

May 10, 1938.

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2,116,549

TELEGRAPH SYSTEM

Original Filed Feb. 16, 1935

2 Sheets-Sheet 1

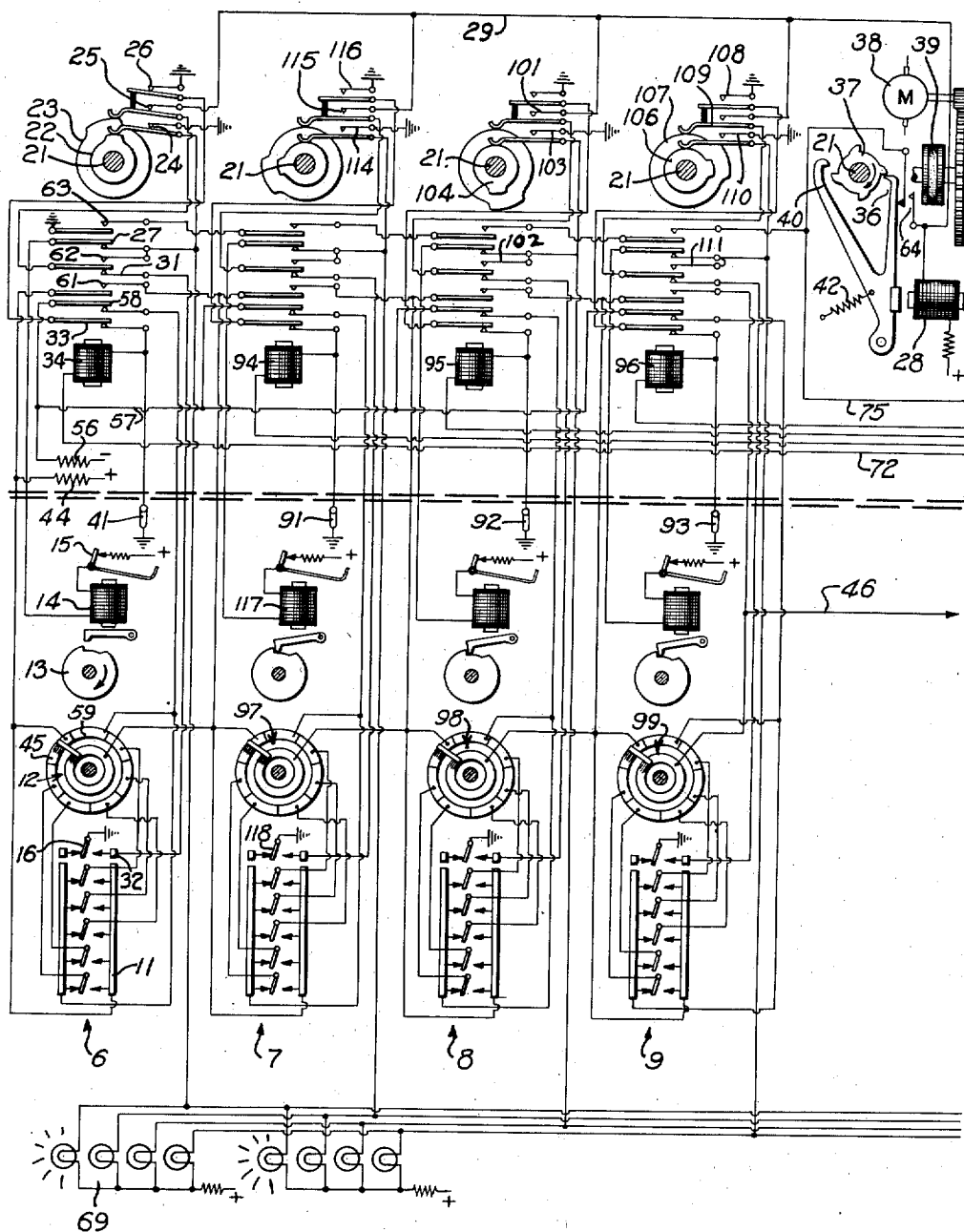


FIG. 1

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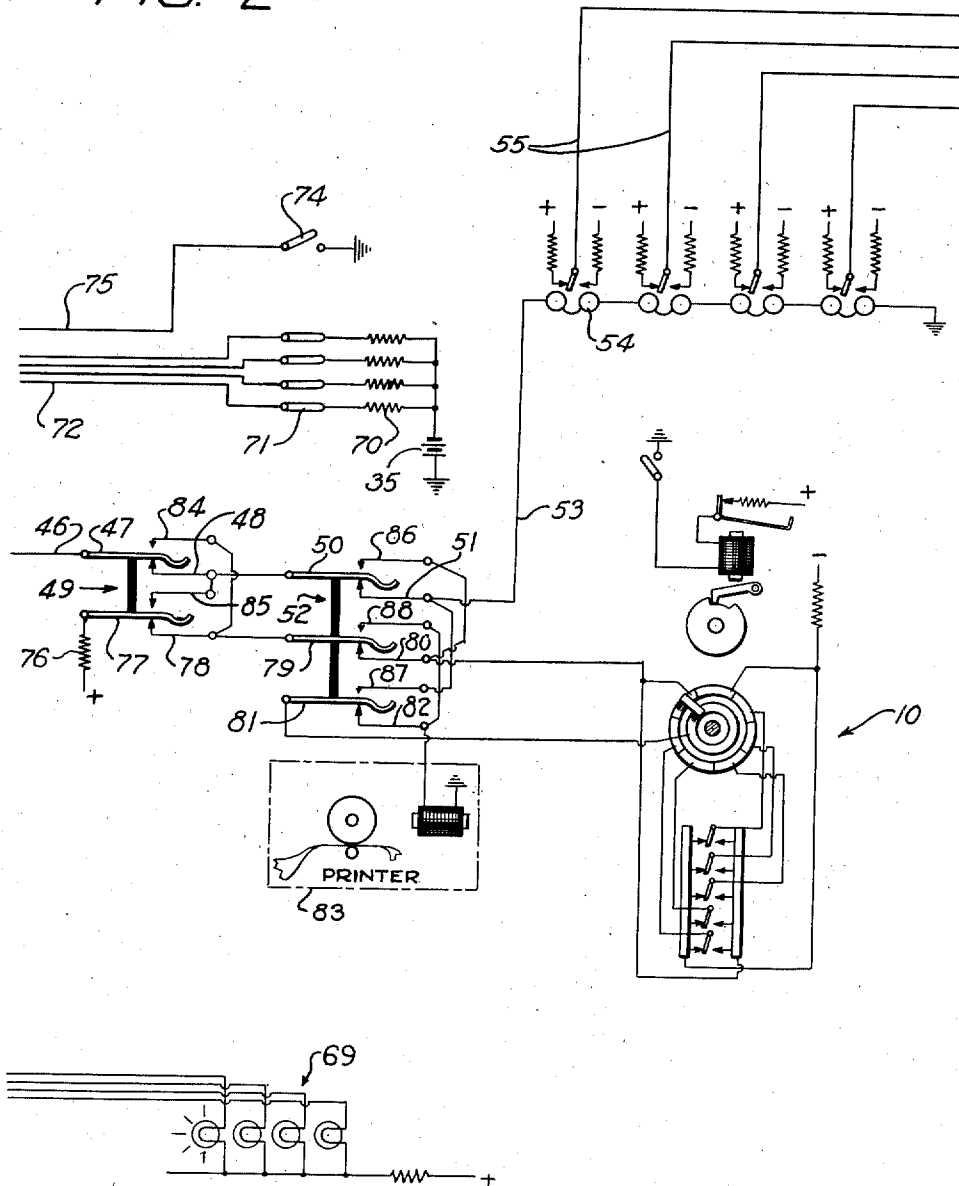
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2 Sheets-Sheet 2

FIG. 2



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2,116,549

TELEGRAPH SYSTEM

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Application February 16, 1935, Serial No. 6,815
Renewed August 25, 1937

23 Claims. (Cl. 178—3)

This invention pertains to telegraph systems in which transmission is impressed on a single telegraph circuit from a plurality of transmitters, either successively or in any desired sequence.

5 The principal object of the present invention is the provision of a telegraph system involving a single signalling channel and a plurality of transmitters arranged for the efficient operation of the signalling channel at its maximum capacity by automatically associating the transmitters with the signalling channel in a selected sequence.

10 A feature of the invention is the provision of a telegraph system having a single signalling circuit with a switching mechanism responsive to a local signalling condition established by an operator for automatically and in predetermined sequence connecting a plurality of transmitters operated by a control form with the signalling circuit.

15 According to another feature of the invention, a plurality of transmitters controlled by a corresponding number of operators are arranged to be connected in a definite order with a single signalling channel through the operation of a step-by-step switching mechanism controlled by an added perforation inserted in the transmitter control form by each operator after the perforation of a certain length of control form, which determines the moment of switching from one transmitter to another, but which does not result in the loss of any appreciable line transmission time.

20 The above and other objects of the present invention are achieved by providing a single signalling channel extending from a transmitting point where there is located a plurality of separate and distinct transmitting devices including individual tape transmitters and start-stop distributors. The tape transmitters, as is common practice in telegraph operation, are controlled by a control tape carrying perforations indicative of a message to be transmitted, and a switching control perforation prepared by the operator assigned to each transmitter for determining the moment of switching one transmitter from the channel and connecting another transmitter thereto. Switching of the transmitters is effected through a step-by-step sequence switch mechanism having a control magnet responsive to the added control perforation accompanying the message perforations of a transmitter then transmitting to the channel to condition the circuits for transmitting from another transmitter, which are completed when the pre-

viously effective transmitter has completed its cycle of operation incident to the transmission of the character represented by the code perforations in the tape adjacent the added control perforation, thus insuring the complete transmission of the last character of the message being transmitted from the then effective transmitter.

5 The invention also embodies mechanism for disabling any transmitting unit or units, yet retaining the switching operation between the effective units to provide continuous transmission over the signalling channel. In addition, a supervisory unit may be used for monitoring the several transmitting units to insure equal distribution of messages from the various transmitting units.

10 The invention will be more fully understood by the following description, taken in connection with the accompanying drawings in which,

15 Fig. 1 illustrates diagrammatically a system involving a plurality of transmitting units to be connected automatically in a certain sequence to a single telegraph channel, and

20 Fig. 2 shows the equipment of the monitor station and when placed to the right of and adjacent Fig. 1, the entire system is shown.

Referring to Fig. 1 illustrating the apparatus at the transmitting station, four transmitting units 6, 7, 8, and 9 are shown with transmitting unit 6 operatively connected to line conductor 46. Unit 6 comprises an automatic tape-controlled transmitter 11 associated with a transmitting distributor 12 of start-stop type whose operating or non-operating condition is controlled by stop cam 13 and start magnet 14, there being associated with magnet 14 a taut-tape switch 15 for stopping the distributor 12 when the slack supply of perforated tape is exhausted. There is provided also in connection with the transmitter 11 a sixth contact element 16 which responds to a change-over perforation in a sixth-row or in an ultra-codal position in the controlling tape as prepared by a keyboard perforator, there being code perforations arranged in five rows to represent the characters of the message to be transmitted.

25 Transmitter unit 6 is associated with its companion transmitting units 7, 8, and 9 through a series circuit to line conductor 46 and also by its association with a sequence switch or searching device common to all transmitting units. The sequence switch comprises mainly a cam shaft 21 which carries sets of cams, each set comprising cams 22 and 23 and pertaining

to an individual transmission unit and each set of cams becoming operative at a certain angular position of cam shaft 21 so that as cam shaft 21 rotates into and through its several angular positions, it causes its cam sets to render effective in turn each of the several transmitter units, unless by operation of means provided for that purpose a transmission unit has been modified to render it non-operating and non-responsive to control by its set of sequence cams.

Shaft 21 has eight angular stop positions, two of which pertain to transmitter unit 6, the first position of cam shaft 21 being shown in the drawings, wherein cam contacts 24, 25, and 26 are closed. Contact 24 connects ground through relay contact 27 to winding of starting magnet 14 and taut tape switch 15 to grounded battery, thus energizing magnet 14 to withdraw its armature from cam 13 to permit transmitting distributor 12 to rotate continuously. Contact 25 connects a control magnet 28 in the sequence switch mechanism over a common conductor 29 through cam contact 25 and relay contact 31 to a contact 32 associated with the sixth contact element 16 in automatic transmitter 11 of unit 6 in readiness for closure of the described circuit as a local changeover signal in response to an ultra-codal perforation controlling the element 16. Contact 26 connects ground through relay contact 33 and winding of relay 34 to battery 35, Fig. 2, for forming a holding circuit for relay 34.

Control of the sequence switch including shaft 21 and cams 22 and 23 may be exercised by unit 6 by means of contact element 16 which, in its operated position closes a local circuit to be traced from battery through winding of stepping magnet 28, conductor 29, cam contact 25, relay contact 31, contact 32, and contact element 16 to ground, thus energizing magnet 28. Magnet 28 operates its armature and its armature carrier, withdrawing front pawl 36 of its armature carrier from a tooth of escapement ratchet 37 and permitting ratchet 37 carried by shaft 21 to rotate through about 30 degrees of angle by power derived from geared motor 38, acting through friction clutch 39, the escapement ratchet being then stopped by engagement of a ratchet tooth with back pawl 40 of the armature carrier. Magnet 28, however, remains energized. A 30-degree stop of cam shaft 21 just described will cause cam 22 to permit contact 24 of cam 22 to open its circuit, yet will retain closed the contacts 25 and 26 of cam 23, thus removing ground connection from magnet 14 which releases its armature to prepare a stop condition for cam 13 and distributor 12 at the end of the current code transmission cycle. Further control of the sequence switch is exercised by unit 6 when in due course of cyclic operation of the automatic transmitter 11 the tape feelers thereof are withdrawn from the controlling tape and contact member 16 thereby is restored, opening the engagement between it and its contact 32 to break the local circuit above described, deenergizing magnet 28 and causing it to release its armature and armature carrier to permit spring 42 to withdraw pawl 40 from a tooth of escapement ratchet 37 and to move pawl 36 into the path of a succeeding tooth of escapement ratchet 37, thus permitting shaft 21 to make a further rotary step which first causes cam 23 of unit 6 to open its contacts 25 and 26 and then continues its rotation to complete a quarter revolution and to bring its cams into proper angular

position to close all of the cam contacts pertaining to transmitting unit 7.

The unit 6 is associated with its companion units 7, 8, and 9 by a common supply of positive or marking battery through resistor 44 and by a series transmission circuit extending from positive or marking battery through resistor 44, segment 45, brush and ring of distributor 12 of unit 6 and in series through a similar distributor in each of units 7, 8, and 9 to line conductor 46, then through contact members 47 and 48 of switch 49, Fig. 2, contact members 50 and 51 of switch 52, and local line conductor 53, and through a plurality of repeating line relays 54 to ground, the repeating line relays 54 operating to repeat the signals of local line conductor 53 into outgoing service line conductors 55. Also unit 6 is associated with units 7, 8, and 9 by a common supply of negative or spacing battery through resistor 56 connected to a common conductor 57 whence a branch path extends through relay contact 58 to "start" segment 59 at unit 6, and a similar branch may be traced at each of units 7, 8, and 9. The contacts of automatic transmitter 11 at unit 6 are supplied with marking and spacing current over branch conductors extending from distributor segments 45 and 59 respectively, and similarly in units 7, 8, and 9.

When relay 34 is deenergized, three relay contacts are closed. Contact 61 closes to shunt the distributor 12. Contact 62 closes to provide a busy-test path from sequence cam contact 24 to sequence cam contact 25 so that when sequence cams 22 and 23 close contacts 24 and 25 with relay 34 deenergized, a "passing" circuit immediately is formed from magnet 28 over common conductor 29, cam contact 25, relay contact 62, and cam contact 24, energizing magnet 28 to permit sequence shaft 21 to advance 30 degrees, when cam 22 will break contact 24, thereby deenergizing magnet 28 and permitting sequence shaft 21 to pass without stopping its angular positions which pertain to unit 6. Contact 63 closes to prepare a chain stop circuit for the sequence mechanism.

Relay contacts 61, 62, and 63 are repeated for units 7, 8, and 9, the four contacts 63 being connected in series to form a contact chain circuit extending from ground at unit 6 through contacts 63 at units 6, 7, 8, and 9 to contact 64 and magnet 28 of the sequence mechanism and to grounded battery. When all relay contacts 63 are closed by reason of all transmission units being removed from service condition and all relays 34 thereby are deenergized, the chain stop circuit will become effective, the last effective transmission unit to deenergize its magnet 34 will have closed relay contact 62 at all transmission units, thus causing magnet 28 to become energized, thereby closing contact 64 and completing the chain stop circuit which will hold magnet 28 energized and will hold shaft 21 stopped.

As has been noted, each of the four units 6, 7, 8, and 9 is provided with an automatic tape-controlled transmitter 11 and each such station has a keyboard perforator of well known construction for forming in a tape a series of code perforations representing the message and controlling the transmitter 11 but modified by addition of a special key for perforating an added ultra-codal record or perforation to control contact element 16, Fig. 1.

A plurality of sets of lamps 69 have each one

lamp for each operating unit and a condition which renders a unit operable also causes all lamps identified with that unit to glow, each lamp being connected by a conductor directly to contact 24 of the unit to which the lamp pertains. A sufficient number of sets of lamps are provided to enable every operator to determine the unit then transmitting.

Operation of the described transmission units is as follows:

Beginning operation

The condition of awaiting beginning of transmission is as shown in the drawings, except that key 41 at unit 6 and corresponding keys 91, 92, and 93 at units 7, 8, and 9 are open, relay magnet 34 at unit 6 and corresponding magnets 94, 95, and 96 at units 7, 8, and 9 are deenergized, commutator 12 at unit 6 and corresponding commutators 97, 98, and 99 at units 7, 8, and 9 are in non-operating condition, and magnet 28 is energized through contacts 64 and relay chain contacts 63. Shaft 21 rests at an angular position 30 degrees after quadrature from its position shown in the drawings, because magnet 20, energized by the chain circuit, is holding escapement pawl 40 in engagement with a tooth of escapement wheel 37. At the beginning of operation, four operators at units 6, 7, 8, and 9 begin operating their keyboard perforators to provide slack tape and immediately thereafter close their switches 41, 91, 92, and 93. Assuming that switch 41 is first to close, it will close an obvious circuit to energize relay 34 which will break the relay chain contact circuit at relay contact 63, unit 6, thus deenergizing magnet 28, which will release its armature to permit spring 42 to withdraw escapement pawl 40 from escapement wheel 37 and to move escapement pawl 36 into the path of a tooth of escapement wheel 37. By operation of its armature, magnet 28 will permit sequence shaft 21 to move to its angular position shown, corresponding to energized relay 34, where a circuit will be completed from battery through taut-tape contacts 15 now closed because a supply of slack tape is available, through winding of starting magnet 14, relay contact 27 now closed and cam contact 24, to ground, and this closed circuit by energization of starting magnet 14 and attraction of its armature will release the stop cam 13 and will permit rotation of distributor 12.

However, should the set of sequence cam contacts first operated by sequence shaft 21 upon deenergization of magnet 28 by opening contact 63 of relay 34 be other than the contacts of unit 6, say instead, the contacts of unit 8, then a "passing" circuit will be formed through the operated sequence contacts of unit 8 to be traced from battery through winding of magnet 28, conductor 29, cam contact 101 now closed, contact 102 now closed in relay 95 now deenergized, cam contact 103 now closed, and to ground, which closed circuit will cause reenergization of magnet 28 and withdrawal of escapement pawl 36 to permit further rotation of escapement ratchet 37 and shaft 21 through an angle of 30 degrees when short cam 104 will permit cam contact 103 to open, interrupting the passing circuit last traced and deenergizing magnet 28 to remove pawl 40 and substitute pawl 36 in the path of teeth of escapement wheel 37, thus clearing the escapement means to permit shaft 21 to rotate into quadrature from its position shown in the drawings, in which position it causes cams 106 and 107 to close cam contacts 108, 109 and 110 of unit 9. A "passing" circuit now is formed for unit 9

to be traced from battery through magnet 28, conductor 29, cam contact 109 now closed, contact 111 now closed in deenergized relay 96, cam contact 110 now closed, and to ground, reenergizing magnet 28, withdrawing pawl 36 and substituting pawl 40 in the path of teeth of escapement wheel 37. Shaft 21 now is permitted to move 30 degrees out of quadrature which causes cam 106 to permit contact 110 to open the passing circuit last traced, deenergizing magnet 28 to remove pawl 4 and substitute pawl 36 in the path of teeth of escapement wheel 37, permitting shaft 21 to rotate into its position shown in the drawings, to close cam contacts 24, 25, and 26, whereupon a starting circuit for magnet 14 will be closed, as described in last paragraph above herein.

Immediately thereafter other switches 41 will be closed by their operators, each switch energizing its associated relay 34 but with no other immediate effect.

The condition of the apparatus of the structure now is as shown in the drawings, with all relays 34, 94, 95, and 96 energized and with magnet 14 energized and distributor 12 operating at unit 6.

Transferring transmission to another unit

After a period of time in accordance with operating instructions, each of the operators will insert in the tape a changeover signal by means of the special key in the perforator and will continue the work of perforating tape for messages to be transmitted. It is necessary that this changeover perforation be recorded in the tape in a position corresponding to the last code of a message to be transmitted so that changeover of the sequence devices from one unit to another unit shall occur between successive messages as recorded in the tape which is being abandoned. Instructions for changeover record in the tape therefore provide for the changeover perforation being made in association with the last code perforations of the last message which is being perforated for transmission before changeover. When at the operating unit the changeover record is sensed by the contact member 16, a changeover circuit is closed to be traced from battery through winding magnet 28, conductor 29, cam contact 25, relay contact 31, transmitter contact 32, and transmitter element 16 to ground, energizing magnet 28 to remove pawl 36 and substitute pawl 40 in the path of teeth of escapement ratchet 37, thus permitting shaft 21 to rotate through an angle of 30 degrees where the shaft 21 stops. Cam 22 will have permitted sequence contact 24 at the operating unit 6 to open the controlling circuit of starting magnet 14, thus deenergizing that magnet to permit its armature to rest against the smooth edge of cam 13 through the remainder of the cycle of one code transmission, the further sequence contacts 25 and 26 remaining closed. When later in the cycle of transmission and substantially at the end of the transmitting code cycle the contact member 16 is restored to its normal position shown, the changeover circuit over common wire 29, will be broken by contact member 16 and the stepping magnet 28 will be deenergized to release its armature and permit withdrawal of pawl 40 and substitution of pawl 36 in the teeth of escapement ratchet 37 to permit sequence shaft 21 to move into its next operating position corresponding to energized relay 94 and distributor 97 of unit 7. At this time while shaft 21 is in motion through

its sixty-degree step, the notch in cam 13 will move under the released armature of magnet 14 and will engage the armature and stop the distributor 12. Immediately thereafter another set of cam contacts 114, 115, and 116 will be engaged and operated by the sequence device, thereby closing an operating circuit through contact 114 and starting magnet 117 of unit 7 from which unit thereafter transmission will be effected until a changeover perforation is engaged to control the contact member 118 in the then operating unit and so on through all operating units in sequence and in repetition of sequence.

It will be noted that the time required for transfer of line control from one transmitting unit to another transmitting unit will be always greater than the time of one cycle of code transmission of a character, and this provision is made to avoid any overlap of the last impulse from one transmitter with the first impulse from the succeeding transmitter which may cause improper action in a remote receiver. The time period of transfer depends in part upon the angular speed of the sequence shaft 21 while in motion and in part upon the angle through which that shaft must revolve, the design intended being such that with a minimum angle of shaft 21 from the preceding unit to the next unit shall be more than one code cycle of time and with a minimum excess time, since the excess time represents a slight delay between codes when changing over. Should the next unit in order of sequence be not available because of open conditions of its manual key 41, the greater angle through which sequence shaft 21 must turn will only lengthen delay during changeover. With all transmitting stations attended by operators and with all relays 34 energized for operation in sequence, the loss of line time on line 46 due to shift of control from unit to unit will be but a fraction of a code cycle for each changeover operation.

Removing a unit from service

Should any operator desire to leave the transmission set, the operation at his unit is as follows: Assuming for illustration the operator at unit 6, at the end of the last message recorded in his tape he records a changeover signal and then follows with blank tape and tape-feed perforations sufficient to permit the changeover signal to reach the transmitter feelers after which, when distributor 12 is operating, the switch 41 is opened. The opening of the switch 41 has no immediate effect because the relay 34 remains energized over a circuit from battery 35, Fig. 2, resistor 70, manual switch 71, conductor 12, winding of relay 34, and thence through relay contact 33 and sequence contact 26 to ground, so that the operator when opening manual switch 41 does not effect immediately the energization of relay 34 which is continued by currents through the path of relay contact 33 and sequence contact 26 to ground. Transmission by distributor 12 continues until the recorded changeover signal reaches transmitter 11 and effects the operation of contact member 16 which, as described above, causes sequence shaft 21 to rotate through 30 degrees, and later upon return of contact member 16 to normal permits sequence shaft 21 to rotate through an additional 60 degrees. This last rotation of sequence shaft 21 effects the opening of sequence contact 26, which effects deenergization of relay 34 which thereafter cannot be re-energized until manual switch 41 has been re-closed.

Discontinuing transmission

At the end of the transmission from all units, the four operators leave the units 6, 7, 8, and 9 one by one in the manner described above for leaving one station temporarily, the only difference being that as the last of the four relays 34, 94, 95, and 96 is deenergized, it closes the circuit of chain contacts through contact 63, which energizes magnet 28 through contact 64 and stops rotation of sequence shaft 21.

Monitor system

A monitor system is provided, Fig. 2, in which a transmitting set 10 may be similar to units 6, 7, 8, and 9. It is not connected to the sequence device. A set of monitor lamps 69 keeps the monitor operator advised of the identity of the transmitting unit which is operating and by the change of illumination from lamp to lamp keeps the operator advised of the progress of the sequence device. A manual key 74 connected between ground and conductor 75 permits the monitor operator to stop the operation of the sequence device in the manner described for stopping that device by the chain circuit of contacts 63 and 64. For each of the transmission units 6, 7, 8, and 9 there is provided at the monitor station Fig. 2 a resistor 70 and a manual key 71, connected to a common battery 35 so that by opening the manual key 71, the corresponding relay 34 may immediately be deenergized which, as will be seen, will close a passing circuit as above described for magnet 28 of the sequence device, from battery through magnet 28, common wire 29, sequence contact 25, relay contact 62 of deenergized relay 34, and sequence contact 24 to ground, thus passing the sequence device to the next service transmission unit and arbitrarily removing a transmission unit from service.

Motor set 10 is provided with a local operating circuit from battery through resistor 76, through contact members 77 and 78 of reversing switch 49, contact members 79 and 80 of sequence switch 52, transmission circuit of set 10, and contact members 81, 82 of switch 52, through receiving printer 83 to ground. By operating the reversing key 49 to its alternative position, a monitor operator may connect the transmission line wire 46 through switch elements 47, 48, 79, and 80 to the monitor set 10 and thence through switch elements 81 and 82 and printer 83 to ground so that the operation of the transmission units 6, 7, 8, and 9 may be observed upon the printer 83 without operating relays 54 and repeating signals into lines 55, this condition being suitable for test before the beginning of transmission for the day, and the relays 54 being controlled meanwhile by a circuit from battery through resistor 76 and switch elements 77, 85, 50, 51 to line 53 and relays 54, and to ground. Should the monitor operator desire to connect the set 10 into the operating system including distributors 12, 97, 98, 99 and relays 54, he may do so by operating the series key 52 into its alternative position, thereby producing a path from wire 46 through switch elements 47, 48, 50, 86, distributor of set 10, switch elements 81, 87, to conductor 53 and relays 54. Meanwhile a holding circuit is provided for receiving printer 83 from battery, through resistor 76, and switch elements 77, 78, 79, 88 and magnet of printer 83 to ground. It will be seen that the monitor operator controls the entire system from a desk, controlling the sequence system by key 74, con-

trolling each service transmitter station individually by keys 71, observing the operation of the entire system by lamps 73, testing the entire central office system by the reversing key 49 without disturbing its service lines, and cutting set 10 into the general service system by series key 52. It will be noted that by key 49 the monitor set may be connected into the entire central office system and communication established with any portion of that system, it being assumed that receiving printers are connected into the wire 46 at all points where they are likely to be required and that the monitor operator may do this without disturbing the circuits 55 which run to subscribers' stations, or on the other hand, the transmitting set may be connected into the general system by key 52 so that communication with the outlying substations of the system to which service is being rendered as well as to all points within the central office may be effected.

The system of the invention provides also for transmission of messages of unusual importance, sometimes called "flash messages," from the monitor's transmitting set 10 without deranging the routine of the transmission sets 6, 7, 8, and 9. Desiring to transmit a flash message to the lines 55, the monitor operator closes stop key 74, operates series key 52 into its alternative position, and watches lamps 73 until all lamps are dark, then transmits the flash message and opens the stop key 74 which releases the sequence device of Fig. 1 and permits the resumption of transmission by the distributors of units 6, 7, 8, and 9. Should the monitor operator desire to transmit a flash message of special importance without waiting for the then operating transmission unit to complete its messages then stored in advance of a changeover signal, the monitor operator may close the stop key 74 and then open the key among keys 71 which pertains to the lamp then glowing in the set of lamps 69. This stops all transmission from units 6, 7, 8, and 9 and the monitor operator then may transmit immediately the urgent message, thereafter opening the stop key 74 and closing the manual key 71, restoring the units 6, 7, 8, and 9 to normal condition, except for the detail that the monitor operator in opening the key 71 may have broken a message or may have mutilated a code cycle of impulses. The damage, if any, may be ascertained by observing a home tape or central office record copy of the transmission supplied over lines 55 and a correction message may be sent subsequently to lines 55 if found necessary.

Although the invention has been described in connection with a specific form thereof, it will be understood that it has further applications and is not intended to be limited in scope by the embodiment shown herein for illustration.

The invention claimed is:

1. In a telegraph system, a plurality of transmitters, a sequence switch for rendering said transmitters effective in rotation, a starting circuit for said sequence switch extending from said sequence switch to all of said transmitters, and tape controlled switches one at each of said transmitters for closing said starting circuit.

2. In a telegraph system, a plurality of transmitters, a sequence switch for operating said transmitters in rotation, a starting circuit for said sequence switch extending from said sequence switch to all of said transmitters, and means at each of said transmitters for closing said starting circuit.

3. In a telegraph system, a plurality of transmitters, starting magnets in each of said trans-

mitters, a sequence switch, a sequence starting magnet in said sequence switch, a sequence starting circuit extending from said transmitters to said sequence starting magnet, and starting circuits extending from sequence contacts of said sequence switch to all of said starting magnets.

4. In a telegraph system, a plurality of transmitters, starting magnets in each of said transmitters, a sequence switch, a sequence control circuit extending from said transmitters to said sequence switch, and starting circuits extending from sequence contacts of said sequence switch to all of said starting magnets.

5. In a telegraph system, a plurality of transmitting units for transmitting code signals, a line over which said units may transmit code signals, conditioning circuits for conditioning said units for transmitting, a distributor for closing only one at a time of said conditioning circuits, a starting circuit for said distributor, and switches in said units and operable by an operating unit while said operating unit is transmitting an effective code signal to said line for closing said starting circuit.

6. In a telegraph system, a plurality of transmitting units for transmitting code signals, a line over which said units may transmit code signals, conditioning circuits for conditioning said units for transmitting, a distributor for closing only one at a time of said conditioning circuits, a control circuit for said distributor, and means in said units and operable by an operating unit while said operating unit is transmitting an effective code signal to said line for closing said starting circuit.

7. In a telegraph system, a plurality of transmitting units for transmitting code signals, a line over which said units may transmit code signals, conditioning circuits for conditioning said units for transmitting, a distributor for closing only one at a time of said conditioning circuits, a control circuit for said distributor, and tape controlled switches in said units and operable by an operating unit while said operating unit is transmitting an effective code signal to said line for closing said starting circuit.

8. The method of operating a plurality of transmitters and a stepping sequence switch to a transmission line having receiving printers connected thereto which comprises, transmitting from one transmitter to line a succession of printing codes and while transmitting to line a printing code generating locally an electric impulse to step the sequence switch and making the step of the sequence switch at the end of the transmission of the printing code, and changing the connection from one transmitter to another transmitter in a time period less than the time period of a printing code.

9. The method of operating a plurality of transmitters and a sequence switch to a transmission line having receiving printers connected thereto which comprises, transmitting from one transmitter to line a succession of printing codes, setting up changeover conditions while transmitting to line a printing code, and making the step of the sequence switch at the end of the transmission of the printing code and in a time period less than the time period of a printing code.

10. The method of operating a plurality of transmitters and a sequence switch to a transmission line having receiving printers connected thereto which comprises, transmitting from one transmitter to line a succession of printing codes, operating the sequence switch locally while transmitting to line a printing code, and changing the

connection from one transmitter to another transmitter in a time period less than the time period of a printing code.

11. In a telegraph system, a plurality of transmitters, a sequence switch for conditioning said transmitters one by one to transmit effective printing code combinations of signals, a circuit closable, and means operable by one of said transmitters while transmitting an effective printing code combination of signals for closing said circuit for controlling said sequence switch to decondition the said one of said transmitters and to condition another of said transmitters.

12. In a telegraph system, a distributor, a plurality of printing code transmitters, means for establishing a control signal, and distributor control means responsive to said control signal generated by one of said transmitters while transmitting a printing code for changing said distributor from one to another of said transmitters.

13. In a telegraph system, a distributor, a plurality of printing code transmitters, means for establishing a control signal, and means responsive to said control signal generated by one of said transmitters while transmitting a printing code and effective for changing said distributor between successive effective codes from one to another of said transmitters in a time period less than the transmission period of one code.

14. In a telegraph system, a line circuit, a plurality of tape controlled code transmitting devices, a sequence switch for conditioning one at a time of said transmitting devices, and a local circuit from a conditioned transmitting device to said sequence switch controlled by an ultracodal perforation for controlling said sequence switch to decondition said conditioned transmitting device.

15. In a telegraph system, a circuit, a plurality of transmitters for said circuit, rotary starting means common to said transmitters and effective to start only one of said transmitters at a time, and means at each transmitter for causing said rotary means to pass said last mentioned transmitter ineffectively.

16. In a telegraph system, a circuit, a plurality of transmitters for said circuit, rotary starting means common to said transmitters and effective to start only one of said transmitters at a time, and means at each transmitter for rendering said transmitter unresponsive to said rotary means.

17. In a system for automatic telegraphic transmission, a transmission line, a plurality of service transmitters connectible to said line automatically in rotation, a monitor transmitter, and means at said monitor transmitter for stopping transmission from said service transmitters at the end of a service message and for enabling said monitor transmitter to transmit to said line.

18. In a system for automatic telegraphic

transmission, a line, a plurality of service transmitters connectible to said line automatically in rotation, a monitor equipment, and means in said monitor equipment for stopping transmission from any of said service transmitters at the end of a complete service message.

19. In a system for automatic telegraphic transmission, a service line circuit, a plurality of service transmitters connectible to said service line circuit automatically in rotation, a monitor set, a source of current for said monitor set, and reversible switching means for connecting said service transmitters to said service line circuit and said source of current to said monitor set or alternatively for connecting said service transmitters to said monitor set and said source of current to said service line circuit.

20. In a system for automatic telegraphic transmission, a service line circuit, a plurality of service transmitters connectible to said service line circuit automatically in rotation, a test circuit, a monitor transmitting set, and reversible switching means for connecting said monitor transmitter set either into said test circuit or alternatively into said service line circuit.

21. In a telegraph system, a transmission circuit, a plurality of transmitting units, each including a distributor and a record reader to be operatively associated with said line, means for maintaining all of said distributors except one ineffective, a sequence switch for rendering said transmitting units effective with said circuit, and means under the control of the record reader of an effective transmitting unit to operate said sequence switch for rendering the distributor of said unit ineffective and for starting the distributor of another transmitting unit.

22. In a telegraph system, a transmission line, a plurality of transmitters arranged to be effective for the transmission of intelligence telegraphically over said line, means for generating an electric impulse concurrently with the transmission of intelligence code impulses from a transmitter, and a sequence switch operated in response to the concurrently generated impulse for rendering the then operating transmitter ineffective and another transmitter effective for transmission over said circuit.

23. In a telegraph system, a transmission line, a plurality of transmitters arranged to be effective for the transmission of intelligence telegraphically over said line, means for generating an electric impulse concurrently with the transmission of intelligence code impulses from a transmitter, means responsive to the concurrently generated impulse, and a sequence switch normally tending to rotate released through the operation of said means for rendering the then operating transmitter ineffective and another transmitter effective for transmission over said circuit.

WALTER J. ZENNER.

DISCLAIMER

2,116,549.—Walter J. Zenner, Des Plaines, Ill. TELEGRAPH SYSTEM. Patent dated May 10, 1938. Disclaimer filed April 28, 1941, by the assignee, Teletype Corporation.

Hereby enters this disclaimer to the invention as set forth in claims 15 and 16 of said Letters Patent.

[Official Gazette May 20, 1941.]

connection from one transmitter to another transmitter in a time period less than the time period of a printing code.

11. In a telegraph system, a plurality of transmitters, a sequence switch for conditioning said transmitters one by one to transmit effective printing code combinations of signals, a circuit closable, and means operable by one of said transmitters while transmitting an effective printing code combination of signals for closing said circuit for controlling said sequence switch to decondition the said one of said transmitters and to condition another of said transmitters.

12. In a telegraph system, a distributor, a plurality of printing code transmitters, means for establishing a control signal, and distributor control means responsive to said control signal generated by one of said transmitters while transmitting a printing code for changing said distributor from one to another of said transmitters.

13. In a telegraph system, a distributor, a plurality of printing code transmitters, means for establishing a control signal, and means responsive to said control signal generated by one of said transmitters while transmitting a printing code and effective for changing said distributor between successive effective codes from one to another of said transmitters in a time period less than the transmission period of one code.

14. In a telegraph system, a line circuit, a plurality of tape controlled code transmitting devices, a sequence switch for conditioning one at a time of said transmitting devices, and a local circuit from a conditioned transmitting device to said sequence switch controlled by an ultracodal perforation for controlling said sequence switch to decondition said conditioned transmitting device.

15. In a telegraph system, a circuit, a plurality of transmitters for said circuit, rotary starting means common to said transmitters and effective to start only one of said transmitters at a time, and means at each transmitter for causing said rotary means to pass said last mentioned transmitter ineffectively.

16. In a telegraph system, a circuit, a plurality of transmitters for said circuit, rotary starting means common to said transmitters and effective to start only one of said transmitters at a time, and means at each transmitter for rendering said transmitter unresponsive to said rotary means.

17. In a system for automatic telegraphic transmission, a transmission line, a plurality of service transmitters connectible to said line automatically in rotation, a monitor transmitter, and means at said monitor transmitter for stopping transmission from said service transmitters at the end of a service message and for enabling said monitor transmitter to transmit to said line.

18. In a system for automatic telegraphic

transmission, a line, a plurality of service transmitters connectible to said line automatically in rotation, a monitor equipment, and means in said monitor equipment for stopping transmission from any of said service transmitters at the end of a complete service message.

19. In a system for automatic telegraphic transmission, a service line circuit, a plurality of service transmitters connectible to said service line circuit automatically in rotation, a monitor set, a source of current for said monitor set, and reversible switching means for connecting said service transmitters to said service line circuit and said source of current to said monitor set or alternatively for connecting said service transmitters to said monitor set and said source of current to said service line circuit.

20. In a system for automatic telegraphic transmission, a service line circuit, a plurality of service transmitters connectible to said service line circuit automatically in rotation, a test circuit, a monitor transmitting set, and reversible switching means for connecting said monitor transmitter set either into said test circuit or alternatively into said service line circuit.

21. In a telegraph system, a transmission circuit, a plurality of transmitting units, each including a distributor and a record reader to be operatively associated with said line, means for maintaining all of said distributors except one ineffective, a sequence switch for rendering said transmitting units effective with said circuit, and means under the control of the record reader of an effective transmitting unit to operate said sequence switch for rendering the distributor of said unit ineffective and for starting the distributor of another transmitting unit.

22. In a telegraph system, a transmission line, a plurality of transmitters arranged to be effective for the transmission of intelligence telegraphically over said line, means for generating an electric impulse concurrently with the transmission of intelligence code impulses from a transmitter, and a sequence switch operated in response to the concurrently generated impulse for rendering the then operating transmitter ineffective and another transmitter effective for transmission over said circuit.

23. In a telegraph system, a transmission line, a plurality of transmitters arranged to be effective for the transmission of intelligence telegraphically over said line, means for generating an electric impulse concurrently with the transmission of intelligence code impulses from a transmitter, means responsive to the concurrently generated impulse, and a sequence switch normally tending to rotate released through the operation of said means for rendering the then operating transmitter ineffective and another transmitter effective for transmission over said circuit.

WALTER J. ZENNER.

DISCLAIMER

2,116,549.—Walter J. Zenner, Des Plaines, Ill. TELEGRAPH SYSTEM. Patent dated May 10, 1938. Disclaimer filed April 28, 1941, by the assignee, Teletype Corporation.

Hereby enters this disclaimer to the invention as set forth in claims 15 and 16 of said Letters Patent.

[Official Gazette May 20, 1941.]