March 4, 1947. F. S. KINKEAD 2,416,699

STATION SELECTOR SYSTEM

Filed Dec. 8, 1942 3 Sheets-Sheet 1

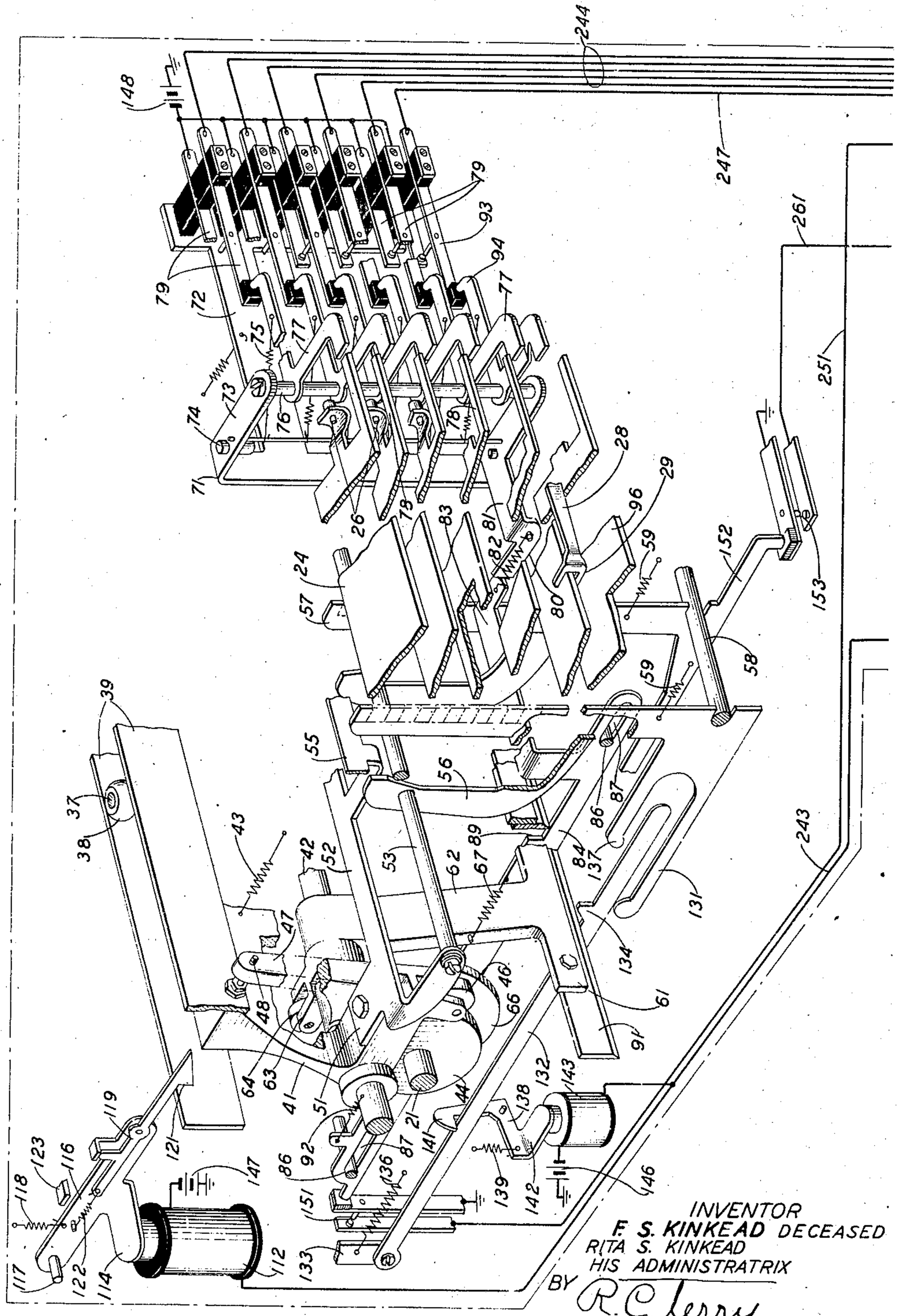

FIG. 1

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STATION SELECTOR SYSTEM

Filed Dec. 8, 1942 3 Sheets-Sheet 2

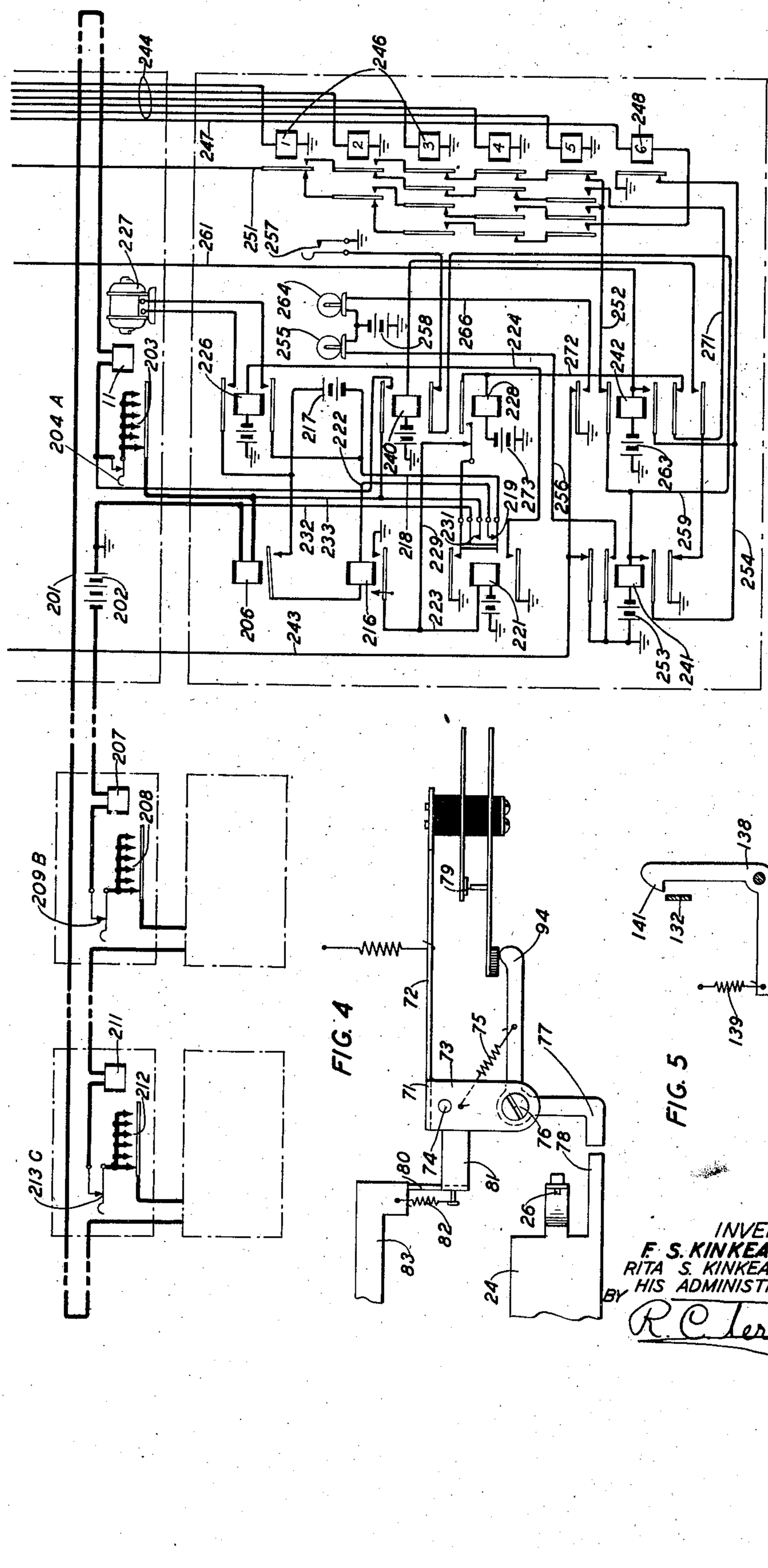

FIG. 2

FIG. 4

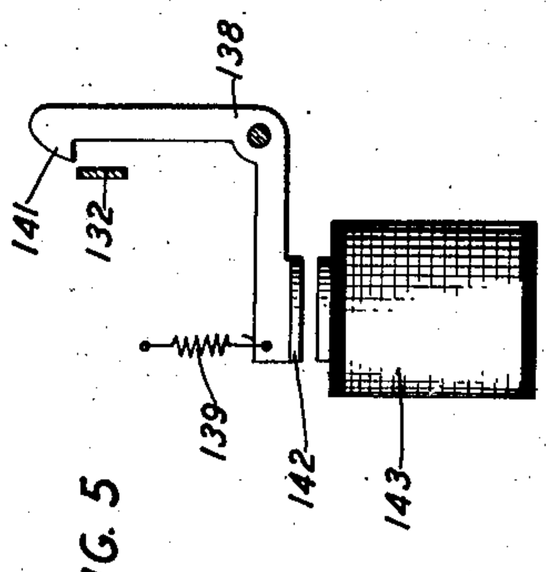

FIG. 5

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STATION SELECTOR SYSTEM

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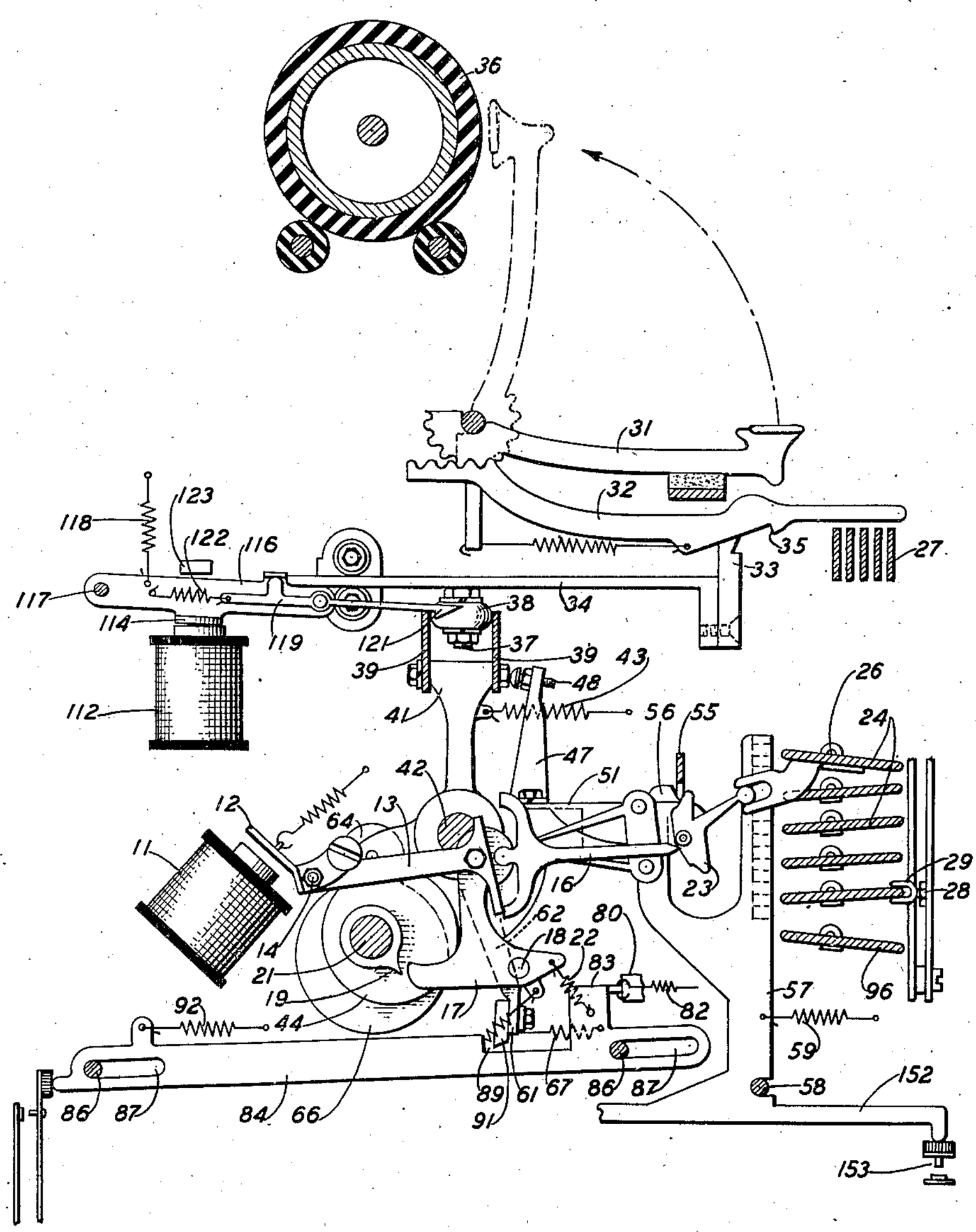
FIG. 3



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UNITED STATES PATENT OFFICE

2,416,699

STATION SELECTOR SYSTEM

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Application December 8, 1942, Serial No. 468,210

22 Claims. (Cl. 178—2)

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This invention relates to telegraph apparatus and systems and particularly to a station selector system for placing two or more of a plurality of stations in a telegraph system in intercommunicative condition under the control of any one of the stations.

The invention represents an improvement over station selector systems heretofore known and particularly of the type shown in Patent 2,152,010 granted March 28, 1939, to W. J. Zenner.

According to the disclosure of the Zenner patent each of a plurality of stations on a telegraph line is provided with a key for opening the line circuit for a predetermined minimum interval of time and each station responds to the opening of the line circuit by the starting of the operating motor of the printing telegraph set at that station. The attendant at the station at which the motor starting function was initiated then transmits the call signal of the calling station which is recorded at all of the stations and which is effective at the calling station to condition the motor starting apparatus to remain operated, and thereafter transmits the call signal or signals of the called station or stations, which are recorded at all stations and which condition the motor starting apparatus to remain operated at the respective called stations. Thereafter the attendant transmits a common disabling signal which is effective at all uncalled stations to shut down the operating motors and to disable the transmitters and the call initiating line circuit keys.

At the conclusion of message transmission between the stations which had been conditioned to participate in such transmission the operator at any of the participating stations again operates the line opening key, the effect of which is to start the operating motors at all of the disqualified stations in the system, those in the participating stations remaining in operation. Thereafter the operator transmits a shutting down code signal which is effective at all stations in the system to open the energizing circuits for their operating motors, thus shutting down all of the stations and restoring them to initial condition.

An object of the present invention is to provide a station selector system in which exclusion of stations from participation in message transmission is accomplished by suppression of printing at such stations, the stations otherwise being in operative condition.

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Another object of the invention is to provide a station selector system in which all stations are normally in operating condition but with printing suppressed and the conditioning of selected stations to participate in message transmission is accomplished by direct signal responsive disablement of the printing suppression mechanism.

Another object of the invention is to restore participating stations at the conclusion of message transmission by the direct signal responsive reenablement of the printing suppression mechanism at those stations.

Another object of the invention is to render uncalled stations unresponsive to station calling signals during message transmission between stations which have been qualified to participate.

The invention features an arrangement whereby all stations in the system may be placed in condition to participate in message transmission in response to the transmission of a common calling code signal differing from the selective calling signal of each station.

The invention also features an arrangement for suppressing a function, the performance of which at disqualified stations may be objectionable.

The invention also features an arrangement whereby the signals employed for qualifying and disqualifying stations may be integrated or interpreted either mechanically or electrically for effectuating selective action.

The invention also features an arrangement for preventing unauthorized placement of an uncalled station in condition to participate in intercommunication, thereby positively excluding uncalled stations and assuring privacy.

The invention contemplates the employment at each station in the system of a printing telegraph receiving recorder which may be of the type shown in Patent 1,904,164, granted April 18, 1933, to S. Morton et al. The invention also contemplates that each of the printing telegraph recorder instrumentalities shall include a printing suppression mechanism and may include a switching contact mechanism such as those shown in co-pending application, Serial No. 398,055, filed June 14, 1941, by W. Y. Lang, now Patent No. 2,318,168, granted May 4, 1943. The

disclosures of the Morton et al. patent and of the Lang application are incorporated herein by reference as part of the present specification.

In accordance with the preferred embodiment of the invention, a magnet, which upon being energized disables the printing mechanism, is normally energized when the system is in the idle operative condition, through parallel circuits controlled by two relays. The idle operative condition refers to the condition under which the printer operating motors at all stations are in operation and the printing suppression mechanism is in the effective condition to suppress printing. One of the relays is operable in response to the calling code signal of the particular station and to the group or universal calling code signal and upon energization interrupts one of the two parallel circuits. A second relay is energizable in response to a code signal common to all stations and this relay is effective to open the second parallel circuit for the print suppression magnet, thus releasing that magnet and disabling the print suppression mechanism when both relays are energized. Both of these relays have holding circuits whereby they are held upon being energized. At unselected stations only the second of the two relays becomes energized and only one of the parallel energizing circuits for the printing suppression magnet is interrupted, so that the magnet remains energized and prevents the printing telegraph recorder from printing in response to signals thereafter received. The second of the two relays interrupts the energizing circuit for the first, so that at unselected stations the first or selectively operable relay will not become energized in response to signals occurring in message transmission between two or more stations which have been qualified to participate in such transmission.

At the conclusion of message transmission a code signal common to all stations on the system and preceded by the figure shift signal effects the interruption of the holding circuit for the one relay which is energized at unqualified stations and for the two relays which are energized at qualified stations, thus restoring the energizing circuit for the printing suppression magnet at all stations, which represents restoration to the idle operative condition.

The power supply circuits for the operating motors of the printer are controlled by systems of relays which are set in operation to effect the closure of the motor circuit in response to placing of the telegraph signaling channel in the spacing condition for an interval which is relatively long in comparison with the interval occupied by a permutation code signal combination. The relay which controls the motor circuit has a holding circuit which is effective to hold the relay energized so that once the motor is started further abnormally long spacing signals on the telegraph channel will not affect the operation of the motor, At the end of a business day or whenever it is desired to shut down the system completely, a signal is transmitted which is common to all stations and is effective under the condition that the printing suppression mechanism has been activated at all stations, to interrupt the holding circuit for the motor control relay whereby the motor operating circuit is interrupted at each station and the motor is stopped.

For a complete understanding of the invention reference may be had to the following detailed

description to be interpreted in the light of the accompanying drawings wherein:

Fig. 1 is a combined schematic perspective view and circuit diagram of a portion of a telegraph printer as exemplified in the Morton et al. patent with the addition thereto of printing suppression mechanism and switching mechanism generally in accordance with the disclosure of the Lang application;

Fig. 2 is a schematic circuit view showing the station selecting circuits, and the circuits in Figs. 1 and 2 are complementary, the proper relationship being established when Fig. 2 is positioned below Fig. 1;

Fig. 3 is a vertical sectional view through the receiving printer showing the printing suppression mechanism;

Fig. 4 is a fragmentary plan view showing switching contact operating mechanism; and

Fig. 5 is an elevational view partly in section showing a function suppression mechanism.

Referring now to the drawings and particularly to Fig. 3, the reference numeral 11 indicates a selector magnet, the armature 12 of which is carried by a selector lever 13 pivoted at 14. As is fully disclosed in the Morton et al. patent, the selector lever 13 controls a plurality of sword levers 16 which are individually articulated to bell cranks 17 pivoted at 18 and individually rocked in counter-clockwise direction once in each receiving cycle by cams 19, one of which is shown in Fig. 3, included in a receiving selector cam assembly mounted on and frictionally driven by a power driven shaft 21. Upon being retracted by their bell crank levers 17, the sword levers 16 are rocked into extreme clockwise or counter-clockwise position depending upon the position of selector lever 13 as determined by selector magnet 11 and when they are shifted rightwardly by their bell cranks 17 as the bell cranks are restored to extreme clockwise position by their individual springs 22, the sword levers rock associated T-levers 23 into extreme clockwise or counterclockwise position depending upon the rotative position into which they have been rocked under the control of the selector magnet. The T-levers 23 are articulated by means of disc and slot connections to individual selector vanes that are pivotally supported at their opposite ends by trunnions 26 (Fig. 1).

A movable typebasket, full structural details of which are shown in the Morton et al. patent, supports permutationally notched code bars 27 that are individually connected to the selector vanes 24 by bell cranks 28, a portion of one of which is shown in Fig. 3. The upwardly extending arm of each bell crank 28 engages one of the code bars 27 and a laterally extending arm of each bell crank 28 terminates in a bifurcated portion 29 which straddles the edge of the selector vane and remains in engagement with the vane while moving along its edge as the typebasket moves for character spacing and carriage return operations. The typebasket pivotally supports a plurality of type bars 31 which have rack and pinion connections with individual selectable pull bars 32, the foremost ends of which are disposed above and in close proximity to the code bars 27. The pull bars 32 are normally supported with their foremost ends just out of engagement with the code bars 27 by engagement of a sloping cam surface on the lower edge of each pull bar 32 with a blade 33 carried by a reciprocable printing bail 34 which is mounted on the typebasket. Each of the pull bars 32 is provided with

a hook 35 at the upper end of the sloping cam surface so that when the printing bail 34 is reciprocated rightwardly as viewed in Fig. 3 and the right-hand ends of the pull bars move downwardly into engagement with the code bars 27, any pull bar which finds an alignment of notches presented to it by the code bars will move still farther downwardly at its right-hand end into the alignment of notches, bringing its hook 35 into the path of blade 33 of printing bail 34, so that as the bail continues to be moved farther to the right, blade 33 will engage the selected pull bar and reciprocate it rightwardly, thus rocking the associated typebar 31 in counter-clockwise direction to bring its type carrying face into printing engagement with paper carried by a printing platen 36.

Printing bail 34 is provided with a depending stud 37 which rotatably supports a roller 38 disposed between a pair of blades 39 supported at the upper end of a printing bail operating arm 41. The roller 38 and blades 39 provide for operative engagement between printing bail 34 and operating arm 41 throughout the path of travel of the typebasket by which printing bail 34 is supported. Operating arm 41, which is supported on rock shaft 42, is urged in clockwise direction by a tension spring 43 which supplies the power for operating the arm 41 and thus the bail 34. A printing cam 44 which is included in a main cam assembly carried by the shaft 21 is engaged by a roller 46 (Fig. 1) carried by a pivoted lever 47, the upper end of which supports an abutment screw 48 which engages the right-hand side of the right-hand one of the operating arm blades 39 as viewed in Fig. 3. The cam 44 operates through lever 47 to restore operating arm 41 to extreme counter-clockwise position and to hold it in that position in the idle condition of the apparatus. When the main cam assembly is released for rotation by the receiving selector cam assembly a sharp drop off of the cam 44 permits the spring 43 to rock printing bail operating arm 41 sharply in clockwise direction to effect a printing operation, and during the remainder of the cycle of the main cam assembly the cam 44 restores operating arm 41 to extreme counter-clockwise position which in turn restores bail 34 to its unoperated position.

Although only one printing bail operating arm 41 has been referred to in the foregoing paragraph, it will be understood that there are at least two such arms located near the ends of rock shaft 42 and that there may be others intermediate those two. Associated with the end ones of the arms 41 are brackets 51 (Fig. 1) interconnected by a bar 52 and supporting the ends of a function selection control rod 53 which extends parallel to the axes of the selector vanes 24. At the rear of the vanes 24 a plurality of selectable function levers, such as the levers 56 and 57, are pivotally mounted on a rod 58. Each of the selectable function levers is provided with two spaced upwardly extending arms. The arm of the selectable function lever that is nearest to the rear edge of the selector vanes is provided with permutation code combinations of lugs with which the selector vanes presented in certain positions interfere. When the selector vanes corresponding to all of the lugs of a selectable function lever are in proper position to select this lever, the function lever is not blocked but is free to rock in clockwise direction as viewed in Fig. 3. However, the rocking of the function lever is normally prevented by bar 52 (Fig. 1). The rod 53

cooperates with a cam portion of the rear arm of each of the function levers. When the printing bail operating arm 41 is operated by spring 43, the rod 53 is moved downwardly along the cam surface of the rear arm of each function lever and permits the function levers to rock in clockwise direction as viewed in Fig. 3 to test the setting of the selector vanes 24. Any function lever which finds no selector vane blocking its lugs will be rocked in clockwise direction by its associated spring 59 to perform or initiate its assigned function as the case may be. The printing bail bar 52 carries an upturned flange 55 which overlies the tops of the rear arms of selectable function levers 56 and 57 and which moves down into engagement with the top of the rear arm of either of those levers when they are selected, the function of the flange being to block the printing bail mechanism after it has operated far enough to permit the selection of the function lever, in order to suppress operation of any pull bar 32 that may also be selected, and also the carriage spacing mechanism.

Those functions which require more power for their performance than the springs 59 can supply, or the performance of which should be prolonged over a greater interval than that involved in the rocking of its function lever to the extreme clockwise position as viewed in Fig. 3, are performed by a function bail 61 supported by operating arms 62 journaled on rock shaft 42. Associated with one of the function bail operating arms is a cam follower lever arm 63 which supports at its free end a roller 64 which engages cam 66 included in the main cam assembly. When the main cam assembly is rotated, the function bail operating arms 62 are positively rocked slightly in counter-clockwise direction by spring 67 under the control of cam 66, then in clockwise direction as viewed in Fig. 3 by cam 66 and thereafter the function bail 61 is restored to normal, which is short of extreme counter-clockwise position, by spring 67. The manner in which function bail 61 operates function performing members will be described hereinafter.

Referring now to Figs. 1 and 4, it will be noted that a cradle 71 consisting of a flat plate 72 and parallel arms 73 is pivotally supported by trunnions 74 which engage the arms 73 near the inner ends thereof. Extending between and supported by the outer ends of arms 73 is a pivot rod 76 which pivotally supports a plurality of bell cranks 77 in alignment with the marking position of fingers 78 integral with and extending rightwardly from the right-hand ends of the selector vanes 24. The plate 72 of cradle 71 supports a plurality of pairs of normally open electrical contact springs 79, there being a pair of electrical contacts assigned to and aligned with the other arm of each of the bell cranks 77.

Cradle 71 is provided with an operating arm 81 which is connected by spring 82 with the free end of a laterally extending arm 83 of a push bar 84. Push bar 84 is mounted for reciprocable movement leftwardly as viewed in Fig. 3, by pins 86 which pass through slots 87 in the push bar 84. Near its foremost end the push bar 84 is provided with a notch in its upper edge which provides a shoulder 89 disposed slightly to the rear of the position occupied by a blade 91 carried by function bail 61 when the bail is in its unoperated position. The push bar 84 is urged to its extreme forward position (rightward position as viewed in Fig. 3) by a tension spring 92 which returns the push bar to its normal position after

each operation of the push bar leftwardly by function bail blade 91. Each time that the push bar is reciprocated leftwardly as viewed in Figs. 1 and 3, it imparts through spring 82 clockwise movement to cradle 71 as viewed in Figs. 1 and 4. An extension 80 of cradle operating arm 81 parallels spring 82 and is held by spring 82 in abutment with the end of push bar arm 83, for the purpose of stabilizing cradle 71 and the motion thereof under the control of push bar 84. The pairs of contact springs 79 carried by the cradle 71 are moved in an arcuate path about the trunnions 74 as an axis and since the bell cranks are held in engagement with their respective contact springs by tension springs 75, which exert insufficient tension to close the springs, the bell cranks 77 are moved arcuately in clockwise direction about the axis of trunnions 74. After the bell cranks 77 have been rocked through a short angular distance, those of the selector vanes 24 that are then presented in the marking position will block by means of their fingers 78 further movement of the bell cranks 77 associated therewith so that the bell cranks will be arrested. As the cradle 71 continues to move to its fully operated position with certain of the bell cranks 77 blocked by the selector vanes 24, the corresponding electrical contact springs yield in order to be further moved while their bell cranks are blocked and in so yielding the contacts are closed. In this way the closing of pairs of contacts 79 in permutational combinations corresponding to the setting of the selector vanes 24 may be accomplished.

As indicated in Fig. 1, the cradle 71 supports six pairs of contacts. Of these the uppermost five pairs have been designated by the common reference numeral 79, and cooperate through the bell cranks designated by the common reference numeral 77 with the five selector vanes designated by the common reference numeral 24. The provision of five selector vanes presupposes the operation of the printer on a five-unit permutation code which is the commonly used code for telegraph printers. The sixth set of contacts 93 cooperate with a sixth bell crank 94 which in turn co-operates with a sixth vane 96. The sixth vane 96, as is fully disclosed in the Morton et al. patent, is the shift and unshift vane, and this vane is operated by the shift and unshift mechanism which also shifts the platen to letter or figure printing positions with respect to the type bars 31. When the platen is in the letter printing position the sixth vane occupies the position shown in Fig. 3, namely, the extreme clockwise position. When the platen is shifted to the figure printing position, the sixth vane is rocked into its extreme counter-clockwise position and it is then in blocking relation to the bell crank 94 which controls the sixth set of contact springs 93. As is disclosed in the Morton et al. patent, the function of the sixth vane 96 is to block certain of the function levers, exemplified by the levers 56 and 57 in Fig. 1, against selective response to the five selector vanes 24. By this means certain of the functions may be initiated or performed only when the printer is in the figure shift condition and others may be selected and performed only when the printer is in the unshift or letters condition. The provision of the sixth set of electrical contact springs 93 operable only when the sixth vane 96 is in the figures shift position provides for the performance of an electrical operation only when the printer is in the figure shift condition as will be described later.

This corresponds to the blocking out of a function lever in the unshift condition of the printer.

Referring to Figs. 1 and 3, an electromagnet 112 has its armature 114 carried by a lever 116 pivoted at 117. Lever 116 is biased in counter-clockwise direction as viewed in Figs. 1 and 3 by a tension spring 118. Lever 116 pivotally supports a lever 119 which is provided with a latching shoulder 121 for the left-hand one of the printing bail operating arm blades 39 as viewed in Fig. 3, and with a pointed or tapered end. Lever 119 is normally maintained in a predetermined position with respect to magnet-controlled lever 116 by means of a tension spring 122. When magnet 112 is deenergized, spring 118 holds lever 116 against a stop 123 with shoulder 121 of lever 119 out of latching or blocking relation to the print bail operating blade 39. When magnet 112 becomes energized, it rocks lever 116 in clockwise direction to bring shoulder 121 of lever 119 into a position below the upper edge of the rearmost blade 39. If print bail operating arm 41 is at this time in its normal or unoperated position, the shoulder 121 of lever 119 will be disposed in the path of blade 39 so as to prevent the movement of the printing bail to its operated position which, it should be remembered, is permissive since the bail is operated by spring 43 and is restored by cam 44. If at the time the magnet 112 becomes energized, the printing bail is partially or fully operated, some portion of the tapered or pointed end of the lever 119 will drop into engagement with the top of blade 39 and when the printing bail is restored to its normal or unoperated position, the lever 119 will be cammed in counter-clockwise direction by the cooperation of its tapered end with the upper edge of the blade 39 until the blade has been moved clear of the shoulder 121. The rocking of lever 119 by blade 39 causes spring 122 to become distended and as soon as blade 39 clears shoulder 121, the spring 122 will restore lever 119 to its normal relation to lever 116 presenting shoulder 121 in the path of blade 39 to block the printing bail 34. Thus whenever magnet 112 is energized, the lever 119 remains in blocking relation to the print bail operating mechanism so that the bail cannot be operated to effect printing. It should be noted that the full operating stroke of the printing bail 34 is not blocked but only that it is blocked sufficiently short of its full stroke to prevent its blade 33 from engaging the hook 35 on any selectable pull bar 32 that may be selected. The partial stroke of the print bail operating arm 41 that is permitted before blade 39 comes into engagement with shoulder 121 of blocking lever 119 is sufficient to permit rod 53 to move downwardly along the cam surfaces of the rear (left-hand) arms of the selectable function levers, such as 56 and 57, to permit the function levers to test the setting of the selector vanes 24 and to permit the selection of any such function lever which is not blocked by the selector vanes.

As shown in Fig. 1, the selectable function lever 56 has a rearwardly extending arm 131 upon which rests the foremost end of a function push bar 132. At its remote end push bar 132 is pivotally supported by the depending arm 133 of a bell crank which is shown only fragmentarily. The bell crank represented by arm 133 is operable to effect step-by-step line feeding rotation of the platen 36 by operation of a line feed pawl in a manner fully disclosed in the Morton et al. patent. On its upper edge the line feed push bar 132 is provided with a lug 134 which is lifted into the

path of function bail blade 91 upon lifting of the foremost end of push bar 132 by function lever 56 as the function lever rocks in clockwise direction as viewed in Fig. 1 upon being selected by the selector vanes 24. When the function bail arm 62 is rocked in clockwise direction as viewed in Fig. 1 by function cam 66 following the lifting of the foremost end of push bar 132, the push bar is reciprocated rearwardly of the printer (leftwardly as viewed in Fig. 1) to rock bell crank lever arm 133 in clockwise direction by which operation platen 36 is rotated one step, and upon the return of function bail arm 62 by spring 67 under the control of cam 66, push bar 132 is restored to normal position by spring 136, the lug 134 on the push bar 132 being lowered out of the path of function bail blade 91 by the upper rearwardly extending arm 137 of selectable function lever 56 when that lever is restored to unselected position.

A latching bell crank for preventing the lifting of the foremost end of push bar 132 into cooperative relation with the function bail blade 91 is indicated by the reference numeral 138. Bell crank 138 is biased in clockwise direction by tension spring 139 seeking to move the latching hook 141 of bell crank 138 out of blocking relation to push bar 132. Bell crank 138 has a laterally extending arm 142 which serves as the armature for an electromagnet 143. When the electromagnet is energized, hook 141 of latching bell crank 138 is presented in blocking relation to push bar 132 so that its foremost end cannot be lifted by the rearwardly extending arm 131 of selectable function lever 56 and thus the lug 134 cannot be brought into the path of function bail blade 91. When push bar 132 is blocked by latching bell crank 138, the push bar in turn prevents the movement of selectable function lever 56 into selected position. Since the rocking of function lever 56 into selected position is permissive under the control of bar 53 carried by the printing bail mechanism, the blocking of push bar 132 against upward rotation is permissible. The function of latching bell crank 138 is to suppress the line feed function under conditions which will be described hereinafter.

A station selector system in accordance with the present invention is shown in Fig. 2, three stations A, B and C being shown. A closed transmission circuit 201 including signaling battery 202 extends through selector magnet 11 transmitting contacts 203, break key 204 and a relay 206 at station A, selector magnet 207 transmitting contacts 208, break key 209 and a relay corresponding to the relay 206 at station B, and selector magnet 211 transmitting contacts 212, break key 213 and a relay corresponding to relay 206 at station C. The closed signaling circuit may include other stations similar to the stations A, B and C. The printing telegraph receiving recorder for the station A controlled by selector magnet 11 is shown in Fig. 1 and certain electrical conductors which will be identified hereinafter extend between Fig. 1 and Fig. 2. At stations B and C the selector magnets 207 and 211 are intended to symbolize the receiving printers.

With current flowing in the closed transmission circuit, the relay 206 at station A and the corresponding relays at stations B and C will be energized. At its single armature and back contact, relay 206 holds open the circuit of a slow operating relay 216, the conductive path being traced from one terminal of battery 217 to the

back contact of relay 206 and from the other terminal of battery 217 through conductor 218, normally closed contacts 219 controlled by relay 221 which at this time is released, conductor 222 and winding of relay 216 to the armature of relay 206. Upon the opening of the break key at any one of the stations, such as the key 204 at station A, the circuit of relay 206 and of all corresponding relays at the other station will be interrupted and those relays will be released. Relay 206 completes the energizing circuit for relay 216 which becomes energized after an interval which is longer than any spacing interval normally encountered in telegraph message transmission, the purpose in providing that relay 216 shall be slow operating is to prevent its operation in response to any fortuitous releases of relay 206 such as might be due to "hits" upon the telegraph circuit 201. Preferably relay 216 requires an interval of the order of three seconds to operate.

Upon the operation of relay 216 ground on its front contact is connected through its armature and conductor 223, winding of relay 221 to grounded battery, thus causing relay 221 to operate. At its lower armature and front contact relay 221 connects ground over conductor 224 and winding of a relay 226 to grounded battery. Relay 226 becomes energized and extends connections from battery 217 through its two armatures and front contacts to the operating motor 227 for transmitting contacts 203 and for the receiving printer mechanism shown in Fig. 1. At the upper armature of relay 221 ground connection is extended through the front contact, the make-before-break contacts of a relay 228, conductor 229 and conductor 223 through the winding of relay 221 to grounded battery thus establishing a holding circuit for the relay. The upper armature of relay 221 opens the contacts 219 through a mechanical connection between contacts 219 and the upper front contact, thus opening the energizing circuit for relay 216 which releases. As contacts 219 are opened, contacts 231 are closed. These contacts short circuit the winding of relay 206 through conductors 232 and 233 so that the relay 206 does not become reenergized upon the reclosure of break key 204 or other break key in the system the opening of which released the relay 206. By the foregoing operations the printer and transmitter operating motors at all stations have been set in operation so that the system has been changed from a shut down condition to the idle active condition with the printers at all stations capable of responding to signals.

The selection of station A for participation in signal transmission is controlled by relay 241. This relay is normally deenergized and a circuit is traced from ground through its outer upper armature and back contact and in parallel therewith from ground through the outer upper armature and back contact of a relay 242, which is also deenergized at this time, through conductor 243 extending into Fig. 1 through the winding of magnet 143 to grounded battery 142 and also from conductor 243 through the winding of electromagnet 112 to grounded battery 147. Electromagnets 112 and 143 will thus be energized to withhold the printing bail 34 against operation farther than to permit the selection of selectable function levers 56 and 57 and to withhold line feed push bar 132 against selective movement into operative relation to the function bail blade 91.

The operation of relay 241 is controlled by the selector vane sensing contacts 72. A battery 148 having one terminal grounded has its other terminal connected to one spring of each of the five pairs of contact springs 79 and to one spring of the pair of contact springs 93. The other spring of each of the five pairs of contact springs 79 is connected by one of five conductors 244 to one terminal of an individual one of five relays 246, the other terminal of which is connected to ground. The other spring of the pair of contact springs 93 is connected by conductor 247 to one terminal of relay 248. The five relays 246 control a fan circuit system of armatures and contacts, the uppermost having a single armature operable between one front and one back contact which are connected to two armatures of the next or second relay. Each of the two armatures of the second relay has one front and one back contact which are connected to four armatures of the third relay. Since only a few fan circuit selective paths are required at each station it is not necessary for the fourth and fifth of the relays 246 to have full complements of armatures and front and back contacts, but it will be understood that the fourth relay could have as many as eight armatures each operating between a front and back contact and that the fifth relay may have sixteen armatures operating between a front and a back contact to provide a maximum of thirty-two selective paths. The armature of the uppermost of the relays 246 is connected by conductor 251 extending into Fig. 1 to one contact spring of a pair of normally open contacts 151, the other of which is connected to ground. Contacts 151 are mounted to be engaged and operated by push bar 84 which operates cradle 71. The contacts 151 are disposed in such relation to the rearmost end of push bar 84 that they are not closed until after cradle 71 has been operated to close those of the contacts 79 and 93, the operating bell cranks of which are blocked by vanes 24 in the marking position or vane 96 in the figure shift position.

For the purpose of illustrating the selection of station A for participating in message transmission, assume that station B transmits the selecting code combination for station A which will be assumed to be the code for the letter A. All of the stations in the system respond to the transmission of this code and position their selector vanes in correspondence with the code of the letter A. Following the positioning of the vanes the main cam assembly of each printer is operated, this including the cams 44 and 66. Cam 44 seeks to operate printing bail 34 which is blocked at all stations. Cam 66 then operates the function bail blade which reciprocates push bar 84 toward contacts 151, first closing certain of the contacts 72 in correspondence with the setting of the selector vanes 24, and then closing the contacts 151. The permutation code combination representing the letter A has impulses 1 and 2 of marking nature and the remaining three of spacing nature so that the first and second set of contacts 79 counting from the top will be closed and a circuit will be extended from battery 148 through the two sets of closed contacts 79, to the first and second of the relays 246 which will become energized. Following the energization of the relays ground connection will be extended through contacts 151, conductor 251, armature and front contact of relay 246 which is now energized, inner armature and front contact of the second relay 246 which is also energized, innermost armature and back contact of the third relay, innermost armature and back contact of the fourth relay, innermost armature and back contact of the fifth relay, conductor 252, back contact and inner upper armature of relay 242 and winding of relay 241 to grounded battery 253. Relay 241 completes its holding circuit through the front contact and inner lower armature, conductor 254 and back contact and armature of relay 248 to ground. At its outer upper armature relay 241 removes one of the ground connections from conductor 243 but electromagnets 112 and 143 in Fig. 1 remain energized to the ground on the outer upper armature of relay 242. At its inner upper armature relay 241 completes a circuit from ground over conductor 256 and lamp 255 to grounded battery 258 and the lamp 255 lights to indicate that station A is being conditioned for participation in message transmission, such conditioning being by remote control. At no other station does the relay corresponding to relay 241 become operated, because at no other station is such relay operable over a fan circuit path completed in response to the code combination for the letter A.

It will be noted that relay 241 may also be energized from ground through normally open key 257, lower armature and back contact of relay 240 and conductor 259. Key 257 and the circuit which it completes enables the selecting relay 241 or its corresponding relay at other stations to be energized by direct manual control such as at a call initiating station so that it is not necessary for the calling operator to transmit the selecting code of his own station in order to prepare that station to be conditioned to participate in the message transmission. It will also be noted that the relay 241 may be energized through the armature and back contact of the first relay 246, outer armature and front contact of the second relay 246, second armature and back contact of the third relay 246, counting armatures from the left, second armature and front contact of the fourth relay 246 counting from the left, and second armature and front contact of the fifth relay 246 counting from the left, through conductor 252 and back contact and inner upper armature of relay 242. This selective path is common to all the stations in the system, being completed when the first and third of the relays 246 are deenergized and the second, fourth and fifth relays are energized, and represents a group selection of all stations by the transmission of a common calling code whereby it is unnecessary to transmit in succession the calling codes of all of the stations when it is desired to transmit to them on a group or broadcast basis.

Following the transmission of the code which effected the operation of relay 241, the calling operator transmits a code combination which effects the selection, at all stations including the calling station, of the selectable function lever 57. This function lever has a forwardly extending arm 152 which momentarily closes normally open contacts 153. One of the contacts 153 is connected to ground and the other is connected over conductor 261 extending into Fig. 2 through the winding of relay 242 to grounded battery 263. Relay 242 becomes energized and completes its holding circuit through the front contact and inner lower armature to ground through the back contact and armature of relay 248 in parallel with the holding circuit for relay 241. Selectable function lever 57 at each station is responsive to

the same code so that contacts 153 at station A and the contacts corresponding thereto at all other stations close, and relay 242 at station A and the relays corresponding thereto at all other stations become energized and held.

At its outer upper armature the relay 242 disconnects ground from conductor 243 thus opening the energizing circuit for the electromagnets 112 and 143 at the calling station and also at the called station A, so that the printers at those stations are conditioned for full normal operation of their printing bails and the suppression of the line feed function is removed. At uncalled stations the magnets 112 and 143 are not released because the relays at those stations corresponding to the relay 241 are not energized and one ground connection remains on conductor 243 at the uncalled stations. The outer upper armature of relay 242 completes the circuit of lamp 264 over conductor 260 to battery 258 so that the lamp 264 becomes lighted at all stations. The lighting of lamp 264 at uncalled stations indicates that the system is in operation for message transmission and that those stations have been excluded. Lamp 264 therefore is a busy lamp. At the calling and called stations both of the lamps 255 and 264 are lighted, indicating that those stations have been selected for participation in message transmission and that the magnets 112 and 143 have been released by removal of both ground connections.

At the inner upper armature relay 242 interrupts the energizing path for relay 241. This has no effect at the calling and called stations since relay 241 and the corresponding relay at the calling station are held energized, but at the excluded stations it prevents the energization of the relay corresponding to the relay 241 in response to signals appearing in the message transmission which are identical with the selective calling signals of the uncalled stations or in response to the signal which is identical with the group calling signal. In this way the assignment of codes for calling stations individually or in a group does not diminish the number of codes available for message transmission. At the middle lower armature, relay 242 interrupts a conductive path from the innermost front contact of the fifth relay 246 to the winding of relay 228, which relay is energizable, as will be described later, over a fan circuit path selectively prepared by the relays 246.

It will be noted that the grounded outer lower armature of relay 241 has a back contact which is connected to the outer lower armature of relay 242. The latter armature has a front contact which is connected through the winding of a relay 240 which is energizable to establish, at its upper armature and front contact, a shunt around transmitter 203 and break key 204. Relay 240 is energized when relay 241 is unoperated and relay 242 is operated, which is the condition of an uncalled and disqualified station, and prevents an attendant at a disqualified station from interfering with transmission on the line, because the break key and the transmitter are short-circuited and are rendered incapable of opening the line circuit. At its lower armature the relay 240 interrupts the conductive path from key 257 to the winding of relay 241. Thus an attendant at an uncalled station cannot unauthorizedly operate relay 241 to disable his print suppression mechanism and render his recording printer operatively responsive to signals on the line which are actuating selector magnet 11, and privacy is thereby assured. When relays 241 and 242 are both released, which is the idle condition, the cirruit of relay 240 is open at the outer lower armature and front contact of relay 242. When relays 241 and 242 are both energized, the circuit of relay 240 is open at the outer lower armature and back contact of relay 241, which is the condition for participation of a station in intercommunication. Only when a station is disqualified is the relay 240 operated.

The system has now been conditioned for intercommunication between the calling and called stations and the printers at those stations are fully responsive to all character and function code signals. At the uncalled stations characters corresponding to the transmitted signals will not be printed although the selector magnets at those stations will respond to all signals and the selector vanes will be operated in correspondence with such signals, printing being suppressed by the magnet 112 and magnets at other stations corresponding thereto which are energized. Character spacing will not occur at the excluded stations except in response to the spacing signal combination because normal spacing for successive characters occurs incident to the operation of the printing bail, as is fully disclosed in the Morton et al. patent, and with printing suppressed at the excluded stations spacing will also be suppressed. The spacing function will be performed at excluded stations corresponding to the few word spaces that will appear in the message material transmitted in each line of message material being recorded at the qualified stations, but the excluded stations will also respond to the carriage return function and will restore the carriage to the beginning of line position before it has advanced more than a few spaces from that position. The shift and unshift functions will also be performed at the excluded stations but these are idle operations since no message material is being recorded. The latching of the line feed push bar at the excluded stations prevents the performance of the line feed function at those stations and thus prevents the advance of paper past the printing line position as the paper is line fed at the printers which are recording the message material transmitted. Were it not for the suppression of the line feed function, it might be necessary for an attendant to back feed the platen manually at frequent intervals to prevent the wastage of paper at those stations.

At the conclusion of message transmission the system may be restored to the idle active condition by transmission from any one of the participating stations of the deactivate code signal. Since it has sometimes been the custom in station selector systems to employ as the deactivate or restoration signal a combination of two permutation code signals one of which is the figure shift signal and the other is the signal corresponding to a character, such as the letter H, whereby the code for that letter may have the dual function, in the unshift condition of the apparatus, of selecting a station when printing is suppressed, and of effecting the printing of the letter H when printing is not suppressed, and when the printer is in the shift condition, for effecting restoration of the stations to the idle active condition.

Upon the transmission from any of the participating stations of the figure shift function, the shift vane 96 at all stations will be operated to the figure shift position where it will be effective to cause closure of the contacts 93. As pre-

viously stated, contacts 93 when closed extend a battery connection to relay 248 but this is not effective to complete the energizing circuit for relay 248 because the fan circuit path to which the lower terminal of relay 248 is connected, is not completed in response to the figure shift signal. Following the transmission of the figure shift signal, the code for the letter H will be transmitted. After the five vanes 24 have been positioned in accordance with this signal, push bar 84 will be operated to cause the rocking of cradle 71 and since the code for the letter H has impulses 1, 2 and 4 of spacing nature and impulses 3 and 5 of marking nature, the third and fifth of the relays 246 will be energized to complete a conductive path from the armature of the first relay 246 through its back contact, the outer armature and back contact of the second relay 246, the outer armature and front contact of the third relay 246, the outer armature and back contact of the fourth relay 246, and the outer armature and front contact of the fifth relay 246, winding of relay 248, conductor 247 and closed contacts 93 to battery 148. Upon the closure of contacts 151 by push bar 84 after it has operated contacts 72 and 93, the conductive path just traced will be extended from the armature of the first relay 246 over conductor 251 and contacts 151 to ground, thus energizing relay 248 momentarily. At its armature and back contact, relay 248 interrupts the holding circuit for relays 241 and 242, thus extinguishing lamps 255 and 264 and restoring the station selecting apparatus to normal at all stations.

At the close of the business day or whenever it is desired to restore the multistation telegraph system to the shut-down condition, this may be accomplished by the transmission from any one of the stations of a signal assigned to the performance of this function which may, for example, be the code corresponding to the letter Z. At all stations, the selector vanes are set in response to this signal to cause the first and fifth of the relays 246 to be energized. When the contacts 151 are closed momentarily following the closure of the first and fifth pairs of contacts 72, a circuit may be traced from ground through closed contacts 151, conductor 251, armature and front contact of the first relay 246, inner armature and back contact of the second relay 246, third armature and back contact counting from the left of the third relay 246, third armature and back contact counting from the left of the fourth relay 246, third armature and front contact counting from the left of the fifth relay 246, conductor 271, middle lower armature and back contact of relay 242, conductor 272 and winding of relay 228 to grounded battery 273. Relay 228 becomes energized over this circuit and as its armature engages its front contact completes its holding circuit to ground through the front contact and upper armature of relay 221, after which the relay 228 interrupts the holding circuit for relay 221, the contacts controlled by the armature of relay 228 being operable in make-before-break manner. As soon as the relay 221, its holding circuit having been interrupted, releases its upper armature, the holding circuit for relay 228 is interrupted so that that relay is released. Relay 228 does not become reenergized when its movable contact comes into engagement with its fixed contact and before the armature becomes disengaged from the movable contact, because it could be reenergized only from the armature and front contact of relay 216 which has been released during the time that relay 221 has been energized and which is a slow-operating relay as previously stated. With relay 221 released, the circuit of relay 226 is interrupted and this relay releases, thus opening the circuit of motor 227. Contacts 231 open and remove the short circuit across the winding of relay 206 so that this relay is reinserted in the closed communication circuit and becomes energized to open the circuit of relay 216. Contacts 219 reclose to prepare the energizing circuit for relay 216 which remains open at relay 206. Thus the apparatus is restored to the initial shut-down condition.

It is to be understood that the energizing circuit for relay 242 could have been completed through a selectively prepared fan circuit path controlled by the relays 246 instead of through the contacts 153 operated by selectable function levers 57. It will also be understood that selectable function levers could be employed in lieu of the relays 246 and the fan circuit paths for completing the energizing circuit of all of the selectively operable relays, these being the relays 241, 242, 228 and 248. In the case of the relay 248 which is to be operable only when the printer is in the figure shift condition, the selectable function lever for completing the energizing circuit of relay 248 may be blocked against selection by the vane 96 when the vane is in the unshift position so that the selectable function lever could not be selected and operated until after the vane 96 had been operated to the figure shift condition in response to a shift signal. It would then not be necessary to include a fan circuit path in the energizing circuit of relay 248, as the selectable function lever would interpret the shift condition of the printer and the code, such as H for selecting the relay. Also the contacts 93 would not be required. In fact the relay 248 could be omitted, substituting normally closed contacts for supplying ground for the holding circuits of relays 241 and 242, the contacts being operable by the function lever to open the holding circuits. The selectable function lever 57 represents a mechanical arrangement for integrating or interpreting a permutation code signal and the contacts 79 and relays 246 represent an electrical means for integrating or interpreting a permutation code signal. Either may be employed exclusively or a combination of both as indicated in Figs. 1 and 2 may be employed within the contemplation of the invention.

Although a single transmitter has been indicated symbolically at each station by a set of transmitting contacts, it is within the contemplation of the invention to provide keyboard transmitters or storage type transmitters, such as tape transmitters, or both, at any or all stations, and to transmit station selecting, station disqualifying and motor stopping signals, as well as message signals, from any such transmitter. The Morton et al. patent, hereinbefore identified, fully discloses how keyboard and tape transmitters may be provided and operated at a telegraph station having a receiving printer of the type shown in that patent, of which the printer shown in the present application is a modification.

Although a specific embodiment of the invention has been shown in the drawings and described in the foregoing specification, it will be understood that the invention is not limited to such specific embodiment but is capable of modification and rearrangement without departing

from the spirit of the invention and within the scope of the appended claims.

What is claimed is:

1. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station, means in each recorder for suppressing printing operation thereof, a relay at each station operable to disable said suppressing means, a second relay at each station operable to estop operation of unoperated ones of said disabling relays, a plurality of signal responsive selector elements in each of said recorders, a selectable member directly responsive to said selector elements for controlling one of said relays, a plurality of sets of electrical contacts controllable by said selector elements in accordance with the signal responsive operation of said elements, a plurality of relays controlled by said electrical contacts, and means controlled by the last-mentioned relays for selectively establishing an energizing circuit for the other of the two first-mentioned relays.

2. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station including a signal responsive selector mechanism, a printing mechanism operable under the control of said selector mechanism and a driving motor for both of said mechanisms, means controlled by said channel independently of said selector mechanism at each station for completing the operating circuit of the motor, means in each recorder for suppressing operation of said printing mechanism, means controlled by the selector mechanism at each station for disabling said suppressing means, means controlled by the selector mechanism at each station for disabling said motor circuit completing means, and means at each station controlled by said selector mechanism for estopping operation of both of said disabling means.

3. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station including a signal responsive selector mechanism, a printing mechanism operable under the control of said selector mechanism and a driving motor for both of said mechanisms, means controlled by said channel independently of said selector mechanism at each station for completing the operating circuit of the motor, means in each recorder for suppressing operation of said printing mechanism, means controlled by the selector mechanism at each station for disabling said suppressing means, means controlled by the selector mechanism at each station for disabling said motor circuit completing means, means at each station controlled by said selector mechanism for estopping operation of both said disabling means, and means at each station controlled by said selector mechanism for restoring said estopping means to non-estopping condition.

4. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station including a signal responsive selector mechanism, a printing mechanism operable under the control of said selector mechanism and a driving motor for both of said mechanisms, means controlled by said channel independently of said selector mechanism at each station for completing the operating circuit of the motor, means in each recorder for suppressing operation of said printing mechanism, means controlled by the selector mechanism at each station in response to a signal individual to such station for disabling said suppressing means, means controlled by the selector mechanism at each station in response to a signal common to all stations for disabling said motor circuit completing means, means at each station controlled by said selector mechanism in response to a signal common to all stations for estopping operation of both said disabling means, and means at each station controlled by said selector mechanism in response to a signal common to all stations for restoring said estopping means to non-estopping conditions, each of said common signals differing from the others.

5. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station including a signal responsive selector mechanism, a printing mechanism operable under the control of said selector mechanism and a driving motor for both of said mechanisms, means controlled by said channel independently of said selector mechanism at each station for completing the operating circuit of the motor, means in each recorder for suppressing operation of said printing mechanism, means controlled by the selector mechanism at each station in response to a signal individual to such station and also in response to a signal common to all stations for disabling said suppressing means, means controlled by the selector mechanism at each station in response to a signal common to all stations for disabling said motor circuit completing means, means at each station controlled by said selector mechanism in response to a signal common to all stations for estopping operation of both said disabling means, and means at each station controlled by said selector mechanism in response to a signal common to all stations for restoring said estopping means to non-estopping condition, each of said common signals differing from the others.

6. In a communication system, a communication channel, a plurality of stations associated with said channel, a normally operative signal responsive selector mechanism at each station, a record producing mechanism controlled by each of said selector mechanisms, means for suppressing operation of said record producing mechanisms, means controlled by said selector mechanisms for selectively disabling the suppressing means of their respective record producing mechanisms, and means controlled by said selector mechanisms for rendering unoperated ones of said disabling means unresponsive to their selector mechanisms.

7. In a communication system, a communication channel, a plurality of stations associated with said channel, a normally operative signal responsive selector mechanism at each station, a record producing mechanism controlled by each of said selector mechanisms, means for suppressing operation of said record producing mechanisms, means controlled by said selector mechanisms for selectively disabling the suppressing means of their respective record producing mechanisms, means controlled by said selector mechanisms for rendering unoperated ones of said disabling means unresponsive to their selector mechanisms, and means controlled by said selector mechanisms for restoring said disabling means and said last-mentioned means to unoperated condition.

8. In a communication system, a communication channel, a plurality of stations associated with said channel, means at each station for transmitting telegraph code signal combinations of equal and predetermined duration, a signal responsive selector mechanism at each station normally responsive to signals generated by any of said transmitting means, record producing mechanisms controlled by said selector mechanisms, means for suppressing operation of said record producing mechanisms, means controlled by said selector mechanisms for selectively disabling the suppressing means of their respective record producing mechanisms, and means controlled by said selector mechanisms for rendering unoperated ones of said disabling means unresponsive to their selector mechanisms.

9. In a communication system, a communication channel, a plurality of stations associated with said channel, means at each station for transmitting telegraph code signal combinations of equal and predetermined duration, a signal responsive selector mechanism at each station normally responsive to signals generated by any of said transmitting means, record producing mechanisms controlled by said selector mechanisms, normally operated means for suppressing operation of said record producing mechanisms, means controlled by said selector mechanisms in response to individually selective signals or group selective signals generated by any of said transmitting means for selectively disabling the suppressing means of their respective record producing mechanisms, and means controlled by said selector mechanisms in response to a common signal generated by any of said transmitting means for rendering unoperated ones of said disabling means unresponsive to their selector mechanisms.

10. In a communication system, a communication channel, a plurality of stations associated with said channel, means at each station for transmitting telegraph code signal combinations of equal and predetermined duration, a signal responsive selector mechanism at each station normally responsive to signals generated by any of said transmitting means, record producing mechanisms controlled by said selector mechanisms, a normally operative driving motor for said selector mechanism and said record producing mechanism at each station, normally activated means for suppressing operation of said record producing mechanisms, means controlled by said selector mechanisms in response to signals generated by any of said transmitting means for selectively disabling the suppressing means of their respective record producing mechanisms, and means controlled by said selector mechanisms for rendering unoperated ones of said disabling means unresponsive to their selector mechanisms.

11. In a communication system, a communication channel, a plurality of stations associated with said channel, means at each station for transmitting permutation code telegraph signals, a permutation code signal receiving selector mechanism at each station, a printing mechanism at each station controlled by said selector mechanism, a normally activated driving motor for said selector mechanism and said printing mechanisms at each station whereby said selector mechanisms are normally operative in response to signals, normally activated means for suppressing operation of said printing mechanisms, means controlled by said selector mechanisms in response to permutation code signals for selectively deactivating the suppressing means of their respective printing mechanisms, and means controlled by said selector mechanisms in response to permutation code signals for rendering unoperated ones of said deactivating means unresponsive to their selector mechanisms.

12. In a telegraph system, a telegraph line, a plurality of stations associated with said line each having a printing telegraph recorder and a permutation code signal transmitter, normally activated means associated with each of said recorders for suppressing operation of the printing mechanism of said recorders, means at each of said stations selectively responsive to permutation code signals transmitted by any of said transmitters for deactivating said suppressing means to qualify those stations having their suppressing means deactivated to participate in message transmission and reception, and means at each of said stations responsive to permutation code signals transmitted by any of said transmitters for rendering the deactivating means at unqualified stations unresponsive to their respective signals until after restoration of all of said stations to activated condition of said suppressing means.

13. In a communication system, a communication channel, a plurality of stations associated with said channel, a recorder at each of said stations including a selector mechanism normally responsive to signals on said channel, a plurality of recording elements selectively controllable by said selector mechanism and an actuator for operating said recording elements, means normally effective to block said actuator upon each attempted operation thereof, means controlled by said selector mechanisms upon response to predetermined signals for disabling said blocking means, and means also controlled by said selector mechanisms upon response thereof to a predetermined signal for estopping operative response of unoperated ones of said disabling means to said selector mechanism until after restoration of said blocking means to effective condition at all stations.

14. In a communication system, a communication channel, a plurality of stations associated with said channel, a recorder at each of said stations including a selector mechanism normally responsive to signals on said channel, a plurality of recording elements selectively controllable by said selector mechanism and an actuator permissibly operable upon each receiving cycle of said selector mechanism for operating said recording elements, means normally effective to block said actuator upon each attempted operation thereof, means controlled by said selector mechanism upon response to predetermined signals for disabling said blocking means, and means also controlled by said selector mechanism upon response thereof to a predetermined signal for estopping operative response of unoperated ones of said disabling means to said selector mechanism until after restoration of said blocking means to effective condition at all stations.

15. In a communication system, a communication channel, a plurality of stations associated with said channel, a printing recorder at each station including a selector mechanism normally responsive to signals on said channel, a plurality of printing elements selectively controllable by said selector mechanism and a bail permissibly operable upon each receiving cycle of said selector mechanism for operating said printing elements, means normally effective to block said

bail upon each attempted operation thereof, means controlled by said selector mechanism upon response to predetermined signals for disabling said blocking means, and means also controlled by said selector mechanism upon response thereof to a predetermined signal for estopping operative response of unoperated ones of said disabling means to said selector mechanisms until after restoration of said blocking means to effective condition at all stations.

16. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station, means in each recorder for suppressing printing operation thereof, a relay at each station operable to disable said suppressing means, a second relay at each station operable to estop operation of unoperated ones of said disabling relays, a plurality of signal responsive selector elements in each of said recorders, a selectable member directly responsive to said selector elements for controlling one of said relays, a plurality of sets of electrical contacts controllable by said selector elements in accordance with the signal responsive operation of said elements, a relay operable under the control of each of said pairs of contacts, and a fan circuit path selectively closable by said plurality of relays for selectively establishing an energizing circuit for the other of the two first-mentioned relays.

17. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel, a printing telegraph recorder at each station, means in each recorder for suppressing printing operation thereof, a relay at each station operable to disable said suppressing means, a second relay at each station operable to estop operation of unoperated ones of said disabling relays, a set of signal responsive selector elements in each of said recorders, a selectable member directly responsive to said selector elements for controlling one of said relays, a plurality of sets of electrical contacts controllable by said selector elements in accordance with the signal responsive operation of said elements, a relay operable under the control of each of said pairs of electrical contacts, a fan circuit path selectively closable by the last-mentioned relays for selectively establishing an energizing circuit for the other of the two first-mentioned relays, a secondary selector element controllable by said set of selector elements, a pair of electrical contacts controllable by said secondary selector element, and a relay energizable over a path including the contacts controlled by said secondary selector element and a fan circuit path selectively closable by the relays controlled by the first-mentioned pairs of electrical contacts for releasing the two first-mentioned relays.

18. In a communication system, a communication channel, a plurality of telegraph stations associated with said channel and having a printing telegraph recorder including a selector mechanism and a printing mechanism, a mechanical element for suppressing operation of said printing mechanism, a normally activated electromagnet for presenting said mechanical element in operation suppressing relation to said printing mechanism, first and second normally deenergized relays providing circuit completing connections in parallel for said electromagnet, means selectively operable at each station by said selector mechanism for completing the energizing circuit of said first relay to interrupt one of

said connections, means concurrently operable at all stations by said selector mechanisms for completing the energizing circuit of said second relay to interrupt the other of said connections whereby to release said electromagnet and suppressing means at any station having both relays energized, and means associated with said second relay for estopping selective energization of unoperated ones of said first relays.

19. In a communication system, a communication channel, a plurality of stations associated with said channel, a signal responsive selector mechanism and a signal transmitting mechanism at each station, a driving motor at each station for said selector and transmitting mechanisms, means at each station controllable from any station for starting all of said motors, a record producing mechanism controlled by each of said selector mechanisms, and means controlled by said selector mechanisms for selectively causing their associated record producing mechanisms and transmitting mechanisms to be operative or non-operative while all of said motors remain in operation.

20. In a communication system, a communication channel, a plurality of stations associated with said channel, a signal transmitting mechanism at each station, a signal responsive selector mechanism at each station, a record producing mechanism controlled by each of said selector mechanisms, a driving motor for each of said signal transmitting mechanisms and selector mechanisms and its associated record producing mechanism, means at each station controllable from any station for starting all of said motors, and means controlled by said selector mechanisms for selectively causing their associated signal transmitting mechanisms and record producing mechanisms to be operative or nonoperative while said selector mechanisms continue to respond to signals representing record producing operations and said driving motors continue in operation.

21. In a communication system, a communication channel, a plurality of stations associated with said channel, a signal transmitting mechanism at each station, a signal responsive selector mechanism at each station, a record producing mechanism controlled by each of said selector mechanisms, a driving motor for each of said signal transmitting mechanisms and selector mechanisms and its record producing mechanism, means at each station controllable from any of said stations independently of said selector mechanisms for starting said motors, means controlled by said selector mechanisms for selectively causing their associated signal transmitting mechanisms and record producing mechanisms to be operative or non-operative while all of said motors remain in operation, and means controllable only by said selector mechanisms for stopping said motors.

22. In a communication system comprising a plurality of interconnected telegraph stations each having a transmitter and a normally disabled record producing mechanism and a driving motor therefor, the method of intercommunicating among said stations selectively which comprises (1) starting the driving motors at all stations, (2) selectively enabling the record producing mechanisms at the stations to be in intercommunication, (3) precluding enablement of the record producing mechanisms and disabling the transmitter at all other stations, (4) continuing the operation of all of said motors during

intercommunication among said selected stations, (5) redisabling the record producing mechanisms at the conclusion of said intercommunication, and (6) continuing the operation of said motors as a preparational condition for subsequent intercommunication among any two or more of all of the stations.

RITA SMITH KINKEAD,
Administratrix of the Estate of Fullerton S. Kinkead, Deceased.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,211,232	Hulfish	Aug. 13, 1940
2,148,435	Carr	Feb. 28, 1939
2,129,741	Levy	Sept. 13, 1938
2,152,010	Zenner	Mar. 28, 1939
2,106,805	Lang	Feb. 1, 1938