E. BURLINGAME.

TELEGRAPHIC TYPE WRITER.

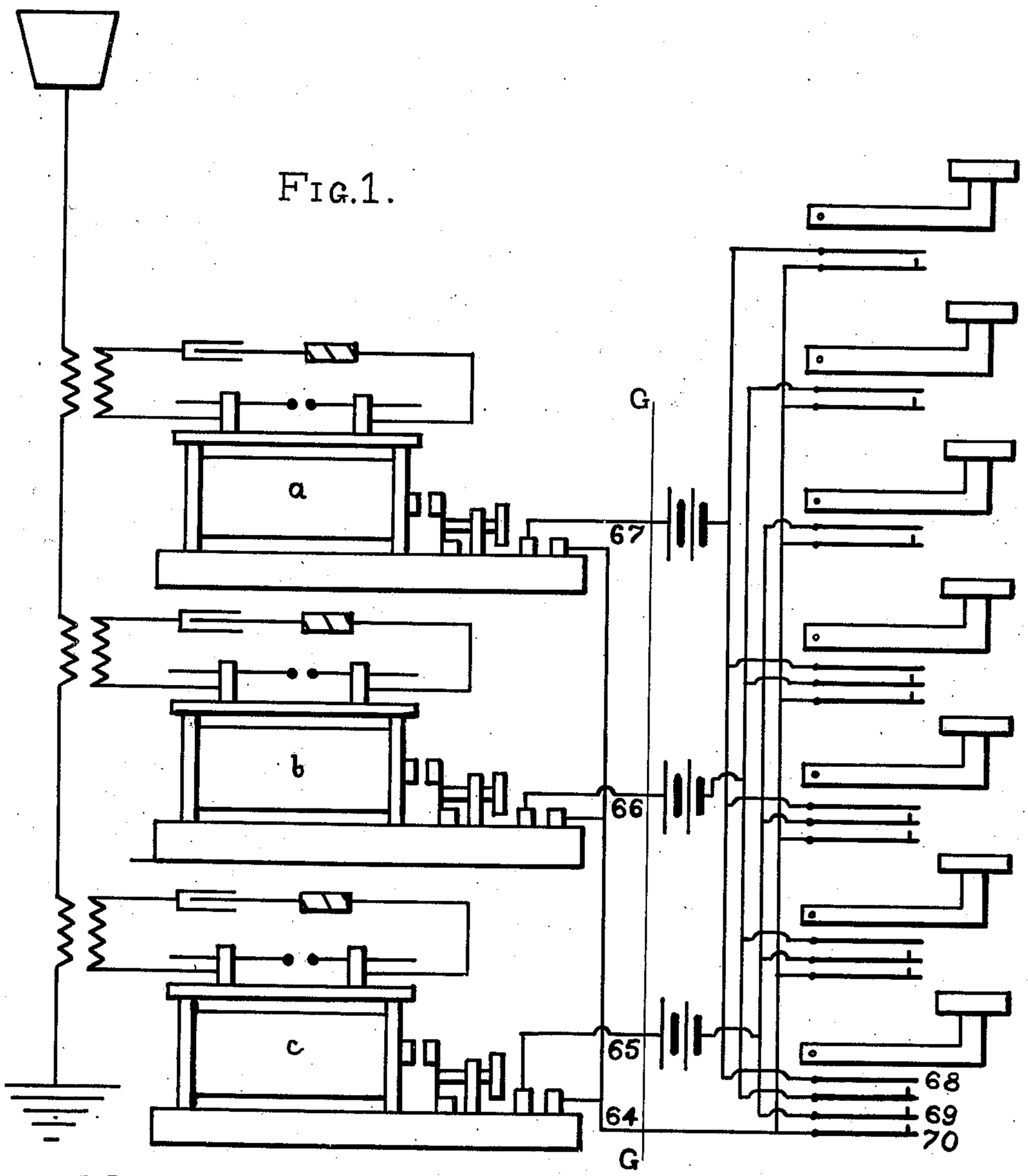
APPLICATION FILED APR. 26, 1906.

928,581.

Patented July 20, 1909.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES,

David Irwin

G. H. Loomis.

INVENTOR,

Elmer Burlingame.

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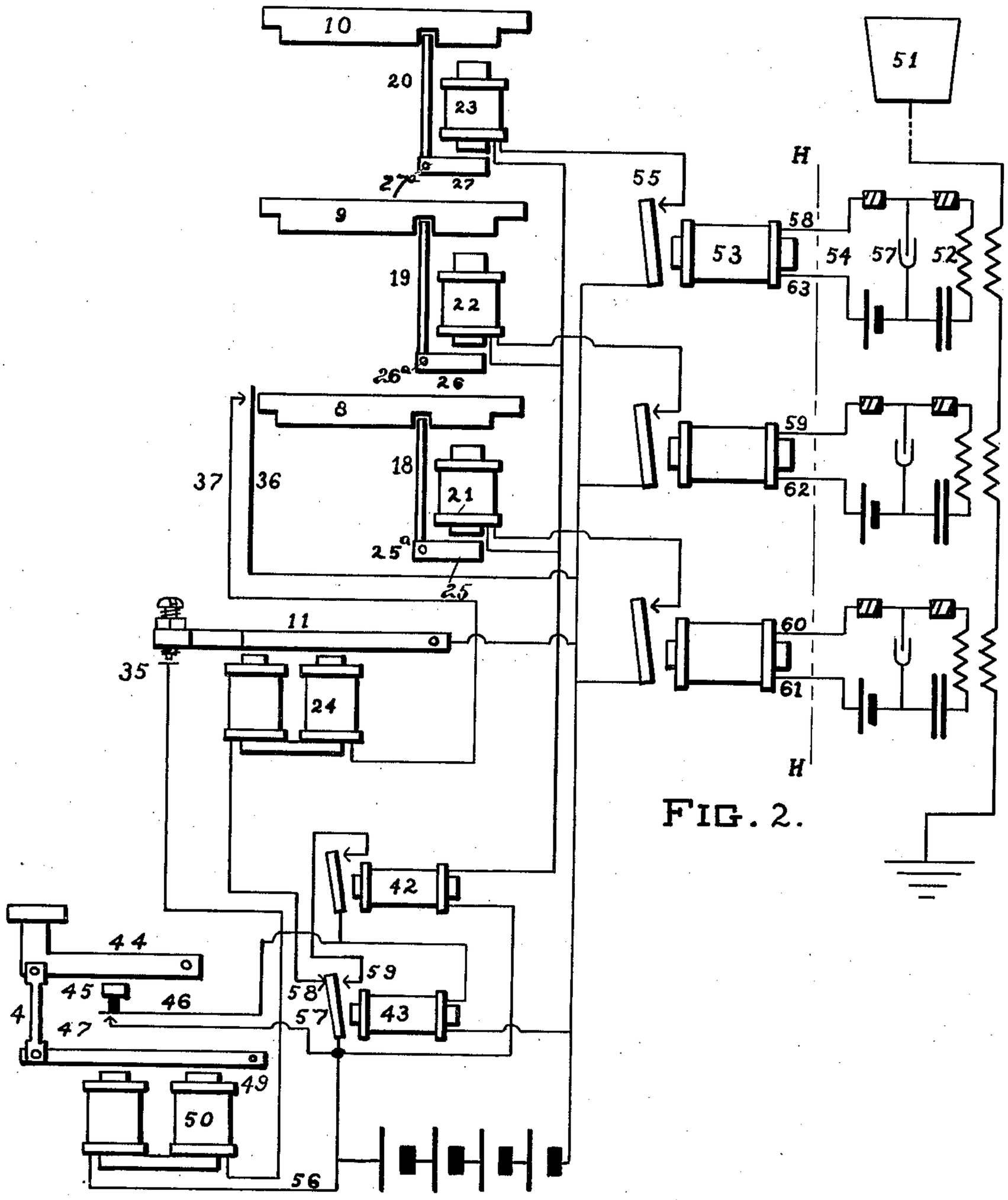

FIG. 2.

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3 SHEETS—SHEET 3.

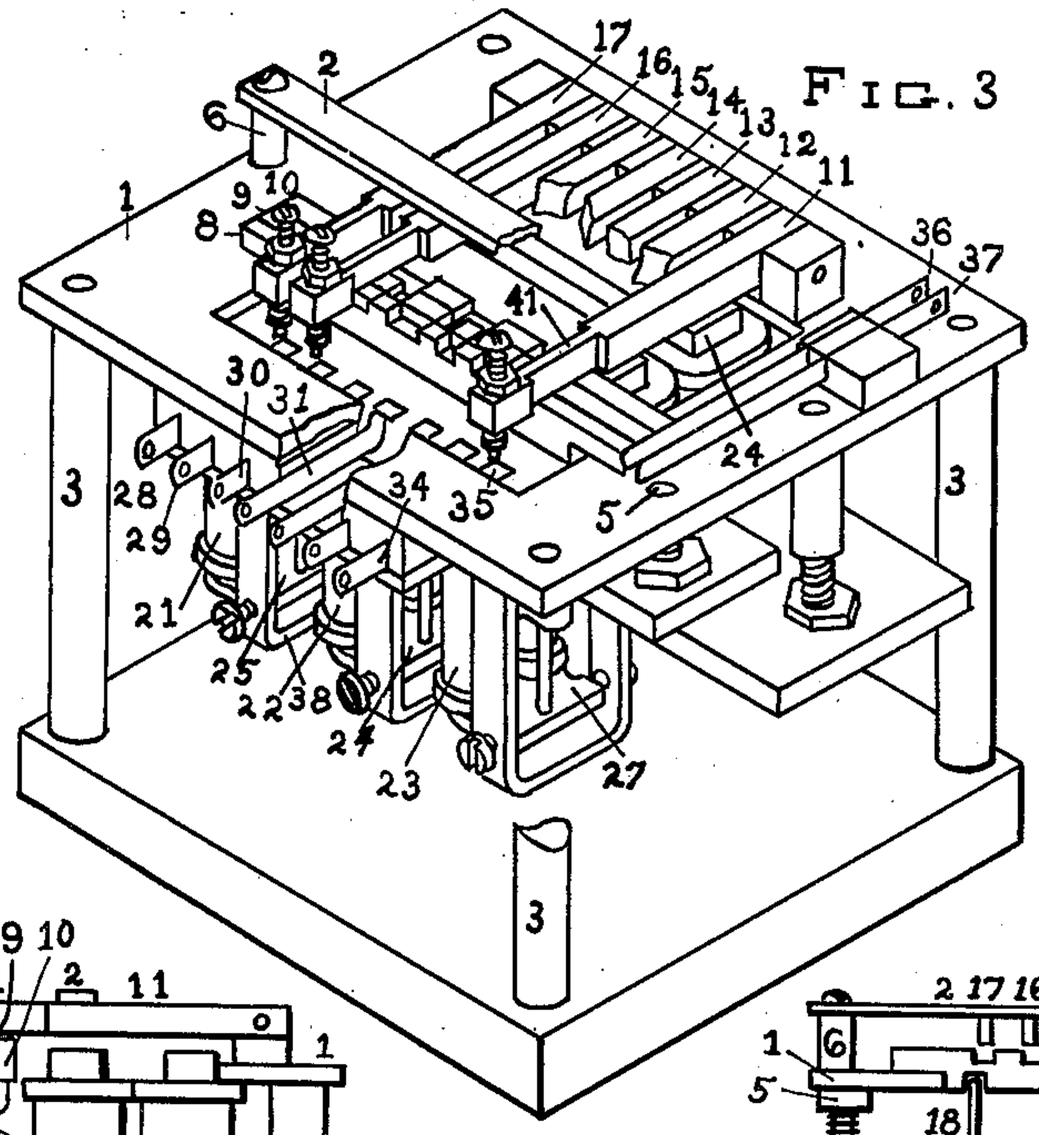

FIG. 3

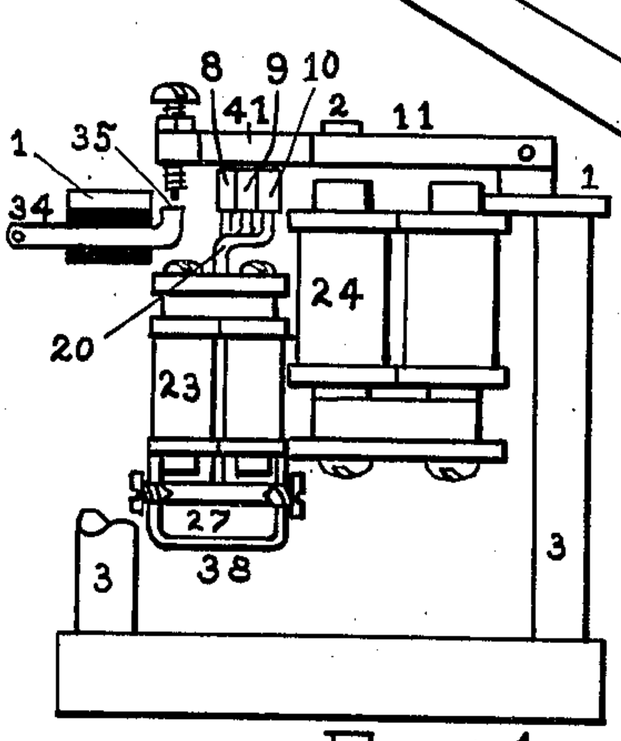

FIG. 4

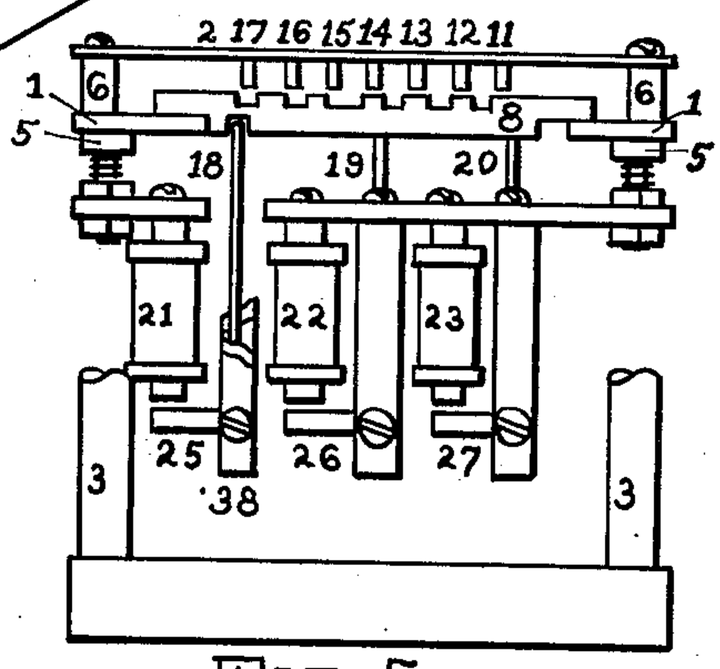

FIG. 5

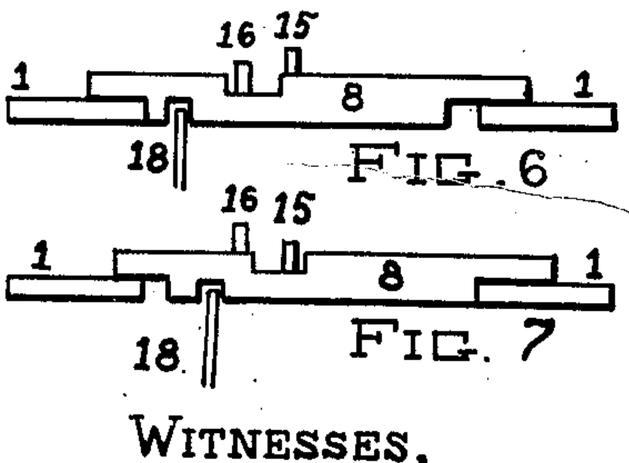

FIG. 6

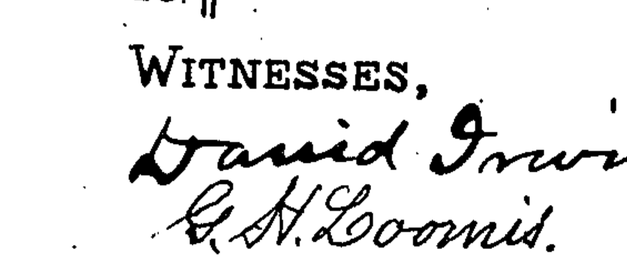

FIG. 7

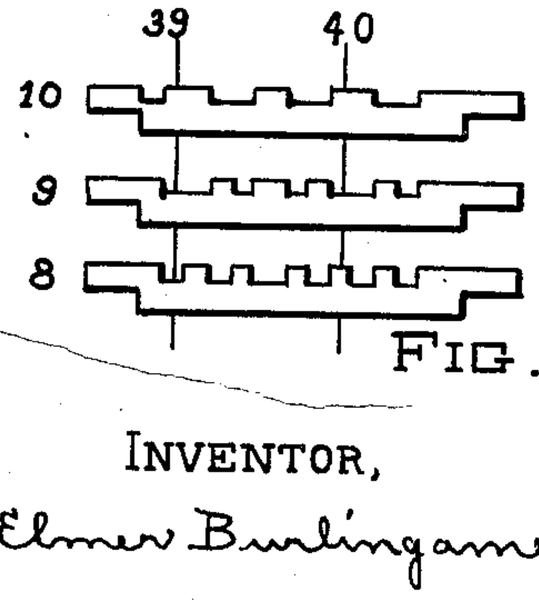

FIG. 8

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UNITED STATES PATENT OFFICE.

ELMER BURLINGAME, OF LAPORTE, INDIANA, ASSIGNOR TO THE BURLINGAME TELEGRAPHING TYPEWRITER COMPANY.

TELEGRAPHIC TYPE-WRITER.

No. 928,581. Specification of Letters Patent. Patented July 20, 1909.

Application filed April 26, 1906. Serial No. 313,757.

To all whom it may concern:

Be it known that I, ELMER BURLINGAME, a citizen of the United States of America, residing in the city and county of Laporte, State of Indiana, have invented a new and useful Telegraphic Type-Writer.

My invention relates to the means of sending, the character of the impulses sent, and the mode of reception.

The object of the invention is to insure greater speed and accuracy, than is at present possible, also to reduce the first cost, cost of maintenance, and liability to disorder. I obtain these objects by means of the mechanism illustrated in the accompanying drawings.

In the Boudet and following similar systems, there are transmitted over a single wire, for each character, a series of impulses, of substantially equal duration, five or more, some positive, some negative. Each character is distinguished from all other characters by a particular permutation of the impulses and these impulses act upon a selecting mechanism at the receiving end of the line and so adjust it as to cause the operation of the printing mechanism to print the desired character.

Whereas the Boudet systems send impulses at five or more different times, over one circuit, I send at one and the same time, impulses over five or more different circuits. Each group of impulses, going at one and the same time over the five or more circuits, represents a character. For the five or more circuits, I will use ether waves of five or more different frequencies, with proper apparatus to send and receive these waves. I shall refer hereinafter to a particular wave frequency and its complementary sending and receiving apparatus as constituting a definite circuit. The several circuits thus formed, I hereby term basic circuits.

In the Boudet systems, a positive impulse represents one state of action, and a negative impulse represents another state of action. I let these two states of action be represented one by the presence of an impulse over a basic circuit, and the other by the absence of such impulse over a basic circuit. To avoid confusion in this description, I will refer to these impulses over the basic circuits, separately, as simple impulses, and will also refer to the one or more impulses over one or more basic circuits at one and the same time required to print a character, collectively, as a character impulse. Thus when five basic circuits are used, five character impulses will consist each of one simple impulse, ten of two simple impulses, ten more of three five of four and one of five simple impulses.

The following table will show of which simple impulses each character impulse may consist. The letters at the tops of the columns refer to five basic circuits, respectively. "0" represents the absence of a simple impulse, and "1" the presence of same.

	A	B	C	D	E
a =	1	0	0	0	0
b =	0	1	0	0	0
c =	1	1	0	0	0
d =	0	0	1	0	0
e =	1	0	1	0	0
f =	0	1	1	0	0
g =	1	1	1	0	0
h =	0	0	0	1	0
i =	1	0	0	1	0
j =	0	1	0	1	0
k =	1	1	0	1	0
l =	1	0	1	1	0
m =	1	0	1	1	0
n =	0	1	1	1	0
o =	1	1	1	1	0
p =	0	0	0	0	1
q =	1	0	0	0	1
r =	0	1	0	0	1
s =	1	1	0	0	1
t =	0	0	1	0	1
u =	1	0	1	0	1
v =	0	1	1	0	1
w =	1	1	1	0	1
x =	0	0	0	1	1
y =	1	0	0	1	1
z =	0	1	0	1	1
Space =	1	1	0	1	1
Carriage =	0	0	1	1	1
Capitals =	1	0	1	1	1
Punctuations =	0	1	1	1	1
Mechanical =	1	1	1	1	1

Thus "k" will consist of simple impulses over basic circuits A, B and D, and the absence of same over C and E. The absence of an impulse is as essential to the formation of a character as the presence of the impulse.

To operate the linotype, it will be desirable to use six basic circuits in order to get sixty-three character impulses.

The accompanying drawings will show

how three basic circuits can be combined to produce seven character impulses. It will not then be necessary to describe how five basic circuits can be so combined as to produce thirty-one, and six basic circuits can be combined so as to produce sixty-three character impulses.

In the accompanying drawings, similar figures of reference refer throughout the drawings to similar parts of the apparatus.

Figure 1 is a diagram of the circuits at the sending station, and shows how the proper basic circuits are closed to produce the desired character impulse. Fig. 2 is a diagram of the circuits at the receiving station, and shows how each simple impulse is converted into mechanical motion. Fig. 3 is a perspective view of the mechanical interpreter, Fig. 4 is an end view thereof, Fig. 5 is a front view, Figs. 6, 7 and 8 are detail views of parts of said interpreter.

In Fig. 2 the waves impinge upon the plate or aerial, 51, and, traveling to ground, excite the resonant circuits 52, with which they are in tune. The relay 53 then operates the magnet 23, through its local circuit.

The contacts under each key of the sending station are so arranged that it is impossible to close any one basic circuit before those intended according to the above code to operate with it to produce the desired character. If this were not provided for, the first simple impulse sent, would operate the receiving mechanism the same as though that were the only simple impulse in that character impulse. Thus, referring to the above table, the letter "g" consists of simple impulses over basic circuits A, B and C. Now if, in closing the contacts 68, 69 and 70, the impulse should be sent on basic circuit B, before A and C, the receiving apparatus would print the letter "b" instead; as the character impulse for the letter "b" consists of a simple impulse over basic circuit B. I avoid this, by placing the terminals of the basic circuits at the beginning of the arc of motion of the key lever 68 (Fig. 1) and the spring 70 which is common to all the basic circuits, toward the last of the said arc of motion. In this manner, the predetermined basic circuits which are to operate in order to send the desired character impulse have their apparatus connected in multiple, before the final closing of their circuits, hence it is obvious that one basic circuit cannot operate before those intended to operate with it. The terminals of the basic circuits, 68, 69 and 70 will be contact springs mounted in such relation to the keys of the sending typewriter as to be moved into electrical contact by the operation of the key lever. In long distance wireless work, it will be impossible to operate mechanically from the key lever, springs of such size to carry the current necessary to operate the coils used. In this case, the contacts under the key levers will operate relays whose secondary contacts are in the circuits of the coils. This means of operation is not shown.

Figs. 3 to 8, show how the character impulse selects the proper circuit to perform the mechanical motion desired by the sender. A, B and C will refer to the three basic circuits, respectively.

In Fig. 2 is shown the receiving apparatus for each basic circuit. It consists of a resonant circuit, 52, detector 57, a local circuit, 54, a relay 53, secondary circuit 55, and the special apparatus shown in Figs. 3 to 8.

Fig. 3 is what I will term the mechanical interpreter, and is what forms the base of this patent. It consists of six essential parts; receiving magnets, 21, 22, and 23; sliding bars, 8, 9 and 10; key armature magnet, 24; key armatures, 11 to 17; key contacts, 35; supporting frame, 1.

11 is an armature with an extension arm 41, and is so placed as to be operated by the magnet 24. There are, in a machine of the capacity herein described, seven of these armatures, 11 to 17, one for each character impulse. When five basic circuits are used, there will be thirty-one armatures, and with six basic circuits, there will be sixty-three armatures. 8, 9 and 10 are sliding bars, one for each basic circuit, and are operated by the magnets 21, 22 and 23, respectively their armatures being pivoted at 25^a, 26^a and 27^a and being provided with arms 18, 19, and 20 respectively, the ends of which engage notches in the under side of the bars as clearly shown in Fig. 2. These bars, 8, 9 and 10, have notches in their upper surfaces, as shown in Fig. 8, so arranged that for each character impulse, the bars 8, 9 and 10 will be in such position as to bring a notch in each bar under the arm 41 of the armature closing the circuit which prints the character desired. These bars may assume eight positions with relation to each other and to the armatures 11 to 17. One combination of positions, must of necessity, be the normal position of the apparatus. This leaves, then, seven combinations available for use to select character impulses, and, when these bars, 8, 9 and 10 are in any one of these positions, other than normal, they set in operation the mechanism which prints the character. All these combinations of positions of the bars 8, 9 and 10 will be termed active positions.

The arrangement of the notches in the bars 8, 9 and 10, is the key to the solution of selecting the desired character. In the Fig. 8, the bars, 8, 9 and 10 are shown one above the other, for the sake of a clear comprehension. The lines 39 and 40 indicate the position that the arms 41 of the two key contact armatures, 17 and 13, will have with respect to the bars 8, 9 and 10. With the

bars in the position shown, it will readily be seen that neither armature can be depressed lower than the tops of the bars. If, however, the bar 10 should be moved to the right, the armature at 39 could be depressed as far as the bottom of the notches, but the armature at 40 could not be depressed so far. Then again, if the bars 8 and 10 both be moved to the right, the armature at 40 could be depressed to the bottom of the notches, while the armature at 39 would be arrested by the bar 8. In Figs. 6 and 7 is shown how a bar 8, by its notch, may select, by its two positions, between the armatures 15 and 16.

When the bars 8, 9 and 10 have assumed their active positions to produce some particular character impulse, the magnet 24 is to be energized. This must not be done before the bars have reached their active positions, for the pressure of the armatures 11 to 17 would interfere with the motion of the bars. In order to do this, I place two contact springs in the path of motion of the bars 8, 9 and 10 in such position that the bars by their motion, cause electrical contact between these two springs, 36 and 37. This contact is not completed until the bars have almost covered the distance through which they are to move. This prevents the armatures 11 to 17 interfering with the motion of the bars. These springs, 36 and 37 are in the circuit of the magnet 24, hence, when this contact is closed, the magnet 24 is energized. One of these springs 36, may mechanically restore the bars 8, 9 and 10 to their normal positions after the magnets 21, 22 and 23 have ceased to be energized. These bars may also be restored by any other means. With the bars 8, 9 and 10 in active positions, and the magnet 24 energized, all the armatures, 11 to 17 will be attracted downward, but only one, that having the notch in each of the bars 8, 9 and 10 directly beneath it, can be depressed beyond the tops of the bars. This extra distance the one armature is allowed to move, effects the closing at contact 35 of the circuit which includes magnet 50 beneath the key of the receiving typewriter, corresponding to the key depressed by the sender.

The pressure of the armatures, 11 to 17 on the bars 8, 9 and 10 will prevent them from returning to normal position after the magnets 21, 22 and 23 have ceased to be energized, so the contact between springs 36 and 37 cannot be broken. Other means must then be provided to release magnet 24. I accomplish this as follows: In all typewriters, there is a bar or plate so placed as to be operated by the depression of any key. This is connected with the space mechanism. I place two contact springs, 46 and 47, in such position with relation to the space bar 45, that electrical contact will be made by the operation of the space bar. These two springs close a circuit including the receiver battery and a relay 43. The secondary contact between 57 and 58 of this relay is part of the circuit of magnet 24. Hence, immediately upon completion of the motion of the type bar, the circuit to magnet 24 is broken, and the armatures 11 to 17 released. The secondary contacts 57 and 59, of relay 43, together with the contact between the secondary contacts of relay 42, are in multiple with the contact between the springs 46 and 47 beneath the space bar. Now, with the secondary contacts of relay 42 closed, relay 43 will keep its own coils energized, after it has been operated by the space bar. This is to prevent a repetition of the character on the typewriter, if the key is still held down by the sending operator. As long as the sending key is depressed, the magnets 21, 22 or 23, whichever operate for that character impulse, will remain energized. The relay 42 is in series in the common return of the magnets 21, 22 and 23. Hence this relay 42, will be energized during the time the sending key is depressed. Relay 43 is never energized till after relay 42 is, hence when it is once energized, it is released by the relay 42. This, then, affords a means of locking all receiving mechanism, after the printing of the character and until the release of the sending key. Should the sending key be released before the completion of the receiving operations, the receiving operations will be completed, as the bars 8, 9 and 10 are locked in operated position by the pressure of the armatures 11 to 17, and will remain locked till the operation of relay 43. When relay 42 is released, all receiving apparatus is in normal position.

Having to the best of my ability described the nature of this invention, and the best means of which I know of carrying the same into practical effect, what I claim as new, and wish to secure by Letters Patent, is as follows;—

1. In an apparatus of the class described, in combination, a plurality of sliding bars, a plurality of electro-magnetic devices arranged in proximity to the bars and controlling the motion thereof, a plurality of movable elements arranged in proximity to the bars and normally held against movement thereby, electro-magnetic means for operating said movable elements, and means whereby the movement of one of said bars energizes said electro-magnetic means, substantially as described.

2. In an apparatus of the class described, in combination, a plurality of sliding bars, a plurality of armatures, one for each character in proximity to the bars and controlled as to its movement by the relative position of the bars, an electro-magnet for each bar for controlling the movement thereof, electro-magnetic means for operating the armatures,

and means whereby the movement of one or more of the bars energizes said electro-magnetic means, substantially as described.

3. In combination, a plurality of sliding bars, a plurality of armatures, one for each character in proximity to the bars and controlled as to its movement by the position of the bars, an electro-magnet coöperating with said armatures, means whereby said bars are yieldingly held in position to prevent movement of any of the armatures, means whereby upon the movement of any one of the bars the said magnet is energized, and an electro-magnet for each bar adapted when energized to move said bar, substantially as described.

4. In combination, a plurality of sliding bars, having notched upper edges, a plurality of armatures, one for each character, located over said sliding bars, and controlled as to movement by the position of the bars, an electro-magnet for attracting said armatures, a spring bearing against the ends of the bars and tending to hold them in neutral position, a contact coöperating with said spring on movement of any one of the bars to close a circuit through the magnet, an armature operatively connecting with each sliding bar, an electro-magnet for operating each armature, and means for energizing any one or more of said last named magnets, substantially as described.

5. In combination, a plurality of sliding bars, a plurality of armatures, in proximity to said bars and controlled as to their movement by the position of the bars, an electro-magnet for operating said armatures, a contact device adapted to be closed by the movement of any of said bars to energize said magnet, a plurality of electro-magnets, one for each sliding bar, means for energizing one or more of said electro-magnets from a distance, means whereby the energizing of said magnets moves the corresponding sliding bar, a plurality of character forming devices, an electro-magnet for each of said devices, a circuit including each of such last named electro-magnets, a source of electric energy, and a switch controlled by the movement of the respective armatures, substantially as described.

6. In combination, a plurality of sliding bars, a plurality of armatures, one for each character, located in proximity to said bars and controlled as to motion by the said bars, a magnet for attracting said armatures, and a relay whose secondary contacts form part of the circuit of said magnet and which furnishes a means of releasing said magnet after the mechanical operation required to print a character has been performed.

7. In combination, a plurality of sliding bars, a plurality of armatures, one for each character, located in proximity to said bars and controlled as to movement by the position of the bars, a magnet for attracting said armatures, means operated by the sending station for determining the position of the sliding bars, a relay whose secondary contacts form part of the circuit of said magnet, means whereby said relay is retained in its operated position from the time the mechanical operation required to print a character has been completed until the release of the key depressed by the sending operator, substantially as described.

8. In combination, a plurality of sliding bars, a plurality of armatures, one for each character, in proximity to said bars and controlled as to movement by the relative position of the bars, a magnet for attracting said armatures, and a relay with make and break secondary contacts, said break contact forming part of the circuit of said magnet and said magnet operating to indirectly close the circuit which is a part of the relay circuit, and means by which the said relay is maintained in its operated position, substantially as described.

9. In combination, a plurality of sliding bars, a plurality of armatures, one for each character, located in proximity to said sliding bars and controlled as to movement by the relative position of the bars, a magnet for attracting said armatures, a relay whose secondary contacts form part of the circuit of said magnet, said relay being provided with another secondary contact by which said relay is maintained in operated position, and means by which said relay may be released when the key depressed by the sending operator is released, substantially as described.

10. In combination, a plurality of sliding bars, magnets for operating said bars, a plurality of armatures, one for each character, and controlled as to its movement by the relative position of the bars, a magnet for attracting said armatures, a first relay with break contact forming part of the circuit of said armature attracting magnet, said relay also having a break contact forming part of the circuit of said relay and by which it is maintained in operated position, and a second relay whose primary circuit is in series with said magnets for operating the sliding bars and is operated and released simultaneously therewith and whose secondary magnet contact is part of the circuit of said first relay and furnishes means to release said first relay, substantially as described.

11. In combination, a plurality of sliding bars at the receiving station, an armature bearing a number of springs, one for each character, whose operation is determined by the relative position of the sliding bars, a magnet controlling said armature, and a relay whose secondary contacts form part of the circuit of said magnet, said relay being also provided with another secondary contact by which it is maintained in operated

position, and means by which said relay may be released when the key depressed by the sending operator is released, substantially as described.

12. In combination, a plurality of sliding bars, a number of armatures, one for each character, whose operation is determined by the relative position of the sliding bars, a magnet controlling said armatures, a first relay with break contact forming part of the circuit of said armature controlling magnet, said relay also having a make contact forming part of the circuit of said relay, and means by which it is maintained in operated position, a contact in circuit with and closed by the operation of mechanical motion desired at the receiving station, said contact being in multiple with the make contact of the said relay and furnishes the means whereby the said magnet controlling the said armatures may be released immediately after the completion of the mechanical motion desired, substantially as described.

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