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J. G. KARLET ET AL
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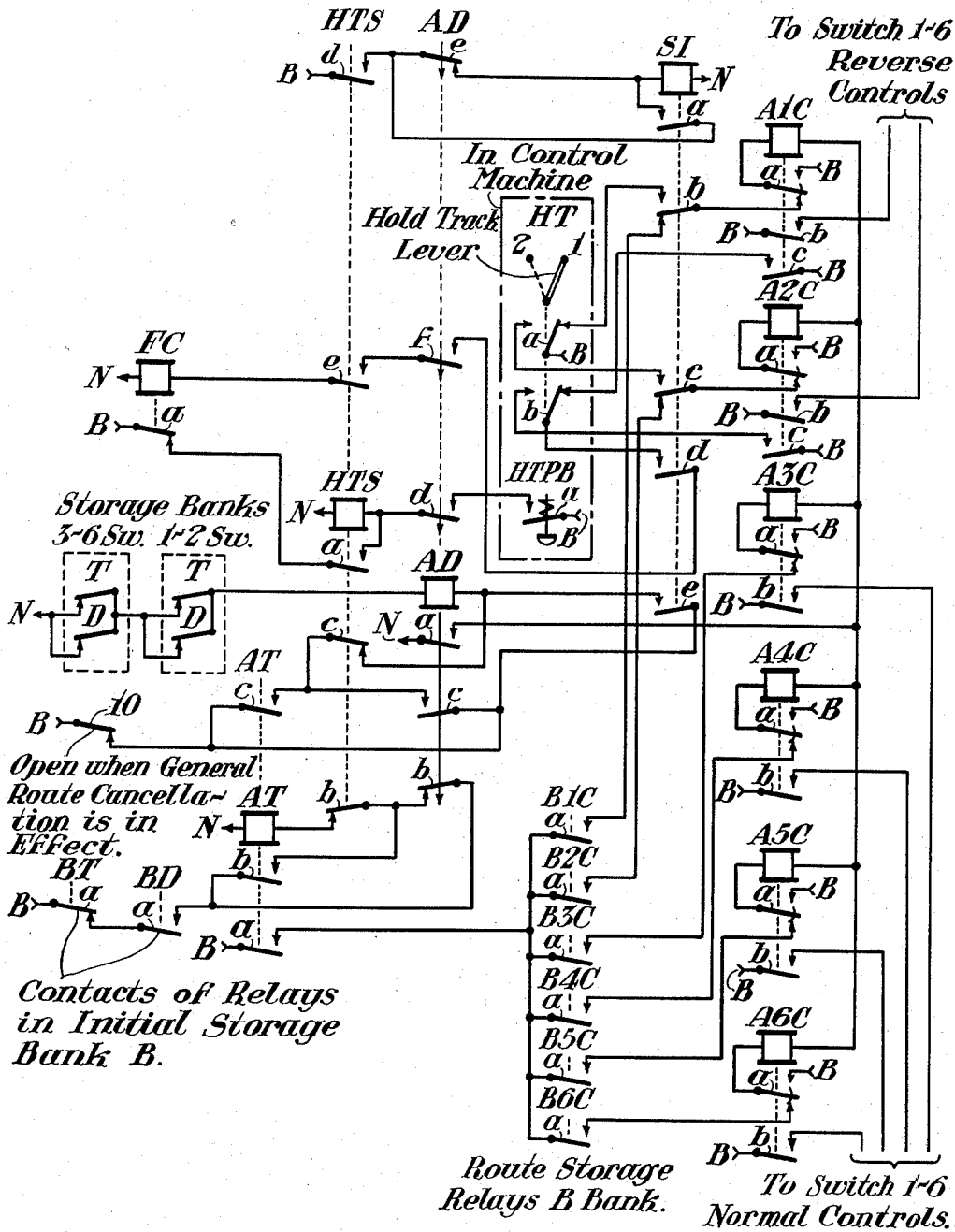


Fig. 2

INVENTORS
Joseph G. Karlet and
Sih Hsui Tsiang
BY
W. L. Stout.
THEIR ATTORNEY

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AUTOMATIC CONTROL OF RAILWAY CLASSIFICATION YARD SWITCHES

Joseph G. Karlet, Roanoke, Va., and Sih Hsueh Tsiang, Pittsburgh, Pa., assignors to Westinghouse Air Brake Company, Wilmerding, Pa., a corporation of Pennsylvania

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5 Claims. (Cl. 246—2)

Our invention relates to the automatic control of railway classification yard track switches. More particularly, our invention relates to the automatic substitution of a preselected route in place of a previously designated route for a railway car in an automatic switching system for such a classification yard, this substitution of routes taking place automatically following a single action on the part of the yard operator.

Automatic switching systems for railway classification yards in general use at present provide for the storing of the routing for successive cars or cuts of coupled cars which are to pass over the hump and move under the influence of gravity to the various tracks in the classification yard. These routes are stored generally by the operator of the yard selecting, from a bank of push buttons, the final classification track number to which the particular car or cut is to travel. The routes may also be inserted into the apparatus directly from printer tapes or by other automatic devices. Such routes are stored in a series of initial storage banks until the corresponding cut of cars is ready to move over the first switch in the yard, after which the route is transferred from the initial storage banks to the storage banks associated with the next switch to which the car is traveling and thence successively transferred to the various other switches along the route designated for that car. The various switches are controlled automatically through the influence of the stored route as it is transferred to the various switch locations and as the corresponding cut of cars approaches that particular switch. Such systems and their automatic operation are well known in the general art.

These systems furthermore usually provide for the cancellation of the various stored routes and the insertion of new routes as changes in the operation become necessary. There are two methods in general use by which the new routes may be inserted. The first method calls for a general cancellation of all the routes stored in the initial storage banks, of which there may be as many as five such routes, and the inserting again in proper order of a route for each of the cancelled routes with the necessary corrections being introduced during the new storage action. The other method calls for a cancellation of the individual routes starting with that route most recently stored, and cancelling one at a time in the reverse order of storage until the incorrect route is cancelled. The new corrected routes are then inserted in the order that the cars will pass over the initial switch. Either of these operations, it may be seen, requires considerable time and effort on the part of the operator. Particular care is necessary that the proper cancellations are made and that the new routes are inserted in the correct order.

At some classification yards, special operations are required in the everyday operation of that particular yard. For example, it may be a requirement that each car passing over the hump and traveling into the various classification tracks must be weighed. This is generally done by a track scale capable of weighing the moving cars and located between the hump and the initial switch to the

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classification yard tracks. In such a case, the trains to be classified must be separated into individual cars which then are weighed as they move across the track scale prior to their passage over the first switch. The route for each car is generally stored in the initial storage bank as that particular car reaches the crest of the hump. In other words, the routes are stored prior to the time that the car passes over the track scale. As a result, in such yards, the frequency at which changes in routing are required is rather high by comparison with a yard where such weighing is not a requirement of general operation. For example, it will frequently occur that a car is not properly weighed or is not weighed at all as it crosses the track scale. Such cars must later be returned to the hump and again passed over the scale in order to be properly weighed. Therefore, it is a definite advantage if such cars can be routed to a holding track from which they may be pulled back and again pushed over the hump. This eliminates the necessity for separating them from other cars which were properly weighed and properly classified. The cancellation and insertion of a new route for each of these cars which is not properly weighed requires time and effort on the part of the operator all out of proportion to the general operation for which he is responsible. In fact, it has been found that unless special measures are provided, such cancellation and the insertion of new routes hinders the regular operation of the yard, reducing the time which the operator can spend in handling the storage of routes and observing the regular movement of the cars to the various classification tracks.

Thus a definite advantage can be realized in the operation of such yards by having a method by which a single action on the part of the operator initiates an automatic sequence of operations which cancels the previously designated route for a particular car and substitutes, for that designated route, a preselected route to a holding track. It is possible in these cases to preselect this special routing since the holding track or, as it is known in one railroad, the "blow-out" track is the same for all diverted cars which are not properly weighed. In other words, any car which is not properly weighed is diverted to a particular track designated for such cars. From this track the cars may, as time permits, then be pulled back and again pushed over the hump for proper weighing and proper classification. However, a system providing such substitution can also be used to divert cuts, in a regular classification yard, which may have joined or coupled together as they move through the yard prior to reaching their final destination. Such coupled cuts are generally allowed to follow the designated route of the first of the two cuts, and the route for the second cut is cancelled out. The second cut must then be later separated from a string of properly classified cars and itself properly placed. However, if the two coupled cuts were diverted to a particular hold-track, it would be much easier and quicker to later pull both of the cuts back for proper classification without having to separate them from other cars which were originally properly classified.

It is thus an object of our invention to provide means, in an automatic switching system for railway classification yards, which will quickly and simply substitute another route for the previously designated route for a particular cut of cars.

A further object of our invention is to provide means in such an automatic switching system to permit the operator, by a single action on his part, to substitute a preselected route for the designated route for a particular cut of cars.

Another object of our invention is to provide means to cancel the designated route stored for a car approaching

an automatically controlled switch and substitute for that car a preselected routing beyond that switch.

A still further object of our invention is to provide means for the operator of an automatic switching system for railway classification yards, by a single action, to cancel the route stored in the storage banks for a car approaching a switch and substitute a preselected route without disturbing the remaining routes already stored in the storage bank for succeeding cars.

Other objects and features of our invention will be obvious from the following description and the appended claims.

In accomplishing the various objects and features of our invention, we provide, on the control panel for such an automatic switching system, a single push button which the operator may push in order to substitute the hold-track route and divert the corresponding car to such a track. Other means may or may not be provided, as a railroad desires, to select from time to time between various tracks in the yard for the hold-track assignment. The substitution push button operated by the yard operator, in his single required action, controls a stick relay which remains energized until the substitution of the hold-track route is completed. This stick relay is used to cancel the designated route, for a car or cut of cars which is to be diverted, stored in a route storage bank for the switch toward which the particular car or cut of cars is approaching. This stick relay is further used to prevent the transfer of the route held in the next preceding storage bank, since this transfer operation would normally automatically occur as soon as the particular storage bank is empty. Instead, with the push button repeater stick relay energized and the storage bank clear of any storage due to the cancellation, a storage insertion relay is energized and is then held energized by the push button stick relay until the substitution action is complete. This storage insertion relay prepares the particular storage bank to receive a new storage by reenergizing the storage detector relay for that bank. The insertion relay then further energizes the proper route storage relay or relays for the hold-track routing. The energized storage relays are then held energized in the usual manner by the storage detector relay for that bank. When the route storage relays are energized, the track switch will be properly controlled to route the approaching cut of cars to the selected hold-track. With a route storage relay and the detector relay for the particular bank picked up, and the hold-track stick relay and the storage insertion relay also picked up, a function-complete relay is then energized. The energizing and resulting pickup of this function-complete relay causes the various substitution relays to be reset to their normal, deenergized position, returns the entire apparatus to its normal condition, and allows the usual sequence of operation to then continue. Thus, as will be described in more detail shortly, the single action of the operator in pushing the hold-track or substitution push button cancels the previously designated route for the approaching car, prevents the transfer of the next succeeding designated route into the empty storage bank, substitutes the routing to the hold-track for that approaching car, and, when this substitution is complete, resets the apparatus to its normal condition to permit the continuation of the normal sequence of operation.

We shall now describe a single form of apparatus embodying the features of our invention, and shall then point out the novel features thereof in the appended claims.

Referring now to the drawings, Fig. 1 is a diagrammatic view of a small classification yard which is provided with an automatic switching system. Fig. 1 also shows the flow plan for the route storages from the control panel through the initial route storage banks at the first switch for the yard, indicating the manner in which

the hold-track route is substituted into the A bank of the initial storage banks.

Fig. 2 is a diagrammatic view of one form of apparatus which embodies the features of our invention when applied to the automatic switching system for the yard shown in Fig. 1.

In each of the drawings similar reference characters refer to similar parts of the apparatus.

Referring now to Fig. 1, a railway classification yard is shown having six classification tracks. As indicated in the drawing, tracks 1 and 2 are designated as hold-tracks but these tracks may also be used at times for the regular classification of cars. It is to be understood that the hold-track in a classification yard may be a special track which has no other designation and which is not normally used for the classification of cars. It is also to be understood that our invention may be applied to any size classification yard, especially those having a greater number of tracks than the number shown in this particular figure. In other words, for purposes of this application, the classification yard in Fig. 1 is greatly simplified over those in general use on railroads. A track scale is provided on the lead from the hump to the first switch for the purpose of weighing each car passing into this classification yard. Cars roll singly, under the influence of the force of gravity, from the hump which is to the left of the drawing, over the track scale, and into the classification tracks at the right of the yard shown. Each car is weighed as it passes over the track scale. In the operation of this classification yard, these cars are diverted by the five switches shown into one of the six classification tracks. All cars of necessity pass over the switch designated 1-6SW. This switch is controlled by a switch motor 1-6 shown in block form in the drawing. It is understood that this switch motor may be of any form well known in the art. For example, it may be either an electric motor or an electropneumatic switch movement. Each switch in the yard shown is similarly equipped with a similar switch motor but such motors and their controls are not shown for simplicity.

The switch motor 1-6 is controlled to operate switch 1-6SW to its normal or reverse position by the relays in bank A, as indicated conventionally by the dotted line, of the initial storage banks of the automatic switching system with which this classification yard is provided. As indicated diagrammatically in this drawing, the designated routes are initially stored in bank C, being inserted therein directly from the control machine as selected by the yard operator. The route storages then advance successively into bank B and into bank A as these succeeding banks become empty. When a car passes over the switch 1-6SW, the corresponding route stored in bank A is then transferred to the similar storage banks for the next switch location along the route being followed by that particular car. The apparatus for this operation is not shown herein in detail since it is not part of our invention. For a complete description and showing of such an automatic switching system, reference is made to the copending application for Letters Patent of the United States, Serial No. 355,281, filed May 15, 1953, now U.S. Patent 2,863,991 granted Dec. 9, 1958 by Benjamin Mishelevich, for Automatic Control of Railway Classification Yard Track Switches. A complete description and understanding of the automatic switching system may also be obtained from Manual 517, entitled, "Automatic Switching for Classification Yards," published January 1953 by the Union Switch & Signal Division of Westinghouse Air Brake Company. Since a complete description of the automatic switching system may be obtained either from the above-mentioned copending application or from Manual 517, it is not necessary to herein provide a complete description of the operation. Only such operation and apparatus as is necessary for an understanding of our invention is thus shown and described herein.

Referring again to Fig. 1, if a car passing over the track

scale is not weighed, the operator is instructed to divert that particular car to the hold-track then in use for diverted cars. As previously mentioned, the operation of the hold-track push button causes the route, for the approaching car, then stored in bank A of the initial storage banks to be cancelled. At the same time, the routes stored in banks B and C are held, that is, their transfer to bank A is prevented. Then the preselected hold-track route is inserted into bank A and the switch 1-6SW is operated, in this case, to its reverse position. The substitution apparatus is then reset and the automatic switching apparatus allowed to continue its normal sequence of operation. As this car passes over switch 1-6SW, the hold-track routing is transferred to the storage banks for switch 1-2SW to which the diverted car is traveling. As the route storage for the diverted car is transferred to the next storage banks, the route storage in bank B for the following car is transferred to bank A and the normal operation continues. It is to be understood that the substitution of the preselected hold-track route may be accomplished in any storage bank. For simplicity, this present description deals only with the A bank.

Referring now to Fig. 2, there is shown apparatus embodying the features of our invention that are necessary for the automatic switching system for the classification yard of Fig. 1. Most of the apparatus shown in Fig. 2 is that relating to or associated with bank A of the initial storage banks of the automatic switching system. However, contacts of several relays in the B bank of the initial storage banks are also shown as they are included in circuits necessary for the operation of the system of our invention. One other circuit, to be described in more detail later, extends through the storage banks for other switch locations. Again, in this figure of the drawings, only those circuits and the apparatus necessary for a discussion of the operation of the apparatus as it embodies our invention are shown. For a complete description and showing, reference is again made to the aforementioned Mischelevich compending application or to Manual 517.

The apparatus of the automatic switching system is provided with a source of direct current, such as a battery, which is not shown in the drawing for simplicity. However, the positive and negative terminals of the source, when shown, are designated by the reference characters B and N, respectively.

The apparatus of Fig. 2 will now be described generally before taking up the detailed operation of the substitution of the preselected route. The relays A1C to A6C, inclusive, shown at the right of Fig. 2, are the route storage relays for bank A of the initial storage banks. In the present application, each relay is associated with a particular classification track. For example, relay A1C is associated particularly with track 1, and any time that relay A1C is energized and picked up, the route to classification track 1 is stored in this particular bank. It is to be understood that in a larger classification yard, additional storage relays would be necessary in this and other storage banks. In fact, as shown in Manual 517, where more than ten classification tracks are included, it is the practice to use two relays to store the route for each classification track. It is to be understood also that the system of our invention may be applied to such larger classification yards with a greater number of tracks and that, for simplicity only, the tracks in the present showing have been limited to six.

During normal operation of the system, that is, when no substitution operation is in progress, the storage relays are energized over contacts of the similar storage relays in bank B of the initial storage banks. Only the contacts of these storage relays of the B bank that are included in the energizing circuits for the A bank storage relays are shown in the drawing in order to make it easier to understand the system of our invention. A typical circuit for energizing one of the storage relays, for example,

relay A6C, may be traced from terminal B at front contact *a* of transfer relay AT, over front contact *a* of relay B6C, back contact *a* and the winding of relay A6C, and front contact *a* of storage detector relay AD to terminal N. When relay A6C picks up, a stick circuit is completed from terminal B at its front contact *a* including the winding of the relay and front contact *a* of relay AD. The transfer contact *a* of each of these storage relays is of the type known as a continuity or make-before-break contact. This is indicated in the drawing by the short arc shown near the end of the armature of the particular contact for each of these relays. Thus the stick circuit for each relay is completed prior to the interruption of the initial energizing circuit at its back contact *a*. It will be noted here that the similar energizing circuits for relays A1C and A2C each also include a back contact of a relay SI. The purpose of these back contacts and the corresponding front contacts will be described shortly, but for normal operation these back contacts remain closed and thus have no effect upon the energizing circuits.

The transfer relay AT here shown is identical with the transfer relay shown in the aforementioned Manual 517 in the general automatic switching systems. This relay is energized and picks up whenever a transfer of a route storage is to be made from the B bank into the A bank. The energizing circuit for relay AT may be traced from terminal B over back contact *a* of a relay BT and front contact *a* of a relay BD, both in storage bank B, back contact *b* of relay AD, back contact *b* of a relay HTS, and the winding of relay AT to terminal N. The contacts of transfer relay BT and storage detector relay BD of storage bank B are included in this circuit, as explained in the before-mentioned references, to determine that there is a storage in bank B to be transferred and that no transfer operation into bank B is in progress. This energizing circuit for relay AT differs slightly from those shown in the references by including back contact *b* of the relay HTS. The utility of this back contact will appear hereinafter during the description of the operation of the system. The closing of front contact *b* of relay AT completes an obvious stick circuit bypassing back contact *b* of relay AD. This stick circuit is effective to retain the relay energized until the transfer of the route storage from bank B to bank A is complete, which will be indicated by the releasing of relay BD to open its front contact *a*.

The storage detector relay AD is used to detect or indicate the presence of a route storage in bank A. As shown in describing the energizing circuit for relay A6C, relay AD must be energized so that its front contact *a* is closed in order to complete the energizing and the stick circuits for the route storage relays. During the normal operation of the system, relay AD will be energized from terminal B over a back contact 10, which is closed except when a general route cancellation is called for by the operator, front contact *c* of relay AT, back contact *c* of relay HTS, the winding of relay AD, and thence over back contacts, in multiple, of the transfer relay T and the detector relay D in each of the next succeeding storage banks, in series, to terminal N. When relay AD picks up and closes its front contact *a*, a stick circuit is completed for that relay which by-passes front contact *c* of relay AT, so that the detector relay AD will remain energized when transfer relay AT is released upon completion of the transfer operation.

The back contacts of the transfer and detector relays of the succeeding storage banks are included in the circuit for relay AD in order to provide a release for this relay when the transfer of the route storage is made from bank A to the storage banks associated with the succeeding switches in the various routes beyond this first switch. Therefore, contacts of these relays in the storage banks at the switches 1-2SW and 3-6SW are included in the circuit for relay AD which thus will be deenergized when

a route storage is transferred either to the storage bank at switch 1-2SW or to the storage bank at switch 3-6SW. Relay AD is of the slow release type so that its front contacts will remain closed until the transfer operation is complete, although the relay winding may be deenergized.

It is to be noted that a back contact of relay HTS is included in the energizing circuit and in the stick circuit for relay AD, the purpose of which will appear in the following discussion. As part of our invention a second energizing circuit is also provided for relay AD which may be traced from terminal B at back contact 10 over front contact *e* of a relay SI through the winding of relay AD and as previously traced to terminal N. The utility of this circuit will also appear shortly.

In providing the features of our invention, we have added to the general automatic switching system the hold-track lever HT, the substitution or hold-track push button HTPB, the hold-track stick relay HTS, the storage insertion relay SI, and the function-complete relay FC. As indicated by the dot-dash rectangle enclosing the hold-track lever and push button, lever HT and push button HTPB are mounted in the control machine near the bank of push buttons by which the operator may select the classification track to which the various cuts are assigned. The hold track lever HT is provided to allow a selection between tracks 1 and 2 as the destination of cars which must be diverted from the normal switching operations. This selection between two or more tracks as a hold-track assignment may or may not be provided as is desired by the railroad making the installation. As previously mentioned, the hold-track may also be a separate track not normally used to receive cars being classified, but used only for the purpose of receiving the diverted cars. The hold-track push button is provided as a means for initiating the substitution operation which diverts a particular car to the hold-track. The yard operator need only actuate this push button to close its contact *a* to initiate the entire operation.

The hold-track stick relay HTS repeats the operation of the hold-track push button HTPB, but only if a route is stored in the A bank. The circuit for energizing relay HTS may be traced from terminal B over contact *a* of push button HTPB, front contact *d* of relay AD, and the winding of relay HTS to terminal N. When relay HTS picks up, the closing of its front contact *a* completes a stick circuit for this relay which includes back contact *a* of relay FC. As will develop hereinafter, this stick circuit is effective, so that relay HTS remains picked up, until the substitution operation has been completed. When relay HTS picks up, it also interrupts various other circuits at its back contacts *b* and *c* as will appear during the description of the general operation of the system.

The storage insertion relay SI is energized when the conditions are fulfilled that a substitution is requested and the designated route cancelled, that is, relay HTS picked up and relay AD released. The circuit for relay SI may be traced from terminal B over front contact *d* of relay HTS, back contact *e* of relay AD, and the winding of relay SI to terminal N. Closing of front contact *a* of relay SI completes a stick circuit which by-passes the back contact of relay AD, but includes front contact *d* of relay HTS. Relay SI when picked up to close its front contacts causes the preselected hold-track route to be inserted into storage bank A. Again, this operation will be described later.

The function-complete relay FC, which is used to indicate that the substitution operation has been completed, is not energized until all of the conditions of the substitution have been met. Thus the energizing circuit for relay FC may be traced from terminal B over front contact *c* of relay A1C and right-hand contact *b* of lever HT, or over front contact *c* of relay A2C and left-hand contact *b* of lever HT, and thence over front contact *d* of relay SI to indicate that the storage insertion is complete, front contact *f* of relay AD to indicate that the

hold-track route is stored in bank A, front contact *e* of relay HTS to indicate that the substitution has been called for, and through the winding of relay FC to terminal N. When relay FC picks up, opening of its back contact *a* starts the resetting action of the apparatus to return the system to its normal operation, as will be shortly described. Since only a single contact of relay FC is used to initiate the resetting action, the energizing circuit for this relay could be used, by proper modification, to initiate the resetting action and relay FC eliminated. While our invention contemplates such a modification, for simplicity only the arrangement using relay FC will be discussed.

We shall now describe the operation of the apparatus in substituting the hold-track route for a previously designated route for a car that is approaching the track switch 1-6SW. We shall first assume that the designated route for the car approaching the first switch is to track 6. Under this condition, when the route storage for the approaching car has been transferred into bank A of the initial storage banks, relay A6C will be energized and will be held energized by its stick circuit previously traced, the stick circuit including front contact *a* of detector relay AD. Relay AT remains released at this time since its energizing circuit is open at back contact *b* of relay AD. Relay AT was deenergized and released when its stick circuit was interrupted by the release of relay BD at the completion of the route transfer into bank A. It is assumed also that the route for a following car is at this time stored in bank B, but because front contact *a* of relay AT is open, the closing of a front contact *a* of one of the relays B1C to B6C is ineffective to energize the corresponding relay in the A bank. Relays HTS, SI, and FC are at this time in their normal, deenergized condition as shown in the drawing.

It is now assumed that this car approaching switch 1-6SW is incorrectly weighed as it passes over the track scale shown in Fig. 1. The operator is immediately instructed to divert this car to the hold, or "blow out" track. Upon receiving these instructions, and when his route storage indicator shows that the designated route for the car not weighed has transferred to bank A, the yard operator pushes the hold-track push button HTPB. Having performed this action, the operator is then free to proceed with other business in the operation of the classification system. Closing of contact *a* of push button HTPB immediately energizes relay HTS, since front contact *d* of relay AD is closed because of the route storage existing in bank A. Relay HTS, having picked up, completes its stick circuit and remains energized.

The opening of back contact *c* of relay HTS interrupts the stick circuit for relay AD and this relay shortly releases at the end of its slow release period. When relay AD releases, the opening of its front contact *a* interrupts the stick circuits for the route storage relays and those which have been energized are released. In the present case, relay A6C was assumed to be picked up and it is now released to cancel the route stored in bank A for the approaching car. The release of relay A6C clears the A storage bank of any stored route, which ordinarily would initiate the transfer of the route storage from bank B into the now empty bank A. However, the opening of back contact *b* of relay HTS interrupts the energizing circuit for transfer relay AT so that this relay is not energized when relay AD releases to close its back contact *b*. Relay AT thus cannot pick up to initiate the transfer of the route storage from bank B into bank A at the present time. The routes stored in banks B and C, as shown in Fig. 1, are thus held inactive in these banks during this substitution operation, and the cancellation of the previously designated route for the approaching car has no effect upon the stored routes for the succeeding cars.

With relay HTS picked up and relay AD now released, the energizing circuit previously described for relay SI

is completed and this relay picks up, completing its stick circuit which includes the front contact *d* of relay HTS. Closing of front contact *e* of relay SI completes the second energizing circuit for relay AD, which circuit includes back contact 10, front contact *e* of relay SI, and the multiplied back contacts of the transfer and detector relays in the succeeding storage banks. This circuit is completed at this time over the back contacts of the transfer relays T which are deenergized since no route transfer is occurring to these succeeding banks. When relay AD, thus reenergized, picks up again, the circuits are completed for inserting the hold-track route into the storage relays of the A bank. As shown in the drawing, with lever HT in its right-hand or track 1 position, the circuit may be traced from terminal B over right-hand contact *a* of lever HT, front contact *b* of relay SI, back contact *a* and the winding of relay A1C, and front contact *a* of relay AD to terminal N. With lever HT in this position, that is, position 1, relay A1C is energized and picks up completing its stick circuit at its own front contact *a* to store the hold-track route to track 1. If lever HT is in its left-hand or track 2 position, the circuit would be over left-hand contact *a* of lever HT, front contact *c* of relay SI, back contact *a* and the winding of relay A2C, and front contact *a* of relay AD to terminal N, so that relay A2C would be energized and pick up to store a route to track 2. However, assuming that the lever HT is in its No. 1 position, relay A1C pick up to complete at its front contact *b* the circuit for energizing the controls for the switch motor 1-6, shown in Fig. 1, which operates switch 1-6SW to its reverse position. Thus the car approaching that switch will be diverted from its original designated route to track 6 to the route to track 1.

With the hold-track route for the diverted car now stored in bank A of the initial storage banks, the substitution is accomplished and the circuit previously traced for relay FC is complete. This circuit under the present conditions includes front contact *c* of relay A1C and right-hand contact *b* of lever HT as well as front contacts of relays SI, AD, and HTS. It is to be understood that front contact *c* of relay A1C in this energizing circuit for relay FC is intended to represent a completed route storage in the A bank and may in larger yards be two or more front contacts, in series, of a corresponding number of storage relays. Our invention is intended also to apply to this larger type of installation.

When relay FC picks up, opening of its back contact *a* interrupts the stick circuit for relay HTS which then releases. The release of relays HTS, opening its front contact *d*, interrupts the stick circuit for relay SI which follows with its release. However, back contact *c* of relay HTS closes before front contact *e* of relay SI opens, so that the stick circuit for relay AD is completed prior to the opening of its energizing circuit over front contact *e* of relay SI. Relay AD therefore holds up to retain the route storage in bank A until such time as the car passes the switch location. Thus the control of relay AD is returned to its normal circuit arrangements at this time and the operation of the system can resume its normal sequence. The closing of back contact *b* of relay HTS prepares the circuit for energizing relay AT, so that when conditions are proper, route transfers from bank B may be resumed. With both relay HTS and relay SI releasing, the circuit for relay FC is interrupted and this relay likewise releases. This resets the substitution apparatus to its normal condition as shown in the drawing and the general automatic switching system of which this is a part returns to its normal sequence of operation. In other words, when the car being diverted to hold track 1 crosses switch 1-6SW, the route storage for that car is transferred from bank A to the storage banks at switch 1-2SW. Following this the route stored in bank B of the initial storage banks for the succeeding

car may be transferred into the A bank and the switch 1-6SW operated accordingly.

It has thus been shown that the apparatus embodying our invention enables the operator of a classification yard equipped with an automatic switching system to substitute a preselected hold-track route for a previously designated route for a particular car, with only one operation being required on the part of the operator. Thus the diverting of cars from their previously designated route to a special routing because of unusual circumstances does not seriously interfere with the general operation of the yard by the operator. Since the single operation required in pushing the hold-track push button does not require much time or effort on his part and does not claim his attention away from the usual operation for which he is responsible, the advantage of our invention to the operator and the improvement in operation of the entire yard because of the system of our invention will be obvious to those familiar with such classification yards.

Although we have herein shown and described but one form of substitution apparatus embodying our invention, it is to be understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of our invention.

Having thus described our invention, what we claim is:

1. In an automatic switching system, a route storage bank, comprising, in combination, storage means for storing a route code, means for supplying a route code to said storage means when said storage means is inactive, means for interrupting the operation of said code supplying means, means controlled by said interrupting means for cancelling the route code stored in said storage means, means controlled by said interrupting means for storing a preselected route code in said storage means, and means responsive to the storage of said preselected route code for resetting said interrupting means to restore the operation of said code supplying means.

2. In an automatic switching system, a route storage bank, comprising, in combination, storage means for storing a route code, means for supplying a route code to said storage means when said storage means is inactive, a route substitution push button, a relay, means controlled by said route substitution push button for energizing said relay, means controlled by said relay in its energized condition for interrupting the operation of said code supplying means, means controlled by said relay in its energized condition for cancelling the route code stored in said storage means, means controlled by said relay in its energized condition for storing a preselected route code in said storage means, and means responsive to the storage of said preselected route code for deenergizing said relay to restore the operation of said code supplying means.

3. In an automatic switching system, a route storage bank, comprising, in combination, storage means for storing a route code, means for supplying a route code to said storage means when said storage means is inactive, a route substitution push button, a first relay, means controlled by said route substitution push button for energizing said first relay, a second relay, means controlled by said second relay in its deenergized condition for maintaining said first relay energized, means controlled by said first relay in its energized condition for interrupting the operation of said code supplying means, means controlled by said first relay in its energized condition for cancelling the route code stored in said storage means, means controlled by said first relay in its energized condition for storing a preselected route code in said storage means, and means responsive to the storage of said preselected route code for energizing said second relay, whereby said first relay is deenergized and the operation of said code supplying means is restored.

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4. In an automatic switching system of the type comprising a series of route storage banks associated with a series of track switches in a route through a classification yard, in which a route code is transferred from one storage bank to the next as the corresponding switch is occupied by a car, in combination, a storage transfer relay for each of said banks, means for energizing each transfer relay when the switch associated with the preceding bank is occupied by a car, a storage detector relay for each of said banks, means controlled by the corresponding transfer relay for energizing each detector relay, a plurality of route code storage relays for each of said banks, means for energizing one of said route storage relays of each bank corresponding to an energized route storage relay of the preceding bank when the transfer relay for the bank is energized and the storage detector relay for the bank is deenergized, means controlled by the storage detector relay for each bank in its energized condition for maintaining energized any previously energized route storage relay for that bank, a route substitution push button associated with a selected bank, a first relay, means controlled by said push button and the storage detector relay for said selected bank in its energized condition for energizing said first relay, a second relay, means controlled by said second relay in its deenergized condition for maintaining said first relay energized, means controlled by said first relay in its energized condition for releasing the storage detector relay for said selected bank, means controlled by said first relay in its energized condition for preventing the energization of the route transfer relay for said selected bank, a third relay, means controlled by said first relay in its energized condition and

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the storage detector relay for said bank in its deenergized condition for energizing said third relay, means controlled by said first relay in its energized condition for maintaining said third relay energized, means controlled by said third relay in its energized condition for energizing a preselected one of the route storage relays for said selected bank, means controlled by said third relay in its energized condition for reenergizing the storage detector relay for said selected bank, and means controlled by said preselected route storage relay, said first relay, said third relay, and the storage detector relay for said selected bank in their energized conditions for energizing said second relay.

5. An automatic switching system, comprising, in combination, a series of route storage banks, transfer means for transferring a route code to each bank from the preceding bank as the previous route stored in the bank is cancelled, a route substitution push button associated with one of said banks, means controlled by said push button for interrupting the transfer means for the associated bank to prevent the transfer of the route stored in the preceding bank, means controlled by said interrupting means for cancelling the route stored in the associated bank, substitute route inserting means controlled by said interrupting means for storing a preselected route in said selected bank, and means controlled by the storage of said substitute route for resetting said interrupting means to restore the operation of the associated transfer means.

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