Jan. 12, 1960 W. E. MAKARY 2,921,116

TELETYPEWRITER AUTOMATIC ALARM REPORTING SYSTEM

Filed April 28, 1958 3 Sheets-Sheet 1

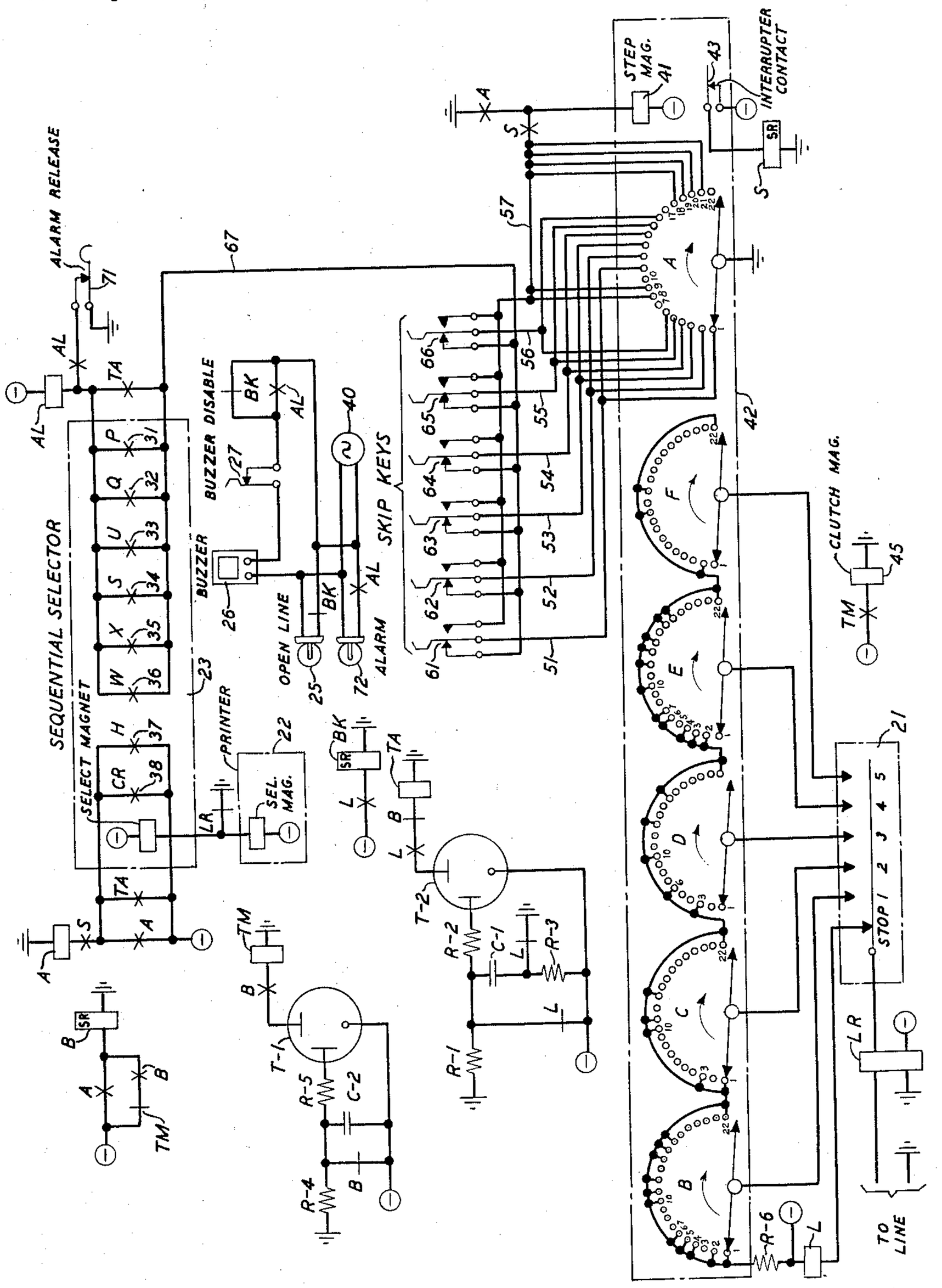

FIG. 1

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TELETYPEWRITER AUTOMATIC ALARM REPORTING SYSTEM

Filed April 28, 1958 3 Sheets-Sheet 2

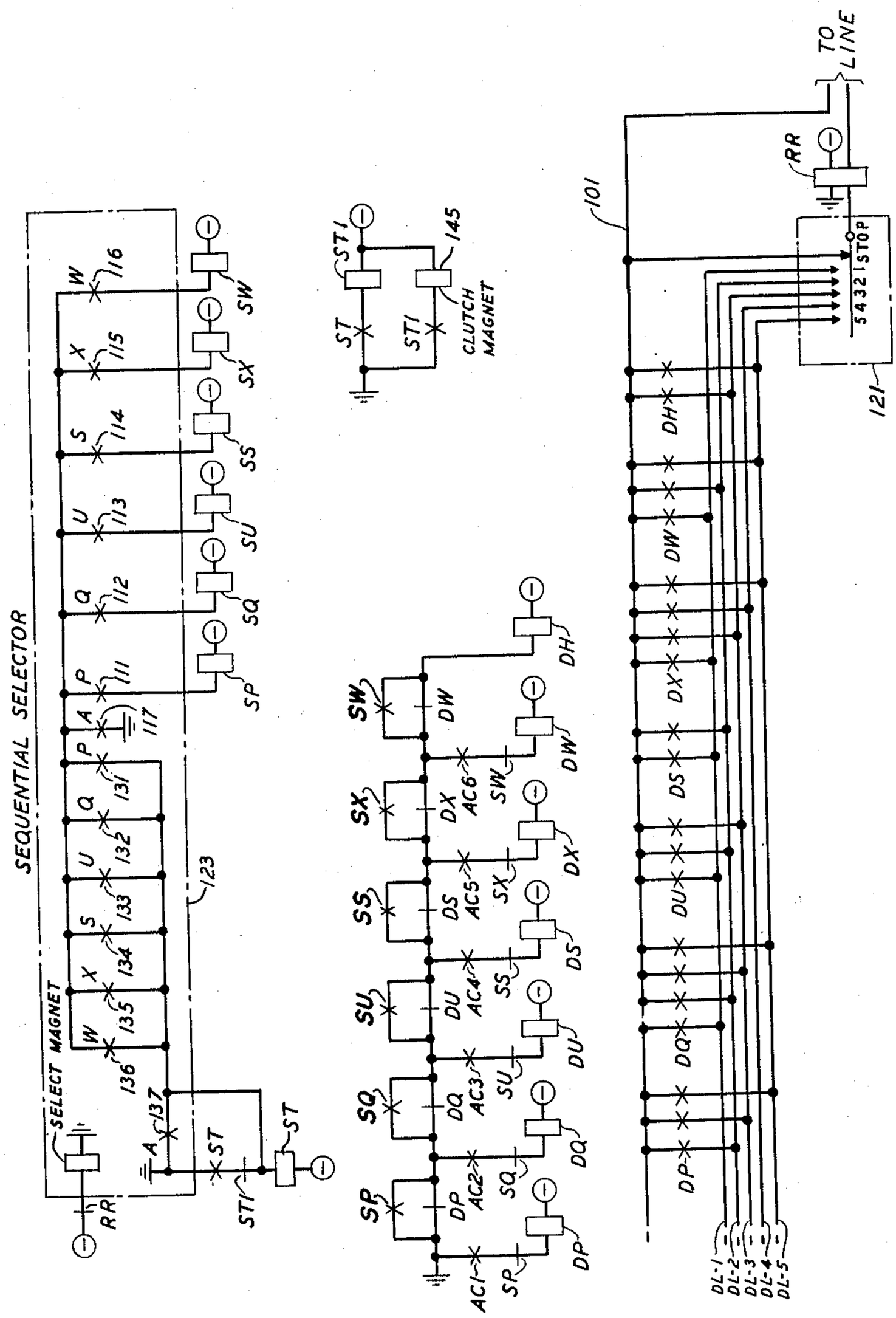

FIG. 2

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TELETYPEWRITER AUTOMATIC ALARM REPORTING SYSTEM

Filed April 28, 1958 3 Sheets-Sheet 3

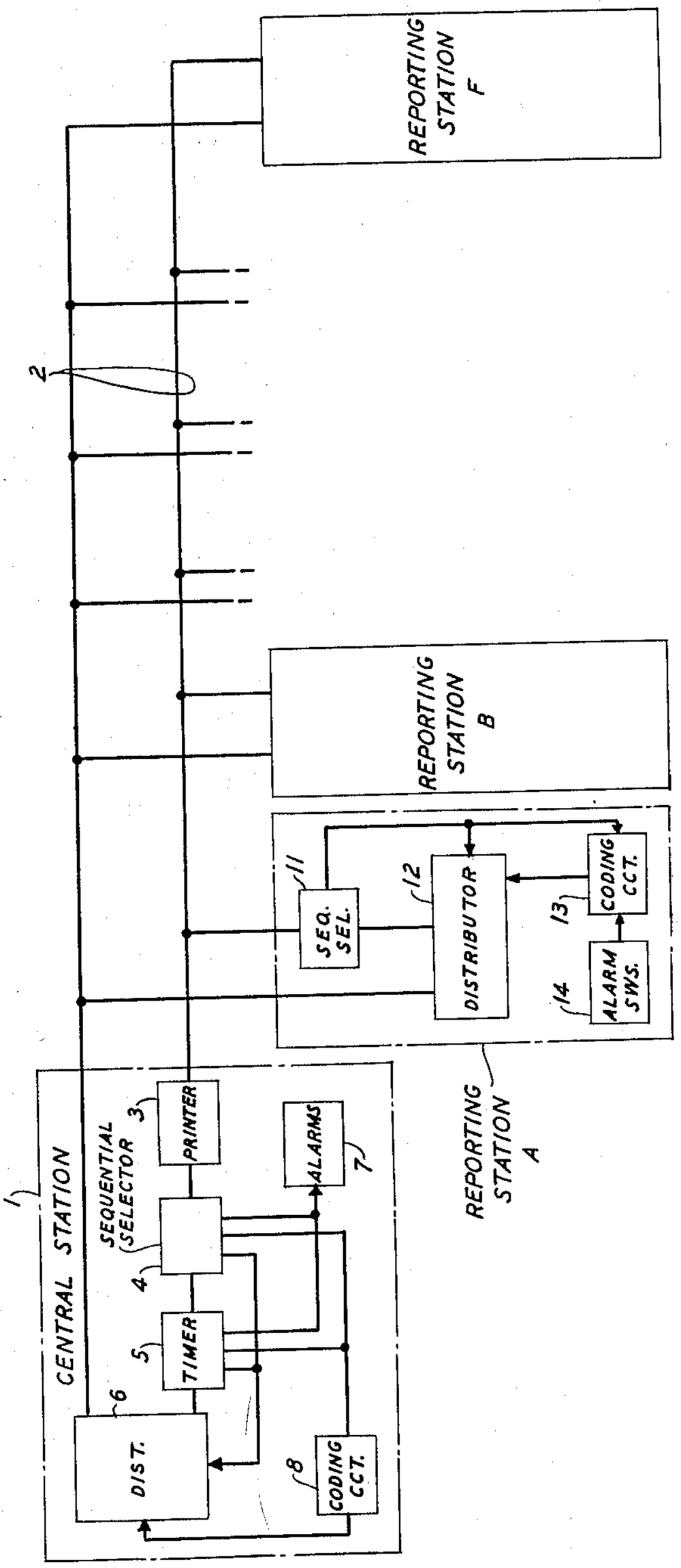

FIG. 3

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2,921,116

TELETYPEWRITER AUTOMATIC ALARM REPORTING SYSTEM

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Application April 28, 1958, Serial No. 731,467

6 Claims. (Cl. 178—2)

This invention relates to a teletypewriter station alarm reporting system and more particularly to a reporting system wherein a plurality of reporting stations on a multistation line are selectively instructed to report trouble conditions to a central control station.

It is a broad object of this invention to provide an improved teletypewriter station reporting circuit for reporting trouble conditions existing at the reporting station.

In known types of teletypewriter station trouble reporting systems, each reporting station is provided with testing and switching equipments individually operated in response to trouble conditions existing at the station. When a teletypewriter station in the known system is selected to report any existing trouble to the central station, scanning equipment at the station proceeds to scan the various testing and switching equipments at the station sequentially and transmits teletypewriter code characters back to the control station indicative of the conditions existing at the reporting station. In a preferred known system of this type, the scanning circuit precludes the reporting of normal conditions and reports trouble conditions only. In such known systems, however, this type of scanning equipment has either required complex circuitry or operation at scanning rates which are slow relative to the signaling speed at which the system is operable.

A further object of this invention is to provide an improved teletypewriter station trouble alarm scanning circuit which reports trouble conditions only.

Another object is to provide a reporting station scanning circuit which has relatively few components and which passes instantly over switching equipments indicating normal conditions.

In accordance with the preferred embodiment of the present invention, the stations are connected to a common multistation line. Each reporting station is provided with a sending distributor, a sequential selector selectively responsive to teletypewriter code characters impressed on the multistation line and a chain of coding relays, in which chain the operation of each relay precludes the operation of relays subsequent in the chain. Assuming none of the prior relays is operated, the final relay in the chain is operated and codes the distributor leads with an acknowledgement code character. Each of the relays other than the final relay in the chain is operated in turn, when an associated alarm switch is closed by a trouble condition, assuming no relay prior thereto is operated. The operation of any relay in the chain codes the distributor leads with an alarm code character indicative of the trouble condition. The sequential selector at the reporting station responds to the station polling character transmitted from the central station by releasing the distributor to send the code character coded on the distributor leads. In addition, the sequential selector responds to the transmission of each alarm code character by selectively releasing the coding relay individual thereto, permitting the operation of a subsequent relay, and releasing the distributor to send the

code character coded on the distributor leads by the subsequent relay. In this manner, the reporting station sequentially transmits code characters indicative of trouble conditions, if any, followed by an acknowledgement character and then returns to the initial waiting condition which prevailed prior to the reception of the polling character.

The means for fulfilling the objects and the practical embodiment of the features of this invention will be fully understood from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 shows the details of circuits and equipments which form a typical central control station;

Fig. 2 shows the details of circuits and equipments which form a typical reporting station in accordance with this invention; and

Fig. 3 illustrates in block form the layout of the various circuits and equipments of the central control station and the outlying reporting stations and the manner in which they cooperate.

In Fig. 1 and Fig. 2, comprising the detailed circuit disclosure, the detached contact method of exposition used in Patent 2,722,675, granted to J. Michal and R. E. Staehler on November 1, 1955, has been adopted. In the detached contact method, the relay core and its winding, or windings, are shown physically separated from the contact controlled thereby and is given a letter or letters designation. Contacts which are closed when the relay is deenergized are represented by a single short line perpendicular to the line representing the conductor, and contacts which are closed when the relay is energized are represented by two short crossed lines diagonally intersecting the conductor line. Each of the contacts is given the same letter designation as its associated relay core.

Referring now to Fig. 3, a typical half-duplex party line **2** is shown extending from a central control station, generally indicated by block **1**, to six outlying reporting stations of which only three, namely reporting station A, reporting station B and station F are shown in Fig. 3. It is to be understood that any number of outlying stations may be served by party line **2**.

Party line **2** comprises a loop or channel for transmitting signals from the central station **1** to the outlying stations and from the outlying stations to central station **1**. Party line **2** is shown as a metallic transmission loop, but it is to be understood that it may include any of the usual types of transmission channels suitable for the transmission of telegraph signals in both directions, but not at the same time.

In general, central station **1** is provided with printer **3**, sequential selector **4**, timer **5** and distributor **6**, all associated with party line **2**. Central station **1** is also provided with audible and visible alarms, indicated by block **7**, and coding circuit **8** which functions to code distributor **6** with code characters designed to selectively poll the outlying stations, one at a time and in rotation.

Printer **3**, sequential selector **4** and timer **5** are responsive to all line signals impressed on party line **2**. Printer **3** may be a page printer similar to the type disclosed in Patent No. 1,904,164, granted to S. Morton et al. on April 18, 1933. Sequential selector **4** operates selected contacts in response to predetermined code signals impressed on party line **2**. A sequential selector suitable for use in this system is disclosed in Patent No. 2,568,264, granted to W. J. Zenner on September 18, 1951. The disclosures of these patents are hereby incorporated by reference as though fully set forth herein.

Reporting station A may be considered as typical of the outlying reporting stations and is provided with sequential selector **11** and distributor **12**, both associated with line **2**. In addition, the outlying station is provided

with coding circuit 13 and alarm switches 14. Sequential selector 11 is similar to sequential selector 4 at central station 1.

Alarm switches 14 comprise a plurailty of switches associated with individual testing or sensing apparatus of the type, well known in the art, that selectively operate the switches upon the occurrence of a trouble or alarm condition. Upon the operation of one or more of the switches, coding circuit 13 is instructed by alarm switches 14 to sequentially code the distributor 12 with code characters individual to each of the operated switches and coding circuit 13, which normally codes an acknowledgement code character on the distributor leads, removes the acknowledgement signal coding and codes the distributor 12 with the first sequential alarm code character.

Assuming now that central station 1 transmits the polling character individual to station A, sequential selector 11 responds by releasing distributor 12 to send the first alarm code character, if any. Upon the transmission of the alarm code character, sequential selector 11 instructs code circuit 13 to code the distributor 12 with the next subsequent character and again releases distributor 12. This process is repeated for the transmission of each of the alarm code characters until all the alarm code characters are transmitted whereupon code circuit 13 codes the distributor 12 with the acknowledgement code character, which is transmitted upon the release of distributor 12. Reporting station A then stops sending.

If outlying station A does not have any alarm conditions to report, only the acknowledgement code character, which is normally coded on the distributor leads by coding circuit 12, will be transmitted when station A is polled.

Printer 3 at central station 1 prints the polling character transmitted by central station 1, the alarm characters, if any, and the subsequent acknowledgement character transmitted by the polled reporting station. When an alarm character is received by central station 1, sequential selector 4 responds by actuating the audible and visible alarms 7 and when the acknowledgement character is received by central station 1, sequential selector 4 responds by instructing coding circuit 8 to code distributor 6 with the code character designed to selectively poll the outlying station next in rotation and releasing distributor 6 to send the polling character.

Timer 5 times the duration between the transmission of the polling character and the reception of the reply from the polled outlying station. If the outlying station fails to respond within a predetermined time, timer 5 actuates the audible and visible alarms, instructs coding circuit 8 to code distributor 6 with the next polling character and releases distributor 6 to send the polling character.

Referring now to Fig. 1, showing the detailed circuitry of the central control station, negative line battery is applied to the loop of the half-duplex transmission line by way of the winding of relay L, the stop contact of the distributor, generally indicated at 21, and the winding of polarized line relay LR. Thus, relay LR follows the line signaling and relay L is maintained operated during the marking or closed condition of the line.

A path is completed from ground to battery by way of the armature and marking or break contact of relay LR and the winding of the select magnet of printer 22 whereby printer 22 prints all line signals. In addition, a path is completed from ground to battery by way of the armature and marking contact of relay LR and the winding of the select magnet of the sequential selector, generally indicated at 23, and sequential selector 23 follows all line signals.

Sequential selector 23 is similar to the type described in the above-mentioned Zenner patent. As shown in Fig. 1, sequential selector 23 is provided with eight

normally open contacts 31 through 38. Contacts 31 through 36 momentarily close when code characters P, Q, U, S, X, and W, respectively, are applied to the line and contacts 37 and 38 momentarily close when code characters H and Carriage Return are applied to the line. As subsequently described, characters P, Q, U, S, X, and W constitute the alarm code characters of the outlying stations and character H, the acknowledgement character of the outlying stations.

With the line in the idle marking condition, relay L is maintained operated completing an obvious operating path for slow-to-release relay BK via the make contacts of relay L. Relay BK operated opens the A.C. circuit of open line lamp 25 via A.C. source 40 and break contacts of relay BK and opens the A.C. circuit of buzzer 26 via A.C. source 40, break contacts of relay BK and the contacts of buzzer disable key 27, maintaining lamp 25 and buzzer 26 deenergized. Relay BK being slow release, will not release during normal line signaling.

Relay L operated also removes the negative cathode voltage applied to the control anode of gas tube T–2 by way of the break contacts of relay L and resistor R–2. In addition, relay L operated removes the ground applied to the lower plate of condenser C–1, as shown in Fig. 1, whereby a negative pulse is applied to the junction of resistors R–1 and R–2 by way of resistor R–3 and condenser C–1. The resulting negative charge on the upper plate of condenser C–1 is slowly discharged to ground by way of resistor R–1. After approximately three minutes of idle line condition, condenser C–1 sufficiently discharges to ground to raise the voltage of the control anode of tube T–2 to the point where tube T–2 fires, drawing plate current from ground by way of the winding of relay TA, the break contacts of relay B, and the make contacts of relay L, operated, operating relay TA.

Relay TA operated completes a path from ground by way of the winding of relay A, the make contacts of normally-operated slow-to-release relay S and the make contacts of relay TA to battery operating relay A which locks by way of its own make contacts and the make contacts of relay S.

Relay A operated completes an obvious operating path for slow-to-release relay B which locks by way of its own make contacts and the break contacts of relay TM.

Relay B operated opens the previously described plate circuit for tube T–2, extinguishing the tube and releasing relay TA. The release of relay TA opens the operating path for relay A.

In addition, relay B operated removes the negative cathode battery applied to the control anode of gas tube T–1 by way of the break contacts of relay B and resistor R–5. Condenser C–2 starts to discharge towards ground by way of resistor R–4 and after approximately two seconds the voltage on the upper plate of condenser C–2 is sufficiently raised to fire tube T–1 which draws plate current from ground by way of the winding of relay TM and the make contacts of relay B operated.

Returning now to relay A operated, an obvious energizing path for step magnet 41 of the step-on release selector, generally indicated at 42, is completed via the make contacts of relay A energizing step magnet 41. The energization of step magnet 41 opens interrupter contacts 43, thus opening the operating path for normally-operated slow-to-release relay S.

When relay S releases, the previously described operating and locking paths for relay A are opened releasing relay A. The release of relay A opens the operating path for relay B and opens the energizing path for step magnet 41 which releases and steps the wipers of step-on release selector 42.

Step-on release selector 42 is provided with six arcs designated A through F and associated wipers. The wiper of arc A is connected to ground and the wipers

of arcs B through F are connected to contacts 1 through 5, respectively, of distributor 21. In the specific embodiment shown in Fig. 1, position 1 of arcs B and C are connected to line battery by way of resistor R–6 so that with the wipers on position 1, contacts 1 and 2 of the distributor 21 are connected to line battery, coding the distributor for the character A. In a similar manner, distributor 21 is coded for the characters B, C, D, E, and F when the wipers are on positions 2, 3, 4, 5, and 6, respectively. In addition, with the wipers in position 7, distributor 21 is coded for the character Carriage Return and with the wipers on position 10, distributor 21 is coded for the character Letters.

Characters A through F constitute the selection codes for the remote calling stations. It is apparent that the arcs of selector 42 may be coded in any suitable manner to poll outlying calling stations in any desired rotation. Assuming that upon the release of step magnet 41 the wipers of selector 42 step to position 1, distributor 21 is coded for character A, the selection code of the first outlying station A.

Returning now to the operation of relay TM, an obvious energizing path via the make contacts of relay TM is completed for clutch magnet 45 of distributor 21. Distributor 21 is released and impresses character A on the line and printer 22, following the line signals, prints character A. Relay TM operated also opens the previously described locking path for slow release relay B and when relay B releases it opens the previously described plate circuit of tube T–1 extinguishing tube T–1 and releasing relay TM.

Relay L is periodically being released during the transmission of the character A, maintaining the negative cathode voltage on the upper plate of condenser C–1 whereby condenser C–1 cannot discharge to fire tube T–2.

The outlying reporting station, shown in Fig. 2, is typical of the six remote stations A through F with the several exceptions noted hereafter. In the normal idle condition the loop of the half-duplex transmission line terminating in the outlying station is maintained closed by way of lead 101, the stop contacts of the distributor, generally indicated at 121, and the winding of polarized line relay RR and a path is completed from ground to battery by way of the armature and the marking or break contact of relay RR and the winding of the select magnet of the sequential selector generally indicated at 123 whereby sequential selector 123 follows all line signals.

Sequential selector 123 is similar to central station selector 23, previously described, with the exception that certain selective contacts are maintained closed by latching bars in a manner disclosed in detail in the above mentioned Zenner patent. Sequential selector 123 is provided with normally open contacts 131 through 137 which are momentarily closed when characters P, Q, U, S, X, W, and A, respectively, are applied to the line and normally open contacts 111 through 117 which are closed when characters P, Q, U, S, X, W, and A, respectively, are applied to the line and maintained closed by means of latching bars, not shown. When the character H is impressed upon the line all the latching bars are released, releasing the contacts which are latched. Contacts 111 through 116 prepare individual operating paths for relays SP, SQ, SU, SS, SX, and SW, respectively.

It is noted that contacts 117 and 137 selectively respond to the selection character A for remote station A. Each of the other remote stations are selected by their respective selection code by providing sequential selector contacts similar to contacts 117 and 137 but responsive to the impression of the selection code character individual to the respective station.

The remote station is provided with alarm switches AC1, AC2, AC3, AC4, AC5, and AC6 which have normally open contacts in the operating paths of relays DP, DQ, DU, DS, DX, and DW, respectively. Switches AC1 through AC6 are associated with individual testing or sensing apparatus, not shown, and close their normally open contacts in response to the occurrence of an alarm or trouble condition in any well known manner.

Relays DP through DW and final relay DH are in a chain sequence wherein the break contacts of each relay are in the common portion of the operating path of the relays subsequent in the chain sequence. Thus operation of relay DP precludes the operation of all the other relays by opening their common operating path by way of the break contacts of relay DP. Furthermore, if relays DP through DW are released, the operating path of relay DH is normally completed from ground by way of the break contact of relay DP, the break contacts of relay DQ, the break contacts of relay DU, the break contacts of relay DS, the break contacts of relay DX, the break contacts of relay DW, and the winding of relay DH to battery.

Assuming now that the contacts of switches AC1 and AC5 are closed due to the occurrence of their associated alarm conditions at the station, an operating path is closed from ground by way of the contacts of switch AC1 operated, the break contacts of relay SP and the winding of relay DP to battery operating relay DP. Relay DP operated opens the previously described operating paths for subsequent relays DQ through DH and completes paths from loop lead 101 to distributor contacts 2, 3, and 5 of distributor 121 by way of the three make contacts of relay DP and distributor leads DL–2, DL–3, and DL–5, thus coding distributor 121 for the character P which is the designated alarm character to indicate the alarm condition associated with switch AC1.

When station selection character A is received by the outlying station, sequential selector contacts 117 close and latch and sequential selector contacts 137 momentarily close completing a path from ground by way of contacts 137 and the winding of relay ST to battery operating relay ST which locks by way of its own make contacts and the break contacts of relay ST1.

Relay ST operated completes an obvious operating path for relay ST1 which in turn completes an obvious energizing path for clutch magnet 145 of distributor 121 releasing distributor 121 and thus sending the character P in accordance with the coding of distributor leads DL–1 through DL–5.

Relay ST1 operated also opens the locking path of relay ST. Relay ST released releases relay ST1 and relay ST1 released opens the energizing path for clutch magnet 145.

The transmission of the character P to the line is followed by sequential selector 123 which momentarily closes contact 131 and closes latching contacts 111 completing a path from ground by way of latched contacts 117, contacts 111 and the winding of relay SP to battery operating relay SP.

Relay SP operated opens the previously described operating path of relay DP by way of the break contacts of relay SP releasing relay DP. Relay SP operated also completes a path via the make contacts of relay SP shunting the break contacts of relay DP whereby a path is completed from ground by way of the make contacts of relay SP, the break contacts of relays DQ, DU, and DS, the closed contacts of switch AC5, which under the assumed condition was previously operated, the break contacts of relay SX and the winding of relay DX to battery whereby relay DX operates.

The release of relay DP further recloses the common portion of the operating paths of the relays subsequent to relay DP in the chain sequence and removes the coding of the character P from distributor leads DL–1 through DL–5 by way of the make contacts of relay DP.

Relay DX operated opens the common portion of the operating paths of relay DW and relay DH by way of the break contacts of relay DX and codes distributor leads DL–1 through DL–5 with the character X by way of the make contacts of relay DX. The character X, in this case, constitutes the code character designating the alarm condition associated with switch AC5.

Returning now to the momentary closure of sequential selector contact 131 in response to the impression of the character P on the line, a path is completed from ground by way of the latched contacts 117, momentarily closed contacts 131 and the winding of relay ST to battery operating relay ST. In the same manner as previously described, relay ST locks and operates relay ST1 which in turn energizes clutch magnet 145 to release distributor 121 which impresses the character X on the line in accordance with the coding of distributor leads DL–1 through DL–5. The operation of relay ST1 also releases relay ST, which in turn releases relay ST1 and relay ST1 released opens the energizing path for clutch magnet 145.

When the character X is transmitted to line, sequential selector contacts 135 momentarily close and sequential selector contacts 115 close and latch completing a path from ground by way of latched contacts 117, contacts 115 and the winding of relay SX to battery. Relay SX operated opens the previously described operating path for relay DX, releasing DX and completes a path via the make contacts of relay SX shunting the break contacts of relay DX whereupon the previously described operating path for relay DH is completed. Relay DX released further recloses the common operating path for relays DW and DH, and removes the coding of the character X from distributor leads DL–1 through DL–5. Relay DH operated codes distributor 121 with the character H by completing paths from loop lead 101 to contacts 3 and 5 of the distributor 121 by way of the make contacts of relay DH and leads DL–3 and DL–5 whereby distributor 121 is coded for the character H which designates the acknowledgement signal of the remote reporting station.

Returning now to the momentary operation of sequential selector contacts 135 in response to the impression of the character X on the line, a path is completed from ground via the latched sequential selector contacts 117, contacts 135, and the winding of relay ST to battery. In the manner previously described, relay ST operated operates relay ST1 which completes the energizing path for clutch magnet 145 whereupon distributor 121 is released and the character H is impressed on the line. Relay ST1 operated also opens the locking path of relay ST and relay ST released releases relay ST1 which in turn opens the energizing path for clutch magnet 145.

When the character H is impressed on the line, latching contacts 111, 115 and 117, which were previously operated, are unlatched and released, releasing relays SP and SX and returning the remote reporting station to its initial condition.

If switches AC1 and AC5 have remained operated, relay DP reoperates but the station will await the reception of its selection character A before resuming transmission. If none of switches AC1 through AC5 are operated, relay DH operates and the remote reporting station will send only the acknowledgement character H upon the reception of the selection character A, indicating no alarm conditions.

The number of alarm conditions and associated alarm switches need not be limited to the six disclosed in the present embodiment. Any number of alarm switches may be employed so long as a chain relay similar to relays DP through DW is provided for each switch and a momentarily operated contact and a latching contact are provided for each alarm code character along with an associated relay similar to relays SP through SW. The central control station should be provided with a sequential selector contact, similar to contacts 31 through 36, for each alarm code character, as will become apparent presently.

Returning now to the central control station shown in Fig. 1, the receipt of the alarm code character P is followed by polarized relay LR and printed by printer 22 in the manner previously described. In addition, sequential selector 23, which is also responsive to the line signals, momentarily closes contacts 31 in response to code character P. The momentary closure of sequential selector contacts 31 completes a path from ground by way of the wiper and position 1 of arc A of selector 42, lead 51, the back contact of skip key 61, lead 67, contacts 31 and the winding of relay AL to battery operating relay AL, which locks by way of its own make contacts and the back contacts of an alarm release key 71.

Relay AL operated completes the A.C. circuit for buzzer 26 via the buzzer disable key 27 and the make contacts of relay AL and completes the A.C. circuit for an alarm lamp 72 by way of make contacts AL. Thus, upon the reception of alarm character P by the central station, printer 22 prints the character P after the reporting station polling character A and buzzer 26 and alarm lamp 72 are energized.

Relay AL can be released by the momentary operation of alarm release key 71 with the consequent de-energization of buzzer 26 and alarm lamp 72. In addition, buzzer 26 may be maintained de-energized by the operation of the buzzer disable locking key 27.

When the alarm code character X is received by the central station it is printed by printer 22 in the same manner as previously described and sequential selector 23 momentarily closes contacts 35 completing the previously described operating path for relay AL with the exception that the path is completed by way of contacts 35 instead of contacts 31. Relay AL operated energizes buzzer 26 and alarm lamp 72 in the same manner as described previously.

When acknowledgement code character H is received at the central station, the character H is printed by printer 22 and sequential selector 23 momentarily closes contacts 37 completing a path from battery by way of contacts 37, make contacts of normally operated relay S and the winding of relay A to ground operating relay A. As previously described, relay A operated locks by way of make contacts S and its own make contacts, energizes step magnet 41 and operates relay B. The energization of step magnet 41 opens interrupter contacts 43 releasing relay S, which in turn releases relay A and relay A released opens the energizing path of step magnet 41 whereupon the wipers of selector 42 step to position 2. Tube T–1 fires two seconds after relay B operates, operating relay TM; which, in turn, completes the energizing path for clutch magnet 45 releasing distributor 21 and thereby impressing the polling character for station B on the line in accordance with the strappings of position 2 of selector 42.

It is apparent that if the acknowledgement code character was not proceeded by alarm code characters, the central station would transmit the polling character for reporting station B without the prior energization of the visible and audible alarms.

The central station now proceeds to raise the alarms in response to the reception of alarm code characters and step the selector in response to the acknowledgement code characters from stations B through F in the same manner as the reception of the alarm and acknowledgement characters from station A and after the reception of the acknowledgement code character from station F selector 42 steps to position 7, which is coded with the character Carriage Return.

In response to the impression to the character Carriage Return on the line, sequential selector 23 momentarily closes contacts 38 completing a path from battery by way

of contacts 38, make contacts of relay S and the winding of relay A to ground. The operation of relay A steps the wipers of sequential selector 42 to position 8 completing a path from ground by way of the wiper and position 8 of arc A, lead 57, make contacts of relay S operated and the winding of step magnet 41 to battery. The energization of step magnet 41 opens interrupter contacts 43, releasing relay S which, in turn, opens the energizing path for step magnet 41, stepping the wipers to position 9. An energizing path is now completed from ground by way of the wiper and position 9 of arc A, lead 57, contacts of relay S and the winding of step magnet 41, energizing step magnet 41 which opens interrupter contacts 43 releasing relay S, which, in turn, opens the energization path of step magnet 41, stepping the wipers to position 10 where distributor 21 is coded with the character Letters.

Returning now to relay A operated, relay B is operated as previously described and tube T–1 fires operating relay TM, which, in turn, energizes clutch magnet 45, releasing distributor 21 to impress the character Letters on the line.

Since the reporting stations do not respond to the character Letters, the line remains thereafter in the idle marking condition maintaining relay L operated as previously described. Tube T–2 fires after relay L has been maintained operated for about three minutes operating relay TA, which, in turn, operates relay A. Relay A operated effects the stepping of the wipers of selector 42 to position 11 and releases distributor 21 whereby the reporting stations are again polled in the same manner as previously described.

In the event that station A does not respond to the polling character within three minutes, tube T–2 fires operating relay TA. Relay TA operated completes a path from ground by way of the wiper and position 1 or 11 of arc A, lead 51, the back contact of skip key 61, lead 67, the make contacts of relay TA and the winding of relay AL to battery raising the audible and visible alarms. In addition, relay T operated completes the previously described operating path for relay A, whereby the wipers of selector 42 are stepped and the polling character for the next reporting station is transmitted to line.

Skip keys 61 through 66 are provided to omit the polling of stations A through F respectively. Assuming that it is desired to omit the polling of station B, locking key 62 is operated and when the wiper of arc A steps to position 2 or 12, a path is completed from ground by way of the wiper and position 2 or 12 of arc A, lead 52, front contacts of skip key 62, lead 57, make contacts of relay S and the winding of step magnet 41 to battery whereby selector 42 self-steps to position 3 or 13. Any other station can be omitted in the polling cycle in a similar manner by operating the skip key associated with the reporting station.

In the event of a prolonged open condition, relay L releases, releasing slow-to-release relay BK, as previously described, thereby raising the audible and visible alarms. In addition, tube T–2 cannot fire with relay L releases, whereby the station circuitry is maintained disabled until corrective action is taken.

The specific embodiment of this invention shown and described herein is by way of illustration only and should not be considered as limited thereto, but capable of modification without departing from the spirit of the invention and within the scope of the appended claims.

What is claimed is:

1. In a telegraph system, a two-way communication line, a plurality of leads, a chain of coding relays for individually coding said leads, switch means individual to each of said coding relays for operating said individual coding relay, a normally operated final relay for coding said leads, means responsive to said operated coding relay for precluding the operation of said final relay and each subsequent one of said coding relays in said chain, a normally disabled code transmitter for transmitting a sequence of signals to said line in accordance with the coding of said leads, means responsive to the reception of a signal from said line for enabling said code transmitter, and selectively operated means responsive to the transmission to said line of said sequence of signals individual to said operated coding relay for selectively releasing said operated coding relay and for enabling said code transmitter and selective means responsive to the transmission to said line of said sequence of signals individual to said final relay for releasing said selectively operated means.

2. In a telegraph system, a communication line, a plurality of leads, a chain of coding relays for individually coding said leads, switch means individual to each of said coding relays for operating said individual coding relay, means responsive to said operated coding relay for precluding the operation of each subsequent one of said coding relays in said chain, a code transmitter for transmitting signals to said line in accordance with the coding of said leads and selectively operated means responsive to the transmission to said line of said signals individual to said operated coding relay for selectively releasing said operated coding relay.

3. In a telegraph system, a two-way communication line, a plurality of leads, a chain of coding relays for individually coding said leads, switch means individual to each of said coding relays for operating said individual coding relay, means responsive to said operated coding relay for precluding the operation of each subsequent one of said coding relays in said chain, a normally disabled code transmitter for transmitting a sequence of signals to said line in accordance with the coding of said leads, means responsive to the reception of a signal from said line for enabling said code transmitter and selectively operated means responsive to the transmission to said line of said sequence of signals individual to said operated coding relay for selectively releasing said operated coding relay and enabling said code transmitter.

4. In a telegraph system, a communication line, a plurality of leads, a chain of coding relays for individually coding said leads, switch means individual to each of said coding relays for operating said individual coding relay, a normally-operated final relay for coding said leads, means responsive to said operated coding relay for precluding the operation of said final relay and each subsequent one of said coding relays in said chain, a code transmiter for transmitting signals to said line in accordance with the coding of said leads, selectively operated means responsive to the transmission to said line of said signals individual to said operated coding relay for selectively releasing said operated coding relay and disabling said precluding means and selective means responsive to the transmission to said line of said signals individual to said final relay for releasing said selectively operated means.

5. In a telegraph system, a communication line, a distributor for impressing code characters on said line, a plurality of distributor input leads, a chain of coding relays for individually coding said leads in accordance with a predetermined code character, operating means associated with each of said coding relays for operating said associated coding relay, a normally-operated final relay for coding said leads in accordance with a final code character, means responsive to the operation of said coding relay for precluding the operation of said final relay and each subsequent one of said coding relays in said chain, selectively operated means responsive to the impression of said predetermined code character on said line for selectively releasing said operated coding relay and selective means responsive to the impression of said final code character on said line for releasing said selectively operated means.

6. In a telegraph system, a communication line, a

start-stop distributor for impressing code characters on said line, start means for momentarily releasing said distributor, a plurality of distributor input leads, a chain of coding relays for individually coding said leads in accordance with a predetermined code character, operating means associated with each of said coding relays for operating said associated coding relay, a normally-operated final relay for coding said leads in accordance with a final code character, means responsive to the operation of said coding relay for precluding the operation of said final relay and each subsequent one of said coding relays in said chain, selectively operated means responsive to the impression of said predetermined code character on said

line for selectively releasing said operated coding relay and disabling said precluding means, selective means responsive to the impression of said predetermined code character on said line for enabling said start means and selective means responsive to the impression of said final code character on said line for releasing said selectively operated means.

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