Feb. 20, 1951 D. P. BASU ET AL 2,542,890

SPACE RESERVATION SYSTEM

Filed Nov. 4, 1948 3 Sheets-Sheet 1

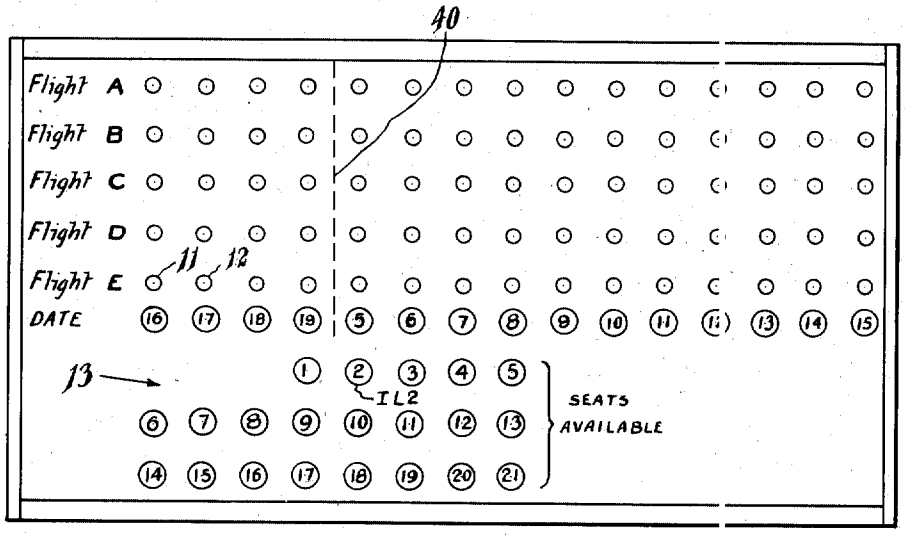

Fig. 1.

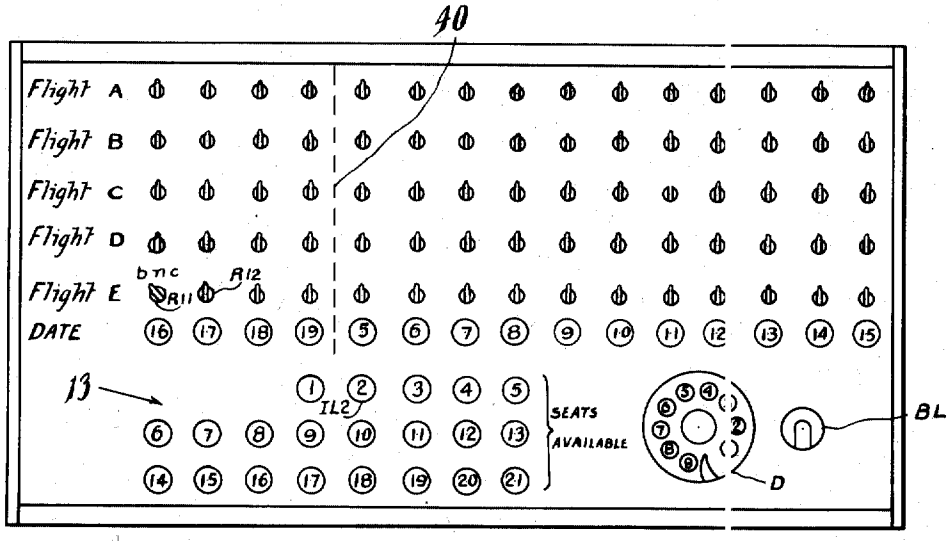

Fig. 2.

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SPACE RESERVATION SYSTEM

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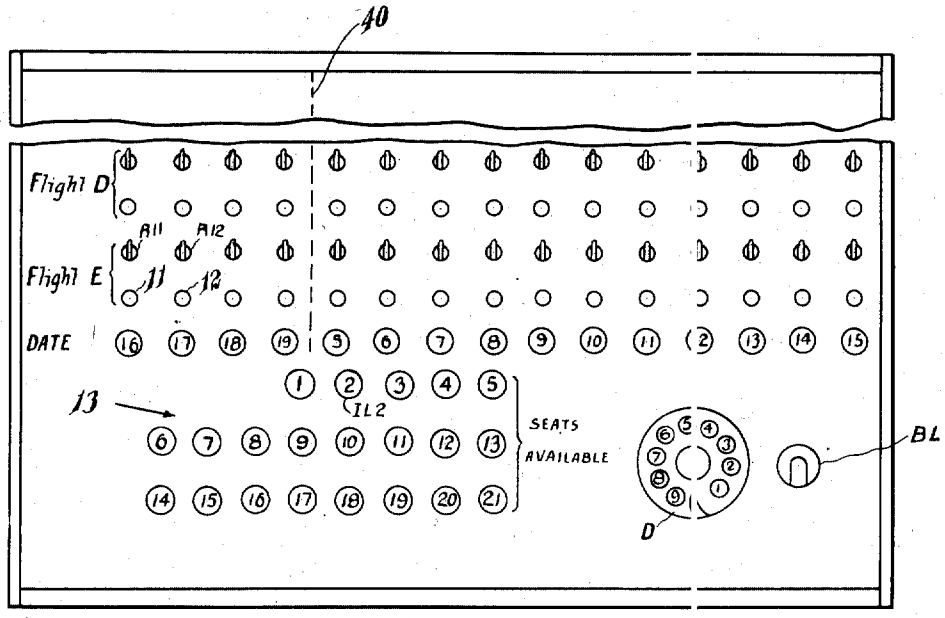

FIG. 3.

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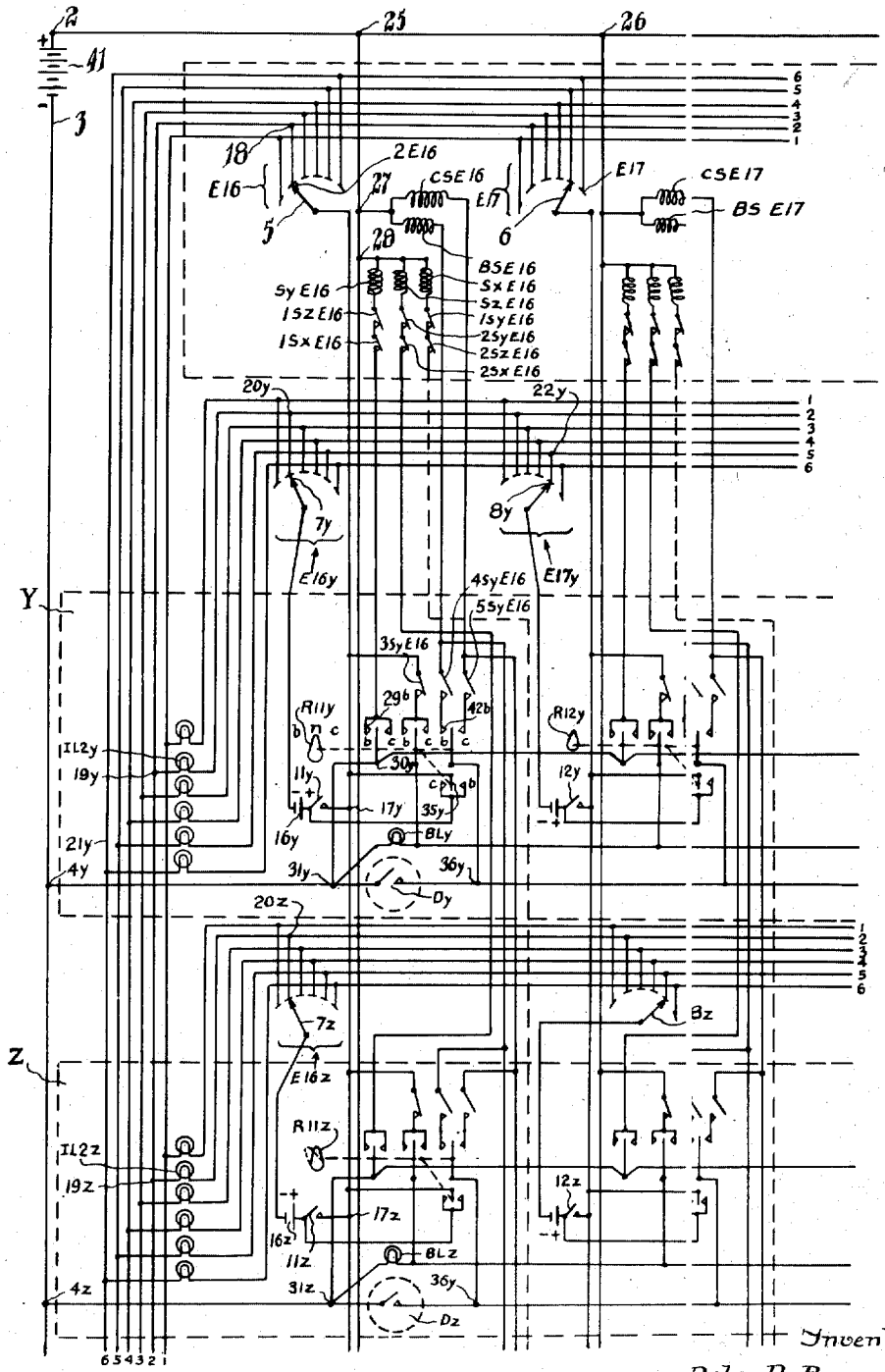

Fig. 4.

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Patented Feb. 20, 1951

2,542,890

UNITED STATES PATENT OFFICE

2,542,890

SPACE RESERVATION SYSTEM

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Application November 4, 1948, Serial No. 58,324
In India November 6, 1947

5 Claims. (Cl. 177—353)

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This invention relates to devices for quickly indicating available seats or accommodations and for registering or cancelling reservations on any predetermined air flight, train service, theatrical show, passenger boat sailing, hotel room accommodation and the like. The indication may be made at reservation panels, described hereafter in detail, or may be made at separate booking centres where booking and cancellation, may be carried out. In a multiple system, a plurality of indication panels may be used, all these panels being electrically connected to a single central reservation control panel at which all the more intricate relay equipment is located.

To simplify the description herein, the various types of travel will be referred to as "flights" even though, as indicated above, this system is equally applicable to train service, passenger boat sailings, and the like.

An object of this invention is to provide a device which will at a moment's notice indicate the number of seats available for any predetermined flight, without the necessity of recourse to telephonic enquiry to a central reservation control.

Another object of this invention is to provide a reservation panel upon which may be recorded a reservation or cancellation of accommodation on a flight at some future date.

A further object of this invention is to provide a reservation panel upon which bookings or cancellations of accommodation may be made by simply dialling the appropriate number.

A still further object of this invention is to provide protective means whereby two or more reservation centres cannot simultaneously book a reservation on the same flight at the same time, a "busy" or "engaged" signal being transmitted to the second reservation panel or panels when the second operator attempts to book or cancel a reservation on a particular flight already engaged by the first operator.

A further object of this invention is to provide a device whereby the other reservation panels can register bookings or cancellations on any other flight desired provided there is no "busy" or "engaged" signal for the flight concerned, even though a prior booking or cancellation is being carried out by another reservation panel on another air flight.

A still further feature of this invention is to provide an arrangement whereby, although registration is ineffective at other reservation panels on a particular flight already engaged by a reservation panel, yet the other panels may still observe the state of availability of seats for the

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very flight on which the booking or cancellation is being registered elsewhere by switching on to either "book" or "cancel" position of the switch for that flight.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in conjunction with the accompanying drawings, wherein like characters of reference indicate corresponding parts throughout the several views and wherein:

Fig. 1 is a plan view of the reservation indicator panel designed to merely indicate the number of seats available;

Fig. 2 is a plan view of a reservation panel designed to book or cancel reservations of seats. This panel will also indicate the number of seats available, but in this regard is not as convenient to operate as is the panel shown in Fig. 1;

Fig. 3 is a plan view of a panel which combines the features of the panels shown in Figs. 1 and 2; however for purposes of simplification, only the portion of the panel relating to flights D and E is shown; and

Fig. 4 is a schematic diagram of the wiring for the combination panel shown in Fig. 3.

In order to more easily comprehend the following description herein it would be well to outline the nomenclature used throughout:

(*a*) The "booking and cancellation" centres are referred to as X, Y and Z.

(*b*) The "flights" to various destinations regardless of date of flight, are designated as A, B, C, D and E.

(*c*) All components associated with a given flight will bear a letter corresponding to that flight, and if also associated with a given date will bear a numeral corresponding to that date. Thus, a relay associated with flight E for the 16th of the month is designated as E16. Furthermore, a section of that relay devoted to a circuit associated with one of the "booking and cancellation" centres such as Y for example, would be designated as E16*y*.

(*d*) Generally, the indicia assigned to a component bear a relationship to its name. For example; D refers to dial; R refers to rotary switch; IL refers to indicator lamp; BS refers to "booking solenoid," and so on.

Referring first to Figs. 1 and 2, flights to destinations A, B, C, D and E are arranged in horizontal rows with either a push button or a 3-position rotary switch for each forward booking date up to 15 days in advance. In other words, for each flight, either 15 push buttons or 15 3-

position rotary switches are arranged in a horizontal row, each corresponding to a calendar date in the future schedule of that particular flight. A horizontal row below the "flight E" column is composed of a series of short posts having removable caps which bear numerals corresponding to the particular date. With the equipment provided having booking relays with 15 positions, it is possible to book as far ahead as 15 days. It will be seen that if the present date of booking is assumed to be the 5th of the month, the numbered caps are arranged in numerical sequence from that date towards the righthand side of the control panel and then carry on from the lefthand side of the control panel up to the present date. The dotted lines 40 drawn between the push buttons and switches for the 19th and the 5th, as in Figs. 1 and 2, represent the imaginary division across the panel between the beginnings and the ends of the booking dates for the five flights.

The dial D shown in Fig. 2 operates a pair of "make and break" contacts which close and open a number of times as determined by the number dialled; dials of this type are well known in the art. A pulsating electrical current results and is used to operate the step-by-step relays as will be subsequently described in detail.

Fig. 3 illustrates a device combining the features of the devices shown in Figs. 1 and 2, and wherein for the five flights A, B, C, D and E, both the push buttons of Fig. 1 and the 3-position rotary switches of Fig. 2 along with the indicating lamps of both Fig. 1 and Fig. 2 have been combined in one panel. It will be appreciated that the drawings would become very involved if all switches and all push buttons for all flights were shown, and so for the sake of simplicity, only flights D and E are shown, it being understood that similar rows of switches and push buttons for the remaining flights A, B and C exist above those shown in the drawings. The schematic diagram shown in Fig. 4 is drawn to represent only a small portion of the electrical circuit which would be requisite for the five flights and for the 15 days. In fact, since each flight is independent, only one (flight E), is described, and since all dates also operate in the same manner, only two (the 16th and the 17th of the month), are shown. On the other hand, in order to illustrate how operations may be automatically carried out by a plurality of booking centres, two centres Y and Z are shown, the actual electrical equipment provided at these centres being enclosed in the drawings by a dotted line; all other equipment consists either of interconnecting multiple conductor cables, or of the equipment at the central office.

In the preferred arrangement, registration of electrical impulses provided by the make-and-break contacts operated by the dial D, said impulses denoting "booking" or "cancellation," are made on a step-by-step telephone-type rotary switch the mechanism of which has been modified so that two electrical solenoids actuate the rotary contacts through ratchet and pawl arrangements, the one solenoid when energized causing a rotation in one direction, and the second solenoid when energized causing a rotation in the opposite direction. For purposes of this invention, one solenoid in each pair is called the "booking solenoid" and the other solenoid is called the "cancellation solenoid." For "booking" the effect of the motion of the solenoid is to move the rotary wipers in a subtractive direction, whereas a "cancellation" actuates the "cancellation solenoid" and thereupon moves the wiper in the opposite direction to thereby effect an addition. For example, if the wiper arm is on contact "6," the counter thereby indicating six seats available, one "booking" impulse would move the wiper to position "5," thereby showing that five seats now remain, whereas if it were a "cancellation," the wiper would move to contact "7," thereby indicating that seven seats are now available. It should be noted that each pair of solenoids through their ratchet and pawl mechanisms rotate a shaft having a plurality of wiper contacts which engage different banks of stator contacts, the number of banks of rotary and fixed contacts being equal to the number of "booking and cancellation" centres, plus an additional bank which operates as a common circuit for all the "booking and cancellation" centres.

That portion of the wiring of the device insofar as it relates to the indication of the number of seats available may best be described by taking as an example an operation at centre Y:

On an enquiry by a prospective passenger as to the number of seats available for flight E on the 16th of the month, the operator at centre Y depresses the push button 11 corresponding to flight E at date 16 (see Fig. 3), and receives an indication on the lamp indicator field designated generally as 13, of the number of seats available by the lighting up of the appropriate indicating lamp. Referring to Fig. 4, it may be seen that a circuit is completed from the positive terminal of battery 16*y* through the closed contact 11*y* of the push button when depressed, to terminal 17*y*, then to rotary wiper 5 on the step-by-step relay E16, across to contact 2E16 of the common stator contact bank. (This counter is assumed to indicate two seats available, the wiper arm being on position "2"). The circuit then continues to binder post 18, thence to binder post 19*y*, through indicator lamp IL2*y*, terminal 20*y* of the stator contact bank E16*y* of relay E16 corresponding to booking position Y, thence to wiper arm 7*y* (since this arm is also on position "2" as in the case of rotary arm 5), and from there to the negative terminal of the battery 16*y* thereby completing the circuit; the glowing of indicator lamp IL2*y* indicates that two seats are available.

Similarly if the operator at "booking" centre Z wished to ascertain the number of seats available for the same flight E16, he would depress the push button 11*z*, completing a similar circuit to that described above with respect to position Y, thereby illuminating lamp IL2*z*. It should be noted that this operation could even be effected simultaneously with the same operation at position Y, or at any other position. More specifically, the circuit is as follows: from the positive terminal of the battery 16*z* through closed contact 11*z*, then to binder post 17*z*, rotary wiper 5, contact 2E16 of the common stator contact bank, terminal 18, terminal 19*z*, indicator lamp IL2*z*, terminal 20*z*, wiper arm 7*z*, and finally to the negative terminal of the battery 16*z*.

Since similar paths are followed for indication of reservations of any of the other flights at these two "booking" centres and at all other "booking" centres, no further description of this feature of the circuit need be made.

In the event that the prospective passenger desired a reservation to be made and recorded, the operation is somewhat more involved.

For each of the five flights A, B, C, D and E, there is provided a bank of 15 4-pole 3-position

rotary switches such as R11 or R12, each of the 15 switches in each flight corresponding to a forward booking date in the same manner as do the push buttons. The dial D is used during "booking" or "cancellation," the dial mechanism being designed to automatically produce a number of electrical impulses equal to the number dialled. A "busy" lamp BL is provided in conjunction therewith which will glow in the event that another "booking" centre is engaged in registering on the same flight for the same date. In order to explain the operation of this portion of the circuit, it will be assumed that a "booking" or "cancellation" is to be carried out at panel Y for flight E on the 16th of the month.

As mentioned above, the switches R have 3-positions, these positions being designated as *b*, *n*, and *c*. For booking a seat at panel Y for flight E16, the switch R*1y* is moved from position *n* (neutral) to position *b* ("booking"), thereby closing the following circuit: From the positive terminal 2 of a 24-volt battery 41 to terminal 25, thence to terminal 28 of the step-by-step relay E16, then through selector relay coil S*y*E16 through the closed contacts 1szE16 and 1sxE16 (if none of the other "booking" panels such as Z and X is in prior operation on the same flight), through switch point 29*b* which has been closed due to the position of rotary switch R1*y*, thence to terminal 30*y*, from there to terminal 31*y*, thence to terminal 4*y* and from there to the negative terminal 3 of battery 41. Thus the selector relay coil S*y*E16 is energized and opens contacts 1*sy*E16, 2*sy*E16, which contacts are in series with lines going to other "booking and cancellation" panels X and Z so as to prevent the other selector relays, such as SzE16 which pertains to booking centre Z for flight E16 from being energized. If still other booking centres are to be used, further contacts in addition to 1*sy*E16 and 2*sy*E16 will be provided, all being operated by coil S*y*E16.

Simultaneously the following contacts on the same relay (S*y*E16) change their positions: Normally closed contact 3S*y*E16 opens the "busy lamp" circuit, therefore showing by the failure of the lamp to glow that no other "booking" centre is engaged in booking for the flight E16; and normally open contacts 4S*y*E16 and 5S*y*E16 close, thereby providing a closed circuit for the impulse solenoids BSE16 and CSE16 ("booking" and "cancellation" respectively) so that either one of these solenoids may be energized depending upon the position (*b* or *c*) of switch R1*y*. The current through the solenoids passes through the make-and-break contacts of the dial D*y* and is therefore controlled thereby.

If switch R1*y* is turned to the "booking" position *b*, electrical impulses produced by closing and opening the contacts D*y* are transmitted to the solenoid BSE16 by way of terminal 2 on battery 41, terminal 25, terminal 27, through the coil BSE16 per se, through contacts 4S*y*E16, through the closed contacts 42b, then to terminal 36*y* through contact D*y*, terminal 34*y*, terminal 4*y* and back to terminal 3 of battery 41. The current flow thereupon energizes solenoid BSE16 so as to operate the associated ratchet and pawl mechanism and thereby move the rotary wiper arm in all the banks of switch E16 one step for each impulse produced by the closing and opening of contact D*y*.

Since all the rotary contacts on switch E16 rotate in unison, and since switch 35*y* by-passes switch 1*y* when rotary switch R1*y* is placed in either the "booking" or "cancellation" position, the operator is able to observe on the lamp indicator field 18 the changing condition as the "booking" or "cancellation" proceeds and is able to view the result of his dialling and to thereby check his accuracy and to see what is the resulting reservation condition after his operation is complete.

A "cancellation" is effected in the same manner as is a "booking," by merely moving switch R1*y* to the *c* position thereby placing the "cancellation" solenoid CSE16 in the circuit previously used for "booking" solenoid BSE16 so that operation of the impulse producing dial D*y* will effect a cancellation by rotating the wiper arms in the opposite direction.

From the foregoing it will be clear that for any particular flight A, B, C, D or E, any of the "booking" centres (X, Y, Z, for example) may book or cancel one or more seats. It will also be clear that while one "booking" centre (Y, for example) may be engaged in booking or cancelling seats on given flights for a given date, another "booking" centre (Z, for example) can simultaneously carry out "bookings" or "cancellations" even on the same flight so long as it is for a different date, or may carry out a "booking" or "cancellation" on a different flight if it is on the same date, since all of the actuating circuits are essentially independent of one another.

In the circuit for E17 (flight E, 17th of the month) the same circuit arrangement is used and this is shown in detail merely to illustrate how a plurality of these circuits may be arranged. There are in fact in the actual working model 15 of these for the 15 forward booking dates. Electrical connection lines are carried off to the right hand side of the drawing (Fig. 4) as well as to the bottom thereof in order to indicate that other identical circuits are arranged in parallel with those shown in the drawing.

It is thought that the construction and use of the invention will be apparent from the above description of the various parts and their purpose. It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:

1. A signalling system for storing and indicating information submitted from a plurality of local stations, comprising a master station, a switch in the master station for each one of the local stations, each switch having a plurality of circuit-making positions, the switches being arranged in a group for operation in unison, a relay in the master station engaging with the group of switches to move them from one circuit making position to the next adjacent circuit making position for each impulse of electrical power applied to the relay, a plurality of indicators at each local station, the indicators being respectively connected through an electrical circuit to one of the circuit-making positions of the switch for the local station to indicate when the group of switches has been moved to the respective circuit-making positions, electrical impulse producing devices at the local stations, each of the said devices being con-

nected through an electrical circuit to the relay, and selector means at the local stations to selectively condition the relay for movement of the switches in one direction or in the opposite direction when an impulse is applied to the relay.

2. A signalling system for storing and indicating information submitted from a plurality of local stations, comprising a master station, a relay in the master station having a component movable step by step when impulses of electrical power are applied to the relay, an indicator connected to the movable component of the relay to indicate information resulting from the position of the said movable component, electrical impulse producing devices at the local stations each of the said devices being connected through a main electrical circuit to the relay, and selector means at the local stations to selectively condition the relay for movement of the movable component in one direction or in the opposite direction when impulses are applied to the relay, a solenoid in each main circuit the said solenoids being energized when the selector means in the circuit is set at relay conditioning position, normally closed switches in each circuit openable respectively by the energized solenoids of the other circuits, a warning means at each local station conditionable to be energized when the selector means at any other station has been set at relay conditioning position, each of the said warning means comprising a warning device, a normally open switch connected through a secondary electrical circuit to the warning device and manually closable when the selector means in the circuit is set at relay conditioning position, and normally closed switches in the secondary circuits of each local station openable by the energized solenoid of the corresponding main circuit for the particular local station.

3. A signalling system for storing and separately indicating at a plurality of local stations information pertaining to a plurality of items submitted from the local stations each item having a number of sub-items arranged in numerical order, comprising a master station, a set of switches in the master station for each local station, each set including a switch for each item, the switches for the same items in the various sets being arranged in groups for operation in unison, each switch having a plurality of circuit-making positions, relays in the master station for moving each group of switches, each relay including an additive solenoid and a subtractive solenoid, the additive solenoid being adapted to actuate the relay to move the group of switches connected thereto from one circuit-making position to the next adjacent circuit-making position in an additive direction for each impulse of electrical power applied to the solenoid, and the subtractive solenoid being adapted to actuate the said relay to move the said group of switches connected thereto from one circuit-making position to the next adjacent circuit-making position in a subtractive direction for each impulse of electrical power applied to the solenoid, an annunciator at each local station including a plurality of indicators arranged in a numerical series, each indicator being adapted, when its annunciator is connected through circuits to any switch of the set for the local station of such annunciator, to be connected to a numerically corresponding circuit-making position in the connected switch to indicate to what position the group of switches to which the connected switch belongs has been moved, an electrical impulse producing device at each of the local stations, each of the said devices being adapted to be selectively connected through an electrical circuit to either solenoid of any of the relays, and selectors at the local stations for each switch of the set, each selector including a normally open 3-position switch selectively adjustable to connect the electrical impulse producing device to the additive and to the subtractive solenoids of the relay for the group of switches to which the switch of the set belongs and also including a switch to connect the annunciator through circuits to a desired switch of the set in the master station.

4. A signaling system for storing and separately indicating at a plurality of local stations information pertaining to a plurality of items submitted from the local stations, each item having a number of sub-items arranged in numerical order, comprising a master station; a set of switches in the master station for each local station; each set including a switch for each item, the switches for the same items in the various sets being arranged in groups for operation in unison, and each switch having a plurality of circuit-making positions; relays in the master station for moving each group of switches, each relay including an additive solenoid and a subtractive solenoid, the additive solenoid being adapted to actuate the relay to move the group of switches connected thereto from one circuit-making position to the next adjacent circuit-making position in an additive direction for each impulse of electrical power applied to the solenoid, and the subtractive solenoid being adapted to actuate the said relay to move the said group of switches connected thereto from one circuit-making position to the next adjacent circuit-making position in a subtractive direction for each impulse of electrical power applied to the solenoid; an annunciator at each local station including a plurality of indicators arranged in a numerical series, each indicator being adapted, when its annunciator is connected through circuits to any switch of the set for the local station of such annunciator, to be connected to a numerically corresponding circuit-making position in the connected switch to indicate to what position the group of switches to which the connected switch belongs has been moved; an electrical impulse producing device at each of the local stations, each of the said devices being adapted to be selectively connected through an electrical circuit to either solenoid of any of the relays; selectors at the local station for each switch of the set, each selector including a normally open 3-position switch selectively adjustable to connect the electrical impulse producing device to the additive and to the subtractive solenoid of the relay for the group of switches to which the switch of the set belongs and also including a switch to connect the annunciator through circuits to a desired switch of the set in the master station; and lock-out relays for each selector, the lockout relay for any selector in a local station including a lock-out solenoid normally energizable through a power circuit when the 3-position switch of such selector has been adjusted to connecting position, normally open switches in the circuits from the electrical impulse producing devices in such local station to the solenoids of the relay for the group of switches at the master station to which belongs the switch in the master station corresponding to such selector, the said normally

open switch being closed by the lock-out solenoid when the said lockout solenoid is energized, and normally closed switches in the circuits for the lock-out relays of the selectors in the other local stations for the switches in the master station belonging to the aforesaid group, the said normally closed switches being opened by the lock-out solenoid when it is energized.

5. A signalling system for storing and separately indicating at a plurality of local stations information pertaining to a plurality of items submitted from the local stations, each item having a number of sub-items arranged in numerical order, comprising a master station; a set of switches in the master station for each local station, each set including a switch for each item, the switches for the same items in the various sets being arranged in groups for operation in unison, each switch having a plurality of circuit-making positions; relays in the master station for moving each group of switches, each relay including an additive solenoid and a subtractive solenoid, the additive solenoid being adapted to actuate the relay to move the group of switches connected thereto from one circuit-making position to the next adjacent circuit-making position in an additive direction for each impulse of electrical power applied to the solenoid, and the subtractive solenoid being adapted to actuate the said relay to move the said group of switches connected thereto from one circuit-making position to the next adjacent circuit-making position in a subtractive direction for each impulse of electrical power applied to the solenoid; an annunciator at each local station including a plurality of indicators arranged in a numerical series, each indicator being adapted, when its annunciator is connected through circuits to any switch of the set for the local station of such annunciator, to be connected to a numerically corresponding circuit-making position in the connected switch to indicate to what position the group of switches to which the connected switch belongs has been moved; an electrical impulse producing device at each of the local stations, each of the said devices being adapted to be selectively connected through an electrical circuit to either solenoid of any of the relays; selectors at the local stations for each switch of the set, each selector including a normally open 3-position switch selectively adjustable to connect the electrical impulse producing device to the additive and to the subtractive solenoid of the relay for the group of switches to which the switch of the set belongs and also including a switch to connect the annunciator through circuits to a desired switch of the set in the master station; lock-out relays for each selector, the lock-out relay for any selector in a local station including a lock-out solenoid normally energizable through a power circuit when the 3-position switch of such selector has been adjusted to connecting position, normally open switches in the circuits from the electrical impulse producing devices in such local station to the solenoids of the relay for the group of switches at the master station to which belongs the switch in the master station corresponding to such selector, the said normally open switch being closed by the lock-out solenoid when the said lock-out solenoid is energized, and normally closed switches in the circuits for the lock-out relays of the selectors in the other local stations for the switches in the master station belonging to the aforesaid group, the said normally closed switches being opened by the lock-out solenoid when it is energized; and a warning means at each local station, the warning means at a local station being effective when the 3-position switch of any selector at such local station for a switch at the master station is adjusted to connecting position if the 3-position switch of the selector at any other local station for a switch at the master station of the same group as the first-mentioned switch at the master station is already adjusted to connecting position, the warning means at each station comprising a warning device, a normally open warning switch for each selector, each normally open warning switch being connected through secondary power circuits to the warning device and being closed by the 3-position switch of the selector when the said 3-position switch is adjusted to connecting position, and a normally closed warning switch in each secondary power circuit, the said normally closed warning switch being opened by the lock-out solenoid for the selector in the secondary circuit of which the said normally closed warning switch is inserted when the said lock-out solenoid is energized.

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