

March 1, 1938.

R. F. DIRKES ET AL

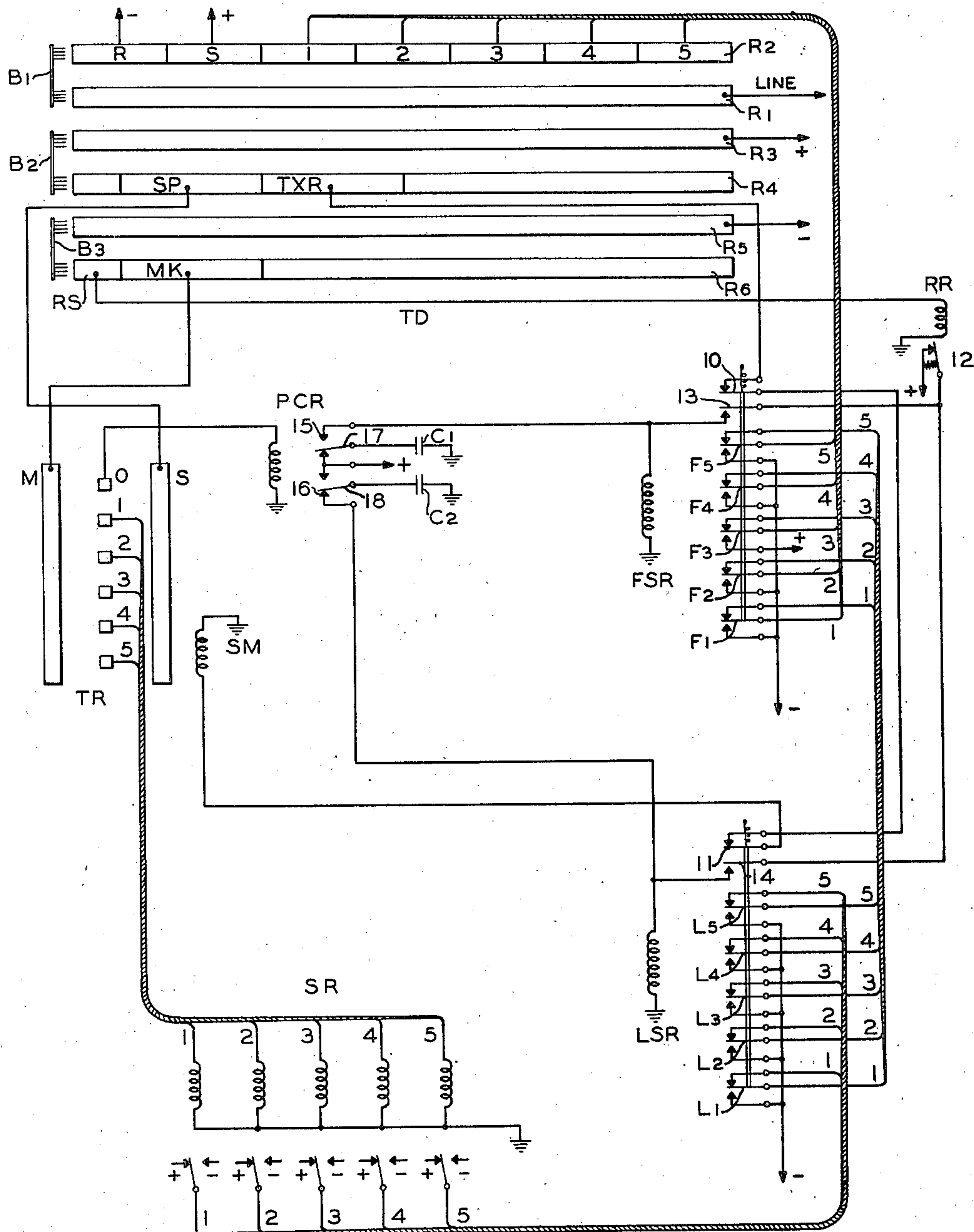
2,109,989

TELEGRAPH TRANSMITTING SYSTEM

Filed Nov. 28, 1934

2 Sheets-Sheet 1

FIG. 1



INVENTOR
R. F. DIRKES
J. N. ANDERSON JR.

BY

Eugene C. Brown
ATTORNEY

March 1, 1938.

R. F. DIRKES ET AL

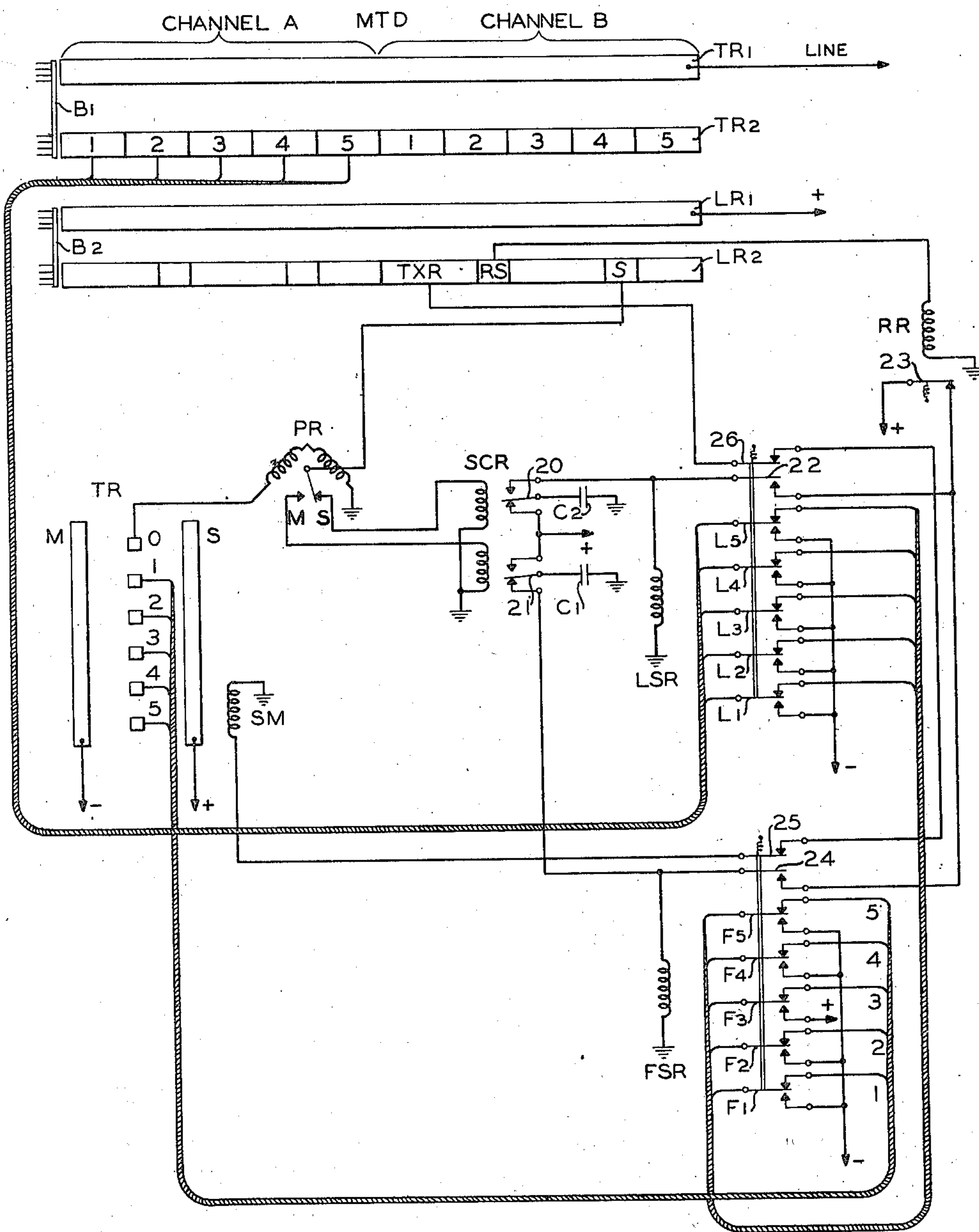
2,109,989

TELEGRAPH TRANSMITTING SYSTEM

Filed Nov. 28, 1934

2 Sheets-Sheet 2

FIG. 2



INVENTOR
R.F.DIRKES
J.N.ANDERSON JR.

BY

Eugene C. Brown
ATTORNEY

UNITED STATES PATENT OFFICE

2,109,989

TELEGRAPH TRANSMITTING SYSTEM

Robert F. Dirkes, Jamaica, N. Y., and James N. Anderson, Jr., North Plainfield, N. J., assignors to The Western Union Telegraph Company, New York, N. Y., a corporation of New York

Application November 28, 1934, Serial No. 755,204

12 Claims. (Cl. 178—17)

This invention relates to a telegraph transmitting system and more particularly to a system for transposing telegraph signals from one standard code to another standard code.

It is well known to those versed in the art that when a five-unit printing telegraph system is operated it is customary to arrange the receiving elements of the printer so they operate or shift from upper case to lower case position or vice versa in response to a full code combination. The standard form of five-unit code keyboard has two characters on each key lever, one in each upper and lower case position. There is a shift key lever and an unshift key lever, one or the other of which must be operated before any change of case shift is to be made. This means that the transmitting operator must keep in mind whether the last combination sent was a figures or letters combination, in order to properly determine in which case the machine is operating. This has a tendency of materially slowing down the operation of the keyboard and is an added mental strain on the operator in preparing the messages for transmission.

In any form of six-unit code there is a separate code combination for each character and consequently a separate key lever on the keyboard for each character whether the character is to be printed in upper or lower case position. Consequently no case shift and unshift character combinations have to be set up. The work of the keyboard operator is therefore much lightened and the chances of error considerably decreased. Obviously it would be desirable from an operating standpoint to have the operator work from a six-unit keyboard or one having a separate key for each character to be transmitted, even in systems which employ a five-unit code and therefore require the transmission of a full character combination to cause it to shift and another combination to cause it to unshift.

Therefore one of the objects of the present invention is to provide means whereby standard six-unit permutation telegraph signals, of which one impulse of each combination determines the shift position in which the character is to be printed, may be transposed into a standard five-unit permutation code in which the shift position is determined by a full five-unit combination permutation only when a change in shift position of the receiving printer is required.

Another object is to permit the operator to prepare copy for transmission in the form of perforated tape employing a six-unit code and cause automatic means to be controlled by said six-

unit tape to transmit standard five-unit permutation signals.

Another object is to render it unnecessary for the transmitting operator to remember which case combination was last perforated and to provide means for automatically transmitting the proper shift combination if and when required.

The invention will be best understood by reference to the accompanying drawings in which

Figure 1 is a diagrammatic view showing the invention applied to a start-stop telegraph system, and

Figure 2 is a diagrammatic view showing the invention applied to a multiplex telegraph system.

Referring first to the system of Figure 1, we have shown a standard six-unit tape transmitter TR having a marking bus bar M, a spacing bus bar S and a set of transmitting tongues 0 and 1 to 5. The transmitter may be of the type shown in the patent to Benjamin No. 1,298,440, granted March 25, 1919, and the tape supplied thereto may be perforated in standard six-unit code. The six-unit tape employs six transverse perforations of which one perforation represents the shift position in which the character is to be printed and the remaining five perforations represent the character selecting combination. The shift or "0" perforation controls the zero tongue of the transmitter and the five code perforations control the five code tongues 1 to 5. Obviously tape may be produced in any manner as by a re-perforator operating from received six-unit signals or directly by a six-unit keyboard perforator of which several types are known in the art.

The zero tongue of the tape transmitter is connected through the winding of a polar control relay PCR to ground and the code tongues 1 to 5 are respectively connected through the windings 1 to 5 of the bank of polar storage relays SR to ground. The tongues of the relays SR work between positive and negative contacts and are connected individually to the upper or break contacts of the letter shift relay LSR, the corresponding tongues L1 to L5 of which are in turn individually connected to the upper or break contacts of the figures shift relay FSR, the corresponding tongues F1 to F5 of which in turn are respectively connected to segments 1 to 5 of transmitting ring R2 of the transmitting distributor TD. The lower or make contacts of relays LSR and FSR, associated with armatures L1 to L5 and F1, F2, F4 and F5 of these relays are connected to negative or marking battery

and make contact of armature F3 is connected to positive or spacing battery. Ring R2 also has a rest segment R connected to negative or marking battery and a start segment S connected to positive or spacing battery. The solid transmitting ring R1 is connected to the outgoing line. Rings R1 and R2 are bridged by brushes B1.

The distributor also has a pair of local rings R3 and R4 bridged by brushes B2 and a pair of local rings R5 and R6 bridged by brushes B3. Solid ring R3 is connected to positive or spacing battery and solid ring R5 is connected to negative or marking battery. Ring R4 has a local segment SP connected to the spacing bus bar S and ring R6 has a corresponding segment MK connected to marking bus bar M. Segment TXR of ring R4 is connected through the break contact and armature 10 of relay FSR in series with the break contact and armature 11 of relay LSR and through the winding of the stepping magnet SM of the tape transmitter to ground.

Ring R6 has its initial segment RS connected through the winding of the release relay RR to ground. The break contact of relay RR has positive battery thereon and its armature 12 is connected through the armature 13 and associated make contact, of relay FSR to the winding thereof, to provide a locking circuit for the relay FSR. Armature 12 is also connected through the armature 14 and associated make contact of relay LSR to the winding of this relay to lock the same.

The figure shift relay FSR is also energized from the marking contact 15 of the polar control relay PCR and the letter shift magnet LSR is arranged to be operated from the spacing contact 16 of the control relay PCR. Armatures 17 and 18 engage these marking and spacing contacts respectively, the former being connected to ground through a condenser C1 and the latter through a condenser C2. The opposite contact of each of the armatures 17 and 18 are connected to a source of positive potential.

The operation of the system is as follows: Assume a letters character to be set up in the tape transmitter TR and that the preceding character was also a letters character. Since the letters shift controlling impulse is a spacing line condition, the zero or shift contact of the transmitter will be on the spacing bus bar. Therefore as the brushes B2 pass onto segment SP, battery from ring R3 will be supplied through the zero contact to the winding of the polar control relay PCR, tending to move it towards its lower or spacing contacts. However, since the preceding character was also a letter character the armatures of this relay will already be resting on their lower contacts and the condenser C2 will have been previously discharged so that no current flows over the armature 18. The condenser C1 will be charging at this time through its armature 17 and its lower contact.

The storage relays SR will be operated in accordance with the combination set up in the contacts 1 to 5 of the tape transmitter from the positive or negative battery supplied over segments SP and MK of rings R4 and R6 respectively, and since the tongues of the relays SR are connected through the break contacts of relays LSR and FSR in series to the segments 1 to 5 of ring R2, the combination in the tape transmitter will be transmitted by the brush B1 and ring R1 to the outgoing line, preceded, of course, by the rest and the start impulses. During this revolution as the brush B2 engages the segment TXR, a circuit will be completed from ring R3, brushes B2,

segment TXR and the upper or break contacts and armatures 10 and 11 of relays FSR and LSR, respectively, to the tape stepping magnet SM, thereby stepping a new selection in the tape transmitter. The relays SR remain set in their last position, however, since there is no battery applied to the marking and spacing bus bars M and S of the tape transmitter at this time.

Assume now that the character just advanced into the tape transmitter is a figures character, whereas the preceding one was a letters character. Since in the figures character the shift selection impulse is marking, the zero contact of the tape transmitter will engage the marking bus bar M. Consequently on the next revolution as the brush B3 engages segment MK, negative battery will be supplied to the polar control relay PCR, causing it to move its armatures to their upper or marking position, a new combination at the same time being set up on the storage relays SR. As tongue 17 of relay PCR engages its contact 15, the condenser C1 will discharge through the winding of the figures shift relay FSR, which upon being energized moves its armatures to their lower or make contacts. Relay FSR is thereupon locked up through its armature 13 and the armature 12 of the release relay RR. At the same time the segments 1 to 5 of ring R2 are disconnected from the armatures of the storage relays SR, at the upper contacts of armatures F1 to F5, these armatures being positioned against their lower or make contacts. These make contacts are coded in accordance with the figures shift combination of the five-unit code, the contacts of armatures F1, F2, F4 and F5 being provided with marking battery and the contact of armature F3 being supplied with spacing battery. The figures shift combination is, therefore, set up on the segments 1 to 5 of ring R2 and as the brush B1 completes its revolution the figures shift combination is set to the line. During this revolution the circuit to the stepping magnet SM is interrupted at armature 10 of relay FSR, so that as the segment TXR is crossed the stepping magnet does not operate.

As the brush B3 passes on to its initial segment RS, following the transmission of the figures shift combination, the relay RR is operated, thereby interrupting the locking circuit for the relay FSR, whereupon this relay releases its armatures back to their break or upper contacts and thus again connects segments 1 to 5 of ring R2 to the tongues of the storage relays SR and again completes the circuit from the segment TXR to the winding of the tape stepping magnet SM.

Therefore, upon the next revolution of the distributor brushes, the figures combination previously set up in the tape transmitter is transmitted to the line and a new combination set up in the tape transmitter. If this new combination is also a figures combination, the relay PCR remains in its marking or upper position with the condenser C1 discharged from the previous operation so that both the relays FSR and LSR remain unoperated, the new figures combination being transmitted directly to the line.

If a letters combination is now set up in the tape transmitter, then on the next revolution of the distributor the relay PCR is operated to its spacing or lower position and the condenser C2 discharged through the winding of the letter shift relay LSR, the armatures of which are thus moved to their lower contacts, again disconnecting segments 1 to 5 of ring R2 from the storage relays SR and, at armature 11, interrupting the

circuit to the stepping magnet SM. The lower or make contacts of armatures L1 to L5 are all connected to marking battery and thereby set up marking battery on all of the segments 1 to 5 of ring R2. This combination corresponds to the letters shift combination and is transmitted over the line preceding the transmission of the letters combination previously set up in the tape transmitter.

It will be noted, therefore, that with this system the six unit signals represented by perforations in the tape in the transmitter TR are converted into five unit signals with a letters shift combination inserted between a change from a figures combination to a letters combination and a figures shift signal inserted between a change from a letters combination to a figures combination. The circuit to the tape stepping magnet is interrupted during the transmission of the letters figures shift combination so that no characters are lost in the tape transmitter.

In Figure 2 we have shown a modification in which a 6 unit tape transmitter is arranged to transmit over one channel of a multiplex system in 5 unit code. The multiplex transmitting distributor MTD is provided with transmitting rings TR1 and TR2, the former being connected to the outgoing line, and the latter having two groups of 5 segments each for transmitting the A and B channel signals.

The A channel segments 1 to 5 of ring TR2 are connected through the armatures L1 to L5 of the letters shift relay LSR and their associated upper or break contacts, in series with the armatures F1 to F5 of the figures shift relay FSR and their corresponding upper or break contacts, to the tongues 1 to 5 of the six unit tape transmitter TR. The zero tongue of the tape transmitter is connected through the polar relay PR to ground.

The tongue of the relay PR is connected to a shift segment S of the local ring LR2 of the distributor and the marking and spacing contacts of relay PR are connected respectively through the opposing windings of the shift control polar relay SCR, to ground. The armature 20 of relay SCR is connected to the ungrounded side of condenser C2 and the armature 21 is connected to the ungrounded side of condenser C1. The upper contact of armature 20 of relay SCR is connected through the winding of the letters shift relay LSR to ground and the lower contact of armature 21 of relay SCR is connected through the figures shift relay FSR to ground. The lower contact of armature 20 and the upper contact of armature 21 are connected to positive battery for the purpose of charging the condensers C1 and C2.

The winding of relay LSR is connected through its locking armature 22 and make contact, to the break contact and armature 23 of the release relay RR, to battery and similarly the winding of relay FSR is connected through its locking armature 24 and make contact to the break contact of relay RR.

The circuit for the tape stepping magnet SM extends through the armature 25 and break contact of relay FSR, in series with the break contact and armature 26 of relay LSR to the segment TXR of ring LR2.

The winding of the release relay RR has its ungrounded terminal connected to the segment RS of ring LR2.

The rings TR1 and TR2 are bridged by brushes B1 and the rings LR1 and LR2 are bridged by

brushes B2. Ring LR1 is connected to positive battery.

The operation of this system is similar to that shown in Figure 1. When a shift from a figures character to a letters character occurs in the tape transmitter the zero tongue moves to its spacing bus bar, thereby operating the armature of relay PR to its spacing contact. Consequently as segment S of ring LR2 is crossed, relay SCR operates to connect condenser C2 through the upper contact of armature 20 to the winding of relay LSR, thereby energizing the same and thus disconnecting the segments 1 to 5 of the A channel from the tongues 1 to 5 of the tape transmitter and connecting them to the lower or make contacts of the relay LSR, which are coded to set up the letter shift combination on the A channel segments of ring TR2.

At the same time the circuit for the stepping magnet SM is interrupted at the armature 26 of relay LSR and the relay LSR is locked up through its armature 22 and the contact 23 of release relay RR to battery. Consequently on the next revolution of distributor MTD, as the segments 1 to 5 of the channel are crossed, the letter shift combination is transmitted to line and thereafter as the segment TXR is crossed the tape stepping magnet remains unenergized since the circuit thereto is open at armature 26. When segment RS is reached, however, relay RR operates to interrupt the locking circuit to relay LSR, permitting its armatures to return to their upper contacts and thus reconnecting the A channel segments 1 to 5 to the tongues 1 to 5 of the tape transmitter. On the next rotation brush B1 of the multiplex distributor transmits the combination previously set up in the tape transmitter.

Since the relay PR is polar, its tongue retains its last set position and no further operation of relay LSR or FSR occurs until a figures shift combination is set up in the tape transmitter. When this occurs the tongue of relay PR moves to its marking contact and subsequently as segment S is crossed the shift control relay SCR operates, permitting the condenser C1 to discharge through the winding of the figures shift relay FSR, thereby again disconnecting the tongues of the tape transmitter from the A channel segments and setting up the figures shift combination thereon from the lower of make contacts of the relay FSR. The circuit to the stepping magnet is again interrupted so that as the figures shift combination is sent over the line the last character set up in the tape transmitter is retained until the following revolution.

While a 6 unit transmitting instrument has been shown in both modifications as a tape transmitter, it is obvious, of course, that a keyboard transmitter could be used in place thereof and various other changes and modifications made in the system and apparatus employed without departing from the essential features of the invention and all such changes as come within the scope of the appended claims are contemplated.

What we claim is:

1. In a telegraph system, means for producing character selecting combinations of electrical conditions and a case shift selecting electrical condition simultaneously, means for storing said character selection combination of electrical conditions, means under control of said shift selecting electrical condition for setting up a shift selection code combination of impulses and cyclic means for transmitting said shift selecting combi-

nation and said character selecting combination in the order named.

2. In a telegraph system, means for producing character selecting combinations of electrical impulses and a case shift selection impulse simultaneously, means for storing said character selection impulses independently of said transmitter, means under control of said shift selection impulse acting whenever a change occurs therein from the preceding shift selection for preparing a case shift combination of impulses for transmission, and means for transmitting said shift combination of impulses and said character selecting combination of impulses in the order named.

3. In a telegraph system, means for producing a character selecting combination of impulses and a case shift selection impulse, means for storing said character selection impulses independently of said transmitter, means under control of said shift selection impulse acting whenever a change occurs therein from a letter shift selection to a figures shift selection for preparing a figures shift combination of impulses for transmission and whenever a change occurs from a figures shift selection to a letters shift selection, for preparing a letters shift combination of impulses for transmission, and means for transmitting said prepared shift combination of impulses and said character selecting combination of impulses in the order named.

4. In a telegraph system, a tape transmitter, tape stepping means for said transmitter, a plurality of contacts in said transmitter under control of perforated tape, for setting up simultaneously character selecting and shift selecting conditions, a storage relay for each of said character selecting contacts, a figures shift selecting relay, a letters shift selecting relay, means controlled through said shift selecting contact for operating one of said shift selecting relays, said operated shift selecting relay preparing a shift control combination of impulses for transmission, and means for transmitting said prepared shift control combination of impulses followed by said character selecting combination of impulses.

5. In a telegraph system, a tape transmitter, tape stepping means for said transmitter, a plurality of contacts in said transmitter under control of perforated tape, for setting up simultaneously character selecting and shift selecting conditions, a storage relay for each of said character selecting contacts, a figures shift selecting relay, a letters shift selecting relay, means controlled through said shift selecting contact for operating one of said shift selecting relays whenever a change occurs in the shift selecting conditions, said operated shift selecting relay preparing a shift control combination of impulses for transmission, means for transmitting said prepared shift control combination of impulses followed by said character selecting combination of impulses, and means for preventing operation of said tape stepping means during transmission of said shift control combination of impulses.

6. A telegraph transmitter, comprising a plurality of transmitting contacts operable in predetermined combinations in accordance with a prearranged code to produce a plurality of character selecting conditions and a single shift selecting condition, means under control of said shift selecting contact for transmitting a shift combination of impulses and means under control of said character selecting contacts for transmitting a character selecting combination of impulses.

7. A telegraph transmitter, comprising a plurality of transmitting contacts operable in predetermined combinations in accordance with a prearranged code to produce a plurality of character selecting conditions and a shift selecting condition, means under control of said shift selecting contact for transmitting a shift combination of impulses, means under control of said character selecting contacts for transmitting a character selecting combination of impulses, and means effective during transmission of each character selecting code combination of impulses for causing reoperation of said transmitting contacts.

8. A telegraph transmitter comprising a plurality of transmitting contacts operable in predetermined combinations in accordance with a prearranged six unit code, five of said contacts representing a character selection and one of said contacts designating a case shift selection, a distributor having contacts corresponding to the character selecting contacts of said transmitter, means for setting up on said distributor contacts a code combination of impulses corresponding to the position of said character selecting contacts, other means for setting up on said distributor contacts an auxiliary combination of impulses preceding said character selecting combination whenever a change occurs in said shift selection, and means for transmitting each code combination of impulses set up in said distributor contacts.

9. A telegraph transmitter comprising a plurality of transmitting contacts operable in predetermined combinations in accordance with a prearranged six unit code, five of said contacts representing a character selection and one of said contacts designating a case shift selection, a distributor having contacts corresponding to the character selecting contacts of said transmitter and a synchronizing contact, means for setting up on said distributor contacts a code combination of impulses corresponding to the position of said character selecting contacts and other means for setting up on said distributor contacts an auxiliary combination of impulses preceding said character selecting combination whenever a change occurs in said shift selection.

10. A telegraph transmitter comprising a plurality of transmitting contacts operable in predetermined combinations in accordance with a prearranged six unit code, five of said contacts representing a character selection and one of said contacts designating a case shift selection, a start-stop distributor having contacts corresponding to the character selecting contacts of said transmitter and a start and a rest contact, means for setting up on said distributor contacts a code combination of impulses corresponding to the position of said selector contacts, other means for setting up on said distributor contacts an auxiliary combination of impulses preceding said character selecting combination whenever a change occurs in said shift selection and means for transmitting each code combination of impulses set up on said distributor contacts preceded by a start impulse and followed by a rest impulse.

11. A telegraph transmitter comprising a plurality of transmitting contacts operable in predetermined combinations in accordance with a prearranged six unit code, five of said contacts representing a character selection and one of said contacts designating a case shift selection, a multiplex distributor having segments corresponding

to each of said character selecting contacts, means for setting up on said distributor segments the code combination of impulses corresponding to the position of said character selecting contacts, other means for setting up on said distributor segments an auxiliary combination of impulses preceding said character selecting combination whenever a change occurs in said shift selection, means for transmitting each combination set up on said segments and means controlled by said distributor for operating said transmitter to set up the next combination on the contacts thereof after each character selecting combination of impulses has been sensed by the distributor.

12. A telegraph transmitter comprising a plurality of transmitting contacts corresponding to a character selecting code combination and an additional contact corresponding to a shift se-

lecting condition, a distributor having contacts corresponding to said character selecting contacts, a shift control relay having pairs of transfer contacts corresponding to each of said character selecting contacts, one contact of each pair being coded to provide a shift combination of impulses, the opposite contact of each pair being connected in series with said character selecting contacts, and the armatures of said relay being connected to said distributor contacts, said relay being under control of said shift selecting condition whereby said character selecting contacts may be disconnected from said distributor contacts and said shift code combination set up thereon.

ROBERT F. DIRKES.
JAMES N. ANDERSON, JR.