(No Model.)

J. E. SMITH.

RELAY FOR PRINTING TELEGRAPHS.

No. 306,187. Patented Oct. 7, 1884.

Fig. 1.

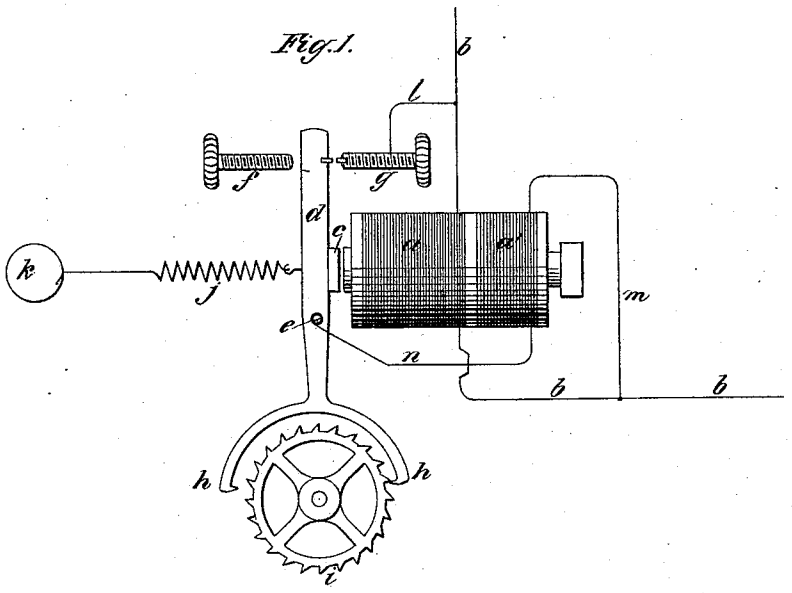


Fig. 2.

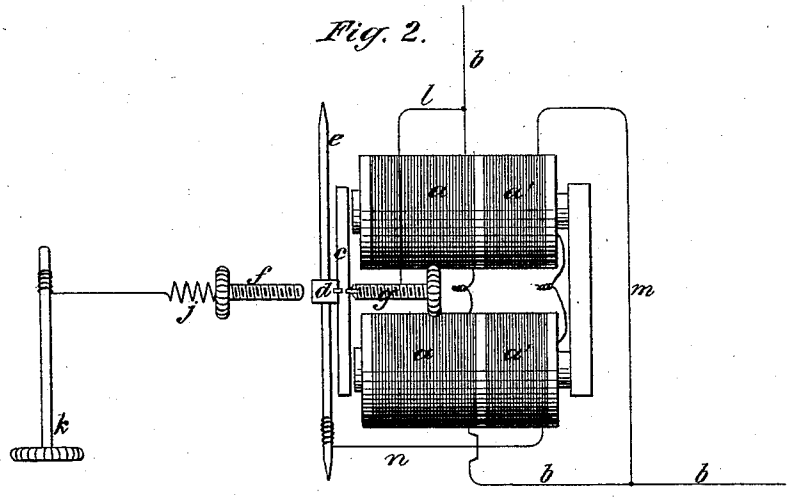
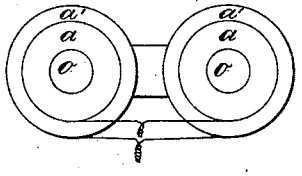


Fig. 3.



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UNITED STATES PATENT OFFICE.

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RELAY FOR PRINTING-TELEGRAPHS.

SPECIFICATION forming part of Letters Patent No. 306,187, dated October 7, 1884.

Application filed April 18, 1883. Renewed July 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. SMITH, of the city and county of New York, and State of New York, have invented a new and useful Improvement in Electro-Magnetic Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to certain improvements in electro-magnetic apparatus, the object of which is to render the action of electro-magnets more prompt and reliable, and to prevent, in a great measure, the brilliant and troublesome spark that occurs in the transmitting or circuit-breaking device when a prolonged current is interrupted. Every electro-magnet requires a perceptible time in gaining its full magnetic charge, and this time is considerably greater than that occupied in making the dot of the Morse alphabet, or in releasing or impelling the type-wheel of a printing-telegraph. All the power that any such magnet acquires after its armature has completed its motion toward the magnet is a detriment, because a greater retracting-power on the armature is required after a long than after a short closing of the circuit. So great is this difference in a Morse relay, for example, that during poor insulation of the line no given tension of the retracting-spring of the armature is suitable for all the telegraphic signals—either the dots will fail of transmission altogether or the dashes and dots immediately following them will be merged into a long meaningless character. In a printing-telegraph whose type-wheel is controlled by short electric pulsations, and whose press-magnet is actuated by a prolonged current, the type-wheel is liable to fall out of unison with the transmitter after each impression of a character, because the type-wheel magnet during such prolonged current acquires so much magnetic power that its armature is not as promptly released thereafter as after the shorter closings of the circuit employed for the rotation of the type-wheel. The spark in the transmitting-instrument caused by the magneto-current after a prolonged closing of the circuit is also much more troublesome than that following short pulsations. In order to overcome these difficulties, I make the helix or helices of the magnet in two parts, and connect one of these parts in circuit as usual, and the other part and the armature-lever in a branch or derived circuit, so that said lever, on completing its movement toward the magnet, will send a derived current through one portion of the helix or helices, so as to partly neutralize the effect of the current through the other portion of the helix or helices, and thereby prevent any increment in the power of the magnet after said lever has closed said derived circuit. This improvement is applicable to the Morse relay, Morse main-line sounder, both press and type-wheel magnets of printing-telegraphs, and all electro-magnets actuated by rapid pulsations or currents of variable duration. When applied to a relay, the local-circuit part of the armature-lever must of course be insulated from the portion connected with the main circuit.

Figure 1 in the drawings illustrating my invention is a side view of a magnet and its armature, the latter carrying the pallets for liberating the escape-wheel of any instrument in which said wheel is employed. Fig. 2 is a plan of the magnet, the armature thereof, and their connections. Fig. 3 is a transverse sectional view of a magnet, illustrating a modification of the invention.

The helices *a a*, Figs. 1 and 2, are the usual or working helices, and are to be situated in and form part of whatever circuit is to act on them, as circuit *b*. Helices *a' a'* are secondary or neutralizing helices, and are to be connected in a circuit derived from circuit *b*. The armature *c* is attached to a lever, *d*, which is supported by an arbor, *e*. One end of lever *d* plays between check-screws *f g*. The other end may be used for various purposes. I have represented it as carrying pallets *h h* for liberating an escape-wheel, *i*. This escape-wheel may belong to a train of wheels for rotating the type-wheel of a printing-telegraph, or to any other clock-work. Lever *d* is drawn back from the magnet by a retracting-spring, *j*, whose tension is regulated by the usual adjusting device, *k*. The line *b* on one side of helices *a a* connects with screw *g* by a wire,

l, and on the other side of said helices connects with one side of helices *a' a'* by a wire, *m*, the other side of helices *a' a'* being connected to lever *d* by a wire, *n*. Thus helices *a' a'*, lever *d*, screw *g*, and wires *l m n* form a derived or shunt circuit to helices *a a*, and these two sets of helices are so wound or connected that they tend to induce opposite polarity in the core of the magnet. It will now be clear that when circuit *b* is first closed all the current over it will pass through helices *a a* and cause the magnet to draw lever *d* against screw *g;* but the instant this movement of lever *d* is completed the current will divide, and a portion of it will pass through helices *a' a'* and prevent any increment in the power of the magnet or actually reduce it, according to the comparative length and size of the wires in the two sets of helices. This will not only allow spring *j* to easily and promptly retract lever *d* after a prolonged closing of circuit *b*, but will greatly reduce the spark in the circuit-breaker of the transmitting-instrument. It will also be seen that in all cases in which the derived circuit is closed before the principal or working circuit is broken less retracting-power on the armature will be required.

If this invention be applied to the press-magnet of a printing-telegraph, it will secure the prompt withdrawal of the platen from the type-wheel when the current effecting the printing is broken, and if applied to the type-wheel magnet it will act to re-enforce the current for energizing the press-magnet, (if in the same circuit,) because the resistance of the two sets of parallel helices is less than that of the working-helices alone.

Instead of having each helix extend from the core to the outside, as shown in Figs. 1 and 2, each helix may be wound the whole length of the core, one being placed on the top of the other, precisely as in small induction-coils. In practice I would first put on the working-helices *a a* next to the core, filling the spools two-thirds or three-quarters full, and then fill the spools with the neutralizing-helices *a' a'*. Fig. 3 shows a cross-section of such a magnet, in which *o o* are the cores, *a a* the working-helices, and *a' a'* the neutralizing-helices.

It is evident that a permanent magnet or an electro-magnet may be substituted for the retracting-spring *s*.

I claim nothing new in these methods of retracting an armature or of winding a magnet; nor do I claim the shunt-circuit when it forms no part of the helices of the magnet.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of an electro-magnet having a working-helix and a neutralizing-helix tending to produce opposite polarity in the core of the magnet, an armature to said magnet, and a circuit-closer operated by said magnet for shunting a portion of the current from the working-helix to the neutralizing-helix, substantially as herein described.

2. The combination of the electro-magnet having the working-helices *a a* and the secondary helices *a' a'*, the armature *c*, the screw or contact-point *g*, connected with the main circuit *b*, in which said working-helices are placed, and the connection *n* between the armature and the secondary helices, and the connection *m* between the latter helices and the main circuit *b*, substantially as herein described.

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