

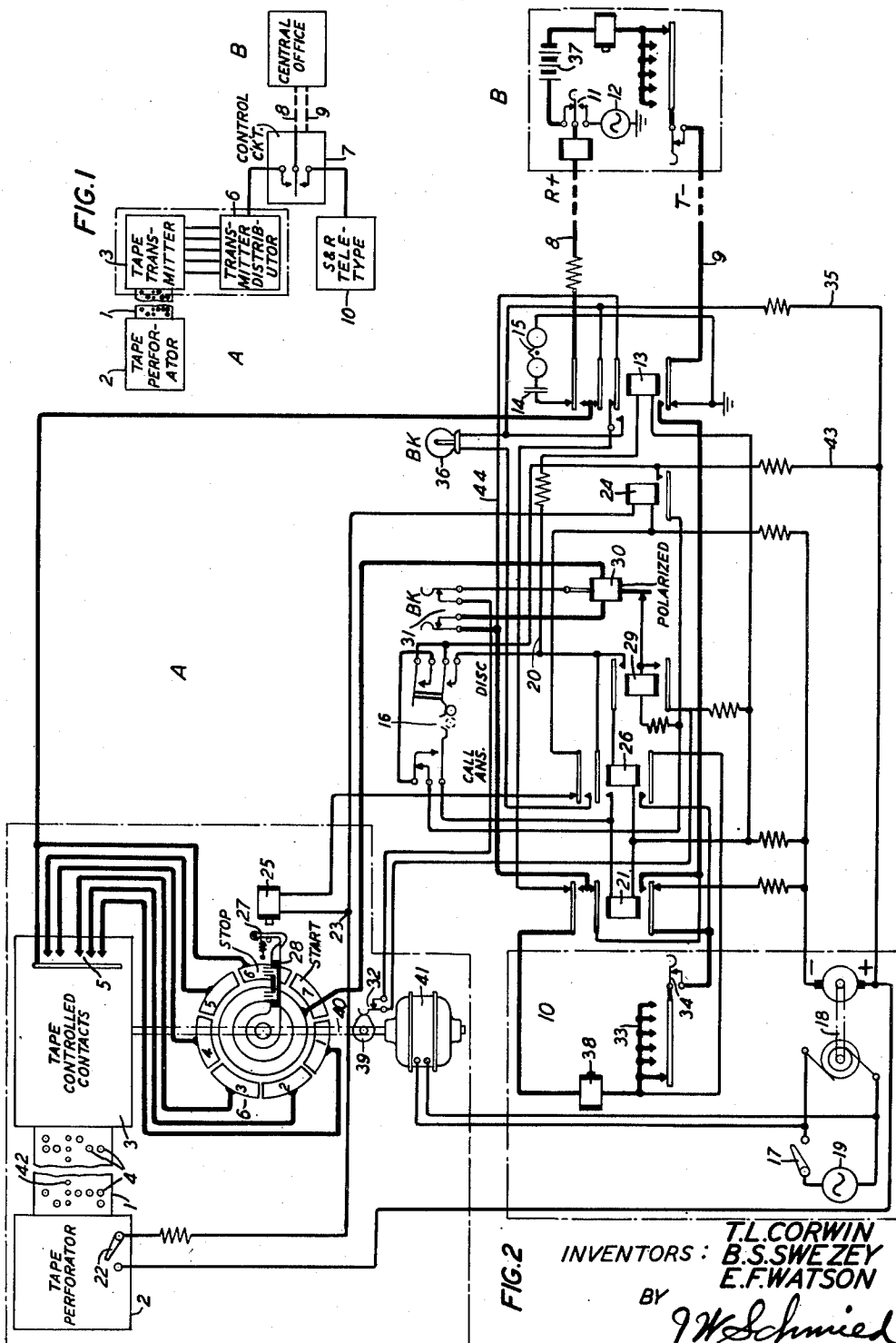
Aug. 9, 1938.

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2,126,535

TELETYPEWRITER SYSTEM

Filed Sept. 28, 1935



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2,126,535

TELETYPEWRITER SYSTEM

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Application September 28, 1935, Serial No. 42,560

5 Claims. (Cl. 178-4)

This invention relates to teletypewriter systems and, more particularly, to arrangements for checking the accuracy of messages perforated in tape while at the same time transmitting automatically from previously prepared tape without sacrificing any of the usual supervisory features of teletypewriter transmission.

In certain types of teletypewriter service, it is desirable to check the accuracy of certain messages, such as code messages or lists of order numbers, before transmitting them. This is because a mistake in a single letter of a code word or a single figure of an order number might change the entire meaning of the word or the significance of the order number.

Accordingly, it is an object of this invention to provide a convenient and practical arrangement for checking the accuracy of a message before transmitting it while also sending from other tape previously perforated.

It is also an object of this invention to enable an operator at a station, which is receiving messages from another station, to switch the teletypewriter at the transmitting station from its local circuit to the line.

A further object of this invention is to enable an operator at a station, which is receiving messages from another station having its teletypewriter connected into a local circuit to switch that teletypewriter into the line circuit, during a pause in transmission, by merely transmitting ordinary message signals and without transmitting a special break signal.

These objects are accomplished by employing a special teletypewriter set which can rapidly perforate tape used for operating a transmitter-distributor. The accuracy of the messages perforated on the tape may be checked, before the messages are transmitted out over the line, by two methods. The first method comprises simultaneously perforating the tape and printing only a local home copy by means of the selecting mechanism of only the teletypewriter at that station. The other method consists of first perforating the tape and then sending it through the transmitter-distributor over a local circuit to only the teletypewriter at that station.

An operator at a teletypewriter station which is receiving messages from a second station, can transmit a break signal which will stop the second station's transmitter-distributor, operate an alarm device at the second station, and automatically switch the second station's teletypewriter from its local circuit, should it be connected therein, into the line circuit. During a

pause in transmission by a sending station, it is not necessary for an operator at a connected station to transmit a break signal in order to communicate with the first station because the teletypewriter at the first station will be automatically switched from its local circuit, should it be connected therein, into the line upon the reception of ordinary message signals transmitted from the second station.

These and other features of the invention will now be fully described and explained with reference to the drawing in which:

Fig. 1 shows diagrammatically the general apparatus arrangement of a teletypewriter system embodying the features of this invention; and

Fig. 2 illustrates in detail the circuit diagram for the teletypewriter system shown in Fig. 1.

According to the arrangement shown in Fig. 1, transmitter tape 1 is perforated in the tape perforator 2 at station A and is then fed into the transmitter 3 by means of feed holes 42 (Fig. 2) and a sprocket feeding mechanism (not shown). The perforations 4 (Fig. 2) in tape 1 operate the transmitting contacts 5 (Fig. 2) to condition distributor 6 for the transmission of signals. The signal impulses originating in distributor 6 are sent through the control circuit 7 and then out over line conductor 8 to a second teletypewriter station, such as central office B. If desired, the signals are also sent from the control circuit 7 to the local teletypewriter 10 to make a home copy of the messages sent to central office B. In the drawing, central office B is shown to be capable of sending messages over line conductor 9 to the teletypewriter 10 at station A which is capable of both receiving and sending messages. It is to be understood that central office B has been so shown for purposes of illustration but may be changed to a subscriber's station according to the requirements of a particular system.

Now that the general arrangement of the apparatus employed in this invention has been described, the operation of the invention will be described in detail with reference to Fig. 2 which shows the apparatus in its neutral condition; that is, with both stations unoperated.

To call the subscriber at station A, an operator at central office B moves switch 11 to its lower position to apply ringing current from alternator 12 to line conductor 8 and then to station A. At station A, the ringing current passes over the top armature of unoperated relay 13, through condenser 14, ringer 15, and then to ground. Ringer 15 will now operate to inform the subscriber at station A that he is being called.

In answering the call from central office B, the subscriber at station A moves switch 16 to its "call-answer" position at the left and also closes power switch 17 for operating motor-generator 18 and motor 41 from power supply source 19. When the motor-generator 18 is started, current flows from its positive terminal, along conductor 43 through the lower right set of contacts, now closed, of switch 16, over conductor 28, through relay 13, and then to the negative terminal of motor-generator 18. Relay 13 is now energized and operates its armatures to disconnect ringer 15 from the line and to prepare a circuit for connecting the printer equipment at station A to line conductors 8 and 9. Relay 21 also operates at this time over a path traced from the positive terminal of motor-generator 18, conductor 43, upper right set of contacts (now closed) of switch 16, upper and lower left set of contacts (now closed) of switch 16, through relay 21 and then to the negative terminal of motor-generator 18. In operating, relay 21 completes the circuit for connecting the printer equipment to the line for communication.

To initiate a call, the subscriber at station A follows the same procedure as in answering a call and operates switch 16 to its "call-answer" position at the left and also closes power switch 17 for operating motor-generator 18. This connects the subscriber's printer equipment to the line in the manner described in the preceding paragraph.

For transmitting from perforated tape while making a home copy, the subscriber closes the perforator switch 22. This closes a path from the positive terminal of motor-generator 18 through perforator switch 22 to junction 23. From junction 23 there are two paths; one leads through relay 24 to the negative terminal of motor-generator 18, the other path goes through the distributor start magnet 25 and upper top armature of unoperated break relay 26 to the negative terminal of motor-generator 18. Current from motor-generator 18 now energizes relays 24 and 25. Upon being energized, relay 25 operates its armature 27 thereby releasing distributor brush 28 for rotation to transmit signal impulses.

Relay 24 in being operated at this time would close a path for positive current from motor-generator 18 to pass along conductor 43 over the armature of operated relay 24, through relay 29, armature of relay 30, right set of contacts of break key 31, break contacts 32, and then to the negative terminal of motor-generator 18 but for the fact that the break contacts 32 are normally open, due to the rotation of cam 39 mounted on shaft 40, when the contact of relay 30 is closed and are normally closed only during a part of the sixth pulse of a signal combination at which time the contact of relay 30 is opened, except when a break signal is transmitted as will be explained hereinafter.

Communication may now take place with perforations 4 in tape 1 controlling transmitting contacts 5 for causing distributor 6 to transmit signal impulses, corresponding to the signals perforated in tape 1, out over the line circuit to central office B. At the same time, these signal impulses pass through the subscriber's receiving magnet 38 for making a home copy of the outgoing messages.

In the event that it is desired to send from the tape 1 without making a home copy of the messages transmitted, the operator moves switch 16 to its middle position. This opens the ener-

gizing path for relay 21. As a result, the subscriber's teletypewriter 10 is disconnected from the line circuit and is connected into a local circuit leading from the positive terminal of motor-generator 18, over conductor 35, lower top contact of operated relay 13, upper top armature of non-operated relay 21, receiving magnet 38, sending contacts 33, break key 34, bottom armature of non-operated relay 21, and then to the negative terminal of motor-generator 18. Transmitter distributor 6 can now send messages over the line to central office B without causing a home copy to be made by teletypewriter 10. While teletypewriter 10 is connected into this local circuit it may be used for further perforation of tape 1 with or without a home copy according to whether the perforator transmitter switch 22 is closed or open.

During transmission by the subscriber at station A, relay 30, which is connected directly into the line circuit, will follow all the signals transmitted, opening its contact when energized by the line current from battery 37 at central office B. Also, during this time, cam 39 mounted on distributor shaft 40, will be constantly rotating because shaft 40 is continuously driven by motor 41 through the usual friction clutch (not shown) during the period of communication. Cam 39 is so mounted on shaft 40 as to close the break contacts 32 during a portion of the sixth pulse, or stop impulse, of each code combination transmitted. This is to test for a "break" during each revolution because, if the line is open when contacts 32 close, a "break" will be recorded through the contacts of relay 30. However, during normal transmission of signals, either the break contacts 32 or the contact of relay 30 will be open at all times.

If an operator at central office B, or any other connected station, sends a break signal while the subscriber at station A is transmitting from perforated tape with his switch 16 in its middle position, the break signal will open the line circuit for the duration of one or two characters. During this opening of the line, relay 30 will become deenergized and will close its armature contact. When break contacts 32 close now due to the rotation of cam 39, a circuit will be closed for current from the positive terminal of motor-generator 18 to pass over conductor 43, upper right set of contacts (now closed) of switch 16, upper left set of contacts of switch 16, through relay 29, contact and armature of relay 30, right set of contacts of break key 31, break contacts 32, and then to the negative terminal of motor-generator 18.

This serves to operate relay 29 which locks-up through its bottom armature subject to the release of relay 24. The operation of relay 29 closes a path for positive current from motor-generator 18 to pass along conductor 43, through the lower right set of contacts (now closed) of switch 16, over the top armature of operated relay 29, through break relay 26, and then to the negative terminal of motor-generator 18. Break relay 26 now operates its three armatures and closes a path for positive current from motor-generator 18 to pass along conductor 43, through the lower right set of contacts (now closed) of switch 16, operated lower top armature of relay 26, through relay 21, and then to the negative terminal of motor-generator 18 thereby energizing relay 21. Relay 21, in operating its bottom and upper top armatures, switches the local teletypewriter 10 from its local circuit to the line

circuit for receiving signals transmitted from station B.

In operating its upper top armature, break relay 26 opens the circuit through the transmitter-distributor start magnet 25 and causes it to release its armature 27 which catches the distributor brush arm 28 to prevent it from rotating and transmitting signals. Relay 26 also closes a path for positive current from motor-generator 18 to pass along conductor 35, through break lamp 36, upper top armature of relay 26, and then to the negative terminal of motor-generator 18 thereby lighting break lamp 36 as a visible signal to the subscriber at station A that the operator at station B desires to communicate. At the same time the bottom armature of relay 26 short-circuits the sending contacts 33 and break key 34 of the local teletypewriter 10.

The break signal can be locally discontinued by moving switch 16 to its "call-answer" position at the left and by opening the perforator switch 22. This opens the energizing circuit of relay 24 which releases its armature thereby opening the locking-up circuit of relay 29 which releases and opens the energizing circuit for relay 26. Although relay 26 releases, relay 21 remains energized over a path through the contacts of switch 16. Relay 29 cannot be operated again until both the contacts of relay 30 and the break contacts 32 are closed.

In the event that the operator at station A has transmitted a series of messages, he might wish to pause for a short interval of time while gathering information for other messages. To effect such a pause in transmission, the operator at station A merely opens the perforator switch 22, leaving the power switch 17 closed and the switch 16 in its middle position. This opens the energizing circuit of the distributor start magnet 25 while leaving relay 13 operated. Magnet 25 now releases its armature 27 which catches the distributor brush 28 and stops it from rotating. Since the distributor brush 28 is attached to the shaft 40, stoppage of brush 28 by armature 27 will stop shaft 40 and cam 39 from rotating further by disengaging the usual friction clutch (not shown) employed with such transmitter-distributors. This leaves the distributor brush 28 in engagement with lever 27, as is shown in the drawing, and also leaves cam 39 in a position where it will close the break contacts 32, as is also shown in the drawing. With the circuit in this condition, all that the operator at station B need do to effect a break signal is to transmit ordinary message signals. Relay 30 will follow these message signals and, since with the usual permutation code employed the first, or start, impulse of a signal is always an open impulse, relay 30 will move its armature to close its contact. This serves to operate relay 29 which, as is described above, effects the operation of break relay 26 and relay 21. Relay 21, in operating its bottom and upper top armatures, switches the teletypewriter 10 into the line circuit for receiving the message signals transmitted from station B. Thus, the operator at station B can "break" station A and can convert the teletypewriter at station A from a sending condition to a receiving condition without transmitting the usual break signal thereby obtaining a saving in transmission time.

If the subscriber at station A should be transmitting from perforated tape with switch 16 in its "call-answer" position at the left and with switch 22 closed at the time when an operator at

station B transmits a break signal, the circuit operation is much the same as that just described above except that relay 29 is now maintained locked-up over a circuit traced from the positive terminal of motor-generator 18, over conductor 43, operated armature of relay 24, through relay 26, over the operated bottom armature of relay 29, and then to the negative terminal of motor-generator 18. As a result, lamp 36 and relays 21 and 26 will operate. Since switch 16 is already in its "call-answer" position, all that need be done to discontinue the break signal is to open the perforator switch 22 which opens the locking-up circuit for relay 29 as was described above.

If the operator at station A has switch 16 in its left position and is transmitting from the keyboard with the perforator switch 22 opened, a break signal transmitted from central office B will not now operate relay 29. However, since the teletypewriter 10 is now connected into the line circuit, the opening of the line by the break signal will cause the teletypewriter 10 to run open and no printing will take place for the duration of the break signal. This will serve to indicate to the subscriber at station A that the operator at the distant central office B wishes to use the line.

When the subscriber at station A wishes to disconnect the station equipment, he opens his power switch 17 thereby stopping motor 41 and motor-generator 18 thereby effecting the release of the relays. Relay 13 in releasing its armatures connects ringer 15 to line conductor 8 and grounds line conductor 9. If the subscriber's printing apparatus is to be used for another call shortly, switch 16 may be left in its "call-answer" position at the left.

On the other hand, if the subscriber's printer set is to be used on local circuits, such as for locally testing the equipment or perforating tape for future calls, switch 16 may be put in its "disconnect" position at the right. The subscriber then closes his power switch 17 which starts up his motor-generator 18 and motor 41. However current from motor-generator 18 will not energize relay 13 at this time because the lower right set of contacts of switch 16 are now open. Therefore, the subscriber's teletypewriter 10 and distributor 6 will now be connected in a local circuit extending from the positive terminal of motor-generator 18, over conductor 35, middle top armature of unenergized relay 13, distributor 6, relay 30, left contacts of the break key 31, conductor 44, lower top armature of relay 13, upper top armature of unenergized relay 21, receiving magnet 38, sending contacts 33, break key 34, bottom armature of relay 21, and then to the negative terminal of motor-generator 18. The subscriber can now perforate tape while making a home copy or local transmission from the teletypewriter keyboard or transmitter-distributor may now take place.

In case the subscriber at station A wishes to send a break signal while he is receiving messages from central office B, he uses the break key 31 of the subscriber set and not the break key 34 in the teletypewriter 10. When the subscriber set break key 31 is operated, the line circuit is opened at the left contacts of break key 31. In addition, the energizing circuit for relay 29 is opened at the right contacts of break key 31. This prevents operation of break relay 26 and also prevents the lighting of break lamp 36 and operation of relay 21 thereby obviating extra manipu-

lation of switches 18 and 22 before transmission takes place.

The above specific embodiment has been described in order to illustrate the invention and it is to be understood that various modifications employing the principles and features of the invention may be made without departing from the scope of the invention which is to be limited only by the claims appended hereto.

10 What is claimed is:

1. A teletypewriter system having in combination a first teletypewriter station having a teletypewriter, a tape perforator-transmitter, a transmitter-distributor, and a local circuit leading from the perforator-transmitter through the transmitter-distributor to the teletypewriter at that station; a second teletypewriter station having a teletypewriter capable of both receiving and sending message signals to the first teletypewriter station; a communication line connecting the two stations for the transmission of significant current variations; and instrumentalities at the first station for automatically switching the teletypewriter at that station from its local circuit into the line in response to the reception of a break signal transmitted from the second station.

2. A teletypewriter system having in combination a first teletypewriter station having a teletypewriter convertible from a sending condition to a receiving condition and vice versa, a tape perforator-transmitter, a transmitter-distributor, and a local circuit leading from the perforator-transmitter and through the transmitter-distributor to the teletypewriter at that station; a second teletypewriter station having a teletypewriter capable of both receiving and sending message signals to the first teletypewriter station; a communication line connecting the two stations for the transmission of significant current variations; means for enabling the transmitter-distributor to transmit over the line while the perforator-transmitter and the teletypewriter at the first station are available for perforating and checking tape in the local circuit, and means operating in response to the reception of a break signal transmitted from the second station for automatically converting the teletypewriter at the first station from its sending condition to its receiving condition and for switching the teletypewriter from its local circuit into the line.

3. A teletypewriter system having in combination a first teletypewriter station having a teletypewriter, a tape perforator-transmitter, a transmitter-distributor, and a local circuit leading from the perforator-transmitter through the

transmitter-distributor to the teletypewriter at that station; a second teletypewriter station having a teletypewriter capable of both receiving and sending message signals to the first teletypewriter station; a communication line connecting the two stations for the transmission of significant current variations; and instrumentalities for enabling the perforator-transmitter and transmitter-distributor at the first station to transmit messages from perforated tape to the teletypewriter at the second station while having the teletypewriter at the first station idle and instantly available for being switched into the line in response to a break signal sent from the second station.

4. A teletypewriter system having in combination a first teletypewriter station having a teletypewriter convertible from a sending condition to a receiving condition and vice versa, said teletypewriter having sending contacts, a second teletypewriter station having a teletypewriter, a communication line connecting the two stations for the transmission of permutation code signals, a normally open circuit for short-circuiting the sending contacts of the teletypewriter at the first station, a normally unoperated instrumentality for closing said normally open circuit, and means for operating said normally unoperated instrumentality in response to the transmission over the communication line by the teletypewriter at the second station of an ordinary permutation code signal during a pause in transmission by the teletypewriter at the first station.

5. A teletypewriter system having in combination a first teletypewriter station having a teletypewriter, a tape perforator-transmitter, a transmitter-distributor, a local circuit leading from the perforator-transmitter and through the transmitter-distributor to the teletypewriter at that station, a second teletypewriter station having a teletypewriter capable of both receiving and sending message signals to the first teletypewriter station; a communication line connecting the two stations for the transmission of significant current variations; a circuit for converting the teletypewriter at the first station from a sending condition to a receiving condition; first control means for preparing said circuit during a pause in transmission by the teletypewriter at the first station; and second control means operating in response to ordinary message signals transmitted from the teletypewriter at the second station for completing said circuit.

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