

(No Model.)

W. L. VOELKER.
Relay.

No. 236,122.

Patented Dec. 28, 1880.

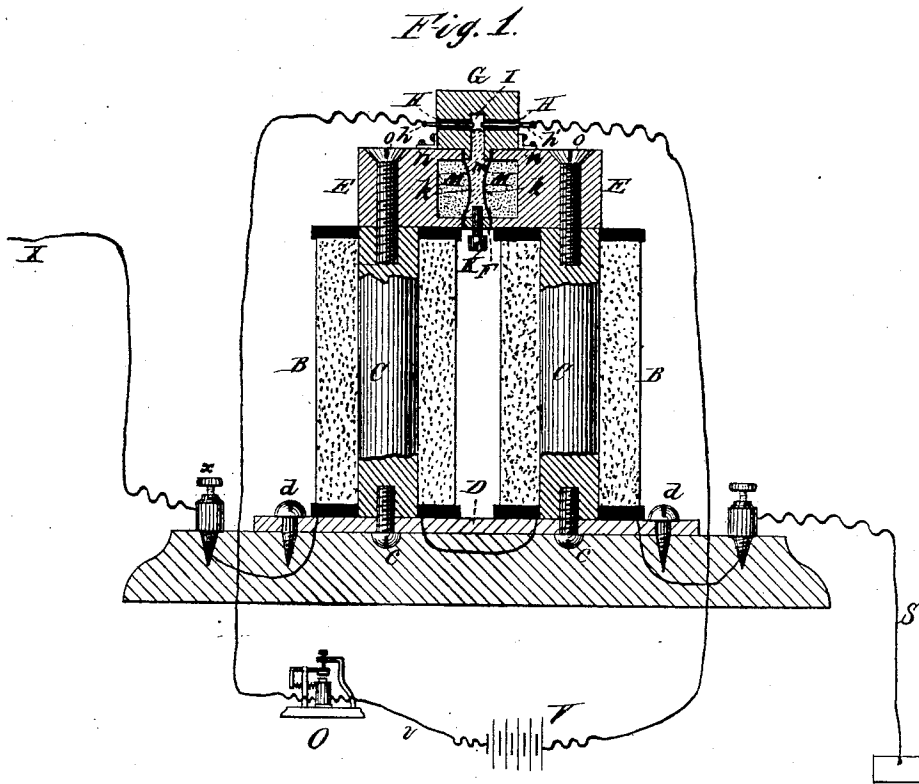


Fig. 2.

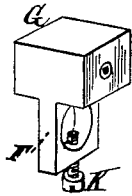
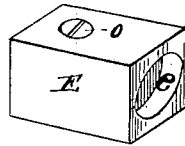


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM L. VOELKER, OF MORTON, PENNSYLVANIA.

RELAY.

SPECIFICATION forming part of Letters Patent No. 236,122, dated December 28, 1880.

Application filed August 5, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. VOELKER, of Morton, county of Delaware, and State of Pennsylvania, have invented certain new and useful Improvements in Relays, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention has relation to that class of devices used in telegraphy commonly known as "relays," employed for the purpose of receiving an incoming current of electricity from the line-wire, said current passing through one or more hollow bobbins the cores of which are electro-magnets, and thereby putting in operation a local battery for the purpose of renewing the current of electricity, in order to transmit messages to a distant station, and for various other uses and purposes well known to electricians.

My improved relay involves the use of finely-powdered iron or other substance capable of magnetic induction, which, when affected by a passing current of electricity, will form itself into points, spikes, or tufts, and the instant the current ceases will resume its normal condition. This I use, in connection with mercury or other liquid conductor, for closing the local circuit and making and breaking the connections of the local battery, and I also make use of any substance for said purpose the resistance of which varies in accordance with the pressure to which it is subjected; and my invention also involves certain novel and useful combinations or arrangements of parts and peculiarities of construction, all of which will be hereinafter first fully described, and then pointed out in the claims.

In the drawings, Figure 1 is a vertical axial section of my improved relay, showing the construction and arrangement of the various parts. Fig. 2 is a perspective view of the central block fitting between the magnet-heads, perforated for the reception of the connections with the local battery and line, and having also a cavity in its base for holding the mercury. Fig. 3 is a perspective view of one of the iron blocks composing the magnet heads or poles, showing the hollow or depression in

one side thereof prepared for the reception of the powdered iron.

Like letters of reference, wherever they occur, indicate corresponding parts in all the figures.

A is a base, of wood, hard rubber, or any other preferred non-conducting material, made of convenient size and shape to support the various parts and connections of the relay when assembled for use.

B B are two hollow bobbins, made of insulated copper wire in the usual manner.

C C are the two soft-iron cores or electro-magnets, fitting into the hollow bobbins, and held firmly in position by means of screws *c c*, passing through the iron bar D, said bar being secured to the base A by means of screws *d d*.

E E are the two magnet-heads, constructed of iron or other suitable metal capable of inductive action, said heads being secured to the poles of the magnet by means of screws *o o*, or equivalent means. One side of each magnet-head is hollowed out, as shown in Fig. 3, for the reception of finely-powdered iron, or any similar substance capable of magnetic induction.

Fig. 2 shows a central block, G, made of brass. Extending from the base of this block is a projection, F, made of such a size as to exactly fit into a space between the magnet-heads E, left for that purpose. A perforation is cut through this projection on block G for the reception of mercury or other conducting-liquid, as will be hereinafter explained. Upon each side of block G, at H, I place insulators, constructed of hard rubber, ivory, or any other suitable non-conducting material. These insulators extend nearly half-way through block G, from side to side, and have a hole therein for the reception of the platinum connections *h h'*, said connections extending entirely through the insulators and projecting slightly into the cavity I in the center of block G. This cavity I extends downwardly in block G and communicates with the large perforation in F.

K is a screw-plug fitting into a screw-threaded hole in the bottom of F, said plug being provided with a slot for the insertion of a screw-driver, or with a thumb-piece for the

purpose of elevating or depressing the same, thereby raising or lowering the confined mercury or other liquid when the same is placed within the perforation in F.

5 When in position block G may be secured to the magnet-heads E by means of the two angular pieces of metal *n*, screwed thereto, as shown in Fig. 1.

10 Instead of constructing block G of brass and placing the insulators therein, it may be made of hard rubber, ivory, or any other non-conducting material, as preferred.

15 In order to assemble the various parts of the completed relay for use, the perforation in F is filled with mercury, the same being confined therein by means of thin films of gold-beater's skin *k k*, or other suitable material, placed over the ends of said perforation and firmly held between the edges of F and the
20 corresponding edges of the magnet heads or poles E E. The spaces on each side of the mercury (shown at *e e*) are filled with finely-powdered iron, M, the iron and mercury being separated and kept apart by the gold-beater's
25 skin *k k*. The height of the mercury in cavity I is regulated by means of the screw-plug K, as previously explained.

30 If preferred, a thin film of collodion or very thin soft rubber, or any other suitable material, may be employed instead of the gold-beater's skin.

35 X is the incoming line-wire, connected by binding-screw *x* with the bobbins B B, from whence the connection is made with the ground at S.

V is the local battery, connected with platinum connection *w*, and *v* is the connection with outgoing line.

40 O is a sounder, which may be placed in the circuit in the usual manner.

The operation of my improved relay is as follows: Upon the reception of electric impulse from the line-wire by the bobbins B B, the electro-magnets C C become magnetized, the
45 powdered iron in cavities *e e* becomes magnetized by induction, and is forced against the gold-beater's skin upon each side of the mercury by its endeavor to establish a magnetic circuit. This forces the mercury up into cavity I against the points of the platinum
50 connections *h h'*, closing the circuit and putting

into operation the local battery. Upon the cessation of the incoming current from the line the powdered iron will become demagnetized, the pressure is removed from the gold-beater's skin confining the mercury, and the
55 mercury drops away from the platinum connections, breaking the circuit of the local battery. This operation will be repeated with each impulse of electricity from the line. 60

Thus it will be seen that my improved relay admirably answers the various uses and purposes for which it is intended.

65 Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a relay of the character herein shown, the powdered iron, or an equivalent substance, confined as explained, and adapted to close the circuit and put in operation a local battery upon the reception of magnetic induction,
70 substantially as shown and described.

2. In a relay of the character herein described, the combination, with the mercury, of the powdered iron adapted to complete the
75 circuit of a local battery, substantially as shown and described.

3. In a relay of the character herein shown, the combination, with the mercury, confined in a closed cavity, the side walls of which are
80 composed of flexible material, of finely-powdered iron adapted to press against said confined mercury upon the reception of magnetic induction, and to close the connections of a local battery, substantially as and for the purposes shown and described. 85

4. In a relay of the character herein described, the hollow bobbins B B, cores C C, magnet-heads E E, cavities *e e*, powdered iron M, gold-beater's skin *k k*, block G, cavity I,
90 mercury *m*, insulators H H, connections *h h'*, and regulating-plug K, the whole combined and arranged to operate substantially as shown and described.

In testimony that I claim the foregoing I
95 have hereunto set my hand in the presence of two witnesses.

WILLIAM L. VOELKER.

Witnesses:

ARTHUR M. PIERCE,
WORTH OSGOOD.