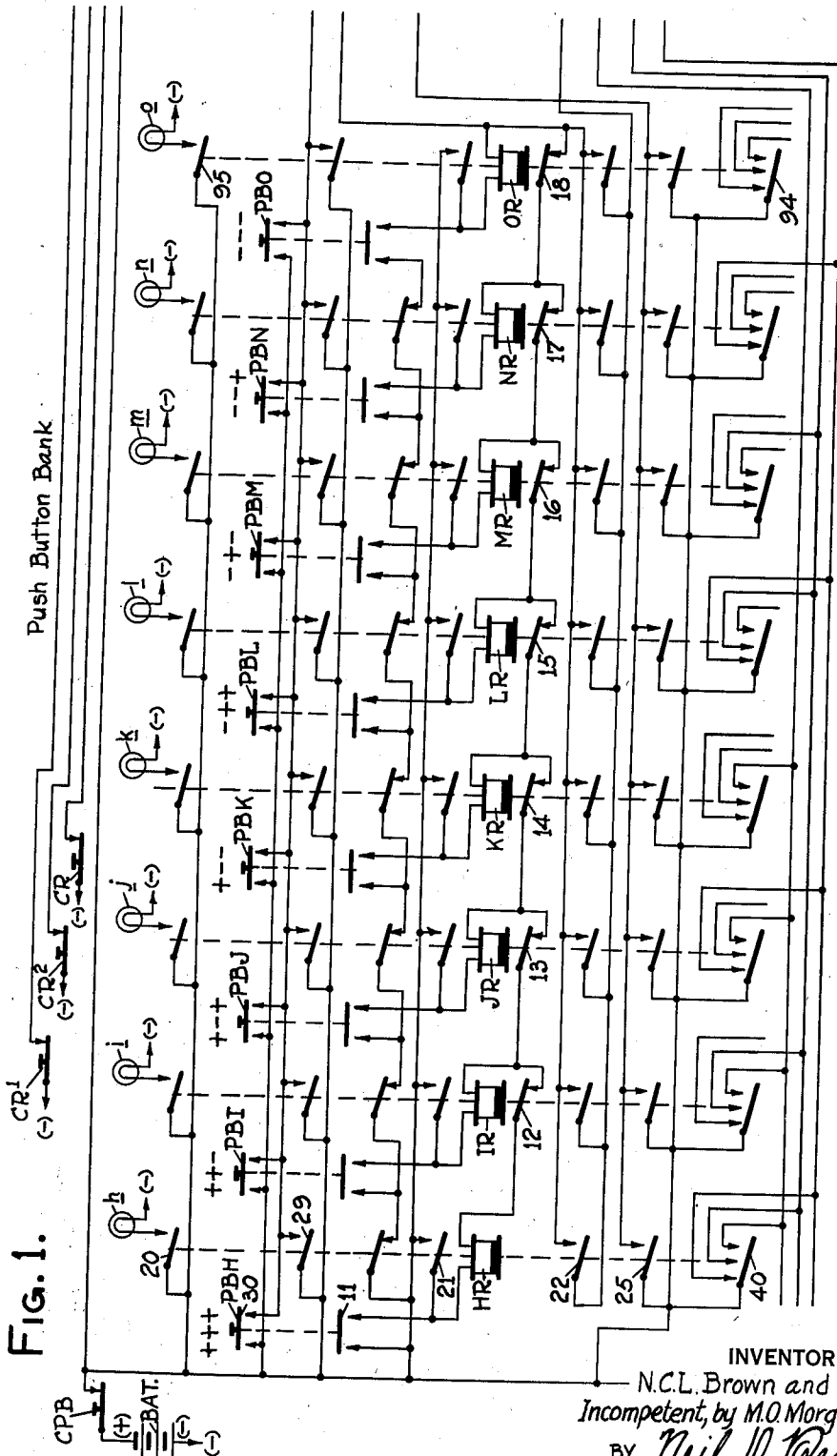


March 19, 1940.

N. C. L. BROWN ET AL
SYSTEM FOR AUTOMATICALLY CONTROLLING THE SWITCHES
IN A RAILROAD CLASSIFICATION YARD
Filed Dec. 9, 1938

2,194,353

6 Sheets-Sheet 1



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BY *Neil D. Preston*, ATT'Y.

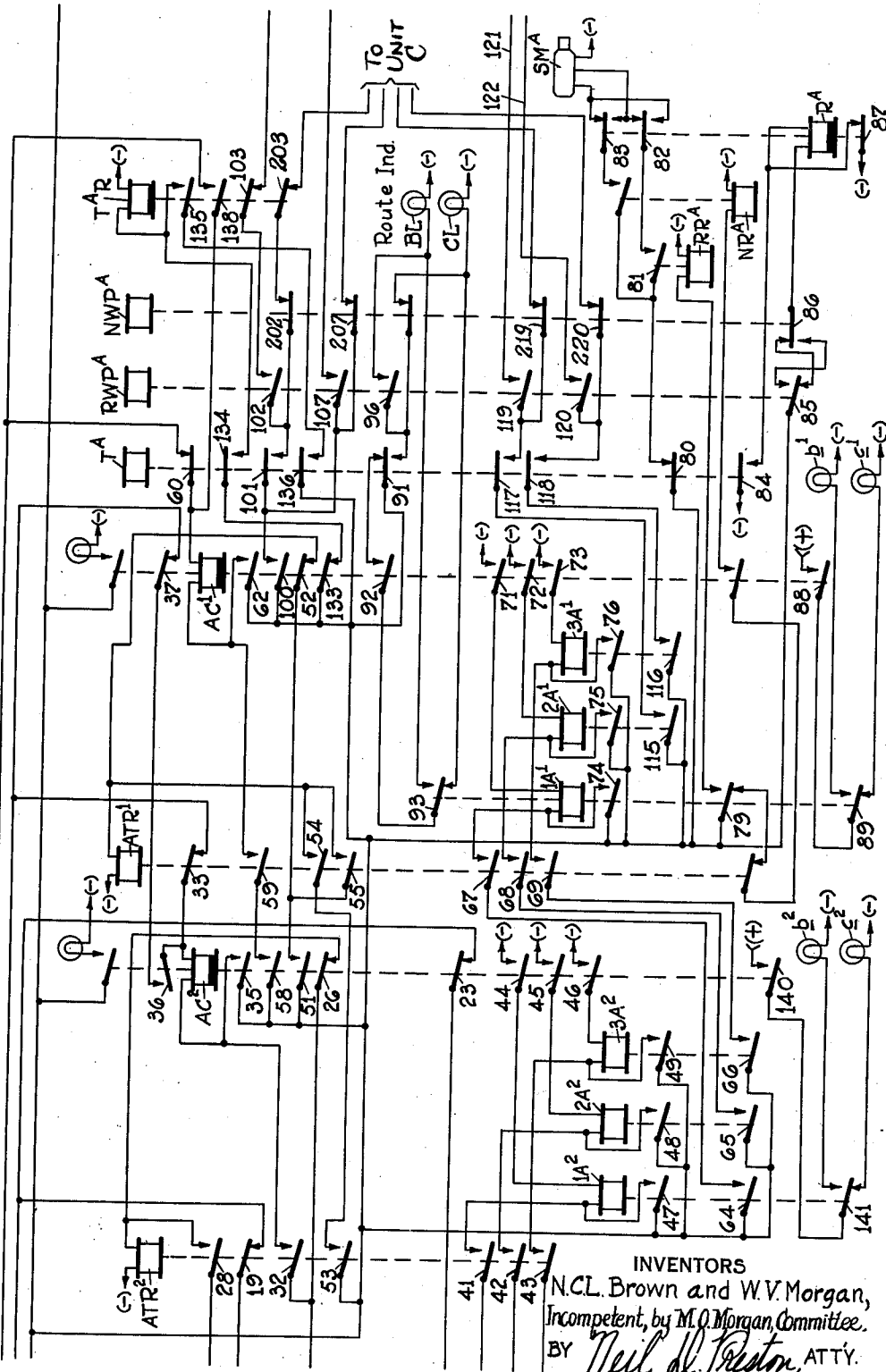
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2,194,353

6 Sheets-Sheet 2

FIG. 2. Storage Bank A² UNIT A Storage Bank A¹



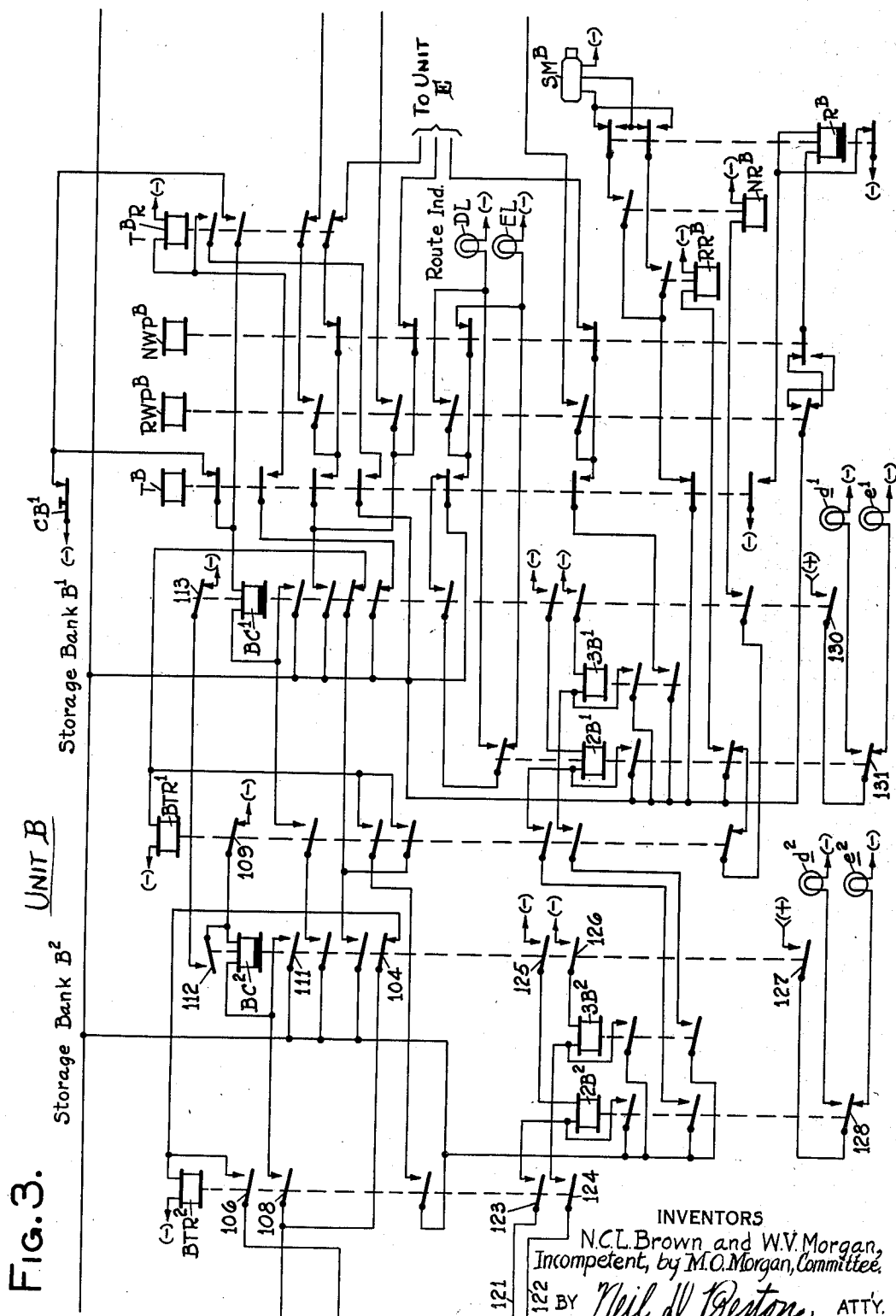
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6 Sheets-Sheet 3



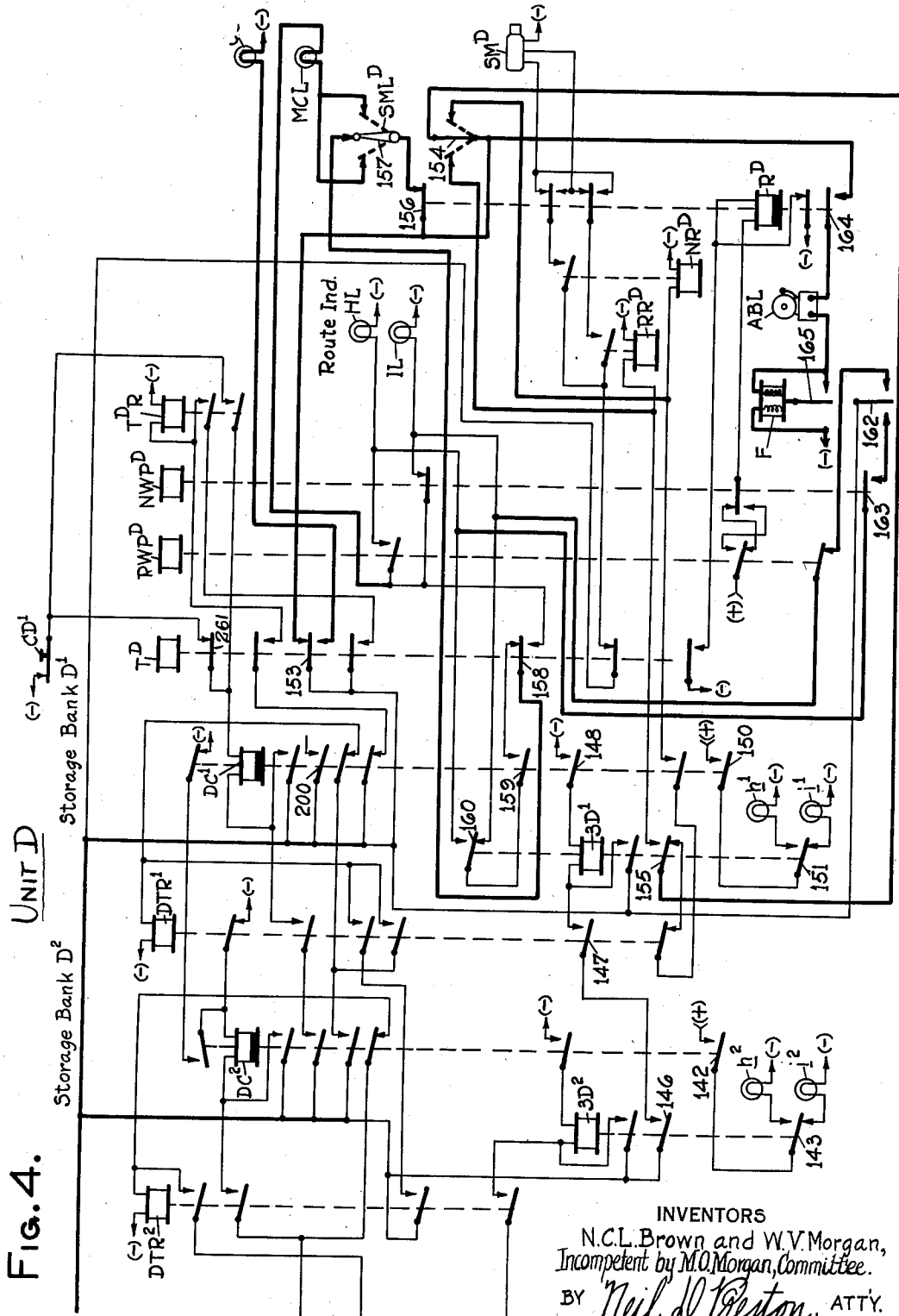
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6 Sheets-Sheet 4



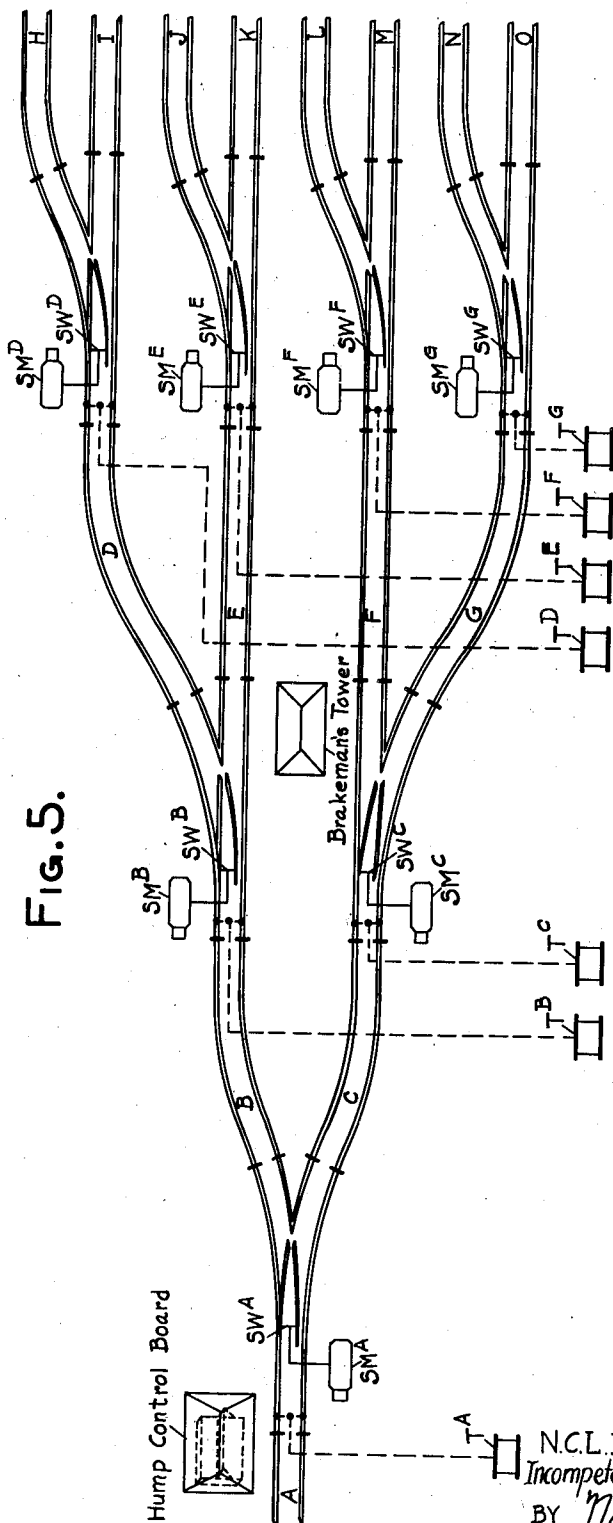
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6 Sheets-Sheet 5



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6 Sheets-Sheet 6

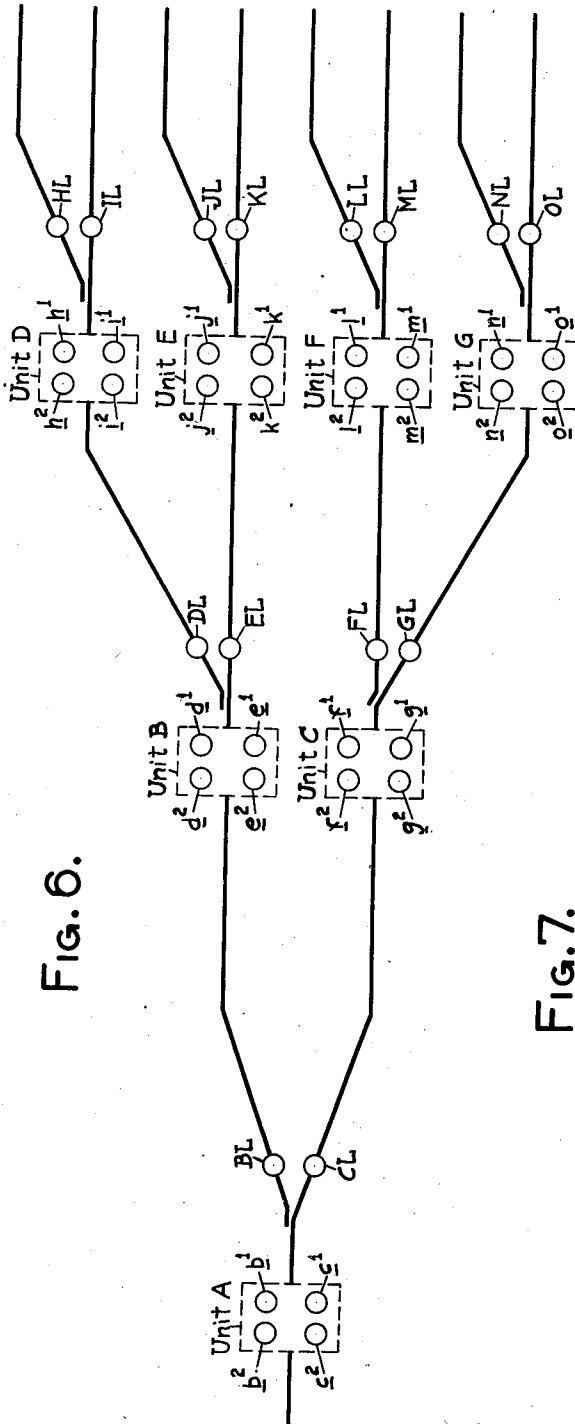
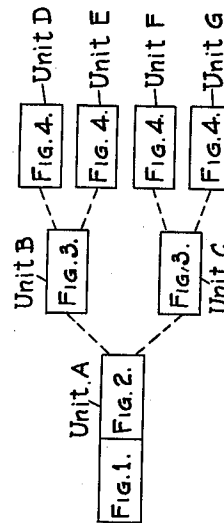


FIG. 7.



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UNITED STATES PATENT OFFICE

2,194,353

SYSTEM FOR AUTOMATICALLY CONTROLLING THE SWITCHES IN A RAILROAD CLASSIFICATION YARD

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Application December 9, 1938, Serial No. 244,816

32 Claims. (Cl. 246—2)

This invention relates to apparatus for automatically controlling the track switches of a hump-yard system, or the like, and includes train describer apparatus for transmitting a train description of the car destination to successive track switches in a route as such train or car approaches these track switches, each switch being controlled by such train describer apparatus before a car reaches it and after such car enters upon the next track switch in the rear, and is an improvement over the invention disclosed in the prior application of Phinney Ser. No. 111,671 filed November 19, 1936, and the prior application of Brixner and Coley Ser. No. 242,250, filed November 25, 1938.

A hump-yard classification system is a yard of railway tracks and track switches, wherein a single track preferably leading from a hump or hill diverges into a large number of storage tracks through suitable track switches. In practice, cars, or cuts of cars as they are sometimes called, are allowed to run down the hump in close succession, each car or cut of cars to a particular storage track. In practice, a large number of such cars, or cuts of cars, follow each other off the hump in close succession, and in order that a track switch may assume the proper position when a particular car reaches it, it is often necessary that the track switch be operated immediately upon vacancy of the detector track circuit associated therewith by the car next in advance. In other words, the requirement of time of operation of track switches is often so precise that automatic control of the track switches is desirable in order that a track switch may be operated as soon as its detector track circuit becomes unoccupied by a preceding car. Since the cars to be classified may be so closely spaced that several differently classifiable cars may occupy the same stretch of non-track circuited track between two successive track switches, it is necessary to have suitable train describer storage apparatus which will store, so to speak, the destination each particular car of several cars is to take, so that this stored indication may operate the track switch before the car designated thereby reaches such track switch. In modern hump-yard train classification systems the cars or cuts of cars, are retarded by suitable track brakes, which track brakes are controlled from a brakeman's tower located below the hump and from which tower the distribution and storage tracks are clearly visible. The car descriptions stored in the train describer system are preferably registered therein by a man located on the hump where the train

to be broken up or classified is located. The brakeman's tower and hump control board have been shown in Fig. 5 of the drawings.

In accordance with the present invention it is proposed to construct the train describer system entirely of manually operable contacts, relays and circuits, which relays are neutral relays many of which are provided with stick and holding circuits. It is proposed to employ a plurality of storage relay banks of which two such storage banks have been shown in each of the storage units, one unit being shown in each of Figs. 2, 3 and 4. The number of storage banks in each storage unit should be such that all of the cars that may occupy the approach track leading to a track switch may have their descriptions stored therein, one car description for each storage bank. Each of these storage banks include three kinds or characters of relays. Each storage unit includes carrier relays which by being energized manifest that a train description is stored in that bank of such unit, include storage relays which manifest what this train description is and include transfer relays which determine when a train description may be transferred to the next successive storage bank. When the train destination is to be transferred from one storage unit to another storage unit, each of Figs. 2, 3 and 4 showing one such storage unit, a detector track relay associated with the track switch separating such storage units must be operated. More specifically these track relays are employed for determining when the train destination shall be transferred from the first storage bank of one storage unit to the last storage bank of another storage unit in advance thereof. By "first" storage bank is meant the storage bank first to store a train destination in a storage unit. These "first" banks have been designated by the exponent "1" affixed to a letter characterizing the storage unit. Similarly the "last" storage bank signifies the bank of a unit last to store a train destination.

The present invention particularly distinguishes from the invention disclosed in the application of Brixner and Coley in the provision of the carrier relays, which carrier relays enable an all negative code to be stored in the storage relays. By all negative code is meant a code in which all of the storage relays remain deenergized. In this connection it may be pointed out that each of the storage relays of a bank definitely defines the position a particular switch is to take for the particular car stored in the storage bank. For instance, if the first storage relay in a storage

bank is energized (+ code element) it means that the first switch in the route over which the described train is to move will assume the reverse position, if the second relay of the storage bank is deenergized (- code element) it shows that the second switch in the route is to remain in its normal position, and so on, there being as many storage relays as there are switches yet to be encountered by the car described by the storage bank. If all of the switches in the route are to remain in their normal position (- - - code) all of the storage relays remain deenergized and the fact that a train description is stored in the storage bank is then wholly manifested by the energized condition of the carrier relay of the storage bank. By this construction one one storage relay in a storage bank may be eliminated for each track switch that a car has already passed over. In other words, the storage banks shown in Fig. 2 include three storage relays, the storage banks shown in Fig. 3 include only two storage relays, and the storage banks in Fig. 4 include only one storage relay. In other words, one of the objects of the present invention resides in the provision of relays so interlocked and interconnected as to perform the necessary functions with the minimum number of relays especially for the more involved hump-yard systems where eight or more storage tracks are employed. More specifically, for the complete system shown conventionally in Fig. 7, unit A employs ten relays, units B and C employ each only eight relays, units D, E, F and G employ each other six relays, making a total of fifty transfer, carrier and storage relays. Other objects and purposes of the present invention reside in the arrangement of relays and circuits which may be readily expanded to control the larger hump-yard systems irrespective of the nature of the track layout.

Other objects, purposes and characteristic features of the invention will be more particularly pointed out in the description hereinafter and will in part be obvious from the accompanying drawings, in which:

Fig. 1 shows the push button bank of control push buttons and storage relays of which the push buttons at least are located on the hump control board.

Each of Figs. 2, 3 and 4 show the apparatus of storage units; Fig. 2 showing a storage unit employing three storage relays for each bank; Fig. 3 shows a storage unit employing two storage relays for each bank; and Fig. 4 shows a storage unit; Fig. 2 showing a storage unit each bank.

Fig. 5 illustrates the actual selected track layout together with the various track switches, switch machines, and track relays, together with the hump control board located on top of the hump and the brakeman's tower located near the storage tracks.

Fig. 6 illustrates a miniature track layout comprising a control and indication panel on which are located the indicating lamps, this panel preferably being located in the brakeman's tower where also is preferably located the apparatus shown in Figs. 2, 3 and 4.

Fig. 7 shows how if Fig. 3 is reproduced once and Fig. 4 is reproduced three times, as by making photostat copies thereof, the entire system selected to illustrate the present invention may be built up by connecting Figs. 1, 2, 3 and 4 as illustrated in Fig. 7 of the drawings.

If the entire system is to be thus reproduced

the reference characters in the photostat copies should be changed as is obvious from the drawings when taken with the description.

Apparatus

Referring to Fig. 1 of the drawings the apparatus includes push buttons PBH, PBI, PBJ, PBK, PBL, PBM, PBN and PBO, one button for each storage track, the last letter in each reference character being the reference character for the storage track (see Fig. 5) to which such push button sends a car. Each of these push buttons has associated therewith a push button storage relay R having a prefix letter corresponding to the letter designating the corresponding storage track. Each of these relays has associated therewith an indicating lamp which has been designated by a small letter corresponding to the capital letter identifying the approach or storage track with which this lamp is associated. Each of these relays set up a particular code in a storage bank signifying a particular track. These codes have been identified by (+) plus and (-) minus signs written over each push button wherein (+) signifies switch reversed and (-) signifies switch normal. (+) also signifies storage relay up and (-) signifies storage relay down, so that ++ signifies relays 1A² and 2A² up and relay 3A² down. These relays R are so interlocked that only one of these relays can be energized at one time, and these relays are provided with stick circuits which maintain them, one at a time, energized until the train description designated by the energized condition of such relay has been either transferred to a storage bank or has been cancelled by a cancelling push button. Four such cancelling push buttons have been shown in Fig. 1 of which the cancelling push button CPB cancels all of the train descriptions that may be stored in the entire system; of which push button CR may cancel any train description stored in the push button relays R, the cancelling push button CR² may cancel any train description that may be stored in the storage bank A² and of which the cancelling push button CR¹ may cancel any train description that may be stored in the storage bank A¹. These cancelling push buttons are preferably located on the hump control board (see Fig. 5). In Figs. 3 and 4 have also been illustrated cancelling push buttons CB¹ and CD¹. These latter push buttons are preferably located in the brakeman's tower (see Fig. 5), the cancelling push button CB¹ being used to cancel any train description that may be stored in storage bank B¹ and of which the cancelling push button CD¹ may be used to cancel any train description stored in storage bank D¹.

Each storage bank of relays is composed of a transfer relay TR, a carrier relay C, and one or more storage relays such as A, B and D illustrated in Figs. 2, 3 and 4, respectively. The transfer relays TR each have their suffix letter R provided with an exponent corresponding to the exponent identifying a storage bank in which it is located. Each transfer relay also has a prefix letter corresponding to the letter identifying the storage unit in which it is located. Similarly, the carrier relays C have their suffix letter C provided with an exponent corresponding to that of the exponent identifying the storage bank in which it is located and have a prefix corresponding to the letter identifying the storage unit in which they are located. The storage relays on the other hand are identified by the same letter which identifies the storage bank but each have a prefix

number corresponding to the order of the track switches in the route over which a particular train description governs, the prefix 1 identifying the first switch, the prefix 2 identifying the second switch, and the prefix 3 identifying the third switch to be traversed in the route. These storage relay reference characters also each include an exponent corresponding to the exponent identifying the storage bank in which it is included.

Where two successive storage banks of relays, such as storage bank A¹ and storage bank B², are separated by a track switch suitable supplemental transferring means is employed. This supplemental transferring means of the system illustrated includes a track relay such as the track relay T^A (see Fig. 2), a track repeater relay such as T^AR, which relays T^A and T^AR allow a train destination or description to be transferred only while such track relay is deenergized and before the track repeater relay is actually picked up.

There are also provided switch machine repeater relays which determine whether the train destination to be transferred shall be transferred to one storage unit or another of two storage units. In Fig. 2 the train description will be transferred to storage unit B, illustrated in Fig. 2, if the switch repeater relay RWP^A is energized, but will be transferred to storage unit C, shown conventionally in Fig. 7, if the switch repeater relay NWP^A is energized. Each storage unit in addition to being provided with the relays constituting two or more storage banks is also provided with switch machine controls NR and RR having an exponent corresponding to the track switch with which that storage unit is associated. This apparatus is also provided with a switch machine SM having an exponent corresponding to the track switch which it controls.

Each switch machine is also provided with a switch reversing relay R containing an exponent corresponding to the track switch with which it is associated. This switch machine reversing relay is a slow dropping relay and is connected in a holding energizing circuit including its own front contact and including a front contact of one switch repeater relay and a back contact of the other switch repeater relay in such a manner that this switch reversing relay R is deenergized the moment that the condition of energization of the switch control relays NR and RR is changed, but will not actually assume its deenergized condition unless the switch machine is slow in completing its stroke. This change of energization of the switch control relays will, of course, establish circuits to cause the switch machine to be operated to the reverse position. If the switch machine operates at its usual normal speed it will have assumed its new position resulting in the energization of the formerly deenergized switch repeater relay and the deenergization of the formerly energized switch machine repeater relay before the slow acting switch reversing relay R has assumed the retracted position and thereby re-establishing a holding circuit for this switch reversing relay R. If, on the other hand, the switch machine is not able to complete its stroke in time, possibly because there is an obstruction between the switch points, the switch reversing relay R assumes its deenergized position and breaks its holding circuit. With the relay R in its retracted position and the switch reversing contacts controlled by this switch reversing relay R down the control circuit for the switch machine is reversed, thereby operating the switch machine back to its original

position preventing derailment of a car. It is, of course, understood that under this condition the car which passed over the track switch will have moved into the wrong storage track, but this is considered preferable to derailment of the car.

Referring to Fig. 4 of the drawings it will be noted that certain wires therein have been shown by heavy lines. These wires are used for giving special flashing indication on the route identifying lamps HL and IL, are used to sound the alarm bell ABL and are also used to enable the operator located in the brakeman's tower to take the control of the track switch at a particular location away from the train describer apparatus to afford operation of this track switch by hand. The apparatus and wiring shown in heavy lines for connecting such apparatus to the system illustrated in Fig. 4 is also preferably used with the storage units A and B shown in Figs. 2 and 3, respectively, but this apparatus and its associated wiring has for convenience been omitted from Figs. 1 and 2. The flashing indication above mentioned is obtained through the medium of the flashing relay F shown in Fig. 4.

Brief description of system

One of the outstanding features of the combined train describing and switch operating system embodying the present invention resides in the provision of transfer apparatus associated with each storage bank including a transfer relay and a carrier relay which is so organized that the carrier relay, by assuming its energized position, manifests that a train is stored in the storage bank even though all of the storage relays of the storage bank actually assume their deenergized position. In other words, the storage relays of a storage bank identify the route over which a train, the description of which is stored in the storage bank, is to pass even though all of the storage relays of that bank assume their deenergized position. Putting this in different words, the storage relays of a particular storage bank in combination with the carrier relay of that storage bank identify the route that a train is to take. The fact that a — — — train destination is stored in this storage bank is manifested by the carrier relay assuming its energized position. The successive storage relays in a storage bank define by their condition of energization whether the successive switches in the route identified by such storage bank are to assume their normal or reverse position. For instance, if the first storage relay in a storage bank is energized this manifests that the first switch encountered in that route will assume its reverse position and if deenergized manifests that the first switch in the stored route will assume its normal position. The second and third storage relays by their condition of energization and deenergization also manifest that the second and third switch in the route identified is to assume their reverse or normal position respectively. Consequently, if all three of the storage relays are deenergized this manifests that all of the three switches of the route identified by the storage relays will all assume their normal position and that the cut of cars will move over the normally set up route to the storage track O as shown in Fig. 5 of the drawings.

Referring to Fig. 1 of the drawings, each of the eight push buttons PBH—PBO signify a particular route (see Fig. 5) which a train will take when run off of the hump when a particular push

button is depressed. Depression of one of these push buttons will cause its associated relay R to be energized. If there is no train stored in the storage bank A² a multiple element code will be transmitted to the storage bank A² to energize the storage relays of this storage bank in accordance with the code character identified by the particular R relay. Referring to Fig. 1, it will be noted that the contact 40 of the relay HR when energized, will apply (+) potential through jumpers to each of the three bus lines leading to the storage relays of the storage bank A², and that all of the other contacts energize only two, one or none of these bus wires, as a result of which none, one, two or three of the storage relays of storage bank A² is energized depending upon which of the push buttons has been depressed. These jumpers correspond to the codes written over the respective push buttons.

Let us assume that the operator depresses the push-button PBH. This will result in energization of the relay HR which relay HR will then be stuck up through a stick circuit readily traced in the drawings. With the relay HR stuck up all of the other push buttons will be rendered ineffective to pick up their associated R relays. With the relay HR picked up, closure of its front contact 25 will result in energization of the transfer relay ATR² (see Fig. 2). With contact 32 of the transfer relay ATR² closed, the carrier relay AC² will be energized. With the transfer relay ATR² and the carrier relay AC² both energized the storage relays of the storage bank A² will be connected to the three bus wires above mentioned and these storage relays will be energized or deenergized depending upon the code character as manifested by the jumpers connecting the contact 40 and the bus wires, and in the instant case, will cause all three of the storage relays 1A², 2A² and 3A² to be energized.

Substantially simultaneous with the picking up of the storage relays of the storage bank A², the transfer relay ATR¹ of the storage bank A¹ is also energized. The picking up of the transfer relay ATR¹ results in energization of the carrier relay AC¹, and with these relays ATR¹ and AC¹ both energized the storage relays of the storage bank A¹ will be energized to the same code pattern as are the storage relays of the storage bank A², which in the present instance resides in all three of the storage relays 1A¹, 2A¹ and 3A¹ being energized.

The picking up of the storage relay 1A¹ through the medium of its front contact 79 results in the energization of the reverse relay RRA and results in operation of the switch machine SM^A to its reverse position. This operation of the switch machine SM^A will of course result in deenergization of the normal switch repeater relay NWP^A and energization of the reverse switch machine indication repeater relay RWP^A.

The picking up of the relay AC² resulted in breaking of the stick circuit for the relay HR (see Fig. 1) and similarly picking up of the relay AC¹ resulted in the breaking of the stick circuit for the relay AC² and dropping of the relay AC² resulted in the deenergization of the storage relays 1A², 2A² and 3A² and also resulted in the deenergization of the transfer relay ATR¹ so that now only the carrier relay AC¹ and the transfer relays 1A¹, 2A¹ and 3A¹ are energized manifesting that a train description is stored in the storage bank A¹ which identifies a train that is to move to the storage track H. This train description cannot be transferred to the storage unit B con-

taining storage banks B² and B¹ until the train described by this train description has entered upon the track circuit associated with track switch SW^A (see Fig. 5), namely, the track relay T^A (see Fig. 2). When this train enters upon the track switch SW^A and deenergizes the track relay T^A the opening of its front contact 60 will deenergize the carrier relay AC¹. Since, however, this carrier relay AC¹ is slow dropping the train description stored in the storage bank A¹ is transferred to the storage relays of the storage bank B², insofar as the condition of energization of the second and third storage relay of the storage bank is concerned, over front contacts 119 and 120 of relay RWP^A.

The train description now stored in the storage bank B² will, in the event that the storage bank B¹ is not being used, be transferred to this storage bank B¹ in a manner as already pointed out in connection with the storage bank A¹ of storage unit A. With the train description now stored in storage bank B¹, this train description will be transferred to the storage bank B², upon occupancy of the detector track circuit containing track relay T^B.

From this brief description, it is readily apparent that both the transfer relay and the carrier relay of a storage bank must be energized to receive a train destination indication but that only the carrier relay need be energized to hold such indication in a storage bank. It is also seen that the carrier relay of each storage bank is made slow dropping and that by reason of this fact a stored indication may be transferred from one storage bank to another storage bank at a time when the carrier relay of the first mentioned storage bank is actually deenergized but has not yet assumed its deenergized position. This is apparent from the fact that a train destination can, for instance, not be stored in the storage relays of storage bank A¹ unless the carrier relay AC¹ is energized and that such energization of the carrier relay AC¹ will result by reason of the opening of its back contact 37 and deenergization of the carrier relay AC² of the storage bank A². It is also readily apparent that when a train destination is stored in a particular storage bank as manifested, among other things, by the energized condition of its carrier relay, the transfer relay of such storage bank cannot be picked up because its pick-up circuit is broken as, for instance, at back contact 52 of the carrier relay AC¹, as a result of which no train destination can be transferred from the storage bank in the rear so long as a previously stored train destination is stored therein. It is also readily apparent by referring to Fig. 4 of the drawings, showing storage banks employing only one storage relay D, that with this storage relay D assuming its deenergized position and its associated carrier relay DC assuming its energized position not only is a circuit closed for manifesting that the train stored therein shall pass to the storage track I, as indicated by the illumination of the indicating lamp I¹, but also shows that a circuit will be closed for the normal relay NR^D to operate the switch position back to its normal position in the event it formerly assumed a reverse position. From this latter consideration, it is apparent that a train destination may be indicated even though all of the carrier relays assume their deenergized position and that the next switch over which the train is to pass may be operated to its normal position event though all the carrier relays are deenergized and the fact that a train destination

is stored in a storage bank may be indicated by the carrier relay assuming its energized position and all storage relays assuming their deenergized position.

Operation

In order to get a clear understanding of applicant's invention it is proposed to now describe the operation of the system. Let us first assume that the operator momentarily depressed in succession the push buttons PBH, PBI and PBO in that order, for the purpose of allowing three cuts of cars to be automatically sent to the storage tracks H, I and O, respectively, shown in Fig. 5 of the drawings. Momentary depression of the push button PBH closes a pick-up circuit for the push button relay HR which may be traced as follows: beginning at the battery BAT, push button contact CPB, contact 11 of the push button PBH, winding of the relay HR, back contacts 12, 13, 14, 15, 16, 17 and 18 of the push button relays IR to OR, respectively, back contact 19 of the relay TRA², through the push button contact CR to the terminal (—). Picking up of the push button relay HR closes an energizing circuit for the indicating lamp *h* through the front contact 20 of this relay, and also closes two stick circuits which may be traced as follows: beginning at the battery BAT, push button contact CPB, stick contact 21 of the relay HR, winding of this relay HR, back contacts 12, 13, 14, 15, 16, 17 and 18 and then branching into two parallel circuits one including the back contact 19 of the relay ATR² and the other including the stick contact 22 of the relay HR and including back contact 23 of the relay AC², both of these branches then passing through the front contact of push button CR to the other terminal (—) of the battery BAT. With the push button relay HR now energized a pick-up circuit is closed for the transfer relay ATR² which may be traced as follows: beginning at the positive terminal of the battery BAT, front contact 25 of the relay HR, back contact 26 of the relay AC², winding of the relay ATR² to the other terminal (—), of the battery BAT. With this relay ATR² now energized it is stuck up through two stick circuits each including the front stick contact 28 of the relay ATR² and including in multiple the front contact 29 of relay HR and the normally open contact 30 of the push button PBH. Picking up of the transfer relay ATR² opens the stick circuit for the push button relay HR including the back contact 19 of this relay ATR², the other stick circuit for the push button relay HR including the back contact 23 of the relay AC² however remains intact. Picking up of the transfer relay ATR² closes a pick-up circuit for the carrier relay AC² which may be traced from the battery BAT, through the cancelling button contact CPB, front contact 25 of the relay HR, front contact 32 of the relay ATR², the winding of the relay AC², back contact 33 of the relay ATR¹, and push button contact CR² to the other terminal (—) of the battery BAT. The relay AC² upon picking up is stuck up through two stick circuits which may be traced as follows: beginning at the (+) terminal of the battery BAT, push button contact CPB, stick contact 35 of the relay AC², winding of this relay AC², through two parallel branches, one including the back contact 33 of the relay ATR¹, and the push button contact CR² in series, and the other including the stick contact 36 of the relay AC², the back contact 37 of the relay AC¹, and the push

button contact CR² in series to the other terminal (—) of this same battery.

With the relays HR, ATR² and AC² now energized the code stored in the relay HR is transmitted to the storage relays 1A², 2A² and 3A². Since the front contact 40 of the relay HR is provided with all three code jumpers all three of the storage relays 1A², 2A² and 3A² will be energized. The energizing circuit for these relays include the front contacts 41, 42 and 43 of the relay ATR² and include the contacts 44, 45 and 46 of the relay AC². The picking up of these storage relays 1A², 2A² and 3A² will complete stick circuits for these relays including the stick contacts 47, 48 and 49, respectively. The picking up of the relay AC² by the opening of its back contact 26 made the transfer relay ATR² dependent upon its stick circuits including the contacts 29 of relay HR and 30 of push button PBH, respectively. Also, the picking up of this relay AC² breaks the only remaining stick circuit for the relay HR at its back contact 23, the other stick circuits for this relay HR having been broken at the back contact 19 of the relay ATR² when this relay ATR² became energized. The actual dropping of the relay HR is however delayed, this relay HR being slow dropping so that the storage relays 1A², 2A² and 3A² have sufficient time to assume their energized position to close their stick circuits before their pick-up circuits were broken at the contact 40 of the relay HR.

With the push button relay HR now deenergized one of the stick circuits for the relay ATR², namely, the one including the front contact 29 of relay HR, is broken and if the operator has released the push button PBH and this push button has not remained down accidentally the other stick circuit for the relay ATR² is also broken at the contact 30 of this relay PBH, so that this transfer relay ATR² assumes its deenergized position.

Picking up of the carrier relay AC² through the medium of its front contact 51 and the back contact 52 of the relay AC¹ has in the meantime picked up the transfer relay ATR¹. This transfer relay ATR¹ once energized closes two stick circuits for this relay which may be traced as follows: (1) beginning at the (+) terminal of the battery BAT, the contact of the push button CPB, the front contact 53 of the relay ATR², the stick contact 54 of the relay ATR¹ through the winding of this relay ATR¹, to the other terminal (—); and (2) beginning at the battery BAT through the push button contact CPB, the front contact 51 of the relay AC², the stick contact 55 of the relay ATR¹, through the winding of this relay ATR¹ to the other terminal (—) of the same battery. Picking up of the transfer relay ATR¹ opens one of the stick circuits for the relay AC² at its back contact 33, thus making the energization of this relay AC² dependent upon the back contact 37 of the relay AC¹. Also with relays ATR¹ and AC² now in their energized condition a pick-up circuit for the carrier relay AC¹ which may be traced as follows is closed: beginning at the (+) terminal of the battery BAT, contact of the push button CPB, front contact 58 of the relay AC², front contact 59 of the relay ATR¹, through the winding of the relay AC¹, through front contact 60 of the detector track relay TA through the push button contact CR¹ to the other terminal (—) of this battery BAT. With this relay AC¹ now energized it will remain energized through a stick circuit including its stick contact 62 and including front contact 60 of the

detector track relay T^A. The picking up of the carrier relay AC¹ will make the transfer relay ATR¹ dependent for its energization upon the two stick circuits for this relay heretofore traced and including the stick contacts 54 and 55, respectively. With the transfer relay ATR¹ and the carrier relay AC¹ now both energized all of the energizing circuits for the relay AC² are broken and this relay will after a short time assume its deenergized position, but before this relay AC² assumes its deenergized position, it being slow dropping, to deenergize the storage relays 1A², 2A² and 3A² the code stored in these storage relays will be transferred to the storage relays 1A¹, 2A¹ and 3A¹ of storage band A¹ through circuits including front contacts 64, 65 and 66 of relays 1A², 2A² and 3A², respectively, and including contacts 67, 68 and 69 of the transfer relay ATR¹ and including contacts 71, 72 and 73 of the carrier relay AC¹.

With these storage relays 1A¹, 2A¹ and 3A¹ now energized they remain energized through stick circuits including their stick contacts 74, 75 and 76, respectively. Shortly after this transfer takes place the carrier relay AC² will assume its deenergized position, its sole remaining stick circuit having been opened at the back contact 37 of the carrier relay AC¹ as a result of which the storage relays 1A², 2A² and 3A² are deenergized because their stick circuits are broken at the front contacts 44, 45 and 46 of the carrier relay AC².

Picking up of the storage relay 1A¹ closes an energizing circuit for the switch control relay RRA¹ which may be traced from the positive terminal of the battery BAT, through the push button contact CPB, through front contact 79 of the storage relay 1A¹. Energization of the reverse control relay RRA¹ causes the switch machine SMA¹ to be operated to its reverse position provided that the detector track relay T^A is energized, this energizing circuit for the switch machine SMA¹ may be traced from the positive terminal of the battery BAT, through the push button contact CPB, through front contact 89 of the detector track relay T^A, front contact 81 of the switch control relays RRA¹ and the front contact 82 of the switch reversing relay RA¹. The completion of this circuit causes the switch machine SMA¹ to be operated to its reverse position and by its initiation causes deenergization of the switch machine repeater relay NWP^A and upon its completion causes the energization of the switch machine repeater relay RWP^A through circuits well known to those skilled in the art. It will be noted that the switch reversing relay RA¹ is normally energized through a stick circuit including the back contact 85 of the relay RWP^A and the front contact 86 of the switch repeater relay NWP^A and the stick contact 87 of the relay RA¹. This switch reversing relay RA¹ is slow dropping to an extent that if the switch machine operates properly the relay RA¹ will remain in its energized position until the contacts 85 and 86 of the relays RWP^A and NWP^A have reversed so that a new stick circuit is closed for the relay RA¹ and this relay RA¹ will remain energized. If, on the other hand, the switch machine should be stalled in mid-stroke possibly because there is an obstruction between the switch points as the result of which the switch repeater relays RWP^A and NWP^A both remain deenergized for a longer time than the drop-away time for the relay RA¹, this relay RA¹ is deenergized thereby dropping the contacts 82

and 83 and shifting the energy for the switch machine SMA¹ back to its normal circuit returning the switch machine SMA¹ to its normal position. In this connection it should be understood that the car in the latter case would take the wrong storage track, but that is preferable to derailment. This stick relay will be picked up again by the passage of the car over the track switch through the medium of back contact 84 of track relay T^A.

With the carrier relay AC¹ and the storage relay 1A¹ both assuming the energized position an energizing circuit is closed for the indicating lamps b¹, including the front contact 83 of the relay AC¹ and the front contact 89 of the relay 1A¹. The route indicating lamp BL is also energized, manifesting that the track switch has been initiated for movement to the reverse position. This energizing circuit for this lamp BL includes the front contact 91 of the track relay T^A, the front contact 92 of the carrier relay AC¹ and the front contact 93 of the storage relay 1A¹. The lighting of this lamp BL (see Fig. 6) will inform the operator in the brakeman's tower that the first cut of cars will enter upon the track section B. When the cars eventually pass over the track switch SWA the track relay T^A becomes deenergized and closes another circuit for the lamp BL which includes back contact 91 of track relay T^A and front contact 96 of relay RWP^A. The indicating lamps h in the hump tower and b² in the brakeman's tower will of course be extinguished as the relays HR and 1A² respectively, become deenergized, the latter of which became energized when the storage relay 1A² was picked up. The carrier relay AC¹ and the storage relays 1A¹, 2A¹ and 3A¹ are assumed to still remain in their energized condition.

By this time the operator at the hump control board will have depressed the push button PBI characterizing a code + + - as conventionally illustrated directly over this push button PBI as a result of which the storage relays 1A² and 2A² become energized in response to the energization of the push button relay IR, all in a manner as already described in connection with the first described train description. The carrier relay AC² of course also becomes energized, but the transfer relay ATR¹ does not become energized because its pick-up circuit is broken at the back contact 52 of the carrier relay AC¹. The code + + + is thus stored in storage bank A¹ whereas the code + + - is stored in storage bank A². The temporary energization of the transfer relay ATR² of course deenergizes the push button storage relay IR. With the storage relay 1A² now again energized the indicating lamp b² shown in Figs. 2 and 6 of the drawings will again become illuminated thus indicating that the second train is also destined for the track section B. The two carrier relays AC¹ and AC² and the two sets of storage relays now have the codes stored therein so that storage relays 1A¹, 2A¹, 3A¹, 1A² and 2A² are now all energized. The storage relay 3A² is deenergized because the second code stored in the describer system is a + + - code.

By this time the operator at the hump control board will have depressed the push button PBO resulting in the energization of the push button relay OR. This push button relay OR reflects a - - - code as indicated by the conventional showing of - - - directly over the push button PBO. This - - - code is also indicated

by the fact that all of the three jumpers leading from the contact 94 of this push button relay OR are disconnected from the bus wires. Since the carrier relay AC² is now energized the picking up of the push button relay OR will not result in energization of the transfer relay ATR², this because the pick-up circuit for this relay is broken at the back contact 26 of relay AC². With the third train description now stored in the push button bank by the relay OR assuming its energized condition the indicating lamp o is illuminated through a circuit including the front contact 95 of the relay OR, thereby informing the operator at the hump control board that the third train is destined to the track O over the normally set up route (see Fig. 5) and that its destination is stored in the push button relay group.

Referring for a moment to Fig. 5 of the drawings let us now assume that the first cut of cars has reached the track switch SW^A, which track switch has been operated to its reverse position as heretofore explained, that this first cut of cars has entered upon the detector track circuit T^A thus causing this track relay to assume its deenergized position, causing the route indicating lamp BL to be energized through the back contact of this track relay T^A and independently of the position of the storage relay 1A¹, but through a circuit including the front contact 96 of track repeater relay RWP^A.

Dropping of the track relay T^A causes deenergization of the carrier relay AC¹, but since this carrier relay AC¹ is slow dropping it will not drop until the indication stored in the storage bank A¹ has been transmitted to the storage bank B², the track switch A now assuming its reverse position, but were it still assuming its normal position this train description would have been transferred to the storage unit C through contact 202 of relay NWP^A instead of contact 102 of relay RWP^A, through contact 203 instead of contact 103 of relay T^AR and through contacts 219 and 220 of relay NWP^A instead of contacts 119 and 120 of relay RWP^A (see Fig. 2). This stored train description is transferred from the storage bank A¹ to the storage bank B² in response to the dropping of the track relay T^A and before the carrier relay AC¹ is deenergized by first picking up the transfer relay BTR² through the following circuit:—beginning at the (+) terminal of the battery BAT, front contact 100 of the carrier relay AC¹, back contact 101 of the track relay T^A, front contact 102 of the switch repeater relay RWP^A, back contact 103 of the track repeater relay T^AR, back contact 104 of the carrier relay BC², winding of the transfer relay BTR² to the other terminal (—) of this same battery. This transfer relay BTR² is then stuck up through a stick circuit including its stick contact 106, the front contact 107 of the switch repeater relay RWP^A and also including the front contact 100 of the carrier relay AC¹. Picking up of the transfer relay BTR² then results in the closure of a pick-up circuit for the carrier relay BC² which includes the front contact 108 of the relay BTR² and the back contact 109 of the transfer relay BTR¹. Picking up of the carrier relay BC² results in the closure of two stick circuits for this relay, one stick circuit including the stick contact 111 of the relay BC² and the back contact 109 of the relay BTR¹, and the other stick circuit including both of the stick contacts 111 and 112 of the carrier relay BC² and also including the back contact 113 of the carrier relay BC¹. With the

transfer relay BTR² and the carrier relay BC² now both energized train description + + + (signifying track H) stored in the storage bank A¹ is transferred to the storage relays of the storage bank B² before the slow dropping carrier relay AC¹ assumes its retracted position to cancel this description from storage bank A¹. This code is transferred only insofar as the last two code characters of the stored code is concerned through the medium of front contacts 115 and 116 of the storage relays 2A¹ and 3A¹, through the back contacts 117 and 118 of the track relay T^A, through the front contacts 119 and 120 of the switch repeater relay RWP^A through wires 121 and 122, through front contacts 123 and 124 of the transfer relay BTR² and through front contacts 125 and 126 of the carrier relay BC². Picking up of the storage relay 2B² results in the illumination of the indicating lamp d² through the medium of front contacts 127 and 128 of the relays BC² and 2B², respectively. The storage relay 3B² is also picked up but this has no effect on the control of indicating lamp d².

Since there is no train stored in the storage bank B¹ of the storage unit B the train description stored in the storage bank B² is immediately transferred to the storage bank B¹. This transfer takes place in a manner and for reasons described in connection with the storage unit A shown in Fig. 2 of the drawings and is for convenience not repeated. It may, however, be stated that it results in the picking up of the relays 2B¹ and 3B¹ and results in the illumination of the indicating lamp d¹ through a circuit including front contacts 130 and 131 of the relays BC¹ and 2B¹, respectively. Also with the relays 2B¹ and 3B¹ energized the switch machine SM^B is operated to the reverse position through the medium of a circuit controlled by the relay RR^B all in a manner as already described for the track switch SW^A.

Reviewing for a moment, storage bank B¹ now stores a code + + +, storage bank B² is empty, storage bank A² stores the code + + —, and code — — — is stored in push button relay OR. It is of course understood that the code + + — stored in storage bank A² will be immediately transferred to storage bank A¹ for reasons already described. Reviewing again the codes + + +, + + — and — — — are now stored in storage banks B¹, A¹ and the push button bank respectively.

Dropping of the track relay T^A in response to the entrance of the first cut of cars upon the track switch SW^A resulted in the energization of the track repeater relay T^AR through a pick-up circuit including the back contact 133 of the carrier relay AC¹ and the back contact 134 of the track relay T^A. Picking up of the repeater track relay T^AR resulted in the closure of the stick circuit for this relay including its own stick contact 135 and the back contact 136 of the track relay T^A. This picking up of the track repeater relay T^AR did of course not take place until the carrier relay AC¹ had actually assumed its retracted position as is evident in view of back contact 133. With the track circuit containing the track relay T^A still occupied by the first cut of cars and with the track repeater relay T^AR still energized the indication code + + — stored in the storage bank A² was transferred to the storage bank A¹ because there is an auxiliary pick-up circuit for the carrier relay AC¹ including the front contact 138 of the repeater track relay T^AR, it being of course understood that the pre-

vious dropping of the carrier relay AC^1 dropped the storage relays $1A^1$, $2A^1$ and $3A^1$. With the train description $++-$ for the second cut of cars which was transferred from the storage bank A^1 to the storage bank A^2 , the storage relays $1A^1$ and $2A^1$ are energized and the storage relay $3A^1$ remains deenergized. Since this train description stored in the storage bank A^1 does not call for a different position of the switch machine, the switch machine SM^A will not be operated to a new position even after the track relay TA becomes again energized and closes its front contact 80. The completion of the transfer of the second train description $++-$ from the storage bank A^1 to the storage bank A^2 results, of course, in the deenergization of the storage relays $1A^2$ and $2A^2$ and also results in the deenergization of the transfer relay ATR^1 , which results in the closure of its back contact 33 and the energization of the carrier relay AC^2 as soon as the transfer relay ATR^2 has become energized. The transfer relay ATR^2 would of course not become energized were it not for the fact that there is a train description $---$ stored in relay OR of the push button group.

With these two relays AC^2 and ATR^2 now both energized the train description $---$ stored in the push button bank of relays shown in Fig. 1 of the drawings, and constituting the push button relay OR in an energized condition, is now transferred into the storage bank A^2 . Since all of the jumpers connected to contact 94 of the push button relay OR are disconnected from the bus wires a transfer of this third train description into the storage bank A^2 results in the energization of the carrier relay AC^2 with all of the storage relays $1A^2$, $2A^2$ and $3A^2$ remaining deenergized. The transfer relay ATR^2 will of course be deenergized in response to picking up of the carrier relay AC^2 followed by deenergization of the push button relay OR due to the transfer of this description, all in a manner as heretofore pointed out. There is thus stored an all negative code $---$ in the storage bank A^2 (relays $1A^2$, $2A^2$ and $3A^2$ deenergized) and since the carrier relay AC^2 is energized and the storage relay $1A^2$ is deenergized the indicating lamp c^2 is energized through a front contact 140 of relay AC^2 and back contact 141 of storage relay $1A^2$, thus informing the towerman that the car described is to take the track section C and that this train description will eventually be transferred to unit C.

Reviewing the condition of the system at this time the codes $+++$, $++-$ and $---$ are stored in storage banks B^1 , A^1 and A^2 , respectively.

Let us now assume that the first cut of cars has vacated the track circuit containing track relay TA and occupies section B. It will be observed by looking at Fig. 2 of the drawings that the transfer circuit, for transferring the fact that a train destination is stored in bank A^1 as evidenced by the carrier relay AC^1 being energized into energization of the carrier relay BC^2 cannot be closed because it is broken at the back contact 131 of the track relay TA before it is again made at the back contact 103 of the track repeater relay TAR . The second train description of $++-$ was of course only temporarily stored in the storage bank B^2 and has in the meantime been stored to the storage bank B^1 , and has resulted in maintaining the switch machine SM^B in its reverse position all in a manner and for reasons heretofore described. The second train description of $++-$ is thus stored in storage

bank A^1 even though the storage bank B^2 is vacant, and the third train description of $---$ is stored in storage bank A^2 .

Let us now assume that the first cut of cars has reached the track switch SW^B (see Fig. 5) and has resulted in the deenergization of the track relay TB (see Figs. 3 and 5), the track switch SW^B already assuming the reverse position for reasons above given. This occupancy of the detector track circuit TB results in the transfer of the train description $+++$ stored in the storage bank B^1 , insofar as the relay $3B^1$ is concerned, to the storage bank D^2 resulting in the energization of the carrier relay DC^2 and the storage relay $3D^2$. This will of course result in the energization of the indicating lamp h^2 through a circuit including front contacts 142 and 143 of the relays DC^2 and $3D^2$. Since the storage bank D^1 is now vacant as reflected by the relay BC^1 being deenergized the transfer relay DTR^1 will become energized, thus resulting in the picking up of the storage relay $3D^1$ through a circuit including the front contact 146 of relay $3D^2$, the front contact 147 of relay DTR^1 and the front contact 148 of the carrier relay DC^1 . With the carrier relay DC^1 and the storage relay $3D^1$ energized the indicating lamp h^1 is energized through front contacts 150 and 151 of relays DC^1 and $3D^1$, respectively. The indication $+++$, which was stored in storage bank D^2 , is of course extinguished by the dropping of relays DC^2 and $3D^2$ due to the picking up of relays DTR^1 and DC^1 . Since the circuit wires and contacts shown in heavy lines in Fig. 4 of the drawings are wires and contacts which for convenience have been omitted from Figs. 2 and 3 of the drawings, the circuits involved will be described in connection with the operation of the apparatus shown in Fig. 4.

With the storage relay $3D^1$ now energized an energizing circuit for the reverse relay RR^D is closed which may be traced from the positive terminal of the battery BAT , the contact of cancelling button CPB , the front contact 153 of the track relay TP . The contact 154 of the switch machine lever $SMLP$ assuming its middle position, the front contact 155 of the storage relay $3D^1$, through the winding of the switch machine control relay RR^D to the other terminal $(-)$ of the battery BAT . The closure of this circuit will result in the picking up of the relay RR^D and in operation of the switch machine SM^D to its reverse position, all in a manner as heretofore described.

If, on the other hand, the operator located in the brakeman's tower desires to operate the switch machine SM^D by hand he may move the switch machine control lever $SMLP$ to the left thereby resulting in the energization of the switch machine control relay RR^D through a circuit including the contact 154 of this lever $SMLP$ assuming its left-hand position. This movement of the switch machine lever $SMLP$ from its middle position of course opens the circuit for automatically controlling the relays RR^D and NR^D through the middle contact 154 of this switch machine lever $SMLP$. Also, with the storage relay $3D^1$ energized and with the switch machine lever $SMLP$ in its original middle position and with the carrier relay DC^1 now energized, as would be the case, the indicating lamp HL will be illuminated through the following circuit: beginning at the terminal $(+)$ of the battery BAT , contact of the push button CPB , front contact 153 of the track relay TP , front contact 156 of

of the relay R^D , contact 157 of the switch machine lever SML^P , front contact 158 of the track relay TP , front contact 159 of the carrier relay DC^1 , and front contact 160 of the storage relay $3D^1$ through this lamp HL to the other terminal (—). The illumination of the lamp HL will inform the operator in the brakeman's tower that the first cut of cars is to move into the storage track H . If, however, the operator moves the switch machine lever SML^P to its left-hand position, as it was above assumed, the route indicating lamp HL will be energized dimly through a circuit included in series with the indicating lamp HL the manual control indicating lamp MCL and also the contact 157 of the switch machine lever SML^P . If the switch machine SM^D shown in Fig. 4 of the drawings should have been slow in completing its stroke it would have resulted in the deenergization of the switch reversing relay R^D thereby resulting in the returning of the switch machine SM^D to its former position, all in a manner as heretofore described in connection with Fig. 2 of the drawings. This deenergization of the switch reversing relay R^D also results in the opening of the front contact 156 of this relay and in extinguishing the lamp HL or IL , as the case may be, and results in the energization of the extinguished lamp through a flashing circuit which may be traced from the (+) terminal of the battery BAT , contact of the push button CPB , contact 162 of the flashing relay F , back contact 163 of the switch machine repeater relay NWP^D through the route indicating lamp HL to the other terminal (—). The lamp HL will be flashed by the completion of this circuit because the flashing relay F intermittently moves the contact 162 to opposite extreme positions. This flashing relay F is controlled through the back contact 164 of the switch reversing relay R^D , and the flashing relay is intermittently operated because its flashing contact 165 intermittently shunts one or the other of its two energizing windings, all in a manner as clearly described in the prior patent to Field No. 2,097,786 granted November 2, 1937. The circuits and circuit portions shown in light lines in Fig. 4 of the drawings are the same as those shown in Figs. 2 and 3 so that these circuit portions need not be again described. It may be pointed out that the front contact 200 of the carrier relay DC^1 corresponds to the contact 190 of the carrier relay AC^1 and this contact would be used to control a subsequent storage bank and storage unit if there were more than three track switches in a route through the hump yard to be controlled.

It is of course understood that occupancy of the detector track circuit containing track relay T^D will cause the train description stored in storage bank D^1 to be cancelled by opening of the front contact 260 of relay T^D . It should be remembered that codes $++-$ and $---$ are still stored in storage banks A^1 and A^2 respectively. Movement of the second cut of cars upon the track circuits containing track relays T^A , T^B and T^D in succession will cause the second code $++-$ to be transferred from storage unit to storage unit, and from storage bank to storage bank within a unit, in the same manner as has been described in connection with the first cut of cars. Likewise the third code $---$ will be similarly transferred, but this latter code will not be transferred to units B and D in succession, as was the case above, but will be transferred to units C and G in succession, the switch ma-

chines SM^C and SM^G in each case remaining in their normal position because this third cut of cars is described by an all negative code as heretofore explained.

Referring to Fig. 7 although the push button bank shown in Fig. 1 and the storage units A , B and D shown in Figs. 2, 3 and 4, respectively, have only been shown and described specifically, it should be understood that storage unit C is identical to storage unit B and that storage units E , F and G are identical to storage unit D . In other words, if it is desired to reproduce the wiring diagram for the entire system illustrated in Fig. 5 of the drawings it is only necessary to reproduce Fig. 3 once photostatically and reproduce Fig. 4 three times photostatically and to then connect the drawings end to end as illustrated in Fig. 7 of the drawings. In order to make the indicating lamps conform to what is illustrated in Fig. 6 of the drawings, it would be necessary to change the reference characters applied to the indicating lamps of units C , E , F and G all in a manner as is obvious from Fig. 6 of the drawings. Similarly the reference characters of the relays of units C , E , F and G should be changed to conform with the scheme of nomenclature heretofore described.

The car classification system described in this application is particularly meritorious by reason of the comparatively few relays required. For instance, there is only one storage relay required for each of the storage banks of the last storage unit in a particular route, there are only two storage relays required for each storage bank in the second last storage unit in a route, and there are only three storage relays required in the storage bank in the third last storage unit in any route, and these same storage relays serve to store the desired positions of the same or different track switches in different routes. For instance, the storage relay $3A^1$ may store whether any one of the switch machines SM^D , SM^E , SM^F or SM^G shall assume a particular position, the particular switch machine which is to be controlled by this storage relay $3A^1$ being determined by the fact whether one or both or neither of the two preceding storage relays $1A^1$ and $2A^1$ are energized. For instance, if all three of the storage relays $1A^1$, $2A^1$ and $3A^1$ are energized it manifests that the storage relay $3A^1$ is to control the switch machine SM^D . If, however, the storage relays $1A^1$ and $3A^1$ only are energized, the fact that the storage relay $1A^1$ is energized and storage relay $2A^1$ is deenergized manifests that the car will take track section E and that the storage relay $3A^1$ will control the switch machine SM^E . In other words, although each one of the storage relays determines what position a particular switch shall take such storage relay may at one time designate the position one particular switch shall take and at another time may designate the position another particular switch shall take. The net result is that the storage bank of each storage unit has one less storage relay than does the storage bank of the next storage unit toward the hump in the same route.

Some important features of the system embodying the present invention reside in the provision of interlocked pick-up circuits for the push button relays (Fig. 1) which function to allow only one of these relays to be picked up at one time. That is, the pick-up circuit for each of these relays includes a back contact of every other push button relay.

Each route push button is provided with a contact, such as contact 30 of push button PBH, for instance, which checks that the push button PBH has been returned to normal, for if it remains closed the transfer relay ATR² cannot drop thus paralyzing the system until this push button PBH has been restored.

A front contact, such as front contact 138 of relay TAR, is provided for each track repeater relay so that the first carrier relay, such as AC¹, may be picked up to store a new train description in the storage bank, such as bank A¹, while the preceding car still occupies the detector track circuit for the associated track switch. The relay TAR, since it cannot pick up until relay AC¹ has dropped, cannot maintain relay AC¹ energized through its front contact 138 but can allow it to pick up as just pointed out.

The stick circuits for the transfer relays and the slow dropping carrier relays are such that carrier relays drop in succession from right to left and that the transfer relays drop in succession from left to right, as viewed in the drawings, providing that the next carrier relay to the rear (to left in drawings) is in a deenergized condition. For instance, if a train description is set up in the push button relay group (Fig. 1), assuming each of the storage banks A² and A¹ to be vacant, the relays ATR², AC², ATR¹ and AC¹ are picked up in that order and then each relay is stuck up. The transfer relay ATR¹ is directly stuck up by relay AC² up (see contacts 51 and 55) and is also directly stuck up by transfer relay ATR² up (see contacts 53 and 54) although carrier relay AC² may drop transfer relay ATR¹ is dependent on transfer relay ATR² up. Reversely with transfer relay ATR¹ up, it having been explained that it is directly stuck up through front contact 51 of carrier relay AC², this carrier relay AC² is dependent on back contact 37 of carrier relay AC¹ being closed. In other words, the carrier relays are sequentially deenergized from right to left except for the one at the extreme right for a particular storage unit having a train description stored therein, and the transfer relays are sequentially deenergized from left to right providing the carrier relay next to the left is in its deenergized condition. This construction positively segregates successive train descriptions in a manner so that two descriptions cannot reach the same storage bank. For instance, one train description must have reached its destination by filtering through one or more vacant storage banks to the last vacant storage bank before a second train description can start on its trip to the vacant storage bank next in the rear of the just occupied bank.

In the same way as with the transfer relay ATR², which remains stuck up if one of the route push buttons is stuck in its depressed condition, the other transfer relays will remain stuck up if the slow acting carrier relay next to the rear thereof (to left in drawings) remains accidentally stuck up. This feature constitutes a check upon the system in that the system will remain paralyzed until a maintainer rectifies the trouble.

The stick circuit for each of the carrier relays which includes the back contact of the next preceding (to right in drawings) carrier relay is provided to prolong the loading time. For instance, the stick circuit for the carrier relay AC² including the back contact 37 of carrier relay AC¹ is maintained intact longer than is the stick circuit including back contact 33 of transfer re-

lay ATR¹ so that the dropping of the carrier relay AC² is additionally delayed.

Another fact to be borne in mind is that the energized condition of a carrier relay manifests that an all negative code is stored therein unless there is also a storage relay energized to manifest a different code or train destination.

Referring to the track layout shown in Fig. 5 of the drawings it may be pointed out that in some earlier systems of automatic hump yard control it was necessary for a first route to have been entirely cleared up before a second route could be established, this by reason of certain shortcomings in the system and the fact that the first track section is common to all routes. This is not necessary in applicants' system for in their system a second route can be set up if it does not conflict with the untraversed portion of the first route, but that is not all for a second route can actually be set up at one track switch even though a portion of the track to be traversed by the second car is still occupied by a first car. Putting this in different words, the track switch for a particular route may be operated as soon as a car for the same or any other route has passed over that track switch. This feature of applicants' system enables a fast car to actually get to its storage track before an earlier started first car reaches its storage track. Referring to Fig. 5 a first car may have only reached the track switch SW^B, whereas a second car has already reached the track switch SW^F. Also, the present system lends itself efficaciously to a hump yard track layout where the actual storage tracks for certain routes may be located as much as a mile beyond the entrance to other storage tracks. This is possible because the car description which is to control the track switch over which such car is to move is carried step by step from one train describer unit to another as it passes over the track switch and in an extreme case a particular train description might be carried from one train describer unit to another for an hour or more, while other and later initiated train descriptions may have long been cancelled because the car which they described has reached its storage track. The present system has a decided advantage from an economic standpoint. This is true because each storage relay, except the first, may define the position that one or another track switch is to take. For instance, the storage relay 2A¹ or 2A² may define the position either the switch SW^B or the switch SW^C is to take, whereas the storage relay 3A¹ or 3A² may define the position that any one of the track switches SW^D, SW^E, SW^F or SW^G is to take. Also, such storage relay by being energized manifests that the track switch is to take the reverse position and by being deenergized manifests that it is to assume the normal position, and in this connection it may be pointed out that the system functions equally well if all of the storage relays remain deenergized because with all storage relays deenergized the route defined thereby is the route set up when each of the successive switches encountered assumes the normal position, this being possible by reason of the provision of the carrier relays which manifest by being energized or deenergized whether or not a train description is stored in a particular storage bank.

Having thus shown and described one specific car classification system applicable to a car classification system in which there are three track switches in each route and in which there are

only eight storage tracks, it is desired to be understood that the system may be applied to much more complicated classification yards in which there are different numbers of switches in different routes. In order to point out how different routes may have different numbers of track switches we may assume that the storage track H is omitted from the present disclosure in which event the track switch SW^D and the switch machine SM^D would be entirely omitted as would all of the apparatus of storage unit D. In this case the storage unit B (see Fig. 3) would still require two storage relays 2B¹ and 3B¹, but the storage relay 3B¹ would perform no function when a train is routed into the track section D terminating in the storage track I, also if the storage track J were also omitted the storage relay 3B¹ could be omitted. Other additions, omissions and modifications may be made to the present invention without departing from the spirit or scope thereof except as demanded by the scope of the following claims.

What we claim as new:

1. In a car classification system the combination with a track switch, a track section leading to said track switch; two other track sections into which said track switch may direct traffic; a train describer unit for controlling said track switch and including a first and a second storage bank of relays; each bank including one carrier relay, one storage relay and one transfer relay; said carrier relay when energized reflecting that a train destination is stored in the bank irrespective of whether or not said storage relay is energized, the condition of energization of said storage relay reflecting only what position the track switch is to assume and the transfer relay determining by being energized that a train destination may be transferred thereto; means for controlling said relays to store a particular train destination in such bank; a switch control circuit for controlling said track switch to one position including a front contact of said storage relay of said first bank and a switch control circuit for controlling said track switch to the opposite position including a back contact of the storage relay of said first bank and a front contact of the carrier relay of said first bank; and circuit means for transferring a train destination stored in said second bank to said first bank including front contacts of the storage relay and the carrier relay of said second bank and front contacts of the carrier relay and transfer relay of said first bank.

2. In a car classification system the combination with a track switch, a track section leading to said track switch; two other track sections into which said track switch may direct traffic; a train describer unit for each of said track sections, each unit including one carrier relay, one or more storage relays and one transfer relay; said carrier relay when energized reflecting that a train destination is stored in the bank irrespective of whether or not a storage relay is energized, the condition of energization of said storage relays reflecting only the train destination stored therein and the transfer relay determining by being energized that a train destination may be transferred thereto; means for controlling said relays to store a particular train destination in such bank; a switch control circuit for controlling said track switch to one position including a front contact of one storage relay of the storage unit associated with the leading section and a switch control circuit for controlling said track switch to the opposite position including a back contact

of said one storage relay and a front contact of the carrier relay of the unit of which said one relay constitutes a part; and means for transferring a train destination stored in the unit associated with said leading section to the unit associated with the section to which said track switch then directs traffic including front contacts of storage relays exclusive of said one storage relay and including a front contact of the carrier relay associated with the same unit as said one storage relay.

3. In a car classification system the combination with a track switch, a track section leading to said track switch; two other track sections into which said track switch may direct traffic; a train describer unit for each of said track sections, each unit including one carrier relay, one or more storage relays and one transfer relay; said carrier relay when energized reflecting that a train destination is stored in the bank irrespective of whether or not a storage relay is energized, the condition of energization of said storage relays reflecting only the train destination stored therein and the transfer relay determining by being energized that a train destination may be transferred thereto; means for controlling said relays to store a particular train destination in such bank; a switch control circuit for controlling said track switch to one position including a front contact of one storage relay of the storage unit associated with the leading section and a switch control circuit for controlling said track switch to the opposite position including a back contact of said one storage relay and a front contact of the carrier relay of the unit of which said one relay constitutes a part; switch repeating contacts associated with said track switch and assuming a position in accordance with the position assumed by said switch machine and track switch; and means for transferring a train destination stored in the unit associated with said leading section to the unit associated with the section to which said track switch then directs traffic including front contacts of storage relays exclusive of said one storage relay and including a front contact of the carrier relay associated with the same unit as said one storage relay, and also including said switch repeating contacts.

4. In combination with a train describer, of a series of push buttons, a train describer unit, a stick relay for each push button, each stick relay when energized describing a particular train, a pickup circuit for each stick relay including a normally open contact of its associated push button, a transfer relay for transferring the train description from a particular stick relay to said train describer unit and having a pick-up circuit including a front contact of each of said stick relays all in multiple, a stick circuit for each of said stick relays including a back contact of said transfer relay, and a stick circuit for said transfer relay including in multiple normally open contacts of all of said push buttons and including in multiple front contacts of all of said stick relays, whereby said transfer relay after once being energized cannot be deenergized unless all of said push buttons and all of said stick relays simultaneously assume their normal positions.

5. In a car classification system the combination with a track switch, a track section leading to said track switch; two other track sections into either of which said track switch may direct traffic at one time; a train describer unit for controlling said track switch and including a first and a second storage bank of relays; each bank includ-

- ing one carrier relay, one storage relay and one transfer relay; said carrier relay when energized reflecting that a train destination is stored in the bank irrespective of whether or not said storage relay is energized, the condition of energization of said storage relay reflecting what position the track switch is to assume and the transfer relay determining by being energized that a train destination may be transferred thereto from a
5. preceding train describer bank; a switch control circuit for controlling said track switch to one position including a front contact of said storage relay of said first bank; a switch control circuit for controlling said track switch to the opposite
10. position including a back contact of the storage relay of said first bank; and circuit means for transferring a train destination stored in said second bank to said first bank including front contacts of the carrier relay and front contacts of the transfer relay of said first bank and front contacts of the storage relays of said bank.
6. In combination, a track switch, a switch machine for operating said track switch, a normal circuit which if closed operates said switch machine to a normal position, to cause the
25. switch machine to open such normal circuit, a reverse circuit which if closed operates said switch machine to a reverse position to cause said switch machine to open such reverse circuit, a
30. normally energized slow dropping switch reversing stick relay energized by a stick circuit including its own front contact, contacts on said switch reversing relay which upon dropping of said switch reversing relay either open said normal circuit and close said reverse circuit or open
35. said reverse circuit and close said normal circuit depending upon which of said circuits was closed, and means for deenergizing and dropping said switch reversing relay by opening said stick
40. circuit if either said normal or said reverse circuit has been closed for more than a predetermined time including contacts closed only if said switch machine assumes its last controlled position.
7. In combination, a track switch, a switch
45. machine for operating said track switch, a normal circuit which if closed operates said switch machine to a normal position to cause the switch machine to open such normal circuit, a reverse circuit which if closed operates said switch machine to a reverse position to cause said switch
50. machine to open such reverse circuit, a normally energized slow dropping switch reversing stick relay energized by a stick circuit including its own front contact and having contacts which up-
55. on dropping of said reversing relay either open said normal circuit and close said reverse circuit or open said reverse circuit and close said normal circuit depending upon which of said circuits was closed, means for deenergizing and dropping
60. said switch reversing relay by opening its stick circuit if either said normal or said reverse circuit has been closed for more than a predetermined time including contacts which are open when either said normal circuit or said reverse
65. circuit is closed, a detector track circuit for said track switch, and a pick-up circuit for said switch reversing stick relay including a back contact of said track relay.
8. In combination, a track switch, a switch
70. machine for operating said track switch, a normal circuit which if closed operates said switch machine to a normal position to cause the switch machine to open such normal circuit, a reverse circuit which if closed operates said switch machine to a reverse position to cause said switch
75. machine to open such reverse circuit, a normally energized slow dropping switch reversing stick relay energized by a stick circuit including its own front contact and having contacts which upon dropping of said reversing relay either open said normal circuit and close said reverse circuit or open said reverse circuit and close said normal circuit depending upon which of said circuits was closed, means for deenergizing and dropping said switch reversing relay by opening its stick circuit if either said normal or said reverse circuit has been closed for more than a predetermined time including contacts closed only if said switch machine assumes its last controlled position.

machine to open such reverse circuit, a normally energized slow dropping switch reversing stick relay energized by a stick circuit including its own front contact and having contacts which upon dropping of said reversing relay either open said normal circuit and close said reverse circuit or open said reverse circuit and close said normal circuit depending upon which of said circuits was closed, means for deenergizing said switch reversing relay by opening its stick circuit and dropping said switch reversing relay if either said normal or said reverse circuit has been closed for more than a predetermined time, a detector track circuit for said track switch, a pick-up circuit for said switch reversing stick relay including a back contact of said track relay, an indicator means for indicating the position of said switch machine, and means for intermittently rendering said indicator active when said stick relay is deenergized.

9. In a train description transfer system, comprising a plurality of relay groups each capable of manifesting whether a train description is stored in storage relays associated with such group, said storage relays by their condition of energization or deenergization characterizing a code defining the train destination, each group including a first and a second stick relay the second stick relay of which when energized manifests that a train description is stored in the group and the first stick relay when energized manifests that a train description may be transferred thereto, a pick-up circuit for a first stick relay including a back contact of the associated second stick relay, a stick circuit for such first stick relay including a front contact of the first stick relay of the next group in the rear, a pick-up circuit for the second stick relay including a front contact of the associated first stick relay, and a stick circuit for such second stick relay including a front contact of a track relay of a track circuit traversed by a train described by such relay group.

10. In a train description transfer system, comprising a plurality of relay groups each capable of manifesting whether a train description is stored in storage relays associated with such group, said storage relays by their condition of energization or deenergization characterizing a code defining the train destination, each group including a first and a second stick relay the second stick relay of which when energized manifests that a train description is stored in the group and the first stick relay when energized manifests that a train description may be transferred thereto, a pickup circuit for a first stick relay including a back contact of the associated second stick relay, a stick circuit for such first stick relay including a front contact of the first stick relay of the next group in the rear, a pick-up circuit for the second stick relay including a front contact of the associated first stick relay, and a stick circuit for such second stick relay including a front contact of a track relay of a track circuit traversed by a train to be described by such relay group and also including a normally closed manually operable cancelling contact.

11. In a train description transfer system, comprising a plurality of relay groups each capable of manifesting whether a train description is stored in storage relays associated with such group, said storage relays by their condition of energization or deenergization characterizing a code defining the train destination, each group including a first and a second stick relay the

second stick relay of which when energized manifests that a train description is stored in the group and the first stick relay when energized manifests that a train description may be transferred thereto, a pick-up circuit for a first stick relay including a front contact of the second stick relay of the group in the rear and including a back contact of the associated second stick relay, a stick circuit for such first stick relay including a front contact of the first stick relay of the group next in the rear, a pick-up circuit for the second stick relay including a front contact of the second stick relay of the group next in the rear, and a stick circuit for such second stick relay including a front contact of a track relay of a track circuit traversed by a train to be described by the storage relays associated with such relay group.

12. In a train describer system; the combination with a series of groups of relays, each group including a first and a second stick relay the second stick relay of which when energized manifests that a train description is stored by storage relays in that group, said storage relays by their condition of energization or deenergization characterizing a code defining the train destination; a pick-up circuit for the second stick relay of a particular group including a front contact of the second stick relay of the group in the rear and including a back contact of the first stick relay of the group in advance; a pick-up circuit for the first stick relay of said particular group including a back contact of the second stick relay of said particular group and a front contact of the second stick relay of the group next in the rear; and stick circuits for the first and second stick relays of said particular group including a front contact of the second stick relay of the group in the rear and a back contact of the first stick relay of the group in advance, respectively.

13. In a train describer system; the combination with a series of groups of relays, each group including a first and a second stick relay the second stick relay of which when energized manifests that a train description is stored by storage relays in that group, said storage relays by their condition of energization or deenergization characterizing a code defining the train destination; a pick-up circuit for the second stick relay of a particular group including a front contact of the associated first relay and a front contact of the second stick relay of the group in the rear and including a back contact of the first stick relay of the group in advance; a pick-up circuit for the first stick relay of said particular group including a back contact of the second stick relay of said particular group and a front contact of the second stick relay of the group next in the rear; and stick circuits for the first and second stick relays of said particular group including a front contact of the second stick relay of the group in the rear and a back contact of the first stick relay of the group in advance, respectively.

14. In a train describer system; the combination with a series of groups of relays, each group including a first and a second stick relay the second stick relay of which when energized manifests that a train description is stored by storage relays in that group, said storage relays by their condition of energization or deenergization characterizing a code defining the train destination; a pick-up circuit for the second stick relay of a particular group including a front contact of the associated first relay and a front contact of the second stick relay of the group in the rear

and including a back contact of the first stick relay of the group in advance; a pick-up circuit for the first stick relay of said particular group including a back contact of the second stick relay of said particular group and a front contact of the second stick relay of the group next in the rear; stick circuits for the first and second stick relays of said particular group including a front contact of the second stick relay of the group in the rear and a back contact of the first stick relay of the group in advance, respectively, and a second stick circuit for the second stick relay of said particular group including a back contact of the second stick relay of the group in advance.

15. In a train describer system; the combination with a plurality of groups of relays each including a transfer relay, a carrier relay and one or more storage relays which storage relays and carrier relay by their condition of energization designate the route a car is to take; pick-up circuits for the storage relays of each group except the rear group including front contacts of the corresponding storage relays of the group in the rear, front contacts of the transfer relay of that group and front contacts of the carrier relay of that group; the route a car is to travel being defined by the energized or deenergized conditions of the successive storage relays of each group in a manner so that each storage relay defines a particular track switch in advance and when energized manifests that the corresponding track switch is to assume one position and when deenergized manifests that the corresponding track switch is to assume the opposite position; and control circuits for the transfer relays of each group constructed to cause the car route stored therein to be transferred to the next relay group when such next relay group has been vacated of the car route which has stored therein.

16. In a train describer system; the combination with a plurality of groups of relays each including a transfer relay, a carrier relay and one or more storage relays which storage relays and carrier relay by their condition of energization designate the route a car is to take; pick-up circuits for the storage relays of each group except the rear group including front contacts of the corresponding storage relays of the group in the rear, front contacts of the transfer relay of that group and front contacts of the carrier relay of that group; the route a car is to travel being defined by the energized or deenergized conditions of the successive storage relays of each group in a manner so that each storage relay defines a particular track switch in advance and when energized manifests that the corresponding track switch is to assume one position and when deenergized manifests that the corresponding track switch is to assume the opposite position; a pick-up circuit for the transfer relay of each group except the rear group including a front contact of the carrier relay of the next group in the rear and a back contact of the associated carrier relay; and a stick circuit for such transfer relay including a front contact of the transfer relay of the next group in the rear.

17. In a train describer system; the combination with a plurality of groups of relays each including a transfer relay, a carrier relay and one or more storage relays which storage relays and carrier relay by their condition of energization designate the route a car is to take; pick-up circuits for the storage relays of each group except the rear group including front contacts of the corresponding storage relays of the group in the

rear, front contacts of the transfer relay of that group and front contacts of the carrier relay of that group; the route a car is to travel being defined by the energized or deenergized conditions of the successive storage relays of each group in a manner so that each storage relay defines a particular track switch in advance and when energized manifests that the corresponding track switch is to assume one position and when deenergized manifests that the corresponding track switch is to assume the opposite position; a pick-up circuit for the transfer relay of each group except the rear group including a front contact of the carrier relay of the next group in the rear and a back contact of the associated carrier relay; and two stick circuits for such transfer relay one including a front contact of the carrier relay of the relay group next in the rear and the other including a front contact of the transfer relay of the relay group next in the rear.

18. A car classification system comprising a plurality of groups of relays each group of which is capable of describing by the condition of energization or deenergization of the relays of such group the destination of a car described thereby, means for transferring a train destination description from one relay group to the next by energizing certain relays of such next relay group to conform to the energized condition of corresponding relays of said one relay group, means for operating the track switch of a particular relay group in accordance with the train destination described by such relay group, and means manually operable for cancelling the train destination descriptions stored in all of said relay groups at the same time.

19. In a car classification system the combination with a track switch, a track section leading to said track switch; two other track sections into which said track switch may direct traffic; a train describer unit for controlling said track switch and including a bank of relays; said bank including one carrier relay, one storage relay and one transfer relay; said carrier relay when energized reflecting that a train destination is stored in the bank irrespective of whether or not said storage relay is energized, the condition of energization of said storage relay reflecting only what position the track switch is to assume and the transfer relay when energized manifesting that a train destination description may be registered therein; a switch control circuit for controlling said track switch to one position including a front contact of said storage relay of said bank; and a second switch control circuit for controlling said track switch to the opposite position including a back contact of the storage relay and a front contact of the carrier relay of said bank.

20. A car classification system comprising a track layout starting with one track and terminating in a large number of storage tracks connected to said one track through routes each route including a plurality of track switches; a train describer switch control unit for each track switch, each unit being divided into a first storage bank and a second storage; each storage bank, including a transfer relay, a carrier relay and one or more storage relays arranged in order; a detector track circuit including a track relay for each track switch; a pick-up circuit for the transfer relay of each bank including a back contact of the carrier relay of that bank and a front contact of the carrier relay of the bank next in the rear, but where such bank in the rear is part of the train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes said particular position; a pick-up circuit for each carrier relay

is part of the train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes a particular position and includes a contact closed only if the associated track relay is deenergized; a stick circuit for each transfer relay including its own front contact and a front contact of the carrier relay of the bank next in the rear, but where such bank in the rear is part of the train describer switch control unit in the rear the stick circuit also includes a contact closed only when the switch in the rear assumes said particular position; a pick-up circuit for each carrier relay including a front contact of the carrier relay of the bank next in the rear, but where such bank next in the rear is part of a train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes a particular position and includes a contact closed only if the associated track relay is deenergized; a stick circuit for each carrier relay including its own front contact and including a back contact of the carrier relay of the bank next in advance when these banks belong to the same train describer switch control unit, but including a contact closed only if the associated track relay is energized when such bank next in advance belongs to another train describer switch control unit; a pick-up circuit for each storage relay including a front contact of a corresponding storage relay of the bank next in the rear, but where such bank next in the rear is part of another train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes a particular position and includes a contact closed only when the associated track relay is deenergized; a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a switch machine associated with the first bank of each unit for operating the associated track switch; and means for operating each switch machine controlled by the first storage relay of the associated first bank.

21. A car classification system comprising a track layout starting with one track and terminating in a large number of storage tracks connected to said one track through routes each route including a plurality of track switches; a train describer switch control unit for each track switch, each unit being divided into a first storage bank and a second storage bank; each storage bank, including a transfer relay, a carrier relay and one or more storage relays arranged in order; a detector track circuit including a track relay for each track switch; a pick-up circuit for the transfer relay of each bank including a back contact of the carrier relay of that bank and a front contact of the carrier relay of the bank next in the rear, but where such bank in the rear is part of the train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes a particular position and includes a contact closed only if the associated track relay is deenergized; a stick circuit for each transfer relay including its own front contact and a front contact of the carrier relay of the bank next in the rear, but where such bank in the rear is part of the train describer switch control unit in the rear the stick circuit also includes a contact closed only when the switch in the rear assumes said particular position; a pick-up circuit for each carrier relay

including a front contact of the associated transfer relay and a front contact of the carrier relay of the bank next in the rear, but where such bank next in the rear is part of a train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes a particular position and includes a contact closed only if the associated track relay is deenergized; a stick circuit for each carrier relay including its own front contact and including a back contact of the carrier relay of the bank next in advance when these banks belong to the same train describer switch control unit, but including a contact closed only if the associated track relay is energized when such bank next in advance belongs to another train describer switch control unit; a pick-up circuit for each storage relay including a front contact of a corresponding storage relay of the bank next in the rear, but where such bank next in the rear is part of another train describer switch control unit in the rear the pick-up circuit also includes a contact closed only when the switch in the rear assumes a particular position and includes a contact closed only when the associated track relay is deenergized; a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a switch machine associated with the first bank of each unit for operating the associated track switch; and means for operating each switch machine controlled by the first storage relay and the carrier relay of the associated first bank.

22. A car classification system comprising a track layout starting with a classification track and terminating in a large number of storage tracks connected to said classification track through routes each route including a plurality of track switches; a switch machine for each track switch; a train describer storage relay bank for each track switch, each bank having as many storage relays as there are track switches yet to be encountered in a route; circuit means controlled by the first storage relay of any bank to, when energized, control the switch machine of the first switch to be encountered to one position and when deenergized controls such switch machine to the opposite position; circuit means controlled by the second storage relay of any bank to, when energized, cause energization of the first storage relay of the next bank in advance; circuit means controlled by the third storage relay of any bank to, when energized, cause the second storage relay of the next bank in advance to be energized, which second storage relay in turn will cause the first storage relay of the succeeding bank to be energized; a detector track circuit, including a track relay, associated with each track switch; means for allowing any first storage relay of a bank to control its associated switch machine only when the associated track relay is energized; and means for allowing any second or third storage relay of a bank to control a storage relay of the next lower order of the storage bank next in advance only when the associated track relay is deenergized.

23. A car classification system comprising a track layout starting with a classification track and terminating in a large number of storage tracks connected to said classification track through routes each route including a plurality of track switches; a switch machine for each track switch; a train describer storage relay bank for each track switch, each bank having as many storage relays as there are track switches yet

to be encountered in a route; circuit means controlled by the first storage relay of any bank to, when energized, control the switch machine of the first switch to be encountered to one position and when deenergized controls such switch machine to the opposite position; circuit means controlled by the second storage relay of any bank to, when energized, cause energization of the first storage relay of the next bank in advance; circuit means controlled by the third storage relay of any bank to, when energized, cause the second storage relay of the next bank in advance to be energized, which second storage relay in turn will cause the first storage relay of the succeeding bank to be energized; a detector track circuit, including a track relay, associated with each track switch; means for allowing any first storage relay of a bank to control its associated switch machine only when the associated track relay is energized; switch repeating contacts for each track switch to manifest the position of the track switch; and means for allowing any second or third storage relay of a bank to control a storage relay of the next lower order of the storage bank next in advance only when the associated track relay is deenergized, and only if the switch repeating contacts for the track switch associated with said bank manifests a switch position to direct traffic to the track switch with which said bank next in advance is associated.

24. A car classification system comprising a track layout starting with one track and terminating in a large number of storage tracks connected to said one track through routes, each route including a plurality of track switches; a switch machine for each track switch; a detector track circuit for each track switch including a normally energized track relay; a train describer bank for each track switch, each bank having a carrier relay and as many storage relays as there are track switches yet to be encountered in a route; circuit means controlled by the carrier relay and the first storage relay of any bank to control the switch machine of the first switch to be encountered to one position or another depending upon whether said first storage relay is energized or said first storage relay is deenergized and its associated carrier relay is energized; circuit means controlled by the second relay of any bank to cause energization of the first storage relay of the bank next in advance when such second storage relay is energized; circuit means controlled by the third storage relay of any bank to cause energization of the second storage relay of the bank next in advance when such third storage relay is energized, which second storage relay of the bank next in advance will in turn cause the first storage relay of the second bank in advance to be energized; means for allowing any first storage relay of a bank to control its associated switch machine only when the associated track relay is energized; and means for allowing any second or third storage relay of a bank to control a storage relay of the next lower order of the storage bank next in advance only when the associated track relay is deenergized.

25. A car classification system comprising a track layout starting with a main track and terminating in a large number of storage tracks connected to said main track through routes, each route including a plurality of track switches; a switch machine for each track switch; switch repeating contacts for each track switch to manifest the position of such track switch; a detector track circuit for each track switch including a

normally energized track relay; a train describer bank for each track switch, each bank having a carrier relay and as many storage relays as there are track switches yet to be encountered in a route; circuit means controlled by the carrier relay and the first storage relay of any bank to control the switch machine of the first switch to be encountered to one position or another depending upon whether said first storage relay is energized or said first storage relay is deenergized and its associated carrier relay is energized; circuit means controlled by the second relay of any bank and the switch repeating contacts of the associated track switch to cause energization of the first storage relay of the bank next in advance when such second storage relay is energized and such switch repeating contacts manifests a track switch position to direct traffic to the track switch with which such bank next in advance is associated; circuit means controlled by the third storage relay of any bank and the switch repeating contacts of the associated track switch to cause energization of the second storage relay of the bank next in advance when such third storage relay is energized and said switch repeating contacts manifests a track position to direct traffic to the track switch associated with such bank next in advance, which second relay of the bank next in advance will in turn cause the first storage relay of the succeeding bank to be energized only if the switch repeating contacts of the track switch associated with the bank containing such second storage relay manifests a track switch position to direct traffic to the track switch associated with such succeeding bank; means for allowing any first storage relay of a bank to control its associated switch machine only when the associated track relay is energized; and means for allowing any second or third storage relay of a bank to control a storage relay of the next lower order of the storage bank next in advance only when the associated track relay is deenergized.

26. A car classification system comprising a track layout starting with one track and terminating in a large number of storage tracks connected to said one track through routes, each route including a plurality of track switches; a switch machine for each track switch; switch repeating contacts for each track switch to manifest the position of said track switch; a detector track circuit for each track switch including a normally energized track relay; a train describer bank for each track switch, each bank having a carrier relay and as many storage relays as there are track switches yet to be encountered in a route; circuit means controlled by the carrier relay and the first storage relay of any bank to control the switch machine of the first switch to be encountered to one position or another depending upon whether said first storage relay is energized or said first storage relay is deenergized and its associated carrier relay is energized; circuit means controlled by the second relay of any bank to cause energization of the first storage relay of the bank next in advance when such second storage relay is energized; circuit means controlled by the third storage relay of any bank to cause energization of the second storage relay of the bank next in advance when such third storage relay is energized, which second storage relay of the bank next in advance will in turn cause the first storage relay of the succeeding bank in advance to be energized; means for allowing a first storage relay of any bank to control its associated switch machine only when the associated

track relay is energized, and means for allowing any second or third storage relay of a bank to control a storage relay of the next lower order of the storage bank next in advance only when the associated track relay is deenergized and then only if the switch repeating contacts of the track switches associated with such bank manifest a switch position to direct traffic to the track switch with which said bank next in advance is associated.

27. In a train classification system the combination with a classification track and a plurality of storage tracks each connected to said classification track through a route including a plurality of track switches; a detector track circuit for each track switch including a normally energized track relay; a storage unit for each track switch including one storage bank; each storage bank including a transfer relay and a carrier relay; each storage bank also including one storage relay for each track switch yet to be encountered by a car approaching the associated track switch; a pick-up circuit for each first storage relay of each unit, except the storage relay of the storage unit most in the rear, including a front contact of the second storage relay of the unit next in the rear and a front contact of its associated transfer relay; and a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a circuit for each transfer relay including a back contact of the track relay associated with the storage unit next in the rear; and a circuit for each carrier relay including a front contact of the track relay associated with the storage unit with which such carrier relay is associated.

28. In a train classification system the combination with a classification track and a plurality of storage tracks each connected to said classification track through a route including a plurality of track switches; a detector track circuit for each track switch including a normally energized track relay; a storage unit for each track switch including one storage bank; each storage bank including a transfer relay and a carrier relay; each storage bank also including one storage relay for each track switch yet to be encountered by a car approaching the associated track switch; a pick-up circuit for each first storage relay of each unit, except the storage relay of the storage unit most in the rear, including a front contact of the second storage relay of the unit next in the rear and a front contact of its associated transfer relay; a pick-up circuit for the second storage relay if any, of each unit except the unit farthest in the rear including a front contact of the third storage relay of the unit next in the rear and a front contact of the associated transfer relay; and a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a circuit for each transfer relay including a back contact of the track relay associated with the storage unit next in the rear; and a circuit for each carrier relay including a front contact of the track relay associated with the storage unit with which such carrier relay is associated.

29. In a train classification system the combination with a classification track and a plurality of storage tracks each connected to said classification track through a route including a plurality of track switches; a detector track circuit for each track switch including a normally energized track relay; a storage unit for each track switch, each storage unit including a transfer relay, a

carrier relay and also including one storage relay for each track switch yet to be encountered by a car approaching the associated track switch; a pick-up circuit for each first storage relay of each unit, except the storage relay of the storage unit farthest in the rear, including a front contact of the second storage relay of the unit next in the rear and a front contact of its associated transfer relay; a pick-up circuit for the second storage relay, if any, of each unit, except the unit farthest in the rear, including a front contact of the third storage relay of the unit next in the rear and a front contact of the associated transfer relay; and a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a pick-up circuit for each transfer relay, except the transfer relay of the unit farthest in the rear, including a back contact of the associated carrier relay and a front contact of the carrier relay of the unit next in the rear; a stick circuit for each such transfer relay including its own front contact and a front contact of the carrier relay of the unit next in the rear; a pick-up circuit for each carrier relay, except the carrier relay of the unit farthest in the rear, including in series a front contact of the transfer relay of the associated unit and a front contact of the carrier relay of the unit next in the rear; and a stick circuit for each such carrier relay including its own front contact and a normally closed contact controlled by the track relay associated with the storage unit with which such carrier relay is associated.

30. In a train classification system the combination with a classification track and a plurality of storage tracks each connected to said classification track through a route including a plurality of track switches; a detector track circuit for each track switch including a normally energized track relay; a storage unit for each track switch; a transfer relay, a carrier relay and one storage relay for each track switch yet to be encountered by a car approaching the associated track switch for each storage unit; a pick-up circuit for each first storage relay of each unit, except the storage relay of the storage unit farthest in the rear, including a front contact of the second storage relay of the unit next in the rear and a front contact of its associated transfer relay; and a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; means for energizing each transfer relay, except the transfer relay for the unit farthest in the rear, for a short time only and just preceding and during the picking up of the associated carrier relay; and means for energizing each carrier relay, except the carrier relay of the unit farthest in the rear, when the unit of which it constitutes a part has no train destination stored therein but the unit next in the rear does have a train destination stored therein and for maintaining it energized until the track relay associated with the storage unit with which such carrier relay is associated becomes deenergized.

31. In a train classification system the combination with a classification track and a plurality of storage tracks each connected to said classi-

fication track through a route including a plurality of track switches; a detector track circuit for each track switch including a normally energized track relay; a storage unit for each track switch including one storage bank; each storage bank including a transfer relay and a carrier relay; each storage bank also including one storage relay for each track switch yet to be encountered by a car approaching the associated track switch; a pick-up circuit for each first storage relay of each unit, except the storage relay of the storage unit most in the rear, including a front contact of the second storage relay of the unit next in the rear and a front contact of its associated transfer relay; and a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a circuit for each transfer relay including a back contact of the track relay associated with the storage unit next in the rear; a circuit for each carrier relay including a front contact of the track relay associated with the storage unit with which such carrier relay is associated; and means for controlling each switch to one position if the first storage relay of the associated storage bank is energized and controlling it to the opposite position when such storage relay is deenergized.

32. In a train classification system the combination with a classification track and a plurality of storage tracks each connected to said classification track through a route including a plurality of track switches; a detector track circuit for each track switch including a normally energized track relay; a storage unit for each track switch including one storage bank; each storage bank including a transfer relay and a carrier relay; each storage bank also including one storage relay for each track switch yet to be encountered by a car approaching the associated track switch; a pick-up circuit for each first storage relay of each unit, except the storage relay of the storage unit most in the rear, including a front contact of the second storage relay of the unit next in the rear and a front contact of its associated transfer relay; a pick-up circuit for the second storage relay if any, of each unit except the unit farthest in the rear including a front contact of the third storage relay of the unit next in the rear and a front contact of the associated transfer relay; and a stick circuit for each storage relay including its own front contact and a front contact of its associated carrier relay; a circuit for each transfer relay including a back contact of the track relay associated with the storage unit next in the rear; a circuit for each carrier relay including a front contact of the track relay associated with the storage unit with which such carrier relay is associated; and means for controlling each switch to one position if the first storage relay of the associated storage bank is energized and controlling it to the opposite position when such storage relay is deenergized.

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