

Dec. 5, 1944.

W. M. BACON

2,364,417

TELEGRAPH SYSTEM

Filed Aug. 26, 1942

5 Sheets-Sheet 1

FIG. 2

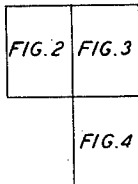
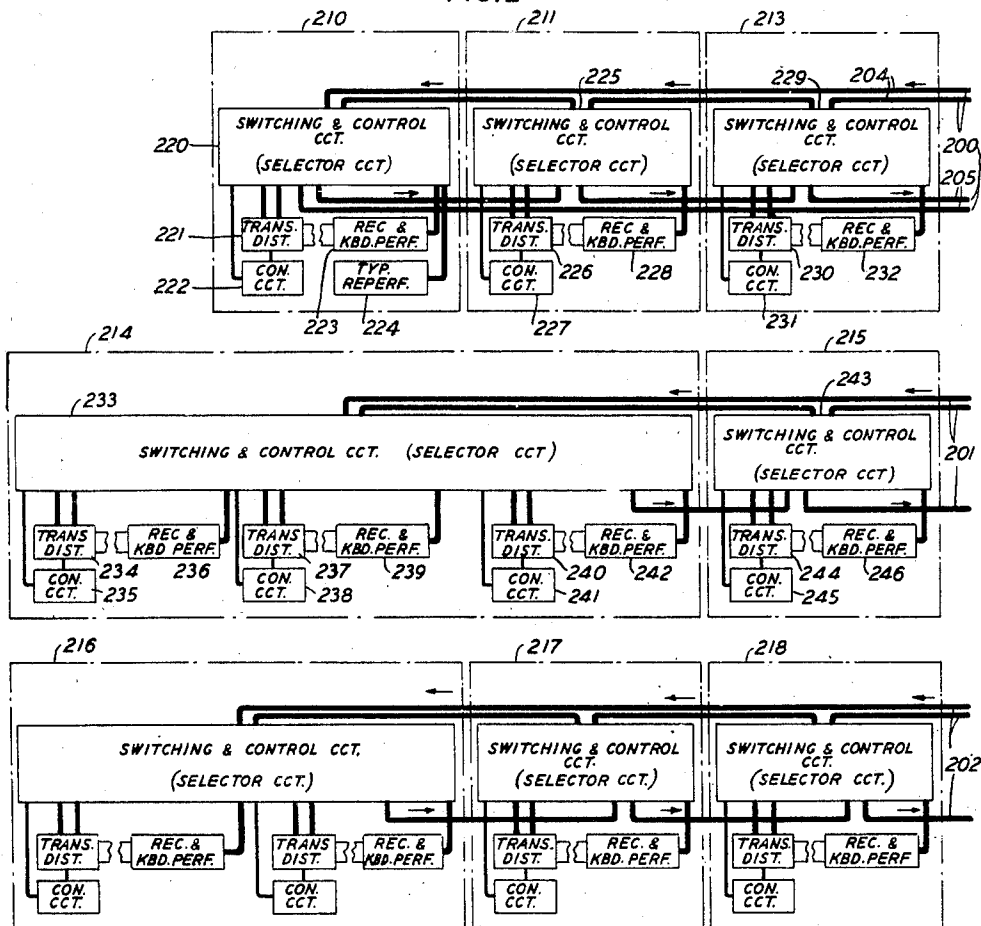
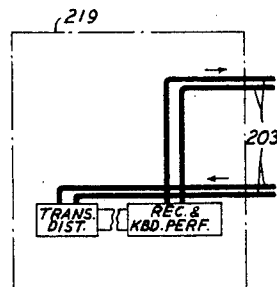
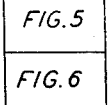


FIG. 1A

FIG. 1B



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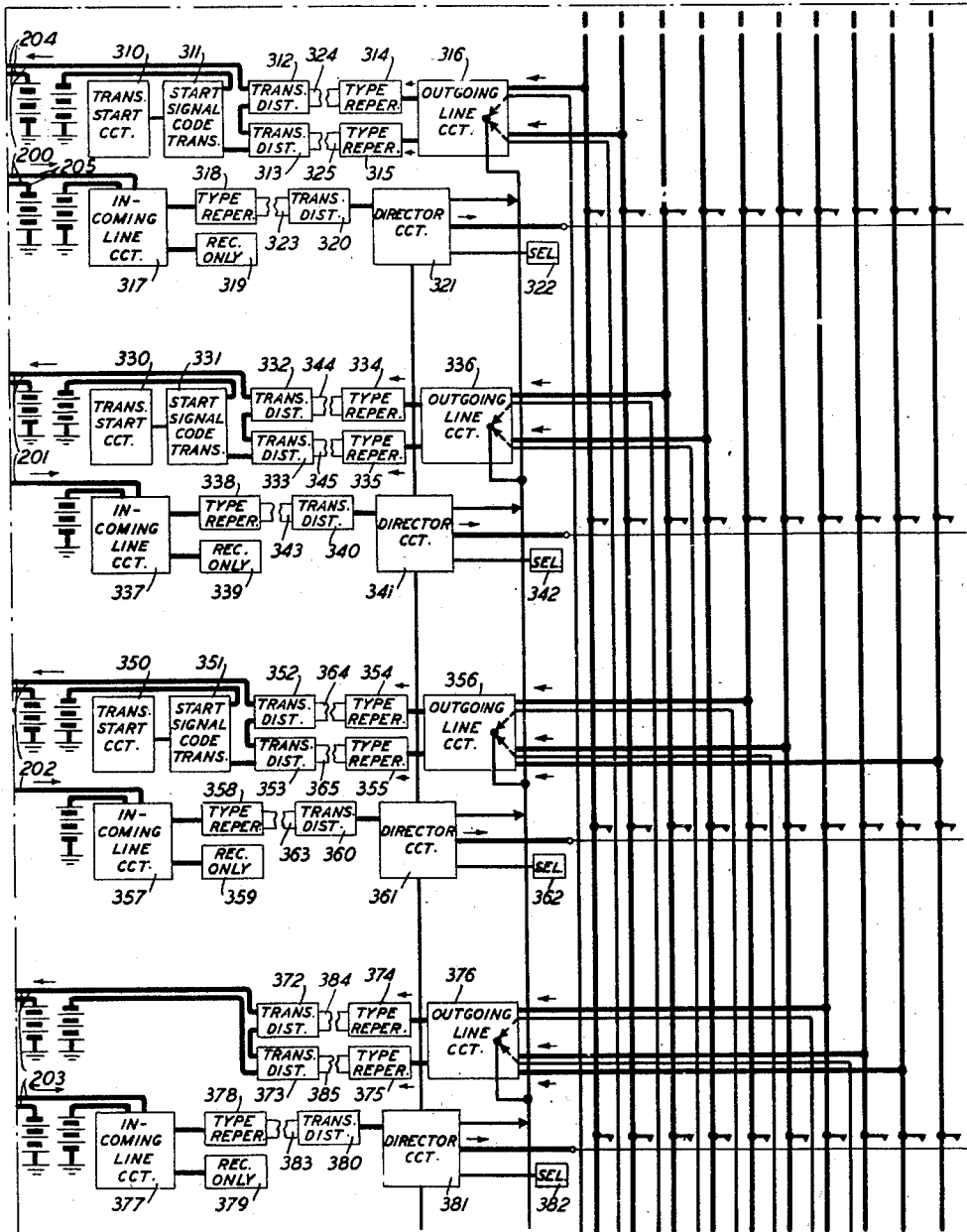
2,364,417

TELEGRAPH SYSTEM

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FIG. 3



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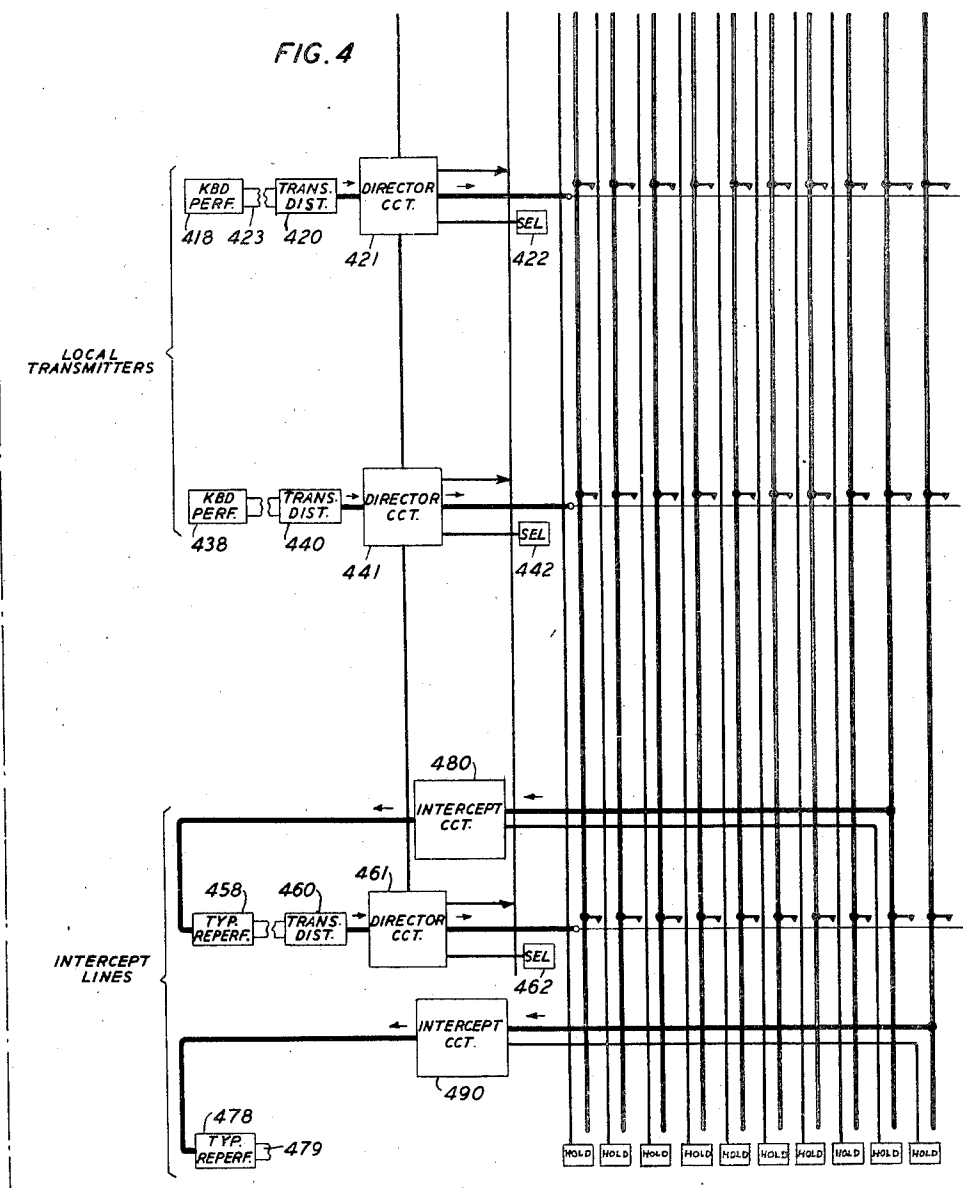
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TELEGRAPH SYSTEM

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5 Sheets-Sheet 3



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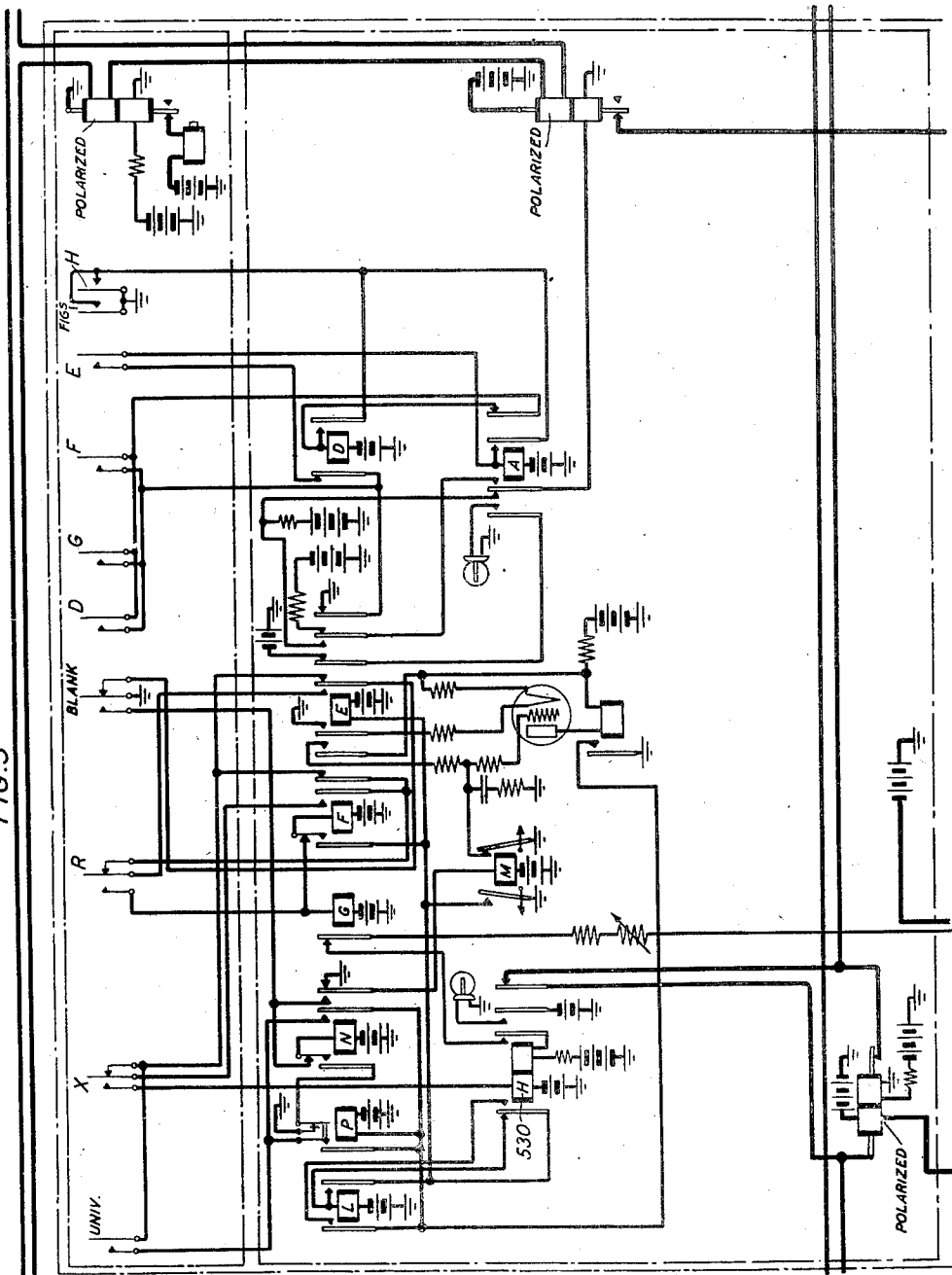
2,364,417

TELEGRAPH SYSTEM

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5 Sheets-Sheet 4

FIG. 5



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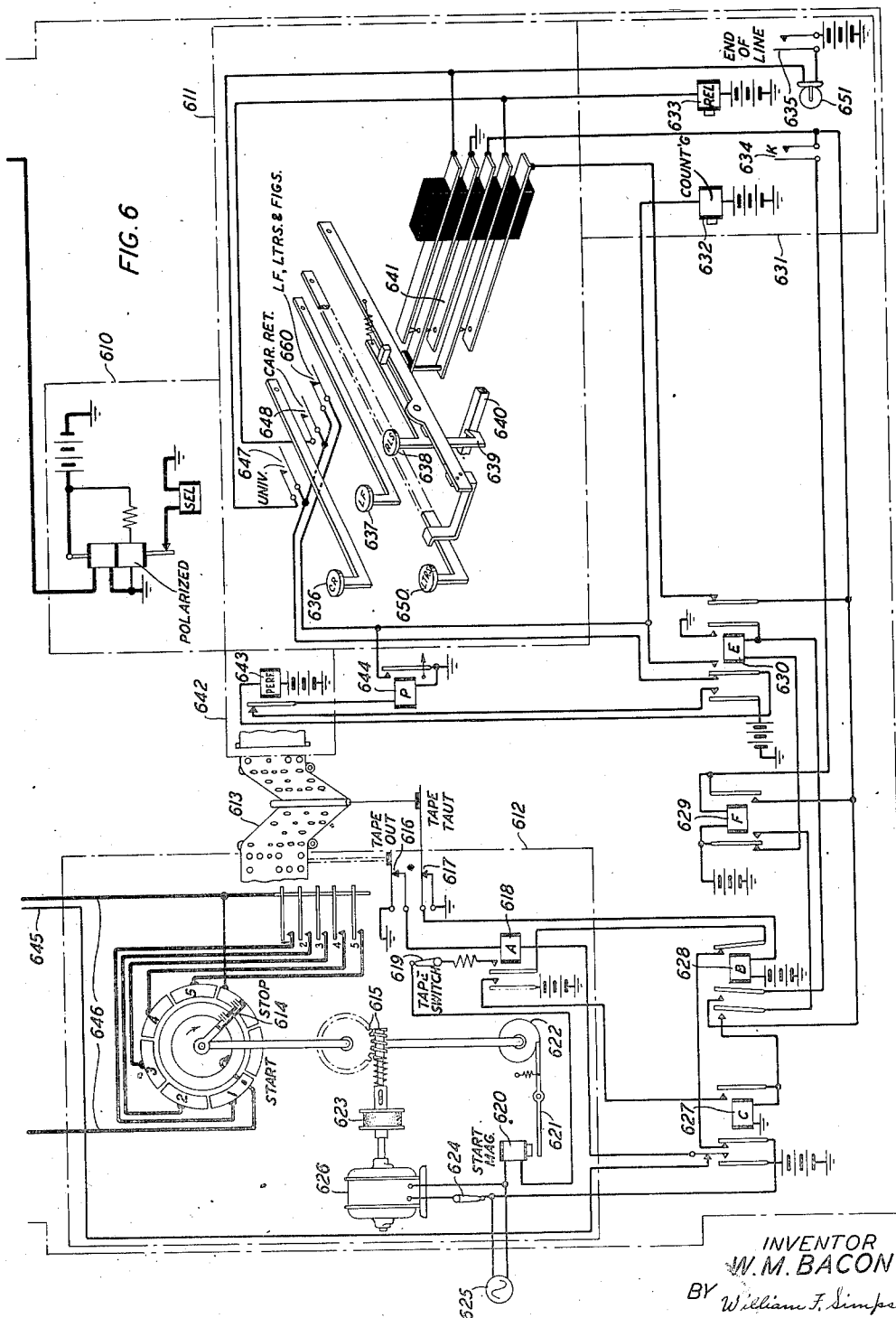
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TELEGRAPH SYSTEM

Filed Aug. 26, 1942

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,364,417

TELEGRAPH SYSTEM

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Application August 26, 1942, Serial No. 456,145

11 Claims. (Cl. 178-17)

This invention relates to telegraph systems and more particularly to printing telegraph systems.

In printing telegraph systems it is frequently desirable for a customer, subscriber or attendant at a telegraph station to perforate tape in accordance with messages to be transmitted and then transmit the messages from the tape at periodic intervals or after some predetermined quantity of tape has been perforated. In systems of this type a transmitter is frequently provided adjacent a keyboard perforator and the tape passes from the perforator to the transmitter. However, a short length of tape having a number of code combinations recorded on it extends from the perforator to the transmitter. In the past it has been necessary for the operator to perforate a number of some specified signals, such as blank signals or letters signals on the tape to insure that the end of the last message will be properly transmitted from the transmitter before the tape becomes taut and the operation of the transmitter interrupted.

This practice requires the time of the operators to perforate these additional signals in the tape and frequently consumes additional line time during which these signals are transmitted over the line which line time could otherwise be employed in the transmission of messages.

In accordance with the present invention these difficulties are overcome or considerably reduced by providing a special key on the keyboard reperforator which the operator can, before leaving the perforator, depress at the end of any message or group of messages which is perforated in the tape. If the operator previously started the transmitter or if it is started in some other manner, as, for example, by remote control, at a later period it will then start to transmit messages recorded in the tape. If the operator does not return by the time the supply of message material has all been transmitted except the end of the last message in the tape between the transmitter and the perforator, auxiliary circuits in accordance with this invention will operate and cause an additional supply of tape to be perforated with predetermined signals, such as letters signals. After a sufficient number of these additional signals are perforated in the tape the automatic operation of the perforating equipment is interrupted even though the special key remains locked operated.

A further feature of the invention is arrangements which require that the operator or attendant remove the tape from the transmitter and then reinsert the same tape or another tape

before another message can be transmitted from the transmitter. Thus, in effect, the operator is required to move the tape so that the added non-message signals will not be transmitted and thus will not waste the line time.

Thus, in accordance with the present invention, the operation of the system from the standpoint of the attendant or subscriber is simplified and less time is required on his or her part. In addition, the additional signals are perforated in the tape only when they are required so that only a minimum of these signals will later have to be either discarded thus saving both time and tape.

Arrangements in accordance with this invention are particularly well suited for use at the outlying subscriber's station in large automatic telegraph switching systems, such as shown in application of Bacon et al., Serial No. 383,490, filed March 15, 1941, and Branson et al., Serial No. 448,878, filed June 27, 1942, where the operator or attendant perforates the tape and then inserts the perforated tape in the transmitter. At a later time, under control of central switching stations, these transmitters are started into operation and transmit the messages over the line to the central switching station. In the past it has been necessary for the operator to actually tear the tape at the reperforator to insure that the end of the tape will be properly transmitted or to perforate a group of predetermined signals in the tape after the termination of the message to insure that the end of the last message is fully transmitted and that the operator or attendant at the central switching station is informed that the subscriber's station is disconnected from the line or has no further messages for transmission. In accordance with the present invention, a special key is provided for the subscriber's reperforator, which key, when operated, will cause the reperforator to perforate additional signals in the tape when and if the tape becomes taut.

The specific embodiment of this invention shown in the drawings described herein has been designed to cooperate with the subscriber's station circuits and the equipment at the central exchange of the system disclosed in the above-identified patent application of Bacon et al. The disclosures in the above-identified application of Bacon et al., as well as the above-identified application of Branson et al. are hereby made part of this disclosure by reference as if fully included herein.

The foregoing objects and features of this invention can be more readily understood from the

following description of the specific embodiment thereof when read with reference to the attached drawings and in which:

Fig. 1A illustrates the manner in which Figs. 2, 3 and 4 are positioned adjacent each other; and

Fig. 1B shows the manner in which Figs. 5 and 6 are positioned adjacent each other;

Figs. 2, 3 and 4, when positioned as shown in Fig. 1A, illustrate in diagrammatic form the various circuits and apparatus of a typical switching system, such as disclosed in the above-identified application of Bacon et al. and the manner in which the various apparatus and elements thereof cooperate;

Figs. 5 and 6 show in detail circuit arrangements at the outlying or subscriber's station and the manner in which they cooperate with the control equipment of the system described in the above-identified application of Bacon et al.

As described in said above-identified application to Bacon et al., the subscriber's stations are provided with a receiving machine and a keyboard reperforator and a transmitting distributor, as well as control circuits therefor. A plurality of transmission paths extend from these stations to a switching control, or selector circuit which circuit is connected to a transmission line extending to the central switching station. Fig. 2 illustrates typical examples of telegraph transmission lines to which a plurality of stations are connected. Briefly, each of these lines comprises a transmitting channel for transmitting signals from the outlying stations to the central exchange and a receiving channel for transmitting signals from the central office to the outlying station. The outlying stations and equipment thereat are controlled from local or secondary switching or control circuits in accordance with signals received over the receiving channel of the party line.

The transmission line between stations and the central exchange may be of any suitable type, including both open-wire circuits and cable circuits operated with either a ground return or on a full metallic basis. These channels may include various types of repeaters, including regenerative repeaters, and other control equipment normally employed in telegraph systems. These channels may also comprise a single full-duplex channel and they may include sections of voice frequency or high frequency carrier current as well as radio transmission between various points of the line. These features are well known and understood by those skilled in the art and operate in the usual manner while cooperating with the other elements which, when included in the system, embody applicant's invention. In compliance with the rules of the Patent Office, therefore, an effort has been made to simplify the drawings so that the specific embodiment of the present invention may be more readily disclosed and described herein by representing the transmission channels as two full metallic transmission lines.

Each of the lines terminates in equipment at the central exchange, such as shown in Fig. 3. Here the transmitting channels terminate in incoming line circuits 317, 337, 357 and 377. The incoming line circuits direct messages either to receiving only teletypewriters 319, 339, 359, or 379 if the message is intended for the central switching station, or to reperforator 318, 338, 358, or 378 if the message is intended for some other station. The message is perforated in respective tapes 323, 343, 363 and 383 and controls the

transmitting distributors 320, 340, 360 or 380. These transmitters, together with associated director circuits 321, 341, 361 and 381 control switching equipment and direct the messages to outgoing line circuits associated with the line extending to the desired station. Each of the outgoing line circuits is provided with two channels so that two messages may be simultaneously directed to any line and then the messages later transmitted in sequence over the outgoing or transmitting channel of this line. As described in the above-identified application of Bacon et al., each of the messages is preceded by a group of directing or switching characters, sometimes referred to as address codes or characters, which control the switching equipment, causing the message to automatically be directed at the central exchange to the proper line and then to the proper station under control of switching equipment associated with that line.

Each of the lines which is provided with more than one transmission station is provided with a transmitter start circuit 310 and a start signal code transmitter 311, which circuits generate under control of the operator, or automatically, different series of line conditions, sometimes designated "transmitter start patterns" which, when transmitted over the receiving channel of the respective lines test each of the transmitters for message tape available for transmission. If a supply of stored message material in the form of tape is available for transmission at the respective transmitter, transmission therefrom will be initiated and at the end thereof the transmitter start circuit again, either automatically or under control of the operator, will transmit another start pattern. If material is found available for transmission at the next station, this material will be transmitted, but if no material is available the operation of the transmitter start circuit will cause another transmitter to be tested for stored material available for transmission.

Fig. 4 shows additional equipment at the central exchange. Local message originating positions are provided comprising local keyboard perforators 418 and 438 which perforate tape and control the respective transmitters 420 and 440. These transmitters cooperate with the director circuits 421 and 441 to direct the messages to the proper line under control of the address codes preceding the messages. Two intercept circuits are provided as indicated at 480 and 490. The intercept circuit 490 merely causes the typing reperforator 478 to perforate tape 479. These circuits and equipment are provided to receive messages improperly addressed or certain messages improperly switched or transmitted through the switching equipment. The intercept circuit 480 is provided to intercept messages for any stations served by the system. The intercept messages are stored by typing reperforator 458 for later transmission to the desired station through the transmitting distributor 460 and the director circuit 461.

Fig. 5 shows details of equipment employed to control transmitting and receiving apparatus at any one of the outlying station circuits, while Fig. 6 shows details of the equipment at the outlying subscriber's stations modified in accordance with this invention so that the equipment will fully transmit all of the message material available for transmission without requiring the tape to be torn between the keyboard perforator and the transmitter. The equipment shown in Fig. 5 is arranged to cooperate with the switching

equipment and other circuits of said above-identified application of Bacon et al. without material alteration including the switching, control, and selector circuits and apparatus as illustrated in Fig. 2 at 220, 225, 229, 233, and 243 and the similar equipment shown at stations 216, 217, and 218. The only change which would be required would be to properly position the contacts of the selector so that they would be selected to control in accordance with the codes assigned to the specific stations controlled by them.

The equipment shown in Fig. 5 is substantially identical with that shown in Fig. 7 of the above-identified Bacon et al. application and can be substituted for this figure without change except for rearranging leads so they will join up with the corresponding leads of the other figures. The circuit arrangement shown in Fig. 5 can likewise be substituted for the equipment shown in Figs. 8, 27, and 45, with the exception that the contacts must be associated with the proper selecting elements of the selector as set forth in the above-identified application of Bacon et al. and the leads arranged to cooperate with the connecting circuits.

The subscriber's station shown in Fig. 6 can be substituted for the subscriber's station equipment at any of the subscriber's stations of the above-identified application of Bacon et al. It will also be readily understood by those skilled in the art that this subscriber's station equipment can be employed at any of the subscriber's stations of the above-identified application of Branson et al. without material change other than rearranging the leads and conductors so that they will match the appropriate conductors of the control equipment of that system.

Fig. 6 shows details of a typical arrangement suitable for use at any of the stations of the system described in the above-identified application of Bacon et al. This station equipment is also suitable for use without any change at any of the stations of systems of the type disclosed in the above-identified application of Branson et al. With slight modifications it may be used in any other type of switching system or may be used in cooperation with only a single transmission line between two points or in any system wherein it is desirable to accumulate a number of messages and then transmit them either under control of the transmitting station or under some other control.

The circuits shown in Fig. 6 are in their normal condition with tape inserted in the transmitter at 612 and available for transmission. The operator or attendant at the station shown in Fig. 6 will operate the keyboard perforator 611 in accordance with the message to be transmitted. The operation of the keys such as 636 through 637 and 650 of this perforator causes tape 613 to be perforated in accordance with the signals to be transmitted.

Typical keyboard controlled perforators suitable for use in cooperation with this invention are disclosed in United States Patents 1,965,572, granted to Burcky et al. July 10, 1934; 2,190,309, granted to Burcky February 13, 1940; 1,969,891, granted to Lake et al. August 14, 1934; 2,018,368, granted to Lake October 22, 1935; and 1,965,602, granted to Lake July 7, 1934 which patents are hereby made a part of this application as if fully included herein. Keyboard control perforators generally employ a perforating magnet 643, the circuit of which is completed, every time a key is depressed, through universal contacts

647. This circuit extends from battery through the winding of magnet 643, the left-hand inner break contacts of relay 630, momentarily operated universal contacts 647 to ground through the upper break contacts 641. A counter 631 is usually provided for keyboard operated perforators to count the characters and indicate to the operator or attendant when it is necessary to send or perforate carriage return and line feed signal. Counter 631 is provided with a counting magnet 632 and a release magnet 633. Counter magnet 632 is operated in a circuit extending from battery through magnet 632, through the break contact 660 and the universal contacts 647 to ground through the upper break contacts of contacts 641. Thus each time the universal contacts are operated due to the operation of one of the keys, perforator magnet 643 operates and causes the corresponding series of perforations in tape 613 and in addition the counter magnet 632 operates. Contacts 660, however, open in response to a line feed code combination, a letters combination and a figures combination and any other combinations which are generally not printed and do not, therefore, cause the printing mechanism to move a space along the line. Consequently, when any of these combinations or keys representing these functions or code combinations are depressed, the perforator magnet 643 will operate and cause the corresponding series of perforations of tape 613 but the counter magnet 632 will not operate.

The counter magnet 631 is provided with a group of contacts which operate after a predetermined number of characters have been counted and complete an obvious circuit for lighting the lamp 651 to indicate to the attendant she should operate the carriage return key, then the line feed key and cause the transmission of the corresponding code combinations. The operation of the carriage return key completes a circuit for the operation of counter release magnet 633 from battery through the winding of magnet 633, contacts 648 to ground through the momentarily operated universal contacts 647 and the upper break contacts of the group of contacts 641.

The manner in which the respective contacts 647, 648, and 660 are closed in response to the operation of the various keys 636 to 637 and 650 has not been shown in the drawings. Instead the mere association of these contacts with the respective keys is indicated. For a more detailed description of the manner in which the operation of the various keys cause the respective contacts to close is shown and described in greater detail in the above-identified patents to Lake and Burcky.

The operator will thus perforate tape 613 in accordance with the message and other signals to be transmitted by the transmitter 612 and will insert the end of the tape in this transmitter. Under these circumstances, contacts 616 and 617 will close. The closure of contacts 617 completes an obvious circuit for the operation of relay 628. Thereafter, the circuits remain in the condition as shown in the drawings.

Generally the operator or attendant at this station will be instructed to operate the special key 638 which has a locking pawl 639 for engaging the locking bar 640 and maintaining the key 638 operated. The operation of key 638 will cause the letters key 650 to be depressed and held down and causes contacts 641 to be actuated. The operation of contacts 641 removes ground from the universal contacts 647 and completes a circuit

for the operation of the release magnet 633 from battery through the magnet 633, the lower operated contacts of the contact assembly 641 to ground through the right-hand break contacts of relay 630 and the upper set of operated contacts of the assembly 641.

Thereafter, the circuits remain in this condition until the operator either returns and restores the release key at which time the ground is connected to the universal contacts 647 and the circuits and equipment operated as described herein or until the transmitter has transmitted all of the signals recorded in tape 613.

As described in the above-identified application of Bacon et al., upon the manually or automatically controlled testing of any of the transmitters, such as transmitter 612, for stored material available for transmission, the corresponding relay at the control point such as relay 530 will operate and connect battery to the conductor 645 extending through left-hand outer break contacts of relay 627 and the winding of relay 618 to ground through the closed contacts 616.

The operation of relay 530 also moves short circuit from around the contacts of the repeating relay at the control point and permits this relay to repeat the signals transmitted by the transmitter 612 over the transmitting channel to the distant central exchange.

The operation of relay 618 in the above-described circuit extending over lead 645 completes the circuit for the operation of transmitter start magnet 620. It is assumed that the motor 626 has been started by closing the switch 624 which connects motor 626 to the source of power 625. The circuit for the operation of the start magnet 620 extends from source of power 625 through the winding of magnet 620 switch 619 which is closed, the inner operated contacts of relay 618, the make contacts of relay 628, and the inner break contacts of relay 627 back to the source of power 625.

The operation of the start magnet 620 attracts the armature 621 which disengages the stop cam 622 and permits the distributor brush arm 614 to be rotated through gears 615 and friction clutch 623 by the motor 626. The rotation of the brush arm 614 causes signals corresponding to the perforations of the tape 613 to be transmitted over the transmission path 646.

When the supply of perforated tape 613 is reduced below a predetermined minimum quantity, the tape control contacts 617 are operated and interrupt the circuit of relay 628. The subsequent release of relay 628 interrupts the control circuit through the start magnet 620 which magnet releases and stops the rotation of the brush arm 614 and thus stops the transmission from transmitter 612. If the attendant is not present or has not operated the special key 638 nothing further happens at the subscriber's station.

As described in the above-identified application of Bacon et al., if the above condition exists for a period of time greater than some predetermined interval, as for example thirty seconds, certain equipment will be set into operation at the central exchange which will cause interruption of the circuit over lead 645 and restore the circuits of the transmitter 612 to their idle condition. Thereafter the operator or attendant at the station shown in Fig. 6 may cause the interrupted message to be retransmitted or correct any other troubles which may have caused contacts 617 to open. If additional messages are perforated by the operator or the trouble corrected, within the

thirty seconds so that contact 617 closes in this interval of time relay 628 will reoperate and transmission from the transmitter 612 be resumed.

Assume now that the attendant has operated the special key 638 and caused the group of contacts 641 to operate and in turn operate the release magnet 633. Further assume that transmitter 612 has transmitted the signals recorded in tape 613 so that the supply of tape 613 between the keyboard perforator 611 and the transmitter 612 is reduced to a predetermined minimum of quantity at which time contacts 617 open. As is well understood by those skilled in the art, an appreciable number of signals comprising at least the last portion of the last message recorded in tape 613 still remain recorded in the tape between the transmitter and the keyboard perforator. Under these circumstances release of relay 628 in addition to interrupting the operation of the transmitter 612 as described above, also completes the circuit for the operation of relay 630 from battery through the break contacts of relay 629 and winding of relay 630 through left-hand inner break contacts of relay 628 to ground through the upper operated contacts 641.

Relay 630 in operating completes a circuit for maintaining itself operated under control of relay 629 from battery through the break contacts of relay 629 and winding of relay 630 to ground through the right-hand operated contacts of relay 630. The operation of relay 630 also interrupts the circuit through the release magnet 633 and thus restores the counter mechanism 631 to its normal idle condition where it is ready to count the signals recorded in tape 613. The operation of relay 630 also transfers the operating circuit of the perforator magnet 643 from the universal contacts 647 to the contacts of relay 644.

The operation of relay 630 in addition completes a circuit for the operation of relay 644 from battery through the left-hand outer operated contacts of relay 630 and the break contacts of the perforator magnet 643 to ground through the winding of relay 644. The operation of relay 644 completes a circuit for the operation of the counter magnet 632 from battery through the winding of magnet 632 to ground through the operated contacts of relay 644. The operation of relay 644 also completes a circuit for the operation of the perforator magnet 643 from battery through the winding of magnet 643 and the left-hand inner operated contacts of relay 630 to ground through the operated contacts of relay 644.

It will be recalled that the operation of the special key 638 will cause the letters key 650 to be depressed. With the key 650 depressed, the interponents are properly positioned between the perforating mechanism and armature of the perforating magnet 643 as described in the above-identified patents to Burcky et al. and Lake et al. so that a letters code combination will be perforated in tape 613 each time perforator magnet 643 is operated. Consequently the operation of magnet 643 as described above causes a letters signal to be perforated in tape 613. As will be readily understood by those skilled in the art any other suitable signal may be perforated in the tape. Such signals which do not form part of the subject matter of any message are sometimes referred to herein as "non-intelligence" or "non-message" signals.

The operation of magnet 643 in addition to causing the letters signals to be perforated in tape 613 interrupts the operating circuit of relay 644 which relay releases and in turn causes the counter magnet 632 to release and the perforator magnet 643 to also release. The release of relay 644 is slightly retarded so that the perforator magnet will have sufficient time to fully operate.

The release of the perforator magnet 643 advances the tape 613 as is well understood by those skilled in the art and in addition reestablishes the operating circuit of relay 644. Relay 644 in reoperating again completes the circuit of counter magnet 632 and the perforator magnet 643. The perforator magnet in reoperating perforates another letters signal in tape 613. The above cycle of operation is then repeated a number of times and for each operation of the perforator magnet 643, a letters signal is recorded in tape 613.

These additional letters signals cause an additional supply of perforated tape 613 to be available for transmission so that contacts 617 will close and complete a circuit for the reoperation of relay 628. Relay 628 in reoperating, reestablishes the operating circuit of start magnet 620. The reoperation of the start magnet 620 causes the transmitter 612 to resume the transmission of the final portion of the message signals stored in tape 613.

In general the operation of the perforator magnet 643 as described above, during the automatic perforation of the letters signals in tape 613, will be at a faster rate than the transmission of signals by transmitter 612 and consequently the circuits will remain in the above-described condition so long as the letters signals are being perforated in tape 613.

If for any reason the transmitter 612 operates faster than the perforator magnet 643, the transmitter 612 will transmit each signal combination substantially as fast as the perforator magnet 643 reoperates. In either case the operation of the transmitter 612 will be resumed long before the end of the thirty second time interval as described above so that the transmissive connection of transmitter 612 to the central switching system will not be interrupted. Instead the remaining portion of the message and end-of-message signals in tape 613 will be transmitted by the transmitter 612 to the central switching station.

As described above, the counter magnet 632 is operated once each time the perforator magnet 643 is operated during the automatic operation of this magnet for perforating a group of letters signals in tape 613. It should be noted that during the keyboard operation of the perforator, the counter magnet 632 is not operated in response to the perforation of letters signals of tape 613. However, when contacts 641 are operated, as described above, counter magnet 632 will count the letters signals punched in tape 613.

The counter 631 is provided with an auxiliary set of contacts 634 which are closed in the same manner as contacts 635. Contacts 634 may be closed when the counter mechanism has counted the same number of characters as when contacts 635 are closed or they may close when the counter mechanism has counted either a greater or lesser number of signals than when contacts 635 close. However, contacts 634 close only when sufficient letters signals have been perforated in tape 613 to insure that all of the message signals previ-

ously recorded in tape 613 will be properly advanced through the transmitter 612 and cause all of these signals to be transmitted over channel 646 which extends at this time to the central switching station over the transmission channel of the party line.

When contacts 634 close, a circuit is completed for the operation of relay 629 from battery through the winding of relay 629 and the operated contacts 634 to ground through the upper operated contacts 641. Relay 629 in operating completes a circuit for maintaining itself operated from battery through its winding and right-hand operated contacts to ground through the upper operated contacts 641.

The operation of relay 629 interrupts the locking circuit of relay 630 and permits relay 630 to release. The release of relay 630 this time interrupts the operating circuit of relay 644 and also the operating circuit of the perforator magnet 643 and restores these circuits to their normal condition. The control of the perforator magnet 643 is returned to the universal contacts 647 controlled by the keys of the keyboard perforator 611. The release of relay 630 also reestablishes the above-described circuit for the operation of the release magnet 633 thus causing this magnet to operate and release the counting mechanism and restore it to its normal condition where it will be ready for counting the characters recorded in the tape under the control of the keyboard mechanism.

Thus the operation of the perforating mechanism is interrupted after sufficient letters signals have been perforated in the tape 613 to insure that the last character recorded in the tape under control of the keyboard 611 will be properly transmitted by transmitter 612.

The operation of the perforating mechanism in perforating the letters signals in tape 613 will generally be at a much higher rate than the rate at which transmitter 612 transmits the message signals, consequently some time will lapse after the perforator magnet ceases to perforate the letters signals in the tape before the end of the previous message is fully transmitted by transmitter 612 and hence before tape 613 becomes taut again and causes contacts 617 to open. When the message is completely transmitted and tape becomes taut, contacts 617 will again open and interrupt the operating circuit of relay 628. Relay 628 in releasing at this time interrupts the circuit of the start magnet 620 thus stopping the operation of the transmitter 612. Release of relay 628 at this time does not cause the operation of relay 630 because relay 629 is still operated. The release of relay 628 at this time, however, completes a circuit for the operation of relay 627 from ground through the winding of relay 627 and the left-hand outer break contacts of relay 628 to battery through the left-hand operated contacts of relay 629.

The operation of relay 627 completes a locking circuit from ground through its winding and right-hand operated contacts to battery through the left-hand operated contacts of relay 618 for maintaining itself operated under control of relay 618. Relay 627 in operating interrupts the circuit extending to the control point over lead 645 and connects a holding battery to the lower winding terminal of relay 618 thus maintaining relay 618 operated under control of the contacts 616. The interruption of the circuit of lead 645 causes relay 530 to release and interrupt the transmission channel to the central office. There-

after other transmitters will be started from the central office if they are supplied with material available for transmission. Thereafter, the circuits of Fig. 6 remain in the condition described. When the operator returns and wishes to perforate an additional supply of tape she will release the release key 638 and cause the pawl 639 to disengage the locking bar 640 and thus restore contacts 641 to their normal position where they condition the perforator magnet 643 and the remainder of the equipment for responding to the operation of the keyboard perforator. When the operator operates these keys, contacts 617 will again close and complete circuit for the operation of relay 628. Relay 628 in operating at this time, however, does not reestablish the circuit to the transmitter start magnet 620 because the circuit of this magnet is open at the left-hand inner break contacts of relay 627.

If the necessary operations are performed at the central stations to test the transmitter 612 for message material to be transmitted during the time relay 627 is operated, the transmitter will not start and the equipment at the control point will respond as if no tape is available for transmission. This will be the case because only letters signals will be actually at the transmitting point and hence no actual message signals will be readily available for transmission. The circuits are arranged in this manner so that valuable line time will not be employed for transmitting the letters signals recorded in this tape by the operator as described above. In order for the operator to recondition the transmitter for transmitting succeeding messages over the transmission path 646, it is necessary for her to lift the so-called transmitter gate (a pivotal member which holds tape over the sensing pins of the transmitter) and advance the letters signals recorded in tape 613 through the transmitter so that they will not be transmitted and thus waste line time.

When the operator lifts the transmitter gate or in effect removes the tape 613 from the transmitter, contact 616 will open and interrupt the locking circuit of relay 618. Relay 618 will release and interrupt the locking circuit of relay 627 which relay then releases and reconnects the lower winding terminal of relay 618 to conductor 645 extending to the control point. The operator or attendant may then reinsert the same or a different tape with the proper relationship between the transmitter and the signals perforated in the tape. Thereafter the transmitter 612 will respond as having message material available for transmission when it is again tested by equipment at the central switching exchange and the circuits at the subscriber's station, shown in Fig. 6, will respond as described above.

While the foregoing embodiment of the invention is described with particular reference to the typical telegraph system described in the above-identified application of Bacon et al., it will be readily understood by those skilled in the art that this invention is not limited to use with this system or related types of systems, but may be used in cooperation with any type of telegraph transmission system in which it is desired to transmit messages from a perforated tape. It is also well understood that various other types of relays and equipment may be employed for the various elements of the specific embodiment described herein.

What is claimed is:

1. Telegraphic arrangements comprising a tape perforator associated with and supplying perforated tape to an automatic telegraph transmitter including means associated with the perforator for feeding out a definite quantity of tape impressed with non-intelligence conveying characters, a conditioning contact associated with the apparatus, and apparatus for initiating the operation of said means for feeding out tape in response jointly to the actuation of said contact together with the utilization by the transmitter of all available tape.

2. In combination, a keyboard perforator for recording message signals in a record medium, a signal transmitter controlled by signals recorded in a record medium, additional apparatus for recording non-message signals in said recording medium, and instrumentalities jointly responsive to the supply of record medium between said keyboard perforator and said transmitter and to a manually operable element for initiating the operation of said additional apparatus.

3. In combination, a keyboard perforator for recording message signals in a record medium, a signal transmitter controlled by signals recorded in a record medium, additional apparatus for recording non-message signals in said record medium, instrumentalities jointly responsive to the supply of record medium between said keyboard perforator and said transmitter and to a manually operable switch for initiating the operation of said additional apparatus, and equipment responsive to the recording of a predetermined number of non-message signals in said medium for interrupting the operation of said additional apparatus.

4. Telegraphic arrangements comprising a key controlled tape perforator associated with and supplying perforated tape to an automatic telegraph transmitter including means associated with the perforator for feeding out a definite quantity of tape impressed with non-intelligence conveying characters, a locking key and a conditioning contact actuated by said key associated with the apparatus, and instrumentalities for initiating the operation of said means for feeding out tape in response to the combined actuation of said conditioning contact and the subsequent utilization by the transmitter of all available tape.

5. In combination, a telegraph tape controlled transmitter, a keyboard perforator for supplying perforated tape to said transmitter comprising a plurality of keys, a perforating mechanism, operative connections between said keys and said perforating mechanism for actuating said mechanism once for each operation of any of said keys, and apparatus jointly controlled by a locking key and the supply of perforated tape between said transmitter and said perforator for causing repeated operations of said perforating mechanism.

6. In combination, a telegraph transmitter controlled by perforated tape, a keyboard perforator for supplying perforated tape to said transmitter comprising a plurality of keys, a perforating mechanism, operative connections between said keys and said perforating mechanism for actuating said mechanism once for each operation of any of said keys, apparatus jointly controlled by a locking key and the supply of perforated tape between said transmitter and said perforator for causing repeated operations of said perforating mechanism, and devices responsive to a predetermined number of repeated operations

of said perforating mechanism for stopping the repeated operation thereof.

7. In combination, a telegraph transmission channel, a telegraph transmitter controlled by perforated tape for transmitting over said channel, a keyboard perforator for supplying perforated tape to said transmitter comprising a plurality of keys, a perforating mechanism, operative connections between said keys and said perforating mechanism for actuating said mechanism once for each operation of any of said keys, apparatus jointly controlled by a locking key and the supply of perforated tape between said transmitter and said perforator for causing repeated operations of said perforating mechanism, devices responsive to a predetermined number of repeated operations of said perforating mechanism for stopping the repeated operation thereof, and means responsive to the supply of tape between said transmitter and said perforator for thereafter disconnecting said transmitter from said channel.

8. In combination, a telegraph transmission channel, a telegraph transmitter controlled by stored telegraph signals, a telegraph storage device for supplying stored message signals to said transmitter, apparatus for supplying non-message signals to said transmitter, and apparatus responsive to the supply of stored signals between said transmitter and said storage device after said non-message signals are supplied to said transmitter for disconnecting said transmitter from said channel.

9. In combination, a telegraph transmitter controlled by perforated tape, a perforating instrument for supplying perforated tape to said transmitter, apparatus for causing said instrument to perforate message signals in said tape, and other apparatus for causing said instrument to perforate non-message signals in said tape, and instrumentalities jointly responsive to the supply of tape between said transmitter and said

instrument and to the perforation of non-message signals in said tape for preventing further operation of said transmitter.

10. In combination, a telegraph transmitter controlled by perforated tape, a perforating instrument for supplying perforated tape to said transmitter, apparatus for causing said instrument to perforate message signals in said tape, and other apparatus for causing said instrument to perforate non-message signals in said tape, and instrumentalities jointly responsive to the supply of tape between said transmitter and instrument and to the perforation of non-message signals in said tape for preventing further operation of said transmitter, and apparatus responsive to the removal of said tape from said transmitter and the reinsertion of another tape in said transmitter for conditioning said transmitter for the transmission of further signals.

11. In combination, a telegraph transmission channel, a telegraph transmitter controlled by a punched tape for transmitting over said channel, a keyboard perforator for supplying perforated tape to said transmitter comprising a plurality of keys, a punch mechanism, operative connections between said keys and said mechanism for operating said punch mechanism only once in response to each operation of each of said keys, other apparatus for repeatedly operating said mechanism in joint response to the operation of a switch and the supply of tape between said transmitter and said perforator, apparatus responsive to a predetermined number of said repeated operations to stop said repeated operations, devices operative thereafter under control of the tape between said transmitter and perforator for disconnecting said transmitter from said channel and preventing its reconnection thereto, and apparatus responsive to the reinsertion of a tape in said transmitter for conditioning it for reconnection to said channel.

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