

Aug. 31, 1926.

L. L. E. CHAUVEAU

1,597,763

PRINTING TELEGRAPHY

Filed March 24, 1922

2 Sheets-Sheet 1

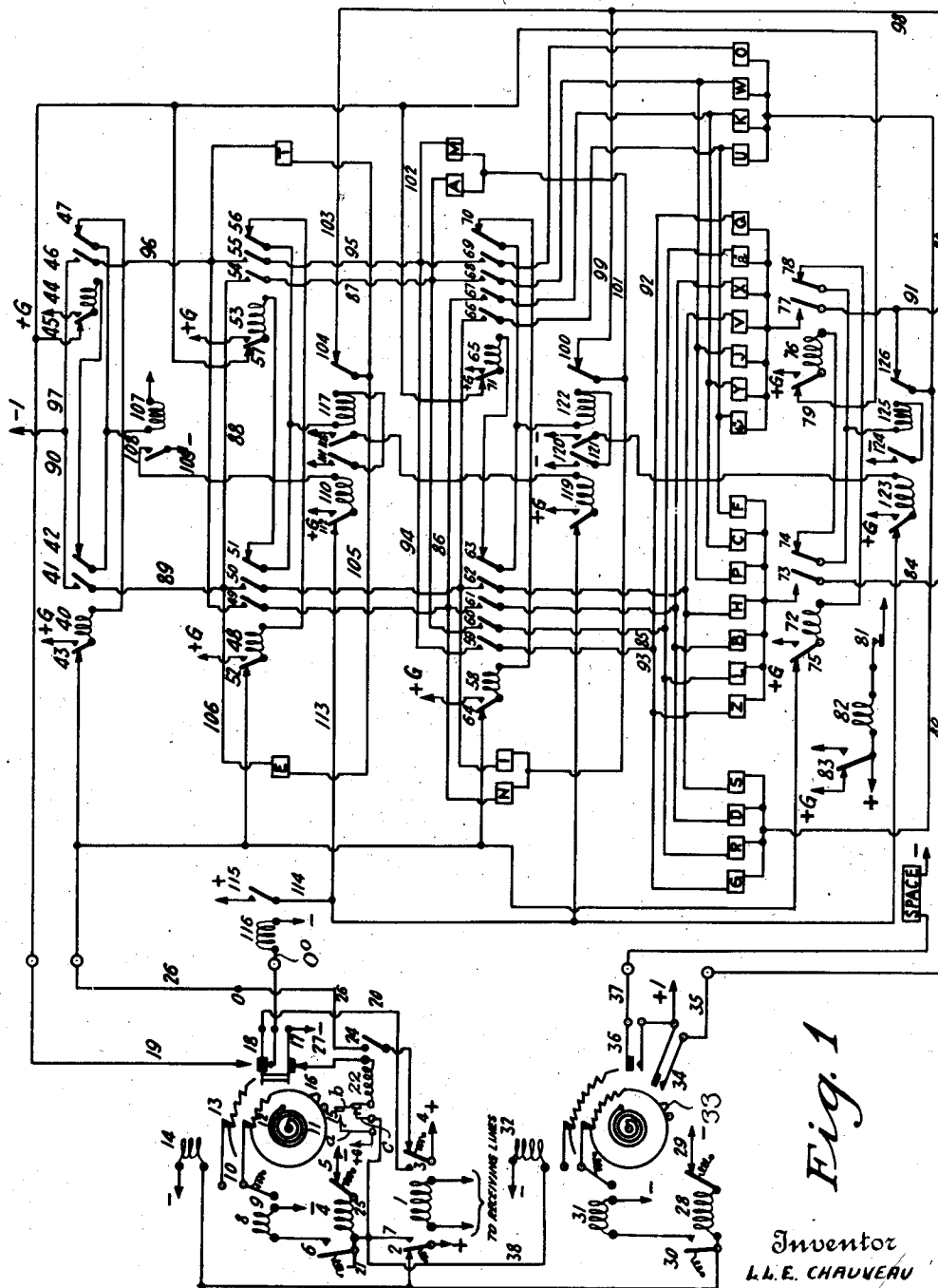


Fig. 1

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2 Sheets-Sheet 2

Fig. 4

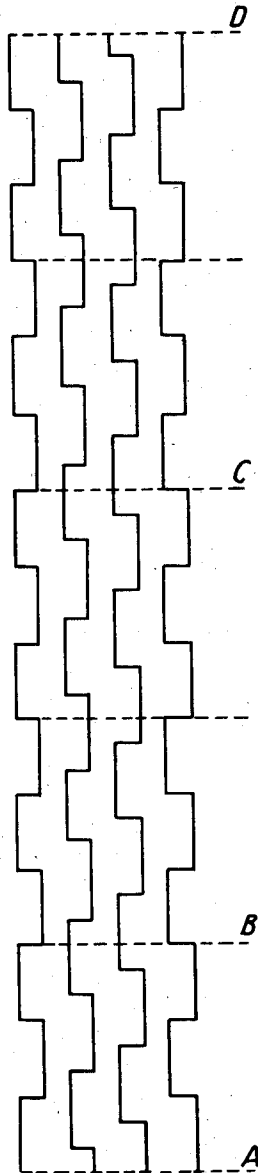


Fig. 2

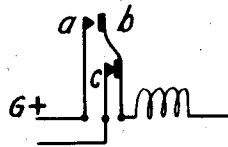


Fig. 3

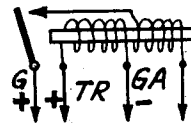


Fig. 8.

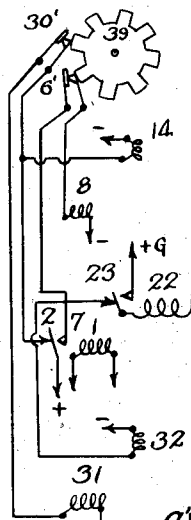


Fig. 5

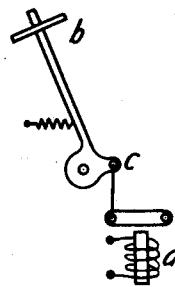


Fig. 6

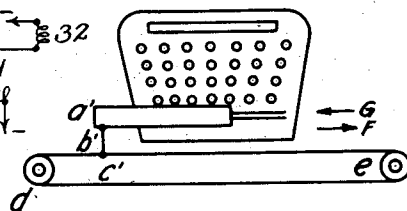
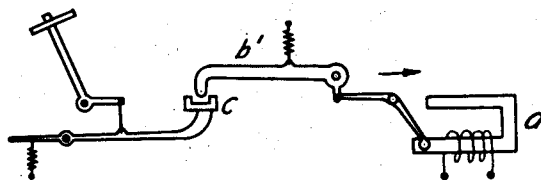


Fig. 7



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UNITED STATES PATENT OFFICE.

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PRINTING TELEGRAPHY.

Application filed March 24, 1922, Serial No. 546,348, and in France March 29, 1921.

The present invention relates to an apparatus for controlling a typewriter from a distance by means of electrical signals of different characteristics, these characteristics being such that the signals are differentiated from each other, e. g. by their duration and spacing. Signals of the International Morse code may for instance, be utilized. The invention will be described as applied to the use of signals of this or some analogous kind.

The letters and characters of the Morse alphabet are composed of groups of dots and dashes separated by silent intervals. As is well known, the dot is taken as a time unit and the normal duration of the different signals of the Morse code is as follows: One time unit for a dot, three units for a dash, one unit for the silent period separating two signals of the same letter, three units for the silent period between letters of the same word, and five units for the silent period separating two words.

The distant controlled receiver forming the object of the present invention, operates under the control of these dots and dashes for controlling a typewriter in such a manner that the characters and punctuation received in the form of dots and dashes are printed by the typewriter in their usual graphical form.

The distant controlled typewriter may be controlled over wires or by means of wireless telegraphy.

In the first case, (over wires) a single circuit is needed between the sending and receiving stations, the latter comprising the distant controlled typewriter. This circuit may be composed of a single wire with ground return path as is customary in telegraphy.

In the second case, the receiving apparatus of a wireless telegraphic station may directly actuate a controlling relay of the distant controlled typewriter. In case of the reception of messages transmitted at high speed and received by means of an arrangement comprising a phonograph or any other registering device; when the message is read, the phonograph record may actuate a microphonic relay which in turn actuates the controlling relay of the distant controlled typewriter.

The typewriter responds to electrical signals of different durations and separated by intervals of silence of various lengths. These signals and silent intervals form groups, each group representing a letter, a number or a punctuation mark of a special telegraphic code, e. g. the Morse code.

Under the control of these signals, the distant controlled typewriter actuates a special printing system or a typewriter adapted to this type of work whereby, letters, numbers and punctuations corresponding to the groups of signals received, will be printed in their usual graphical form.

The distant controlled typewriter comprises a selector and a distributor.

The selector comprises a controlling relay which responds to the signals received and to the control of an element adapted to measure the duration of the signals or the silent intervals. Through the agency of magnets this relay causes the selection of the different signals received. This selection is performed by connecting to one pole of a local source the one line corresponding to the nature of the signal received (dot, dash, silent intervals between letters, space between words). Furthermore, the selector controls a signalling line connected to a magnet of the distributor, the function of this magnet being to advance regularly the members of the switch in accordance with the reception of the signals composing one and the same letter.

The distributor comprises magnets that control through the agency of suitable mechanism, the type bars of the typewriter. The circuits of each one of these magnets includes as many breaks as there are signals in the groups corresponding to the letter. These breaks are progressively closed by the magnets "dot" and "dash" in accordance with the selection of signals by the selector. After the receiving of a group of signals forming a letter, only the magnet corresponding thereto has its circuit completely closed. The magnet will operate and cause the printing of the letter whereupon the apparatus is automatically returned to its normal position to receive a new letter.

The distributor comprises also a group of electromagnets representing signals. The purpose of these magnets is partially to close

circuits of the magnets "dot" and "dash" of a signal immediately after the receiving of a dot or a dash constituting the preceding signal. Finally, means are provided for preventing the dot or the dash forming a signal from actuating the magnet of the dot or the dash corresponding to the preceding signal.

One and the same character-carrier of the distance controlled typewriter may be provided with a plurality of figures. In this case, the same electro magnet controls a plurality of letters. All the letters beginning with a dot will be obtained for a determined position of the paper with respect to characters. All the letters beginning with a dash will be obtained for a different position. The magnets "dot" and "dash" of the first signal of each letter will be utilized for correctly positioning the paper with respect to the characters.

The distant controlled typewriter is arranged in such a manner that the impulses received are transmitted directly to the magnets which they have to control. In this manner all the magnets and the elements that must operate during the time unit, act simultaneously and not successively, whereby the apparatus may be used for printing messages sent at high speed.

The same distant controlled typewriter may be used for receiving messages sent at different speeds if certain previous adjustments are made in the elements of the selector which control the duration of the signals and the silent periods.

The invention will be better understood by means of the following detail description illustrating, without limiting one embodiment of an apparatus constructed in accordance with the invention. This description is accompanied by drawings in which:

Fig. 1 shows the general arrangement of the apparatus.

Fig. 2 shows the locking arrangement by means of contacts for the magnets.

Fig. 3 shows a locking arrangement by means of induction for the magnets.

Fig. 4 shows a diagram of the closing of the special contacts provided in the apparatus.

Fig. 5 shows a method of controlling the character-carriers of the typewriter.

Fig. 6 shows an arrangement for automatically restoring the carriage of the typewriter.

Fig. 7 shows a method for controlling the keyboard of the typewriter.

Fig. 8 shows a modification of my selector shown in Fig. 1.

In principle, the distant controlled typewriter comprises two distinct parts:

The selector and the distributor.

The function of the selector, as its name

indicates, is to determine the nature of the signals received: dots, dashes, intervals between signals of one and the same letter, intervals between two consecutive letters, spaces between two words.

The distributor operates under the control of the selector to cause the printing of the letters received.

The selector comprises a controlling relay 1, which operates in response to dots and dashes originating in the sender and controls the contacts 2 and 3.

When a dot or a dash energizes the controlling relay 1, this relay will attract this armature (or its armatures) and the contacts 2 and 3 are closed in their operating position. Under these conditions, the contact 2 closes the circuit of the regulator magnet 4, the circuit being as follows: +, contact 2 in its operating position, conductor 7, magnet 4, and - (the signs + and - designates the poles of a suitable source of electricity not shown in the drawings from which the circuits of the apparatus are fed).

The regulator magnet 4 operates to control the duration of the signal received. For this purpose the magnet is connected up as a vibrator, i. e. it opens its own circuit by means of its contact 5. The regulator magnet 4 is adjusted in such a manner that it may close its contact 6 once during one time unit; i. e. during the time necessary for a dot. As a result of this, it will close this contact 6 three times during the time necessary for a dash. Furthermore, the frequency of the regulator magnet 4 will be variable in such a manner that it may be regulated at will. Under these conditions, one and the same distant controlled typewriter may be used for receiving messages sent at different speeds. All one would have to do would be to adjust the regulator 4 prior to the sending of each message to the speed at which this message is sent. In other words, the regulator magnet 4 is an apparatus for closing its contact 6 once during the sending of a dot and three times during the sending of a dash.

The contact 6 controls the magnet of "dash" relay 8, the circuit of which is as follows: +, contact 2 in its operating condition, conductor 7, contact 6, magnet 8, and -. As a result of this, as soon as a dash is received, the magnet 8 will be energized three times. In response to each energization, this magnet actuates the pawl 10 through its armature 9 whereby, the wheel 11 is each time advanced by one tooth. This wheel may be restored by means of a spring 12, but it is maintained in its advanced position by means of a pawl 13 as long as the magnet 14 is not energized. The starting point of the wheel 11 being the one shown in the drawing, it will be seen that this wheel will advance by three

teeth during the receiving of a dash. Under these conditions, by the third time unit of a dash the projection 16 carried by the wheel 11 will open the contact 17 for a purpose to be hereinafter described and will operate the contact 18 to engage its upper contact. The "dash line" 19 is thus connected through conductor 20 and the contact 3 of the controlling magnet 1 in its operating position with the + pole. This constitutes the control of a dash.

Immediately after this time, the controlling magnet 1 is no longer energized and its contact 2 moves into the normal position whereupon the magnet 14 is energized through the following circuits: +, contact 2 in normal, conductor 21, magnet 14 and -. Magnet 14 lifts the pawls 10 and 13, and these in turn free the wheel 11 which, under the control of its spring 11, moves backward until the projection 16 encounters the abutment 15. The arrangement is now ready to select a new signal.

The selection of a dot is performed in the following manner: When a signal is sent, the controlling relay 1 closes its contact 2 whereby, the dot magnet 22 is energized through the following circuits: +, contact 2 in its operating condition, conductor 7, conductor 25, contact 23 in its normal position, conductor 27, and -. Upon energization, the magnet 22 attracts its armature and connects itself direct to + G through contact 23 in its operating condition. (the sign + G designates a branch taken from the + terminal through the armature of a switching relay 82 the function of which will be hereinafter set forth; the circuits beyond this point are so called holding circuits, i. e. circuits which when closed, maintain energized the magnets included therein.) Under these conditions, the magnet 22 will remain energized and the contact 24 will be closed.

Two cases may now arise: The signal received may be either a dot or a dash.

In the latter case the dash magnet 8 operates in the above described manner and by the third time unit of the dash, the projection 15 will open the contact 17 whereby dot magnet 22 is deenergized.

On the other hand, the magnet 22 is energized at the first time unit and the magnet 8 will not be energized at the second time unit because a dot having been transmitted, the second time unit will be necessarily a silent period. Under these conditions, the relay 1 is no more energized and its contact 3 have been retracted, the + pole is connected through contact 24 to the dot line 26. This constitutes the controlling of a dot.

For obtaining a proper functioning of the dot magnet 22, it is necessary that as soon as the magnet is energized the opening of its circuit by its contact 23 be prevented. For

this purpose its contact must be of special construction and of the make-before-break type illustrated in Fig. 2. The holding contact *a* engages the contact of the magnet *b* and forces it out of engagement with the controlling contact *c*. The same result may be obtained (Fig. 3) by providing the magnet with two windings. The first of these windings is an operating winding TR which receives the impulses and the second winding is the holding winding GA, the circuit of which is closed by the magnet itself in response to an impulse. This manner of closing the holding circuit before the opening of the energizing circuit, is frequently used in the circuits of the distributor. This operation is now described in detail and will later on be referred to only as the make-before-break contact.

It will be obvious from the above, that the control of a dot will take place during the first time unit of the silent period following the sending of the dot. At this time the contact 2 is in its normal position and the magnet 14 energized. Ratchet 11 will therefore be returned to normal. The apparatus is now ready to receive a new signal: A dot or a dash.

The selection of the intermediate silent time units is accomplished in the following manner: At the time of a silent period the contact 2 closes in its normal position the circuit of the regulator magnet 28. This magnet is like the regulator magnet 4 but is responsive to the duration of a silent period. By means of its contact 30, the magnet closes periodically the circuit of the silence magnet 31. The magnet 31 is like the dash magnet 8 but its wheel carries five instead of three projections. After the third impulse, the projection 33 encounters the contact 34 whereby the + pole is connected with the conductor 35 to cause the printing of the letter. It should be remembered at this time that, the duration of the silent period separating two letters of the same word is equal to three time units.

After the fifth impulse the projection 33 closes the contact 36 through which the conductor 37 is connected with the + pole causing the operation of the magnet controlling the spacing between words. As above stated this space is equal to five time units.

If an impulse is sent while contact 2 is in its operating condition, the pawl controlling magnet 32 will be energized over conductors 38 and 7. This magnet is operated and causes the wheel to return to normal.

The operations of the dash magnet 8 and the silence magnet 31, are exactly alike. The former is responsive to the duration of the impulses and the latter to the duration of the silent periods.

In the case of receiving signals sent out

at high speed, the vibrators 4 and 28 can be replaced by an element which is permanently moving during the receiving of a message. The movement of this element is uniform or periodically uniform (rotation, vibration, pendulum movement, pulsation, etc.) and the movement is such that it permits the establishment of satisfactory contacts under the following conditions:

These contacts must be made periodically; the duration of the period thus determined is different from that of the time unit; and finally, the number of possible closures of the contacts corresponding to the durations of one, three and five time units must be respectively distinct.

For example, in Fig. 8 a wheel 39 may be provided which is driven by a small motor, and started prior to the sending of the message. This wheel will continually rotate and carries projections which periodically close the contact 6' and 30' which replace, respectively, the contacts 6 and 30 in Fig. 1.

As a practical embodiment of the above stated conditions, the projections of the wheel 39 may be arranged in a manner to close the contacts during one third of the time and to open them at intervals also equal to one third of the time. By tracing the current representing the closures of contacts 6' and 30' in function of time units (Fig. 4) it will be seen that during the time A—B taken up by a dot, the wheel 39 can make two contacts at the most, whereas always more than two and at less than six makes occur during a dash A—C, and at least during the silent period of five time units A—D. As a result of this, the wheel of the silence controlling magnet 31 must carry six instead of five teeth whereby it will not be affected by the 5th contact which might be made during the third time unit. It will not be necessary to modify the number of the teeth on the wheel 11.

An examination of the graphical illustration in Fig. 4 will also show that under these conditions a certain latitude is left in the coincidence of the time units and the contacts of the wheel 39. This latitude is such that the speed of the wheel may without trouble vary appreciably during a receiving without distorting the message received, and inversely, the actual speed of sending signals may be varied to a certain extent with respect to the normal speed.

The above described adjustment merely illustrates one embodiment of the invention. Numerous modifications or similar solution are possible without departing from the spirit of the invention.

As stated with respect to the vibrating regulators, the arrangement comprising the wheel 39 may be used for receiving messages sent at different speeds. It will suf-

fice for this, that the speed of rotation of the wheel 39 be suitably regulated in regard to the speed of sending.

The selector also controls the circuit of the signal line 0°. This line must be traversed by current during the first time unit of a signal. For this purpose the contact 3 in its operating position connects the + pole through conductor 20 and the contact 18 with the signal line 0°. This line is connected to the magnet of a switch provided for causing the regular advancing of the elements of the switch in accordance with the reception by the selector of the impulses constituting one and the same letter. The signal line 0° must be opened when the dot line 26 or the dash line 19 is traversed by current. In the first case the contact 3 is already out of its operating position and in the second case the contact 18 has already left its normal position.

The distributor comprises three groups of different circuits: the groups of circuits appertaining to the letter magnets, the group of circuits appertaining to the signal magnets and the group of circuits of the dot and dash magnets.

As will be hereinafter set forth more in detail, the letter magnets directly control the keys of the typewriter, one magnet being provided for each letter. These magnets are controlled through the agency of the dot and dash magnets in the following manner:

The circuits of all the letter magnets have breaks in their circuits, the number of these breaks being equal to the number of the signals corresponding to their respective letters. The magnets of the letter L, for instance, is controlled by four breaks: . — . . The function of the dot and dash magnet is progressively to close these breaks in accordance with the selection of the signals of a letter by the selector.

Upon the first signal, the dot magnet 40 or the dash magnet 44 is energized depending whether the letter sent begins with a dot or a dash. The dot magnet 40 is closed through its contact 41 the first break in the circuits of all the magnets representing letters having as their first signal a dot. If the dash magnet 44 is the one that operates, it will close in its contact 46 the first break in the circuit of all magnets representing letters having as their first signal a dash.

When the second signal arrives, the dot magnet 48 closes its contacts 49 and 50, the second break in the circuit of all the letter magnets that have as their second sign a dot. On the other hand if the dash magnet 53 operates, it will close its contacts 54 and 55 constituting the second break of the circuits of all the magnets representing letters the second signal of which is a dash.

When the third signal arrives, the dot

magnet 58 closes in its contacts 59, 60, 61 and 62, the third break in the circuits of all the magnets representing letters having as their third signal a dot or the dash magnet 65 closes in its contacts 66, 67, 68 and 69 the third break in the circuits of all the magnets representing letters having as their third signal a dash. Finally, when the fourth signal arrives the dot magnet 72 closes in its contact 73 the fourth break in the circuits of all the magnets representing letters the fourth signal of which is a dot, or the dash magnet 76 closes its contact 77 the fourth break in the circuits of all the magnets representing letters the fourth signal of which is a dash.

It will be seen from the above description that when the letter sent out comprises four signals, after the action of the fourth signal, the letter magnet corresponding thereto is actuated because all of its breaks are closed. This magnet is connected on one hand with the pole — 1 of the current source and on the other hand with the letter line 80. The silent period following the sending of the letter will have a duration of three time units whereby, the silence magnet 31 of the selector will operate and its projection 33 will close the contact 34 during the third time unit. The letter line 80 will thus be connected through the contact 34 with the pole + 1 of the source and the letter magnet corresponding to the letter transmitted will cause the printing of this letter.

In order to insure the actual printing of the letter, it is necessary to maintain the circuits closed until the printing takes place. The details of this will be explained hereinafter. All the dot and dash magnets of the distributor are provided with make-before-break holding means connecting them directly with + G as soon as the first impulse is received.

When printing the letter, the bar carrying the character closes the contact 81 whereupon the magnet 82 is energized and opens its contact 83. + G is now disconnected from the + pole of the battery and all the magnets that were locked up become deenergized.

The apparatus is now ready to be controlled by another letter.

With respect to the letters composed of less than four signals, the breaks in the circuits of the magnets representing these letters are controlled in the same manner as the breaks in the circuits of the magnets representing letters composed of four signals. However, when a signal arrives immediately after the sending of their last signal, one magnet operates and severs again their circuit from the letter line 80 as will be hereinafter set forth.

In order to facilitate the explanation of the above, a few examples will be given.

Let or assume that the printing of the letters M and L is desired.

The printing of the letter L (— .) will cause the energization of the magnets 40, 53, 58 and 72. The closed circuit of the magnet 70 representing the letter L is as follows: + 1, contact 34 of the space selector, line 80, conductor 84, contact 73, magnet L, conductor 85, contact 60, conductors 86 and 87, contact 54, conductors 88 and 89, contact 41, conductor 90 and — 1.

The letter M (— —) will cause the energization of the magnets 44 and 53, whereupon a circuit is closed for the magnet representing the letter M as follows: + 1, contact 34, line 80, conductors 98 and 99, contact 100 in normal, conductor 101, magnet M, conductor 102, conductor 95, contact 55, conductor 96, contact 46, conductor 97, and — 1. If the letter transmitted comprises more than two signals, the contact 100 will be open when the third signal is sent opening the circuit of the magnet M.

It will be seen, therefore, that when the signals representing a letter are received, only the circuit of the magnet representing this letter may be completely closed.

The spacing magnet acts directly on the spacing key of the typewriter and is controlled by the contact 36 of the silence relay 31 of the selector.

The dot and dash magnets of the distributor are progressively actuated in accordance with the signals received under the control of a combination of signal magnets operating in the following manner:

All the dot magnets of the distributor (40, 48, 58 and 72) are connected with the dot line through make-before-break contacts (43, 52, 64 and 75). All the dash magnets of the distributor (44, 53, 65 and 76) are connected to the dash line through make-before-break contacts (45, 57, 71 and 79). As stated with reference to the selector, when a dot is received, the dot line is connected with the + pole, and when a dash is received, the dash line is connected with the + pole. Normally, the dot magnet 40 and the dash magnet 44 corresponding to the first signal are connected to the — through the winding of magnet 107 in series, and the other dot and dash magnets are disconnected from the — pole. When the first signal arrives and causes the energization of magnet 40 or 44, the magnet 107 will be energized and connects through its contact 108 and conductor 109 the magnet 110 with the — pole.

The magnet 110 may be connected with the + pole through conductors 113, 114 and the contact 115 when magnet 116 is energized. However, this energization cannot take place simultaneously with the energization of the magnet 40 or 44 and 107 because, as stated with reference to the selector, the dot line is

supplied with current by keeping the contact 3 in its normal condition, and the dash line is supplied with current through the contact 18 in its operating condition. The signal line over which the magnet 116 is controlled is, therefore, without current, and this magnet cannot operate.

Upon arrival of the signal, the dot magnet 40 provided with a make-before-break contact 43, or the dash magnet 44 similarly provided with a make-before-break contact 45, is locked up to + G, and remains energized together with the magnet 107 even when the dot or dash line is deprived of current. During the first time unit of the next signal, the signal magnet 116 will be energized and closes through its contact 115 the energizing circuit of the magnet 110.

The magnet 110 is also provided with make-before-break contacts and looks up to + G. Through its contact 111, this magnet connects the + pole to the dot magnet 48 and the dash magnet 53 of the second signal.

This + pole is connected through the winding of magnet 117, but these magnets do not become energized until the second signal is transmitted to the distributor.

When the second signal is transmitted, the magnet 116 is no more energized. The magnet 48 or 53 as well as the magnet 117 are energized. The magnet 117 opens its contact 104 the connections existing between the letter line 80 and the magnets representing the letters formed by a single signal.

Through its contact 118, the magnet 117 prepares the circuit of magnet 119. After the second signal, the magnet 116 will operate in the above described manner. The magnet 119 becomes energized and connects the + pole through the winding of magnet 122 through its contact 120 to the dot magnet 58 and dash magnet 65 of the third signal.

Upon the sending of the third signal, the magnet 58 or magnet 65 is energized. The magnet 122 is also energized and severs through 100 the circuit of the magnets representing the letters formed by two signals. Furthermore, this magnet 122 prepares the circuit of magnet 123 in contact 121. Upon the interruption of the third signal, the magnet 116 operates and causes in turn the energization of magnet 123. Magnet 123 connects through its contact 124 the + pole through the winding of magnet 125 to the dot magnet 72 and the dash magnet 76.

Upon the sending of the fourth signal, the magnet 72 or magnet 76 will be energized. The magnet 125 will also be energized and will open in its contact 126 the circuit of the magnets representing letters formed by three signals.

It will be seen from the above that, the control of the signals is progressively trans-

mitted in accordance with the arrival of the signals. The magnets of the second signal are traversed by current only after the registration of the first signal, and those of the fourth signal only after the registration of the third signal.

If the first signal is a dot, the magnet 40 operates and opens in 42 the circuit of dash magnet 44. On the other hand, if the first signal is a dash, the magnet 44 operates and opens in 47 the circuit of dot magnet 40. In the same manner, the second signal causes the operation of magnet 48 to open in 51 the circuit of magnet 53. Or else, the magnet 53 operates and opens in 56 the circuit of magnet 48. This holds good also for the dot and dash magnets of the third and fourth signals. The purpose of this arrangement is to prevent the energization of the magnets the circuits of which were opened in response to the signals received. Such energization can be caused by the action of the signals in accordance with the signal or signals received.

A typewriter may be controlled by the distant controlled typewriter in two different ways:

Directly (Fig. 5) in which case the letter magnets *a* operate directly the bars carrying the characters *b*, in the neighborhood of the joint *c* of these bars or by any other system of transmission.

Indirectly (Fig. 7) in which the letter magnets *a* control hammers *b*, and these hammers actuate the keyboard *c*. In this case, no special typewriter need be provided for a distant controlled typewriter. The keyboard is operated in the manner as that used for actuating pianos by means of an automatic system. The advantage of this arrangement is that the apparatus can be adapted to any type of typewriter the keyboard of which corresponds to that of the distant controlled typewriter.

No matter which method is used for operating the typewriter, a special arrangement is provided for causing the uniform advancing of the paper during the printing of the letters. The following or any other equivalent arrangement may be used for this purpose:

1. The paper may be in the form of a ribbon. The carriage of the typewriter is not displaced laterally. The paper is advanced after the printing of each letter under the control of the mechanism that is usually employed for displacing the carriage. This mechanism actuates an unrolling mechanism like the one used for unrolling the paper ribbon in the Morse apparatus. The arrangement is so adjusted that, in response to each impression the paper ribbon is advanced by the space of one letter.

2. The paper and the usual movable car-

riage of the typewriter may be retained. In this case, the carriage actuated at the end of its course a contact in the circuit of a magnet by means of which the carriage is returned to normal. This magnet controls also the rotation of the platen corresponding to the line changing movement. An arrangement like the one shown in Fig. 6 may be used:

The carriage *a'* is connected at a point *b'* with a belt *c'* rotating around two loose pulleys *d* and *e*. During the printing the belt will follow the movement of the carriage in the direction of the arrow *F*. Special means are provided whereby, upon the end of its movement, the carriage causes the clutching of the pulley *e* on a shaft which is driven by a small motor either directly or through suitable reduction. The carriage will be moved oppositely in the direction of the arrow *G* until it reaches its starting position.

The carriage opens the circuit of the motor and the clutch is disconnected shortly before the arrival of the carriage to its starting point. The circuit of the motor is closed shortly before the carriage reaches the end of its course. In this manner, the motor will be operating at full speed when the clutch is actuated.

The advantage of the second method of advancing the paper consists in its ready adaptability to usual typewriters. It completes the arrangement for operating the keyboard of a usual typewriter by means of the distant controlled typewriter and through the agency of hammers.

The above given general description contains no reference to numerals and punctuation marks. These omissions were made for the sake of clarity. It will be readily seen that the numerals of the Morse code having five characters may be printed by using a fifth set of signal magnets in the distributor. However, this is not absolutely necessary. As well known, in most typewriters the same key of the keyboard controls two and sometimes three different letters or numerals. One or the other of these letters is printed by actuating a shift key to displace the carriage with respect to the shaft of the typebars or vice versa. The same result may be obtained in the distant controlled typewriter by controlling its shaft keys in response to a group of four Morse signals. This group will be different from the one used for the letters, e. g. group — — — .

The dot and dash magnets (40, 44) in the distributor corresponding to the first signal may be used for causing the shifting of the carriage. The same letter magnet may be used for two letters which differ from each other only in their first signal. The carriage will have a definite position for

all the letters beginning with a dot and a different position for all the letters beginning with a dash.

The contacts 47, 49, 55, 59, 61, 67, 69, magnets *N*, *D*, *B*, *X*, *M*, *G*, *Z*, *Q*, *O*, *K*, *Y*, *C* and the connections therebetween, comprising one set of contacts, magnets and connections on the second, third and fourth signals need not be used in this case. That is, magnets *N* and *I*, *A* and *M*, *G* and *R*, *D* and *S*, *Z* and *L*, *B* and *H*, *C* and *F*, and *Y*, *V* and *X*, *a* and *Q*, *U* and *K* and *W* and *O* may be combined and operate a single key having both characters.

Numerous modifications of this character, as well as modifications in the circuit details may be effected in adapting the distant controlled typewriter to different typewriter keyboards in use without departing from the spirit of the invention.

Having described my invention, what I claim is:

1. In printing telegraphy a selector comprising means responsive to telegraphic signals, said selector also comprising a timed interrupter cooperating therewith for determining the duration of said signals, a plurality of connections cooperating with the interrupter and means for selectively energizing said connections in accordance with the number of interruptions.

2. In printing telegraphy, a selector comprising means responsive to telegraphic signals and means responsive to the marking periods of telegraphic signals and means responsive to the spacing periods, a pair of timed interrupters cooperating therewith for determining the duration of said marking periods and spacing periods, a plurality of connections cooperating with the interrupters and means for selectively energizing said connections in accordance with the number of interruptions.

3. In printing telegraphy, a selector comprising the combination with means responsive to telegraphic signals of a source of current, a relay cooperating with said means connected to said source, said selector also comprising timed interrupting means cooperating with the relay, ratchet mechanism operated by the interruptions of said relay, a plurality of lines and means for selectively connecting said lines to a point of the current source in response to the movements of the ratchet mechanism.

4. In printing telegraphy, a selector comprising the combination with means responsive to telegraphic signals of a source of current, a relay cooperating with said means and connected to said source, timed interrupting means cooperating with the relay, ratchet mechanism adapted to be operated by the interruptions of said relay, a plurality of lines, means for selectively con-

necting said lines to a point of the current source in response to the movements of the ratchet mechanism and means for closing one of the lines through the source when the relay is de-energized.

5 In printing telegraphy, a selector comprising the combination with means responsive to telegraphic signals of a source of current, a relay cooperating with said means
10 and connected to said source, timed interrupting means cooperating with the relay, ratchet mechanism adapted to be operated by the interruptions of said relay, a plurality of lines, means for selectively connecting
15 said lines to a point of the current source in response to the movements of the ratchet mechanism, a distributor connected to said lines and means for closing the source through the distributor when the relay is de-energized.

20 6. In printing telegraphy, a selector comprising means responsive to telegraphic signals, a source of current, a relay cooperating with said means and connected to said
25 source, timed interrupting means cooperating with the relay, ratchet mechanism arranged to be operated by the interruptions of said relay, means for returning the ratchet mechanism, a plurality of lines and
30 means for selectively connecting said lines to a point of the current source in response to the movements of the ratchet mechanism.

7. In a selector for printing telegraphy, the combination with means responsive for
35 telegraphic signals of a source of current, means for selecting marking periods and means for selecting spacing periods, each comprising a relay cooperating with said first mentioned means and connected to said
40 source, timed interrupting means cooperating with the relay, ratchet mechanism operated by the interruptions of said relay, a plurality of lines and means for selectively connecting said lines to a point of the current
45 source in response to the movements of the ratchet mechanism.

8. In a selector for printing telegraphy, the combination with means responsive to telegraphic signals of a source of current,
50 means for selecting marking periods and means for selecting spacing periods, each comprising a relay cooperating with said first mentioned means connected to said source, timed interrupting means cooperating
55 with the relay, ratchet mechanism operated by the interruptions of said relay, means for returning the ratchet mechanism, a plurality of lines and means for selectively connecting said lines to a point of the current
60 source in response to the movements of the ratchet mechanism, each of said ratchet returning means being cooperatively associated with the relay for operating the other ratchet.

9. In printing telegraphy, the combina-

tion with a selector of means responsive to telegraphic signals, a source of current, a relay cooperating with said means and connected to said source, timed interrupting means cooperating with the relay, ratchet
70 mechanism operated by the interruptions from said relay, a pair of lines, a contact connected to one of the lines cooperating with said relay having holding means, means for energizing said contact when the marking
75 ing period is off, means cooperating with the ratchet for releasing the holding means and means for energizing said contact when the marking period is off, means cooperating with the ratchet for releasing the holding
80 means and means for energizing the other line in response to the movements of the ratchet mechanism.

10. In printing telegraphy, means responsive to telegraphic signals, a source of current, a relay cooperating with said means and connected to said source, timed interrupting means cooperating with the relay, ratchet mechanism operated by the interruptions
85 of said relay, a pair of lines, a magnet connected to one of said lines for actuating the character and a second magnet connected to the other line for actuating a spacer.

11. In printing telegraphy, means responsive to the spacing periods intermediate to the marking periods of the telegraphic signal, a source of current, a relay cooperating with said means and connected to said
95 source, timed interrupting means cooperating with the relay, ratchet mechanism operated by the interruptions of said relay, a pair of lines, a magnet connected to one of said lines for actuating the character and a second magnet connected to the other line for
100 actuating a spacer.

12. In a selector for printing telegraphy, the combination of means responsive to the spacing periods between the marking periods of the telegraphic signal, a source of current,
110 a relay cooperating with said means and connected to said source, timed interrupting means cooperated with the relay ratchet, ratchet mechanism operated by the interruptions of said relay, a pair of lines, a magnet
115 connected to one of said lines for actuating the character, a second magnet connected to the other line for actuating a spacer and means for returning the ratchet mechanism in response to marking periods.

13. In printing telegraphy, the combination with a selector having a plurality of output lines corresponding to marking and spacing periods of different duration, a current source and a distributor comprising
120 relays cooperating with the lines corresponding to the marking periods, a magnet cooperating with each relay for printing the character beginning with a marking period corresponding to that of the relay, said magnets
125 130

being connected to an output line corresponding to a spacing period of certain duration through the current source.

14. In printing telegraphy, the combination with a selector having a plurality of output lines corresponding to marking and spacing periods of different duration, a current source and a distributor comprising a relay cooperating with each of the lines corresponding to the marking periods, a magnet adapted to be connected to a point of the current source for printing the character beginning with a marking period corresponding to that of the relay, said magnets being connected to an output line corresponding to a spacing period of certain duration through the current source.

15. In printing telegraphy, the combination with a selector having a plurality of output lines corresponding to marking and spacing periods of different duration, a current source and a distributor comprising a relay cooperating with each of the lines corresponding to the marking periods, a magnet adapted to be connected to a point of the current source for printing the character beginning with a marking period corresponding to that of the relay, said magnets being connected to an output line corresponding to a spacing period of certain duration through the current source and the magnet for operating a spacer connected to another output line corresponding to a spacer period of another duration.

16. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating with the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character connected to one of the relays and to the third mentioned line, and a switch connected between the third mentioned line and the source adapted to close the magnet circuit.

17. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising relays cooperating with the dot line and the dash line, a pair of contacts adapted to be connected to the source by said relays, a magnet connected to each of said relays for printing a pair of characters, a switching means connected to the third mentioned line adapted to close the magnet circuit.

18. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising relays cooperating with the dot line and the dash line, a contact

adapted to be connected to the source by one of said relays, holding means for said contact, a magnet for printing a character connected to one of the relays and to the third mentioned line and a switch connected between the third mentioned line and the source adapted to close the magnet circuit at the end of the spacing between lines.

19. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising relays cooperating with the dot line and the dash line, a pair of contacts adapted to be connected to the source by said relays, holding means for said contacts, a magnet connected to each of said relays for printing a pair of characters, and switching means connected to the third mentioned line, adapted to close the magnet circuit.

20. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays, cooperating with the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character connected to one of said relays and to the third mentioned line, and a relay having contacts for opening a connection between the third mentioned line and the magnet at the beginning of another dot or dash.

21. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays, cooperating with the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character connected to one of said relays and to the third mentioned line, a relay having contacts for opening a connection between the third mentioned line and the magnet at the beginning of another dot or dash, and a switch connected between the third mentioned line and the source adapted to close the magnet circuit.

22. In printing telegraphy, the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating between the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character, connected to one of the relays and to the third mentioned line, a second pair of relays cooperating between the dot and dash lines, a second contact adapted to be connected to the first contact by one of the second pair of relays, a second

magnet for printing a character connected to one of the second pair of relays and to the third mentioned line, and a relay having contacts for opening the connection between the third mentioned line and the first magnet at the beginning of another dot or dash.

23. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating between the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character, connected to one of the relays and to the third mentioned line, a second pair of relays cooperating between the dot and dash lines, a second contact adapted to be connected to the first contact by one of the second pair of relays, a second magnet for printing a character connected to one of the second pair of relays and to the third mentioned line, a relay having contacts for opening the connection between the third mentioned line and the first magnet at the beginning of another dot or dash, and a switch connected between the third mentioned line and the source, adapted to close one of the magnet circuits.

24. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating between the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character, connected to one of the relays and to the third mentioned line, a second pair of relays cooperating between the dot and dash lines, a second contact adapted to be connected to the first contact by one of the second pair of relays, a second magnet for printing a character connected to one of the second pair of relays and to the third mentioned line, holding means for each of said contacts, and a relay having contacts for opening the connection between the third mentioned line and the first magnet at the beginning of another dot or dash.

25. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating between the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character, connected to one of the relays and to the third mentioned line, a second pair of relays cooperating between the dot and dash lines, a second contact adapted to be connected to the first contact by one of the second pair of relays, a second

magnet for printing a character connected to one of the second pair of relays and to the third mentioned line, a relay having contacts for opening the connection between the third mentioned line and the first magnet at the beginning of another dot or dash, and a second relay having contacts for opening the connection between the third mentioned line and the second magnet at the beginning of a further dot or dash.

26. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating between the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character, connected to one of the relays and to the third mentioned line, a second pair of relays cooperating between the dot and dash lines, a second contact adapted to be connected to the first contact by one of the second pair of relays, a second magnet for printing a character connected to one of the second pair of relays and to the third mentioned line, a relay having contacts for opening the connection between the third mentioned line and the first magnet at the beginning of another dot or dash, a second relay having contacts for opening the connection between the third mentioned line and the second magnet at the beginning of a further dot or dash, and a switch connected to the third mentioned line and the source adapted to close one of the magnet circuits.

27. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a pair of relays cooperating with the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a second pair of relays cooperating with the dot line and the dash line, and a second contact adapted to be connected to the source through the first contact, a plurality of magnets connected to said relays and to the third mentioned line, for printing characters, and a switch connected between the third mentioned line and the source, adapted to close the magnet circuit.

28. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, a distributor comprising a plurality of pairs of relays cooperating with the dot line and the dash line, a contact cooperating with the relays of each pair, adapted to be connected to the source, a plurality of magnets for printing characters, connected to said relays and to the third mentioned line, and a relay

having contacts for opening the connection between the third mentioned line and certain magnets at the beginning of another dot or dash.

29. In printing telegraphy the combination with a current source of a selector having a dot line, a dash line, and a line corresponding to the spacing between letters, and a fourth line corresponding to the spacing between words, a distributor comprising a pair of relays cooperating with the dot line and the dash line, a contact adapted to be connected to the source by one of said relays, a magnet for printing a character connected to one of the relays and to the third mentioned line, a switch connected between the third mentioned line and the source, adapted to close the magnet circuit, and a second magnet for operating a spacer connected to the fourth line.

30. In printing telegraphy, the combination with a current source of a selector having lines corresponding to dots, dashes, and to spaces between characters, a distributor comprising a plurality of pairs of relays, each of said pairs cooperating with the dot and dash lines, the first relays of said pairs having a contact adapted to be connected to said source, contacts cooperating with each pair of relays, adapted to be connected in series with the first contact, magnets associated with each pair of relays for printing characters, said magnets being connected to the space-between-characters line, and means for opening certain of the last mentioned connections.

31. In printing telegraphy, the combination with a current source of a selector having lines corresponding to dots, dashes, and to spaces between characters, a distributor comprising a plurality of pairs of relays, each of said pairs cooperating with the dot and dash lines, the first relays of said pairs having a contact adapted to be connected to said source, contacts cooperating with each pair of relays, adapted to be connected in series with the first contact, magnets associated with each pair of relays for printing characters, said magnets being connected to the space-between-characters line, means for opening certain of the last mentioned connections, and a switch connected between the third-mentioned line and the source, adapted to close one of the magnet circuits.

32. In printing telegraphy, the combination with a current source of a selector having lines corresponding to dots, dashes, and to spaces between characters, a distributor comprising a plurality of pairs of relays, each of said pairs cooperating with the dot and dash lines, the first relays of said pairs having a contact adapted to be connected to said source, contacts cooperating with each pair of relays, adapted to be connected in series with the first contact, holding means

for said relay contacts, magnets associated with each pair of relays for printing characters, said magnets being connected to the space-between-characters line, means for opening certain of the last mentioned connections, and a switch connected between the third mentioned line and the source, adapted to close one of the magnet circuits.

33. In printing telegraphy, the combination with a current source of a selector having lines corresponding to dots, dashes, and to spaces between characters, and spaces between words, a distributor comprising a plurality of pairs of relays, each of said pairs cooperating with the dot and dash lines, the first relays of said pairs having a contact adapted to be connected to said source, contacts cooperating with each pair of relays, adapted to be connected in series with the first contact, magnets associated with each pair of relays for printing characters, said magnets being connected to the space-between-characters line, means for opening certain of the last mentioned connections, and a switch connected between the third mentioned line and the source, adapted to close one of the magnet circuits, and a magnet for operating said spacer.

34. In printing telegraphy, the combination with a current source of a selector having lines corresponding to dots, dashes, and to spaces between characters, a distributor comprising a plurality of pairs of relays, each of said pairs cooperating with the dot and dash lines, the first relays of said pairs having a contact adapted to be connected to said source, contacts cooperating with each pair of relays, adapted to connect said contacts in series with the first contact, a typewriter having magnets associated to the keys cooperating with the relays, for printing characters, said magnets being connected with the spaces-between-characters line, and means for opening certain of the last mentioned connections.

35. In printing telegraphy, the combination with a current source of a selector having lines corresponding to dots, dashes, and spaces between characters, a distributor comprising a plurality of pairs of relays, each of said pairs cooperating with the dot and dash lines, a typewriter having a shift key associated with the first pair of relays, a contact associated with the first pair of relays and adapted to be connected to said source, contacts cooperating with each of the other pair of relays adapted to be connected to said first contact, in series, magnets for operating the typewriter keys associated with each pair of relays for printing characters, said character printing magnets being connected to the space-between-characters line, and means for opening certain of the last mentioned connections.

36. In printing telegraphy, the combination

tion of a source of telegraphic signals, a selector having lines responsive to dots, dashes and to spaces between letters, and a distributor cooperating with the selector, 5 having a number of sets of relays responsive to dots and dashes, said number being equal to the maximum number of marking periods comprising the characters and a printing device cooperating with said relays and said space between letters line. 10

37. A selecting device comprising means responsive to impulses of comparatively short duration, means responsive to impulses of comparatively long duration, means responsive to space periods of comparatively short duration, means responsive to space periods of comparatively long duration and control circuits associated with each of said means. 15

38. The combination with a signal responsive means of means responsive to impulses of comparatively short duration, means responsive to impulses of comparatively long duration, means responsive to space periods of comparatively short duration, means responsive to space periods of comparatively long duration and control circuits associated with each of said means. 20 25

39. The combination with the plurality of first electrical means comprising units responsive to signal impulses of comparatively short duration, and a second electrical means comprising units responsive to signal impulses of comparatively long duration of a plurality of electrical means responsive to the separate or combined action of the units of said first and second means. 30 35

40. The combination with a first means comprising units responsive to signal impulses of comparatively short duration and a second means comprising units responsive to signal impulses of comparatively long duration of a plurality of means selectively responsive to the separate or combined action of the units of said first and second means. 40 45

41. The combination with a first set of circuits comprising relays responsive to comparatively short impulse signals and a second set of circuits comprising relays responsive to long impulse signals of a plurality of relays responsive to the separate or combined actuation of said short and long impulse relays. 50

42. The combination with a first set of electrical circuits responsive to short signal impulses and a second set of electrical circuits responsive to long signal impulses, each set having as many circuits as the maximum number of impulses in any one character of a plurality of electrical devices responsive to the separate or combined energization of the circuits in said sets. 55 60

43. The combination with a first set of circuits comprising relays responsive to 65

short signal impulses and a second set of circuits comprising relays responsive to long signal impulses, each set having as many relays as the maximum number of impulses in any one character of a plurality of printing mechanisms comprising printing magnets responsive to the separate or combined actuation of said relays. 70

44. The combination with first means responsive to signal impulses of comparatively short duration and second means responsive to signal impulses of comparatively long duration, of means whereby the actuation of said first means prevents the actuation of said second means and the actuation of said second means prevents the actuation of said first means. 75 80

45. The combination with a circuit comprising a short signal impulse relay and another circuit comprising a long signal impulse relay of means for preventing the energization of the said short impulse relay upon the actuation of said long impulse relay or preventing the energization of said long impulse relay upon the actuation of said short impulse relay. 85 90

46. The combination with a plurality of circuits each comprising a short signal impulse relay of means for preventing the energization of said relays in other than a predetermined sequence. 95

47. The combination with a plurality of circuits comprising relays responsive to signal impulses of means responsive to an introductory impulse for preventing the energization of the said relays in other than a predetermined sequence. 100

48. The combination with a first set of electrical devices responsive to short signal impulses, a second set of electrical devices responsive to long signal impulses and a plurality of printing magnets with their associated circuits prepared for energization by the combined or separate actuation of said devices, of means responsive to the silent period between characters for energizing said printing magnets. 105 110

49. The combination with a first set of electrical devices responsive to short signal impulses, a second set of electrical devices responsive to long signal impulses and a plurality of printing magnets with their associated circuits prepared for energization by the combined or separate actuation of said devices, of means responsive to the silent period between characters for energizing said printing magnets and to the silent period between groups of characters for actuating a spacing means. 115 120

50. In combination a first set of electrical devices responsive to "dots," a second set of electrical devices responsive to "dashes," means responsive to silent periods between impulses for preparing certain of the electrical devices in each set for operation in a 125 130

- predetermined sequence, a plurality of printing circuits, a plurality of printing magnets in said circuits, a spacing between words, mechanism and means for completing the circuit of any one of said printing magnets in response to the silent period between characters and actuating said spacing between words mechanism in response to the silent period between words.
51. In combination a plurality of electrical circuits, each comprising a relay responsive to signal impulses, a relay in one of said circuits energized upon the energization of one of said signal responsive relays, a circuit comprising a preparatory relay prepared for energization by the actuation of said relay, means responsive to the following signal impulse for energizing and actuating said preparatory relay, the actuation of said preparatory relay energizing and actuating the other of said signal impulse relays.
52. The combination with a selecting device comprising means responsive to signal impulses and to space periods of different duration between said impulses of a character impressing device comprising means responsive to certain of the space periods for impressing characters and means responsive to other silent periods for interposing spaces between groups of characters.

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