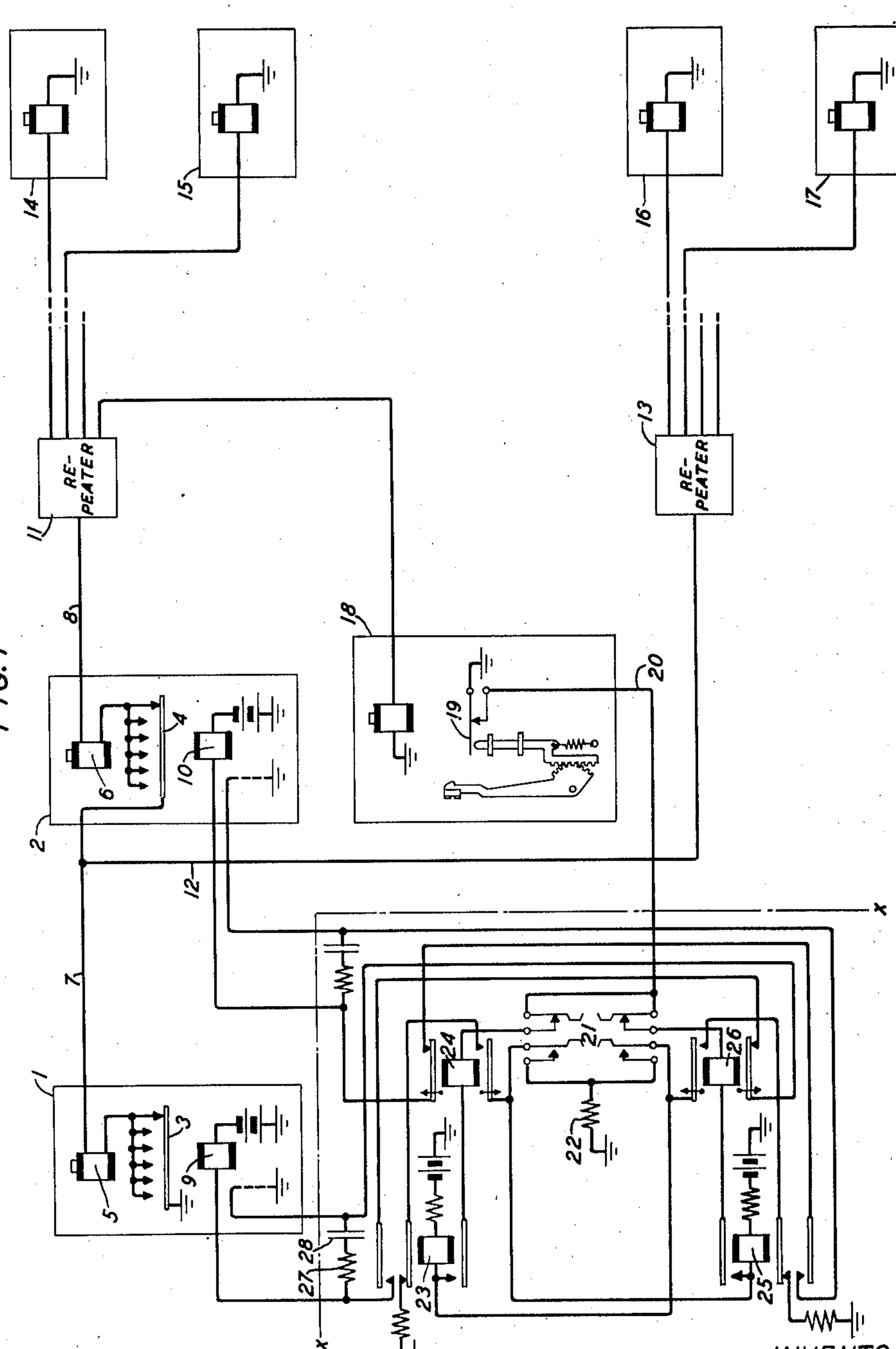
Oct. 27, 1942. E. O. GAMMELL 2,300,045

TELETYPEWRITER SYSTEM

Filed March 19, 1940 2 Sheets-Sheet 1

FIG. 1



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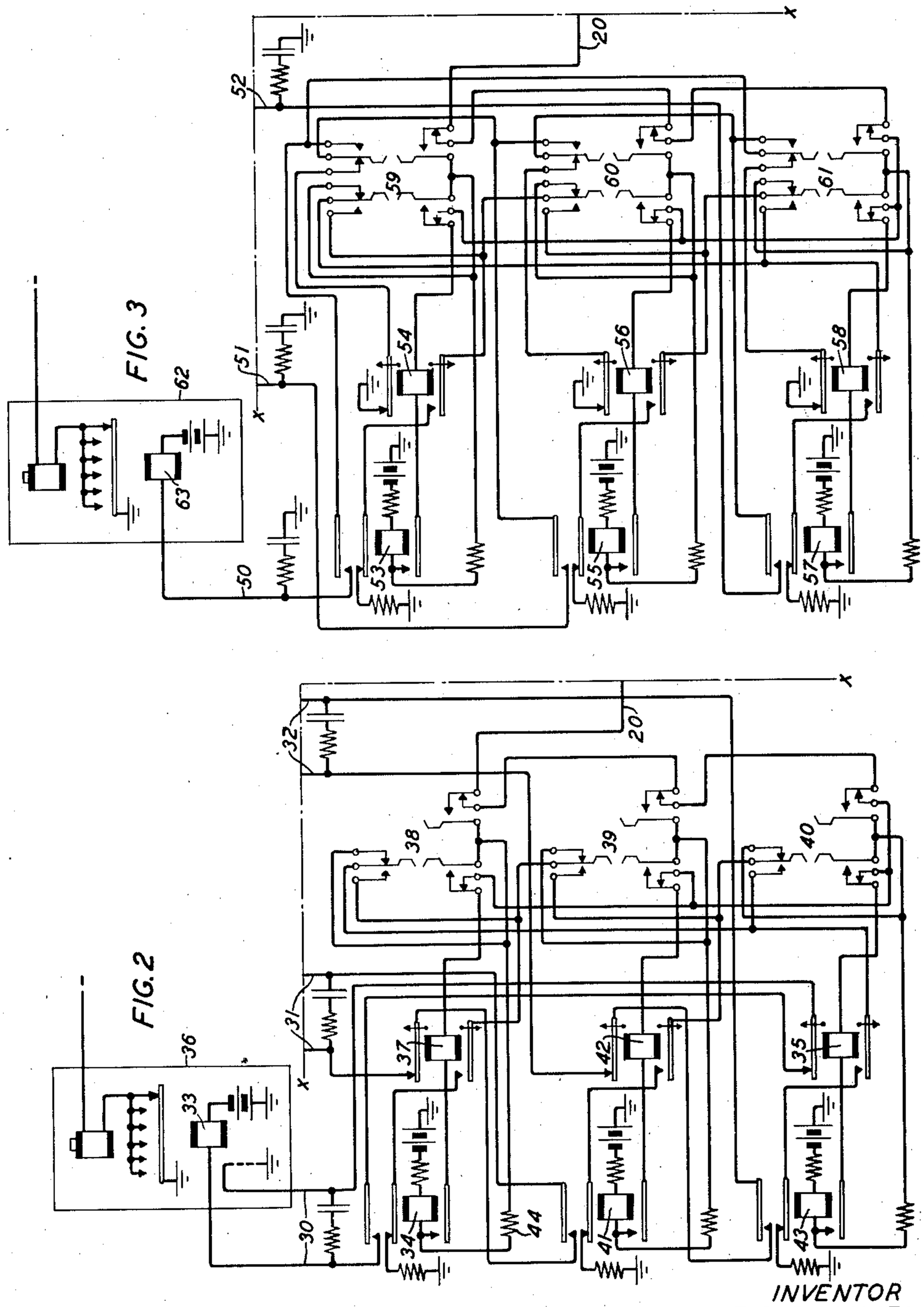

Patented Oct. 27, 1942

2,300,045

UNITED STATES PATENT OFFICE

2,300,045

TELETYPEWRITER SYSTEM

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Application March 19, 1940, Serial No. 324,888

14 Claims. (Cl. 178—2)

This invention relates to communication systems and particularly to systems for the distribution of intelligence to receiving devices where it is recorded for display.

The general object of the invention is to provide means for automatically switching from one transmitter provided for distributing one type of intelligence to another distributing another type of intelligence. A more specific object is to provide means for preventing mutilation of signals during the automatic switchover from one transmitter to another.

Heretofore service has been provided for the dissemination of news items to many points where it is received on an electrical printer, and then displayed either on a tape as a continuous line or a wide tape in the form of an elongated page. In accordance with the present invention additional transmitters are provided and automatic means are used to switch from one to the other when transmittable matter runs low so that the receiving printers will at no time become idle. One use for such an arrangement is to provide a primary transmitter for sending out news items and a secondary transmitter for sending out advertising matter so that when the news items become exhausted the time of the printer may be occupied with advertising matter until more news items are ready for distribution. Or it may be arranged that an advertising item is interpolated in the news at regular intervals or between each given number of news items. According to the present invention a circuit arrangement is provided so that different classes of service may be provided from two or more of such automatically operating transmitters, one service for instance to subscribers who are willing to receive both news and advertising items and another service to subscribers who are willing to receive news items only.

In accordance with this invention slow operating means are provided for preventing the mutilation of signals at the automatic switchover from one transmitter to another. It is well known that in receiving devices of the nature here employed the code for the next character is being received during the time that the type bar is in movement for printing a character and in like manner when a code is used to actuate a contact set that such contact set is not actuated and does not effect a functional operation until the succeeding code is well advanced in its reception. In cases similar to the present where a switching arrangement is controlled by a code actuated contact it is necessary that the start of transmission of the newly cut in transmitter be delayed until the first transmitter be stopped. If the transfer were instantaneous upon the operation of the code actuated contact then the start of transmission of the newly cut in transmitter would be mixed with code impulses still being sent from the transmitter just being cut out of service. Hence a slow releasing relay is provided which does not allow the newly cut in transmitter to begin operation for a predetermined time after the circuit change for cutting the first transmitter out of service has been made.

Another feature of the invention is the use of a common code actuated contact for causing the automatic switching operation to take place. In similar arrangements such for instance as that disclosed in Patent No. 1,870,352, issued August 9, 1932, to E. F. Watson, it was necessary to employ an individual code actuated contact for each transmitter, which meant practically that an expensive receiving device had to be associated with each transmitter whether used as such or not.

Applicant achieves economy both in first cost and maintenance and more dependable operation by employing a single code responsive contact arrangement. In practice this contact arrangement may be placed on a monitoring receiver connected to the outgoing lines to those receivers which respond to the full outgoing transmission.

In accordance with another feature of the invention a plurality of transmitters and a plurality of various types of service may be provided. For instance one transmitter might be provided for news items of international interest, another for news items of local interest, another for news items of sporting events, another for items of nationally distributed advertising, another for items of locally distributed advertising, another for items regarding charitable appeals and so forth and so on and the output of these transmitters might be sent out to various subscribers in a large number of combinations.

Another feature of the invention is a manual switch for transferring from one transmitter to another by temporary actuation or for causing the continuous use of one transmitter or another under continuous actuation. There may be times when important news items are ready for transmission when it will be deemed expedient to delay one or more advertising items in favor of news items or in times of great activity it

may be deemed expedient to give over all the time to news items. For the immediate insertion of a single important news item the above-mentioned manual switch may be temporarily actuated if the advertising transmitter is in operation whereupon the news transmitter will immediately come into action and the advertising item will be cut off before its normal ending. For continuous transmission of either news or advertising items the said manual switch may be left operated in one or the other of its transferring positions whereupon the automatic transfer feature is disabled.

The drawings comprise two sheets of circuit diagram, partly in schematic form;

Figure 1 shows the invention applied to two transmitters with an automatic transfer circuit for alternately placing these transmitters in operative condition;

Fig. 2 shows a means whereby three transmitters may be alternately rendered operative and is representative of an arrangement whereby an unlimited number of transmitters may be used; and

Fig. 3 is an extension of the circuit shown in Fig. 2; in this circuit there are means for delaying the start of a newly switched on transmitter even though one or more transmitters are rendered idle by their corresponding manual switching means.

In Fig. 1 the rectangle 1 and the rectangle 2 represent teletypewriters equipped with transmitting contacts 3 and 4, respectively, and with receiving means 5 and 6, respectively. These receiving means may be omitted entirely so that the circuit will extend from the ground through the transmitting contacts 3 directly to the line 7, thence through the transmitting contacts 4 directly to the line 8. In each of the rectangles 1 and 2 is shown a magnet 9 and 10, respectively, whose function it is to render the transmitting contacts effective.

When the magnet 9 is operated, the transmitting contacts 3 are effective and transmission from this point will go out over the line 7 and thence divide into two parallel paths, one leading through the transmitting contacts 4 and the line 8 to the repeater 11 and the other leading over the line 12 to the repeater 13. The repeaters 11 and 13 are well known and are used for the purpose of distributing the transmission coming in over lines 8 and 12, respectively, to a large number of subscribers having receiving apparatus such as those indicated by the rectangles 14, 15, 16 and 17. Thus, when the magnet 9 is energized, all of the receiving devices 14 to 17, as well as a monitoring device 18, will be operated.

When the automatic transfer circuit shown below and to the left of the broken line x—x causes the deenergization of magnet 9 and the energization of magnet 10, then the repeater 13 will remain unoperated since the circuit over line 7 and the now inoperative transmitting contacts 3 to the ground is effectively a ground on line 12. With magnet 10 energized transmitting contacts 4 are effective and transmission from this point will go out over line 8 to repeater 11. Thus, the monitoring receiver 18 and receiving devices 14 and 15 will respond to the transmission from both transmitters 1 and 2. When this system is used, the end of an item or a series of items is signalized by the transmission of a particular code, for example, upper case H may be the signal used. This will result in the operation of the contact 19 which will momentarily remove ground from conductor 20.

If this system is to be started in operation, the key 21 may be momentarily operated either upwardly or downwardly. By way of example, suppose the key is moved so that its lower contacts are momentarily operated. Thereupon a circuit will be established from ground, resistance 22, the left-hand lower contacts of key 21, winding of relay 23 to battery. Relay 23 operates and locks through its lower armature and front contact through the winding of relay 24, the normally closed upper right-hand contacts of key 21, over the conductor 20 and through the contact 19 of the monitoring teletypewriter 18 to ground. Since it only takes a momentary operation of the key 22 to establish this connection, we will now assume that the key has been returned to its normal position. With relay 23 operated, a circuit may be traced from battery, the magnet 9 through the front contact and upper outer armature of relay 23, the back contact and lower armature of relay 26 to ground within the rectangle 1. The transmitting contacts 3 are rendered operative and both repeaters 11 and 13 will respond, thus distributing items of intelligence to all the subscriber sets 14 to 17, inclusive. At the end of an item being distributed or at the end of several items, the code for upper case H is transmitted, whereupon the contact 19 is momentarily opened, thus causing relay 23 to become deenergized. Relay 24 will also become deenergized but, due to its slow releasing construction, it will not immediately move its armatures to their normal positions. Upon the deenergization of relay 23 the magnet 9 will become deenergized, the resistance 27 and condenser 28 acting to minimize sparking at the contacts of relay 23.

During the period that relay 23 is deenergized and relay 24 still maintains its armatures in their operated positions, a circuit is established from ground, back contact and inner upper armature of relay 23, the front contact and lower armature of relay 24, the winding of relay 25 to battery. Relay 25 locks through its front contact and upper armature through the winding of relay 26, the lower right-hand contacts of key 21, over the line 20 and the contacts 19 to ground. The operation of relay 25 would normally close the circuit for the energization of magnet 10, but this is momentarily prevented through the slow-releasing construction of relay 24 and it is not until this relay returns its armatures to their normal position that magnet 10 is operated. At that time the circuit may be traced from battery through magnet 10, the upper armature and back contact of relay 24, the front contact and lowermost armature of relay 25 back to ground in the rectangle 2.

This delayed start of magnet 10 is provided to prevent multilation of a code combination since it is well known that there is a slight time delay in the receiving teletypewriters between the actual receipt of the code impulses and the printing operation. If this delay were not provided, then the last code combination being sent out by the transmitting contacts 3 might be mutilated by the first operation of the transmitting contacts 4.

During the operation of the transmitting contacts 4 only teletypewriters connected to the repeater 11 will be operated.

When the contact 19 is next operated, relays 25 and 26 will become deenergized and relays 23

and 24 will be energized in the same manner as described above in relation to the automatic transfer to the relays 25 and 26.

Should it be expedient to cause the transmitter 1 to operate continuously, the automatic transfer feature may be rendered inoperative by the movement of the key 21 downwardly where it will be left until some other change is to be made. In this case, if upper case H should be transmitted and contact 19 therefore momentarily opened, relay 23 would not become deenergized although the circuit for relay 24 would be momentarily opened. This relay, however, being slow to release could not respond before it again becomes energized through the release of contact 19 to normal.

The circuit in Fig. 2 may be fitted into the remainder of the circuit of Fig. 1, as indicated by the broken line x—x. In this case, three enabling circuits 30, 31 and 32 are provided. If we assume that the enabling circuit 30 is in operative condition, then a circuit may be traced from battery, the magnet 33, the front contact and upper outer armature of relay 34, the back contact and upper armature of relay 35, to ground within the rectangle 36. Relay 37 will also be operated. Now when ground is temporarily removed from conductor 20, which ground extends through the normally closed lower right-hand contacts of keys 38, 39 and 40 in series and thence through the normally closed contacts of the lower left-hand contacts of key 38 to the winding of relay 37 and the locking circuit of relay 34, relay 34 becomes deenergized and in time relay 37 moves its armatures to their normal position. Upon the deenergization of relay 34, the winding of magnet 33 will be opened and this magnet will become deenergized. During the period where relay 34 is deenergized and relay 37, due to its slow-release construction has not moved its armatures to their normal positions, a circuit is established from ground through back contact and inner upper armature of relay 34, the front contact and lower armature of relay 37, the normal contacts of the upper left-hand set of contacts of key 39, winding of relay 41 to battery. Relay 41 becomes energized and locks through its front contacts and lower armature and the winding of relay 42, the normally closed contacts of the lower left-hand set of contacts of key 39 and thence in series through the normally closed contacts of the lower right-hand set of contacts of keys 40, 39, and 38 in series to the ground on conductor 20. Thus, upon the deenergization of the pair of relays 34 and 37, the pair of relays 41 and 42 will automatically become energized and this will result in the enabling of circuit 31 after the slow-releasing relay 37 becomes fully deenergized.

In like manner, upon the receipt of the next momentary removal of ground from conductor 20, the pair of relays 41 and 42 will become deenergized and in so doing will cause the automatic energization of the pair of relays 43 and 35 and the enabling of circuit 32.

If the circuit 31, for instance, is to be left out of operation continuously, then the key 39 is operated so that its upper left-hand contacts are moved. Therefore, when relay 34 becomes deenergized, but before relay 37 moves its armatures to their normal positions, a circuit is established from ground, the back contacts and upper inner armature of relay 34, the front contacts and lower armature of relay 37, the alternate contacts of the upper left-hand set of contacts of key 39, the normal contacts of the upper left-hand set of contacts of key 40, winding of relay 43 to battery. Thus, with key 39 moved upwardly, the pair of relays 43 and 35 will become energized upon the deenergization of the pair 34 and 37 and circuit 32 will become enabled instead of circuit 31.

Should it be desired to cause the continued enabling of circuit 30, then the key 38 is moved downwardly. Thereupon ground on conductor 20 is connected directly to the relay 37 and through the resistance 44 to the relay 34. This will cause the energization of the relays 34 and 37 continuously since the ground for the locking circuits of the other two circuits has been opened at the contacts of the lower right-hand set of contacts of key 38.

Any one of the circuits 30, 31 and 32 may be enabled through the momentary movement of the corresponding keys 38, 39 and 40 downwardly.

Fig. 3 shows a similar arrangement with circuits 50, 51 and 52 which may be sequentially enabled through the automatic operation of the transfer circuit or may be controlled by corresponding keys. A set of relays 53 and 54 control the circuit 50, a set of relays 55 and 56 control the circuit 51, and a set of relays 57 and 58 control the circuit 52. Keys 59, 60 and 61, respectively, correspond to circuits 50, 51 and 52. In this figure only a single line extending into the teletypewriter 62 and magnet 63 therein is shown. The ground circuit is provided at the back contact of the upper armatures of relays 54 and 56 and 58 and since this is a common ground, it may be used to properly operate the magnet 63. It may also be noted that the lead from the magnet 63 running to the battery may be brought out of the teletypewriter and attached to a common source of current.

In this arrangement a slow releasing relay normally is arranged to hold circuit 51 open after it has been closed by the relay 55 until the slow releasing relay 54 is fully released. That is, relay 54 controls the delayed start of the next in order transmitter enabling circuit 51 similarly relay 56 delays the start of the next in order transmitter enabling circuit 52 and relay 58 delays the start of the next in order enabling circuit 50. By the provision of the contact arrangement provided through the upper right-hand contacts of the keys 59, 60 and 61, the control, which relay 54 for instance exercises over the next in order enabling circuit 51 may be transferred to the enabling circuit 52. Thus, if it is desired to render the enabling circuit 51 idle, the key 60 is moved to its upper right and left hand sets of contacts. Thereupon, when the pair of relays 53 and 54 are becoming deenergized a circuit is first set up from ground, the back contact and inner upper armature of relay 53, the front contact and lower armature of relay 54, the alternate contacts of the upper left-hand set of contacts of key 60, the normal contacts of the upper left-hand set of contacts of key 61, relay 57 to battery. Relay 57 operates and locks through the winding of relay 58 which becomes operated. Through the uppermost armature of relay 57 the enabling circuit 52 is closed at one point and may be traced from the enabling circuit 52 through the front contact and upper outer armature of relay 57, the alternate contacts of the upper right-hand set of contacts of key 60, the normal contacts of the upper right-hand set of contacts of key 59 to the upper armature of relay 54 but this circuit is not completed to ground until relay 54

finally becomes deenergized. By this means not only is the sequence of the automatic transfer circuit advanced about a transmitter to be rendered idle but the automatically delayed start is also similarly advanced.

What is claimed is:

1. In a telegraph system, a plurality of transmitters operatively connectable to transmit telegraph code signals into a channel of transmission, switching means for rendering one only of said transmitters effective to transmit into said channel of transmission at any one time, a single contact responsive to code signals successively impressed upon said channel of transmission for controlling the operation of said contact successively to control said switching means successively to render said transmitters effective one at a time to so transmit.

2. In a communication system, a plurality of transmitters of permutation code combinations, a switching arrangement including means responsive to permutation code combinations transmitted from any one of said transmitters for rendering one only of said transmitters effective at a time, and means operative during the switching from one of said transmitters to another for delaying the effectiveness of the said other transmitter then being rendered effective by said switching means for sufficient time to clear the last code combination from the said transmitter which was last to transmit.

3. In a communication system, a plurality of transmitters and an automatic circuit arrangement for rendering each of said transmitters separately effective, said circuit comprising a pair of relays for each of said transmitters, one for closing a circuit for rendering its associated transmitter effective, and the other for closing a circuit for rendering a non-associated transmitter effective and a single contact adapted to be momentarily actuated for causing the release of one of said pairs of relays and the operation of another of said pairs of relays.

4. In a communication system, a plurality of transmitters and an automatic circuit arrangement for sequentially rendering each of said transmitters separately effective to transmit, said circuit comprising a pair of relays for each of said transmitters so arranged that when one of said pairs of relays is operated its associated transmitter will be rendered effective, one of said relays of each pair being for controlling the circuit for its associated transmitter and the other of said relays of each pair being for controlling the circuit for a transmitter next in sequence to be rendered effective to transmit.

5. In a communication system, a plurality of transmitters, an automatic circuit arrangement for sequentially rendering each of said transmitters separately effective, said circuit comprising a pair of relays for each of said transmitters so arranged that when one of said pairs of relays is operated its associated transmitter will be rendered effective, one of said relays of each pair being for controlling the circuit for rendering its associated transmitter effective and the other of said relays of each pair being slow to release and being for controlling the circuit for a transmitter next in sequence to be rendered effective.

6. In a communication system, a plurality of transmitters and an automatic circuit arrangement for sequentially rendering each of said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter effective when both relays of the said pair are operated, and a sequence controlling contact for causing the release of one pair of said relays and the operation of the pair of said relays next in sequence, each said pair of relays comprising one relay for controlling the circuit for rendering its associated transmitter effective and a slow releasing relay for opening the circuit for the transmitter next in sequence for a predetermined time after said sequence controlling contact has signalled an operation of said sequence circuit.

7. In a communication system, a plurality of transmitters and an automatic circuit arrangement for sequentially rendering each of said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render their associated transmitter effective when both relays of the said pair are operated, and a sequence controlling contact responsive to a predetermined operation of the effective one of said transmitters for causing the release of one pair of said relays and the automatic operation of the pair of said relays next in sequence, each said pair of relays comprising a first relay for controlling the circuit for rendering its associated transmitter effective and a second relay for delaying the said first relay next in sequence from controlling the circuit for rendering its associated transmitter effective for a predetermined length of time after said sequence controlling contact has signaled an operation of said sequence circuit.

8. In a communication system, a plurality of transmitters and a sequence circuit for rendering said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render the said associated transmitter effective when both relays of the pair are operated, one of said relays being slow releasing, a circuit being established during the release of a pair of said relays during the slow release marginal time of said slow release relay for automatically causing the next in sequence of said pairs of relays to become energized and a sequence controlling contact for causing the release of the energized pair of said relays.

9. In a communication system, a plurality of transmitters, a sequence circuit for rendering said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render the said associated transmitter effective when both relays of the pair are operated, one of said relays being slow releasing, a circuit being established during the release of a pair of said relays during the slow release marginal time of said slow release relay for automatically causing the next in sequence of said pairs of relays to become energized and a sequence controlling contact for causing the release of the energized pair of said relays and means controlled by the effective one of said transmitters for operating said sequence controlling contact.

10. In a communication system, a plurality of transmitters, a sequence circuit for rendering said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render the said associated transmitter effective when both relays of the pair are operated, one of said relays being slow releasing, a circuit being established during the release of a pair of said relays during the slow release marginal time of said slow releasing relay for automatically causing the next in sequence of said pairs of relays to become ener-

gized, a sequence controlling contact for causing the release of the energized pair of said relays and manual means individual to each said pair of relays for placing a said pair of relays in idle condition and causing the next in sequence pair of relays to operate in the turn of said idle pair of relays.

11. In a communication system, a plurality of transmitters, a sequence circuit for rendering said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render the said associated transmitter effective when both relays of the pair are operated, one of said relays being slow releasing, a circuit being established during the release of a pair of said relays during the slow release marginal time of said slow releasing relay for automatically causing the next in sequence of said pairs of relays to become energized, a sequence controlling contact for causing the release of the energized pair of said relays and manual means for disabling said sequence circuit and maintaining one of said pairs of relays continuously energized.

12. In a communication system, a plurality of transmitters, a sequence circuit for rendering said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render said associated transmitter effective when both relays of the pair are operated, one of said relays being slow releasing, a circuit being established during the release of a pair of said relays during the slow release marginal time of said slow releasing relay for automatically causing the next in sequence of said pairs of relays to become energized, a sequence controlling contact for causing the release of the energized pair of said relays and manually operated means for interrupting the normal sequential operation of said sequence circuit to immediately render any given transmitter effective.

13. In a communication system, a plurality of transmitters, a sequence circuit for rendering said transmitters separately effective, said circuit comprising a pair of relays associated with each transmitter arranged to render said associated transmitter effective when both relays of the pair are operated, one of said relays being slow releasing, a circuit being established during the release of a pair of said relays during the slow release marginal time of said slow releasing relay for automatically causing the next in sequence of said pairs of relays to become energized, said slow releasing relay having control over the next in order transmitter to render said transmitter inoperative until said slow releasing relay has released, a sequence controlling contact for causing the release of the energized pair of said relays and manually operated means for rendering a pair of said relays inoperative in said sequence circuit and for transferring the control exercised by the said slow releasing relay of the pair becoming deenergized when said pair is immediately prior in order to that rendered idle by said manual means over the next in order transmitter to the next in order transmitter beyond that rendered idle by said manual means.

14. In a permutation code transmission system, a plurality of transmitters of permutation code combinations, the nature of each code being such as to occupy a predetermined transmission time, a channel of transmission for said code combination, means for establishing an initial condition wherein one of said transmitters is conditioned to transmit over said channel of transmission, selectively operable means selectable and operable to uncondition the one of said transmitters conditioned to transmit over said channel, said means being operable by a code combination transmitted from the one transmitter at the moment so conditioned, means controlled by operation of said selective means to condition another transmitter, and time delay means whereby the said conditioning of another transmitter follows the unconditioning of said one transmitter by a time interval approximately equal to or greater than the said transmission time.

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