

G. LITTLE.

Improvement in Combined Telegraph Relays and Sounders.

No. 130,812.

Patented Aug. 27, 1872.

Fig. 2.

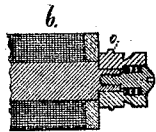
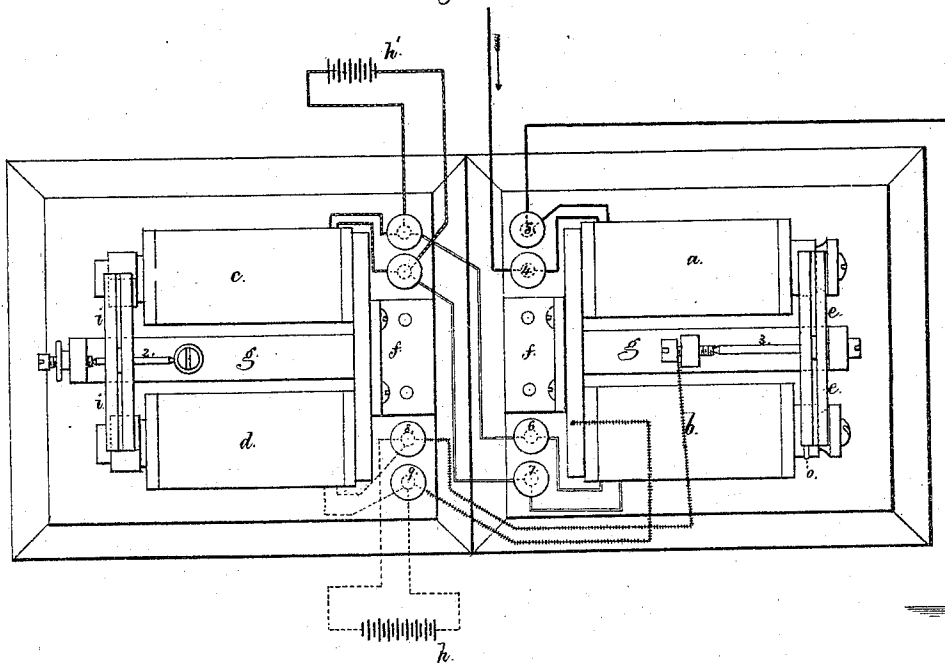


Fig. 5.



Fig. 1.



Witnesses,

Chas. A. Smith
Geo. D. Hawley

Inventor

George Little
Lemuel W. Ferrell atty.

G. LITTLE.

Improvement in Combined Telegraph Relays and Sounders.

No. 130,812.

Patented Aug. 27, 1872.

Fig. 3.

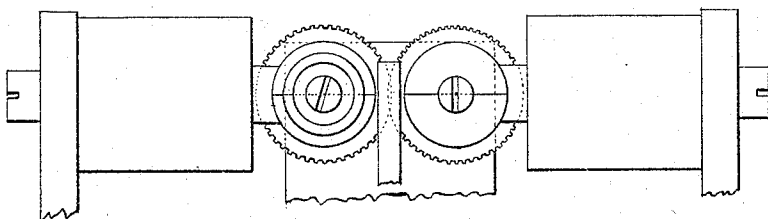
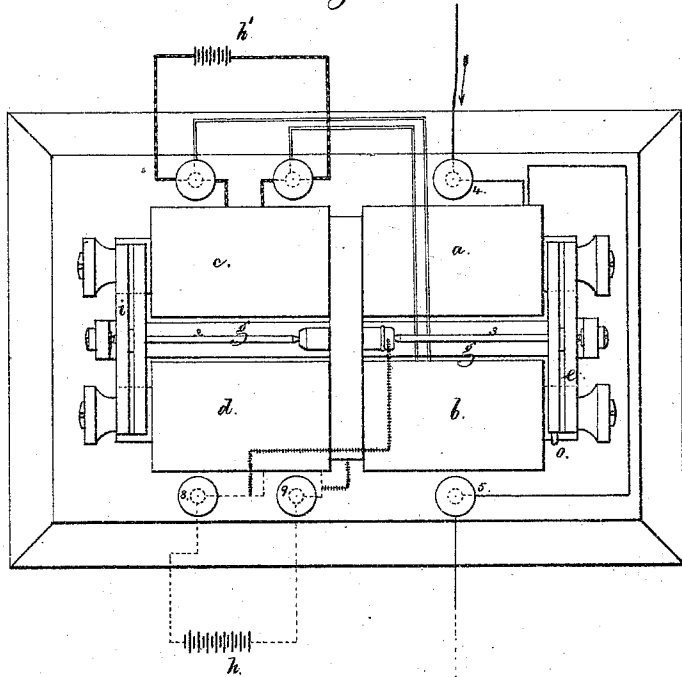


Fig. 4.



Witnesses,

Chas. A. Smith
Geo. D. Parker

Inventor

George Little,
Lemuel W. Stowell atty.

UNITED STATES PATENT OFFICE.

GEORGE LITTLE, OF RUTHERFORD PARK, NEW JERSEY.

IMPROVEMENT IN COMBINED TELEGRAPH RELAYS AND SOUNDERS.

Specification forming part of Letters Patent No. 130,812, dated August 27, 1872.

Specification of Electro-Magnetic Apparatus, invented by GEORGE LITTLE, of Rutherford Park, in the county of Bergen and State of New Jersey.

This invention relates to an arrangement of circuits and electro-magnets, whereby a vibrating armature is employed to operate a shunt-sounder, to give a clear distinct sound in cases where only a very feeble line-current exists that is not sufficient to give a distinct sound.

Two pairs of electro-magnets are employed and two vibrating armatures, and the connections from the battery are such that a very feeble constant current acts in one helix, and the main-line current acts in the other helix of the one pair of magnets. When the main-line current is broken, the constant attracts the armature and closes a shunt-circuit through its own core, and cuts out the other magnet from the constant circuit. When a pulsation is given in the main-line helix the movement of the armature opens the shunt aforesaid, and causes the constant circuit to act in the magnet of the second sounder with a suddenness and force sufficient to produce the necessary sound. An adjustment is provided for the core of the magnet to regulate the attractive power of the same upon the armature.

In the drawing, Figure 1 is a plan of the apparatus and the connections of the main-line and constant circuits. Fig. 2 is a sectional view of the magnetic adjusters. Fig. 3 shows the same in a slightly different form, and Fig. 4 is a diagram illustrating the connections in a more compact form.

The magnets *a b c d* are supported upon a suitable frame or frames, *f*, and where but one frame is employed the cores may be composed of two round rods passing through and projecting at each side of such frame to receive the respective helices *a b c d*, as in Fig. 4. The vibrating armatures *e i* are preferably made of thin sheet-iron, as set forth in my patent No. 123,490. These armatures vibrate upon the respective axes 3 and 2, and the fulcrums of these, especially of the armature *e*, should be insulated from the supporting-bar *g*, and the pivots and bearings of non-corrosive material. The main-line connections to 4 and 5 pass only through the helices *a*. The battery *h* is connected, as shown, and either one or

more cups of that battery or a separate battery, *h'*, is employed to maintain the necessary constant attractive force in *b* through the connections 6 and 7. The positive and negative poles of the constant may be connected as required by the magnetic helices for producing the best effect. When the main-line current is broken, the armature *e* by the constant attraction in *b*, closes a shunt-circuit from the constant-battery *h*, through the binder 8 and wire to 3, *e*, and the core of *b*, back to 9, the negative wire of the battery. At this time there will be a sufficient force exerted in *c* by a feeble action of the shunt-current from *h'* to attract that end of the armature *i*. As soon as the current in the main line operates in *a*, the armature *e* is attracted, thereby lifting the shunt from metallic contact between *e* and the core of *b*, in which case the current goes from *h* through 8 *d* 9 and back to *h*, energising the core of *d* sufficiently to act upon the armature and produce a sound which is simultaneous with the pulsation in the main line. If the connections are made as illustrated in the diagram, Fig. 4, the breaking of the circuit through *e* will compel the constant current to pass through *d*, as before, and *b* and *c* will also be slightly energised. The magnetic adjusters at the ends of the respective cores must be positioned to give the preponderating force from the magnet *d*, to move the armature and give the sound when the circuit through *e* is broken. Between the armature *e* and the core of *b* the shunt-circuit will generally be closed; there should therefore be a plate of platina on the under side of *e*, and a ring, *o*, of platina around said core, in order to insure a perfect shunt-circuit. The core of the magnet *a* is to be insulated from the armature *e* by a plate of rubber upon the under side of *e*, or in any other convenient manner. The core of *c*, by preference, has a band of soft rubber or other suitable material around it to prevent sound upon the reverse movement of the sounder-armature *i*. I have found this instrument to work to best advantage when the main-line helix of *c* is composed of No. 32 copper wire, and the constant helix *d* No. 30 copper wire, and the helices of *a b* No. 23 copper wire. The magnetic core-adjuster is made, as more clearly shown in Figs. 2 and 5, partially of soft iron and partially of brass or other non-

magnetic material. The core end, made of these two materials, is of a circular form, and capable of rotation or partial rotation. By revolving the iron portion of the core end to a greater or less distance from the armature, the attractive force will be greater or less, and in this way the action of an electro-magnet on an armature can be varied without changing the force of the electric current, or the adjustment of retractile springs or weights, or withdrawing the cores, as usual. The movement of the armature may be limited by a stop or pin, in which case it will not be necessary to employ the brass portion of the core-adjuster, because this brass portion only forms a stop to conveniently arrest or limit the movement of the armature. The two revolving core ends may be geared together so as to be moved in harmony to lessen the action of one as the action of the other is increased, and in cases where the "sounder"-armature vibrates

between two of these core-adjusters there may be a rubber ring in a crease around the periphery of one of the adjusters. The adjustment of the core end may be applied with a permanent as well as an electro-magnet.

I claim as my invention—

1. The magnets *a b c d*, and swinging armatures *e i*, and connections to the main line and local constant battery, substantially as set forth, whereby the sounder is operated by the main-line pulsation breaking the shunt-circuit, as set forth.

2. A magnetic core-adjuster, mounted so as to be rotated and made partially of soft iron, substantially as set forth.

Signed by me this 10th day of July, A. D. 1872.

GEORGE LITTLE.

Witnesses:

GEO. T. PINCKNEY,
CHAS. H. SMITH.