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AUTOMATIC STOP FOR TELEGRAPH TRANSMITTERS

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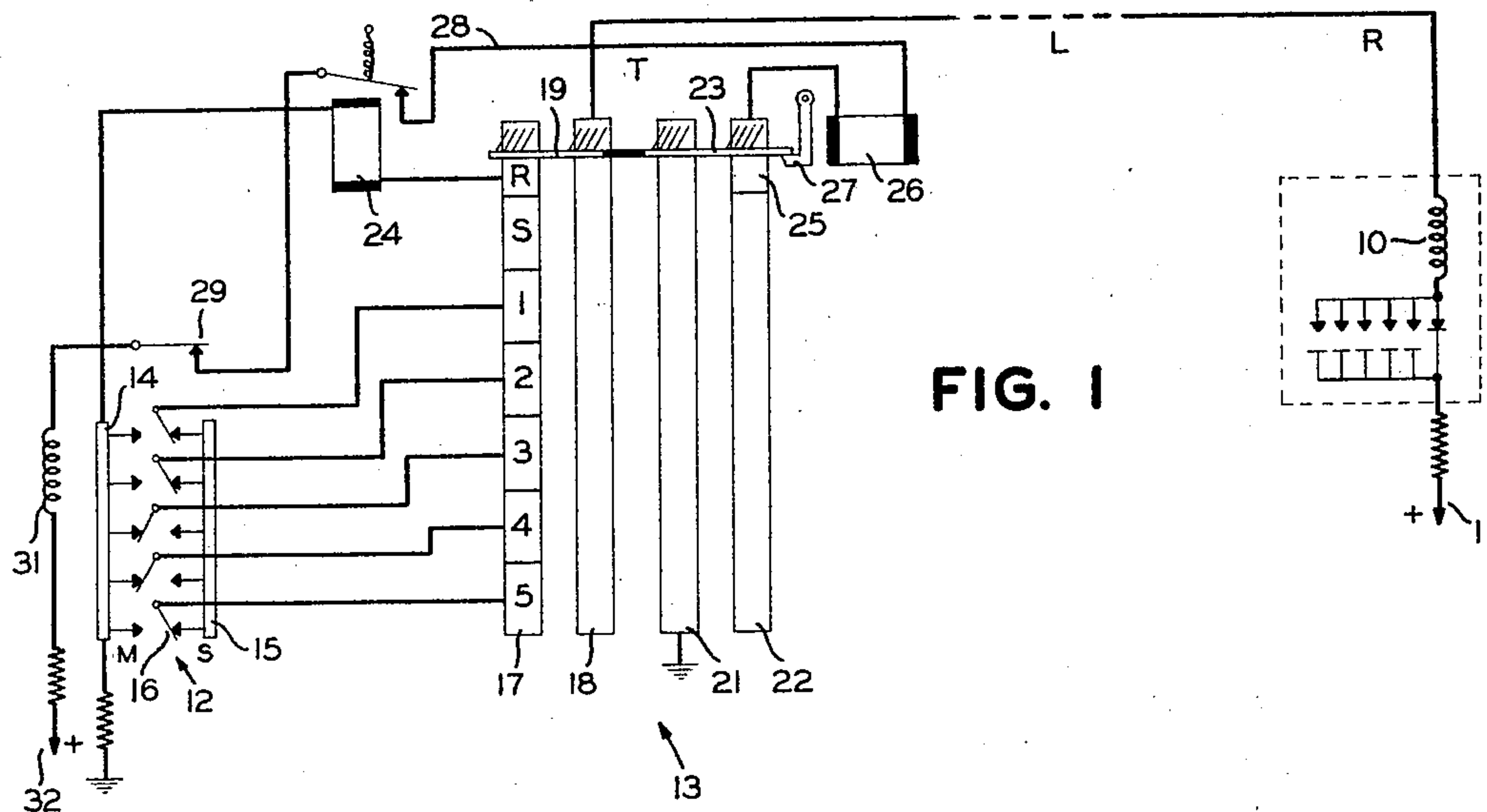


FIG. 1

FIG. 2

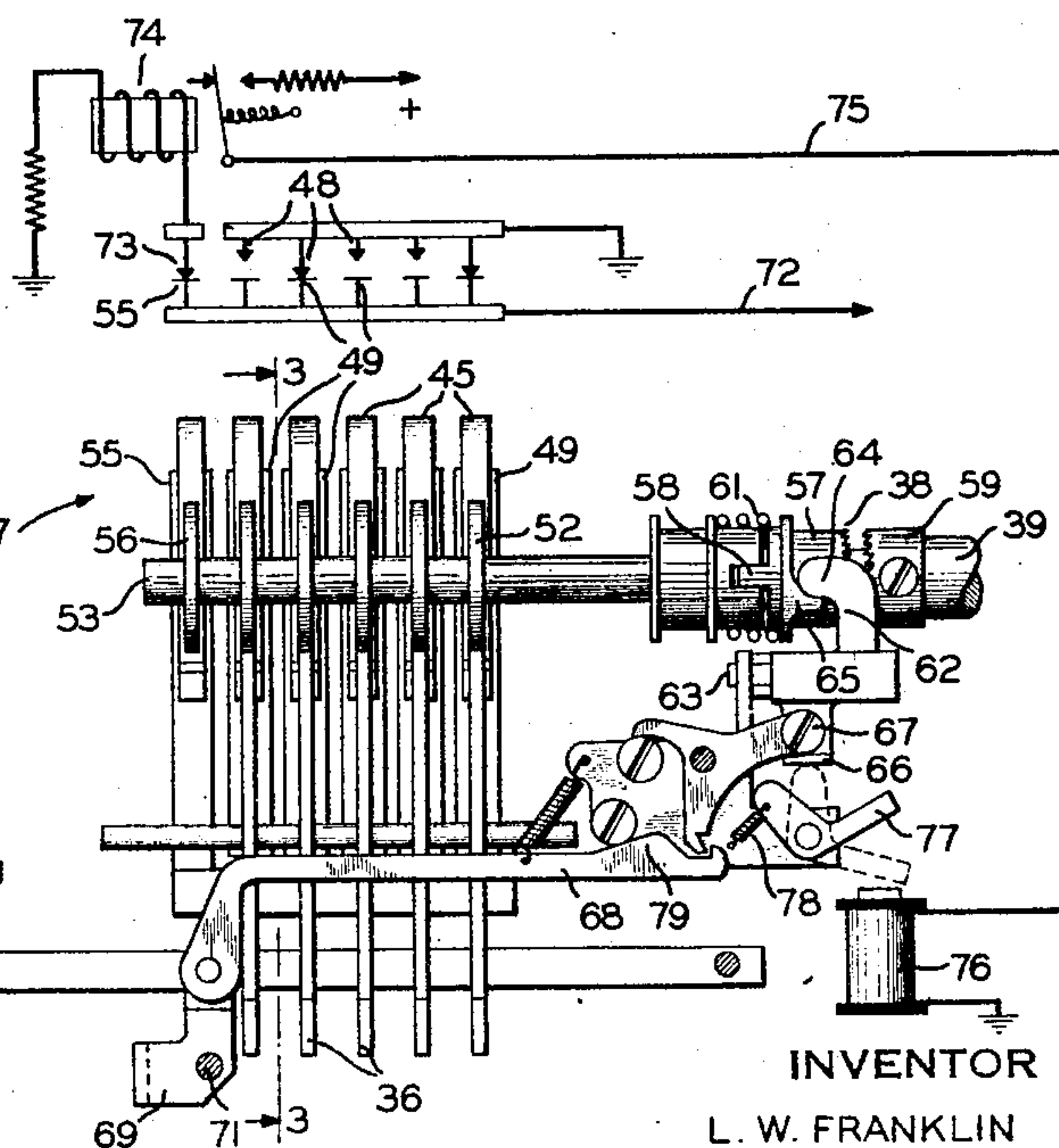
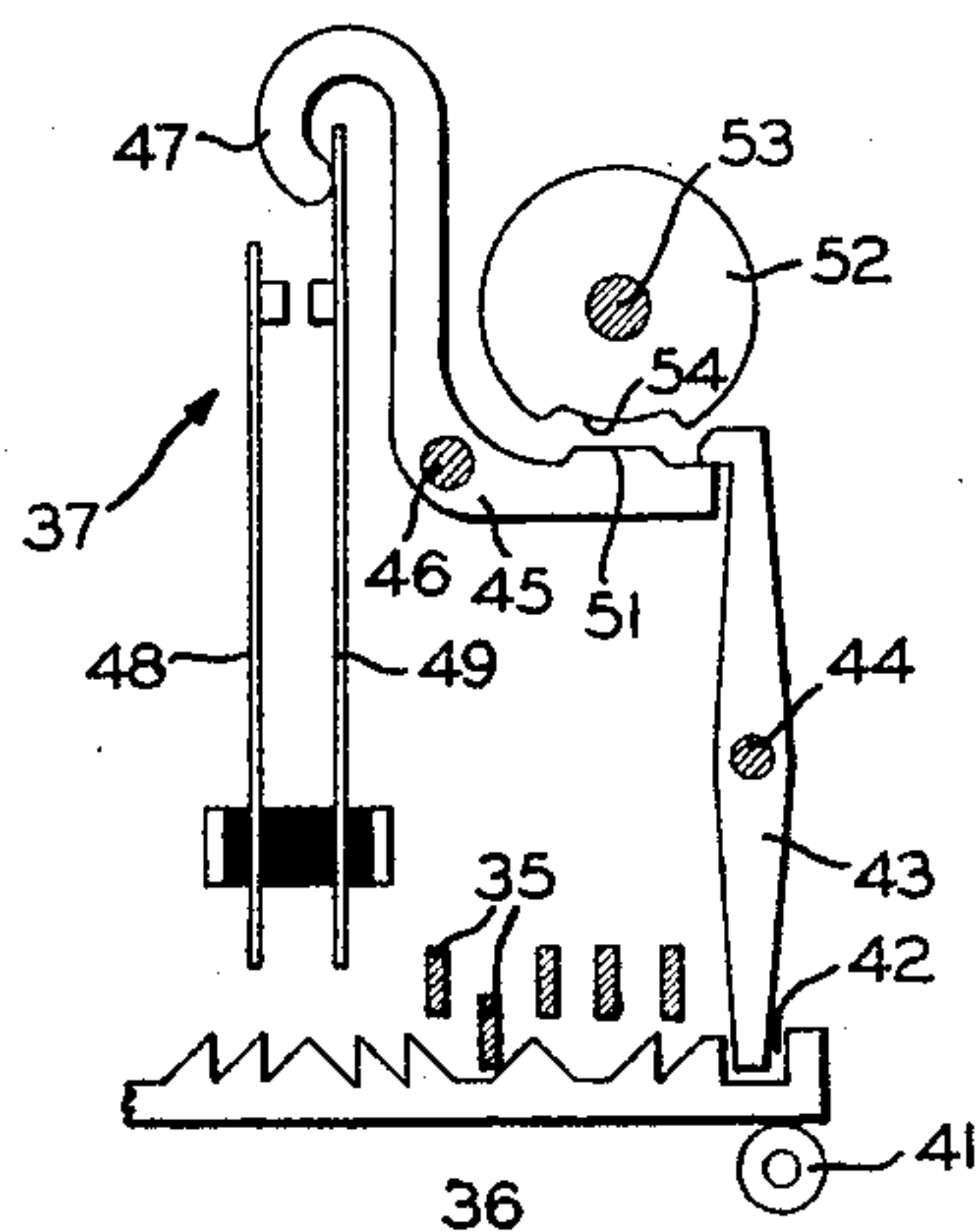


FIG. 3



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AUTOMATIC STOP FOR TELEGRAPH TRANSMITTERS

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This invention relates to a telegraph transmitting system employing either a keyboard or tape transmitter. It is described herein with particular reference to a simplex system employing a start-stop distributor, but with some modifications it may be applied to a multiplex or other type of system.

In numerous installations of telegraph equipment no printer is provided at the transmitting station for taking an outgoing record of the messages transmitted, and in such cases, if for any reason a spacing condition of the line occurs, as for instance due to an open or grounded condition of the line, the sending operator has no indication of such condition and may continue to transmit signals out over the open line for a considerable period.

The principal object of the present invention is to provide an arrangement for use in such instances which will automatically stop the operation of the telegraph transmitting apparatus if a spacing condition occurs on the line at any point other than at the contacts of the transmitter, thereby preventing the sending of messages to the wind, unbeknown to the transmitting operator or attendant.

Another object is to permit the attendant at the receiving station to interrupt the transmission, as for instance, if the receiving apparatus becomes defective or fails to correctly respond to the signal impulses.

Another object is to cause the locking up of the transmitting apparatus to occur at the end of the transmission of a character code combination of impulses.

Other objects and advantages of the invention will hereinafter appear.

In accordance with one embodiment of the invention, I employ a telegraph tape transmitter in connection with a start-stop distributor for transmitting intelligence over the outgoing line. The brush of the start-stop distributor is normally held stationary in the rest position by a starting magnet. The circuit for the starting magnet, when the transmitter is operating, is completed as the brush reaches its rest position, thereby releasing the brush for the succeeding revolution.

This circuit includes a stepping magnet for the tape transmitter, thereby causing a new character to be set up in the transmitter at the time the brush starts its cycle of operation. Also in circuit with the starting magnet are the contacts of an autocontrol mechanism which serves, when the tape approaching the tape transmitter is reduced to a predetermined amount, to interrupt the circuit so as to prevent further operation of the distributor until additional tape is supplied. I also include in this same circuit, the contacts of a relay which is arranged so as to be responsive to a spacing condition of the line circuit occurring from any cause other than the normal operation of the transmitter, to interrupt the circuit and thus render the distributor inoperative as long as the open line condition continues.

In another modification embodying a manual keyboard transmitter, the control mechanism is so arranged as to positively lock up the keyboard transmitter and prevent further operation thereof when the open line or spacing condition occurs. Preferably, I apply battery to the system at the distant or receiving end so that a grounded condition of the line will also cause the control mechanism to be actuated to interrupt the transmission.

In order that the invention may be more fully understood, reference will be had to the accompanying drawing, in which:

Figure 1 is a circuit diagram showing the invention applied to an automatic distributor transmitter;

Figure 2 shows the invention applied to a manual keyboard transmitter; and

Figure 3 is a section on the line 3—3 of Figure 2.

Referring first to Figure 1, there is shown a transmitting station T and a receiving station R connected by a line L. At the receiving station a printing telegraph machine 10 is shown diagrammatically, battery being applied from a source of potential 11 through the operating winding of the machine to the line L.

At the transmitting station T, I provide a tape transmitter 12, which may be of the

type disclosed in patent to G. R. Benjamin, Serial No. 1,298,440, granted March 25, 1919, and a start-stop distributor 13. The tape transmitter 12 is shown diagrammatically as having a group of five marking contacts M connected to a grounded bus bar 14 and a similar group of spacing contacts S connected to an insulated bus bar 15. Each set of marking and spacing contacts is provided with a tongue 16 adapted to be positioned against one or the other of its contacts in accordance with a code combination represented by the perforations in the tape.

The start-stop distributor 13 has a pair of transmitting rings 17 and 18 traversed by a brush 19 and a pair of local rings 21 and 22 traversed by a brush 23. The transmitting ring 17 is provided with a rest segment R, a start segment S, and five code segments 1 to 5. The rest segment R is connected through the winding of a relay 24, to the grounded bus bar 14, and the code segments 1 to 5 are connected individually to the tongues of the tape transmitter. The solid transmitting ring 18 is connected to the line L. The solid local ring 21 is grounded and the ring 22 is provided with a single segment 25 disposed opposite the rest segment R and connected to one terminal of a start magnet 26. The brushes 19 and 23 are normally held at rest on the segments R and 25, respectively, by a latch 27.

When the brush 19 is in engagement with the rest segment R, a circuit is completed from the battery 11 over the line L, ring 18 of the distributor, brush 19, rest segment R, and winding of relay 24, to the grounded bus bar 14, thereby maintaining the contacts of relay 24 closed. With the transmitter operating normally, that is, with contacts 29 and the contacts of relay 24 closed, a circuit is completed for the start magnet 26 each time the brush comes to rest in the position shown, this circuit being traced from ground at ring 21, through brush 23, segment 25 of ring 22, winding of the start magnet 26, conductor 28, front contact and tongue of the relay 24, contact and tongue 29 of an auto-control mechanism not shown, and winding 31 of a tape stepping magnet, to battery at 32. At the time this circuit is completed, the tape is advanced through the tape transmitter by means of the stepping magnet 31, to set up a new combination on the contacts of the transmitter and start magnet 26 is energized to release the brushes 19 and 23 to make a revolution. As the brush 23 passes off the live segment 25, the start magnet 26 is de-energized, releasing the latch 27 so that it will be positioned to stop the brush at the end of the revolution.

When sufficient tape is being supplied to the tape transmitter, the autocontrol contacts 29 are held closed, but if for any reason the tape supply becomes nearly exhausted, the in-

creased tension on the tape serves to open contacts 29, thereby interrupting the circuit to the tape stepping magnet 31 and to the start magnet 26, so as to cause the brushes to come to rest at the end of the transmission of a character. As soon as additional tape is supplied to the tape transmitter, the contacts 29 again close, permitting the transmission to continue.

If for any reason the line L should become open or grounded other than at the contacts of the tape transmitter, the circuit to the relay 24 will not be completed over the line circuit, as the brush 19 passes onto the segment R and as a consequence, its contacts will remain open at this time, thus preventing the operation of the stepping magnet 31 and start magnet 26. The transmitting apparatus is therefore brought to rest, in which condition it remains as long as the open line condition continues. Thus for instance, if the attendant at the station R desires to interrupt the transmission, as for the purpose of adjusting or repairing the receiving printer, he may do so by merely opening the line and after the adjustment has been made, he may cause the transmission to continue by again closing the line circuit.

It will be noted that the relay 24 is not included in the line circuit during the time of the transmission of the code impulses from the transmitting contacts and therefore does not add any inductance to the line at this time. Consequently, it does not affect the margin of the receiving printer. If an open line condition occurs during the period of transmission of a signal, the distributor comes to rest at the end of the character then being transmitted so that only a single character will be lost.

Obviously, in place of the tape transmitter, I may employ any other type of automatic transmitter, such as a metallic storage transmitter of the type shown in patent to Wheeler et al., Serial No. 1,776,167, granted March 9, 1926. For simplicity of illustration I have shown the distributor 13 as comprising a segmented face plate having rotating brushes, but it is to be understood that in place thereof I may employ a cam operated distributor such as that shown in patent to Rothermel, Serial No. 1,805,374, granted May 12, 1931. With this latter type of transmitter, the marking and spacing conditions are applied to a series of contacts by means of a tape or metallic storage transmitter, which contacts are closed in succession by a revolving cam, driven from a continuously operating motor, through a clutch mechanism. The clutch is released for engagement during each revolution of the cam shaft by a stop arm which, in applying my invention to this type of distributor, may be operated by a magnet connected in cir-

cuit in the same manner as the start magnet 26.

The relay 24 has been shown as a neutral relay but obviously it may be polarized and arranged to respond to a spacing condition of any nature, either open line or of either polarity to interrupt the circuit to the start magnet 26.

In Figures 2 and 3 I have shown the present invention applied to a keyboard transmitter of the general type shown in patent to Krum, Serial No. 1,595,472, granted August 10, 1926, only such features of the machine being illustrated as are essential for a proper understanding of the invention.

Briefly the keyboard transmitter includes a bank of key levers 35, a number of notched selector bars 36, adapted to be engaged by the key levers when depressed, a contact mechanism indicated generally at 37, for setting up the selected signal combination and a clutch 38 by which the contact mechanism is operated from a constantly rotating shaft 39, driven from a suitable motor, not shown.

The selector bars, five in number in the present case, extend across the width of the keyboard beneath the key levers and are provided with triangular notches according to the requirement of the signal code so that they will be moved sideways over rollers 41, either to the right or to the left, when the key lever strikes the slanting sides of the notches. At the righthand end of each selector bar is a slot 42 in which one end of a vertical locking latch 43 is set. The latch is pivoted at 44 so that when the corresponding selector bar is moved to the right, the upper end of the latch engages the horizontal arm of a contact lever 45, one of which is provided for each selector bar. The lever 45 is pivoted at 46 and the vertical arm thereof has a hooked end 47 engaging one of a pair of contacts 48 and 49. The contact levers, in combination with the locking latches control the transmitting contacts 48 and 49, which are normally held open by the contact lever against the tension of the spring contact 49.

The horizontal arm of each contact lever 45 has a hump 51 thereon, engaging the periphery of a cam 52 mounted upon a shaft 53. The cam has a depression 54, which, when opposite the hump 51, permits the lever to rock under the pressure of the spring contact 49 to close the contacts 48 and 49, provided they are not held open by the locking latch 43. There is an individual cam 52 for each contact lever, arranged so that the depressions 54 come opposite the humps 51 successively. By permitting certain of the contacts to close and others to remain open as the cams revolve, the desired intelligence signal is formed. In addition to the contacts and contact levers corresponding to the selector bars 36, there is an additional con-

tact lever 55 and operating cam 56 for controlling the transmission of the start-stop impulses preceding and following the signal combination. This latter element is disposed at the left end of the group of contacts shown in Figure 2.

The cam shaft 53 is normally at rest and is permitted to make one complete revolution, by means of the ratchet clutch 38, for each signal combination set up. The driven ratchet 57 of the clutch is keyed to the cam shaft by the key and slot 58 so as to be movable longitudinally into engagement with the driving ratchet 59 by a spring 61. The clutch faces are normally held out of engagement by a clutch stop arm 62 pivoted below the shaft at 63 and having a curved end 64 extending into the path of a collar 65 of the driven ratchet 57. Stop arm 62 has a horizontal extension 66 which is engaged by a pivoted pawl 67 operated by a trip pawl 68 to which is connected a universal bar 69 extending beneath the key levers, so as to be engaged by each key lever as it is depressed. The universal bar 69 is pivoted at 71 and upon downward movement thereof it rocks the pawl 67 through the link 68 and thereby moves the stop arm 62 out of engagement with the driven ratchet of the clutch, permitting the clutch faces to engage and causing the cam shaft to make one complete revolution. At the end of the revolution the clutch stop arm forces the driven ratchet out of engagement with the driving ratchet, so that the cam shaft comes to rest.

The code contacts 49 and rest contact 55 are connected directly to the simplex line 72 which in the present instance is assumed to have battery applied to it at the distant station. The code contacts 48 are connected through a resistance to ground and the opposite rest contact 73 is connected to ground through the winding of a control relay 74. The back contact of relay 74 is insulated and the front contact is connected to a source of potential. The tongue of the relay is joined by a conductor 75 to one terminal of the winding of a locking magnet 76, the opposite terminal of which is grounded. A latch 77 is pivoted beneath the horizontal extension 66 of the stop arm 62 and is normally held out of the path of such extension by a spring 78. The latch is arranged to be attracted by the magnet 76, when energized, so as to position the upwardly extending arm of the latch beneath the extension 66 and thereby prevent release of the stop arm.

In normal operation with the cam shaft at rest, the rest contacts 55 and 73 are closed, thereby completing a circuit from the line through relay 74 so as to hold the relay tongue on its insulated contact, maintaining the magnet 76 de-energized. In this condition when one of the key levers is depressed, the stop arm 62 is rocked to permit engage-

ment of the clutch and consequent rotation of the cam shaft, to transmit to the line the code signal corresponding to the depressed key. Due to the cam face 79 of the trip pawl 68, the pivoted pawl 67 is released immediately after actuating the stop arm 62 so as to permit the stop arm to return to its normal position to disengage the clutch at the end of the revolution. As the cam shaft revolves, the rest contacts are opened, thus de-energizing the relay 74 and applying battery to the locking magnet 76 so as to position the latch 77 beneath the extension 66 of the stop arm 62, thereby locking the same in stopping position until the end of the revolution, at which time the rest contacts again close, operating the relay 74 and releasing the locking magnet 76. Another key may then be depressed to transmit the succeeding code combination. However, if at any time the line becomes open, other than through the transmitting contacts, the relay 74 will remain unenergized upon the closing of the rest contacts as the cam shaft comes to rest at the end of a character. Consequently, the locking magnet 76 will hold the latch 77 in such position beneath the extension of the stop arm 62 so as to prevent the movement thereof away from the cam shaft, and consequently the transmitter will be locked against further operation. As soon as the open line condition has been remedied, relay 74 will again operate to release the locking magnet 76 to unlock the transmitter. Normal transmission may then be resumed.

It is obvious, of course, that the locking mechanism may be applied to other parts of the transmitter, as for instance, directly to the key levers, and numerous other changes and modifications may be made without departing from the invention, and therefore, I do not desire to be limited to the exact details shown and described.

What I claim is:

1. In a telegraph system, a line circuit, a transmitting apparatus associated with said line circuit comprising a tape transmitter, a start-stop distributor having a normal rest position and means responsive to an interruption in the continuity of said line circuit for locking up said start-stop distributor in its normal rest position.

2. In a telegraph system, a line circuit, a transmitting apparatus including a start-stop distributor, having a rest position and a relay having its winding arranged in said line circuit when said distributor is in its rest position, said relay serving in case an open circuit condition obtains when the distributor is in rest position, to prevent operation of said transmitting apparatus.

3. In a telegraph system, a line circuit, a transmitting apparatus associated with said line circuit and a relay having its winding in said line circuit and serving when an in-

terruption in the continuity of the line circuit occurs, other than that occasioned by the normal operation of the transmitting apparatus, to lock up said transmitting apparatus so as to preclude further operations thereof.

4. In a telegraph system, a line circuit, a manual transmitter associated with said line circuit, a plurality of key levers for said transmitter, a transmitting apparatus controlled by said levers for sending code combinations of impulses over the line circuit, and means responsive to an interruption in the continuity of the line circuit, other than that occasioned by the transmitting apparatus, for locking said transmitter so as to preclude further operations thereof as long as said interruption of the line circuit continues.

5. In a telegraph system, a line circuit, a transmitting apparatus connected to said line circuit comprising a tape transmitter, a start-stop distributor and a start magnet for said distributor, a circuit for said start magnet and a relay having its input circuit associated with said line circuit for interrupting the circuit to said start magnet when spacing conditions occur on said line other than those occasioned by the transmitting apparatus.

6. In a telegraph system, a line circuit, a transmitting apparatus connected in said line circuit, said transmitting apparatus having a rest contact and a plurality of code contacts and means in series with said rest contact and independent of said code contacts for interrupting the operation of said transmitting apparatus when a predetermined condition of said line circuit occurs.

7. In a telegraph system, a line circuit, a transmitting apparatus connected therein and comprising a storage transmitter, a stepping magnet therefor, a distributor, a start magnet for said distributor and means controlled by a spacing condition of said line circuit for interrupting the circuit to said stepping and start magnets.

8. In a telegraph system, a line circuit, a transmitting apparatus connected therein and comprising a storage transmitter, a stepping magnet therefor, a distributor, having a rest contact, a start magnet for said distributor and a relay having its winding associated with said line circuit and its contacts in circuit with said stepping and start magnets and rest contact, said relay being responsive to an open line condition, occurring when said distributor is on its rest contact, to interrupt the circuit to said stepping and start magnets.

In testimony whereof I affix my signature.

LAURENCE W. FRANKLIN.