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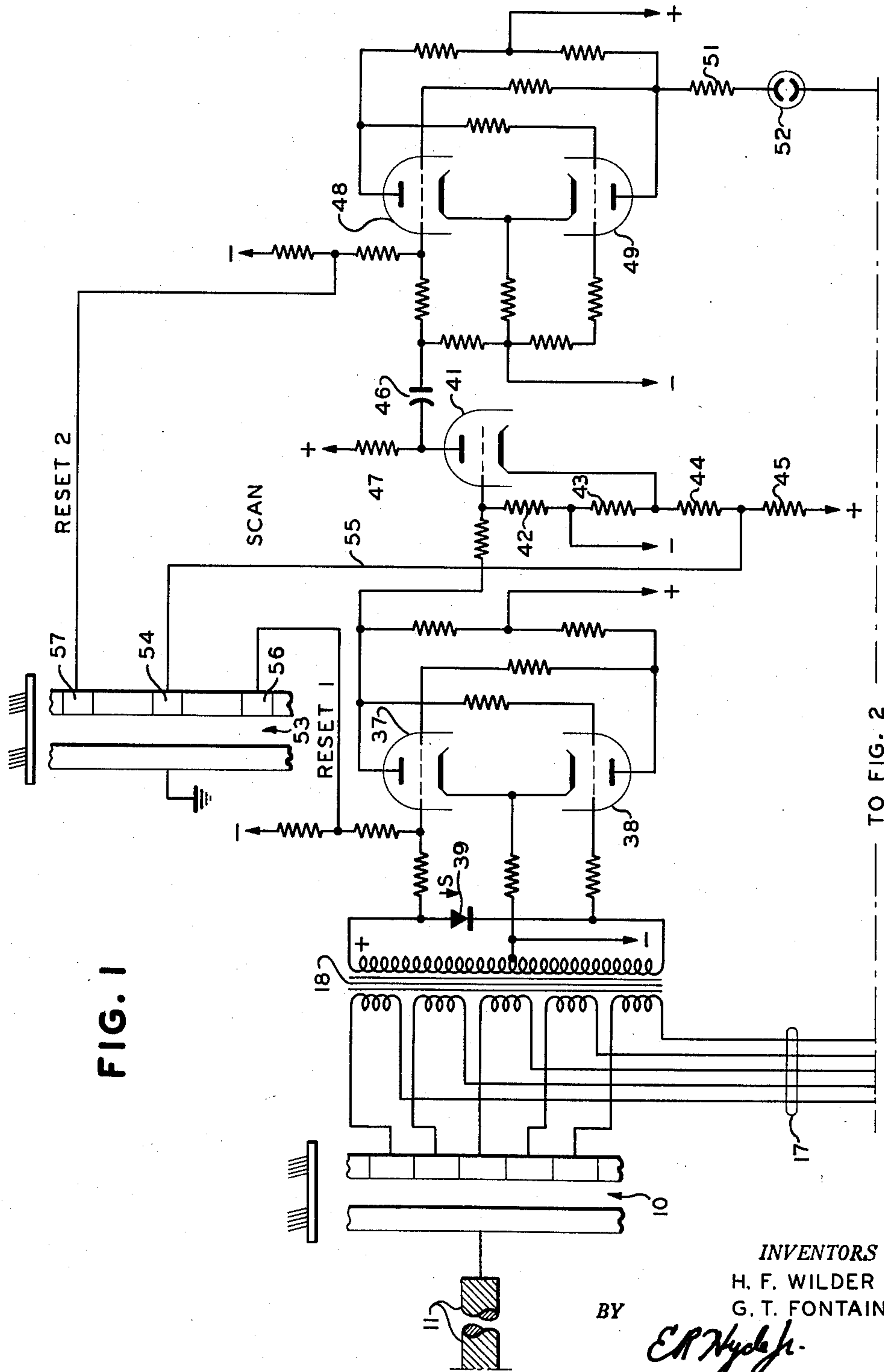
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MULTIPLEX TO TELEPRINTER TRANSLATOR

Filed June 19, 1957

2 Sheets-Sheet 1



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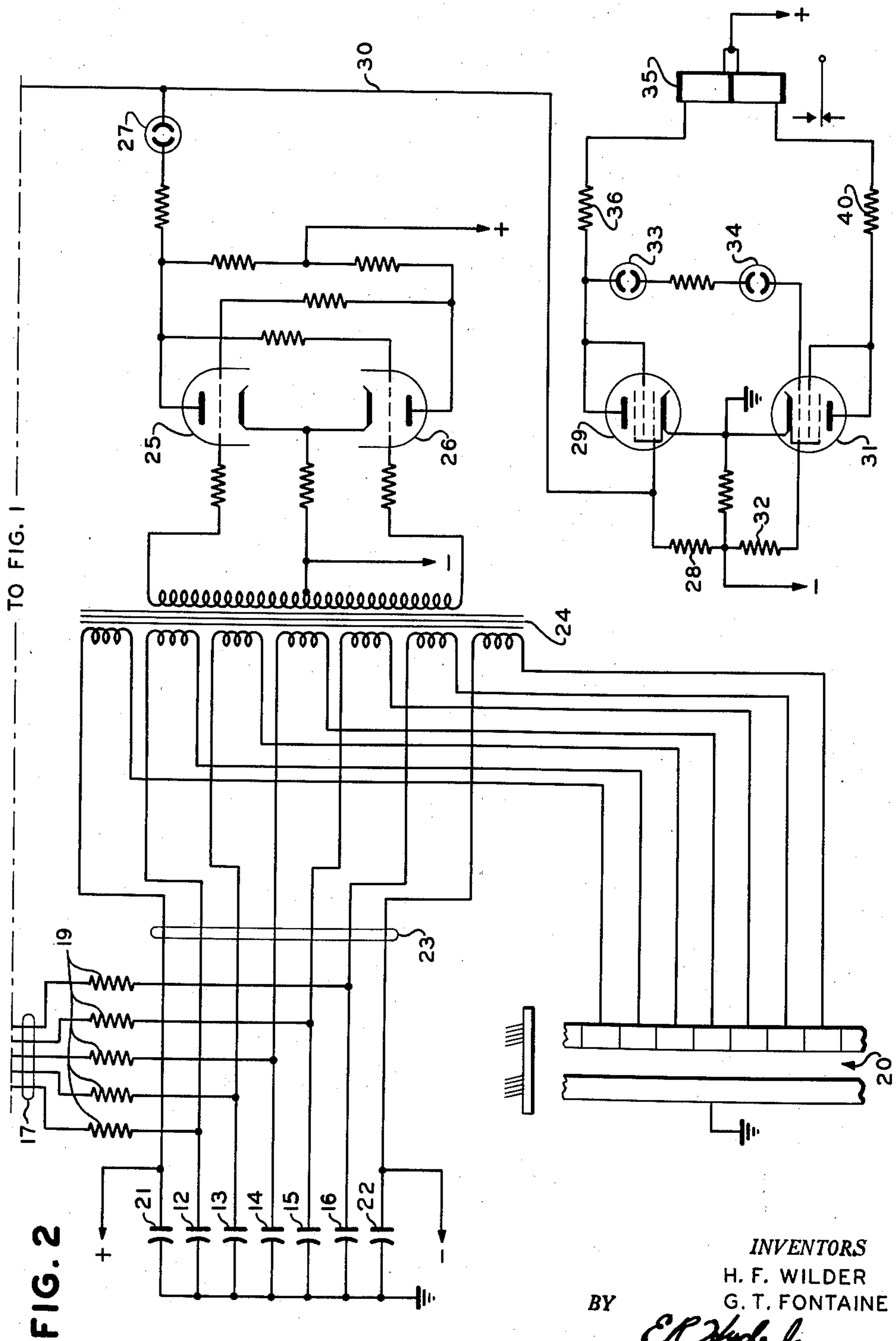
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MULTIPLEX TO TELEPRINTER TRANSLATOR

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3 Claims. (Cl. 178—26)

The present invention relates to printing telegraphy and more particularly to a telegraph system for receiving multiplex signals and translating them to start-stop signals to operate a teleprinter.

A conventional telegraph receiving station will have a multiplex distributor for receiving signals employing the conventional 5-unit code. In order to operate a teleprinter, these signals must be translated to the 7-unit start-stop form. Heretofore translating devices and systems have been used that employ relays or tape. These prior art systems have the disadvantages of relay malfunctioning and cumbersome tape reperforators and readers. The present invention is directed to overcoming these and other disadvantages of the prior art systems.

Accordingly, it is a primary object of the present invention to provide an improved system for translating 5-unit telegraph code to the 7-unit start-stop code.

Another object of the present invention is to provide a 5-unit to 7-unit code translator which is of simple construction and certain of operation.

Another object of the present invention is to provide a 5-unit to 7-unit code translator which avoids the use of relays and telegraph tape devices heretofore employed.

Another object of the present invention is to provide a system for translating telegraph characters represented by a predetermined number of electrical pulses to a code of a different number of electrical pulses.

Another object of the present invention is to provide a system to add a start and stop pulse of predetermined polarity at the beginning and end respectively of intelligence characters represented by a predetermined number of pulses.

A further object of the present invention is to provide a system employing a multiplex to teleprinter code translator wherein the character transmitted during the idle condition of the line does not operate the teleprinter mechanism.

A further object of the present invention is to provide a blank deletion network for a system wherein received multiplex signals operate a teleprinter.

In accordance with the above and other objects of the invention, there is provided a series of five capacitors that connect to the segments of a receiving multiplex distributor and selectively receive charges in accordance with the received characters. Two additional capacitors are provided which receive a permanent charge corresponding to a start pulse and a rest pulse. These seven capacitors are then sequentially discharged by means of a timing ring thereby resulting in a 7-unit start-stop system adapted to control a teleprinter relay.

During the idle condition of the line, it is customary to send a series of blank characters each of which represent five space pulses. If these characters were passed to the teleprinter relay, it would energize repeatedly thereby causing an annoying noise and undue wear. Therefore, this system includes a novel blank deletion network wherein these blank characters are prevented from passing to the teleprinter relay.

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The invention will be more fully understood from the following description of a specific embodiment thereof taken with the drawings in which—

Figs. 1 and 2 comprise a schematic diagram of the translator and blank deletion system of the present invention.

Referring now to the drawings, there is shown a receiving distributor 10 connected to the receiving end of a cable 11. It is understood that the distributor may be a multichannel one and that only one channel thereof is herein shown for the purpose of the present description. The five receiving segments of distributor 10 are connected to five capacitors 12, 13, 14, 15 and 16 over the respective wires 17, through five primary windings of a transformer 18 and five limiting resistors 19. The purpose of transformer 18 will be described hereinafter. The other side of each capacitor 12 through 16 is grounded. As the brush of distributor 10 scans the receiving segments, it is seen that the mark and space pulses, which are of minus and plus polarity respectively, will selectively charge the capacitors to store each character. An additional capacitor 21 is provided which connects between positive battery and ground to store a positive start pulse. A capacitor 22 connects to negative battery and to ground and permanently stores the negative rest pulse. The input sides of each of the seven capacitors are connected by wires 23 through seven primary windings of a transformer 24 and then to respective segments of a timing distributor 20. This distributor is synchronized with the receiving distributor 10 so that the brush of distributor 20 will commence scanning the segments after each character is stored on the capacitors. As the timing distributor rotates and the capacitors are sequentially grounded, each will produce a pulse in the respective primary winding of transformer 24. Since the capacitor 21 connects to positive battery the uppermost primary winding will receive a positive start pulse at the beginning of the scanning of each character. This will be followed by five pulses of positive or negative polarity depending upon the stored character. Then as capacitor 22 is grounded by the timing distributor, a negative rest pulse will appear across the lowermost primary winding.

The secondary winding of transformer 24 connects to a trigger circuit comprising an upper triode 25 and a lower triode 26 as shown in the drawings. The transformer is so wound that a space or positive pulse in a primary winding will reflect in the secondary winding so that the upper point of the transformer, as shown in the drawings, will be positive with respect to the lower point thereof. Thus, the start pulse or a spacing pulse will bias the grid of tube 25 positive and the grid of tube 26 negative. The former will thereupon conduct and its plate will swing negative. This negative swing is passed to a neon tube 27, the other side of which connects to negative battery through wire 30 and resistor 28. The negative swing of the anode of tube 25 will thereupon extinguish the neon tube 27. This will cause the grid of tube 29 to swing negative to bias this tube to cut off. Tube 29 functions in cooperation with a tube 31 to form a second trigger circuit. A pair of neon tubes 33 and 34 are connected in series between the anode of tube 29 and the control grid of tube 31 which in turn connects to negative battery through resistor 32. Thus as tube 29 cuts off in response to a positive space pulse, the two neon tubes 33 and 34 will ignite and tube 31 will conduct. The relay 35 of a teleprinter will have one winding connected to positive battery and to the anode of tube 29 through a limiting resistor 36. The other winding of the teleprinter relay will connect through limiting resistor 40 to the anode of tube 31. It is seen then that as tube 31 conducts in response to a space pulse, the lower winding of the teleprinter relay will be energized.

The receipt of a negative mark pulse will cause trigger tubes 25 and 26 to reverse resulting in the ignition of neon tube 27. This will put a positive bias on the control grid of tube 29 resulting in the conduction thereof. Neon tubes 33 and 34 will thereupon extinguish to cause a negative bias on the grid of tube 31 which in turn will extinguish. Thus the negative mark pulse will provide an energizing path for the upper winding of teleprinter relay 35. It is seen that the two windings of the teleprinter relay will selectively energize with the received mark and space pulses.

It is understood that during the idle condition on the line, a series of blank characters are transmitted each of which is represented by five space pulses. If these blank characters were permitted to pass through the translator that would cause repetitive energizing of the teleprinter relay 35. This would result in an annoying noise and unnecessary wear of the teleprinter mechanism. Thus it is desirable to delete these series of blank pulses during idle line conditions. For this purpose a blank deletion network is provided which will now be described. The secondary of transformer 18 connects to a trigger circuit comprising tubes 37 and 38. A diode 39 is connected across the transformer secondary and so poled that received space pulses will pass therethrough. As shown in the drawing, a positive space pulse will be reflected in the secondary of transformer 18 by the upper end thereof being positive with respect to the lower end so that the positive pulse will pass through the diode 39 and be ineffective to change the normal condition of the trigger circuit. Tubes 37 and 38 are normally biased with tube 37 conducting and tube 38 cut off. Thus the lower potential on the anode of tube 37 is passed to the grid of a control tube 41. Also a voltage divider comprising resistors 42, 43, 44 and 45 is connected between positive potential and the control grid of tube 41. With tube 37 conducting, the control tube 41 is cut off and a capacitor 46 is permitted to charge positively through a resistor 47.

Another trigger circuit formed by tubes 48 and 49 is provided and normally biased with tube 48 conducting and tube 49 cut off. The output of this trigger circuit is taken at the anode of tube 49 which connects through a limiting resistor 51 to a neon tube 52, the other side of which connects to the control grid of tube 29. Thus, with tube 48 conducting and tube 49 cut off, which represents the idle condition of the line or blank characters, neon tube 52 will be conductive. With tube 52 connected to the grid of tube 29, the latter will conduct regardless of the condition of neon tube 27. Therefore the blank characters which are stored in the receiving capacitors and passed through the trigger circuit of tubes 25, 26 will be ineffective to control trigger tubes 29, 31. Thus the teleprinter relay will remain in a mark condition and will not repeat or operate with each received blank character.

When a character other than blank is received, a mark pulse will appear and pass through the transformer 18. The mark or negative pulse will not be bypassed through the diode 39 and will serve to bias the grid of tube 37 negatively. As a result tube 37 will cut off and tube 38 will conduct. The positive swing of the anode of tube 37 will be passed to the grid of control tube 41. However, due to the positive potential applied to the voltage divider in the cathode circuit of this tube, it will not conduct at this time. A distributor 53 is provided which periodically grounds a segment 54 connected by wire 55 to the junction point of resistors 44 and 45. As the brush of distributor 53 grounds the scanning segment 54, a higher negative potential is applied to the cathode of tube 41 which thereupon conducts. It is seen then that tube 41 will conduct at a predetermined point in the scanning cycle since distributor 53 is synchronized with distributors 10 and 20. This point in time at which tube 41 conducts is chosen so that a complete character is

stored on the receiving capacitors. When tube 41 conducts, capacitor 46 can discharge to cause the control grid of tube 48 to swing negatively. At this point tube 48 will cut off and tube 49 will conduct to lower the potential of its anode. This negative swing is applied to the neon tube 52 which will thereupon extinguish so that neon tube 27 will control the trigger circuit 29, 31. At this point in the timing cycle, the capacitors 21, 12 through 16 and 22 are scanned and their respective mark and space pulses will control the teleprinter relay 35 as above described. Just prior to the reading of the character, the brush of distributor 53 will contact segment 56 to apply a reset pulse to the control grid of trigger tube 37. In this manner the trigger circuit 37, 38 is immediately restored to its normal or idle condition. After the storage capacitors are scanned by distributor 20, the brush of distributor 53 will scan a second reset segment 57. This will apply a reset pulse to the control grid of tube 48. The trigger circuit comprising 48, 49 will then revert to their normal condition to cause neon tube 52 to conduct. In brief, when a multiplex character has been received, i.e., the multiplex distributor brush has passed the fifth segment of the associated channel group, the brush of distributor 53 engages its segment 54 and then engages segment 56; the brush of distributor 20 then scans its seven segments to read the stored signals, after which the brush of distributor 53 engages segment 57. In accordance with common telegraph practice, the distributor brushes may, if desired, be rotated by the same shaft and hence at the same rotational speed, the distributor segments of each ring being positioned relative to those of the other rings so as to effect the proper sequence of operations. It is only necessary that the foregoing sequence of operations be performed before the next incoming character is received over the associated multiplex channel, and ample time is provided since in the meantime the multiplex brushes are scanning the other channels of the multiplex system.

From the above description, it is seen that characters received over the multiplex line 11, will be stored on capacitors 12 through 16 and start and reset pulses are provided by capacitors 21 and 22 respectively. The timing distributor will sequentially ground the capacitors thus reading the stored intelligence which is then passed to the teleprinter relay. In order to eliminate the normal blank characters, the blank deletion network is provided which eliminates the blank characters received during idle condition of the line.

Although the present invention has been described with respect to a specific embodiment thereof, it is understood that this is not to be considered as limiting the scope of the appended claims.

What is claimed is:

1. In a telegraph receiving system of the character described wherein incoming multiplex characters each are represented by a predetermined number of permuted marking and spacing code pulses, a plurality of capacitors equal in number to said predetermined number of pulses, distributor means for applying the pulses of an incoming multiplex character respectively to said capacitors, another capacitor on which is stored a charge of fixed potential for initiating a start pulse and an additional capacitor on which is stored a charge of a different fixed potential for initiating a reset pulse, transformer structure having a plurality of primary windings respectively individual to said capacitors, means for sequentially discharging all of the aforesaid capacitors through their respective primary windings at unit time intervals, said transformer structure having a secondary winding into which pulses are induced by each of said primary windings, a repeating relay, and means comprising a trigger circuit connected to said secondary winding for actuating said repeating relay for retransmitting the received multiplex characters as start-stop characters.

2. A system according to claim 1, including a syn-

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chronous time-division distributor for applying to said plurality of capacitors the said code pulses comprising each incoming multiplex character at a predetermined rate, start-stop receiving apparatus and means for re-transmitting the received multiplex characters as start-stop characters to said receiving apparatus, and means for sequentially discharging all of said capacitors including those for producing start and rest pulses at a baud rate equal to that at which said start-stop receiving apparatus is adapted to operate.

3. A system according to claim 1, including a blank character deletion circuit, said last named circuit including a second transformer structure having a plurality of primary windings respectively individual to the incoming code pulses comprising each multiplex character, distributor means for sequentially applying the said code pulses to said primary windings of the second transformer

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structure, said second transformer structure having a secondary winding, an electronic circuit connected to said last named secondary winding and responsive only to the occurrence of at least one marking pulse in each received character, and means controlled by said electronic circuit for preventing the retransmission of blank characters.

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