Dec. 6, 1938. P. ABELOOS 2,139,324

AUTOMATIC SELECTION STATION

Original Filed Nov. 25, 1933 7 Sheets-Sheet 1

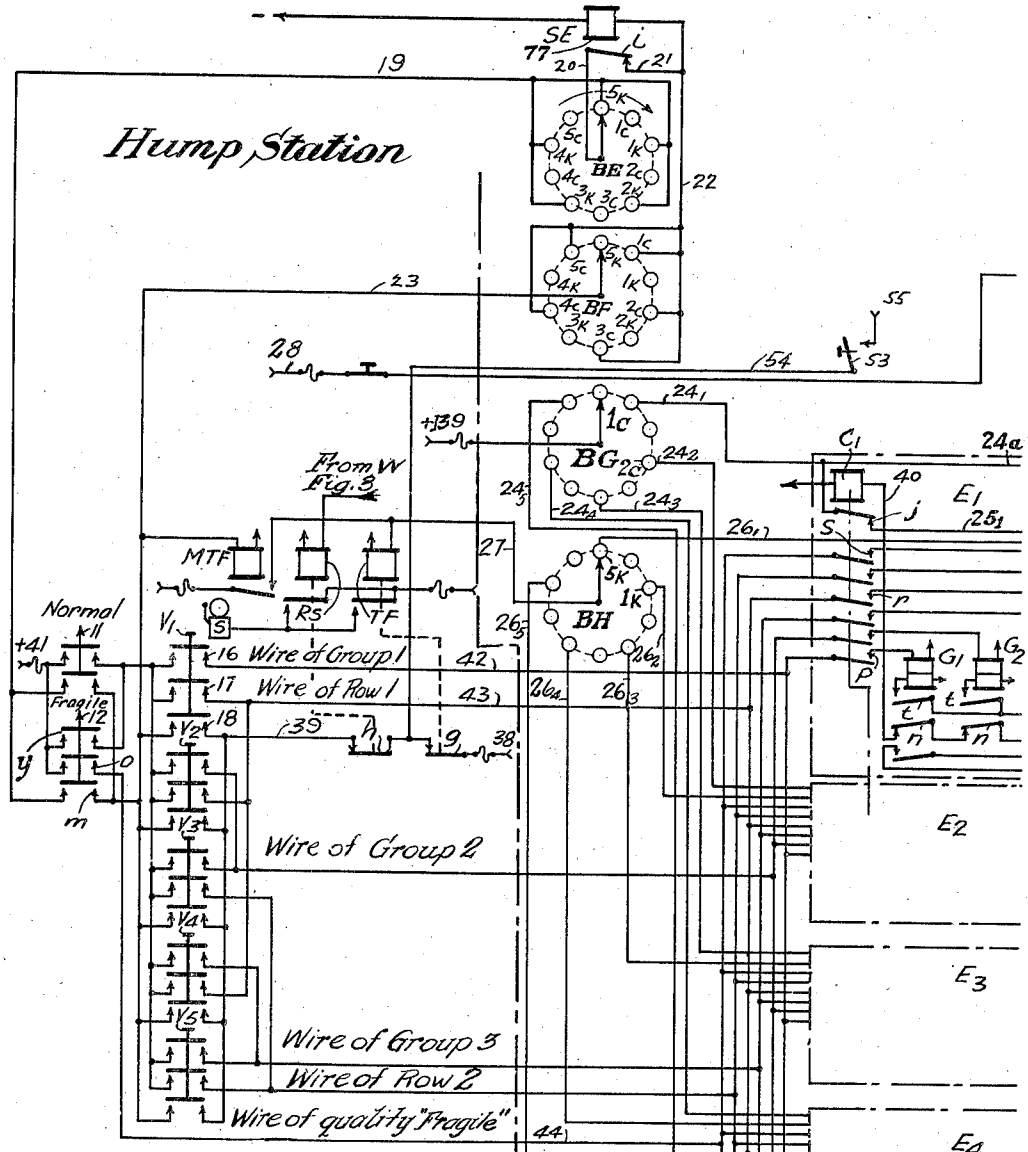


Fig. 2.

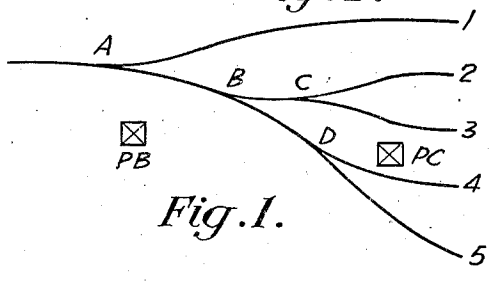


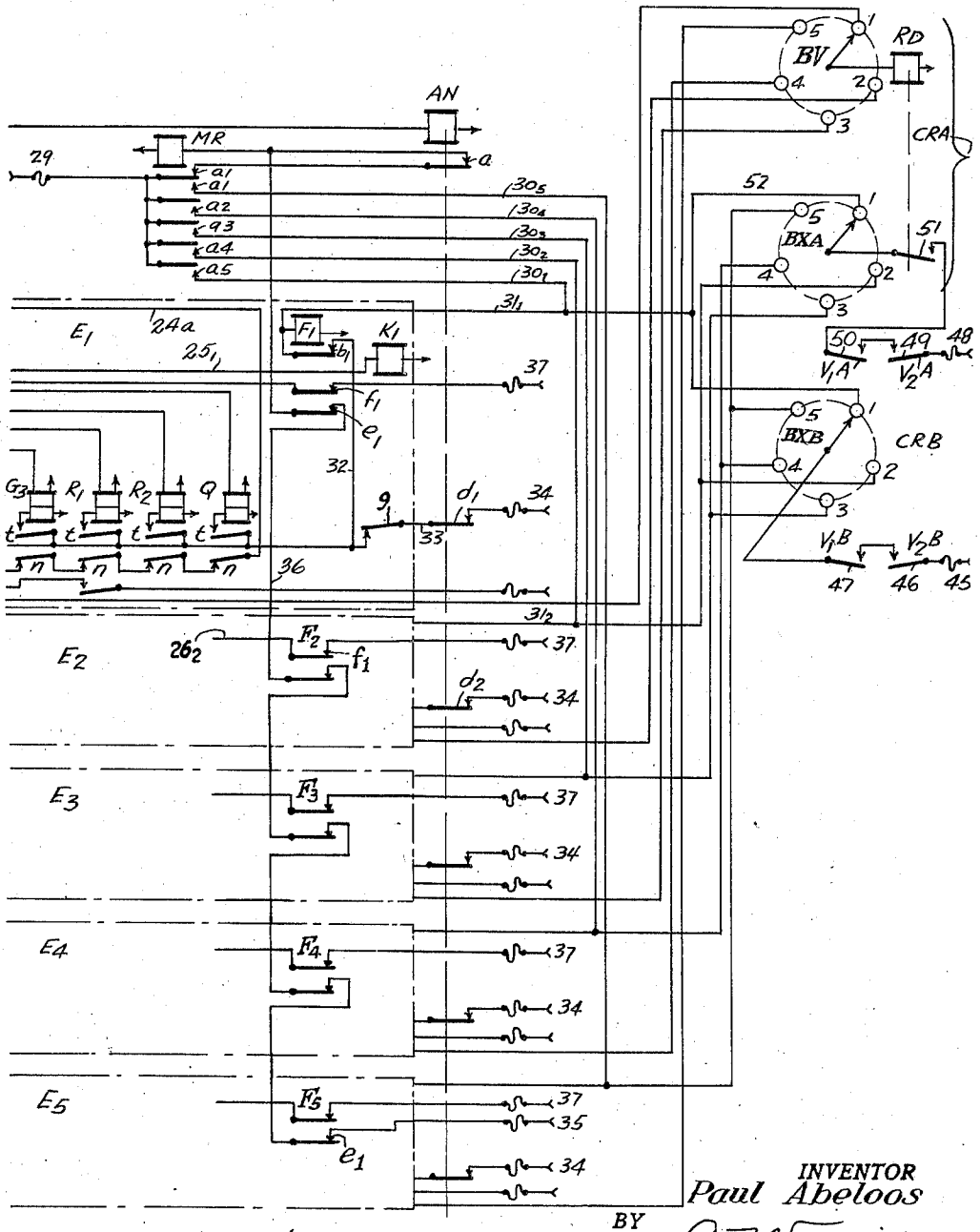
Fig. 1.

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AUTOMATIC SELECTION STATION

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Central Station Fig. 2a

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AUTOMATIC SELECTION STATION

Original Filed Nov. 25, 1933 7 Sheets-Sheet 3

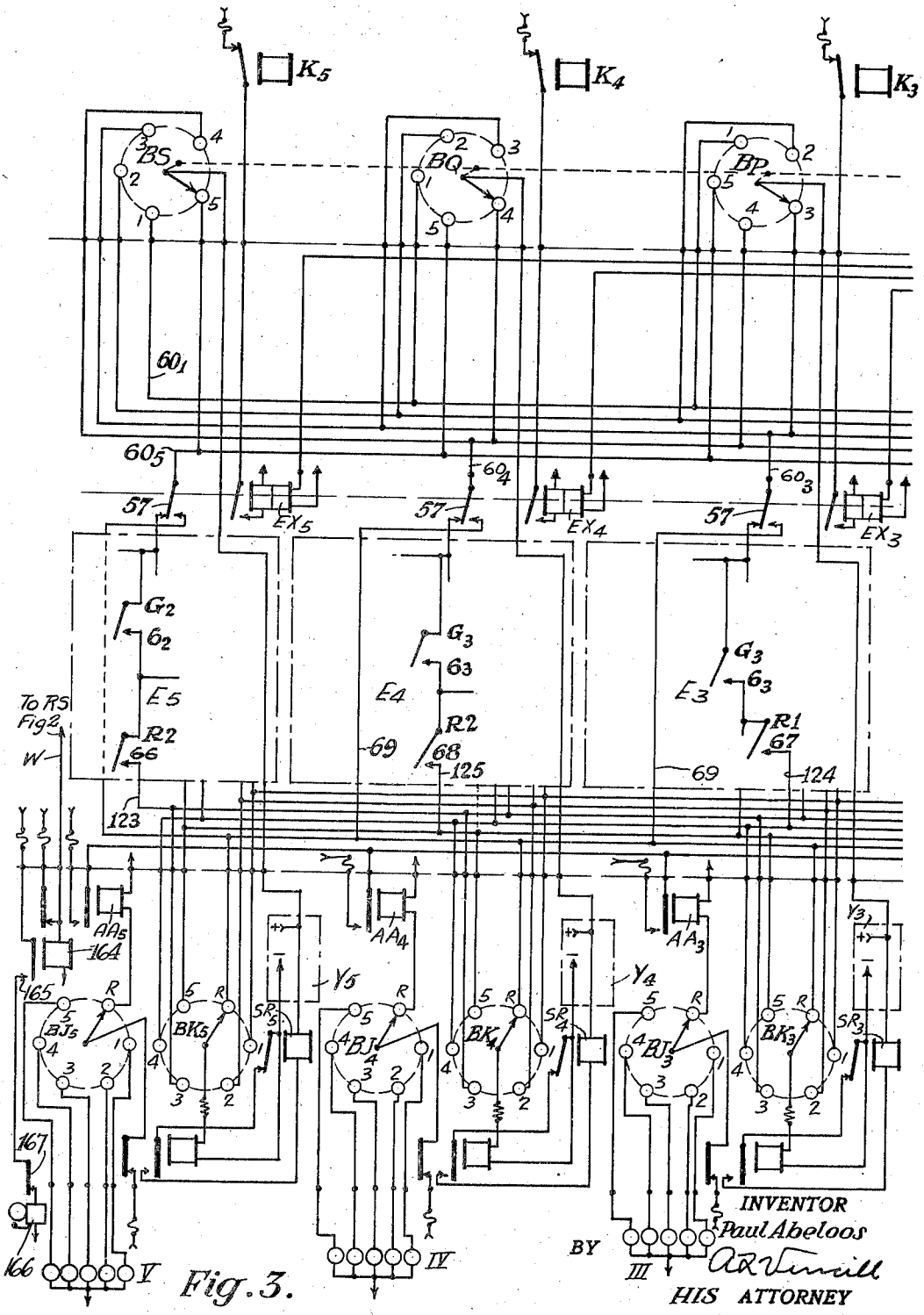


Fig. 3.

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AUTOMATIC SELECTION STATION

Original Filed Nov. 25, 1933 7 Sheets-Sheet 4

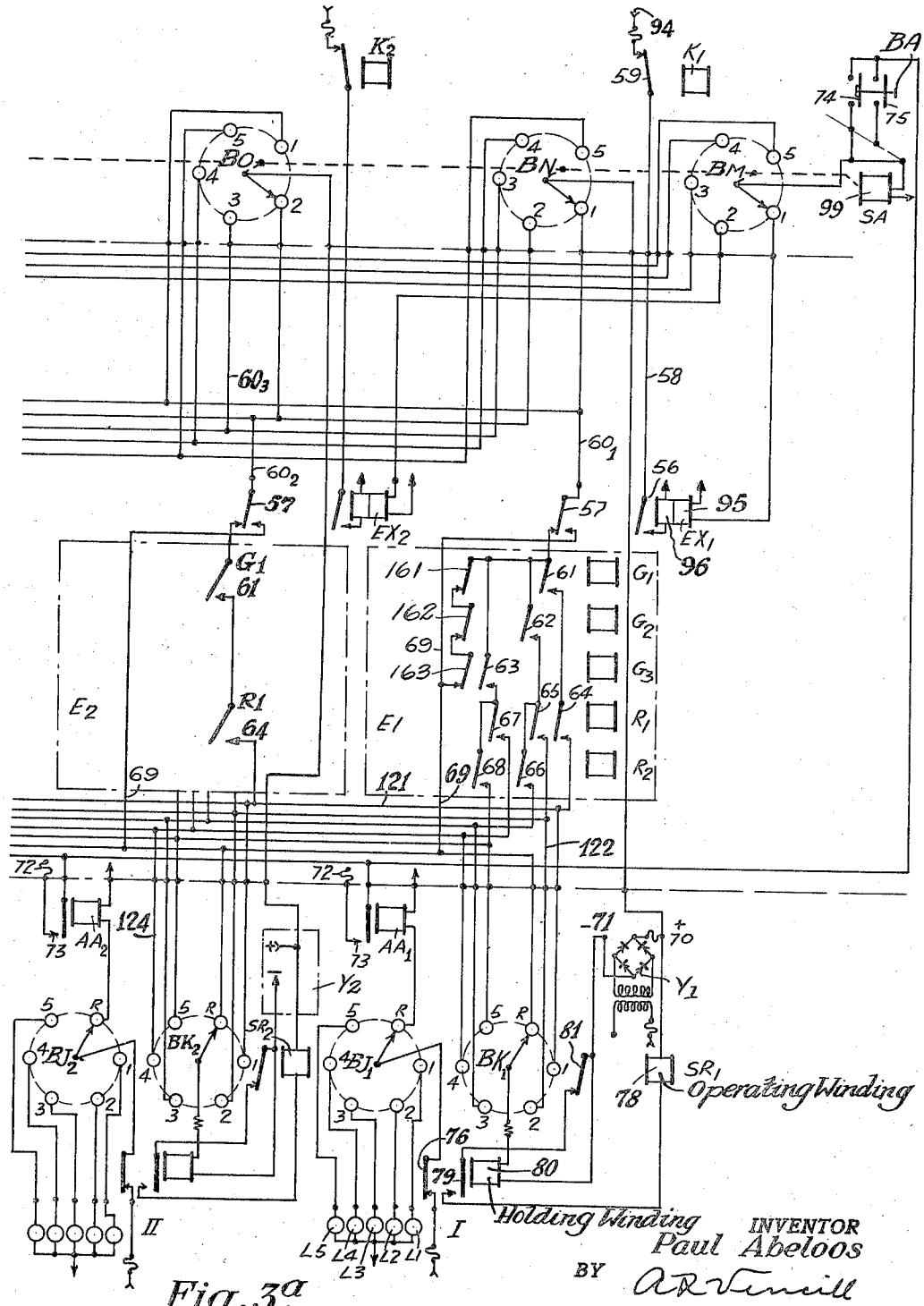


Fig. 3a

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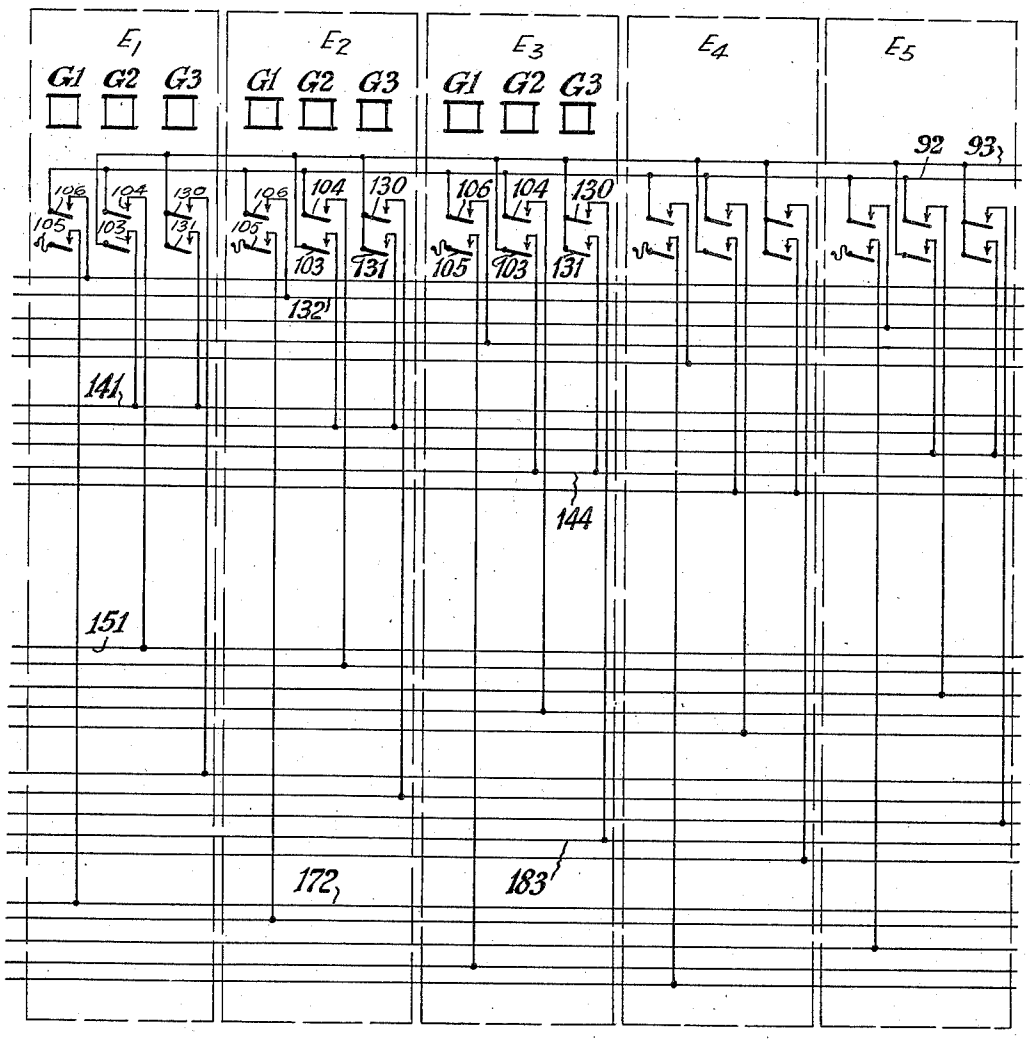


Fig. 4.

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AUTOMATIC SELECTION STATION

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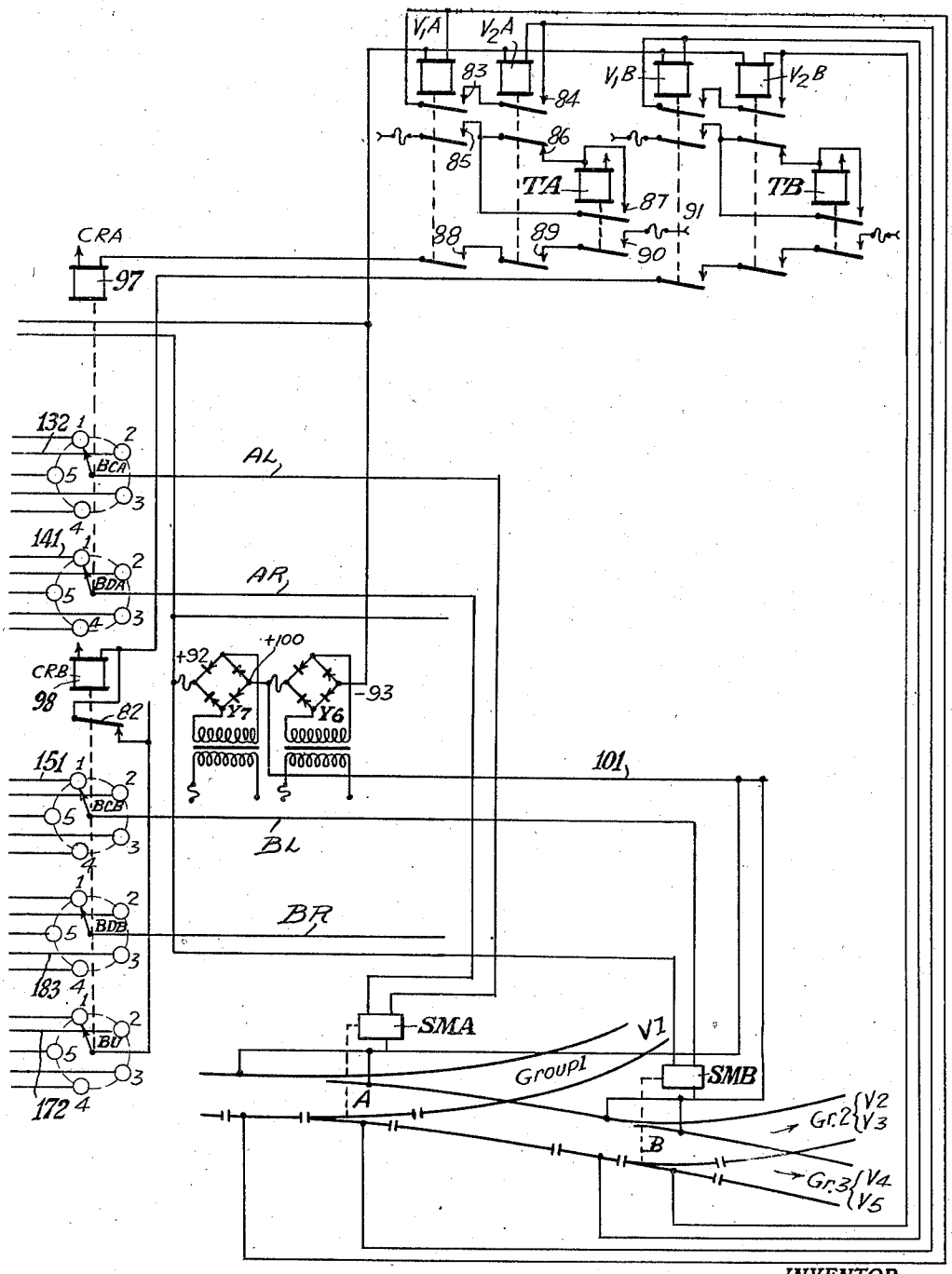


Fig. 4a

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AUTOMATIC SELECTION STATION

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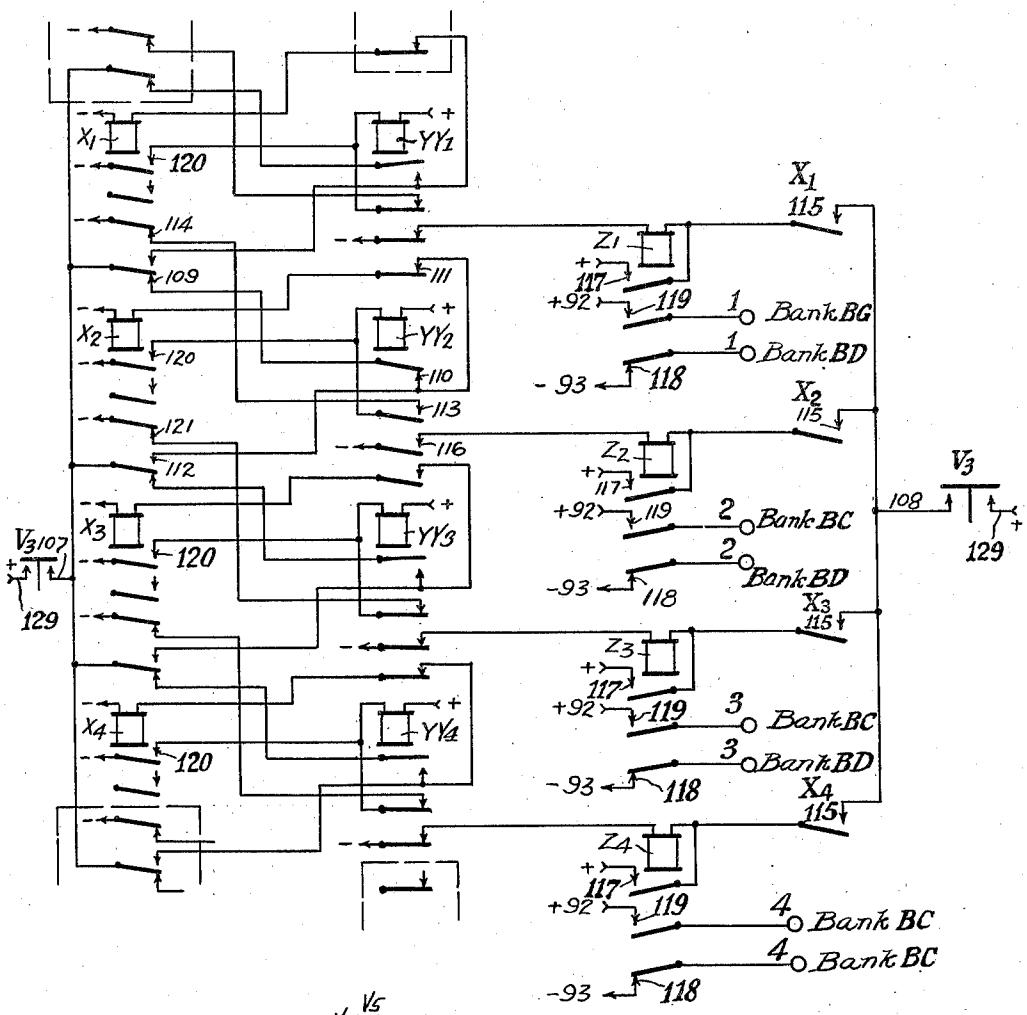


Fig. 6.

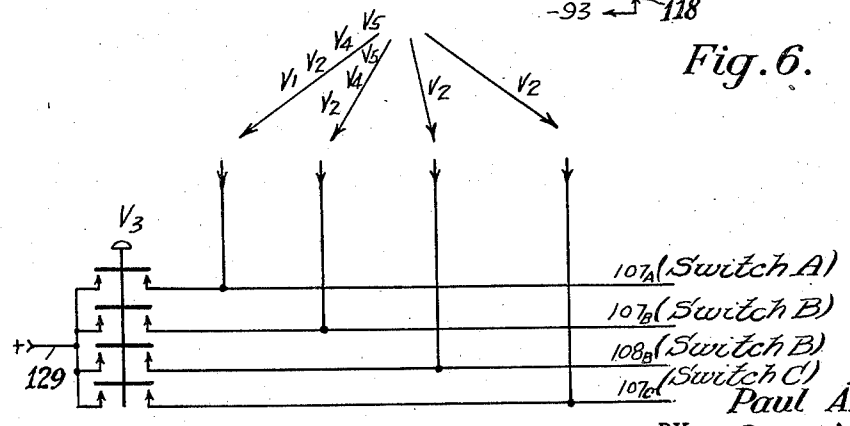


Fig. 5.

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2,139,324

UNITED STATES PATENT OFFICE

2,139,324

AUTOMATIC SELECTION STATION

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Application November 25, 1933, Serial No. 699,798. Renewed September 16, 1936. In France December 17, 1932

35 Claims. (Cl. 104—26)

This invention relates to a system for recording orders and transmitting them in a given succession, on the one hand to operating mechanism for the automatic control thereof and on the other hand to an annunciator for the guidance of an operator responsible for the control of other mechanism. The present invention is particularly applicable, though not limited thereto, to a centralized traffic control system for establishing the routes for a series of cars or cuts of cars in a railway classification yard, especially where the cars to be classified are pushed over a hump and then move under their own inertia to the classification track, the movement of the car being governed by car retarders or car riders as desired.

I will describe a system embodying my invention as applied to a railway classification yard, and will then point out the novel features thereof in claims.

One feature of the invention consists in permitting the use of the same recording apparatus for two purposes: first, the automatic control of operating mechanism so that the recorded orders may be carried out automatically in whole or in part; and second, the display of the orders to an operator, by means of a series of visual indicators.

A further feature of the invention consists in the system of automatic distribution of the orders to the operating mechanism according as the preceding orders are used. A further feature consists in the system of announcement to the operator comprising a series of indicators for exhibiting the recorded orders in the sequence in which they are to be used. Other features and advantages of the invention will appear as the specification progresses.

In railway classification yards it is advantageous to set the railway switches for the successive cars either automatically, or by having an operator stationed at a control station within the yard govern the operation of the railway switches in accordance with the orders transmitted to him. Again, it may be advantageous to arrange for automatic operation of the switches near the hump which perform the greater number of movements, leaving to the operator at the central station the control of the switches farther back in the yard and which have a lesser number of movements to perform. Furthermore, if car retarders are utilized, it may be advantageous to give the operator of such devices special indications, for example, "quality" according to the nature of the load of the cars, so that certain cars may be given special handling. The system forming the subject of the present invention fulfills these two functions.

The accompanying drawings will serve to illustrate by way of example the system applied to a railway classification yard and in which Fig. 1 is a diagrammatic view of the network of tracks under consideration. Figs. 2 and 2a when taken together with Fig. 2 placed at the left are a diagrammatic view of the apparatus for recording and storing the destination orders. Figs. 3 and 3a when taken together with Fig. 3 at the left are a diagrammatic view of the apparatus for announcing the orders to the operator at the central control station. Figs. 4 and 4a when taken together with Fig. 4 at the left are a diagrammatic view of the apparatus for transmitting the recorded orders to the operating mechanisms for the railway switches, and Figs. 5 and 6 represent portions of the system as modified to provide for the automatic control of the switch points without announcements and constitute a second form of the apparatus.

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

For each car to be classified the head operator records the classification track to which that car is directed. The result of such record is—

1. To effect in good time the automatic operation of the switch points in advance of the car in order to direct that car to the desired classification track.

2. To announce to the operator at the central control station the selected route and to announce special indications.

It is possible either to record in advance the selected routes for all the cars of a train to be classified or to effect such recording as and when the cars are pushed over the hump. In the first case the system must be such as to permit the recording of a large number of routes; in the second case, it is sufficient to provide for the storage of the records for only the number of routes equal to the maximum number of cars or cuts of cars which may be at any given moment moving from the hump to the classification tracks, for instance, five.

In describing the system as applied to the classification yard illustrated in Fig. 1, I will assume that the maximum number of records to be stored at any one time is five and that a single indication of quality is to be transmitted at times, for instance, the indication "Fragile". It is to be understood that the system may be applied to a classification yard having any arrangement

and any number of tracks and permits of any number of simultaneous records and also any number of "quality" indications.

Referring to Fig. 1, cars to be classified will move from the hump track shown at the left-hand end of the drawings to the right to any one of the five classification tracks designated by the numerals 1, 2, 3, 4, and 5, the different routes from the hump to the classification tracks being governed by the railway switches designated A, B, C, and D. I shall assume that the points A and B are to be operated between the right and left-hand positions as viewed from the left-hand side of Fig. 1 by switch machines of any standard type, the operation of which is automatically controlled. I shall also assume that the movements of the switch points C and D are under the control of an operator at the central control station who may operate the switches mechanically, electrically, or electropneumatically. As shown in Fig. 1, the hump station or "head point" is indicated by the reference character PB and at this station the routes for the different cars are recorded. The central control station is indicated by the reference character PC and at this station the orders recorded at the hump station are received and stored, the operator responsible for the operation of the switches C and D and car retarders if used being stationed preferably at this point.

The installation as a whole comprises the following essential elements: The hump station PB from which the orders for the destination and quality of the cars to be classified are transmitted; the central control station PC where these records are received, stored and exhibited in the form of announcements to be used by the operator at that station for manual control of the switch points C and D, and from which they are transmitted to effect the automatic control for the switch points A and B; and the line circuit equipment which transmits these orders between the hump station PB and the control station PC and between the control station PC and the several railway switches.

I. The principal apparatus located at the hump station PB (left-hand end of Fig. 2) is as follows:

1. Two independent rows of push buttons: the first row is that of the quality buttons comprising a "normal" button **11** and a "quality" button **12**. The second row is that of the route buttons V_1, V_2, V_3, V_4, and V_5, corresponding to the routes from the hump to the classification tracks 1, 2, 3, 4, and 5, respectively. The button "Normal" is provided with two contacts while each of the other buttons is provided with three contacts.

The first two contacts **16** and **17** of the route buttons are used to record a route through the medium of a combination of group relays G_1, G_2, and G_3 and of row relays R_1 and R_2 to be referred to later, and which are located at the central control station PC. The last contact **18** of the route buttons serves to control the route recording selector SE to be referred to later, and which is also located at the central control station.

2. A bell S which after five records have been stored operates in the following cases:

(*a*) If none of the five last announcements stored at the central station has been cancelled by the operator at that station, in which case the bell relay RS is released.

(*b*) If none of the five stored routes has been actually passed over by a car, in which case the total passage relay TF is released.

The operation of these relays and apparatus at the hump station will be described hereinafter.

As regards the central control station PC, the apparatus (Figs. 2 and 2[a]) for effecting and storing the records of the hump station will first be described and consists of the following—

(*a*) A plurality of relay assemblages or groups which store the different orders. That is to say, a relay assemblage or group is provided for each successive destination which is to be recorded. In the example here taken, there will be five such relay assemblages since the destination of five different cars is to be simultaneously stored. These relay assemblages are indicated as a whole by the reference characters E_1, E_2, E_3, E_4, and E_5. These relay assemblages are all alike and consist of a corresponding number of relays and, hence, it is thought that a description of one will suffice for an understanding of all. Referring to E_1, the assemblage consists of three group relays G_1, G_2, and G_3; two row relays R_1, and R_2, a quality relay Q, a control relay C_1, a section relay K_1, and a clearing relay F_1.

The corresponding relays G, R and Q of each assemblage E in turn are energized directly over the same line wires when the contacts of the route and quality buttons at station PB are momentarily closed. In order to provide the maximum number of orders with relatively few relays and line wires, the relays are operated two or more at a time, in different code combinations, a selected group relay G and a selected row relay R being operated for each order, the quality relay Q being also operated when required. It will be apparent that with this arrangement the number of available route orders equals the product of the number of group relays and row relays in each assemblage.

For the routes of Fig. 1, for orders of quality "Normal" the codes have been assigned as follows:

Route 1, relays G_1 and R_1 energized.
Route 2, relays G_2 and R_1 energized.
Route 3, relays G_2 and R_2 energized.
Route 4, relays G_3 and R_1 energized.
Route 5, relays G_3 and R_2 energized.

In the codes for orders of quality "Fragile", relay Q is also energized, these codes being otherwise similar to those listed.

As stated above, each of the relay assemblages E_1, E_2, E_3, E_4 and E_5 consists of a similar group of relays. In the following description corresponding relays of the different assemblages (except the group and row relays) will be identified by the reference character of the relay with a numerical suffix corresponding to the assemblage, for example, the clearing relays F_1, F_2, F_3, F_4, and F_5 refer to the clearing relay for the assemblages E_1, E_2, E_3, E_4, and E_5, respectively.

(*b*) A recording selector SE which selects the relay assemblage to be operated in response to the recording of a destination at the hump station. The selector SE may take different forms and, as here shown, is of the type which advances automatically from one operating position to the next upon deenergization of a stepping magnet **77** for actuating finder brushes. In this instance the selector SE actuates four brushes in a clockwise direction over four banks of contacts BE, BF, BG, and BH. Each bank of contacts consists of twice as many contacts as there are simultaneous records to be stored. In each bank these contacts are represented by the symbols 1_c, 1_k; 2_c, 2_k; 3_c, 3_k; 4_c, 4_k; 5_c, 5_k. The bank BE,

which serves to advance the selector, has its *k* contacts connected in parallel by the wire 19 to the last contact of the quality buttons 11 and 12 and from thence to the third contact of each of the route buttons in parallel. The brush for the bank BE is connected to the stepping contact *i* of the selector magnet 77.

The brush of the bank BF is connected by the wire 23 to the last contact of the route buttons, and the contacts *c* of the bank BF are connected in parallel by a wire 22 to the operating winding of the stepping magnet 77 of the selector.

The bank BG has its contacts *c* connected by wires 24_1, 24_2 ... to back contacts *j* of the control relays C_1, C_2 ... of the relay assemblages and from there by the wires 25_1, 25_2 ... to the section relays K_1, K_2 ..., the brush of the bank BG being connected to a positive terminal 139 of any convenient source of current such as a battery not shown. The bank BG through its control over the two relays C and K of the relay assemblages is effective, as will be described hereinafter, to cancel the old record and then to establish a new record of the group, row and quality relays according as to which of the route buttons V_1 ... V_5 and the quality buttons 11 and 12 at the hump station are operated.

The bank BH has its contacts *k* connected by the wires 26_1, 26_2 ... to the positive terminal 37 of the current source over front contact f_1 of the clearing relays F_1, F_2 ... of the different assemblages, and its brush connected by the wire 27 to the winding of the total passage relay TF, for energization of that relay when a car has cleared the last automatic switch point of the route resulting from the record under consideration. The operation of the clearing relays F_1, F_2 ... is determined by selectors CRA and CRB and the route relays V_1A, V_2A and V_1B, V_2B which will be described hereinafter.

The recording apparatus also includes a manually controllable cancelling relay AN normally energized by a simple circuit extending from the positive battery terminal 28 at the hump station. This relay controls at its front contact *a* the stick circuit of a route placing relay MR, and at its *d* contacts the different relay assemblages.

There will now be described the operation of recording the destination of a car to be classified assuming that the selector SE of the control station has stopped at the position 5_k as shown.

With both the hump station and the central control station supplied with proper sources of current, the cancelling relay AN is at once energized by the circuit extending from the positive battery terminal 28 at the hump station. The clearing relays F_1 ... F_5 are next each energized by a pickup circuit extending from the positive terminal 29 at the central station, a back contact a_1, a_2 ... a_5 of the route placing relay MR which is deenergized at the start, the corresponding wires 30_1 and 31_1, 30_2 and 31_2, etc., to the windings of these relays and thence to the opposite terminal of the current source and these clearing relays are all picked up. These clearing relays are each maintained energized by a stick circuit formed in the case of relay F_1 from the battery terminal 34 over contact d_1 of the cancelling relay AN, wire 33, back contact 9 of the section relay K_1, wire 32, front contact b_1, the winding of the relay and to the opposite terminal of the current source. The route placing relay MR is now energized over a circuit extending from the terminal 35 associated with the assemblage E_5 and the contacts e_1 of the various clearing relays F connected in series in the wire 36, winding of the relay and to the opposite terminal of the current source, and this relay MR is picked up to open the pickup circuits of the clearing relays which are now held energized over their stick circuits.

The total passage relay TF is energized by a circuit extending from the terminal 37 over contact f_1 of the relay F_1, wire 26_1, contact 5_k and brush of the bank BH of the selector SE, wire 27, winding of the relay TF and to the opposite terminal of the current source. The relay RS at the hump station is also energized by current supplied from the control station over the wire W in a manner to appear hereinafter. It follows that the cancelling relay AN, the clearing relays F, and the route placing relay MR of the central control station are normally energized, together with the total passage relay TF and the relay RS at the hump station.

In order to effect a record for the destination of a car to be classified, the operator at the hump station presses simultaneously on a route button, for example V_1, and a quality button, for example, "Fragile" button 12. The relay MTF for maintaining the relay TF energized during the passage of the brush of bank BH from one *k* contact to the next is now picked up over a circuit from the terminal 38, contacts *g* and *h* of the relays TF and RS, respectively, wire 39, contact 18 of the button V_1, winding of the relay MTF and to the opposite battery terminal. At the same time the magnet 77 of selector SE is supplied with current from the terminal 38 over contacts *g* and *h*, wire 39, contact 18 of the button V_1, contact *m* of the button 12, wire 19, contact 5_k and brush of the bank BE, the back contact *i*, wire 21, and the winding of magnet 77 to the opposite battery terminal. Upon energization of magnet 77 its circuit is broken at the contact *i* and hence is immediately deenergized and in consequence thereof the selector SE advances its contact brushes to the respective contacts 1_c. Upon arriving at this new position magnet 77 is energized from the terminal 38 over contacts *g* and *h*, wire 39, contact 18, wire 23, the brush and contact 1_c of the bank BF, wire 22 and the winding of magnet 77 to the opposite battery terminal, and is held energized as long as the button V_1 is depressed. The selector having advanced to the position 1_c, the section relay K_1 is energized from the battery terminal 139 over brush and contact 1_c of the bank BG, wire 24_1, the lower contact *j* of the control relay C_1, wire 25_1, and the winding of the relay K_1 to the other battery terminal. As the relay K_1 is picked up, it breaks at its back contact 9 the stick circuit for the clearing relay F_1 and that relay is released, the relay F_1 in turn opening the pickup circuit to the relay MR at its front contact e_1. This latter relay is nevertheless retained energized by a stick circuit from terminal 29 including its own front contact a_1 and the front contact *a* of the cancelling relay AN. The advancing of the selector SE to the 1_c position is effective to also supply current from the terminal 139 over the brush and contact 1_c of the bank BG, wires 24_1 and $24a$, contacts *n* in series of the group, row and quality relays of the assemblage E_1, wire 40 and winding of the relay C_1 to the opposite battery terminal, and relay C_1 is energized. When energized, the control relay C_1 breaks at its back contact *j* the circuit to the section relay K_1 and that relay is deenergized.

The energizing of the control relay C_1 also completes recording circuits from the terminal **41** at the hump station as follows:

(1) Contact *y* of the button **12**, contact **16** of the route button V_1, line wire **42**, contact *p* of relay C_1, winding of the group relay G_1 and to the opposite battery terminal.

(2) Contact *y*, contact **17** of the route button V_1, line wire **43**, front contact *r* of the relay C_1, winding of the row relay R_1 and to the opposite battery terminal.

(3) Contact *o* of the button **12**, line wire **44**, contacts *s* of the relay C_1, winding of the quality relay Q and to the opposite battery terminal.

These relays G_1, R_1 and Q of the assemblage E_1 are therefore energized in response to the operation of the buttons **12** and V_1 and are maintained energized from terminal **34** by stick circuits that include a holding winding, their own front contacts *t*, and the contacts **9** and d_1 of the section relay K_1 and the cancelling relay AN, respectively. The circuit for the control relay C_1 is now open at the contacts *n* of the selected group, row and quality relays and that relay is released.

When the operator ceases to depress the route button V_1, the maintaining relay MTF is deenergized, its energizing circuit being broken at the contact **18**. At the same time the maintaining circuit for magnet **77** of the selector SE is broken and the selector advances one step to the contacts 1_k upon its deenergization. There has now been described the complete operation of recording a route for a car to be classified, the record being in the form of a selection of the relays of the assemblage E_1 according to the destination of the car. The selector SE has advanced to its next control contact, in this instance to the contact 1_k. The total passage relay TF will remain energized after relay MTF releases because it will now receive current from terminal **37**, Fig. 2^a, over the f_1 contact of the clearing relay F_2 of the assemblage E_2, wire 26_2 and the contact 1_k of the bank BH. The manner in which a second record is made from the position 1_k of the selector SE and the advancing of that selector to its next position 2_k, and so on, will be evident. It is clear that the operator at the hump station can proceed to record the destination of five separate cars, the destinations of the separate cars being recorded and simultaneously stored by the five relay assemblages, the selector SE advancing one operating position in response to each record made.

It should be noted that if the hump station comprises several indications of quality capable of being applied to the same car, any one of these indications may be recorded by pressing on the corresponding quality buttons while maintaining the route button depressed. Each of these indications will be recorded by a special Q relay of the assemblages at the control station.

The quality "normal" is intended for cars not having any special characteristic. For these cars a route button and the normal button **11** are depressed at the same time, the record of the route being effected without any record of quality.

The records set up at the different relay assemblages are maintained during a complete rotation of the recording selector SE. When the selector has returned to the position 5_k, it is only possible to effect a sixth record if the contacts *g* and *h* are closed, that is to say, if the relays RS and TF are energized. The conditions for operating the relay RS will be described later.

It will be noted that as the selector SE moves to the different *k* positions, relay TF is held energized over the brush of bank BH, wire 26_2, 26_3, etc., and contact f_1 of the relay F for the assemblage next in advance, and that since the circuit for the stepping magnet **77** includes contact *g* of relay TF, the operation of a push button V will not advance the selector unless the next assemblage is unoccupied and its clearing relay F is energized. However, since all five clearing relays were initially energized in the case described, it will evidently be possible to store records successively in each of the five assemblages E.

The selector SE having been operated around to its 5_k position, the relay TF will become deenergized unless the clearing relay F_1 is first reenergized, it having been seen that after the completion of the first record this clearing relay F_1 was released. Relay F_1 is reenergized at the moment when the first car passes over the last automatic switch point in the route corresponding to the order stored in the assemblage E_1, if at this moment the respective switch selector CRA or CRB is at the position where its finder brush for its contact bank corresponds to the contact *1*. For a car intended for routes 2, 3, 4 or 5 of Fig. 1, this switch is switch B and the circuit for the relay F_1 is traced from the battery terminal **45** shown at the right-hand end of Fig. 2^a, over front contacts **46** and **47** of the route control relays V_2B and V_1B associated with the switch B, (these control relays are shown in Fig. 4^a and their operation will be described in detail hereinafter, and the respective front contacts **46** and **47** are shown in Fig. 2^a remote from the winding of the relay for the sake of simplicity), brush and contact *1* of the bank BXB of the switch selector CRB to be referred to later, and thence by wire 31_1 to the winding of the relay F_1 and to the opposite battery terminal. For a car intended for route 1 of Fig. 1, switch A is the last switch to be passed over and the circuit for relay F_1 is formed from the terminal **48** over the front contacts **49** and **50** of the route control relays V_2A and V_1A for the switch A, (these relays are likewise shown in Fig. 4^a and their operation will be described hereinafter, the contacts **49** and **50** being shown remote from the windings of the relays for the sake of clearness), the front contact **51** of a directional relay RD, the brush and contact *1* of the bank BXA of the selector CRA to be referred to later and wires **52** and 31_1 to the winding of the clearing relay F_1 and to the opposite battery terminal. It will be noted that the front contact **51** of the directional relay RD is interposed in this last traced control circuit for the clearing relay F_1 to render that circuit inoperative at a time when cars intended for routes 2, 3, 4 or 5 clear the switch point A and to render it operative only for the cars intended for the route 1, that is to say, the cars for which the switch A is the last automatic switch. The directional relay RD is energized only when the finder brush of the bank BV of the selector CRA is on a contact corresponding to a record for the route 1, that is to say, only when the G_1 and the R_1 relays of the respective relay assemblages are energized, as will be understood by an inspection of Figs. 2 and 2^a.

To sum up, the clearing relay F_1 is reenergized at the moment when the route recorded in the assemblage E_1 is utilized by the car. It is then maintained energized over its stick circuit previously traced. If then the clearing relay F_1 and consequently the total passage relay TF are reenergized, it is possible to effect a sixth record,

assuming, of course, that the relay RS is also energized in a manner to shortly appear. When the sixth record is made at the hump station, the section relay K_1 will become energized as previously described, and as that relay picks up it will break at its contact 9 the stick circuits for the group, row and quality relays of E_1 still energized since the first record and these relays will now all be released. In deenergizing, the group, row and quality relays will complete at the back contacts *n* the energizing circuit for the control relay C_1 and that relay will be picked up in response to the sixth record in the same manner as previously described for the first record. With the control relay C_1 picked up, the group, row and quality relays will be selected in accordance with the sixth record made at the hump station. It will be seen, therefore, that the cancellation of the old record is assured before a fresh one can be effected.

An auxiliary manually controlled contact 53 is provided at the central station and is interposed in the wire 54 leading from a battery terminal 55 over contact *h* of relay RS to line wire 39 extending to the hump station and permits the operator at the central station to shunt the contact *g* of the total passage relay TF so as to eliminate the function thereof. In this latter case, the records no longer depend upon the passage of the cars over the route set up but only on the closing of the contact 53 and on the energizing of relay RS by the cancellation of the announcements, as will shortly appear.

II. There will now be described, with reference to Figs. 3 and 3ª, the system for decoding and displaying to the operator at the central control station, in the form of visual announcements, records stored in the relay assemblages in the manner above explained. As before, the apparatus only will be described in broad lines, the details of the various apparatus only appearing in the explanation of the operation.

The system for the announcement of the route records to the operator comprises essentially a route-announcing table constituted by as many vertical rows I, II, III, IV, and V of lamps L_1 L_2 . . . L_5 as there are records to be kept at the same time, for instance, five in the example chosen. The number of lamps in each row corresponds to the number of classification tracks, which is also five in the present instance.

The illumination of the lamp corresponding to the route recorded in the corresponding relay assemblage is governed by lamp row selectors SR_1, SR_2, SR_3, SR_4, and SR_5. These selectors are preferably of the type similar to the selector SE and are advanced automatically, and each comprises two banks BJ and BK each provided with a finder brush and as many contacts as there are classification tracks (five in the case under consideration) plus one rest contact R for which no lamp is illuminated in the corresponding row. The bank BK serves to control the selector by means of its finder brush, the control of the selector being in accordance with the well-known arrangement in which it adjusts itself automatically to the position in which the brush of the bank BK is on a live contact. The contacts of the BK banks having like reference numbers are connected in parallel to a series of relay contacts operated by the G and R relays of the different relay assemblages E_1 to E_5, the relay contact series corresponding to a bank contact being alike in each assemblage. For example, the circuit including contacts 61 and 64 of relays G_1 and R_1, (closed when route 1 is recorded) in each of the relay assemblages E_1 to E_5 is connected to a bus wire 121 which is also connected to contact 1 of bank BK of each of the selectors SR_1 to SR_5. Similarly, the circuits including contacts 62 and 65 of relays G_2 and R_1 (route 2) are all connected together and to the contacts 2 of all of the banks BK by a bus wire 122. The bank BJ serves to select the lamp corresponding to the recorded route by simple circuits as will be understood by an inspection of Figs. 3 and 3ª.

Each announcement displayed by illumination of a lamp may be cancelled by a cancelling button BA which, when depressed, is effective to extinguish the particular lamps and substitute in the row of the extinguished lamp, by a fresh illumination, the announcement of the next following record. The extinction and substitution of announcements initiated by the button BA are effected by a route announcement selector SA which is controlled by the contact 74 of the cancelling button BA in a manner to shortly appear. The route announcement selector SA, which acts on the lamps through the medium of five extinguishing relays EX_1 . . . EX_5, comprises six banks BM, BN, BO, BP, BQ, and BS, each having five contacts. The bank BM controls the extinguishing relays. The banks BN, BO, BP, BQ, and BS have their respective brushes angularly displaced by one contact and each corresponds to a row of lamps.

The extinguishing relays EX_1 to EX_5 are each provided with two contacts 56 and 57, the first of which, 56, connects a holding winding 96 of the relay to a terminal 94 of the current source to form a stick circuit for the relay, wire 58 and a back contact 59 of the corresponding section relay K_1 . . . K_5 already described in connection with Fig. 2ª being interposed in the stick circuit. The contact 57 is interposed in the connection of a wire 60 with the relay contacts of the associated assemblage. In the arrangement under consideration and referring to assemblage E_1, the back contact 57 of relay EX_1 connects the wire 60_1 to the front contacts 61, 62 and 63 of the three group relays G_1, G_2 and G_3, respectively, and to back contact 161 of relay G_1, in parallel. The contact 61 of relay G_1 is connected in series with the contact 64 of the row relay R_1, and these two contacts 61 and 64 form a decoding contact series for an announcing circuit for energizing wire 121 corresponding to the track route 1. The contact 62 of relay G_2 is connected with contact 65 of relay R_1 and these two contacts 62 and 65 form a decoding series for an announcing circuit for energizing wire 122 corresponding to the track route 2. Contact 62 is also connected with contact 66 of row relay R_2 and these contacts 62 and 66 form a decoding series for an announcing circuit for energizing wire 123 corresponding to track route 3. The contact 63 of relay G_3 is connected to the contact 67 of relay R_1 for completing an announcing circuit for energizing wire 124 corresponding to track route 4, and to a contact 68 of the relay R_2 for completing an announcing circuit for energizing wire 125 corresponding to the track route 5. There is also provided a special circuit which leads from wire 60, over back contact 57 to a bus wire 69 called the "rest" wire, the back contacts 161, 162 and 163 of the group relays being interposed in the connection. The wire 60_1 may also be connected directly to the wire 69 over the front contact 57 of the extinguishing relay EX_1. It will be understood that each of the remaining wires 60 is connected over the contact

57 of the associated extinguishing relay and over the different series of relay contacts in the associated assemblage to the bus wires 121, 122, etc., in exactly the same manner as just explained in the case of assemblage E_1, to form announcing circuits corresponding to the respective track routes.

The contacts having the same reference number in all the banks BN, BO, BP, BQ, and BS of the route selector SA are connected in parallel to the same wire 60. As here shown, the contacts 1 of each of the banks are connected to the wire 60_1 for the assemblage E_1, the contacts 2 to the wire 60_2 of the assemblage E_2, etc. As previously set forth, the contacts having corresponding numbers in the banks BK of the lamp row selectors are connected in parallel to the exit of the corresponding anonuncing circuit of each of the relay assemblages.

Each lamp row selector SR_1 and its corresponding lamp row is provided with an independent source of direct current Y which, as here shown, consists of a transformer and a full wave rectifier. Referring to selector SR_1, it is provided with current from the source indicated by the reference character Y_1. The sources Y_2 to Y_5 for the remaining selectors and lamp rows are preferably similar in each case to that shown for selector SR_1 and are indicated conventionally only for the sake of simplicity.

A cancelling relay AA is associated with the bank BJ of each of the lamp row selectors and is energized as long as the selector remains at the rest contact and the brush of bank BJ engages its contact R.

The operation of the system for announcing the recorded routes to the operator at the central station is as follows: The successive positions of the announcement selector SA will be refererd to by the position of the brush of the first bank BM, the position 1 meaning that the brush of the bank BM is on contact 1, the brush of the bank BN on its contact 1, the brush of bank BO on its contact 2, the brush of bank BP on contact 3, and so on.

Assuming that the announcement selector SA is in position 1 and that no record has yet been made in the relay assemblages, a circuit can be traced from the positive terminal of each of the sources Y to the rest contact R of a different one of the lamp row selectors. Referring to the assemblage E_1, the circuit extends from the positive terminal 70 of the source Y_1 over brush and contact 1 of bank BN, wire 60_1, back contact 57 of the relay EX_1, the back contacts 161, 162 and 163 of the group relays to wire 69, and thence to the rest contact R of bank BK_1. If the brush of bank BK_1 of selector SR_1 is not on contact R, the holding winding 80 will be deenergized and a circuit will be closed from terminal 70 of source Y_1, through the operating winding 78, back contacts 79 and 81 controlled by windings 80 and 78, respectively, to the other terminal 71 of the source, so that winding 78 will be energized intermittently to advance the selector brushes step by step. When selector SR_1 operates to where the brush of its bank BK_1 engages the R contact, the circuit is completed from wire 69 through the holding winding 80 of selector SR_1 and to the negative terminal 71 of the source Y_1, so that contact 79 opens and selector SR_1 is held at rest. The brush of bank BJ_1 of selector SR_1 is thus on its contact R and no lamp in the row I is illuminated, the associated cancelling relay AA_1 being energized, however, over the R contact of the bank BJ_1 and front contact 76 controlled by winding 80. In a like manner each of the lamp row selectors is held stationary at its rest contacts R and no lamp is illuminated, each of the cancelling relays AA, however, being energized.

It is to be noted particularly that each of the selectors SR responds selectively to current from its associated source Y, for the reason that one terminal of magnet 80 of selector SR_1 for example, is connected to the negative terminal 71 of source Y_1 only and the circuit for magnet 80 is not completed when the positive terminals of one or more of the sources Y_2 to Y_5 for the other selectors are connected to the brush of bank BK_1.

Suppose that a record is made in the relay assemblage E_1 for establishing route 3 for a car, that is, the relays G_2 and R_2 of E_1 are energized. The energizing of relays G_2 and R_2 of the assemblage E_1 is effective to remove current from the rest contact R of the selector SR_1 and to render the contact 3 of the bank BK_1 of that selector alive and, consequently, this selector is operated until its finder brushes are in engagement with the respective contacts 3. With the brush of the bank BJ_1 at the contact 3 the lamp L_3 of row I is illuminated to announce to the operator that a route record for a car destined to track 3 has been stored.

The energization of relay G_2 of assemblage E_1 is also effective to control switches A and B to set up route 2 or 3 leading over switch C, as hereinafter explained, but with the apparatus arranged as described, it is to be understood that switch C is controlled manually by the operator at the control station PC. When lamp L_3 of row I becomes illuminated, therefore the operator at station PC will act accordingly and will cause switch C to be operated to the right so that route 3 and not route 2 will be completed when switches A and B are operated automatically in response to the energization of relay G_2.

Assume next that additional orders for route 1, route 4, route 5 and route 3 are recorded in succession. In the relay assemblages E_2, E_3, E_4 and E_5, group relay G and row relay R corresponding to these respective routes will be energized in the manner described hereinbefore. In each case the recording of the route is effective to interrupt the rest circuit for the associated lamp row selector at the back contact, such as contact 161, of the G relay that is energized, and the selectors will operate to positions determined by the stored code combinations, that is, selector SR_2 will operate to the contacts 1, selector SR_3 to the contacts 4, selector SR_4 to the contacts 5 and selector SR_5 to the contacts 3 with the result that lamp L_1 of row II, lamp L_4 of row III, lamp L_5 of row IV and lamp L_3 of row V will be illuminated to announce to the operator that these successive routes have been stored. It will be noted that as each lamp row selector is operated away from the rest contact the associated cancelling relay AA became deenergized. When the fifth record has been made and the cancelling relay AA_5 associated with the lamp row selector SR_5 has been released, the connection from the source of current to the wire W, which supplies current to the relay RS (Fig. 2), is opened with the result that the contact h at the hump station is ruptured and no further recording of routes can be made. It will be seen, therefore, that it is impossible for the operator at the hump station to effect a sixth record as long as the op-

erator at the central station has not cancelled one of the previous five records.

This control of the relay RS gives the second condition governing the transmission of records from the hump station, namely, the progressive cancellation of the previous records by the operator at the central station with the subsequent energization of relay RS. The first condition is that of clearing a route by a car and the reenergizing of the total passage relay TF, as described hereinbefore.

When the fifth record has been made and the cancelling relay AA_5 associated with the lamp row selector SR_5 has been released, the circuit to a relay 164 is opened and that relay is released to close its back contact 165 and complete a simple circuit to an indicator bell 166, a contact 167 operated by the holding winding of selector SR_5 being interposed in the circuit. The bell 166 may be a single stroke bell or any desired indicating device to inform the central station operator that an announcement has been recorded on the last lamp row V.

To cancel an announcement, the operator at the central station presses the cancelling button BA for operating the selector SA. With the button BA depressed, a circuit can be traced from any one of the battery terminals 72 over the back contact 73 of the respective cancelling relay AA, since all of these relays are now deenergized, contact 74 of the button BA, winding 99 of the selector SA and to the opposite terminal of the same source of current. In shunt with the winding of the selector SA is a circuit leading to the pickup winding 95 of the extinguishing relay EX_1, the latter connection including the brush and contact 1 of the bank BM. Relay EX_1 will therefore pick up, and will then be retained energized by the circuit including its holding winding 96, its own front contact 56 and the back contact 59 of the corresponding section relay K_1 of Fig. 2[a]. When the push button BA is released, magnet 99 of the selector SA is deenergized and the selector advances to the position 2, but relay EX_1 remains energized over its stick circuit.

When the selector SA arrives at the position 2, the brush of the bank BN engages the contact 2 and hence is connected to the wire 60_2 leading to the relay assemblage E_2. In like manner, the brush of the bank BO is in engagement with its contact 3 and hence is connected to the wire 60_3 leading to the asesmblage E_3. Similarly, the brush of the bank BP is connected to its contact 4 and to the wire 60_4 leading to the assemblage E_4, the brush of the bank BQ is connected to its contact 5 and to the wire 60_5 of assemblage E_5, and the brush of the bank BS is connected to its contact 1 and to the wire 60_1 for the assemblage E_1. It will be noted that the positive terminal 70 of the source Y_1, which source operates the selector SR_1, is now connected over the brush and contact 2 of the bank BN to wire 60_2 and through contacts of the selected relays G_1 and R_1 of the assemblage E_2, which are arranged for route 1, to wire 121 leading to the contact 1 of the bank BK_1 of selector SR_1 with the result that the selector SR_1 will now step around until the brush of its bank BK_1 engages the contact 1. The brush of bank BJ_1 of SR_1 being now also in engagement with its contact 1, the lamp L_1 of row I is illuminated. Consequently, the previous announcement of row II is now transferred to the row I. In like manner, the positive terminal of the source Y_2 which operates the selector SR_2 is connected over the brush and contact 3 of bank BO to wire 60_3 and through the contacts of the selected relays G_3 and R_1 of the assemblage E_3 to wire 124 leading to contact 4 of bank BK_2 of selector SR_2 since assemblage E_3 is arranged for route 4, and that selector operates to the position of contact 4, and the lamp L_4 of row II is illuminated. Hence, the previous announcement of row III is now transferred to the row II. In like manner, the source of current Y_3 for the selector SR_3 is connected over the brush and contact 4 of the bank BP to wire 60_4 and through the contacts of the selected relays G_3 and R_2 of the assemblage E_4 to wire 125 leading to the contact 5 of bank BK_3 of selector SR_3. Selector SR_3 operates to the corresponding position, and the announcement of the row IV is transferred to the row III. Again, the source of current Y_4 for the selector SR_4 is connected over the brush and contact 5 of the bank BQ to wire 60_5 and through the contacts of the selected relays G_2 and R_2 of the assemblage E_5 with wire 123 leading to the contact 3 of the bank BK_4 of selector SR_4 and the announcement of row V is transferred to the row IV. The source of current Y_5 for the selector SR_5 is connected over the brush and contact 1 of the bank BS to wire 60_1, front contact 57 of relay EX_1 and wire 69 with the R contact of the bank BK_5 of selector SR_5 and that selector is stepped around to its rest contact and no lamp is illuminated in the row V. With the selector SR_5 operated to its rest position, the corresponding relay AA_5 is picked up and current is supplied to the wire W for energizing the relay RS at the hump station.

If now a new record is made by the operator at the hump station, it will be stored in the relay assemblage E_1 in the manner described hereinbefore. The energizing of the section relay K_1 in response to this new record will have the effect of opening the holding circuit for the extinguishing relay EX_1 at contact 59 and that relay will be released to close the back contact 57 and complete the connection of the source Y_5 over the brush and contact 1 of the bank BS to wire 60_1 and through the contacts of the freshly selected relays G and R of the assemblage E_1 to the corresponding contact of the bank BK_5 of the selector SR_5 with the result that a lamp in row V corresponding to the new record will be illuminated. It is to be seen, therefore, that for each cancelling of an announcement by the operator at the central station the announcement displayed at a lamp row is transferred to the preceding row leaving the last row free for announcing a new record.

On the other hand, the system prevents the operator from effecting more cancellations than there are announcements displayed on his board. When he has cancelled all the announcements, the cancelling relays AA of all the rows are energized and, consequently, the circuit for the selector SA is open at the back contact 73 of the AA relays and it is impossible to energize that selector until a new record is effected in response to the recording of a route at the hump station.

The central station comprises also a table of the announcements of quality on which the advance of the announcements is controlled by the contact 75 of the push button BA and an associated selector similar to selector SA, but not shown, and is effected therefore at the same time as the cancellation of the route announcement. The principle is analogous in the two cases. The

operation of the table of quality announcements will not, therefore, be described in detail.

III. There will now be described the system for transmitting the route records stored in the relay assemblages to the motors of the operating mechanisms for the switches A and B.

Each route record, it will be remembered, is stored by energizing a group relay in combination with a row relay. If switch C is to be operated automatically, it is obvious that since each position of the switch defines a particular route, the same relay combinations as are used to control lamps L_2 and L_3 of the visual indicator may also be used to operate switch C to the left and right. Likewise switch D may be controlled by the same relay combinations as are used to control lamps L_4 and L_5. However, in the system as illustrated, only switches A and B are controlled automatically, and since these switches are each included in a plurality of routes, the arrangement has been simplified by arranging the code combinations so that switches A and B may be controlled by the G relays only. That is, each record controls switch B to the left when relay G_2 is energized and to the right when relay G_3 is energized. Likewise each record controls switch A to the left when relay G_1 is energized and to the right when either relay G_2 or G_3 is energized.

The system functions in such a manner that the track switches A and B are placed under the control of the G relays of each assemblage E in turn by means of selectors controlled by track relays. As each car vacates a switch section, the corresponding track relay advances the selector one step so as to place the switch under the control of the assemblage E containing the record for the next following car.

Referring to Figs. 4 and 4a, this system comprises a selector CR for each of the switches A and B, these selectors being further identified by a suffix corresponding to the associated switch. The selectors CRA and CRB are preferably of the same type as the selector SE. Referring to the selector CRA, it is provided with two banks BCA and BDA each of which has as many contacts as there are records, that is, five contacts in the example under consideration. Moreover, this selector CRA is provided with two additional banks BV and BXA (Fig. 2a) each of which is provided with as many contacts as there are routes, being also five in number in the example being considered.

The first bank BCA of selector CRA is used for controlling the operation of the switch A to the position for movement to the left when viewed from the left-hand side of Fig. 4a, that is, to the position illustrated in Fig. 4a. The second bank BDA is used for controlling the operation of the switch A to the position for movement to the right when viewed from the left-hand side of Fig. 4a, that is, to the position reverse from that illustrated in Fig. 4a. The banks BV and BXA (Fig. 2a) are used to control the clearing relays F_1 . . . F_5 when a car for route 1 passes over switch A as previously explained.

As regards the selector CRB associated with the switch B, it is provided with two banks BCB and BDB having functions similar to corresponding banks of the selector CRA. The bank BXB is used to control the clearing relays F when a car passes over switch B, in the manner previously described. As regards the fourth bank BU (Fig. 4a) for the selector CRB, it serves to advance the selector CRB when the switch B is not used in the route considered, in this instance when a car is routed for the track 1. Under such conditions the brush of the bank BU is effective to advance the selector until it is over a contact for which an operation of the switch B is required. The brush of the bank BU is connected with the winding 98 of the selector CRB over a back contact 82.

For the purpose of actuating these selectors one step in response to each car moving over the switch a forward relay such as relay V_1A or V_1B controlled by a rail section ahead of the switch, and a rear relay such as relay V_2A or V_2B controlled by a rail section in the rear of the switch, are provided. Assuming a car to be approaching the switch A from the hump, when its wheels and axles span the rail section shown just ahead of that switch, the relay V_1A is energized over a circuit extending from the positive terminal 100 of the current source Y_6 over wire 101 to the upper rail thence through the wheels and axles of the car to the lower rail and to the winding of the relay V_1A and to the negative terminal 93 of the current source. As the car advances to the point where its wheels and axles span the rail section back of the switch the relay V_2A is supplied with current over a circuit extending from the positive terminal 100 to the upper rail thence the wheels and axles of the car to the lower rail and to the winding of the relay V_2A and thence to the negative terminal 93. By means of the front contacts 83 and 84 of these two relays, the relay V_1A will be maintained energized until the relay V_2A is released. These two relays control by their contacts 85 and 86 a trailing relay TA, the arrangement being such that the relay TA is energized as a car passes over the switch in a normal direction but remains deenergized for a trailing movement. In the normal movement, the forward relay V_1A is first energized and by its upper contact 85 and the lower contact 86 of the rear relay V_2A, the relay TA is picked up after which it is maintained energized over its own front contact 87 until the forward relay is released and the front contact 85 is opened. In the event a car passes over the switch in a trailing direction the rear relay V_2A will be energized previous to the energizing of the relay V_1A and the relay TA will remain deenergized.

The contacts 88 and 89 of the two route relays V_1A and V_2A, respectively, and the contact 90 of the relay TA are interposed in series in the circuit from terminal 91 for energizing the stepping magnet 97 of selector CRA. It follows that each time a car passes over the switch A in the normal direction, the magnet 97 of selector CRA is energized and then deenergized to advance selector CRA one step when the car has cleared the switch.

The route relays V_1B and V_2B associated with the switch B are controlled in a manner similar to that just described for the route relays V_1A and V_2A, the two relays V_1B and V_2B being operated as a car passes over the switch B. A trailing relay TB is also associated with these relays V_1B and V_2B, and these three relays by means of their respective front contacts control the energizing of magnet 98 of the selector CRB.

As stated hereinbefore, the operation of the switch points A and B is accomplished by means of switch machines of any of the standard types and, since such machines form no part of my present invention, they are not shown in detail for the sake of simplicity. It is deemed suffi-

cient for the present specification to say that, when current is supplied from the positive terminal 92 of source Y_7 to the wire AL, the switch machine SMA is operated to set switch A for movement to the left, that is, for movement toward the track 1. When a reverse current is supplied from the negative terminal 93 of source Y_6 to the wire AR, the switch A is set to the right for movement toward the switch B. In like manner, when current is supplied from terminal 92 to the wire BL, the switch machine SMB is operated to set switch B to the left, that is, for movement toward the tracks 2 and 3 and, when current is supplied from terminal 93 to the wire BR, the switch B is set to the right for movement toward the tracks 4 and 5. Current is supplied to the wires AL, AR, BL and BR over contacts of the group relays G of the assemblages $E_1 \ldots E_5$. As shown in Fig. 4, the terminal 92 of the current source Y_7 of Fig. 4*a* is connected to the front contacts 106 of each of the G_1 relays of the assemblages, and to the contact 104 of the G_2 relay of each of the assemblages. The terminal 93 of the current source Y_6 is connected to the 103 contact of each of the several G_2 relays, and to the 130 and 131 contacts of each of the several G_3 relays. During the storing of the route records, a group relay of each assemblage is energized. For example, we have already seen that for a car directed to route 3 the relay G_2 of assemblage E_1 is energized and is maintained energized by its stick circuit. Contact 103 of relay G_2 of assemblage E_1, Fig. 4, connects the negative terminal 93 of the current source Y_6 to wire 141 leading to contact 1 of the bank BDA of the selector CRA so that when the brush of bank BDA is on contact 1, a circuit is completed over wire AR through the switch machine SMA to wire 101 which leads to the positive terminal of source Y_6, for operating the switch A to the right. Contact 104 of the relay G_2 of assemblage E_1 connects the positive terminal 92 of source Y_7 over wire 151 to the contact 1 of the bank BCB of the selector CRB so that when the brush of bank BCB is on contact 1, a circuit is completed over wire BL through the switch machine SMB to wire 101, which also leads to the negative terminal 100 of source Y_7 for operating the switch B to the left. It follows, therefore, that the relay G_2 of assemblage E_1 when energized is effective to set the switches A and B for the route 3, it being understood that switch C has been operated to the right by the local operator at station PC as already explained. For every stored record there is, therefore, a group relay in the respective assemblage which is energized and which is effective to supply current to the corresponding contacts of the BC and BD banks of the respective switch selectors.

It is to be noted that prior to the recording the routes for a series of cars the selectors CRA and CRB are in synchronism with the rotary selector SE of Fig. 2. To be explicit, with the selector set at the 5_k position, the selectors CRA and CRB are set one step ahead at their respective contacts 1. In other words, with the recording selector at the *nk* contact, the switch point selectors are at the contact $n+1$.

In describing the automatic control of the switches A and B in accordance with a series of records transmitted from the hump station, I shall assume this series to be the same as that assumed in the preceding description of the visual indicators, viz., that in addition to the storage for route 3 in assemblage E_1, route 1 for a second car is stored in assemblage E_2 so that its relay G_1 is energized and that route 4 for a third car is stored in assemblage E_3 so that its relay G_3 is energized. It will also be assumed that switch D is moved to the left by the local operator when the record for route 4 is received so as to complete route 4 and not route 5 when switches A and B are both moved to the right.

As the first car passes over the switch A, it energizes the route relays V_1A and V_2A and relay TA and, consequently, magnet 97 of the selector CRA is energized from terminal 91 over the contacts 88, 89, and 90. When the car clears the switch A, these route relays are deenergized and, in turn, magnet 97 is deenergized and selector CRA advances to the contacts 2. As the first car passes over the switch B, the route relays V_1B and V_2B and relay TB are energized, and, in turn, energize magnet 98 of the selector CRB. As the first car clears the switch B, these route relays are deenergized and, in turn, magnet 98 of the selector CRB is deenergized to advance that selector to its contacts 2. The contact 2 of bank BCA of selector CRA is now supplied with current from terminal 92 over the 106 contact of the relay G_1 of assemblage E_2 and wire 132, and hence, the switch A is set to the left to direct the second car to route 1. Since the switch B is not included in the route for the second car, it is necessary to advance the selector CRB one step and this is done through the medium of the bank BU of that selector. From a source connected to the front contact 105 of the G_1 relay of assemblage E_2 current is supplied over wire 172 to the contact 2 of bank BU, and, hence, as the selector CRB advances to the contact 2 in response to the first car clearing the switch B, magnet 98 is energized over its back contact 82, which contact is immediately opened to again deenergize magnet 98 and advance selector CRB to its contact 3. The brush of bank BDB of the selector CRB then becomes connected to the negative terminal 93 over wire 183 and contact 3 due to the fact that contact 130 of the relay G_3 of assemblage E_3 is closed, consequently, the switch B is set to the right for directing the third car to route 4.

As the second car advances over the switch A toward route 1, it operates the route relays in the manner previously pointed out and the selector CRA is advanced to its contacts 3 as the car clears the switch. The brush of bank BDA of selector CRA then becomes connected to the negative terminal 93 over wire 144 and contact 3 due to contact 131 of the relay G_3 of assemblages E_3 being closed, and the switch A is set to the right for advancing the third car toward route 4. In the same manner the switches A and B will be set for each succeeding car and, if there are five destinations recorded, the selectors CRA and CRB are successively advanced as the five different cars pass to their destinations until they reach the contact 1. Hence, the selectors CRA and CRB for the switch points are retained in synchronism with the recording selector SE of Fig. 2.

IV. The system has been described as applied to a concrete case of a classification yard such as shown in Fig. 1 and in which system five records are simultaneously effected at the central station for automatically controlling the two switch points A and B and for automatically announcing to the operator at the central station the successive routes the five different cars are to take, the operator acting on these announcements for governing the position of the switches C and D.

It is obvious that the principle of the system

is not modified if it is applied to any number of destinations and that the switch points may all be automatically operated according to the records. It is clear, on the other hand, that without altering the principle of the system it is possible to replace the rotary selectors employed in the above description by relay selectors, as will hereinafter be explained in describing the second form of the apparatus.

In the matter of records, it is likewise possible to combine differently the recording members, such as the group and row relays of the different assemblages, which can be replaced for example, by relays of tens and of units, or automatic and unit point relays, group relays, sub-group relays and unit relays. The combination to be adopted in order to reduce to a minimum the number of recording relays will depend in each case on the track layout of the classification yard and on the relative number of switch points to be automatically operated.

It is evident that it is possible, by means of the manually operated controller **53** (Fig. 2), to employ the automatic recording system for the operation of the announcements only, eliminating entirely the apparatus relating to the automatic operation of the switch points A and B (Figs. 4 and 4ª). On the other hand, the apparatus for the operation of the announcements may be eliminated (Figs. 3 and 3ª), leaving the records to automatically control the railway switches.

Figs. 5 and 6 show in particular a modification of the system with a view of the automatic control of the switch points without announcements by the use of record groups of relays and without a recording selector.

The recording of the destinations in this form of the apparatus is effected directly in apparatus provided for each railway switch to be operated. The selector for the railway switch then picks up the records one after the other as and when the switch is cleared by the car or cuts of cars and distributes the records to the switch operating mechanism.

The recording apparatus for each individual switch in this arrangement is connected to the hump station by two wires **107** and **108**. If for a car the switch when viewed from the hump track is to have the position "right", the wire **107** alone is temporarily energized. If the switch when viewed from the hump track is to have the position "left", the wires **107** and **108** are energized at the same time temporarily. At the hump station, there are provided as many buttons V_1, etc., as there are destinations or routes, as in the first form of the apparatus. For each switch of a route the button comprises one or two contacts (according as to whether it is to be right or left) which, when the button is pressed, supplies current from terminal **129** to the wire **107** only if the position of the switch is to be "right", and to both wires **107** and **108** if the position of the switch is to be "left".

Fig. 5 gives by way of example the diagram of the button V_3 for route 3 for the classification yard shown in Fig. 1 on the assumption that all the switches A, B, C, and D are automatically operated.

As is apparent from the drawings, the operation of button V_3 connects the positive terminal **129** to wire 107_A for switch A to operate switch A to the right; to wires 107_B and 108_B for switch B to operate switch B to the left; and to wire 107_C for switch C to operate switch C to the right, to thereby establish route 3. The connections for each of the switches V_1, V_2, V_4 and V_5, for the remaining routes 1, 2, 4, and 5 of Fig. 1, to the wires **107** for switches A, B and C and to wire **108** for switch B are indicated by arrows in Fig. 5. It will be clear, moreover, that switches V_1 and V_2 may also connect terminal **129** to wires **108**, not shown, for switches A and C, respectively, to operate these switches to the left for routes 1 and 2 and that switches V_4 and V_5 may be provided with additional contacts for controlling switches D, if required.

Fig. 6 illustrates a recording group comprising rows of relays provided in this form of the apparatus in place of the relay assemblages E, a separate group being provided for each switch, but one of which is shown. Each row of relays having the same numerical suffix replaces the assemblage E in the control of the switch to which the group is assigned, except that, in this form, one additional row is required so that for five storages six rows of relays in each group are provided.

As illustrated, but four rows of one group are shown. All rows are alike, and each includes a transmission relay X, a counting relay YY, and a switch control relay Z each having a numerical suffix identifying the row. The rows of relays, like the assemblages E, are used successively, row 1 following the last row of the group, and it is to be understood that the contacts above the relays of the first row in Fig. 6 are the lower contacts of the relays of the last row in this case, the sixth row, assuming five storages to be provided.

The wire **107** for the switch which the recording group controls is arranged to be connected to each transmission relay X of the group, say relay X_2 for example, by a circuit passing over a lower contact **109** of the preceding transmission relay X_1, a lower contact **110** of the counting relay YY_2 of the same row, and an upper contact **111** of the preceding counting relay YY_1.

In this circuit the lower contacts **110** and **109** can be shunted by a branch circuit, i. e., a stick circuit passing over an upper contact **112** of the said transmission relay X_2.

The counting relays YY each possess an energizing circuit passing over the upper contact **120** of the transmission relay X of the same row, and a stick circuit which passes over their upper contacts **113** and a lower contact **114** of the preceding transmission relay X.

The wire **108** is arranged to be connected to each control relay Z by the upper contact **115** of the transmission relay X of the same row and an upper contact **116** of the counting relay YY of the same row. To facilitate reading the diagram, the contacts **115** are shown remote from the windings of the relays X. Each of the control relays Z also has a stick circuit which passes over its contact **117** and the upper contact **116** of relay YY of the same row.

The control relays Z establish the control circuits of the switch points for each record; control to the right by closing the lower contact **118** and control to the left by closing the upper contact **119**. The controls thus stored in the recording group are distributed to the switches as and when the cars pass by means of a step-by-step system, for example, of the kind previously described with reference to Figs. 4 and 4ª.

In this last case, the connection between the recording group of Fig. 6 and the switch selector CR, Fig. 4ª, is effected in the following manner:

A connection is provided, as shown in Fig. 6,

from the positive terminal 92 of source Y_7, Fig. 4a, to contacts 119 of the relays Z_1, Z_2, etc., each of which is connected to the corresponding contacts 1, 2, etc., of the switch bank BC for the associated track switch, the brush of bank BC, as shown in Fig. 4a, being connected by a control wire AL or BL to the switch machine SM. A similar connection is provided from the negative terminal 93 to contacts 118 of the relays Z, each of which is connected to the corresponding contacts 1, 2, etc., of the switch bank BD for the associated track switch, the brush of bank BD being connected to the control wire AR or BR for the switch machine. It will be apparent that the switch will be controlled successively by the relays Z in the same manner as it is controlled by the relays G of assemblages E in the first form of the apparatus. It should be noted, however, that in this form it is unnecessary to provide a switch bank BU for switch B because of the principle of individual recording, the records for route 1 not being stored in the recorder for switch B in this form of the apparatus.

The operation of the recording group of Fig. 6 is as follows:

At a given moment, all the counting relays are held energized over their stick circuits, except one, for example, the relay YY_2. Certain control relays are energized (according to the nature of the orders already recorded) the relay Z_2 corresponding to YY_2 being deenergized. All the transmission relays X are deenergized.

Suppose that a record is stored by pressing the button of a route which includes the switch corresponding to the recording group of Fig. 6 and suppose that the setting of the switch for this route is to the left, the wires 107 and 108 for the corresponding recording group are energized during the time that the button is pressed.

By the circuit extending from the positive battery terminal 129, wire 107, contact 109 of X_1, contact 110 of YY_2, contact 111 of YY_1, winding of relay X_2, and to the negative terminal, the relay X_2 is energized and it is the only X relay to be energized as the back contacts of all the other relays YY are open. By closing the contact 120, the relay X_2 energizes the relay YY_2 which is maintained energized by the closing of its stick circuit including contacts 113 and 114.

On the other hand, by closing its front contact 112, the relay X_2 completes its own stick circuit which maintains it energized so long as the button is pressed.

By breaking the contact 121, the relay X_2 deenergizes the next counting relay YY_3 which remains deenergized until the next record is received and deenergizes if necessary the control relay Z_3.

By the closing of contact 115 of X_2 and the contact 116 of YY_2 the energizing circuit of the control relay Z_2 is completed provided wire 108 is energized. The relay Z_2 when energized is maintained energized over a stick circuit including its contact 117. By its contact 119 it completes the circuit from terminal 92 over the control wire which leads to the contact 2 of the bank BC of the switch selector CR. When the button is released, the relay X_2 is deenergized, but the relays YY_2 and Z_2 remain energized over their respective stick circuits.

The operation of storing a record therefore includes:

(1) The energization of that one of the counting relays YY that is deenergized and in the case in which the switch is to be operated to the left, the energization of the corresponding control relay Z.

(2) The deenergization of the next counting relay and, if necessary, of the corresponding control relay. It will be seen that the state of the system is the same as before recording, except that it has advanced one step as regards the relays which are deenergized.

It is obvious that if $n+1$ is the number of the recording rows there are always n in which the counting relay is energized, that is to say, there are n routes recorded. It is likewise obvious that the functions of classification or counting of the records are performed solely by the wire 107, the transmission relays X and the counting relays YY. By the use of several wires such as 108 and a combination of control relays such as Z_1 to Z_4 in each row it would be possible to effect records of several different characters.

In general, the arrangement constituted by the transmission relays and the counting relays may be utilized in combination with any system of control, whenever it is desired to execute the orders in a definite order of succession.

I have now described in detail two forms of apparatus embodying my invention. The mode of operation of this apparatus may be summarized as follows: In the first form, route designations are transmitted in the form of code combinations, by the operation of one or another of a series of push buttons V, of which one is provided for each route. An auxiliary designation of quality is also transmitted, by operating a button 11 or 12 each time a button V is operated.

The designations are recorded successively in a series of relay assemblages E by energizing relays in different combinations, and are stored until cancelled. A rotary selector SE places the relays of each assemblage E in turn under the control of the push buttons until all the assemblages are occupied, whereupon a signal bell S is operated. The stored records are cancelled in the same order, either manually by an operator when the corresponding car reaches its destination, or automatically when the car passes over the last switch of its route.

The cancellation of the records renders the assemblages again available; thus if five are provided, the sixth record will be stored in the first assemblage provided the first record has been cancelled.

The stored records are used for two purposes, one being to control a series of visual indicators operating in such a manner as to always exhibit the stored announcements in the order they are to be used, the first uncancelled route record being exhibited by the first indicator although it may be stored in any of the assemblages. The cancellation of the first record advances each remaining announcement to the next indicator leaving the last indicator vacant.

The second purpose for which the stored records are used is to automatically operate one or more of the track switches to set up, in whole or in part, the track route corresponding to the visual announcement. This is accomplished by rotary selectors controlled by track relays which place the switches under the control of each of the assemblages E in turn as the successive cars vacate the corresponding switch sections.

The second form of the apparatus is arranged for the automatic control of the track switches only without announcements, and differs from the corresponding portion of the first form principally in that relay chains such as that of Fig. 6

are used in place of the assemblage E and the rotary switch SE, and in that individual control is employed with separate line wires for each switch, in place of route code combinations.

Although I have herein shown and described only two forms of apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. A control system including, a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, an automatically advancing selector having a given number of operative positions, a group of relays for each of said positions each group adaptable of being energized in a particular arrangement for each destination, means governed by each circuit controller when actuated effective to advance the selector one position and to energize the relay group corresponding to this new position in the arrangement corresponding to the same destination as the actuated controller, means for retaining the selected relays of a group energized to store the destination orders for as many different objects as positions of said selector, operating means controlled by the relay group effective to arrange the passageway for the destinations corresponding to the selected arrangement, and means governed by an object in passing to its destination effective to release the control of the next succeeding group of relays for arranging the passageway for the next succeeding object.

2. A control system including, a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a central station from which the passageway is to be manually arranged for the different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, an automatically advancing selector having a given number of operative positions, a group of relays for each of said positions each group adaptable of being energized in a particular arrangement for each destination, means governed by each circuit controller when actuated effective to advance the selector one position and to energize the corresponding relay group in the arrangement corresponding to the same destination as the actuated controller, means for retaining the selected relays of a group energized to store the destination orders for as many different objects as positions of said selector, and means at the central station controlled by the relay groups effective to announce the stored destination orders in the sequence the successive objects are to move over the passageway.

3. A control system including, a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a central station from which the passageway is to be manually arranged for the different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, an automatically advancing selector having a given number of operative positions, a group of relays for each of said positions each group adaptable of being energized in a particular arrangement for each destination, means governed by each circuit controller when actuated effective to advance the selector one position and to energize the corresponding relay group in the arrangement corresponding to the same destination as the actuated controller, means for retaining the selected relays of a group energized to store the destination orders for as many different objects as positions of said selector, means at the central station controlled by the relay groups effective to announce the stored destination orders in the sequence the successive objects are to move over the passageway, and means controlled by the announcing means effective when said given number of orders are stored for preventing the recording means from advancing the selector.

4. A control system including, a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a central station from which the passageway is to be manually arranged for the different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, an automatically advancing selector having a given number of operative positions, a group of relays for each of said positions each group adaptable of being energized in a particular arrangement for each destination, means governed by each circuit controller when actuated effective to advance the selector one position and to energize the corresponding relay group in the arrangement corresponding to the same destination as the actuated controller, means for retaining the selected relays of a group energized to store the destination orders for as many different objects as positions of said selector, means at the central station controlled by the relay groups effective to announce the stored destination orders in the sequence the successive objects are to move over the passageway, and manually controlled means at the central station effective to successively cancel the announcements.

5. A control system including, a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a central station from which the passageway is to be manually arranged for the different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, an automatically advancing selector having a given number of operative positions, a group of relays for each of said positions each group adaptable of being energized in a particular arrangement for each destination, means governed by each circuit controller when actuated effective to advance the selector one position and to energize the corresponding relay group in the arrangement corresponding to the same destination as the actuated controller, means for retaining the selected relays of a group energized to store the destination orders for as many different objects as positions of said selector, a plurality of indicators at the central office one for each relay group and each indicator capable of displaying a particular announcement for each of said destinations, means controlled by the relay groups for governing the indicators effective to successively display on the indicator the destinations corresponding to the stored orders, and manually controlled means effective to cancel an announcement and to advance each of the re-

maining announcements to the next preceding indicator.

6. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a central station from which the passageway is to be manually arranged for the different destinations, a plurality of groups of relays each group adaptable of being energized in a particular arrangement for each destination, means for retaining the selected relays of a group energized for simultaneously recording the destinations of as many different objects as there are groups of relays, means at the central station controlled by the relay groups effective to announce the destination orders as stored by the groups, an automatically advancing selector including two contact banks each bank having a distinctive contact for each relay group, means controlled by one bank effective to deenergize the selected relays of a group in response to the selector advancing to the corresponding contact, means controlled by the other bank effective to prevent the canceling of the selected relays of the group unless the object has passed to the destination of the selection, recording apparatus at the head point including a circuit controller for each destination, and means controlled by each controller when actuated effective to advance the selector one contact and to energize the relays of the corresponding group in the arrangement corresponding to the same destination as the controller if the previous selection has been canceled.

7. A control system including, a passageway for passing an object from a head point to any one of a plurality of different destinations, a central station from which an operator is to arrange the passageway, recording means at the head point including a circuit controller for each destination and a plurality of quality controllers, an automatically advancing selector having a given number of operative positions, a group of relays for each of said positions including a destination relay and a quality relay and adaptable of being energized in a particular arrangement for each destination and each quality, means governed jointly by a destination controller and a quality controller when simultaneously actuated effective to advance the selector one position and to energize the corresponding relay group according to the actuated controllers, means for retaining the selected relays of a group energized to store the orders for as many different objects as positions of said selector, and announcing means controlled by said relay groups.

8. A control system including, a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, an automatically advancing recording selector having a plurality of different operating positions, record means for each of said positions each adaptable of being energized in a particular arrangement for each destination, means governed by each circuit controller when actuated effective to advance the recording selector one position and to energize the record means corresponding to this new position in the arrangement corresponding to the same destination as the actuated controller, means for retaining the record means energized to store the destination orders for as many different objects as positions of said selector, a plurality of operating devices capable of different positions for arranging the passageway for the different destinations, an operating selector for each of such devices each having as many positions as the recording selectors, means controlled by the record mean and including a position of the operating selectors effective to govern the operating devices, and means controlled by the successive objects in passing over the pasageway for synchronizing the position of the operating selectors with the recording selector.

9. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, a plurality of relay asemblages each adaptable of being energized in a particular arrangement for each destination, means responsive to successive operation of the controller of the recording means effective to supply current to the asemblages successively and to energize the relays of each assemblage in the arrangement for the destination corresponding to the destination of the controller actuated for that assemblage, means for each assemblage effective to retain the selected relays energized to store the destination orders for as many different objects as there are assemblages, operating means controlled by the relay assemblages effective to arrange the passageway for the destination corresponding to the selected arrangement, and means governed by an object in passing to its destination effective to release the control of the next succeeding assemblage for arranging the passageway for the next succeeding object.

10. A control system including a classification yard having a plurality of classification tracks and track switches, each switch having a right and a left position and said switches capable of arrangement in various combinations as to positions to form a distinctive route for each track, a plurality of relay asemblages each adaptable of being energized in a particular arrangement for each route, recording means at a head point including a circuit controller for each route, means responsive to successive operation of the controllers of the recording means effective to supply current to the assemblages successively and to energize the relays of each assemblage in the arrangement for the route corresponding to the route of the controller actuated for that assemblage, means for each assemblage effective to retain the selected relays energized to store the route orders for as many different cars as there are assemblages, operating means for each track switch, means governed by the relay assemblages effective to actuate the operating means for arranging the track switches for the route corresponding to the selected arrangement of that assemblage, and trackway means governed by a car in passing to its classification track effective to release the control of the next succeeding assemblage to set the track switches for the following car.

11. A control system including a classification yard having a plurality of classification tracks and track switches, each switch having a right and a left position and said switches capable of arrangement in various combinations as to positions to form a distinctive route for each track, a first recording means at a head point including a circuit controller for each route, a second recording means at the head point including a cir-

cuit controller for each of a plurality of different quality conditions, a plurality of relay assemblages each adaptable of being energized in a particular arrangement for each route and each quality condition, a selector including a distinctive position for each assemblage, means responsive to simultaneous operation of a route and quality controller effective to advance said selector one position and to energize the relays of the corresponding assemblage in accordance to the actuated route and quality controllers, and means for each assemblage effective to retain the selected relay energized to store the route and quality orders for as many different cars as assemblages.

12. A control system including a classification yard having a plurality of classification tracks and track switches, each switch having a right and a left position and said switches capable of arrangement in various combinations as to positions to form a distinctive route for each track, a plurality of relay assemblages each adaptable of being energized in a particular arrangement for each route, recording means at a head point including a circuit controller for each route, a recording selector having a distinctive position for each assemblage, means responsive to operation of a controller of the recording means effective to advance said selector one position and to energize the relays of the corresponding assemblage in accordance to the actuated controller, means for each assemblage effective to retain the selected relays energized to store the route orders for as many different cars as assemblages, operating means for each track switch including a track selector having a distinctive position for each assemblage, means controlled by the selected relays of an assemblage and said track selectors for setting the track switch for the corresponding route, and trackway means governed by a car in passing to its classification track to advance the track selector one position.

13. A control system including a classification yard having a plurality of classification tracks and track switches, each switch having a right and a left position and said switches capable of arrangement in various combinations as to positions to form a distinctive route for each track, recording and storing means including a plurality of different relay groups each capable of being arranged in a particular condition for each route for selecting the separate routes of a series of individual cars each destined to a distinctive classification track, trackway means governed by a car in passing over a track switch in moving to its classification track to automatically release the control of the recording and storing means for setting that switch for the following car, and means governed by a car passing over the switch in the trailing direction to render said trackway means ineffective.

14. A control system including a classification yard having a plurality of classification tracks and track switches, each switch having a right and a left position and said switches capable of arrangement in various combinations as to positions to form a distinctive route for each track, recording and storing means including a plurality of different relay groups each capable of being arranged in a particular condition for each route for selecting the separate routes of a series of individual cars each destined to a distinctive classification track, operating means for each track switch including a selector having a distinctive position for each group of relays, means controlled by each relay group and the selectors for governing the operating means to set the switches according to the condition of said relay group, means controlled by a car in passing a switch as it moves to its classification track to advance the selector of the switch one position, and other means to advance the selector a position when its switch is not included in the route of a car.

15. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a relay assemblage capable of being energized in a particular arrangement for each destination, operating means controlled by the assemblage effective to arrange the passageway for the destination corresponding to the selected arrangement of the relays, controlling apparatus to energize the relay assemblage and including at the head point a circuit controller for each of said destinations and apparatus effective in response to operation of a controller to clear out the prior arrangement of the relay assemblage and to then energize the relays in the arrangement for the destination corresponding to the controller operated, means effective to retain the relays in the newly selected arrangement and to render said controlling apparatus ineffective to control the assemblage, and means governed by an object in passing to its destination to restore the control of the controlling apparatus.

16. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a relay assemblage capable of being energized in a particular arrangement for each destination, operating means controlled by the assemblage effective to arrange the passageway for the destination corresponding to the selected arrangement of the relays, controlling apparatus to energize the relay assemblage and including at the head point a circuit controller for each of said destinations and apparatus effective in response to operation of a controller to clear out the prior arrangement of the relay assemblage and to then energize the relays in the arrangement for the destination corresponding to the controller operated, means effective to retain the relays in the newly selected arrangement and to render said controlling apparatus ineffective to control the assemblage, means governed by an object in passing to its destination to restore the control of the controlling apparatus, and an emergency means including a manually operated circuit controller effective when actuated to restore the control of the controlling apparatus.

17. A control system including a passageway, adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, operating means effective to arrange the passageway for the different destinations, a series of relay assemblages each capable of being energized in a particular arrangement for each destination, controlling apparatus for energizing the assemblages and including at the head point a circuit controller for each of said destinations and apparatus effective in response to successive operation of the controllers to successively clear out the prior arrangement of each assemblage and to then energize the relays of the assemblage in the arrangement for the destination corresponding to the controller actuated for that assemblage, means governed by

each assemblage effective to actuate the operating means to arrange the passageway for the destination corresponding to its selected arrangement, other means for each assemblage effective to retain its relays in the newly selected arrangement and to restrain the next succeeding assemblage from governing the operating means, means controlled by the assemblages to render the controlling apparatus ineffective when all of the assemblages are energized to store the destination orders for as many different objects as there are assemblages, and means governed by an object in passing to its destination to release the control of the next succeeding assemblage over the operating means and to restore the control of the controlling apparatus over the last effective assemblage.

18. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, operating means effective to arrange the passageway for the different destinations, a series of electroresponsive governing units each capable of being energized in a particular arrangement for each destination, controlling apparatus for energizing said units and including a circuit controller for each of said destinations and effective in response to successive operations of the controllers to successively clear out the prior arrangement of each unit and to freshly energize the unit in the arrangement for the destination corresponding to the controller actuated for that unit, means governed by each unit effective to actuate the operating means to arrange the passageway for the destination corresponding to its selected arrangement, other means for each unit effective to retain it in the newly selected arrangement and to restrain the next succeeding unit from governing the operating means, means controlled by the units to render the controlling apparatus ineffective when all the units are energized to store the destination orders for as many different objects as there are units, and means governed by an object in passing to its destination to release the control of the next succeeding unit over the operating means and to restore the control of the controlling apparatus over the last effective unit.

19. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, a first recording means at the head point including a circuit controller for each destination, a second recording means at the head point including a circuit controller for each of a plurality of different quality conditions of an object, a relay assemblage adaptable of being energized in a particular arrangement for each destination and for each quality condition, circuit means to energize said relay assemblage and effective in response to simultaneous operation of a destination and quality controller to energize the relays in accordance to the actuated destination and quality controllers, and other circuit means effective to retain the selected relays energized to store such destination and quality orders.

20. A control system including a passageway for passing an object from a head point to any one of a plurality of different destinations, a series of electroresponsive indicating units each capable of displaying a particular announcement for each of said destinations, controlling apparatus for energizing said units and including a controller at the head point having a particular position for each destination and apparatus effective in response to successive operations of the controller to its different positions to progressively energize the units of the series with each unit displaying the announcement corresponding to the destination for the position of the controller that effected energization of that unit, a selector having as many different positions as there are indicating units and normally set at a given position, circuit means controlled by said selector effective in response to successive operations of the selector to its different positions to successively cancel the announcement of each indicating unit and to substitute by a fresh announcement the announcement of the next following unit, and an energizing circuit for said selector including a normally open contact and effective to advance the selector one position each closing of the contact.

21. A control system including a passageway for passing an object from a head point to any one of a plurality of different destinations, a series of electroresponsive indicating units each capable of displaying a particular announcement for each of said destinations, controlling apparatus for energizing said units and including a controller at the head point having a particular position for each destination and apparatus effective in response to successive operations of the controller to its different positions to progressively energize the units of the series with each unit displaying the announcement corresponding to the destination for the position of the controller that effected energization of that unit, means governed by said units effective when all of the units are energized to render the controlling apparatus ineffective to control the units, and means effective when actuated to cancel the announcement of each unit and to substitute by a fresh announcement the announcement of the next following unit leaving the last unit without an announcement, and means controlled by the last unit when left without an announcement to restore control of the controlling apparatus over that unit.

22. In combination with a power-operated railway track switch, a series of relay assemblages each including relays adapted to be energized in a particular arrangement for each position of the track switch, manually operable means at a remote point for energizing said relay assemblages selectively one at a time in order to simultaneously store a series of controls for the track switch, each relay assemblage remaining energized until cancelled, switch operating means arranged to be connected to any one of said relay assemblages to operate the track switch to a position in accordance with the energization of the relays of the assemblage to which it is connected, and means responsive to the passage of a car over the track switch to transfer the connection of the switch operating means from the relay assemblage to which it is then connected to the next succeeding relay assemblage of the series.

23. In combination with a switch section of railway track including a power operated track switch, a series of relay assemblages each including relays adapted to be energized in different arrangement to store different controls for the track switch, manually operable means at a point which cars pass before reaching the switch for selectively energizing said relay assemblages one at a time in order, said assemblages remaining energized to store a plurality of switch con-

trols until manually cancelled, track controlled means rendered effective each time the switch section becomes occupied and is then vacated by a car for operating the track switch in accordance with one of said stored controls, and cancelling means controlled by said track controlled means for preventing any one of said relay assemblages from effecting a second operation of the track switch until such assemblage is again energized by said manually operable means.

24. In combination with a stretch of railway track including a power operated track switch, a series of relay assemblages each including relays adapted to be energized in different arrangements to store different controls for the track switch, circuit controllers at a point which cars pass before reaching the switch for selectively operating said relay assemblages one at a time in order in accordance with the routes over the switch that are to be taken by said cars, means including said relay assemblages and independent of the positions of said cars in the stretch for simultaneously storing a plurality of said switch controls until the cars to which they correspond pass over the track switch, and means controlled by each car in passing over the track switch for automatically operating the switch in accordance with a different one of said controls.

25. In combination with a stretch of railway track including a power operated track switch, a series of relay assemblages adjacent the switch each including relays adapted to be energized in different arrangements to store different controls for the track switch irrespective of the position of cars in the stretch, circuit controllers at a point which cars pass before reaching the switch for operating said relay assemblages in accordance with the routes over the switch that are to be taken by said cars, selecting means for operating said relay assemblages one at a time in order in response to the repeated operation of said circuit controllers and effective irrespective of the position of the cars in the stretch to store a plurality of switch controls until the cars to which they correspond pass over the track switch, and means controlled by each car in passing over the track switch for automatically operating the switch in accordance with the stored control for the next following car.

26. In combination with a stretch of railway track including a power operated track switch, a series of relay assemblages each including relays adapted to be energized in different arrangements to store different controls for the track switch irrespective of the positions of cars in the stretch, circuit controllers at a point which cars pass before reaching the switch for selectively operating said assemblages one at a time in order in accordance with the routes over the switch that are to be taken by said cars, and track controlled means rendered effective each time the switch section becomes occupied and is then vacated by a car for operating the track switch in accordance with a different one of said stored controls.

27. In train describing apparatus, a stretch of railway track including a plurality of track switches leading to different destinations, two groups of manually operable keys for describing cars of different classes and destinations and located at a point which said cars pass before reaching said switches, comprising one group including a key for each different class and another group including a key for each different destination, a plurality of relay assemblages each including relays adapted to be energized in different arrangements to store the descriptions of the cars, selecting means for successively energizing said relay assemblages one at a time in order in response to successive operations of selected ones of said keys, and means preventing the energization of any of the relays of an assemblage unless a key of each group is operated.

28. Control apparatus for a power operated railway track switch comprising a manually operable control contact for each position of the switch, step-by-step apparatus having a plurality of operative positions, a relay assemblage for each position of said apparatus, each said assemblage including relays adapted to be energized in different arrangements to store different controls for the switch, means governed by each said contact when actuated to energize a relay assemblage selected in accordance with the position that the step-by-step apparatus occupies and to advance said apparatus to the next operative position, and means for controlling the track switch in accordance with the condition of each of said relay assemblages in turn as successive cars pass over the switch.

29. In combination with a railway track layout including a plurality of traffic routes, power operated track switches for establishing said routes, a relay assemblage including relays adapted to be energized in different arrangements including a distinctive arrangement for each traffic route through the layout, means controlled by said relays when energized for controlling the track switches to establish the corresponding route, and means preventing the release of said relays until a car has passed over the last switch of the route.

30. In combination with a railway track layout including a plurality of traffic routes, power operated track switches for establishing said routes, a relay assemblage including relays adapted to be energized in different arrangements including a distinctive arrangement for each traffic route through the layout, means controlled by said relays when energized for controlling the track switches to establish the corresponding route, track controlled means effective to remove each switch in turn from control by said relays as a car passes over the switch, and means preventing the release of said relays until said car passes over the last switch of the route.

31. In combination with a railway track layout including a plurality of traffic routes, power operated track switches for establishing said routes, a series of relay assemblages each including relays adapted to be energized in different arrangements each of which corresponds to a particular traffic route through the layout, track controlled means for each track switch for placing the switch under the control of each relay assemblage of the series in turn as successive cars pass over the switch to effect its operation in accordance with the route for the next succeeding car, and means controlled by each relay assemblage when a switch which is not included in the route to which the arrangement of the relays of said assemblage corresponds is placed under its control for transferring the control of said switch to the next succeeding assemblage of the series.

32. In train describing apparatus, a relay assemblage at a control station comprising a plurality of relays adapted to be energized in different combinations each of which constitutes a description of the class and destination of an approaching car, control means located at a point

which cars pass before reaching said control station comprising two groups of manually operable keys one group including a key for each destination and the other group including a key for each class of car, and means responsive to the simultaneous operation of a key of each group for energizing selected relays of said assemblage to store the description of a car of corresponding class and destination.

33. In train describing apparatus, a relay assemblage at a control station comprising a plurality of relays adapted to be energized in different combinations each of which constitutes a description of the class and destination of an approaching car, control means located at a point which cars pass before reaching said control station comprising two groups of manually operable keys one group including a key for each destination and the other group including a key for each class of car, means responsive to the simultaneous operation of a key of each group for energizing selected relays of said assemblage to store the description of a car of corresponding class and destination, and track controlled means controlled by a car passing said control point for releasing said relay assemblage.

34. A control system including a passageway adaptable of different arrangements for passing an object from a head point to any one of a plurality of different destinations, recording apparatus at the head point including a circuit controller for each of said destinations, a plurality of relay assemblages each adaptable of being energized in a particular arrangement for each destination, means responsive to successive operation of the controller of the recording means effective to supply current to the assemblages successively and to energize the relays of each assemblage in the arrangement for the destination corresponding to the destination of the controller actuated for that assemblage, means for each assemblage effective to retain the selected relays energized to store the destinations for as many different objects as there are assemblages, operating means controlled by the relay assemblages effective to arrange the passageway in accordance with the destination stored in one of the relay assemblages, and means governed by an object in passing to its destination effective to control said operating means in accordance with the destination previously stored in another relay assemblage.

35. Control apparatus for a power operated railway track switch comprising a circuit controller for each position of the switch, step-by-step apparatus having a plurality of operative positions, a relay assemblage for each position of said apparatus, each said assemblage including relays adapted to be energized in different arrangements to store different controls for the switch, means governed by each said circuit controller when actuated to energize a relay assemblage selected in accordance with the position that the step-by-step apparatus occupies and to advance said apparatus to the next operative position, and means for controlling the track switch successively in accordance with the condition previously imposed upon each of said relay assemblages as successive cars pass over the switch.

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