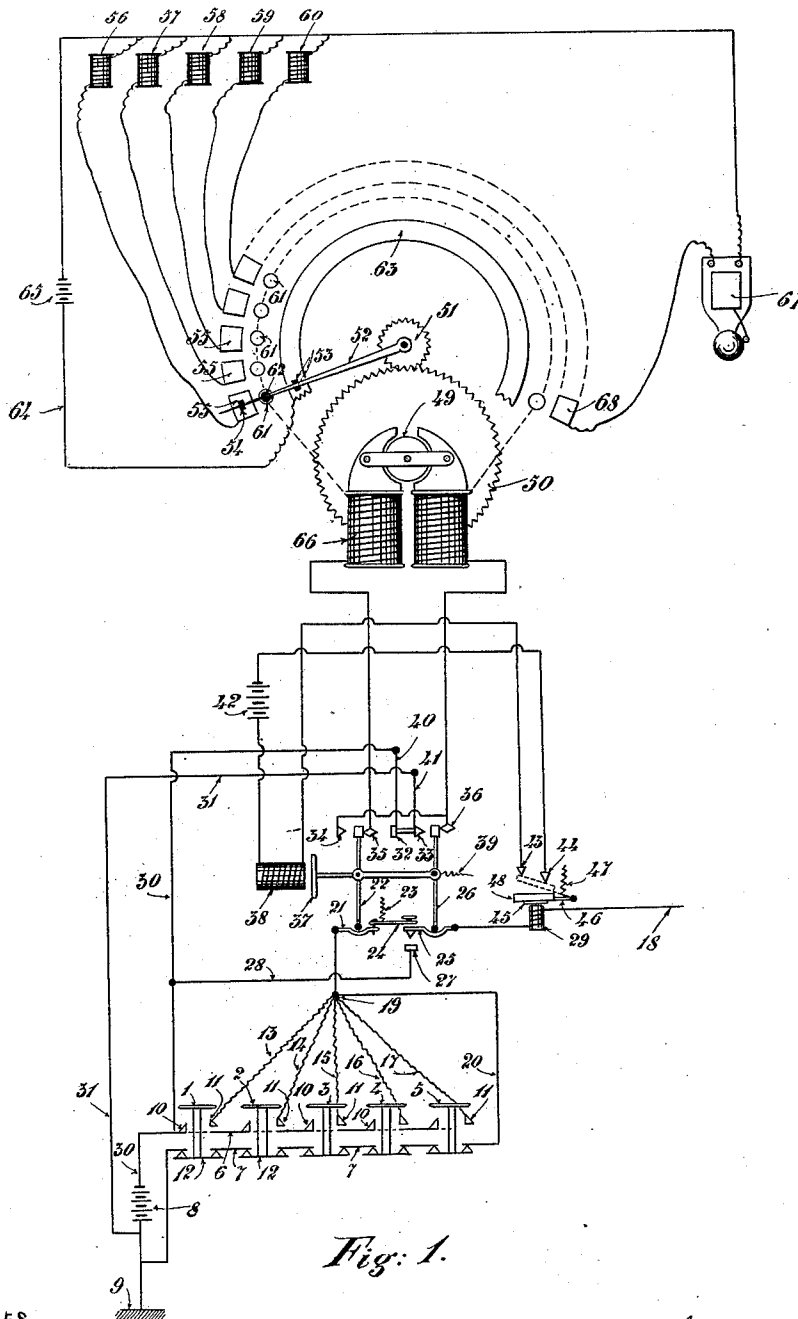


G. MUSSO.
PAGE PRINTING TELEGRAPH.

(Application filed July 3, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES
Isabella Kaldron.
Adelaide Claire Mason.

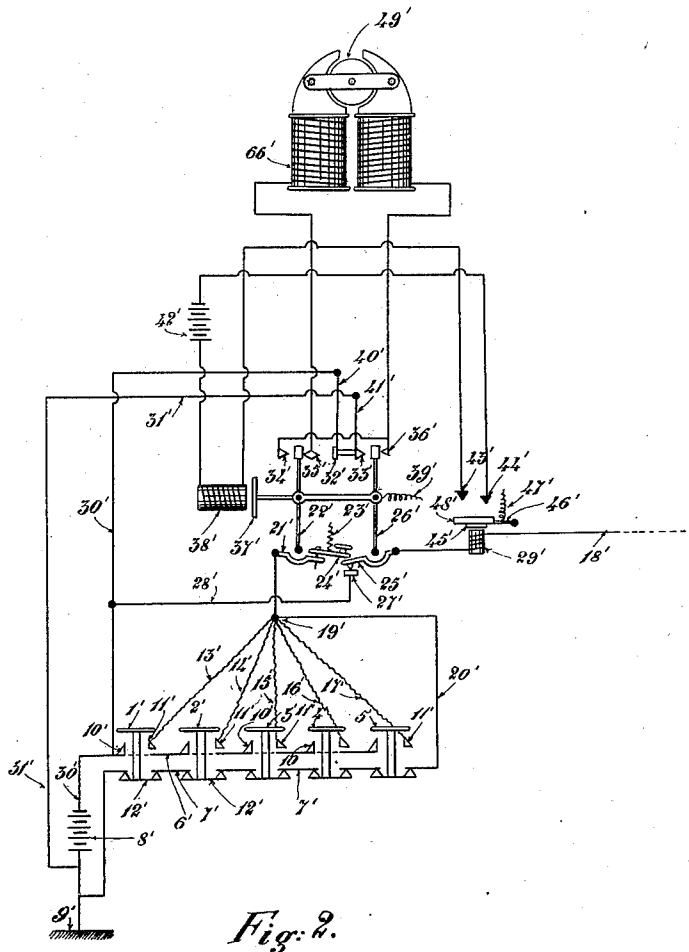
INVENTOR.
Giuseppe Musso
BY
Richardson
ATTORNEYS

G. MUSSO.
PAGE PRINTING TELEGRAPH.

(Application filed July 3, 1901.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:
Isabella Aldron
Adelaide Claire Pearson

INVENTOR.
Giuseppe Musso
BY
Richardson
ATTORNEYS

G. MUSSO.
PAGE PRINTING TELEGRAPH.

(Application filed July 3, 1901.)

(No Model.)

3 Sheets—Sheet 3.

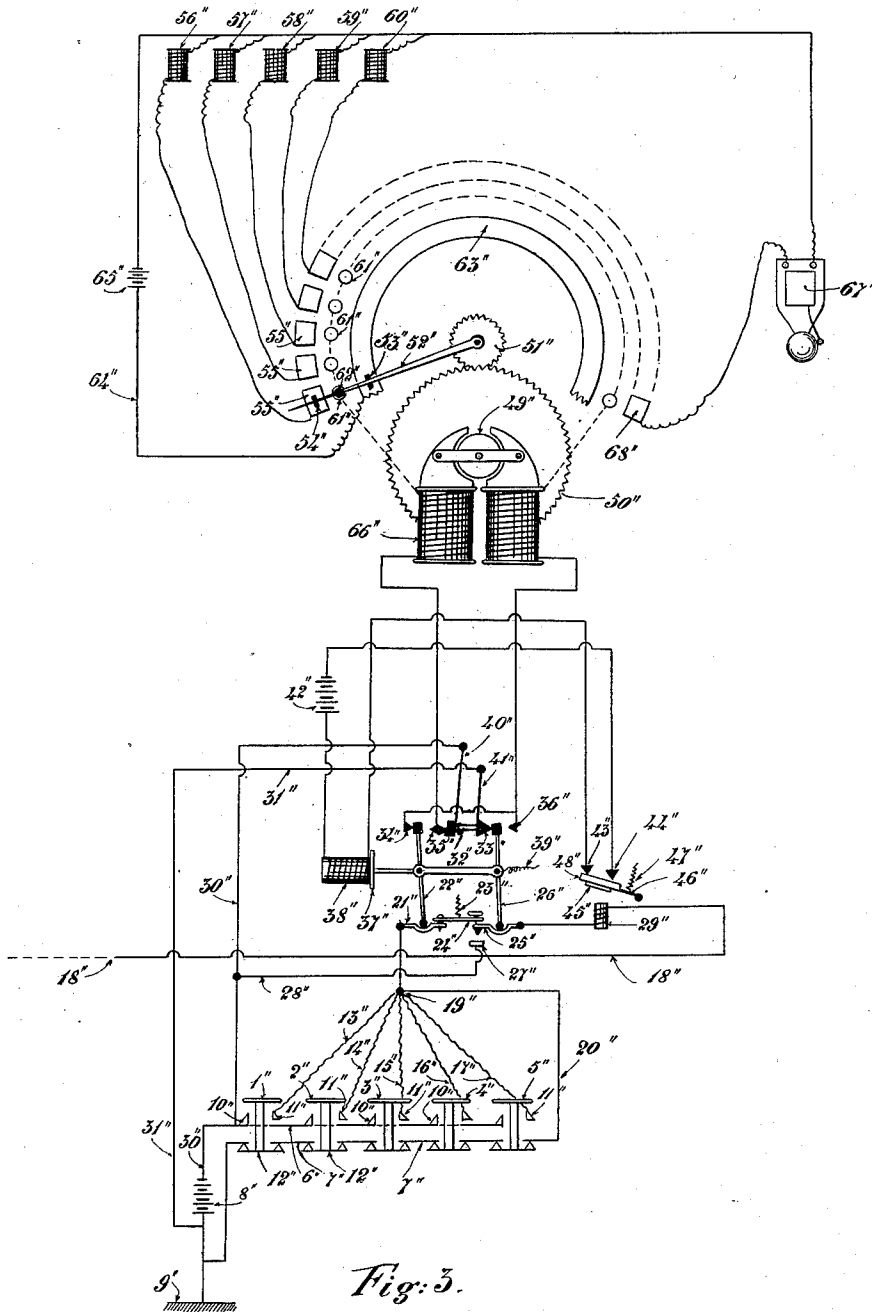


Fig. 3.

WITNESSES:
Isabella Kaldron.
Odelaide Claire Gleason.

INVENTOR,
Giuseppe Musso.
BY
Richardson
ATTORNEYS.

UNITED STATES PATENT OFFICE.

GIUSEPPE MUSSO, OF S. ANGELO DEI LOMBARDI, ITALY.

PAGE-PRINTING TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 707,612, dated August 26, 1902.

Application filed July 3, 1901. Serial No. 67,058. (No model.)

To all whom it may concern:

Be it known that I, GIUSEPPE MUSSO, a citizen of the Kingdom of Italy, residing at S. Angelo dei Lombardi, Province of Avellino, Italy, have invented certain new and useful Improvements in Page-Printing Telegraphs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention refers to an electrical contrivance which permits the reproduction of a telegraphic message transmitted at any distance by means of ordinary types.

It is a well-known fact that in the usual type-writing machines the lowering of a key puts in movement a corresponding lever, which impresses a letter or figure on a sheet of paper. Naturally in these machines all the different parts are grouped together in a relative small space and under the immediate control of the operator.

With the contrivance of the present invention the keyboard is disposed at the transmitting-station and the printing apparatus at the receiving-station. These two stations are connected with each other by means of a telegraphic line, and as both have to act as transmitting and receiving station each one must be provided with the corresponding apparatuses.

In the accompanying drawings, Figure 1 shows the transmitting-station with its apparatuses at rest, and Fig. 3 the receiving-station with its apparatuses at the moment of reception. Fig. 2 shows a part of the transmitting apparatus in which the call-manipulator is lowered.

In all the figures the same parts are indicated by the same numbers, with the difference, though, that those of Fig. 2 bear one dot and those of Fig. 3 two dots.

Although in all the figures the keyboard is shown with only five keys, 1 2 3 4 5, it is evident that their number should correspond to that of the letters or signs of the writing-machine.

Referring to the drawings, 6 is a metal plate which stands in communication with a battery 8 and an earth-contact 9.

7 is a series of small metal plates which com-

municate on one side with the earth and on the other side with the line 18 by means of a wire 20 and other intermediate organs, as will be described hereinafter. The metal plate 6 is electrically connected with the contact 10, while the contacts 11 stand insulated from the said plate and communicate instead with the graduated resistances 13 14 15 16 17. The lower parts 12 of the keys are made of metal, so as to establish an electrical continuity of the plates 7 when the keys are at rest. The resistances 13 14 15 16 17 end with their terminals at the binding-post 19, connected with the oscillating lever 21, which when the apparatus is at rest, Fig. 1, is in electrical communication with the conducting-rod 22. 24 is a non-conducting manipulator fixed to the lever 21 and regulated by a spiral spring 23. 25 is another oscillating lever which operates with the conducting-rod 26 and which may also be brought into contact at 27 with the wire 28. The electromagnet 66 communicates on one side with the contact 35 and on the other side with the contacts 34 and 36 by means of the respective wires. The oscillating lever 25 is connected with the non-polarized electromagnet 29, and when the current is sent out from the transmitting-station it flows through the electromagnets 66 and 29 and arrives by following the line 18 at the other station, Fig. 3. The wires 30 and 31 of the battery 8 end with the contacts 32 and 33. The two oscillating conducting-rods 22 and 26, which are acted on by the armature 37 of the non-polarized electromagnet 38 and by the spiral spring 39, form a double reverser in respect to the two contacts 34 35 and 33 36. It is to be observed that the two arms 40 and 41 are also oscillating, so that when the conducting-rod 26" touches the contact 33" this latter will yield, and with it yields also the contact 32", which joins the contact 35", as shown in Fig. 3. The electromagnet 38 makes part of a circuit in which is inserted a battery 42 and which ends with the two contacts 43 44. The armature of the electromagnet 29 consists of a permanent magnet 45, fixed on the oscillating lever 46 and regulated by a spiral spring 47. The lever 46 is further provided with a conducting-plate 48. Between the polar jaws of the electromagnet 66 is fixed the polarized solenoid 49, which can

rotate freely on its axis. On the said axis is wedged a toothed wheel 50, which engages with another small wheel 51, on the gudgeon of which is fixed a flexible arm 52, that carries the contacts 53 and 54, which are in electric connection with each other.

55 represents plates that are insulated from the system and which communicate with the coils 56 57 58 59 60, &c. 68 is another plate similar to the one 55 and stands in communication with the bell 67. The small polarized iron cores 61 61 have their coils inserted in series with the line.

62 is a small magnet fixed on the arm 52. The opposite poles of 61 and 62 are poles of contrary names when no current flows through the coils 61, and consequently attract one another, and prevent thereby the arm 52 from moving; but as soon as a current flows through the coils 61 the poles of their cores get inverted, the magnet 62 gets removed, and the arm 52 can freely move. Immediately the current ceases these parts return to their original position.

The electromagnets 56 57 58 59 60 are designed to act on the corresponding levers of the typewriter, conveniently adapted for the purpose, and correspond therefore in number to the letters and signs of the machine, although in the figures are only shown five of them. There are further inserted in the circuit a conducting-plate 63, a wire 64, and a battery 65.

Let us now examine how the apparatus works. If in the transmitting-station, Fig. 2, the telegraphic key 24' is lowered, the contacts 21' 22' and 25' 26' will be interrupted and the lever 25' will be brought into contact with the plate 27', so that the current of the battery 8, passing over 28, 27, and 25', will flow through the line 18. The winding of 29 is such as to polarize the iron core, so that its upper end forms a pole of a contrary name in respect to the opposite pole of the small magnet 45, so that this latter, which was already adherent to the core of the coil 29 when no current passed through this coil, will remain adherent to it for a still stronger reason when a current passes through it in the direction indicated in Fig. 1, and consequently the plate 48 will remain apart from the contacts 43 and 44 and the circuit of the battery 42 remains interrupted. The reverser 22' 26' under the action of the spring 39 will remain in the position shown in Fig. 2. Following the circuit of the current coming from the transmitting-station we find the coil 29", Fig. 3. Before the passage of the current the receiving-station was in the position of rest and the magnet 45 adherent, therefore, to the iron core 29" and the reverser occupied the position shown in Fig. 1. Referring, therefore, to Fig. 1, it will be seen that the current would have passed at the beginning over the circuit 25 26 36 and through the receiver 66, returning afterward over 35 22 21 to the earth. In this case the action of the appa-

ratus would have been contrary to the one desired, it being absolutely necessary in order to obtain a regular working of the two receivers that the current runs through them in the same direction. This is obtained by means of the special arrangement of the coil 29". Be it noted that the current which runs through the said coil circulates in the opposite direction in respect to the current that runs through the coil 29, Fig. 1. The iron core of the coil 29" presents, therefore, to the magnet 45" a pole of the same name, and the plate 48" under the action of the spiral spring 47" will touch the contacts 43" and 44" and close the circuit in which is inserted the battery 42". The armature 37 will be attracted by the magnet 38, and the apparatus will take the position shown in Fig. 3. Examining this figure it will be seen that the current circulates in the receiver 66" of the receiving-station in the same way as in the receiver 66 of the transmitting-station. It will further be seen that in the circuit is inserted the local battery 8". The electromagnet 29", which works under the impulse of a very feeble current, performs, therefore, a double operation—namely, it reverses the entrance of the current into the receiver and inserts also the line-battery 8" in the circuit, which acts in this case as a relay. Let us suppose now that the inner resistances of the apparatuses and that of the circuit in the two stations be equivalent and that the equivalent value of the currents be ascertained by electric measurements. By depressing the key 24 in the transmitting-station the call-bell 67" will be put in movement, as will be shown later. By releasing the key 24 and by depressing one of the keys of the keyboard—for instance, the key 1—the metal head of it will at once establish a communication between the contacts 10 and 11, while the inferior disk 12 will leave the plate 7 and interrupt thereby the contact with the earth 9, preventing thus the forming of a short circuit over 8 10 1 11 13 19 20 7 9. The current of the battery 8, passing over 10 1 11 and the resistance 13 and further over 19 21 22 35, the electromagnet 66, the solenoid 49, the magnets 61, of which it inverts the poles, will return over 36 26 25 and the line 18 to the receiving-station, Fig. 3. The solenoid of 49 will under the magnetic impulse overpower the feeble antagonistic resistance and rotate at a certain angle, which depends from the resistance 13 and produce the rotation of the wheel 50, connected with it. In consequence of this movement the small disk 51 will be obliged to rotate till it brings the arm 52 in the position shown in Fig. 1. After this the operator will have released the key 1, which returns under the pressure of a spring (not shown in the drawings) in its original position. The current is interrupted, and the magnets 61 having recovered their natural polarities will attract the small magnet 62, which was till now kept at distance by the current, as was stated be-

fore. The attraction of the magnet 62 produces now the union of the contacts 53 and 54 with the plates 63 and 55. This causes the closing of the circuit of the battery 65 and the
 5 excitation of the electromagnet 56, that acts on the lever of the corresponding letter in the type-writer. The same effects take place in the same order, also, in the receiving-station, because, as has been explained before, the
 10 current flows in the same direction and the arrangements in the two apparatuses are identical. Considering that the resistances 13 14 15 16 17 are regulated in such a way as to determine a special position of the lever
 15 52 it will be easily understood how the keys of the keyboard and the levers of the type-writer correspond with each other. From this it will also be understood how the call-bell 67" works. By depressing the key 24
 20 the current of the battery 8 passes through the circuit 28 27 25 29 18, to which corresponds a special resistance that will oblige the arm 52" to take a certain position, which we suppose to be the one that corresponds to
 25 the plate 68. By releasing the manipulator 24 the arm 52 will be attracted and close the circuit of the bell 67, which will continue to ring till the arm 52 does not get removed by the passage of a new current of different in-
 30 tensity. From the above description it clearly results that the transmitted despatch could be received by the apparatus in the receiving-station even during the absence of the officials.

35 I claim—

1. In a printing-telegraph, the combination with a main line or circuit and transmitting means for producing electrical impulses of
 40 different strength therein, of a receiver comprising an armored solenoid rotatably mounted and adapted to take different positions corresponding to the intensity of the impulse or current, a circuit-closing arm operatively connected with said solenoid, and
 45 type-writer-operating circuits controlled by the movement of said arm, substantially as described.

2. In a printing-telegraph, the combination with a main line or circuit and transmitting

means for producing electrical impulses of 50 different strength therein, of a receiver comprising an electromagnet included in said circuit, a solenoid rotatably mounted in proximity thereto and designed to be operated according to the strength of the electrical im- 55 pulse, a contact-carrying arm operatively connected with said solenoid, type-writer-operating circuits controlled by said arm, an auxiliary circuit and battery, and means operated by the initial current on the main line 60 for connecting said auxiliary circuit with the magnet, substantially as described.

3. In a printing-telegraph, the combination with a main line or circuit and transmitting means for producing electrical impulses of 65 different strength therein, of a receiver comprising an electromagnet included in said circuit, a solenoid rotatably mounted in proximity thereto and designed to be operated according to the strength of the electrical im- 70 pulse, a contact-carrying arm operatively connected with said solenoid, type-writer-operating circuits controlled by said arm, an auxiliary circuit and battery, and means controlled by the initial current in said main 75 line for reversing the flow of current through said magnet and reinforcing it by said auxiliary battery, substantially as described.

4. The combination with the main line of a combined transmitter and receiver comprising a plurality of keyboard-controlled con- 80 tacts, variable resistances interposed between said contacts and the line, an electromagnet 66 having electrical connection with the line, current-reversing means included in said con- 85 nections, an electromagnet 38 for operating reversing means, means controlled by the initial current on the main line for energizing said magnet 38, type-writer-controlling circuits and means whereby the varying im- 90 pulses in said magnet 66 operates said controlling circuits substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GIUSEPPE MUSSO.

Witnesses:

LETTERIO LABOCCETTA,
 L. IDSUNDITTI.