May 29, 1934. H. E. HERSHEY 1,960,780

SIGNALING SYSTEM

Filed Dec. 3, 1928 4 Sheets-Sheet 1

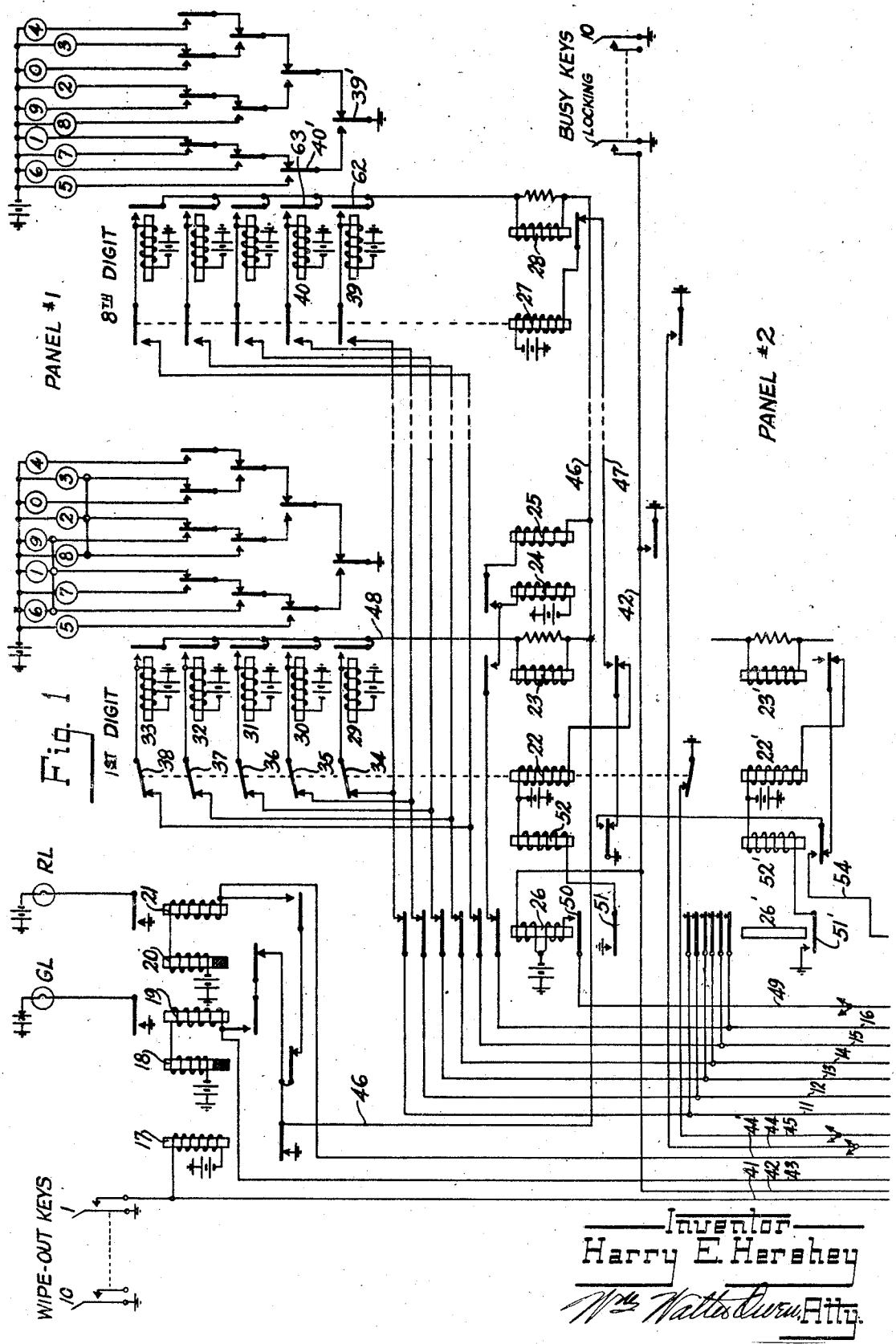


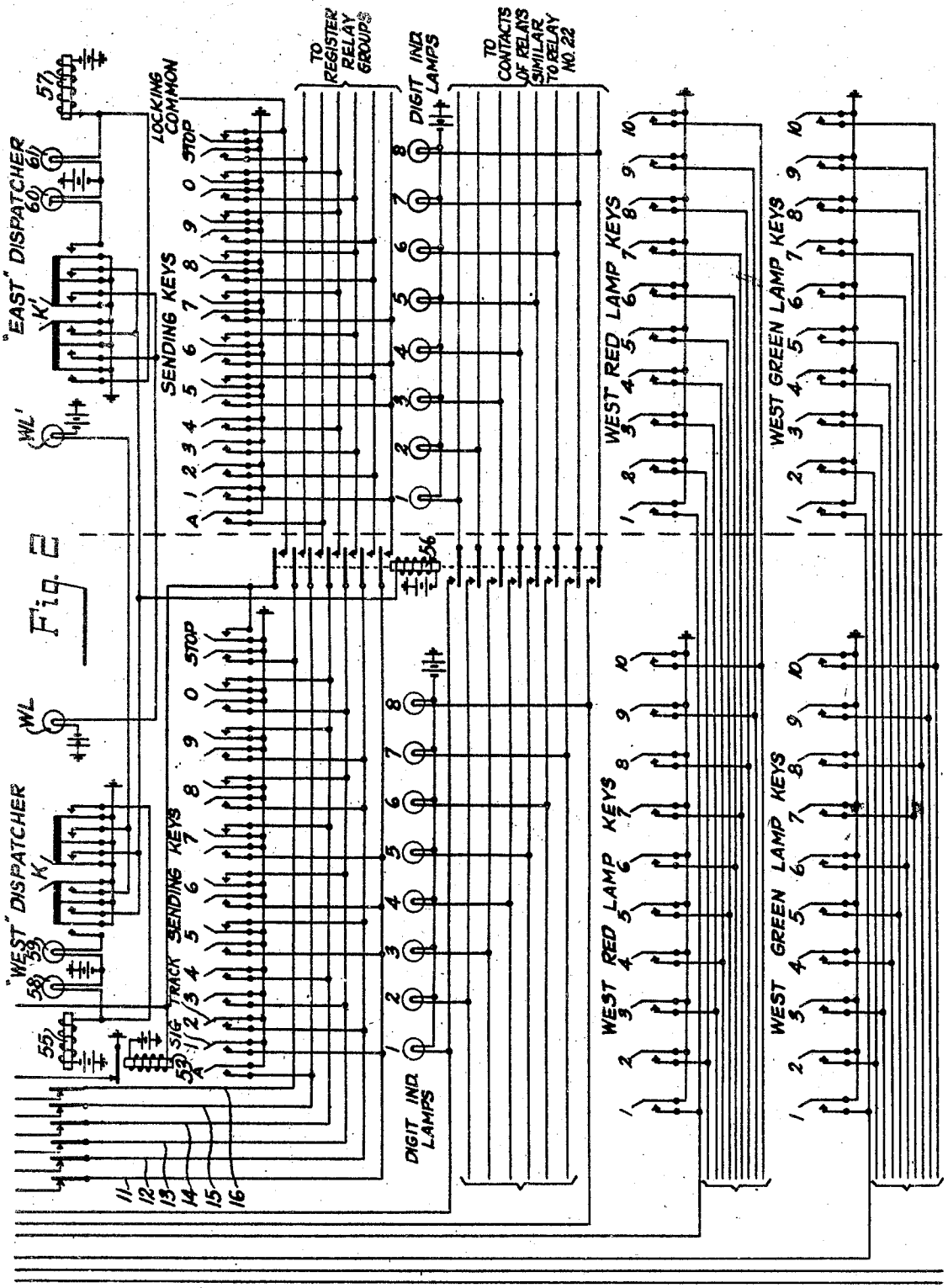
Fig. 1

Inventor
Harry E. Hershey
Wm Watts Dunn Atty.

May 29, 1934. H. E. HERSHEY 1,960,780

SIGNALING SYSTEM

Filed Dec. 3, 1928 4 Sheets-Sheet 2



Inventor
Harry E. Hershey
Wm Watts Owen Atty.

May 29, 1934. H. E. HERSHEY 1,960,780

SIGNALING SYSTEM

Filed Dec. 3, 1928 4 Sheets-Sheet 3

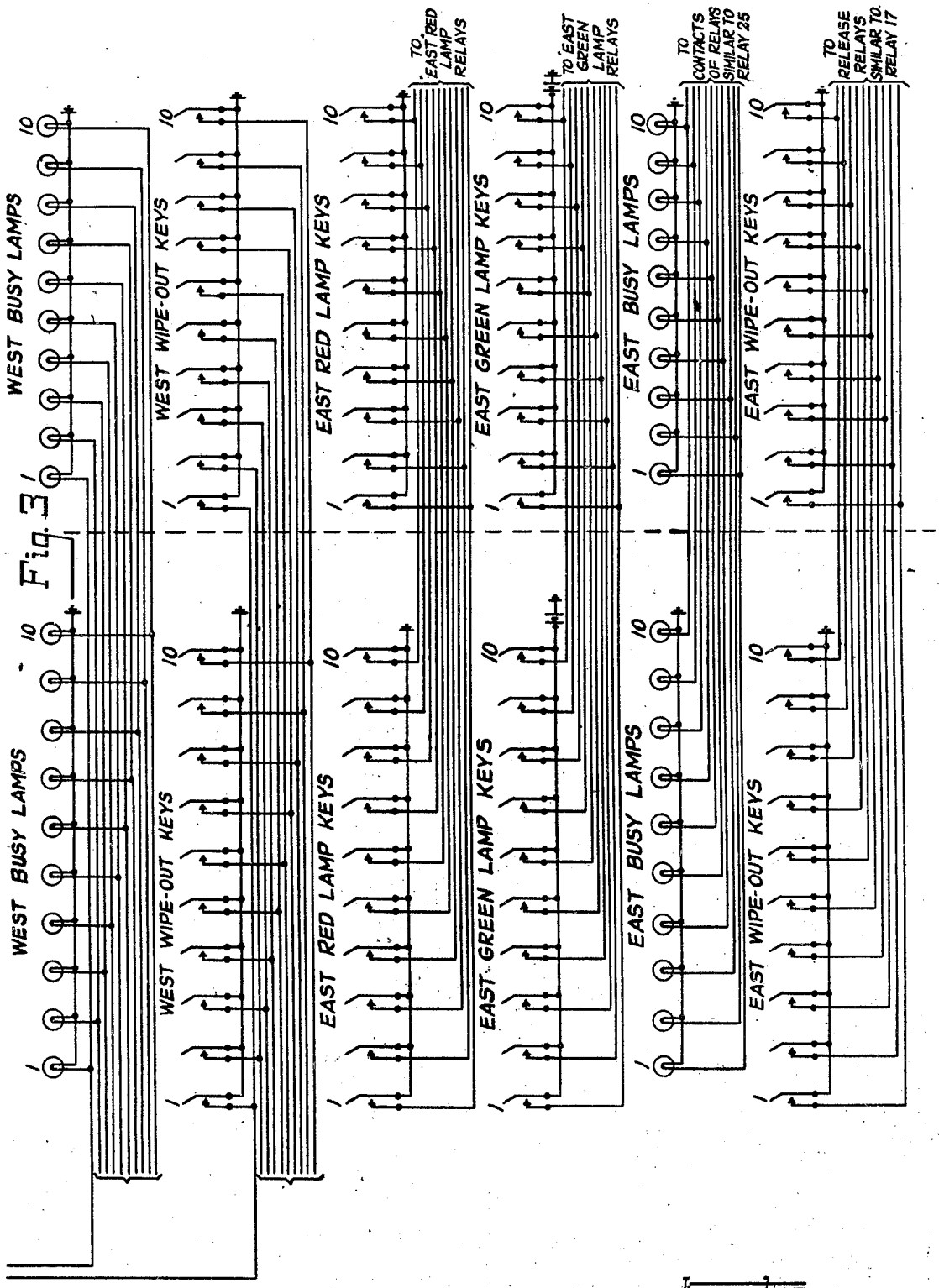


Fig. 3

Inventor
Harry E. Hershey
Wm. Watts Owen, Atty.

May 29, 1934. H. E. HERSHEY 1,960,780

SIGNALING SYSTEM

Filed Dec. 3, 1928 4 Sheets-Sheet 4

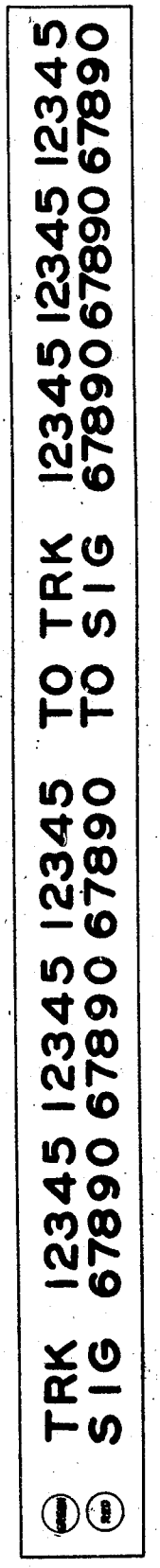


Fig. 4

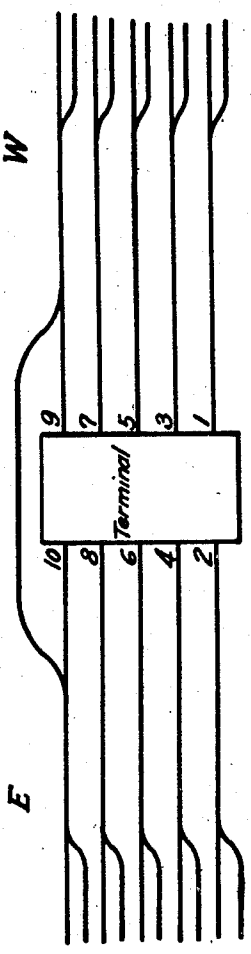


Fig. 4a.

Inventor
Harry E. Hershey
Watts Dorsey Atty.

Patented May 29, 1934 1,960,780

UNITED STATES PATENT OFFICE

1,960,780

SIGNALING SYSTEM

Harry E. Hershey, Oak Park, Ill., assignor, by mesne assignments, to Associated Electric Laboratories, Inc., Chicago, Ill., a corporation of Delaware

Application December 3, 1928, Serial No. 323,325

3 Claims. (Cl. 177—353)

This invention relates to signaling systems in general, but pertains more particularly to signaling systems in which the signals transmitted from one position are registered upon display panels at a distant position.

In railway systems wherein trains are dispatched in two directions from a terminal, it is necessary to have means for setting the various switches so that the departing trains may be routed over the correct track routings and so that trains entering the terminal or passing therethrough may be routed to enter or pass through upon certain tracks. In many systems, that means constitutes one or more switching positions, or towers, from which the track routes are set by means of switch-controlling levers. The persons located at towers for manipulating the levers are termed levermen.

One feature of the system herein disclosed is an arrangement whereby one dispatcher may disconnect his signaling equipment from the normally associated display equipment at his leverman's position and connect it to the display equipment normally associated with the signaling equipment of the other dispatcher, and whereby he may connect his signaling equipment to the display equipment of the other dispatcher in multiple with his own display equipment to display signals simultaneously on both concerning track routings for trains passing through the terminal.

Other objects and features of the invention not herein specifically mentioned will be apparent from a perusal of the following detailed description when studied in conjunction with the accompanying drawings, in which:

Fig. 1 is a diagrammatic representation of the equipment at each displaying position or leverman's position.

Figs. 2 and 3 show diagrammatically the equipment located at two dispatchers' positions, and it includes the various sets of keys and indicating lamps whose functions will be described later.

Fig. 4 shows a display panel in which the lamps of Fig. 1 are located. These lamps are invisible when not lighted, as they are located behind an opaque glass plate. When a lamp is lighted, it will cause a numeral or word to be exhibited on the face of the panel in the well-known manner.

Fig. 4*a* diagrammatically shows a few representative tracks controlled by the levermen, those designated W being ordinarily controlled by the West leverman and those designated E being ordinarily controlled by the East leverman.

The equipment at each leverman's position consists of ten display panels like that in Fig. 4, each of which has associated therewith eight register relay groups and eight lamp sets, one relay group for each lamp set. In furnishing eight register relay groups and lamp sets for each panel, it has been assumed that signals with a maximum number of eight digits are to be registered and displayed upon a panel and that one register relay group and one lamp set will be used to register only one digit.

For the sake of simplicity of the drawings, only the first register relay group and lamp set for the first digit and the eighth register relay group and eighth lamp set for the eighth digit have been shown for the first display panel, Panel No. 1, Fig. 1, since a complete understanding can be had without the showing of the six intervening register groups and lamp sets.

For the same reason, only two panels, or rather the equipment associated with the first two display panels is being shown, and only a small portion of the equipment associated with the second display panel, Panel No. 2, this being shown since it is believed that a thorough understanding may be had from the description of the operation of Panel No. 1 without showing any of the register relay groups and lamp sets.

The display panels, wipe-out keys and busy keys of Fig. 1 are located at a leverman's position in the tower from which the leverman controls the setting of the track routes. It is desirable to locate the register relay groups, Fig. 1, which control the lighting of the lamps in the display panels also at the leverman's position there, although they may be located at the associated operator's position or any other convenient place.

In the present case, it will be assumed that there are two dispatchers' positions and two levermen's positions. It will, therefore, only be necessary to duplicate the equipment of Fig. 1 for the other leverman's position. As it is believed that a complete understanding of the invention may be had from the equipment shown, it was not believed necessary to show the equipment of the other position.

As a matter of convenience, the dispatcher, or operator, having charge of west-going traffic will be termed the "West" dispatcher, and the dispatcher having charge of east-going traffic will be termed the "East" operator. Also as a matter of convenience, it will be assumed that the equipment shown to the left of the dotted line in Figs. 2 and 3 is that belonging to the "West" dispatcher and that to the right of the dotted line to the "East" dispatcher.

Also as a matter of convenience, the leverman's position represented by the equipment in Fig. 1 and normally associated with the "West" dispatcher's position shall be termed the "West" leverman's position. Similarly, the other shall be termed the "East" leverman's position.

In the present system it has been arranged so that if desired the "West" dispatcher by the operation of the key K, Fig. 2, may associate his key and lamp equipment with the register relay groups of the "East" leverman, and the "East" dispatcher by the operation of key K' may associate his equipment with the relay groups of the "West" leverman.

When a dispatcher desires to transmit a signal to the normally associated leverman's position, the dispatcher writes the signal of eight, or less, digits upon his sending keys 1 to 10, inclusive, selecting the keys according to digits desired. The depression of each key will operate a relay or a pair of relays in the relay register group for each digit. These relays will operate to light lamps in the lamp panel to exhibit the corresponding words and numerals on the display panel. The register relay groups employed in the present system are similar to those shown and described in United States Letters Patent No. 1,832,118, granted to Harry E. Hershey on November 17, 1931. When a complete signal has been transmitted, the key designated "Stop" of the sending keys will be depressed and the sending keys will then be connected to the next register relay group assembly and display panel.

After a signal has been written upon a panel, the light corresponding to that panel in the "Busy lamp" group at the dispatcher's position will light to indicate that that panel is in use. As each digit of a set of eight digits is registered by the corresponding relay group, the corresponding lamp of the "Digit indicating lamps", Fig. 2, at the dispatcher's position will light. No two digit lamps are ever lighted at the same time at one dispatcher's position as will be evident as the description progresses.

If it is desired to erase the signal written upon a display panel, the wipe-out key at either the leverman's position or the dispatcher's position may be depressed. There is one wipe-out key at each position, leverman's and dispatcher's, associated with each panel.

If the "West" dispatcher desires to transmit a signal to the leverman's position normally associated with the "East" dispatcher, he will move key K to the right. This will disconnect his equipment from that at the "West" leverman's position and connect it to that at the "East" leverman's position. In this case, the "West" dispatcher's "Sending keys" and "Digit indicating lamps" will be associated with the "East" relay register groups. All other equipment at the "West" dispatcher's position marked "East" will be associated with the "East" relay register groups. The equipment marked "West" will be ineffective at this time.

By moving key K to the left, the "West" dispatcher may operate the "West" and "East" relay register groups in multiple, sending the same signal to both levermen's positions. This operation will be described in detail subsequently.

The "East" dispatcher also has access to the "West" register relay groups through the manipulation of key K'. The movement of key K' to the left associates the "East" dispatcher's equipment exclusively with the "West" register relay groups, and the operation of that key to the right connects the "East" and "West" register relay groups in multiple to the dispatcher's equipment.

A general description of the operation of the equipment having been given, a detailed description of the operation will now be given, which when taken in conjunction with the accompanying drawings will afford a complete understanding of the system of my invention.

The Figs. 1, 2, and 3 should be placed with corresponding lines in alignment, with Fig. 1 at the top, Fig. 2 directly below Fig. 1, and Fig. 3 below Fig. 2. Fig. 4 is a view of a display panel and is not directly associated with the other three figures.

It will be assumed that the equipment of Fig. 1 is the "West" leverman's register relay groups and display panels and that the "West" dispatcher desires to write up the signal "TRK 396 TO TRK 475" upon a display panel at that leverman's position.

In the ordinary course of operation with the two dispatchers at their respective positions, each will ordinarily limit his activities to the transmission of instructions to his own leverman only. For example, when there is a westbound train about to enter the terminal, the west dispatcher will transmit to his leverman the indication "TRK 9" to advise him to throw the proper switches to permit the incoming train to enter the terminal on track 9. In most instances, this same train, after discharging its passengers, will be backed out onto the siding leading to the yards. However, some trains which enter the terminal do not terminate their run at the terminal. Under such a circumstance, if the train is west bound, the west dispatcher may transmit the indication "TRK 9 TO TRK 10" to his leverman. The transmission of this signal to the east leverman is also necessary since the train is to enter a section of track under the east leverman's control. If both dispatchers are on duty, each may individually set up the indication "TRK 9 TO TRK 10" before his leverman. On the other hand, the policy under these circumstances may be for the leverman who is first to receive the train to move his key K to the position necessary to simultaneously transmit the indication to both levermen. In any case when only one dispatcher is on duty, the latter would be the usual and logical procedure.

It will be noted that the sending key 1 is also marked "Signal" and that sending key 2 is also marked "Track". The operation of sending key 1 for the first and fifth digits will cause the display of "Sig" and "To Sig", respectively, on the display panel. The operation of sending key 2 for the first or fifth digits will cause the display of "TRK" and "TO TRK", respectively, on the display panel. As these symbols comprise three and five letters, three and five of the lamps in the display panels for those digits will be multipled together so as to clearly display every letter.

Although the first register relay group has been shown as being similar to the eighth register relay, it is to be understood that this has been done to more easily describe the equipment without showing an unnecessary lot of equipment and to enable standard relay groups to be used throughout. It will be evident as the description progresses that the relays 29, 30, and 33 are the only ones in the first groups actually used since the lighting of the necessary number of lamps is obtained by connecting certain of the lamps in multiple as shown in Fig. 1. The fifth register relay group of each

register, or panel, is similar to the first relay group.

In accordance with the first digit "TRK" of the assumed signal to be transmitted, the "West" dispatcher depresses sending key 2, which is marked "Track". The depression of sending key 2 connects ground to conductor 12 to complete the circuit for relay 30, Fig. 1, of the first register relay group. This circuit may be traced from ground, through contacts of sending key 2, conductor 12 which includes the second from the left armature and resting contact of relay 55, through the second from the top armature of relay 26 and its resting contact, through make contact and armature 35 of normally energized relay 22, winding of relay 30 to battery. Relay 30 energizes and attracts its armatures. At the outer right-hand armature, relay 30 completes a circuit for lamp 2 of the associated lamp set. This lamp, and those which will be connected in multiple with it, light to exhibit the digit "TRK" on the lamp panel face. At its inner right-hand armature, relay 30 prepares a locking circuit for itself in series with relay 23, but relay 23 will not energize until sending key 2 is released because of the ground on conductor 12.

The "West" dispatcher now releases sending key 2 to remove the ground from conductor 12. Relay 23 accordingly energizes in series with relay 30 over the following circuit; grounded back contact and armature of release relay 17, conductor 46, winding of relay 23, conductor 48, inner right-hand armature and make contact of relay 30, winding of relay 30 to grounded battery.

Relay 23 in energizing moves its lower armature out of engagement with its resting contact and into engagement with its alternate contact, thereby opening the circuit of relay 22. Relay 22 deenergizes when its circuit is opened and retracts its armatures 34 to 38, inclusive, thereby disconnecting the relays 29 to 33, inclusive, from conductors 11 to 15, inclusive.

Each relay group has a relay 22 with armatures 34 to 38, inclusive, and a lower armature, and a relay 23 through whose lower armature and resting contact the circuit of that relay 22 extends to the alternate contact of the relay 23 of the preceding relay group, by way of conductor 47.

Therefore, when the relay 23 of the first group attracted its lower armature into engagement with its alternate contact, it extended the ground from the armature and resting contact of relay 52 to the winding of relay 22 of the second group. The relay 22 of the second group then energizes to attract its armatures 34 to 38, inclusive, to connect the register relays of the second group to the conductors 11 to 15, inclusive, to prepare those relays for the reception of the second digit. When that digit is received and the key released, the relay 23 energizes in series with the one or the pair of register relays operated and in so doing causes the deenergization of the relay 22 of the second group and the energization of the relay 22 of the third group. This same cycle of operations is performed by each of the succeeding relay groups as the third, fourth, fifth, sixth, and seventh digits are transmitted.

In accordance with the second to seventh digits of the assumed signal, the "West" dispatcher successively depresses the following sending keys: 3, 9, 6, 2, 4 and 7. When the seventh digit has been transmitted, the relay 23 of the seventh digit relay group completes the circuit of relay 27 of the eighth group corresponding to relay 22 of the first group and relay 27 energizes to connect the relays of that register group to the conductors 11 to 15, inclusive. Therefore, the depression of sending key 5 in accordance with the last digit of the assumed signal connects ground to conductors 11 and 12 to complete the circuits of relays 39 and 40 by way of the two innermost make contacts and armatures of relay 27. These relays operate to complete the circuit for lamp 5 of the associated lamp set by way of armatures 39' and 40' and to complete their locking circuits in a multiple series circuit with relay 28 by way of armatures 62 and 63. Relay 28 energizes when ground is removed from conductors 11 and 12 by the release of sending key 5 and opens the circuit of relay 27 which deenergizes and retracts its armatures to disconnect the relays of the group including relays 39 and 40, from the conductors 11 to 15, inclusive.

The complete signal is now displayed upon the panel and will remain there until the relays of each group are released. This release will be explained subsequently.

The "West" dispatcher now depresses the key of the sending key group marked "Stop". The operation of that key connects ground to conductor 16 to complete the circuit of relay 24, which circuit was prepared by the operation of relay 23. This circuit may be traced from ground, left-hand contacts of the stop key, conductor 16 including the innermost armature and resting contact of relay 55, the innermost upper armature and resting contact of relay 26, armature and make contact of relay 23, winding of relay 24 to battery. Relay 24 energizes and completes a locking circuit for itself in series with relay 25, which relay energizes when the "Stop" key is released and ground is removed from conductor 16. Relay 25 in energizing at its armature and make contact connects ground to conductor 42 to complete a circuit through the upper winding of relay 26 and to light the "West busy lamp" 1 at the "West" dispatcher's position. That lamp lights to indicate that Panel No. 1 has a signal written upon it. Relay 26 operates when its circuit is completed and at its armature 50 completes a locking circuit for itself through its lower winding to common conductor 49 which is grounded through resting contact and armature of relay 53. At its upper armatures, relay 26 disconnects the sending keys from the first series of register relay groups by disconnecting the conductors 11 to 16, inclusive, therefrom. At armature 51, relay 26 completes the obvious circuit of relay 52, which relay energizes and moves its armature into engagement with its alternate contact to complete the circuit of relay 22' of the next series of register relay groups. The circuit for relay 22' is as follows: grounded armature and alternate contact of relay 52, armature and resting contact of relay 52', armature and resting contact of relay 23', winding of relay 22' to battery.

Relay 22' energizes and moves its armatures, corresponding to armatures 34 to 38, inclusive, of relay 22, into engagement with their make contacts to associate the sending keys with the first relay group of the second series of relay register groups. The operation of this series is identical with that of the first series, and when the complete signal is written upon the panel, the depression of the "Stop" key will operate the relays 24 and 25 of the second panel, in a manner similar to that in which relays 24 and 25 of panel #1 were operated, to operate relay 26'.

Relay 26' upon operating locks itself to the common locking conductor 49 as did relay 26 and

at its armature 51' completes the circuit for relay 52'. Relay 52' operates and attracts its armature to extend the ground from armature and make contact of relay 52 to the relay 22 of the succeeding series of register relay groups, or, to the next display panel. If relay 52' were a relay in the last series of relay groups, ground from armature and make contact of relay 52 would be connected to conductor 54 through a chain circuit including an armature and make contact of each of the relays 52 for a purpose which will be explained subsequently.

Each depression of the "Stop" key completes through its right-hand contacts, the obvious circuit for relay 53. Relay 53 operates and attracts its armature to remove ground from the common locking conductor 49 for a purpose which will also be described a little later. The release of the "Stop" key causes the deenergization of the relay 53.

Since relay 22 of the first panel is normally energized when none of the lamp panels are in use and remains energized until the first digit of a signal is transmitted, ground is connected to conductor 45 by the lowermost armature of relay 22. This completes a circuit for the lamp 1 of the "Digit indicating lamps," Fig. 2. That lamp, therefore, is lighted until after the transmission of the first digit when relay 22 deenergizes, as has been explained. Thereafter, as each of the relays corresponding to relay 22 is energized, a circuit will be completed for the corresponding lamp of the "Digit indicating lamps" by the connection of ground to a conductor similar to conductor 45 to show the progress of registration during the transmission of a plurality of digits comprising a signal. When relay 27 energizes, it connects ground to conductor 44, thereby completing the circuit of "Digit indicating lamp" 8. The wires corresponding to conductors 45 and 44 have not been included in the drawings, as their inclusion would complicate the drawings. It is believed that an understanding is complete without them. The small arrows attached to conductor 45 indicate that this conductor is common to the relay 22 of the first relay group of each panel, and similarly, conductor 44 is shown to be common to the relay 27 of the last group of each panel. The conductors, similar to conductors 44 and 45, but which are not shown, are, in a similar manner, each made common to the relay 22 of the corresponding relay register group of each panel. In this manner, one set of "Digit indicating lamps" is employed for all panels, those lamps being associated with the relay group of each panel which is in the process of receiving or which is next to receive the signals transmitted from the dispatcher's position. Inasmuch as registration takes place upon only one panel at a time, and inasmuch as only one relay 22 of that panel is operated at any time, it will be apparent that not more than one digit indicating lamp is ever lighted at any one time.

The wires leading from each series of register relay groups to the "West busy lamps" have also been omitted for the same reason. It is to be remembered that when each relay corresponding to relay 25 is energized, the lamp of the "West busy lamps" associated with that series of relay groups or panel lights to indicate that that panel is in use.

It can be understood that some signals transmitted by the dispatcher will be more important than others and that the dispatcher must have some means of notifying the leverman of the relative importance of the various signals. This may be done in many ways. In this case, each lamp panel is provided with a red light and a green light, as can be seen in Fig. 4. Thus when a signal is displayed, if it is very important, the dispatcher will cause the red lamp RL, Fig. 1, to glow. If it is not so important, but still more important than other signals, the dispatcher will cause the green lamp GL, Fig. 1, to glow. When no lamp is lighted the leverman will know that the signal is not important, and can take care of it at his convenience.

To operate these lamps, each dispatcher is provided with "Green lamp keys" and "Red lamp keys", being provided with one of each for each panel.

Associated with each panel are sets of relays corresponding to relays 18 and 19 for operating the green lamp and relays 20 and 21 for operating the red lamp.

If the "West" dispatcher desires to display the green light in front of the signal he has written upon the Panel #1, he will depress "West green lamp key" No. 1, Fig. 2. The operation of that key connects ground to conductor 43 to complete the obvious circuit for relays 18 and 19 in series. These relays energize thereupon, and relay 19 at its lower armature completes a locking circuit for relay 18 and itself from grounded armature of release relay 17 through the resting contact and armature of relay 20. Relay 19 at its upper armature completes the circuit for green lamp GL. Relay 18 operates and moves its armature out of engagement with its resting contact which at this time has no effect.

If the "West" dispatcher desires to change the light from green to red, or light the red lamp if the green lamp has not been lighted, he will depress No. 1 key of the "West red lamp keys", Fig. 2. The depression of that key connects ground to conductor 44', thereby completing the obvious series circuit for relays 21 and 20. Both of these relays energize and attract their armatures. Relay 20 in attracting its armature opens the locking circuit of relays 18 and 19, which relays will deenergize and retract their armatures. Relay 18 because of the copper slug on its core is slow to release. Relay 21 in attracting its upper armature completes the circuit for the red lamp RL and in attracting its lower armature completes a locking circuit for relay 20 and itself, which circuit will be complete when relay 18 deenergizes to cause its armature to engage its resting contact and connect ground from resting contact and armature of relay 17 to the lower armature of relay 21. The release of relay 19 extinguishes the green lamp.

Had it been that the red lamp had been lighted first, then the operation of relay 18 in series with relay 19 which lights the green lamp, opens the locking circuit of relays 20 and 21 which deenergize to extinguish the red lamp and complete the locking circuit of relays 18 and 19. If the "West" dispatcher desires at any time to extinguish whichever one of the red or green lamps that is lighted, he will depress both the green-lamp key and the red-lamp key associated with the desired panel. This depression energizes all of the relays 18, 19, 20, and 21. When the keys are released, relays 19 and 21, being quick acting, release and open the locking circuit at their lower armatures before slow-to-release relays 18 and 20 can release to complete the locking circuits. Thus all four relays terminate their operations in the deenergized positions.

It is sometimes the desire of a dispatcher to skip a digit in the transmission of a signal. In order that he might do this he has been provided with a key in the sending key group which is termed the "Advance" key and which is designated by reference character "A" in Fig. 2. The operation of this key in place of one of the digit keys connects ground to conductor 15. This connection completes the circuit of the relay of the group with which the sending keys are associated corresponding to the relay 33 of the first group of Panel No. 1. This relay operates as do relays 29 to 32, inclusive, and locks itself in series with the relay 23 of that group, which relay energizes when key A is released and causes the transfer of the conductors 11 to 15, inclusive, to the next register relay group. Since it does not control the circuit of any lamp, no lamp is lighted and that digit is skipped.

At the leverman's position there is a set of wipe-out keys comprising one key for each display panel. The dispatcher is also provided with such a set of keys. When the leverman has set his levers according to the signal on display Panel No. 1 and has no further use for the signal, he will depress the No. 1 Wipe-out key, thereby energizing the relay 17. There is a relay similar to relay 17 associated with each panel.

The energization of relay 17 disconnects ground from the conductor 46 and from the locking circuits of relays 18 and 19 and 20 and 21, if either pair of these relays happens to be energized. The opening of the locking circuits will cause the deenergization of the relays to extinguish the lamp. The disconnection of ground from conductor 46 opens the circuits of relays 23 and 28 of Panel #1, and those similar thereto, and the relays 24 and 25, besides those relays in the register relay groups which are energized in series with the relays 23 and 28. All of these relays will deenergize and restore to normal. The relays of the register groups extinguish the lights to erase the signal from the panel. Relay 23 deenergizes to prepare the circuit for relay 22 at its lower armature. Relay 25 deenergizes to extinguish the West busy lamp for that panel and to open the energizing circuit of relay 26. Relay 26 remains energized, however, through its lower winding to maintain relay 52 energized and to keep the sending keys disconnected from the relay groups of Panel #1.

As explained, relay 53, Fig. 2, energizes with each depression of the "Stop" key to remove ground from conductor 49. Therefore, when the "Stop" key is depressed to associate the sending keys with another idle series of register groups, ground is disconnected from conductor 49. This disconnection opens the locking circuit of relay 26, and all relays similar thereto, and relay 26 deenergizes because the circuit through its upper winding was opened with the release of the associated relay groups as just explained. In deenergizing relay 26 opens the circuit of relay 52 which also deenergizes to complete the original energizing circuit of relay 22. Relay 22, therefore, energizes and associates the sending keys with the first register relay group of Panel #1.

From the foregoing it can readily be seen that the release of any panel, the release of the relays associated therewith, leaves only the relays 26 and 52 of that panel energized and that those relays remain energized until the completion of the transmission of the next signal. When the "Stop" key is depressed, relay 53 energizes to open the locking circuits of all the relays 26, allowing those relays associated with released panels to deenergize and cause the deenergization of their associated relays 52. Since all of the relays 22 and 27 have their circuits completed through the armature and break contact of the relay 52 of the first panel and the armatures and make contacts of the relays 52 of the preceding panels, the relay 22 of the first idle panel of the sequence is the only one energized when more than one panel is released as just explained. Therefore, the sending keys are associated always with the first idle panel of the sequence, that sequence going from Panel No. 1 to Panel No. 10, or higher if there are more panels.

When all panels are in use, all of the relays 52 are operated and a chain circuit is completed for relay 53, Fig. 2. This circuit extends from grounded armature and make contact of relay 52, Panel No. 1, through all armatures and make contacts of the relays 52 of the other panels, conductor 54, winding of relay 53 to battery and ground. Relay 53 energizes to remove ground from the locking conductor 49 to which all relays 26 are locked. Thus, when a Wipe-out key is depressed, the relay 26 of the erased panel deenergizes when the circuit through its upper winding is opened to connect the sending keys to the associated register relay group series. Accordingly, relay 52 of that panel opens the chain circuit of relay 53 and that relay falls back to again connect ground to the common locking conductor 49.

If any of the relay equipment associated with any panel becomes faulty in its operation and does not register the proper signals, it is undesirable to have the sending equipment connected to that equipment. To prevent such a connection, the locking type Busy keys are provided, one for each panel. The operation of any one of these keys completes a circuit for the associated relay 26 through its upper winding and this circuit remains completed as long as the Busy key is in its operated position. Relay 26 operates to take the faulty equipment out of service. The relay 52 associated with that relay 26 operates as a result of the operation of that relay 26 and connects the chain circuit to the next equipment series.

The "West" dispatcher is also provided with a set of Wipe-out keys for the "West" display panels. He rarely uses these keys for any purpose other than wiping out a signal in which he has made a mistake in transmitting.

The "West" dispatcher is also provided with "East red lamp keys", "East green lamp keys", "East busy lamps" and "East wipe-out keys" whose function and operation are the same as those of the "West" operation when the "West" dispatcher has associated his "Sending keys" and "Digit indicating lamps" with the "East" register relay group equipment.

The "East" dispatcher has equipment at his position similar to that at the "West" dispatcher's position for the operation of the "East" register relay group equipment and the "West" relay group equipment. That equipment at the two dispatchers' positions which are solely for operation of the "West" register equipment is directly multipled together and marked "West". That equipment at the two positions which is solely for use with the "East" register equipment is marked "East". That equipment at the two positions which is used for operating both the "East" and "West" register equipments is adapted to be connected together through the medium of relays.

The operation of the "East" register equipment by the "West" dispatcher will now be explained, it

being remembered that the "East" register equipment is the same as that shown in Fig. 1. If the "West" dispatcher wishes to operates the "East" register equipment and not the "West" equipment he will operate key K to the right and close the right-hand set of contacts. This operation completes the obvious circuits for relays 55 and 56, which relays operate. Relay 55 in operating disconnects the "West" dispatcher's sending keys from the "West" register equipment by attracting its armatures. Relay 56 in operating connects the "West" dispatcher's sending keys in multiple with those of the "East" dispatcher and the Digit indicating lamps in multiple with those of the "East" dispatcher. Thus if the "East" dispatcher is in the process of writing up a signal on one of the east panels, the "West" dispatcher will be so informed by the operation of his Digit indicating lamps in multiple with those of the "East" dispatcher. The "West" dispatcher will wait until the "East" dispatcher has completed his transmission before operating the sending keys. The operation of key K to the right also lights the red lamp 58 and the red warning lamp WL' at the "East" dispatcher's position. The lamp 58 informs the "West" dispatcher that his equipment is connected solely to the "East" register equipment. The warning lamp WL' informs the "East" dispatcher that the "West" dispatcher desires to set up a signal on one of the "East" panels, so the "East" dispatcher will accordingly hurry his transmission to completion.

The "West" dispatcher when he sees that the "East" dispatcher is through will operate his sending keys to transmit the signal to the "East" equipment as he did in transmitting a signal to the "West" equipment.

If the "West" dispatcher desires to transmit the same signal to both levermen, he will operate key K to the left. This operation completes the circuit of relay 56 as before and lights the lamp WL' as before and the green lamp 59. The relay 55 is not operated this time so the sending keys remain connected to the "West" register equipment besides being connected to the "East" register equipment by the operation of relay 56. Thus it can be seen that the operation of the sending keys will operate both register equipments simultaneously. The lighting of green lamp 59 informs the "West" dispatcher that his sending keys are connected to both register equipments.

The "East" dispatcher has the same access to "West" register equipment through the operation of his key K'.

Restoration of keys K and K' to their normal positions, those shown in Fig. 2, disassociates the dispatcher's equipment with the other leverman's equipment.

Although I have chosen the foregoing example as an illustration of my invention, it is not my intention to be limited to the exact disclosure, for there are alterations and adaptations which may be made without departing from the scope and spirit of the invention.

Having thus described my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. In a signaling system, a sending station, a plurality of receiving stations having means for registering signals comprising series of digits, digit transmitting means at the sending station normally connected to the digit registering means at one of the receiving stations, means at the sending station for indicating the progress of the registration of digits transmitted to said one receiving station, means variably operable to connect said transmitting means and said indicating means to the registering means at another receiving station in multiple with said first registering means or alternatively to the registering means of such other receiving station to the exclusion of said first registering means, and means whereby said indicating means then denotes the progress of the registration of digits transmitted simultaneously to both receiving stations or the progress of registration at such other station as determined by the operated position of the specified connecting means.

2. In a signaling system wherein signals are transmitted from a dispatcher's station to a receiving station whereat each signal is registered on a different register, the combination of emphasis-indicating apparatus individual to each register and adapted to be variably operated to indicate different degrees of emphasis, said apparatus being located at the receiving station, means at the dispatcher's station individual to each register and directly connected to the associated emphasis-indicating apparatus whereby the dispatcher can operate any emphasis-indicating apparatus at any time to indicate any one of the degrees of emphasis, and means enabling the retirement of any previously actuated emphasis-indicating apparatus consequent to the simultaneous actuation of more than one of said means at the dispatcher's station.

3. In a signaling system, a pair of sending stations, a pair of receiving stations each having means for registering signals transmitted from either of said pair of sending stations, circuit connections normally connecting the two sending stations separately to the respective two receiving stations, means at the respective sending stations for indicating the progress of registration of digits at their receiving stations, and means at each of the sending stations for connecting their transmitting means and their indicating means to the registering means of the other receiving station selectively independent of or in multiple with its own registering means, and means whereby the indicating means of such station then denotes the progress of the registration in either instance.

HARRY E. HERSHEY.