

July 27, 1948.

C. E. AMMANN ET AL
SELECTIVE SIGNALING SYSTEM

2,446,037

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3 Sheets-Sheet 1

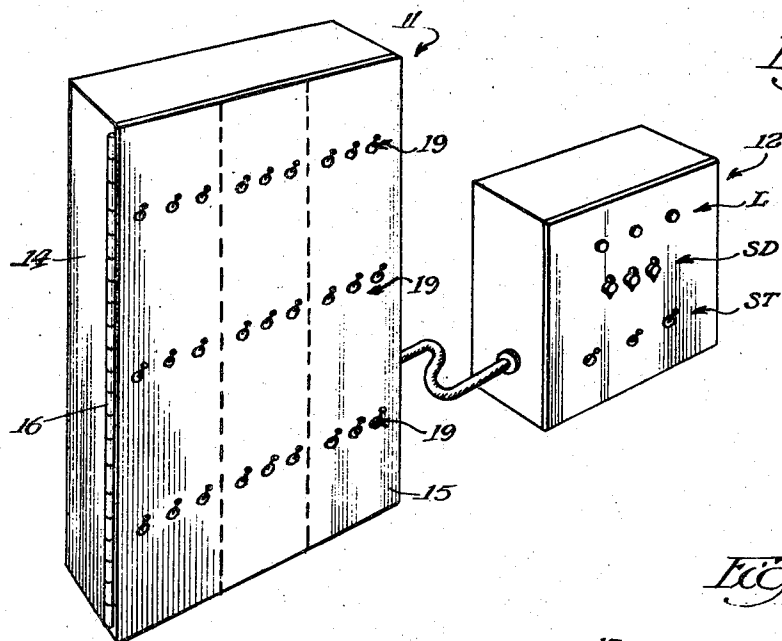


Fig. 1

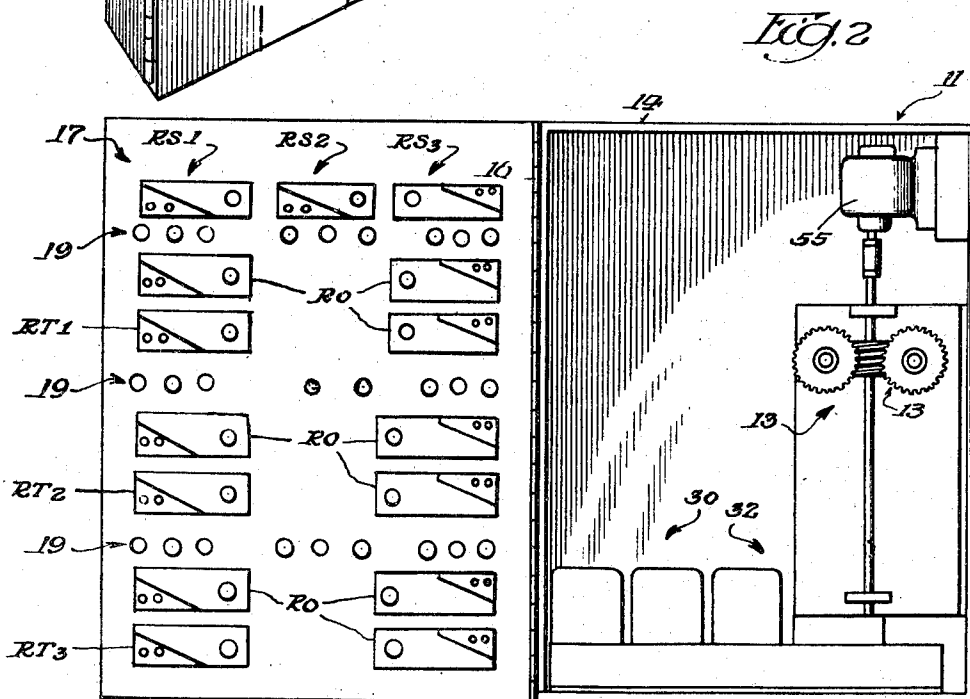


Fig. 2

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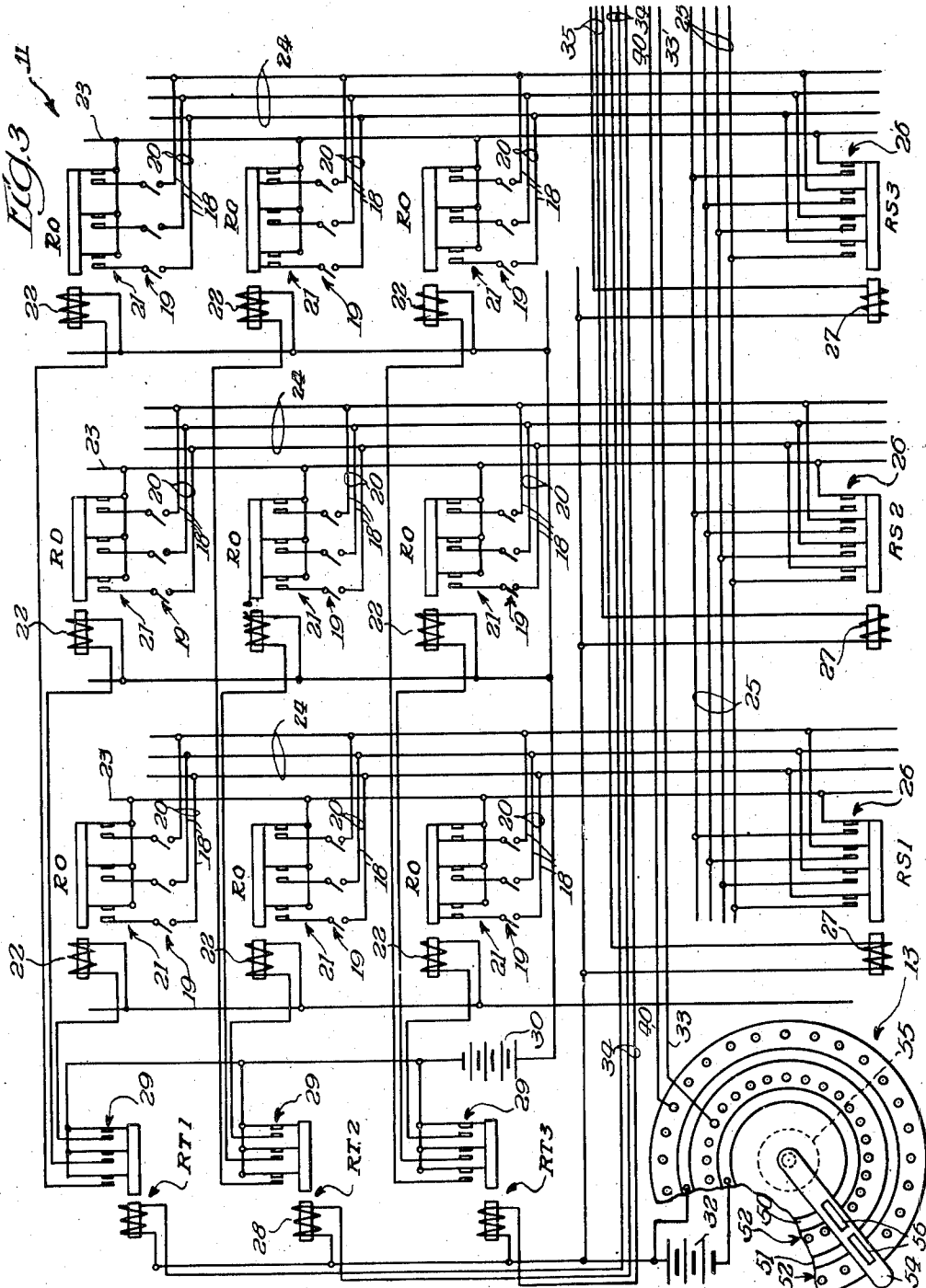
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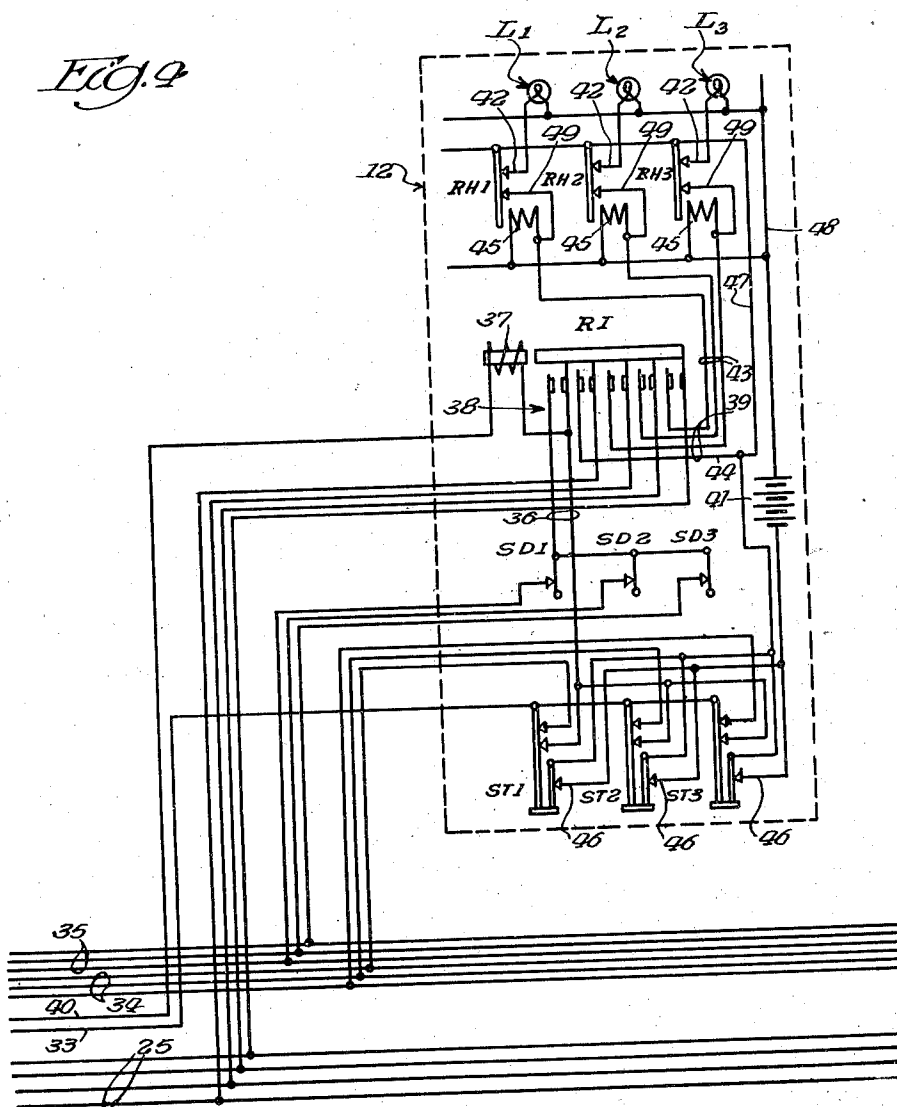
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3 Sheets-Sheet 3

Fig. 4



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SELECTIVE SIGNALING SYSTEM

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10 Claims. (Cl. 177—353)

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The present invention relates in general to signaling, and has more particular reference to a signaling system for transmitting information between a central and a number of local stations, the invention pertaining especially to a televisor system operable to advise any or all of several space sales agents, at several remote stations, of space available for sale at any given instant; and for allowing any of such sales agents at the remotely located stations to register the sale of space at the central station, to the end that the transmitting mechanism at the central station will indicate, at any instant, all of the space available for sale and will thus be at all times in condition to indicate such space at the remotely located agent stations, whenever required to do so in response to an inquiry operation initiated by any of such remotely located agents.

The necessity of selling space on airplanes, railroad trains, and other enterprises requiring the issuance of tickets evidencing the space sold to purchasers, at remote ticket selling stations, requires the provision of means for advising each agent as to the space available for sale whenever application for space is made by a prospective purchaser. In some circumstances, remotely located space salesmen can be supplied in advance with tickets, each representing a particular space available for sale; but where, as in the sale of railroad and airplane transportation, the delivery of tickets to remotely located sales agents, in advance, is impractical, the agents are ordinarily supplied with blank tickets and obtain the information for filling out a blank ticket, from a central station, usually by telephone, whenever application for space is made by a customer.

The sale of space, particularly by organizations dealing in transportation, represents an enormous expenditure of time and effort merely to keep remotely located space sales agents advised as to what space is available, from time to time. The problem is particularly acute with respect to the sale of transportation in airplanes, because of the limited size of planes and the speed at which they operate. Available space often can not be sold merely because the agent can not, quickly, be advised that the space is available, thereby not only inconveniencing the prospective customer, but sacrificing revenue.

An important object of the present invention is to provide mechanism, as at a central station, wherein information concerning space available for sale can be stored and transmitted to any or all of a number of remotely located space selling stations to the end that sales agents at such

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stations may immediately and automatically be advised of space available for sale, by operation of agent's equipment at the remote station; a further object being to provide means at each remote station, and operable by the agent at such station, to secure the transmission of the desired information from the central station.

Another important object is to provide automatically operating signaling mechanism for transmitting available space information from a central station, in response to the action of a sales agent requiring the information at a remotely located agent's station.

Another important object is to provide means whereby remotely located sales agents may register, on signaling mechanism at a central station, the sale of space made by the agent at such remote station.

Another important object resides in providing apparatus of the character mentioned, which is operable for storing and distributing information regarding the availability of space for sale on any one of a number of trips, or legs of trips, the equipment serving to indicate not only the availability of space for a complete trip as between terminals, but indicating, also, space available for any portion of the trip, as between intermediate points or stops defining the several legs of the trip between terminals.

Another important object is to provide mechanism operable to indicate daily trip space available for sale on any number of successive days.

Another important object is to provide central station storing and transmitting mechanism comprising information storing circuits, conditionable to indicate whether or not salable space represented by the circuit has or has not been sold, including apparatus for so conditioning the circuits from any one of a number of remotely located stations; a further object being to provide relay apparatus whereby a sales agent at any one of a number of remotely located agent stations may operate the central station equipment to indicate, at such agent station, the available space indicating condition of the conditioned circuits at the central station.

Another important object resides in utilizing scanning switch mechanism, whereby the available space indicating condition of the central station circuits may be transmitted successively to the several remotely located agent stations, thereby requiring minimum power for information transmitting purposes; a further object being to operate the scanning switch mechanism continuously at the central station at all times

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ready for instant delivery of information to any one or all of the remote stations, whenever such remote stations are actuated for the reception of the desired information.

Another important object is to employ a continuously rotating scanning switch adapted to connect the central station equipment, rapidly and successively and cyclically, with all of the connected agents' stations for the transmission of information to so many of such stations as may, at any instant, be conditioned to receive information, and to provide, at each agent's station, means operable to indicate received information, including holding mechanism for retaining the indicating means in indicating position, after the scanning switch shall have disconnected the agent's station from the central station apparatus; a further object being to provide for the continued operation of such holding means at the agent's station for as long as desired by the operating agent at such station.

The foregoing and numerous other objects, advantages and inherent functions of the invention will become apparent as the same is more fully understood from the following description, which, taken in connection with the accompanying drawings, discloses an embodiment of the invention.

Referring to the drawings:

Fig. 1 is a perspective view of central station storing and transmitting apparatus, contained in a suitable cabinet, and interconnected remotely located agent's station apparatus, embodying the present invention;

Fig. 2 is a view of the central station apparatus illustrated in Fig. 1, the cabinet being shown in open position to illustrate the interior equipment; and

Figs. 3 and 4 are electrical wiring diagrams showing the central station and remote agent station equipment, respectively, including a scanning unit for connecting the several remotely located agent stations successively with the central station.

To illustrate the invention, the drawings show central station equipment 11 for the storage and dissemination of information with respect to space available for sale, and an interconnected, remotely located agent station unit 12, of which any desired number may be interconnected with the central station by means of a scanning unit 13 located at and forming a part of the central station equipment.

The central station apparatus, as shown, may be conveniently mounted on a suitable support such as a cabinet comprising a box 14, closed by a cover panel 15 secured to the box as by means of a hinge 16. The cabinet provides a mounting for electrical equipment 17, including relays, switches, and power supply means, which may be mounted and supported on the cabinet in any suitable or preferred fashion. If desired, of course, the mechanism may be supported and mounted in other than a cabinet, although where a small installation is involved, it is convenient to mount all of the equipment, or as much of it as is possible, in a portable container. Equipment at the agent stations 12 also may be mounted in suitable supporting means, preferably a portable box or container.

In general, the system comprises a network of available space circuits 18, at the central station, and conditionable, as by the operation of suitable circuit conditioning means, to store information thereon with respect to the availability

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of space for sale. The available space circuits are arranged in combination with means, at the central station, for selecting a desired group of circuits and for indicating, at the remote agent stations, the condition of such circuits and, hence, the information stored therein. To this end, each circuit 18 may include a control switch 19, or other suitable circuit conditioning means; and each circuit may serve to represent a specific unit of space available for sale. Each circuit 18 may be employed to indicate a space sold condition whenever its associated switch 19 is closed, availability for sale being shown so long as the switch remains open. It is obvious, however, that the reverse convention may be employed to show space available for sale when the switch is closed, and space sold when the switch is open. Likewise, other means than switches may be employed to selectively condition the circuits for the storage and delivery of information. Any suitable operable device, such as an adjustable resistor or condenser, may be employed as a means for conditioning the circuits, providing that appropriate indicating means be provided at the agent station for operation in response to conditions determined by the conditioning means to indicate the circuit condition. In the interests of cost, however, it is preferable to utilize circuit conditioning switches 19 at the central station, and indicating devices 1, such as lamps or other indicating means selectively operable, at the agent stations, in accordance with the open or closed condition of the switches 19.

The circuit conditioning means 19 may be arranged for manual operation at the central station, or, if desired, may be adapted for operation by remote action, as at the agent stations 12, by providing suitable remote control equipment.

The circuits 18 are preferably, though not essentially, arranged in circuit groups 20, each group preferably including the number of circuits required to represent all of the space units or seats of a multiple space unit, such as an airplane, railway car, row of theater seats, or the like. The circuit groups, conveniently and preferably, though not essentially, may, in a particular installation, each comprise the same number of circuits, so that each circuit group represents duplicate space, such as all of the seats in a standard airplane or railway car, or all of the seats in a standard theater or stadium seat row. As a consequence, each circuit of a group 20 has a corresponding or matching circuit in all of the other circuit groups in the system. Where employed in the sale of airway transportation, a circuit group may conveniently include the total number of circuits needed to represent the number of seats, or other space, available on a passenger airplane, for each of the several legs of a standard trip between terminal points; that is to say, each individual seat or space unit of the multiple space airplane unit is preferably represented by a separate circuit, in the circuit group, for each leg of the trip. Although, in the interests of descriptive and illustrative simplicity, the circuit groups 20 shown each comprise three circuits, it will be understood that, in an actual installation, the groups 20 will each ordinarily comprise many more than the three circuits illustrated. In an installation to serve, say, an airline operating a fleet of twenty seat passenger planes, over standard trips having five legs, that is to say, four intermediate passenger loading and unloading stops between terminals, the circuit

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groups 20 may each contain at least one hundred circuits 18. In such an installation each seat space unit may be represented by five circuits, one for each trip leg, in each circuit group.

The several circuit groups of an installation also may be arranged or assigned, by groups, in accordance with a preferred and predetermined convention, in main categories to represent multiple space units available for sale for successive repetitive trips or performances, as for example, airplane flights repeated on successive days, or daily theater performances during a theatrical run. This assignment of circuit groups, of course, need not necessarily be based upon successive day performances. They may be based on weekly, monthly, or other convenient repetitive intervals. As a matter of convenient nomenclature, however, it is expedient to designate the so classified circuit groups as day groups. The present invention also contemplates the further classification of the circuits 20 in categories, here called trip groups, in accordance with the several repeat performances or trips conducted during the selected day group interval, in accordance with which the main or principal classification is made.

The several circuit groups may thus be, and preferably are, arranged in day groups, shown as vertical columns of circuit groups in Fig. 3, there being as many day group columns as may be needed to accommodate advance space sales for as many days as desired or required of this installation. Any number of advance selling days may be provided for by incorporating the necessary number of day group columns, although but three day group columns are shown in Fig. 3. The circuit groups are, also, preferably arranged in trip groups, shown, in Fig. 3, as horizontal rows of circuit groups 20 transversely of the day columns, the groups in a trip row representing the available space, for sale, for a particular trip or flight repeated, as at the same hour, on each successive day. As many trip rows as are needed may be incorporated in the equipment, although only three trip rows are shown in Fig. 3. The circuit groups in each day group column thus represent all available space on all trips for a particular day, while the trip row groups represent all of the space available on a particular trip or flight for all of the days within the range of the apparatus.

The central station equipment includes preferably relay operated switching means RO, RS and RT, operable in response to inquiring action taken at any of the remote agent stations, for selecting the circuit groups 20, by day column and by trip row, in order thus to isolate any desired circuit group. The central station also includes means for utilizing the circuits of the so isolated group to actuate the indicating means L, at the inquiring agent station, and thus show the condition of the several circuits of the selected group, thereby indicating the availability for sale of space represented by the circuits of the group.

The several agent stations 12, on the other hand, in addition to the indicators L, each comprise means, such as switches SD and ST, operable to select any desired one of the circuit groups 20. Each agent station also preferably includes relay means RH and RI operable, during the instant when the scanning unit 13 connects the agent station with the central station, to actuate the indicators L in accordance with the condition of the circuits of the selected group 20, such relay means RH serving also to hold the indicators L in operation at the agent station for

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as long as desired, after the scanning unit operates to disconnect the agent station equipment from the central station. Any ticket selling agent may thus instantly determine the availability for sale of space represented by any circuit group 20 at the central station. Remote control means, at the agent station, may also be provided for closing or opening any selected one of the circuit conditioning switches 19, whereby a ticket selling agent at any remote station may reserve space for sale, record a sale, or release a cancelled reservation or a revoked sale of space, appropriately on the central station equipment as soon as the sale, reservation, revocation or cancellation is made. Interlock means also may be provided whereby access to a circuit group, after the same has been isolated by action at one agent station, is denied to all other agent stations, until released by the isolating agent station, to thereby avoid duplicate sale of the same space.

In order to provide for the isolation of a selected circuit group 20 by action initiated at any of the remote agent stations, and to apply the circuits of the isolated group to the operation of the indicators L at the isolating agent stations, each of the agent stations comprises equipment preferably identical in function to that at all of the others; and all of the stations are interconnected in parallel relation with the central station through suitable conductors 34 and 35, and the scanning unit 13. Since each agent station is preferably a duplicate of the others, only one agent station is shown, and a description of that one will suffice for all.

At the central station, the circuits 18 of each circuit group 20, in addition to the conditioning switches 19, are each controlled by an operating switch 21, each circuit 18 having its own operating switch. The operating switches of all circuits in a circuit group 20 are connected together mechanically for operation in unison by a common relay coil 22, which, with its associated switches 21, forms a multiple operating-switch relay unit RO, a separate multiple switch unit RO being provided for each circuit group 20, so that all of the circuits 18 of a group 20 may be operated simultaneously and in unison when the operating coil of the relay RO, associated with the group, is energized.

The corresponding circuits 18 of the circuit groups 20 forming each day column are interconnected in parallel as by connecting one side of each operating switch 21 with a common conductor 23, each circuit 18 extending thence through its operating switch 21, its conditioning switch 19, and being connected each in parallel relation with the corresponding circuits of the other circuit groups of the same day column, the parallel connection of corresponding or matching circuits being accomplished through common conductors 24.

Means comprising day column selector relays RS, one for each day column, are provided for connecting the conductors 23 and 24 each with a corresponding conductor of a cable 25, to which all agent stations are also connected in parallel relation. As a consequence, all of the circuits of the groups 20, in any day column, may be connected to all of the agent stations, under control of the scanning unit 13, upon operation of the appropriate relay RS. To this end, each relay RS comprises a plurality of switches 26 operable in unison, when its operating coil 27 is energized, to connect the conductors 23 and 24 of the as-

sociated day column each with the corresponding conductors of the cable 25.

Means comprising trip relays RT, one for each trip row of circuit groups 20, are provided. Each trip relay RT is adapted to actuate the circuit operating relays RO, which control the circuit groups forming a trip row. To this end, each trip relay may comprise an operating coil 28 and associated switch means 29 adapted for actuation when the coil 28 is energized. The operating coils 22 of all of the relays RO, in all trip rows, may be connected in common to one side of a suitable source 30 of relay actuating power, at the central station. The coils 22 of all relays RO of a trip row may also be connected with the power source through the switch means 29 of the trip relay associated with such trip row, so that all of the operating relays of any trip row may be actuated, to operate the switches 21 of the circuit groups in such row, by operation of the corresponding trip relay RT. The switch means 29 of each trip relay, as shown, may comprise multiple switches, one for each relay of a trip row, or may comprise a single switch to which all operating coils 22 of the relays RO in a trip row are connected in parallel.

It will be seen from the foregoing that, by actuating a selected one of the day group selector relays RS, all of the circuits 18 of the circuit groups 20 of the selected day column may be connected, in corresponding circuit sets, with the corresponding conductors of the cable 25. All of the so connected circuits, however, will remain open and inactive at the switches 19, unless such switches be closed. By actuating a selected one of the trip relays RT, however, simultaneously with the operation of the selected day relay RS, all of the switches 21 of a desired circuit group in the selected day column may be closed, thereby activatingly connecting only the circuits of the desired circuit group with the cable 25. By thus selectively operating the relays RS and RT, any desired one of the circuit groups 20 may be isolated and activatingly connected with the cable 25, while all other groups remain disconnected therefrom either at the switches 21 or the switches 26.

Any or all of the circuits of a so selected and activatingly connected circuit group may be closed or may remain open, or otherwise conditioned, as determined by the position or adjustment of the conditioning means 13; and the condition of the circuits of the so connected group is made to selectively operate the agent station indicators L.

In order to make available, at the remotely located agent stations 12, the information stored on the several storage circuits 18, signalling means, including the scanning unit 13, is provided at the central station. The scanning unit 13 serves to connect the central station equipment rapidly and successively, with the equipment at each of the remote agent stations, so that, in response to inquiring action initiated at any agent station, responsive means, at the agent station, may indicate the ticket selling information stored on the equipment at the central station. To this end, the scanning unit 13 may comprise a frame carrying a plurality of circularly arranged contact switches, there being preferably a pair of contact switches for each remote agent station; and the scanning unit comprises preferably turnable means for closing the contact switches successively, whereby successively to connect each agent station with the equipment 11 at the cen-

tral station. As shown, the scanning unit may comprise concentric conductor rings 50 and 51 and concentrically arranged and spaced-apart contacts, including a contact set 52 and a contact set 53, in combination with a rotatable contact arm 54 drivingly connected with a suitable, preferably constant speed motor 55. The arm 54 may thus be turned to connect the conductor rings 50 and 51, respectively, and successively with the contacts of the contact sets 52 and 53, as by means of contact brushes 56 mounted on the arm 54. Obviously, any suitable rotary switch construction may be employed, as a scanning unit, the important function of which is to provide for successively connecting each agent station with the central station equipment, each through a pair of agent station connected and simultaneously acting switches 52 and 53.

In order to actuate the relays RS and RT from any of the several agent stations, and to apply a selected circuit group to the operation of the indicators L at a particular station in response to inquiry action there initiated, the operating coils 27 and 28 of the relays RS and RT are interconnected in common, as on a conductor 31, to one side of a suitable relay operating power source 32, the other side of which connects through the scanning unit 13, in succession with conductors 33, each connected to a separate switch contact 52 and leading to a separate one of the several agent stations.

At each agent station the corresponding conductor 33 is connected in common to the blades of several trip switches ST, there being a trip switch for each trip relay RT at the central station, and each trip switch being connected by a separate conductor 34 with its corresponding trip relay RT. By closing a selected one of the trip switches ST at any of the agent stations, the corresponding trip relay RT may be energized by the power source 32 during the interval when the scanning switch connects such agent station, through its contact 52, with the central station. The scanning unit, however, connects the several agent stations rapidly and successively with the central station, so that each agent station is connected with the central station for a short period of time only sufficiently long to allow the relays RO, RS and RT to operate and to actuate the indicator operating relay means RH and RI at the agent station. Immediately thereafter the scanning unit disconnects the connected agent station and connects the next one of the series.

At each agent station, also, there are a series of selector switches SD, one for each of the selector relays RS. These selector switches are connected each separately with the operating coil 27 of its corresponding relay RS, through suitable conductors 35, and are also connectible in common with the power source 32, preferably by conductor means 36, connecting with the conductor 33 and thence to the power source through the scanning switch. As a consequence, a relay RS, selected by closure of a switch SD, is operated by the scanning unit simultaneously with the operation of the relay RT selected by closure of a switch ST. To prevent operation of a relay RS upon closure of a switch SD, unless a switch ST is also closed for the operation of a relay RT, the connection of the common conductor means 36 with the conductor 33 is accomplished through the blades of the switches ST, so that the common portion of the relay operating circuits controlled by the switches SD is open, and the cir-

cuits consequently inoperative unless and until one of the switches ST is closed.

From the foregoing it will be seen that upon closure of one of the switches SD together with one of the switches ST, a corresponding one of the relays RS and one of the relays RT will be conditioned for operation, under the control of the scanning unit 13, to select and connect a desired circuit group 20 with the agent station through the cable 25, relay means RH and RI being provided at the agent station and operable at the instant of connection to actuate the indicators L in accordance with the condition of the circuits of the connected group 20 as determined by the conditioning means 19. The switches SD are preferably of a type allowing the same to be set in either open or closed position and to remain as set. The switches ST, however, are preferably of the normally open type adapted to close when manually depressed, and to remain closed only so long as held in depressed position by action of the operator. An agent, thus, may close a desired switch SD and allow it to remain closed, thereby selecting the space represented by the circuits 18 in a selected day column at the central station. Closure of the selected switch SD will not, however, initiate an inquiry action. Having closed a switch SD, however, the agent may discover all available space on all trips, during the so selected day, by pressing the several switches ST in succession, holding each one closed only so long as is necessary to determine what space is available for the trip represented thereby.

Ordinarily, a prospective space purchaser is interested in buying space on a particular day, regardless of the particular trip, and, consequently, the ability to determine rapidly the availability of space on the several trips during a particular day is a valuable facility afforded by the particular arrangement here shown. The arrangement, however, also allows space availability information, on any trip regardless of the day, to be obtained from the central station with great rapidity.

The indicators L, at the agent station, may take any suitable or preferred form, and any suitable or preferred means for actuating the same under the control of the circuits 18 may be employed. For example, the circuit conditioning means 19 may comprise frequency responsive or other circuit conditioning means; the circuits themselves may be used to control radio transmitters, thereby eliminating direct wire connection with the agent stations; and many other possibilities for the technical application of the present invention to operational circumstances will suggest themselves. As shown, however, each agent station is provided with an isolation relay RI comprising an operating coil 37 and a plurality of switches 38 adapted for operation in unison when the coil 37 is energized. There is preferably a separate switch 38 for each conductor of the cable 25, so that the cable conductors, and hence the circuits 18 of the isolated conductor group, selected by operation of the relays RS and RT, may be connected through corresponding conductors 39 for the operation of the indicators L.

The isolation relay, also, preferably includes an additional switch 38 that is connected in the common conductor means 36 of the switches SD so that the relays RS and RT may not be operated unless and until the relay RI, at the agent station first operates. The relay RI is preferably

operated by power supplied from the power source 32. To this end, one side of the relay coil 37 is connected through a conductor 40 to a contact 53 of the scanning unit 13, which serves to connect the conductor 40 with one side of the source, at the same time that the unit connects the conductor 33 with the other side of the power source. The other side of the coil 37 is connected to the conductor 33, preferably through the switches ST, as by connection with the conductor means 36, so that the relay coil 37 can not be energized unless and until one of the switches ST is closed at the agent station.

The foregoing interconnection of the relay coil 37 with the switches SD and ST provides an interlock preventing false operation and assuring operation of the telemetric apparatus in a desired sequence and only in response to closure of a switch ST, providing a switch SD has previously closed. Upon closure of a selected switch SD, the equipment remains inert, although closure of such switch selects the corresponding day selecting relay RS for operation. Upon closure of a switch ST, a switch SD having been previously closed, the corresponding relay RT is also selected for operation, but the system remains inert until the scanning switch connects the agent station conductors 33 and 40 with the central station. At such instant the coil of the selected relay RT becomes energized to close switch means 29 and energize the connected coils of relays RO, thereby closing all switches 21 in the selected trip row of circuit groups 20. At the same instant, the coil 37 becomes energized, closing the switches 38 and connecting the conductors of cable 25 with the indicator operating apparatus. Closure of the switches 38 also completes the day relay selection circuit through the closed switch SD and the switch 38 in the conductor 36, thus energizing the selected relay RS, to connect the conductors 23 and 24 of the selected day column of circuit groups, with the cable 25, thereby connecting the same with the corresponding conductors 43 and 44 of the indicator operating conductor set 39.

The indicators L preferably comprise lamps one for each circuit of a circuit group 20, although any other suitable indicating means may be utilized. A local power source 41 at the agent station may be employed to operate the indicators. The indicators are preferably connected together in common to one side of the source 41, as through a conductor 48, and are individually connected each through the switch 42 of a corresponding actuating and holding relay RH with the other side of the power source 41, as through a conductor 47.

The relay RH, one for each lamp, each have operating coils which are connected with the conductors 43 and, hence, with the circuits 18 of the selected circuit group 20 when the device is in operation to actuate the lamps. One side of the coils 45 of the several relays RH is connected in common to one side of the source 41. The other sides of the coils are connectible each separately through the conductors 43, switches 38, cable 25, switches 26, conductors 24, to the selected circuits 18 and the conditioning means 19, the indicator actuating circuits being completed back to the power source 41 from the conditioning means 19, through the switches 21, common conductor 23, one of the switches 26, a conductor of the cable 25, one of the switches 38, and the conductor 44. These actuating circuits, however, are preferably also controlled by

auxiliary switches 46, forming a part of the switches ST. The switches 46 are connected in parallel and between the conductor 44 and the power source 41, so that the indicator actuating circuits can not operate the relay coils 45 unless and until one of the switches 46 is closed by the manual operation of the associated switch mechanism ST. As soon, however, as the switches 38 close, such of the coils 45 will be energized as are connected in operating circuits in which the conditioning switches 19 are closed. Coils 45 connected in circuits in which the switches 19 are open, of course, will not be energized, and the associated indicators L will give a null signal indicating, for example, a space available for sale condition.

Any coil 45 that is energized, however, may operate its associated switch 42 to connect its corresponding lamp with the conductor means 47 leading to the power source 41, as by way of the conductor 44 and the switches 46. Each indicator L, during the interval while the scanning device connects the conductors 33 and 40 with the central station, will thus be operated in accordance with conditions determined by the circuit conditioning means 19 of the circuit group selected by operation of the switches SD and ST.

The relays RH are also preferably constituted as holding relays to maintain the indicators L in operation, even after disconnection of the agent station from the central station, as a result of continued operation of the scanning device. To this end, each relay RH embodies a holding switch 49 connected with its associated operating coil 45, on the side thereof that is connected by the conductor 43 to the switch 38, such holding switch closing, when the relay operates, to connect the coil 45 with the conductor 47 and, hence, directly by way of the conductor 44 and the switches 46 to the power source 41. As a consequence, after operation of a relay RH, by action at the central station, its coil 45 will remain energized through its holding switch 49 and one of the auxiliary switches 46 for as long as the switch ST, of which the switch 46 is a part, is held down by the operator.

It will be seen from the foregoing that the present disclosure teaches the basic structure required in building a signalling system for the delivery, from a central station, of information, quickly at any one of a number of remote stations. The invention contemplates the provision of apparatus for further isolating a selected circuit group 20 in order to render the same inaccessible to other agent stations so long as the same may remain reserved by a particular agent station. This may be accomplished by providing holding means, in conjunction with each relay RO, and operable to block selection thereof by any other agent station so long as the selector switch ST is held closed at a particular agent station. Such holding means may be adapted to signal the blocked condition to each of such other stations.

The present invention also contemplates the provision of means, operable at each agent station, whereby the operator may actuate any of the conditioning switches of a circuit group, while the same is blocked by such agent station. The foregoing additional facilities are desirable to afford maximum utility and to prevent the possibility of duplicate space sales by several agents desiring to sell the same space at about the same time.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the form herein disclosed being a preferred embodiment for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

1. A signalling system for the selective operation of signalling devices, at a remotely located station, comprising central station storage apparatus, including a plurality of information storage circuit groups, each circuit of each group matching a like circuit in each of the other groups, to provide matched circuit sets each corresponding with a signalling device to be operated, said storage circuit groups including group classes, comprising corresponding circuit groups, and group categories comprising like circuit groups, each group class comprising a circuit group from each group category, and each group category comprising a circuit group from each group class, a circuit conditioning switch in each circuit and selectively operable to set the circuit for the storage of information and the dissemination thereof by operation of its corresponding signalling device, a relay switch in each circuit on one side of its circuit conditioning switch, selectively operable group category conditioning means comprising a set of group category selector switches at the remote station, each of said category selector switches being operable to select and condition the relay switches of the circuits of the circuit groups of the corresponding group category for the operation of the signalling devices, relay switch means in said circuits on the other side of the circuit conditioning switches thereof, selectively operable group class conditioning means comprising a set of group class selector switches at the remote station, each of said class selector switches being operable to select and condition all of the relay switch means of the circuits of the circuit groups of the corresponding group classes for the operation of said signalling devices, and actuating means, operable in response to the actuation of any selector switch in one of said switch sets contemporaneously with any selector switch in the other of said sets, for actuating said signalling devices in response to the set condition of the corresponding circuits of the circuit group contained in the selected group class and also in the selected group category.

2. A signalling system for the selective operation of signalling devices comprising a plurality of circuit groups, each circuit of each group matching a like circuit in each of the other groups to provide matched circuit sets each corresponding with a signalling device to be operated, said circuit groups including group classes, comprising corresponding circuit groups, and group categories comprising like circuit groups, each group class comprising a circuit group from each group category and each group category comprising a circuit group from each group class, a circuit conditioning switch in each circuit and selectively operable to set the circuit for the operation of its corresponding signalling device, a relay switch in each circuit on one side of its circuit conditioning switch, selectively operable group category conditioning means for selecting and condition-

ing all of the relay switches of the circuits of the circuit groups forming selected group categories for the operation of the signalling devices, relay switch means in said circuits on the other side of the circuit conditioning switches thereof, selectively operable group class conditioning means for selecting and conditioning all of the relay switch means of the circuits of the circuit groups forming selected group classes for the operation of said signalling devices, and actuating means for actuating said signalling devices in response to the set condition of the corresponding circuits of the circuit group contained in the selected group class and also in the selected group category.

3. A signalling system for the selective operation of signalling devices comprising a plurality of circuit groups of like circuits, each circuit of each group matching a like circuit in each of the other groups thus providing matched circuit sets each corresponding with a signalling device to be operated, said circuit groups including group classes comprising corresponding circuit groups and group categories comprising like circuit groups, each group class comprising a circuit group from each group category and each group category comprising a circuit group from each group class, circuit conditioning means selectively operable to set the condition of each circuit for the actuation of its corresponding signalling device when the circuit is energized, selectively operable group category conditioning means for selecting and conditioning all of the circuits of the circuit groups forming selected group categories for the operation of said signalling devices, selectively operable group class conditioning means for selecting and conditioning all of the circuits of the circuit groups forming selected group classes for the operation of said signalling devices, and actuating means for actuating said signalling devices in response to the set conditions of the corresponding circuits of the circuit group contained in the selected group class and also in the selected group category.

4. A signalling system for the selective operation of a plurality of signalling devices comprising means forming a plurality of circuit groups, of like circuits, each circuit of each group matching a like circuit in each of the other groups thus providing matched circuit sets each corresponding with a signalling device to be operated, said circuit groups including group classes comprising corresponding circuit groups and group categories comprising like circuit groups, each group class comprising a circuit group from each group category and each group category comprising a circuit group from each group class, means operable to set the condition of each circuit in accordance with one of several selectable signal device operating conditions, category selecting means operable to select and condition all of the circuits of the circuit groups of selected group categories for the selective operation of said signalling devices, class selecting means operable to select and condition all of the circuits of the circuit groups of selected group classes for the selective operation of said signalling devices in response to the selective actuation of any of the circuits of the corresponding matched circuit sets of the selected group class whereby to actuate said signalling devices in response to the set condition only of the corresponding circuits of the circuit group contained in the selected group class and in the selected group category.

5. A signalling system as set forth in claim 4,

wherein said category selecting means comprises category selecting relays at a central station, each of said category selecting relays being controllably associated with the circuits of a corresponding circuit group of the several group categories, category relay actuating means selectively conditionable, at a remote signalling station, to control the selective operation of the category selecting relays, said class selecting means comprising class selecting relays at the central station, each of said class selecting relays being controllably associated with the circuits of a corresponding circuit group of the several group classes, class relay actuating means selectively conditionable, at the remote station, for the selective operation of the class selecting relays, and scanning switch means, at the central station, for periodically connecting the central station with said remote station, for the operation of said signalling devices in accordance with the set condition of the circuits of a circuit group selected by said class and category selecting relays acting under the control of said class and category relay actuating means.

6. A signalling system as set forth in claim 4, wherein said category selecting means comprise category selecting relays, at a central station and corresponding with and controllably associated with the circuits of the circuit groups of the several group categories, category relay actuating means selectively conditionable at a remote signalling station, to control the selective operation of the category selecting relays, said class selecting means comprising class selecting relays, at the central station and corresponding with and controllably associated with the circuits of the circuit groups of the several group classes, class relay actuating means selectively conditionable, at the remote station, for the selective operation of the class selecting relays, scanning switch means, at the central station, for periodically connecting the central station with said remote station, for the operation of said signalling devices in accordance with the set condition of the circuits of a circuit group selected by said class and category selecting relays acting respectively under control of said class and category relay actuating means, and interlocking means at the remote station for preventing operation of said signalling devices unless the class and category relay actuating means are both in selectively actuated condition to operate their corresponding relay means at the central station.

7. A signalling system as set forth in claim 4, wherein said category selecting means comprises category selecting relays, at a central station and corresponding with and controllably associated with the circuits of the circuit groups of the several group categories, category relay actuating means selectively conditionable at a remote signalling station, to control the selective operation of the category selecting relays, said class selecting means comprising class selecting relays, at the central station and corresponding with and controllably associated with the circuits of the circuit groups of the several group classes, class relay actuating means selectively conditionable, at the remote station, for the selective operation of the class selecting relays, scanning switch means for periodically connecting said central station with said remote station and relay means at the remote station and operated by said scanning switch means periodically, for connecting the circuit group, selected by operation of said class and category selecting relays, for the opera-

tion of said signalling devices in accordance with the set condition of the circuits of said selected group.

8. A signalling system as set forth in claim 4, wherein said category selecting means comprises category selecting relays, at a central station and corresponding with and controllingly associated with the circuits of the circuit groups of the several group categories, category relay actuating means selectively conditionable at a remote signalling station, to control the selective operation of the category selecting relays, said class selecting means comprising class selecting relays, at the central station and corresponding with and controllingly associated with the circuits of the circuit groups of the several group classes, and class relay actuating means selectively conditionable, at the remote station, for the selective operation of the class selecting relays, scanning switch means, at the central station, isolation relay means, at the remote station and operated by said scanning switch means periodically for connecting the selected circuit group with said remote station, for the operation of said signalling device in accordance with the set condition of the circuits of said selected group, said isolation relay means including a switch normally isolating but operable to connect said relay actuating means at the remote station and said selecting relay means at the central station when said isolation relay means is actuated by said scanning switch means.

9. A signalling system as set forth in claim 4, wherein said category selecting means comprises category selecting relays, at a central station and corresponding with and controllingly associated with the circuits of the circuit groups of the several group categories, category relay actuating means selectively conditionable at a remote signalling station, to control the selective operation of the category selecting relays, said class selecting means comprising class selecting relays, at the central station and corresponding with and controllingly associated with the circuits of the circuit groups of the several group classes, and class relay actuating means selectively conditionable, at the remote station, for the selective operation of the class selecting relays, and scanning switch means, at the central station, for periodically connecting the selected circuit group with said remote station, for the operation of said signalling device in accordance with the set condition of the circuits of said selected group, and holding relays operatively associated with said signalling devices to maintain the same in operation after said scanning switch means has broken

connection of said selected circuit groups with said remote station.

10. A signalling system as set forth in claim 4, wherein said category selecting means comprises category selecting relays, at a central station, corresponding with and controllingly associated with the circuits of the circuit groups of the several group categories and category relay actuating means comprising a set of switches, at a remote signalling station and selectively conditionable to control the selective operation of the category selecting relays, said class selecting means comprising class selecting relays, at the central station, corresponding with and controllingly associated with the circuits of the circuit groups of the several group classes, and class relay actuating means comprising a set of switches, at the remote station and selectively conditionable for the selective operation of the class selecting relays, one of said sets of switches being of the normally open, manually closable, self opening type, and the other of said set of switches being settable in either open or closed position, scanning switch means, at the central station, for periodically causing connection of the selected circuit group with said remote station, for the operation of said signalling devices in accordance with the set condition of the circuits of said selected group, and holding relays operatively associated with said signalling devices, at said remote station, to maintain the same in operation after said scanning switch means shall have disconnected the selected circuit group, said holding relays being under the control of holding switches forming a part of and operable simultaneously with said manually controllable relay actuating switches.

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