2 Sheets--Sheet 1.

G. LITTLE.

Improvement in Telegraph Apparatus.

No. 128,894. Patented July 9, 1872.

Fig. 2.

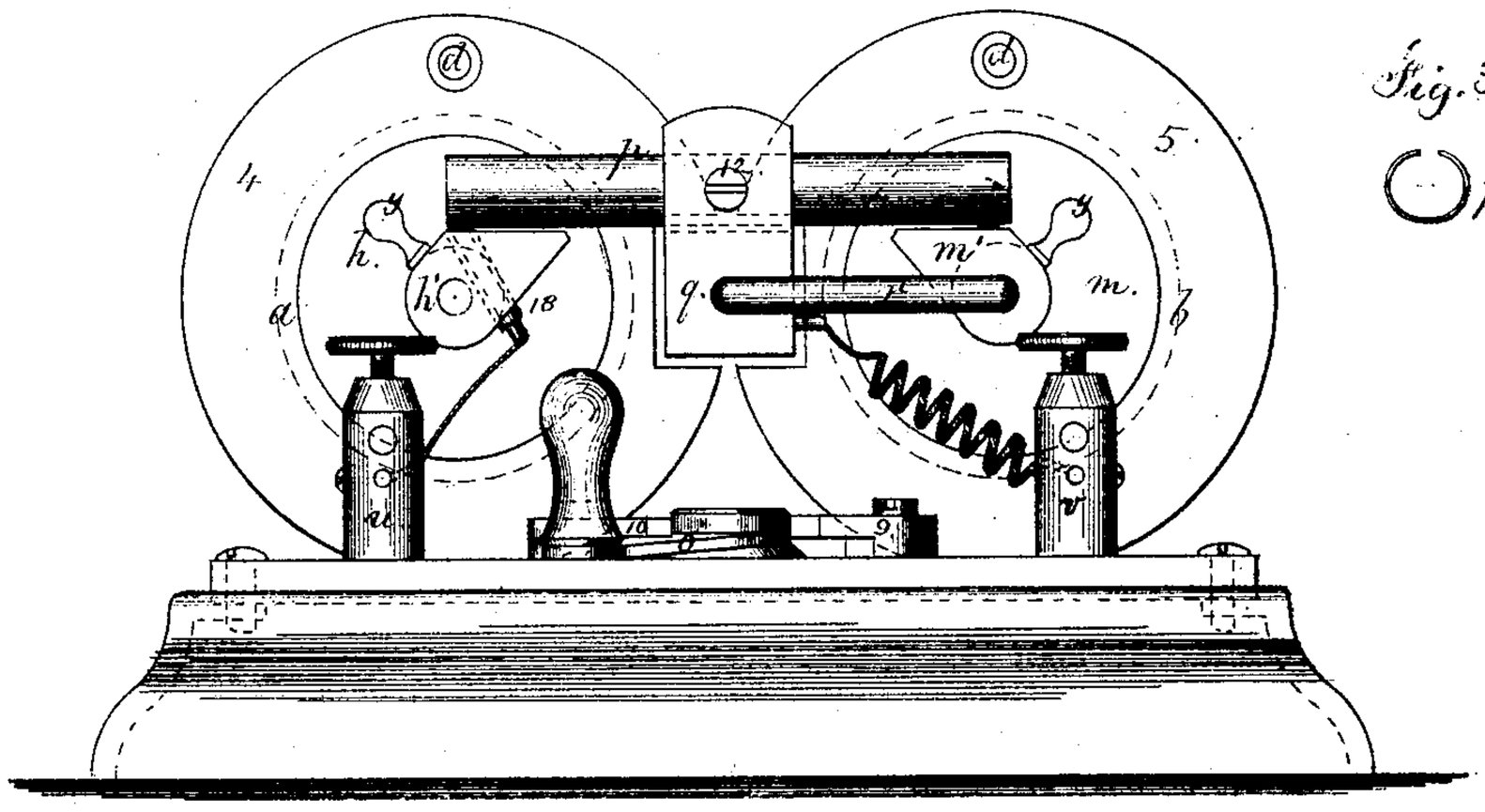
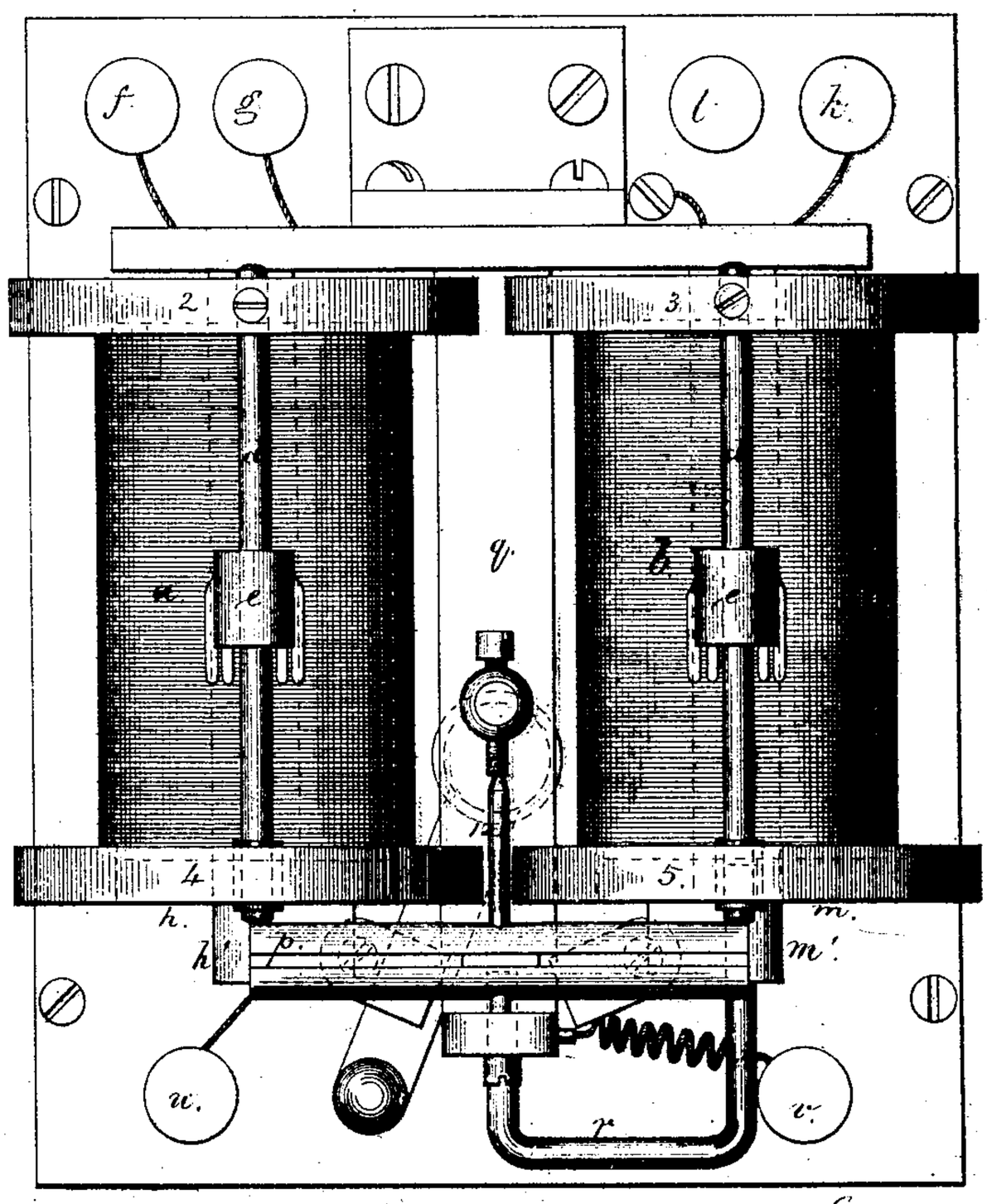


Fig. 3.

Fig. 1.



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2 Sheets--Sheet 2.

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Fig. 4.

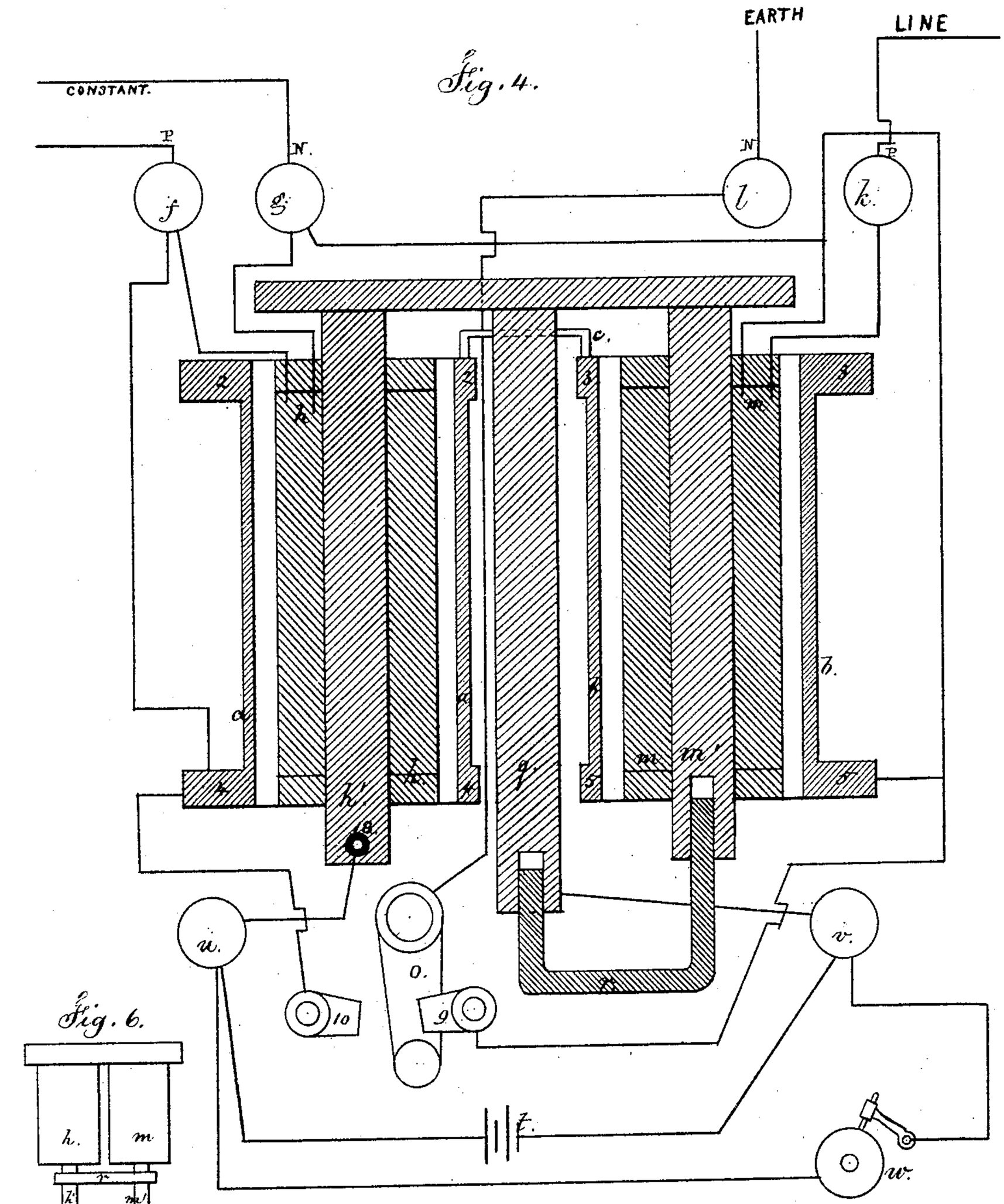
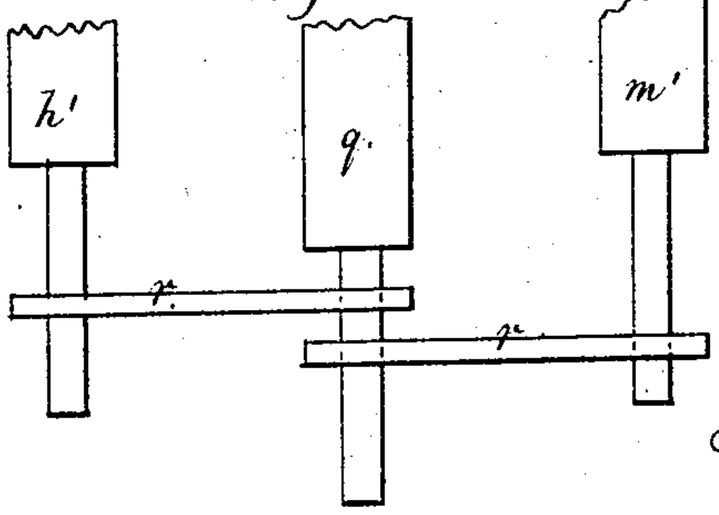


Fig. 6.

Fig. 5.



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GEORGE LITTLE, OF RUTHERFORD PARK, NEW JERSEY.

INPROVEMENT IN TELEGRAPH APPARATUS.

Specification forming part of Letters Patent No. 128,894, dated July 9, 1872.

To all whom it may concern.

Be it known that I, GEORGE LITTLE, of Rutherford Park, in the county of Bergen and State of New Jersey, have invented an Improvement in Telegraphic Apparatus; and the following is declared to be a correct description of the same.

This instrument is adapted to use in receiving messages, and also in effecting pulsations and movements in transmitting by a relay or local or shunt circuit, and in producing sound for a call or sound-receiving instrument. I make use of a rheostat or resistance-coil that is constructed in two parts so as to be more compact than the coils heretofore employed to regulate the force of electrical currents and divide or shunt portions thereof. I also make use of two electro-magnets and a swinging armature, the axis of which latter is upon a bar that forms a central pole of the magnet. The armature is vibrated by the greater or less attraction of the respective poles, and the residual magnetism in the pole or poles is neutralized to whatever extent may be desired by a variable metallic connection, and the armature is made of thin sheet-iron, preferably tinned. By making the armature of sheet-iron it is lighter and more easily vibrated, a larger extent of surface is exposed to the magnetic action, and the edges of the longitudinal division in the same act to increase the vibration and sound resulting from the quick vibration, thereby better adapting the instrument to a sounder for general purposes. The aforesaid variable metallic connection between the poles is adapted to preventing the armature remaining in contact with the pole too long, because the said metallic connection from one pole to the other neutralizes the residual or induced magnetism and causes the poles to free themselves much more quickly than in cases where the armature only aids in this operation. This residual or induced magnetism may result from the pulsations of electricity in the helix, or from terrestrial or other causes, and the same is neutralized by my improvement.

In the drawing, Figure 1 is a plan of the instrument complete. Fig. 2 is an elevation of the same. Fig. 3 is an end view of the armature. Fig. 4 is a diagram representing the connection of the electric circuit. Fig. 5 is a plan of the ends of the magnet with a modification of the variable metallic connections; and Fig. 6 is a plan in small size of the variable metallic connections between the poles of the electro and permanent magnets.

The rheostats *a* and *b* are connected together by a bar or metallic connection at *c*, Fig. 4, passing from one head, 2, to the other head, 3, and the rods *d* are insulated from heads 4 and 5, but in metallic contact with the heads 2 and 3, and the adjusters *e e* are made to slide on these rods *d*, as usual. The binding-screws *f* and *g* are connected to the heads 4 and 5, and also to the helix *h* of the electro-magnet hereafter referred to, so that by positioning the adjusters *e e* more or less of the current from *f* will be obliged to pass through the helix *h* and the remainder pass from *f* to 4; thence, by the rheostat-coil *a*, adjuster *e*, rod *d*, head 2, bar *c*, head 3, bar *d*, adjuster *e*, coil *a*, and head 5, back to *g*. The main line and earth-wires connect to the screws *k l*, and to the helix *m*, and to the switch-plates 9 and 10 of the switch *o*, so that, according to the position of the switch *o*, the current will come from *k* through helix *m;* thence to 9 *o* and to earth-connection *l;* or if the switch is changed the current will pass from *k* through *m;* thence to *g* through helix *h*, (in the opposite direction to the current from *f;*) thence, by *f*, 4, 10, and *o*, to *l*. When the main-line current acts in the helix *h* in the opposite direction to that of the constant current from *f* the latter will be lessened or neutralized, and if it does not act in *h* the force of the main-line current must be enough to overcome the force of the electro-magnet *h* in a manner similar to that described in my patent heretofore granted, and numbered 123,490, the features of novelty thus far pointed out relating to dividing the rheostat so as to occupy little space, and to the connections arranged as aforesaid. For convenience and compactness the electro-magnetic coils are placed within the rheostat-coils, as set forth in my application dated March 22, 1872. My invention in this particular, however, is not limited to this arrangement, as the electro-magnetic coils may be separate from the said rheostat-coils. The next feature of my said invention consists in the hollow sheet-metal armature *p* that is hung, by an axis, 12, upon the central magnetic pole *q* that is polarized by induced magnetism from the cores

h' and *m'* of the respective electro-magnets. The hollow sheet-metal armature may be very light and thin, so as to vibrate at its edges and produce sound each time it moves, and the said armature may be round or flattened to give more or less surface for the magnets *h' m'* to act upon. The change of polarity of *h*, or the superior force of the current in *m*, vibrates this armature *p* each pulsation on the main line. The helices *h m* are wound so that the cores *h' m'* will be polarized south; hence the central pole *q* will be north, or the reverse. If the current is powerful the armature *p* may adhere to either *h'* or *m'* by induced or residual magnetism. I prevent this by a metallic connection from the center-pole *q* to either or both poles *h' m'*, and this connection is, preferably, adjustable or variable, so as to regulate the force with which it operates to free the parts from residual or induced magnetism. I have shown the wire staple *r* passing into holes in *q* and *m'*, and this may be drawn further out or thrust further in to vary the magnetic action; or the connection may be made by a sliding or circular wedge-shaped piece between one and the other that comes in contact with more or less of the surface of the respective poles, and hence is more or less effective in neutralizing the magnetic action. The poles of the magnet might have projecting wires, upon which a metal cross-piece, *r*, is made to slide, as shown in the detached figure, 5, so as to regulate the rapidity of action in the discharge of induced or residual magnetism by the position of the cross-piece. The swinging movement of the armature may produce only a sound, the message being received by the ear; or the movement might make or break a local or relay circuit; or it may bring into action a constant circuit, as in a patent heretofore allowed to me. The feature of novelty in this respect in the present case, however, is in rendering operative a constant circuit. The battery *t*, Fig. 4, is connected with the binders *u* and *v*, that in turn are connected with pole *q* and an insulated pin, 18, in the pole *h'*. The binders *u* and *v* are also connected with the telegraphic receiving-instrument *w*, that is of any desired character. When the circuit is closed through the armature *p*, resting upon the pin 18 in the normal position, there will not be any record made at the receiving-instrument *w*, the current passing through the armature *p*, because it affords less resistance; but when the connection of the armature *p* with 18 is severed by the pulsation in the magnet *m* the battery *t* operates in the receiving-instrument *w*. In some instances the pole *h'* might be a permanent magnet instead of an electro-magnet. In the small figure, 6, I have illustrated the same features of adjustment as applied by bars set to move upon the cores of the magnets themselves, so as to vary the action and free the magnet with greater or less rapidity of the induced or residual magnetism, and these connecting-bars *r* are represented as applied to both an electro-magnet and a permanent magnet. The poles *h' m'* may be made so as to be partially revolved within the respective helices by means of handles or projections *y y*, so as to bring the surfaces of the poles at a greater or less inclination to the armature, and thereby regulate the magnetic action upon such armatures.

I claim as my invention—

1. A rheostat made in two parts united at one end, and provided with two adjusters, substantially as and for the purposes set forth.

2. An armature made of thin sheet metal, and vibrated, substantially as set forth, to form a receiving-sound instrument.

3. A metallic connection between one pole and the other at the operative end of an electro-magnet to more rapidly disperse or neutralize the residual or induced magnetism, substantially as set forth.

4. A metallic connection between the two operative poles of a magnet, made adjustable, substantially as set forth, for regulating the action of such connection in neutralizing the residual or induced magnetism.

5. The connections, arranged, substantially as specified, for the main line, and constant circuits between the rheostats, the electro-magnets, and the switch, in combination with the vibrating armature, substantially as specified.

6. The battery *t* and the receiving-instrument *w* connected to the same, binding-screws *u v*, in combination with the vibrating armature *p* and connections to said binding-screws, substantially as and for the purposes set forth.

Signed by me this 4th day of April, A. D. 1872.

GEO. LITTLE.

Witnesses:

GEO. D. WALKER,

GEO. PINCKNEY.