2 Sheets—Sheet 1.

E. P. WARNER.

PRINTING TELEGRAPH.

No. 190,456. Patented May 8, 1877.

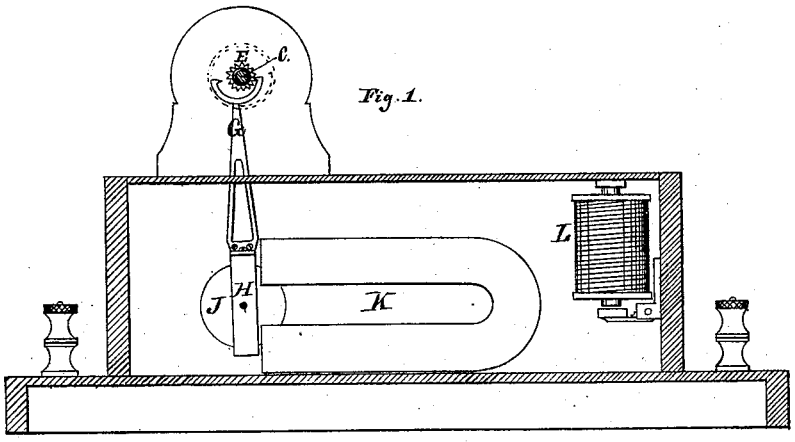

Fig. 1.

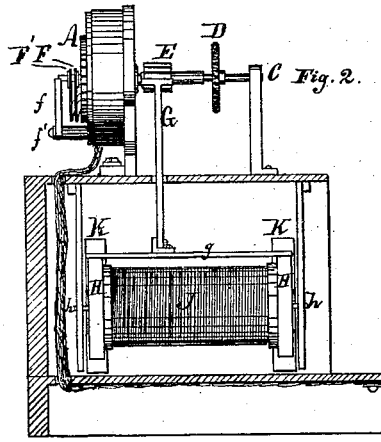

Fig. 2.

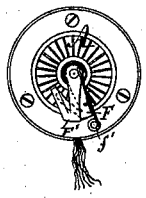

Fig. 3.

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2 Sheets—Sheet 2.

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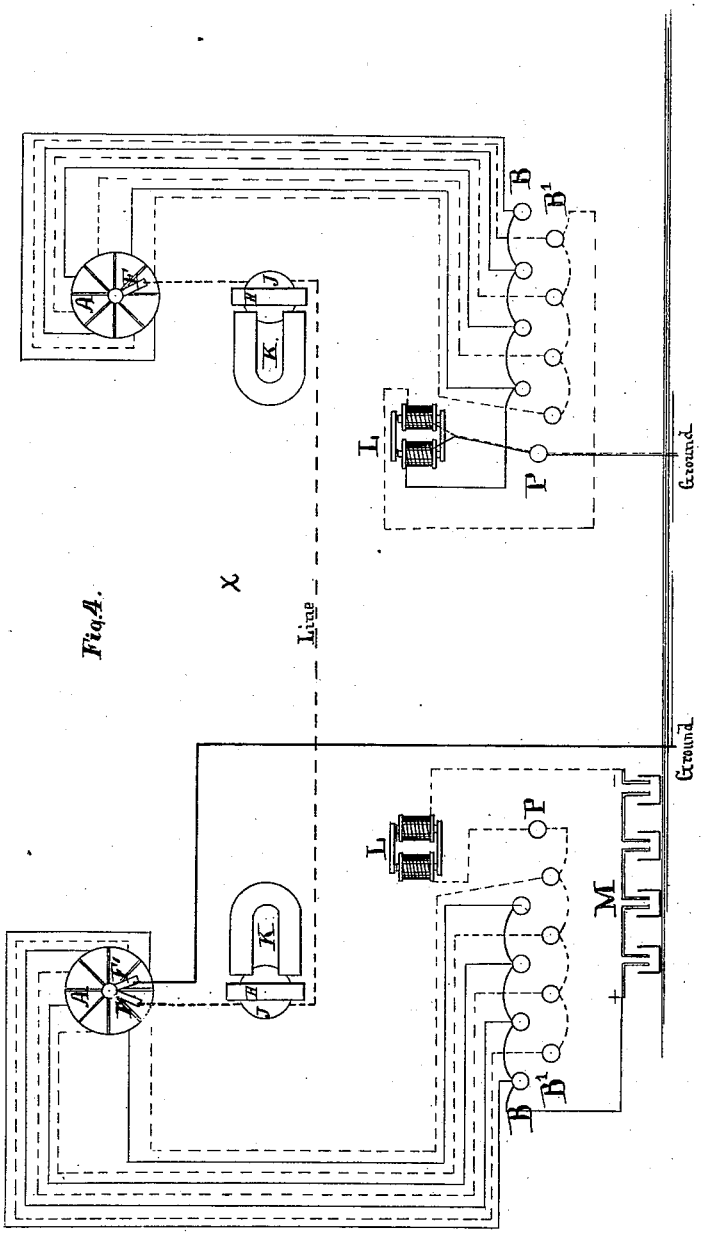

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UNITED STATES PATENT OFFICE.

ERNEST P. WARNER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **190,456**, dated May 8, 1877; application filed August 28, 1874.

To all whom it may concern:

Be it known that I, ERNEST P. WARNER, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Printing-Telegraphs, of which the following is a specification:

My improved printing-telegraph employs, as is usual, a type-wheel, upon the shaft of which is a verge-pinion actuated by a vibrating verge; also, a "sunflower" or circuit-piece and an alphabetical key-board; also, a relay-magnet for operating the printing mechanism for impressing the type upon the paper, all of which are such as are in common use and need no special description.

My improvement consists in the arrangement of the circuits from the key-board to the sunflower in such a manner that the segments of the sunflower are connected, alternately to opposite poles of the battery, through the key-board, which is arranged so that each alternate key is connected, first one to the positive and then one to the negative pole of the battery; and in providing the type-wheel shaft of the leading instrument with two spring-drags, insulated from each other, and resting upon adjacent segments of the sunflower, one of said drags being connected through the magnet which produces the vibration of the verge to line and the other to ground. This arrangement of circuits and the double drag makes of the sunflower a pole-changer, and dispenses with the necessity of an especial additional contrivance for that purpose. And the invention also consists in the novel combination of a vibrating electro-magnetic armature with a stationary permanent magnet or magnets, which I employ with reversing-currents for actuating the verge, whereby I am enabled to employ a large and powerful permanent magnet in connection with a light and powerful electro-magnetic armature, obviating the clumsiness, weight, and friction of a permanently-magnetic vibrating armature large enough to give a strong decided action.

In the accompanying drawing, which forms a part of this specification, Figure 1 is a sectional front elevation of my printer, showing the electro-magnetic vibrator, the verge, and pinion. Fig. 2 is a sectional end elevation of same. Fig. 3 is a face view of the segmental circuit-piece or sunflower; and Fig. 4 is a diagram of the circuits, showing the leading and following instruments, battery, &c.

Like letters of reference made use of in the several figures indicate like parts.

In the said drawings, A represents the sunflower, consisting of a disk of platinum, divided into insulated segments, corresponding in number to the keys B B′ of the alphabetical key-board, and connected each segment to a separate key by a wire. C is the type-wheel shaft, carrying the type-wheel D, the verge-pinion E, and the drag-springs F F′. The latter are insulated from each other, the spring F being in electrical communication with the metal frame-work of the machine, from thence through the verge-actuating contrivance to line, while the spring F′ is in communication with the circuit-preserving spring *f*, and thence to the stud *f′*, and so to ground. G is the verge, mounted upon the bar *g*, which connects the pole-pieces H H of an electro-magnet, J, which is swung upon pivots *h h*, so that it may oscillate and give vibration to the verge. K K are permanent magnets, placed near enough to influence the pole-pieces H. Now, it will be readily seen that if to and fro, or positive and negative, currents are sent through the helix of the pivoted electro-magnetic armature J, it will be caused to oscillate, impelled by the alternate attraction and repulsion of the permanent magnets K K. The same effect would be produced if only a single horseshoe-magnet should be placed so that one pole should stand at each side of one of the pole-pieces H. The oscillation of this armature furnishes, through the verge, the impulse which rotates the type-wheel shaft, and carries the drag-sprin s around the sunflower; and as one of said drags is connected to line and the other to ground, and as they rest upon adjacent segments of the sunflower, the current through said armature J is changed at each impulse.

The keys B B′ remain always closed when not in use. When a key is depressed it is opened, and when the foremost drag-spring F arrives at the segment connected to that key, the circuit is broken and the type-wheel stops in position to print the letter corre-

sponding to the key. At the same instant the printing-magnet L, being in the same circuit, allows its armature to fall, setting in motion the necessary printing mechanism, which may be a train of clock-work, a local printing-circuit, or any desired contrivance, such as are in common use, and which I have not thought it necessary to show or describe.

In the diagram, Fig. 4, M represents the battery, connected at its positive pole to all of the keys B, and at its negative pole first to the printing-magnet L, and thence to all of the keys B′ of the leading instrument. The keys B B′ are connected in their regular order to the segments of the sunflower, as shown, whereby one segment is connected to the positive and the next one to the negative pole of the battery. To facilitate tracing the connections, the wires from the positive pole of the battery are marked in full, and those from the negative in dotted lines. The follower or repeating instrument is connected in precisely the same manner, except that its keys B B′ are connected, one series to one and the other series to the other of the spools of the magnet L of that instrument, as shown, and a wire taken from between the spools is led to ground.

To follow the circuit we may commence at the + pole of the battery; from thence to the keys B; from thence to every alternate segment of the sunflower; but as there is no outlet except at the segment upon which a drag-spring rests, the current passes to the rearmost drag-spring, (which happens to be the one resting upon a segment connected to the + pole,) and thence to ground; through the ground to the ground-wire of the follower-instrument; thence through one spool of the printing-magnet of that instrument, and through the key-board to the segment of the follower-sunflower, upon which rests the single spring-drag F; from the drag to the electro-magnetic armature J, which carries the verge of the follower-instrument, and finally to line, and to the electro-magnetic armature of the leader-instrument; thence to the foremost drag-spring of the leader-instrument; thence to B′ keys of leader-instrument; from thence to stop-key P; thence to printing-magnet L; thence to negative pole of battery, and the circuit is complete, and one impulse is given to the verge. This impulse carries both drag-springs of the leader-instrument forward one segment, and the circuit would then be first through magnet J of leader-instrument to line and to the other instrument, being exactly reversed. As the leading instrument reverses the currents for the whole circuit, it is unnecessary to provide any of the other instruments with more than a single drag-spring.

The instrument is started by breaking the circuit at any of the stop-keys P, and closing it again immediately. Unison contrivances of the usual style are applied to all the machines in the line, to secure uniformity of action.

Having thus described the construction and operation of my invention, I claim—

1. The sunflower, having its segments alternately connected through the key-board to the + and − poles of battery, substantially as specified.

2. The key-board, with each alternate key connected to the positive and the others to the negative pole of battery, and all connected in regular succession to the segments of the sunflower, substantially as specified.

3. The sunflower, having its segments alternately connected through the key-board to the + and − poles of battery, in combination with the two spring-drags of the leader-instrument resting upon segments of opposite polarity, said drags being insulated from each other and connected, one to line through the verge-actuating magnet and the other to ground, substantially as specified.

4. The stationary permanent magnet or magnets, in combination with the pivoted electro-magnetic armature and a pole-changer operated by the vibration of the said pivoted electro-magnetic armature, substantially as specified.

5. The combination of the sunflower, having alternate positive and negative segments, the two spring-drags resting upon segments of opposite polarity and carried by the type-wheel shaft, the said type-wheel shaft, the verge-pinion and verge, the electro-magnetic armature, and permanent magnet, all connected and operating substantially as specified.

E. P. WARNER.

Witnesses:

JOHN W. MUNDAY,

EDW. S. EVARTS.