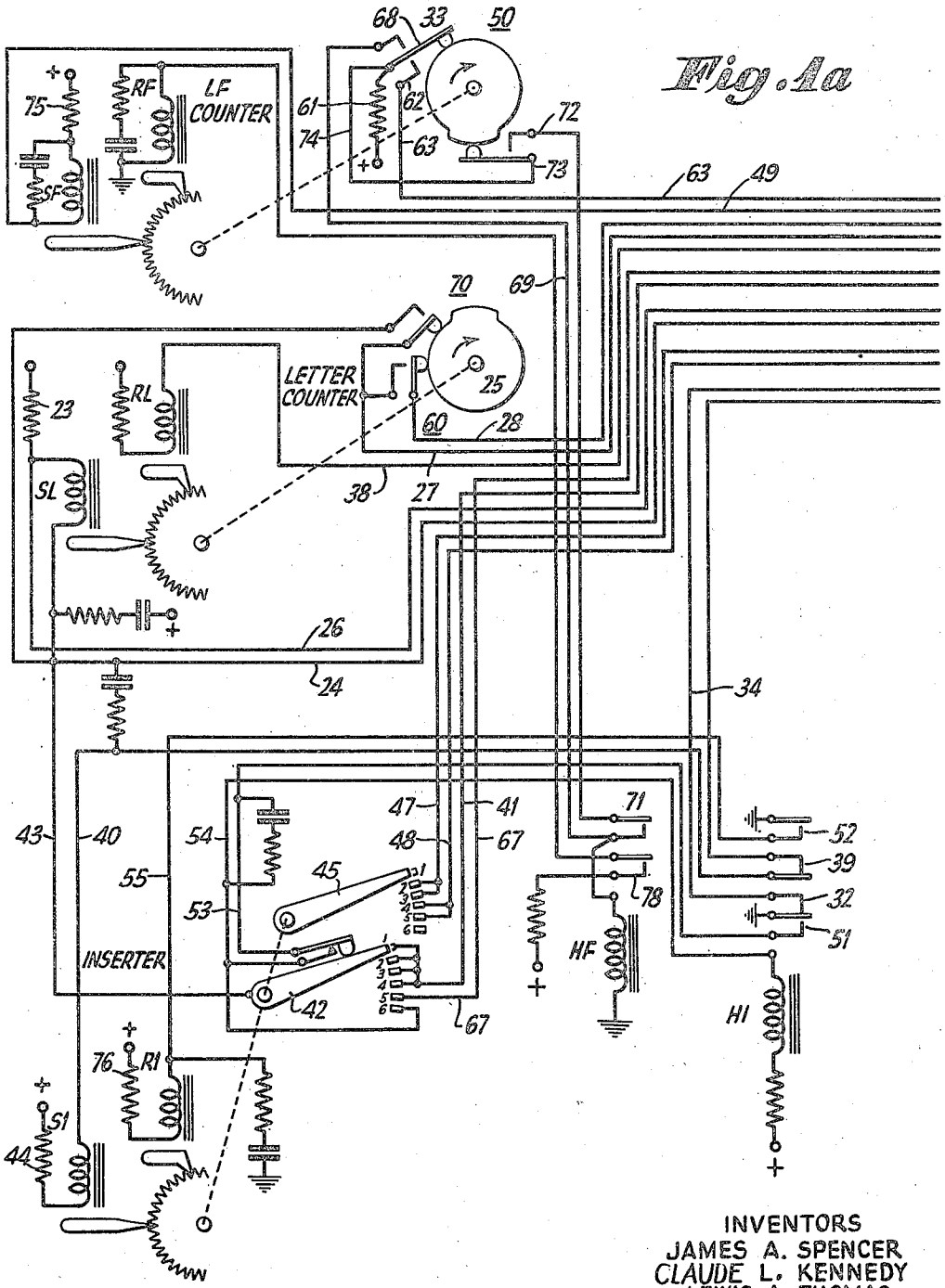
Oct. 26, 1948. J. A. SPENCER ET AL 2,452,333

TELEGRAPHIC CODE TRANSMITTER

Filed Feb. 11, 1947 2 Sheets-Sheet 1

Fig. 1a



INVENTORS
JAMES A. SPENCER
CLAUDE L. KENNEDY
LEWIS A. THOMAS

BY H. B. Grover

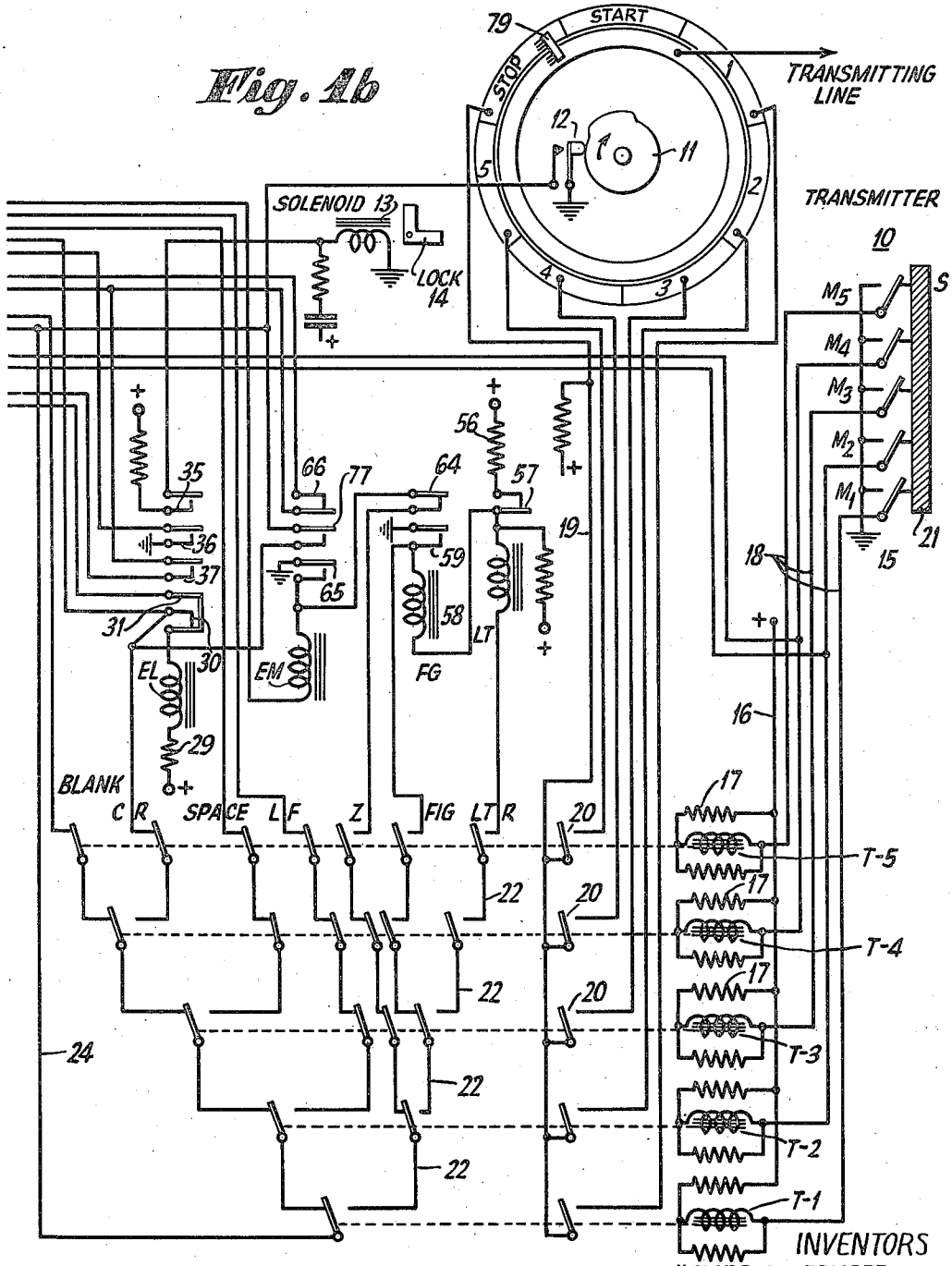
ATTORNEY

Oct. 26, 1948. J. A. SPENCER ET AL 2,452,333

TELEGRAPHIC CODE TRANSMITTER

Filed Feb. 11, 1947 2 Sheets-Sheet 2

Fig. 1b



INVENTORS
JAMES A. SPENCER
CLAUDE L. KENNEDY
LEWIS A. THOMAS
BY H. B. Brower
ATTORNEY

Patented Oct. 26, 1948

2,452,333

UNITED STATES PATENT OFFICE

2,452,333

TELEGRAPHIC CODE TRANSMITTER

James A. Spencer, Teaneck, N. J., and Claude L. Kennedy, Patchogue, and Lewis A. Thomas, Brooklyn, N. Y., assignors to Radio Corporation of America, a corporation of Delaware

Application February 11, 1947, Serial No. 727,880

3 Claims. (Cl. 178—3)

1

This invention relates to telegraphic code signal transmitters and more particularly to instrumentalities for converting "tape printer" signals into "page printer" signals.

It is common practice in modern telegraph systems for messages to be received on a reperforator and the perforated tapes thus produced placed in tape transmitters and sent to subsidiary offices where they are received by telegraph printers. Many of the tapes produced by the perforators carry only such symbols as are required for controlling "slip type" teleprinters, i. e., printers which produce the message as printed characters upon a narrow tape. The message to the subscriber is then prepared by manually cutting the printed tape into suitable lengths and pasting or gumming the strips to a message blank.

There are instances, however, in which the subsidiary stations utilize a "page printer," i. e., printers which produce the message on an endless web of paper. This type of printer is normally constructed in such a manner as to require certain signals to initiate the performance of functions which are not necessary in tape printer operation. For example, page printers must receive signals to initiate the operations of line feed and carriage return to which functions there are no corresponding functions in a tape printer. However, when continental Morse signals are converted into printer code, only the original Morse signals, such as punctuation, the symbols for the "blank" between the address and the text of a message and between the end of the text and the signature, together with the "end of message" symbol, are transmitted. Accordingly, it is necessary to supply the special signals required by the page printer or to perform the operations at the receiver.

In order to eliminate unnecessary manual operations in obtaining a final deliverable copy, the present invention is designed so that the additional functions are automatically inserted into the transmitted signals in order to produce a page copy at the receiving point.

It is an object of this invention to provide auxiliary telegraph signaling apparatus capable of sensing the proper times for inserting the required signal combinations and of automatically making such insertions.

It is a more specific object of this invention to produce from a standard 5-unit telegraph printer code perforated tape, signals suitable for controlling a page type printer.

It is a further object of this invention to provide a system which will utilize a perforated tape

2

normally producing slip type messages to produce a page copy which can be delivered to a customer without further manual transcribing or gumming.

Briefly, in accordance with the invention, a system is provided which will transmit to a page printer all the characters on a perforated tape and will, in addition thereto, produce and transmit to the page printer two additional "carriage return" and two "line feed" code signals upon the occurrence of the transmission of a "carriage return" symbol in the tape, the transmission of a "space" character at the end of a normal line, after predetermined letter count indicating a maximum line, or upon the transmission of a symbol indicative of the end of the message. In addition, in the latter case, the apparatus will continue transmitting line feed characters until a predetermined total number of line feeds have been counted.

The above and other objects of this invention will become apparent upon a consideration of the following detailed description taken in conjunction with the accompanying drawing in which the single figure represents schematically a preferred embodiment of the invention.

For the purpose of simplicity, the chosen embodiment of the invention utilizes 5-unit signals. It will be understood that the merits and advantages of the invention are readily adaptable to signaling codes using a different number of elements. It will assist in understanding a study of the drawing if it is remembered that the abbreviations for the relays and magnets roughly describe their functions, i. e., HF—Hold Feed, HI—Hold Inserter, EL—End of Line, EM—End of Message, FG—Figures, LT—Letters, etc.

Referring to the drawing, it will be seen that there has been provided a standard tape transmitter 10 provided with contact tongues having mark and space positions. Certain of the contacts of the transmitter are connected to a series of relays T1, T2, T3, T4 and T5. Suitable line resistors 17 are provided for each of the afore-mentioned relays. The paths energizing these relays may be traced from a source of power through lead 16, line resistor 17, the relays and leads 18 to the tongues of the sensing switches 15 of the transmitter 21. When any of the tongues of the sensing switches 15 are in the mark position, the corresponding relay will thus be energized.

The segments of the distributor are connected to switches 20 associated with the relays T1 to T5, inclusive. The switches are connected so that when the corresponding relay is actuated a source

of potential is connected through lead 19 to the corresponding commutator segment.

Also actuated by the relays T1 to T5, inclusive, are additional permutation switches 22 which identify various 5-unit signal combinations. The characters identified are Blank (i. e., no marking signals), Carriage Return, Space, Line Feed, the Letter Z, Figures and Letters. As will appear, these combinations are utilized by the inserter.

On the distributor there is placed a cam 11 arranged to close switch 12 during each revolution of the distributor shaft. The cam surface is designed to close switch 12 approximately at a time when the shorting brush 79 connects with the number 5 transmitting segment, and to open switch 12 approximately at a time when the shorting brush 79 connects with the "stop" transmitting segment. The closure of switch 12 puts a periodic ground on leads 24, and causes pulses to occur on the circuits whose leads connect to lead 24. These circuits will be explained as their functions are taken up in turn.

The first circuit to be operated by switch 12 is step magnet SL of the Letter Counter. A circuit is established from plus, through resistor 23, the coil of relay SL, lead 24 and switch 12 to ground. The relay SL actuates a ratchet which moves cam 25 one step clockwise for each energization of the relay. Normally this would occur during each revolution of the commutator cam 11. However, should a blank combination be transmitted, the permutation switches 22 establish a path such that ground is applied to leads 24 and 26 simultaneously, thus diverting the return from resistor 23 direct to ground through lead 26 and preventing the operation of step magnet SL.

The Letter Counter cam 25 is arranged to close switch 60 after a predetermined letter count. For purposes of illustration, the count may be assumed to be 60 letters. Closure of switch 60 ties lead 27 to lead 28. When switch 60 is closed, the first "space" combination on permutation switches 22 causes energization of relay EL through a circuit from plus, resistor 29, coil of relay EL, break contact 30, lead 27, switch 60 of cam 25, lead 28, "space" combination of permutation switches 22, lead 24, and switch 12 to ground.

The closure of relay EL has several functions. It is held closed by a circuit from make contact 31 of relay EL, lead 34, break contact 32 of relay HI to ground. Make contact 35 of relay EL closes a circuit which operates solenoid 13 and lock 14, mechanically stopping the transmitting tape and locking sensing switches 15 against the insulated space bus 21. Make contact 36 of relay EL grounds lead 38, actuating the release magnet RL of the Letter Counter. Make contact 37 of relay EL completes a path from plus, through resistor 44, coil of stepping magnet SI of the inserter, lead 40, break contact 39 of relay HI, break contact 37 of relay EL, lead 41, contacts on arm 42 of the inserter switch, lead 43, lead 24, and switch 12 to ground.

The stepping magnet SI of the inserter has a ratchet which advances the switch of the inserter one step. In the number 2 position inserter arm 45 completes the circuit from plus, through series resistor 17, coil of relay T4 and lead 47 to ground, thus transmitting a "carriage return" code combination to the line. The next actuation of switch 12 transmits a second pulse of current into the coil of the inserter relay SI which steps the inserter switch arms 42 and 45 to the number 3 position. With arm 45 on the number 3 position,

operation of the number 2 position is repeated and the arms stepped to the number 4 position.

With arm 45 on the number 4 position the foregoing operations are repeated with the exception that the path is through lead 48 and the coil of relay T2 causing a "line feed" character to be transmitted and also a "line feed" combination to be set up in permutation switches 22. This establishes a path from plus through series resistor 75, coil SF of the Line Feed Counter, lead 49, the line feed combination of the permutation switches 22, lead 24 and switch 12 to ground.

The next pulse from switch 12 actuates magnet SF of the Line Feed Counter which advances cam 50 one ratchet tooth. The same pulse also actuates stepping magnet SI of the inserter, advancing switch arms 42 and 45 of the inserter to the number 5 position. With arm 45 on the number 5 position, the foregoing operations are repeated and the switch arm 45 is moved to the number 6 position.

The arrival of arm 42 at the number 6 position forms a path for operating relay HI from plus, to the coil of relay HI, lead 54, arm 42, lead 43, lead 43, lead 24, and switch 12 to ground. Relay HI operates and locks up through lead 54, "off-normal" switch 46 associated with the inserter switch arm 42, lead 53, and make contact 51 on relay HI to ground. The operation of relay HI opens the hold circuit of relay EL by means of break contact 32 of relay HI and releases relay EL. Break contact 39 of relay HI opens the return to the inserter stepping magnet SI. Make contact 52 of relay HI closes a return path for the coil of release magnet RI of the inserter, from plus, through series resistor 76, coil of release magnet RL, lead 55, to ground. The inserter release mechanism operates and mechanically returns the inserter switch arms 42 and 45 to their home position.

The return of switch arm 42 to its home position opens "off-normal" contact 46, thus releasing the locking circuit of relay HI. The release of relay HI opens contacts 52 removing the actuating current from the release magnet RI of the inserter. The release of relay HI closes contacts 39 and returns the actuating circuit to the stepping magnet SI of the inserter. However, this circuit is opened at contact 37 on relay EL. The release of relay HI returns the holding path of relay EL to normal through the opening of contacts 32 of relay HI.

The release of relay EL opens contacts 35, releasing solenoid 13, opens contact 36, deactivating release magnet RL and opens contact 37. As a result, lock 12 releases the sensing switches 15 of the transmitter at a time while shorting brush 79 is traversing the "stop" magnet of the distributor, permitting the transmitter to continue at normal operation.

Should a "space" combination fail to appear on the permutation switches 22 within a predetermined number of letters, say ten, after the closure of switch 60, the continued rotation of the cam 25 will close switch 70. The closure of switch 70 will energize relay EL through leads 27 and 24 initiating the insertion cycle as described above.

The occurrence of a "double dash" code character in the 5-unit code chosen for purposes of illustration is translated as a "carriage return" function will likewise lock up relay EL and start the insertion function. In this case three "carriage return" functions and two "line feed" functions will be transmitted.

Relay FG operates upon the "figure" combination in the permutation switches 22 and locks up from plus through series resistor 56, break contacts 57 of relay LT, coil 58 of relay FG, make contacts 59 of relay FG to ground. Relay LT operates in response to a "letter" combination existing in the permutation switches 22. The function of relays FG and LT is therefore to register the last case shift selection passed through the transmitter.

Upon the occurrence of the letter Z while relay FG is closed (upper case Z) indicative of the end of the message, a circuit is completed from plus through resistor 61, break contact 62 of the line feed counter, lead 63, coil of relay EM, make contact 64 of relay FG, a combination of permutation switches 22, lead 24 and switch 12 to ground. Relay EM locks up through break contact 62 and its own make contact 65 to ground.

The closure of contact 77 of relay EM actuates relay EL starting the insertion function. However, closure of relay EM opens break contacts 66 removing the connection between leads 41 and 47, so that when the switch arm 42 of the inserter reaches the number 5 position the actuating path of stepping magnet SI of the inserter is broken. The inserter switch arms 42 and 45 remain in this position and the transmitter continues transmitting "line feed" characters and the Line Feed Counter continues to count these characters until a predetermined number of "line feed' characters have been counted, say thirty three. At the end of the predetermined count, cam 50 of the Line Feed Counter lifts the armature of switch 33 breaking contact 62 and make contact 68. This releases relay EM and closes relay HF through a circuit from plus through resistor 61, contact 68, lead 69 and the coil of relay HF to ground. Relay HF locks up from plus, through resistor 61, lead 74, switch 73 of the Line Feed Counter, lead 72, make contacts 71 of relay HF and the coil of relay HF to ground.

The release of relay EM closes break contact 66 allowing the succeeding closure of cam switch 12 to step switch arms 42 and 45 to their number 6 position, whence the inserter will be reset and release relay EL as explained above.

The closure of contacts 78 of relay HF actuates release magnet RF of the Line Feed Counter allowing cam 50 to reset. In its home position, cam 50 opens switch 73 releasing relay HF and thence magnet RF.

The foregoing operations initiated by the upper case Z code signal complete the counting function of the Line Feed Counter and reset all counter circuits to zero. Relay FG remains locked up until the occurrence of a letter combination, otherwise all circuits are in exactly the same condition as they were at the start of the message.

In describing the operation of the invention, several lines of an assumed message will be utilized in order to exemplify the several possible sequences of operation.

The first line will be assumed to be a normal line having no abnormally long words in it. As the transmitter 10 scans the perforated tape, the signals will be transmitted in the normal fashion. Each revolution of the distributor path causes, through the closure of switch 12, a pulse to appear across the Letter Counter Step Magnet SL and advance cam 25 one step. The normal operation continues until the cam 25 reaches a position where switch 60 is closed, tying together leads 27 and 28. The tape transmitter will continue transmitting the signal characters until the occurrence of a "space" signal indicative of an interval between groups of signal characters. Upon such an occurrence, the permutation switches 22 operate as described above to energize relay EL, and locks the transmitter 10, through the energization of solenoid 13. The next closure of switch 12 on the distributor energizes a stepping magnet SI of the inserter and steps switch arms 42 and 45 to position number 2. This stepping establishes a "carriage return" code combination which is transmitted by the distributor. The next closure of switch 12 steps the inserter switch arms 42 and 45 to the number 3 position where a second "carriage return" function is transmitted and the switch arms are stepped to the number 4 position. With the switch arms in the number 4 position, a "line feed' signal is transmitted and the arms step to the number 5 position. With the arms in the number 5 position, the foregoing operations are repeated and the switch arms move to the number 6 position. In the number 6 position the next pulse produced by the closure of switch 12 operates relay HI, releases relay EL, opens the circuit to the inserter, releases magnet RL, returning arms 42 and 45 to their home position, and releases solenoid 13 unlocking the tape transmitter 10.

At this point the inserter switch arms and the letter counter are in their home positions. The Line Feed Counter has counted two steps. The letter counter resumes counting as before.

Let it be assumed that the next line contains an abnormally long word near the end of the line, that is, a space fails to appear after switch 60 and the continued rotation of cam 25 closes switch 70. The relay EL will then be energized upon the next pulse produced by the closure of switch 12 and will initiate the insertion cycle as just described. This will prevent the piling up of letters at the end of a line due to abnormally long words.

Let it be assumed that the next line completes a paragraph. There will thus appear in the tape a double-dash code character. The occurrence of a double-dash code character which in the 5-unit code is transmitted as a carriage return function, will actuate permutation switches 22 in such a manner that the next closure of switch 12 will energize relay EL and initiate the insertion function. In this case three carriage return functions and two line feed functions will be transmitted.

Let it be assumed that the final line ends the message. There will then appear in the tape a signal character corresponding to an upper case Z. Upon the occurence of the letter Z while FG relay is closed, indicative of the end of the message, relay EM will be energized. The energization of relay EM actuates relay EL starting the insertion function. However, the circuit to the inserter stepping magnet SI will be opened when the switch arms 42 and 45 reach the number 5 position. The transmitter will continue transmitting line feed characters and the Line Feed Counter will count these characters until the cam 50 operates switch 33. The operation of switch 33 closes relay HF releasing relay EM so that the next closure of switch 12 steps the inserter switch arms 42 and 45 to their number 6 position. From the number 6 position the system is reset in the same cycle as described above.

In recapitulation, therefore, this invention describes an apparatus which is completely automatic in its operation, is fully controlled at the transmitting station and which will transmit to a page printer all the characters on a perforated 5-unit printer tape, and will, in addition thereto,

produce and transmit to the page printer two additional "carriage return" and two "line feed" code signals upon the occurrence of any of the following signal characters:

Transmission of a "carriage return" character in the tape, transmission of a "space" character at the end of a normal line, transmission of a pre-determined letter count indicating a maximum line, or upon the transmission of an upper case Z.

In addition, in the latter case, the apparatus will continue transmitting "line feed" characters until a pre-determined total number of "line feed" characters have been counted.

While the invention has been described in connection with a 5-unit signal code, it will be clear that the merits and advantages of the invention may be utilized with other types of codes without departing from the spirit of the invention. It will also be clear that while only the insertion of "carriage return" and "line feed" functions have been described, other characters may be inserted at desired times. For purposes of simplicity, a plurality of sources of operating power have been shown in the drawing. It will be obvious that any desired type of common power supply may be used.

While there has been indicated and described a system for carrying the invention into effect, it will be apparent to one skilled in the art that our invention is by no means limited to the particular organization shown and described, but that many modifications may be made without departing from the scope of the invention.

We claim:

1. In a telegraph printing system utilizing a fixed unit signal code, a tape transmitter having a distributor, a relay for each unit of said code connected so as to establish a potential on an element of said distributor when energized, means energizing said relays in accordance with the signal characters to be transmitted by said transmitter, means counting the signal characters transmitted, means operated by said counting means interrupting the transmission of said signal characters after the transmission of a predetermined number of said signal characters, means operated by said counting means energizing said relays during said interruption in accordance with function performing characters not appearing in said signal characters whereby said distributor transmits said function performing characters during said interruption and means operated by said counting means reestablishing the transmission of said signal characters after the transmission of said function performing characters.

2. In a telegraph printing system utilizing a fixed unit signal code, a tape transmitter having a distributor, a relay for each unit of said code connected so as to establish a potential on an element of said distributor when energized, means energizing said relays in accordance with the signal characters to be transmitted by said transmitter, means counting the signal characters transmitted, means determining the occurrence of a group interval in said signal characters, means operated under the joint control of said counting means and said interval determining means interrupting the transmission of said signal characters upon the occurrence of a group interval after the transmission of a predetermined number of said signal characters, means operated by said counting means energizing said relays during said interruption in accordance with function performing characters not appearing in said signal characters whereby said distributor transmits said function performing characters during said interruption, and means operated by said counting means reestablishing the transmission of said signal characters after the transmission of said function performing characters.

3. A telegraph printing system in accordance with claim 2 including means operated by said counting means whereby the interruption of the transmission of said signal characters and the insertion of said function performing signals will occur upon the transmission of a second greater predetermined number of signal characters without the occurrence of such a group interval.

JAMES A. SPENCER.
C. L. KENNEDY.
LEWIS A. THOMAS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,379,865	Connery	July 10, 1945