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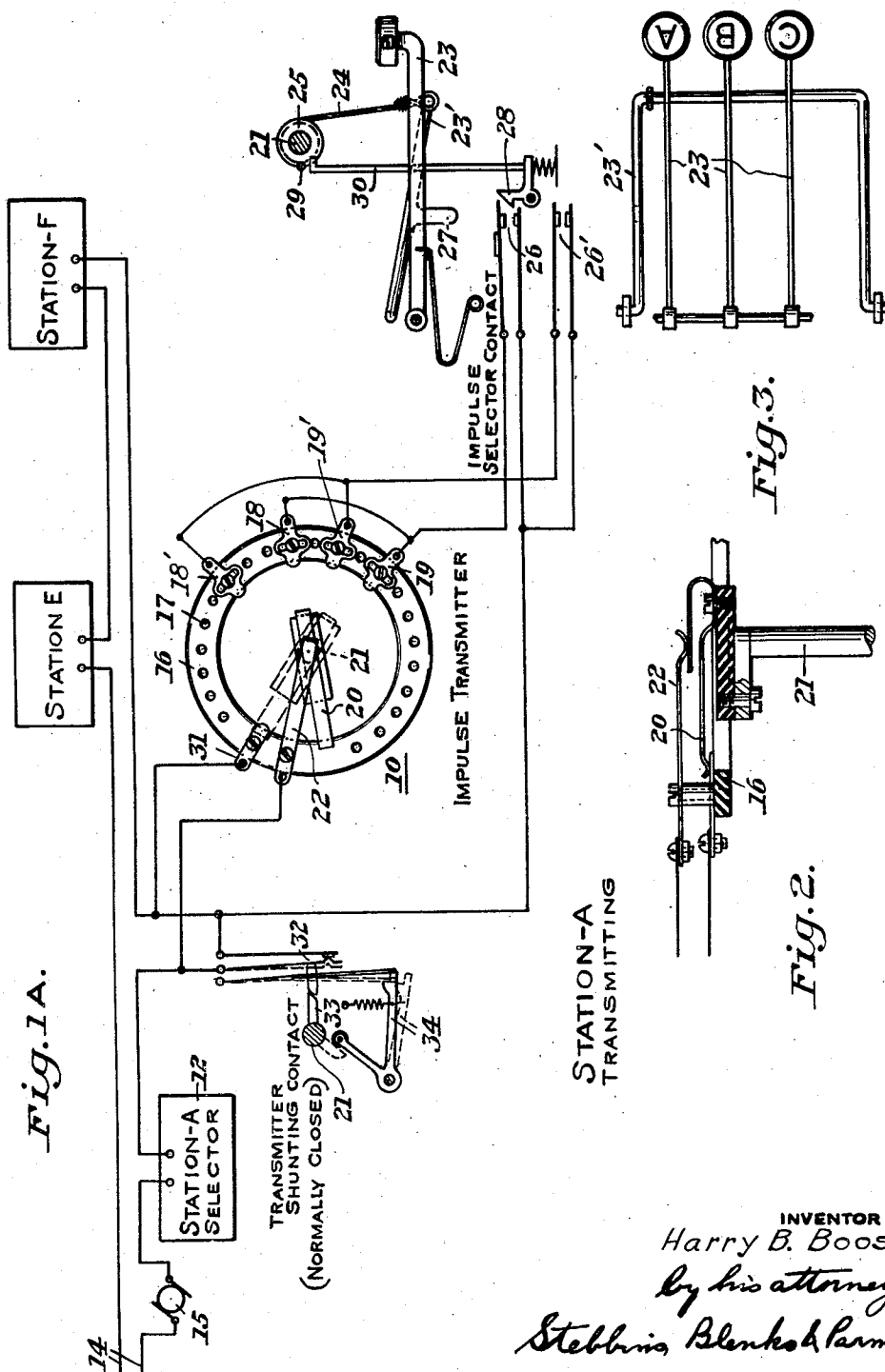
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2,177,609

SELECTIVE REMOTE CONTROL SYSTEM

Filed Nov. 4, 1936

2 Sheets-Sheet 1



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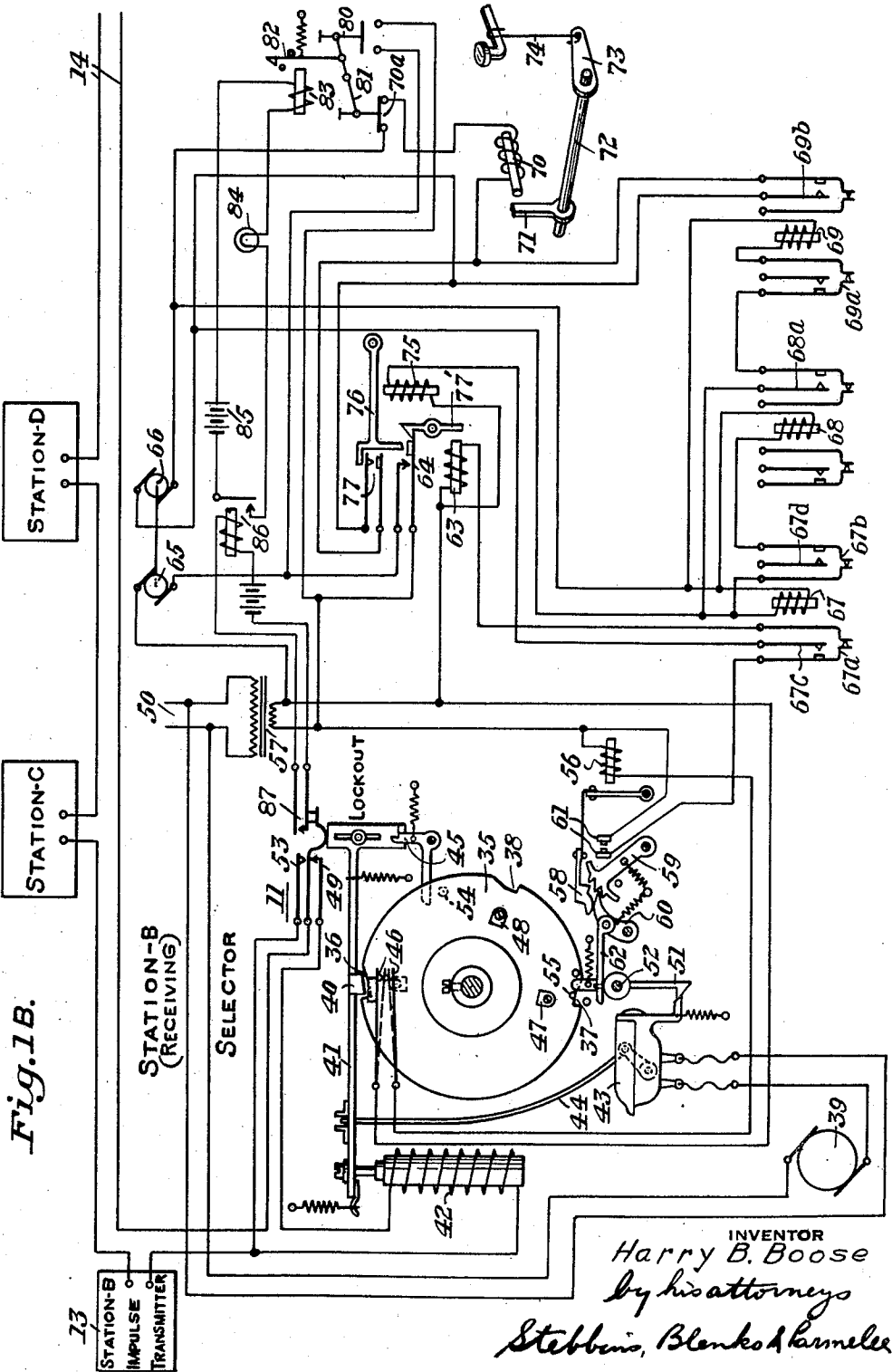
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UNITED STATES PATENT OFFICE

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SELECTIVE REMOTE CONTROL SYSTEM

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20 Claims. (Cl. 178—23)

This invention relates to a system for selecting one of a plurality of remote devices and placing it in condition for operation. The invention is particularly applicable to and will be described with reference to tele-typewriter communication systems, although it will be apparent that it has numerous other applications as well.

It is frequently desirable to transmit communications from a central or master station to one of a number of distant stations when there is no operator present at the latter. This invention provides means for selecting the desired station from a group and placing its tele-typewriter in condition for operation, without the presence of an attendant. The invention also provides a return signal to the transmitting station whereby the operator thereat is assured that the tele-typewriter at the distant station is in condition for receiving a communication, before the latter is transmitted. I also provide means for restoring the distant station to normal condition at the completion of the message and returning a further acknowledgment thereof to the sending station, and for preventing tele-typewriters at stations other than that selected from being placed in operation during the transmission of a communication, thus insuring secrecy.

I am aware that remote control systems of various kinds have heretofore been provided with answer-back signals. My invention, however, provides a system of this kind which is simpler and more positive than those used heretofore and is considerably easier to maintain.

In accordance with the invention, I provide means for transmitting timed impulses from the sending station. The initiation of the impulse transmitting operation causes rotatable discs at each of the stations on the circuit to turn. The discs of the several stations have differently arranged notches therein. The impulse transmitting device is constructed to transmit impulses timed according to the location of the notches on the discs at the several stations. A given combination of impulses picks out the particular station associated therewith, while the discs at the other stations return to starting position. Other automatic operations at the selected station cause the tele-typewriter thereat to be placed in receiving condition.

The invention may readily be understood from the following detailed description which is to be read in connection with the accompanying drawings illustrating a present preferred embodiment thereof. In the drawings:

Figures 1A and 1B taken together constitute a

circuit diagram, the elements of apparatus associated therewith being shown diagrammatically;

Figure 2 is a sectional view of a portion of the apparatus shown in Figure 1A taken along the line II—II thereof;

Figure 3 is a plan view of a portion of the apparatus shown in Figure 1A.

Referring now in detail to the drawings, Figure 1A shows an impulse transmitter 10 associated with the sending station designated in general as "Station A". One of these transmitters may be located at each of the several stations indicated in the drawings, B, C, D, E and F, dependent on whether or not it is desirable to be able to transmit communications from all stations as well as receive them thereat. Generally this will be the case. Figure 1B shows in detail a selector 11 which apparatus is duplicated at each of the several stations. The selector of station A is indicated diagrammatically by a rectangle 12 and the impulse transmitter at station B is similarly represented by a rectangle 13. The apparatus at stations C, D, E and F is represented by a single rectangle for each, as indicated by legends.

A circuit 14 connects the several stations in series, the selector and impulse transmitter at each station being connected as shown in Figures 1A and 1B. The circuit 14 is normally closed and current flows therethrough from source 15 at any convenient location. The circuit 14 is preferably established over existing telephone systems with which the tele-typewriters at the various stations are associated. The connection and operation of the latter are well known and form no part of the present invention so they are not shown, but it is to be understood that they are connected in series in the circuit 14 in the usual manner.

The impulse transmitter

Referring now particularly to Figure 1A, the impulse transmitter 10 comprises principally an annulus 16 of insulating material provided with tapped holes 17 for receiving contacts 18 and 19 at various points about the circumference thereof. A wiper 20 carried on the shaft 21 is adapted to engage the contacts 18 and 19. A finger 22 fixed on the annulus 16 makes contact with the wiper 20 as best shown in Figure 2, which also shows that the wiper 20 is insulated from the shaft 21.

The shaft 21 may conveniently be that of a telephone dialing device modified somewhat for the particular service to be described. It is provided with the usual return spring, governor, etc. Instead of using a finger plate to turn the shaft 21, I employ a key-lever 23 bearing on a yoke 23'. I

The yoke 23' has a cable 24 wound about a sheave 25 on the shaft 21. A key 23 is provided for each station in the group, the keys being marked as shown in Figure 3 to agree with the designations of the stations. It will be understood that the keys 23 are independent of and apart from the tele-typewriter keys used in the transmission of letters and other characters.

An impulse selector contact 26, 26' etc., is associated with each of the keys 23A, 23B etc., being adapted to be closed by a projection 27 thereon. A detent 28 common to all the contacts 26, 26' etc., holds the contact closed once it has been operated until the yoke 23' returns to the illustrated position in which a projection 29 on the sheave 25 operates a link 30 to retract the detent 28 and release the contact 26.

The operation of any one of the keys 23A, 23B etc., therefore shifts the wiper 20 to the position shown by dotted lines in Figure 1A. It also closes the contact 26 which is associated with the particular key. The contact 26 connects to the line circuit the contacts 18 and 19 associated with the station corresponding to the key 23 which is depressed.

As shown in Figure 1A, the line circuit 14 is connected to the finger 22 and a contact 31 engaged by the wiper 20 in its dotted line position. The finger 22 and the contact 31 are normally shunted by a transmitter shunting contact 32. The contact 32 is normally held in closed position by a finger 33 on the shaft 21 and a detent 34. When the shaft 21 is operated by depressing one of the keys 23, the finger 33 moves to the dotted line position and trips the detent 34 to release the contact 32 and permit it to open. The construction of the parts is such that the contact 32 is opened only after the wiper 20 has engaged the contact 31. The difference in the arc of travel of the wiper 20 and the finger 33 between extreme positions is for convenience of illustration. In actual practice, the finger 23 moves through the same arc as wiper 20 being attached rigidly thereto.

The selector

The selector 11 comprises a disc 35 having notches 36, 37 and 38 in its periphery. A motor 39 is provided for driving the disc at a predetermined speed. The notches in the disc cooperate with a detent 40 carried on a floating lever 41 controlled by a solenoid 42 connected in series with the circuit 14. The motor 39 is controlled by a mercury switch 43 actuated by a link 44 connected to the lever 41. The end of the lever 41 remote from the solenoid 42 cooperates with a lock-out detent 45. Contacts 46 mounted adjacent the disc 35 are adapted to be closed when the upper is depressed by the detent 40 and when the lower one is simultaneously raised by one or the other of a pair of cam blocks 47 and 48 carried on the disc 35. The cam blocks are located on the disc in positions corresponding to those of contacts 18 and 19 associated with the station in which it is installed.

The general plan of operation will doubtless be clear from the description given above. In any event, the principle of the invention is to transmit timed impulses from the sending station, and simultaneously to set control discs into rotation at the several stations. The timing of the impulses will correspond to the successive elevations of the lower contact 46 at one of the stations. This will cause the automatic operation of apparatus at that station as will shortly

be described in detail. The other stations are locked out and restored to normal condition after one rotation of the discs 35. The remainder of the apparatus cooperating with selector 11 at the called station will be explained in the course of the following description of a cycle of operations.

The operation of the system

The drawings illustrate the positions of the parts under idle or normal conditions. The circuit 14 is closed and current flows from the source 15 through the contacts 32 and the solenoid 42 at each station. The circuit for the latter is completed through a contact 49 which is closed until the selector is locked out. If it is desired to send a communication from station A to station B, the operator at station A will depress the key 23 marked B. When the key 23 reaches its downward limit of movement, the contact 26 will be closed and locked by the detent 28. The wiper 20 furthermore engages the contact 31 shunting the contact 32 which is opened. At that time, the finger 33 will release the detent 34 so that the contact 32 opens. When the key 23 is released the wiper 20 moves toward the solid line position. Wiper 20 interrupts the circuit 14 as it leaves contact 31, and deenergizes the solenoids 42 at the several stations permitting the levers 41 to be raised by their restoring springs. From this point, the description of operation will be confined to station B unless otherwise noted but it will be understood that similar operations occur simultaneously at the other stations.

The deenergization of the solenoid 42 tilts the mercury switch 43 counter-clockwise to close the circuit for the motor 39, extending to a local supply source indicated at 50. The switch 43 is locked in closed position by a detent 51 pivoted at 52.

The motors 39 drive the disc 35 through a friction clutch (not shown). The detent 40 releases the disc 35 at the notch 36 simultaneously with the tilting of the switch 43 as the result of upward movement of the lever 41. The motor 39 therefore causes the disc to start rotating immediately. The motor is suitably geared to provide a speed of rotation of the shaft 35 about equal to the angular speed of the wiper 20. Forward movement of the disc and wiper thus occur at about the same speed, as soon as the selecting key is released.

The block 47 on the disc 35 approaches the lower contact 46 and raises it slightly as shown by dotted lines and at the same time the wiper 20 engages contact 18. The latter engagement recloses the circuit 14 to energize the solenoids 42. The latter then pulls the lever 41 down. At station B, the detent 40 enters the notch 37 in the disc 35 and depresses the upper contact 46 in the engagement with the lower one. At all stations other than station B, the detent 40 will engage the periphery of the disc 35 apart from any of the notches thereon. Energizing of the solenoid 42 at such stations will cause the right-hand end of the levers 41 to rise, the detent 40 bearing on the disc 35 serving as fulcrum. The lock-out detents 45 at stations other than station B immediately function to hold the right-hand end of the levers 41 in raised position. The raising of the right-hand end of the levers 41 opens the contacts 49 at the several stations and closes contacts 53. The opening of the contacts 49 disconnects the solenoids 42 from the line cir-

cuit 14. The latter is re-established at the contacts 53.

The link 44 has a hook connection with the lever 41 so that movement of the latter after the initial raising thereof does not affect the switch 43. Rotation of the discs 35 at all stations is thus maintained. Since the solenoid 42 at stations other than station B are out of circuit, nothing further happens at said stations until a pin 54 on the discs 35 at each station trips the detent 45. This permits the righthand end of the levers 41 to drop far enough so that when the solenoids 42 are again energized, the detents 40 enter the notches 37 to stop the discs 35. Simultaneously, pins 55 trip the detents 51, permitting the switches 43 to be restored to their open position by re-setting springs. This deenergizes the motors 39 and restores all parts to their original positions.

As previously stated, the contacts 46 at station B are closed when the solenoid 42 is energized by the completion of the circuit 14, resulting from engagement of the wiper 20 with the contact 18. The closing of the contacts 46 energizes a magnet 56, current being supplied to the circuit from a transformer 57, the primary of which is connected to the source 50. Instead of the transformer, I may employ a copper oxide rectifier to provide a local direct current source. Energization of the magnet 56 operates a detent 58 to advance a notching lever 59 having a toothed segment. A pawl 60 holds the lever in the position to which it is advanced.

As the wiper 20 moves away from the contact 18, the circuit 14 is again opened, and the solenoid 42 deenergized. The rotation of the disc 35 and the wiper 20 continues until the latter engages contact 19 and at the same time, the notch 38 has advanced into radial alinement with the detent 40 and the block 48 has again raised the lower contact 46. The engagement of the wiper with the contact 19 closes the circuit of the solenoid 42 which pulls the left-hand end of the lever 41 down so that the detent 40 enters the notch 48 and forces the upper contact 46 again into engagement with the lower. This again energizes the magnet 56 and the detent 58 advances the lever 59 clockwise to cause instantaneous engagement of contacts 61. When the magnet 56 is deenergized, the contacts 61 are open.

As the wiper 20 departs from the contact 19, the line circuit is again opened and the solenoid 42 deenergized. Rotation of the disc 35 continues until the pin 55 trips the detent 51 to open the switch 43 and stop the motor 39. At that instant, the finger 33 returns to the solid line position and recloses the contact 32 at station A. Since the lock-out detents 45 at stations other than station B are tripped as the discs reach their starting position, the line circuit 14 is restored by the opening of contacts 53 and the closing of contacts 49. This energizes solenoids 42 at all stations, opening switches 43 and causing detents 40 to enter notches 36. The operation of the detent 51 also restores the lever 59 to its original position, a link 62 being connected to the detent 51 and the pawl 60.

The instantaneous closing of contacts 61 energizes a magnet 63 at station B. The energization of the magnet 63 trips a contact 64 which closes a circuit from a secondary of the transformer 57 to a motor 65. The motor 65 drives a generator 66, and both serve in the known manner to operate the teletypewriter at station B, in response to operations of the teletypewriter at station A, the

two instruments being connected by the usual circuits (not shown).

As the voltage of generator 66 builds up, it energizes a winding of a relay 67 having normally closed contacts 67A and 67B which are adapted to be opened when contacts 67C and 67D are actuated to closed position by energization of the relay winding. The winding of a relay 68 is connected in parallel with relay 67 through contacts 67B. The windings of relays 67 and 68 are thus energized simultaneously but the energizing circuit of relay 68 is broken by the opening of contacts 67B. The relays 67 and 68 are slow release relays so that the contacts thereof remain in operated position for a predetermined time after deenergization of their windings. The energization of the winding of relay 68 causes closing of its contact 68A. This connects the winding of a relay 69 across the generator 66 through its own contacts 69A. Energization of the relay 69 breaks its own energizing circuit at the contacts 69A which are thereby reclosed so that the relay 69 operates as a vibrator so long as the contacts 68A of the relay 68 are closed. The relay 69 is also of the slow release type and is adjustable as to the time delay between deenergization and re-setting of the contacts. Each time the relay 69 is energized it closes its contact 69B which completes a circuit including a normally closed switch 70A, from the generator 66 to a magnet 70 having an armature 71 fixed on a shaft 72. The shaft also has a crank arm 73 provided with a link 74 engaging the lever of the teletypewriter key at station B, which when depressed will cause the simultaneous printing of the letter B at stations A and B through the usual connecting circuits established in the usual manner. The time delay characteristic of relay 69 is adjusted in conformity with the usual tele-typewriter operating speed.

The relay 68 is adjusted to release its contacts after a time sufficient to permit the printing of the letter B twice by successive energizations of the magnet 70. The contacts 68A are then opened and the windings of the relays 68 and 69 remain deenergized. The winding of the relay 67 remains energized, as it is permanently connected to the generator 66.

The solenoids 42 at all stations are energized by the impulses which are set up in circuit 14 in the normal operation of the teletypewriters. This merely restarts the discs 35 and they are stopped again in the manner described. The discs thus start and stop repeatedly during the transmission of a communication but have no effect until the selecting impulses are set up in the line circuit.

The operations described so far place the teletypewriter at station B in condition to receive a communication, and give a positive indication to that effect by the transmission of the station letter back to station A. The operator at the latter station then knows he can proceed to transmit his communication. When the message has been transmitted, the operator at station A again presses the key 23 corresponding to station B. The impulse transmitter 10 and the disc 35 at station B are again operated as before, the discs 35 at stations other than station B being locked out as described. As the result, the contacts 61 at station B are instantaneously closed again. This time, the closure of contact 61 completes a circuit through contacts 67C of relay 67 and a magnet 75. By means of a pivoted armature 76, the energization of magnet 75 causes instantaneous closing of contacts 77 which again ener-

gizes the magnet 70 to give an indication to station A that the shutting down operation has taken place at station B. The movement of the arm 76 opens contacts 64 which are thereupon locked out by a detent 77, stopping the motor 65 and generator 66. Relay 67 is thereupon deenergized and its contacts restored to normal.

If an operator at a station other than stations A and B should place his teletypewriter in operative condition by starting his motor generator corresponding to that shown in 65, 66 by closing the manual switch customarily provided for that purpose, the relays 67, 68 and 69 at that station would be operated as described, and cause the transmission of an acknowledgment from that station which would interfere with the communication being transmitted from station A to station B. I provide means for preventing this occurrence, and also for making it impossible for an operator at a station other than the selected station to place his apparatus in operative condition so long as a communication is being transmitted.

The manual switch for starting the motor generator 65, 66 is shown at 80. This switch is normally open and is in parallel with the contact 64. The switch 80 is connected by a link 81 to the normally closed switch 70a. By this arrangement, if the operator at any station attempts to start his apparatus by closing the switch 80, he automatically opens the switch 70a, preventing energization of the magnet 70 when the motor generator comes up to speed. This avoids confusion in case an operator at a non-selected station attempts to start up his apparatus while a communication is being transmitted.

To insure absolute secrecy of transmission, I provide a detent 82 which prevents operation of the switch 80 at a non-selected station, so long as a communication is being transmitted. A magnet 83 is connected in series with a signal lamp 84 and a local current source 85, the circuit being controlled by the contact of a slow-release relay 86. The relay 86 is controlled by a contact 87 which is closed when the lockout operation previously described occurs. The relay 86 is set so that it will not release its contents in the interval between successive closures of the contact 87 resulting from the repeated locking-out operations occurring during the transmission of a communication.

The contacts 87 at all stations, therefore, remain closed throughout the transmission of a communication, energizing the visual signal 84 and positively preventing the operators at non-selected stations from intercepting the message. To prevent tampering, the detent 82 and associated apparatus should be enclosed and may also be sealed.

From the foregoing description it will be clear that the invention provides means for selecting anyone of a number of teletypewriter stations, and giving a definite signal indicating that the desired selection has been accomplished, before the transmission of the message to the desired station has commenced. The invention is also effective to shut down the apparatus at the selected station and give an acknowledgment signal showing that this has been done. The invention thus makes it possible for an operator to transmit communications to unattended stations with as much facility as if an operator were actually present at each station. It will be clear that while the invention has been described with reference to a teletypewriter system, other de-

vices could be as readily controlled. The message transmitted will be received only by the station selected, as the teletypewriters at the other stations will remain shut down.

Although I have illustrated and described herein but one preferred form of the invention, it will be recognized that changes in the specific embodiment disclosed may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A selective control system including a plurality of stations, a connecting circuit therebetween, an impulse transmitter at one station connected to said circuit and selectors at the other stations, each selector comprising a disc having peripheral notches therein, and a lever mounted for movement relative to the disc having a projection adapted to enter said notches, electromagnetic means connected in said circuit for moving said lever relative to the disc in accordance with the impulses transmitted, a motor for driving said disc continuously, a control switch for the motor, and means whereby said electromagnetic means operates said switch and contacts adjacent said disc adapted to be closed by said lever when said projection enters one of said notches.

2. The selective control system defined by claim 1 characterized by lock-out means actuated by movement of one of said levers toward its disc at a time when the notches in the disc are spaced peripherally from said projection.

3. The selective control system defined by claim 1 characterized by lock-out means actuated by movement of one of said levers toward its disc at a time when the notches in the disc are spaced peripherally from said projection, and means for tripping the lock-out means when said disc has returned to starting position.

4. The selective control system defined by claim 1 characterized by means responsive to the operation of said transmitter for starting said motors, and means actuated by said discs returning to starting position for stopping said motors.

5. The selective control system defined by claim 1 characterized by means controlled by said contacts for causing operation of devices at said other stations.

6. A device for transmitting impulses over a line circuit comprising a wiper, a group of contacts adapted to be engaged successively thereby, a plurality of key levers, means whereby operation of any of said levers causes said wiper to traverse said contacts, and means, also controlled by operation of any one of said levers, to connect certain predetermined contacts of said group in series with said circuit.

7. The device defined by claim 6 characterized by means actuated by return of any one of said levers to starting position for disconnecting said certain predetermined contacts from said circuit.

8. The device defined by claim 6 characterized by contacts in said circuit normally shunting said transmitter, and means actuated by operation of any of said key levers for holding said contacts open until the operated key lever returns to normal.

9. The selective control system defined by claim 1 characterized by means at said other stations controlled by said contacts for starting a teletypewriter at each station and operating a key thereof.

10. A system for selectively operating one of a plurality of devices at a distance comprising

a disc associated with each device having a peripheral notch, a circuit extending from a control point to the location of said devices, means at the control station for opening and closing said circuit in a sequence identified with one of said devices, a motor for driving each disc continuously at uniform speed, means responsive to the first occurrence in said sequence for starting each motor, contacts adjacent each disc, and means for closing the contacts adjacent the disc associated with the device with which the sequence is identified.

11. The apparatus defined by claim 10 characterized by means for locking out all said responsive means associated with said devices except that identified with said sequence.

12. The apparatus defined by claim 10 characterized by means at the control station whereby a desired sequence of opening and closing said circuit may be selected.

13. The apparatus defined by claim 10 characterized by means for stopping all said discs in starting position.

14. The apparatus defined by claim 10 characterized by said last mentioned means comprising a member movable to close said contacts only when said notch is in predetermined position.

15. The apparatus defined by claim 10 characterized by means for locking out all said responsive means associated with said devices except that identified with said sequence, including a lever movable toward the disc, and a lock-out detent for the lever operative when the lever moves toward the disc at a time when the notch therein is spaced from the lever.

16. The combination with a plurality of teletypewriters located at remote points, a selector at each of said points, and means including an impulse transmitter for actuating a particular selector, means adjacent each teletypewriter for placing it in operating condition, said means being controlled by the selector at the same point, manually operable means at each point for placing the teletypewriter thereat in operating condition, and means rendered effective by the actuation of the selector at any point for locking out the manually operable means at said point.

17. The combination with a plurality of teletypewriters located at remote points, a selector at each of said points, and means including an impulse transmitter for actuating a particular selector, means adjacent each teletypewriter for placing it in operating condition, said means being controlled by the selector at the same point,

means operated when the teletypewriter has been placed in operating condition for depressing a key of the teletypewriter, thereby providing an indication of such condition, manually operable means at each point for placing the teletypewriter thereat in operating condition, and means actuated by said manually operable means for disabling said key-depressing means.

18. The combination with a plurality of printing telegraph devices adapted to be connected to a transmitting circuit, of means adjacent each device effective on transmission over said circuit of impulses identified with a particular device, to place said particular device in condition to receive a message to be transmitted, an electromagnet and mechanism actuatable thereby for depressing a key of the said particular device, and means for energizing said electromagnet when said particular device has been placed in condition to receive a message.

19. The combination with printing telegraph devices at two spaced stations connected by a circuit, of means at one station adapted to be controlled over said circuit from the other station, effective to place the device at the first mentioned station in condition to receive a message to be transmitted, means for causing the device at the first mentioned station to execute a transmitting operation when it has been placed in condition for receiving, means at said first mentioned station effective to shut down the device at the first mentioned station after causing it to transmit an acknowledgment signal, said last mentioned means being adapted to be controlled over said circuit when the device at the first mentioned station is in operating condition.

20. The combination with printing telegraph devices at two spaced stations connected by a circuit, of means at one station adapted to be controlled over said circuit from the other station, effective to place the device at the first mentioned station in condition to receive a message to be transmitted, means for causing the device at the first mentioned station to transmit an acknowledgment signal when it has been placed in condition for receiving, means at said first mentioned station effective to shut down the device at the first mentioned station after causing it to transmit said acknowledgment signal a plurality of times, said last mentioned means being adapted to be controlled over said circuit when the device at the first mentioned station is in operating condition.

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