined by the class of train registered on the class relay selected by the added contacts on the exit counter.

Having thus shown and described a specific embodiment of the present invention and having more specifically pointed out a preferred form of the invention with two modifications, it is desired to be understood that this should not be construed as a limitation of the scope of the invention, nor should it be construed as illustrating the exact construction to be employed in practicing the invention, but that the specific forms illustrated have been selected for the purpose of disclosing the principles and methods of practicing the invention and that various changes and additions may be made to adapt the invention to particular problems encountered in practice, all

without departing from the spirit thereof except as limited by the scope of the following claims.

What I claim is:—

1. In combination, a stretch of railway track, a station located alongside said stretch of track, an indicator at said station for indicating a train of a particular class, an entrance counting device and an exit counting device each having a plurality of positions, means for advancing said entrance counting device to consecutive positions for counting consecutive trains entering said stretch of track, means for advancing said exit counting device to consecutive positions for counting consecutive trains leaving said stretch of track, a plurality of class register devices, means including said entrance counting device for registering on said class register devices in rotation the class of consecutive trains entering said stretch of track, means including said exit counting device for consecutively actuating said indicator in accordance with the class of trains registered on said class register devices, a correspondence device actuated when said entrance counting device and said exit counting device are in corresponding positions, and means controlled by the actuation of said correspondence device for preventing the actuation of said indicator.

2. In combination, a first counter and a second counter, means including said first counter for counting the number of moving objects passing a first point along a route, means including said second counter for counting the number of said objects passing a second point along said route, an indicator, a plurality of class registers, means including said first counter for registering the class of said objects on said class registers in rotation, means including said second counter and said class registers for distinctively actuating said indicator in accordance with the class of said objects registered on said class registers, and means rendered effective when said counters have counted the same number of objects passing both of said points for preventing the actuation of said indicator by any register.

3. In combination, a first counter and a second counter, means responsive to the passage of vehicles for causing said first counter to count the number of vehicles passing a first point along a route, means responsive to the passage of vehicles for causing said second counter to count the number of said vehicles passing a second point along said route, a switch for guiding said vehicles over different paths out of said route, a plurality of class registers, means including said first counter for registering the class of said vehicles on said class registers, and means including said second counter and said class registers for successively actuating said switch to one position or the other in accordance with the class of the successive vehicles registered on said class registers.

4. In combination, a first counter and a second counter, means including said first counter for counting the number of vehicles passing a first point along a route, means including said second counter for counting the number of said vehicles passing a second point along said route, a switch for guiding said vehicles over different paths out of said route, a number of class registers one for each count of said counters, means including said first counter for registering the class of said vehicles on said class registers in rotation, means including said second counter and said class registers for successively actuating said switch to one position or the other in accordance with the class of the successive vehicles registered on said class registers, and means effective only when said counters have counted the same number of vehicles passing both of said points for preventing the actuation of said switch by any register.

5. In a train indicating system, a train carried inductor winding and a co-acting wayside inductor winding forming an inductive coupling, train registering and classifying means controlled by said coupling for registering the class of a train entering a stretch of track, a bank of counting relays, a number of class registers one for each counting relay, means controlled by said train registering and classifying means for causing said counting relays to count the number of trains entering said stretch of track and for causing said class registers in rotation to distinctively register the class of the successive trains, an indicator, a second bank of counting relays for counting trains out of said stretch, and means including said second bank of counting relays and said class registers for causing said indicator to indicate the presence and the class of the next train to leave said stretch of track.

6. In a switching system for railways, a track section comprising a main track and a diverging route connected to said main track by a track switch, a power operated switch machine for operating said track switch, an entrance counting means automatically controlled by the successive entrances of a plurality of trains into said main track for counting said entrances, a number of class registers, means including said entrance counting means and selectively controlled by a manual operation or the absence of a manual operation as each of a plurality of trains enters said main track for distinctively conditioning said class registers, an exit counting means automatically controlled by the successive exits of said plurality of trains from said track section for counting said exits, and means including said exit counting means for successively and distinctively operating said switch machine in accordance with the distinctive conditions of said class registers.

7. In a switching system for railways, a track section comprising a main track and a diverging route connected to said main track by a track switch, a power operated switch machine for operating said track switch, an entrance counting means automatically controlled by the successive entrances of a plurality of trains into said main track for counting said entrances, a class register including a number of register devices selectively controlled by a manual operation or the absence of a manual operation as each of a plurality of trains enters said main track, an exit counting means automatically controlled by the successive exits of said plurality of trains from said track section for counting said exits, means including said class register and said exit counting means for successively and distinctively operating said switch machine in accordance with the presence or absence of said manual operations, and means controlled by said entrance counting means and said exit counting means for preventing the operation of said track switch by a register device when said counting means assume corresponding counting positions.

8. A train describer system of the type described; comprising a pair of indicators, each active indicator indicating the class of an approaching train; a plurality of class relays, each having a back contact connected to one of said indicators and each having a front contact connected to the other of said indicators; a plurality of channel conductors selectively connected to

said front or said back contacts in accordance with the operated or released condition of said class relays; means controlled by approaching trains for selectively operating or not operating said class relays in rotation in accordance with the class of said trains and in the order of their approach; and means controlled by departing trains for sequentially energizing said channel conductors in the same rotation, whereby said indicators are sequentially rendered active to indicate the class of the next approaching train.

9. A train describer system of the type described; comprising a pair of indicators, each active indicator indicating the class of an approaching train; a plurality of class relays, each having a back contact connected to one of said indicators and each having a front contact connected to the other of said indicators; a plurality of channel conductors selectively connected to said front or said back contacts in accordance with the operated or released condition of said class relays; means controlled by approaching trains for selectively energizing or not said class relays in rotation in accordance with the class of said successive trains; means controlled by departing trains for sequentially energizing said channel conductors in the same rotation, whereby said indicators are sequentially rendered active to indicate the class of the next approaching train; and means controlled by departing trains for sequentially releasing each of said class relays in turn if energized.

10. In combination, a stretch of railway track, an indicator signal for indicating the presence of the next train approaching the exit end of said stretch, a first plurality of counting relays and a second plurality of counting relays, means for successively energizing and de-energizing said first plurality of counting relays as successive trains enter said stretch, means for successively energizing and deenergizing said second plurality of counting relays as successive trains leave said stretch, and means effective only if said first and said second plurality of counting relays have counted an unequal number of said trains for energizing said signal.

11. In combination, a first plurality of counting relays sequentially operated by a first series of events of different classes, a second plurality of counting relays equivalent to said first plurality and similarly operated by a second series of events, an indicator lamp, a correspondence relay, means responsive to the operation of said first and said second plurality of counting relays by an unequal number of events for causing said correspondence relay to light said lamp, and means controlled by the class of any of said first series of events for permitting or preventing the lighting of said lamp.

12. In combination, a stretch of track having an entering end and an exit end, a plurality of indicators at said exit end each representing a particular class of train, a track circuit including a track relay at the entering end, an entering group of stepping relays successively energized and de-energized in response to the entrance of a plurality of trains into said stretch only one of said stepping relays being energized and de-energized for each de-energization and energization of said track relay, a group of class registering relays one for each stepping relay of said entering group each of which registering relays if energized signifying that the train which caused the corresponding stepping relay to be picked up and dropped was of a particular class, a track circuit at the exit end of said stretch including a track relay, an exit group of stepping relays successively energized and de-energized in response to the departure of a plurality of trains from said stretch, only one of the stepping relays of the exit group being energized and de-energized for each de-energization and energization of the track relay at the exit end of said stretch, and means including a particular stepping relay of the exit group and the class registering relay for the corresponding stepping relay of the entering group for rendering a particular indicator active in accordance with the class of the next train to leave said stretch.

13. In combination, a stretch of track having an entering end and an exit end, a plurality of indicators at said exit end each representing a particular class of train, a track circuit including a track relay at the entering end, an entering group of stepping relays successively operated in response to the entrance of a plurality of trains into said stretch only one of said stepping relays being operated for each de-energization and energization of said track relay, a group of class registering relays one for each stepping relay of said entering group each of which registering relays if energized signifying that the train which caused the corresponding stepping relay to be operated was of a particular class, means partly on the train and partly along the track for energizing or leaving de-energized the particular class registering relay corresponding to the stepping relay for the entering group energized when the train so equipped enters said stretch of track, a track circuit at the exit end of said stretch including a track relay, an exit group of stepping relays successively operated in response to the departure of a plurality of trains from said stretch, only one of the stepping relays of the exit group being operated for each de-energization and energization of the track relay at the exit end of said stretch, and means including a particular stepping relay of the exit group and the class registering relay for the corresponding stepping relay of the entering group for rendering a particular indicator active in accordance with the class of the next train to leave said stretch.

14. In combination, a stretch of track having an entering and an exit end, a track switch at said exit end of said stretch for directing trains to particular destinations, a track circuit including a track relay at the entering end, an entering group of stepping relays successively energized and de-energized in response to the entrance of a plurality of trains into said stretch only one of said stepping relays being energized and de-energized for each de-energization end energization of said track relay, a group of class registering relays one for each stepping relay of said entering group each of which registering relays if energized signifying that the train which caused the corresponding stepping relay to be picked up and dropped was destined for a particular destination, a track circuit at the exit end of said stretch including a track relay, an exit group of stepping relays successively energized and de-energized in response to the departure of a plurality of trains from said stretch, only one of the stepping relays of the exit group being energized and de-energized for each de-energization and energization of the track relay at the exit end of said stretch, and means including a particular stepping relay of the exit group and the class registering relay for the corresponding stepping relay of the entering group for operating said track switch to a

particular position in accordance with the destination of the next train to leave said stretch.

15. In combination, a stretch of track having an entering end and an exit end, a track switch at said exit end of said stretch for directing trains to particular destinations, a track circuit including a track relay at the entering end, an entering group of stepping relays successively operated in response to the entrance of a plurality of trains into said stretch only one of said stepping relays being operated for each de-energization and energization of said track relay, a group of class registering relays one for each stepping relay of said entering group each of which registering relays if energized signifying that the train which caused the corresponding stepping relay to be operated was for a particular destination, means partly on the train and partly along the track for energizing or leaving de-energized the particular class registering relay corresponding to the stepping relay for the entering group energized when the train so equipped enters said stretch of track, a track circuit at the exit end of said stretch including a track relay, an exit group of stepping relays successively operated in response to the departure of a plurality of trains from said stretch, only one of the stepping relays of the exit group being operated for each de-energization and energization of the track relay at the exit end of said stretch, and means including a particular stepping relay of the exit group and the class registering relay for the corresponding stepping relay of the entering group for operating said track switch to a particular position in accordance with the destination of the next train to leave said stretch.

16. In combination; a stretch of railway track; an entrance counting relay bank; means actuated by the entrance of each train into said stretch for automatically causing said entrance counting relay bank to take one step, whereby the number of steps taken is equal to the number of trains entering said stretch; an exit counting relay bank; means responsive to the leaving of each train from said stretch for causing said exit counting relay bank to take one step, whereby the number of steps taken is equal to the number of trains leaving said stretch; class registering means for each step of said entrance counting relay bank; means for controlling said class registering means for each step so as to assume a distinctive condition in accordance with the class of the train causing its respective step of said entrance counting relay bank to be taken; a train class indicator; and means including said exit counting relay bank for rendering said train class indicator responsive to the distinctive condition of the various class registering means one at a time in turn to cause said indicator to show the class of the train which will next leave said stretch of track.

17. In a train describer system, apparatus for counting trains into a stretch of track comprising in combination with a track circuit at the entrance to said stretch, an impulse relay energized and deenergized as each train enters and leaves said track circuit, a bank of counting relays comprising odd and even numbered relays, a steering relay, a pick-up circuit for each odd numbered stepping relay including a front contact of the next preceding even numbered stepping relay and a front contact of said steering relay and closed by a back contact of said impulse relay, a pick-up circuit for each even numbered stepping relay including a front contact of the next preceding odd numbered stepping relay and a back contact of said steering relay and closed by a back contact of said impulse relay, a stick circuit for each of said counting relays except the last including a back contact of a next succeeding relay, a stick circuit for the last stepping relay including a contact of said steering relay, a pick up circuit for said steering relay including a front contact of said impulse relay and back contacts of all of said odd numbered counting relays, whereby said steering relay is picked up in response to succeeding odd numbered impulses only when all of said odd numbered counting relays are released, a first stick circuit for said steering relay including back contacts of all of said odd numbered counting relays in series, and a second stick circuit for said steering relay including a back contact of said impulse relay, whereby said steering relay is released in response to even numbered impulses only when one of said odd numbered counting relays is picked up.

18. A system for automatically operating a track switch at the end of a stretch of track to the normal or reverse positions as required for directing successive trains to their respective destinations comprising, a number of registering relay devices each adapted to be conditioned for governing the operation of said switch to the normal or the reverse position, an entrance counting chain of relays operable to different step positions for as many steps as there are registering devices, control circuits for said register devices prepared for each device in turn by the operation of a corresponding relay in said entrance counting chain, an entrance track circuit near the entrance end of said stretch of track, manually operable means co-operating with said entrance track circuit to operate said entrance counting chain of relays to a new step position for each train and governing the energization of the control circuits for the corresponding register devices one at a time in turn, an exit track circuit adjacent the exit end of said stretch, an exit counting chain of relays automatically operated step by step by the movement of successive trains over said exit track circuit, and control means for said switch operatively connected to said register devices one at a time in turn by the operation of said exit counting relays.

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