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PRINTING TELEGRAPH SYSTEM AND APPARATUS

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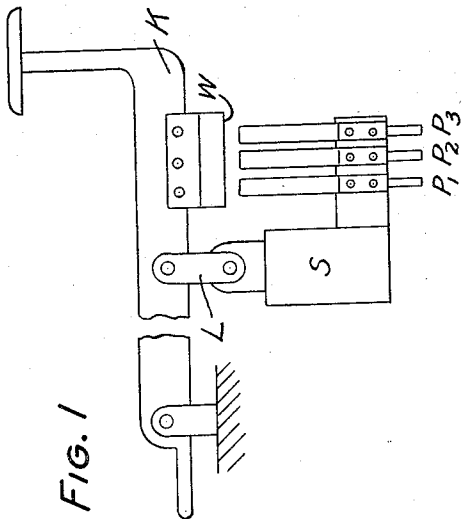
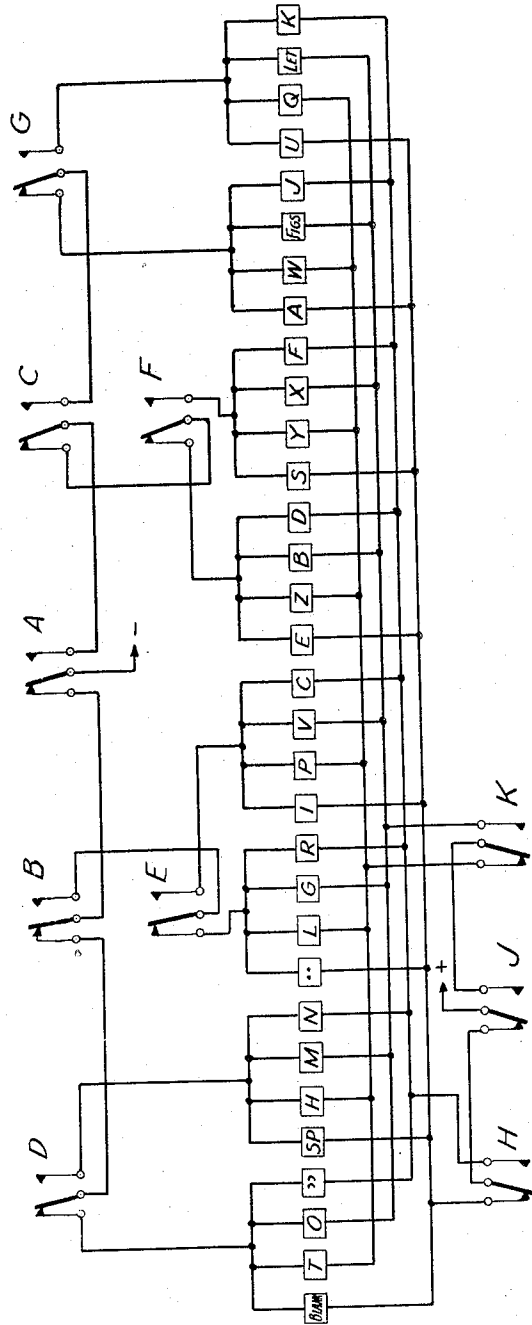


FIG. 1

FIG. 3



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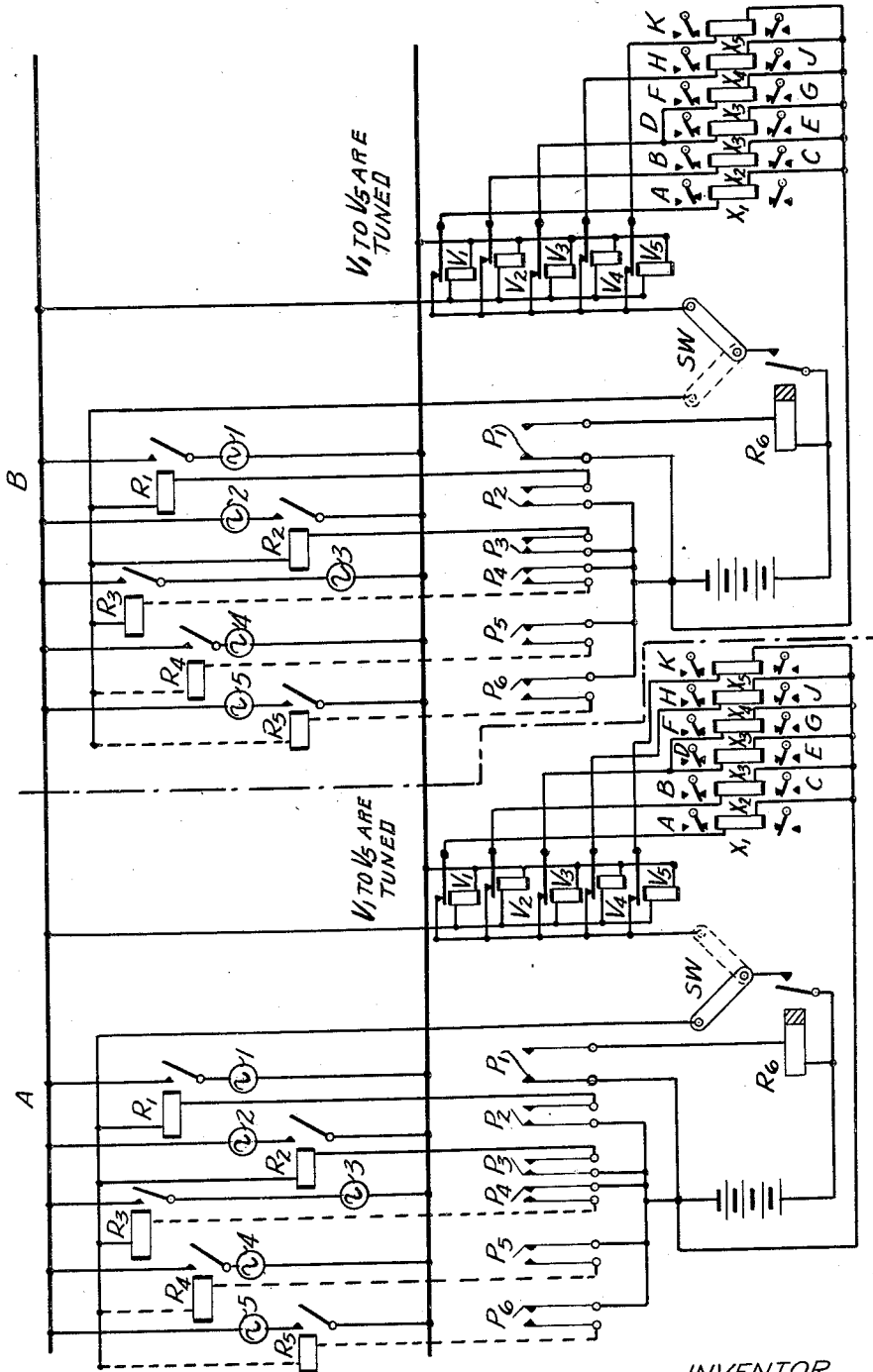
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FIG. 2



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# UNITED STATES PATENT OFFICE

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## PRINTING TELEGRAPH SYSTEM AND APPARATUS

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4 Claims. (Cl. 178-66)

This invention relates to printing telegraph apparatus and more particularly to apparatus employing a code consisting of a combination of alternating currents of different frequencies.

5 According to one feature of the invention a keyboard transmitter is provided comprising a key for each signal to be transmitted and contacts arranged to be operated selectively by the depression of the keys to connect simultaneously to the line a code combination of alternating currents of different frequencies.

10 Preferably five different frequencies are provided which represent the respective elements of a signal in accordance with the usual five-unit code.

15 In ordinary printing telegraphy using code elements of marking or spacing current, the elements are sent successively to the line. Some means must be provided for ensuring that the successive elements act upon different parts of the receiving apparatus. The means usually provided consist of a rotating distributor, either of the brush type, or cam operated contact type which connects the line successively to the different parts of the receiver.

20 Means for ensuring that the distributor keeps in synchronism with the transmitter is also necessary and that usually employed is embraced under the term "start stop" operation. Each signal element thus comprises a start element, followed by five selecting elements, and a stop element.

25 In the arrangements according to the present invention there is no need for these elaborate arrangements. Since all selecting elements are sent simultaneously, there is no need for synchronism.

30 Receiving apparatus according to another feature of this invention thus comprises an arrangement in which the selection of a character to be printed or an operation to be performed is effected by the simultaneous operation of a combination of relays each responsive only to a particular frequency of alternating current.

35 The invention lends itself also to the production of an instrument which will operate both as transmitter or receiver and needs little additional equipment over one or other separately.

40 Accordingly, another feature of the invention comprises a set of hand operated keys for printing a local record, generators of the frequencies required for transmission, relays to respond to those frequencies, contacts operated by the keys to connect the transmitters to line, solenoids to act on the keys to simulate manual operation and  
55 a switch whereby either the generators may be

connected to the line to transmit, or the relays may be connected to the line to receive and selectively operate the solenoids.

A preferred embodiment of the invention will now be described with the aid of the accompanying drawings in which Fig. 1 shows one manner of operating the transmitting contacts from a key lever, Fig. 2 is a diagrammatic representation of the electrical connections at two associated stations, and Fig. 3 illustrates a preferred arrangement for selecting the particular character to be printed.

60 It is preferred to use an ordinary typewriter mechanism with the addition of a solenoid for each key lever, and also modified so that all operations on the paper carriage, such as line feed, and carriage return may be operated by key levers provided for the purpose.

65 Each key lever K is attached by means of a link L to the core of a solenoid S. Attached to the under side of the lever K is an insulating wedge W and immediately below the wedge and fixed to the frame of the machine are six pairs of contact springs, of which three only P1, P2, P3 are seen in the drawings. The wedge W is cut so to operate contact springs P1 and also a combination out of the remaining springs which represents the signal to be transmitted or the operation actually performed in the machine when the key is depressed. The springs P1 are set with a larger airgap so that they do not make contact until after the other springs.

70 The springs as shown in Fig. 2, serve to energize a combination of five relays R1-R5 to connect to the line 1, 2, connecting stations A and B a combination of five frequencies. The springs P1 when actuated energize a slow operating and slow release relay R6 which breaks the circuit of relays R1-R5.

75 Instead of the arrangement shown in Fig. 1, the key levers K may move a set of combination bars in the usual way to operate springs P2-P6 and a universal bar to operate springs P1.

80 The required five frequencies of alternating current may be generated in any convenient manner, as, for example by means of commutators on a motor driven shaft, and in this case the relays R1-R5 may be removed and the alternating currents connected directly to the line by the springs P2-P6.

85 Each of the stations A and B is equipped with a switch SW by means of which the apparatus may be connected to the line either to receive or transmit. The switch at station A is shown in  
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transmitting position and that at station B in receiving position.

The switch SW at station A connects relays R1-R5 to be operated by the springs P2-P6, but the sources of alternating current could be connected to one line wire directly and to the other line wire through springs P2-P6, the contacts of relay R6 and the switch SW in send position.

Relays V1-V5 tuned to respond to the respective frequencies of alternating current are connected directly across the line wires at each station. These relays close circuits through relays X1-X5, the contacts of relay R6 and the switch SW (in receiving position) in series. Two relays X3 are shown connected in parallel for convenience of representation, but it is to be understood that a single relay with four sets of contacts could be used.

The contacts of these relays are lettered A-K and Figure 3 shows how these contacts are connected so as to select the particular solenoid (shown as a square) that it is required to operate.

It will be observed that if switch SW is in "transmit" position, relays V1-V5 are operated by the transmitted alternating currents but they have no effect in closing a printing circuit. If desired, however, the relays V1-V5 could be connected to the line through the "receive" position of switch SW and the contacts thereof be connected to close a printing circuit in the same manner as contacts A-K of relays X1-X5, thus abolishing the need for the latter relays.

Actuation of a solenoid depresses the appropriate key lever and so operates springs P1-P6. Operation of spring P1 causes the operation of relay R6 to break the circuit of relays X1-X5, and the relay R6 is made slow to operate so as to ensure the closure of a solenoid circuit for a time long enough to permit printing.

There is no danger of a double printing taking place owing to continued depression of a key since while the key remains depressed springs P1 remain closed and relay R6 operated and no alternating current is therefore being transmitted to the lines.

The frequencies to be used are preferably those within the voice frequency range, in order that the apparatus may be operated over long lines adapted for telephone traffic.

What is claimed is

1. Keyboard transmitter for printing telegraph

apparatus comprising a key for each signal to be transmitted and a set of contacts individual to each key arranged to be operated by the depression of the key to connect simultaneously to the line a code combination of alternating currents of different distinctive frequencies representing the signal to be transmitted.

2. Keyboard transmitter as claimed in claim 1 in which each key is provided with and arranged to operate another contact later than the other contacts, and means controlled by the operation of said contact to remove said frequencies from the line.

3. In combination, a line, printing telegraph apparatus comprising a set of hand operated keys each arranged to print a particular character or to cause a particular operation to be performed, an electromagnet or solenoid associated with each key and arranged when energized to simulate manual operation of the said key, a plurality of generators of alternating currents each of different frequency, connecting means for connecting the said generators with the line, an equal plurality of relays each tuned to a different one of said frequencies, means associated with said relays for selectively closing a circuit for one of said solenoids of electromagnets, contacts associated with the keys for selectively operating said connecting means, and a switch operable to associate either said relays or said connecting means with the line.

4. Receiving apparatus for printing telegraphy utilizing  $n$  relays to reproduce approximately  $2^n$  characters or operations and in which the selection of a character to be printed or an operation to be performed is effected by the simultaneous operation of a permutation of relays each responsive only to alternating current of a particular frequency characteristic in which a plurality of type bars are each connected to the armature of a solenoid or electromagnet, in which a selective circuit for the operation of one of the electromagnets is prepared by the operation of a particular permutation of said relays each responsive to alternating current of a particular frequency characteristic only, and wherein depression of the type bar to perform a printing operation actuates apparatus to disconnect a particular combination of relays from their energizing alternating current.

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