

(No Model.)

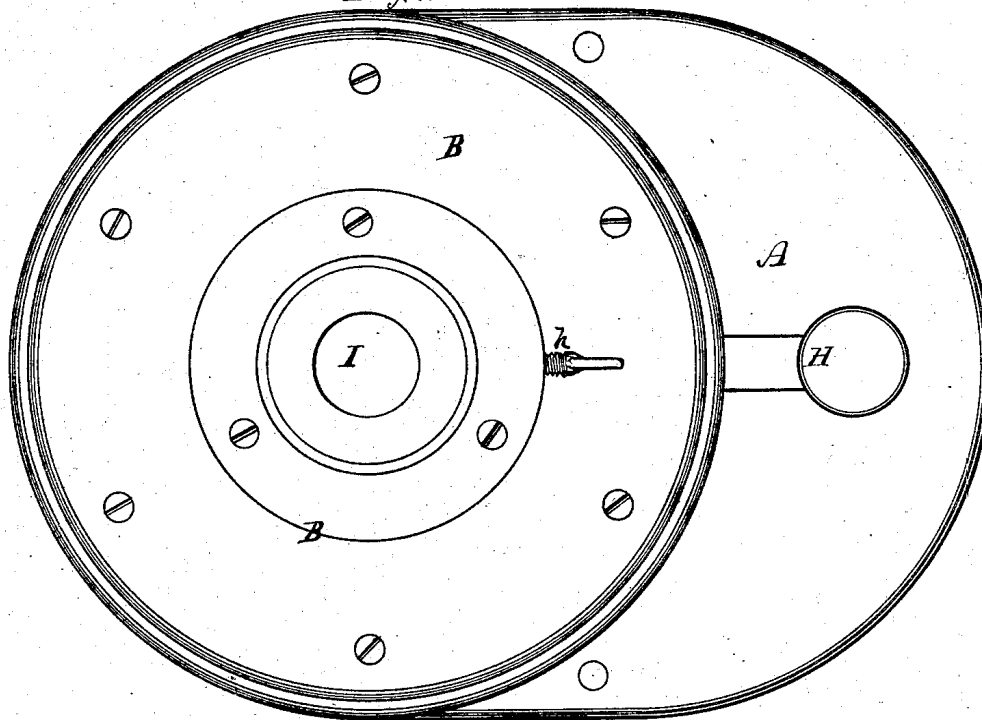
J. S. BROWN.

Magneto-Electric Signaling Apparatus.

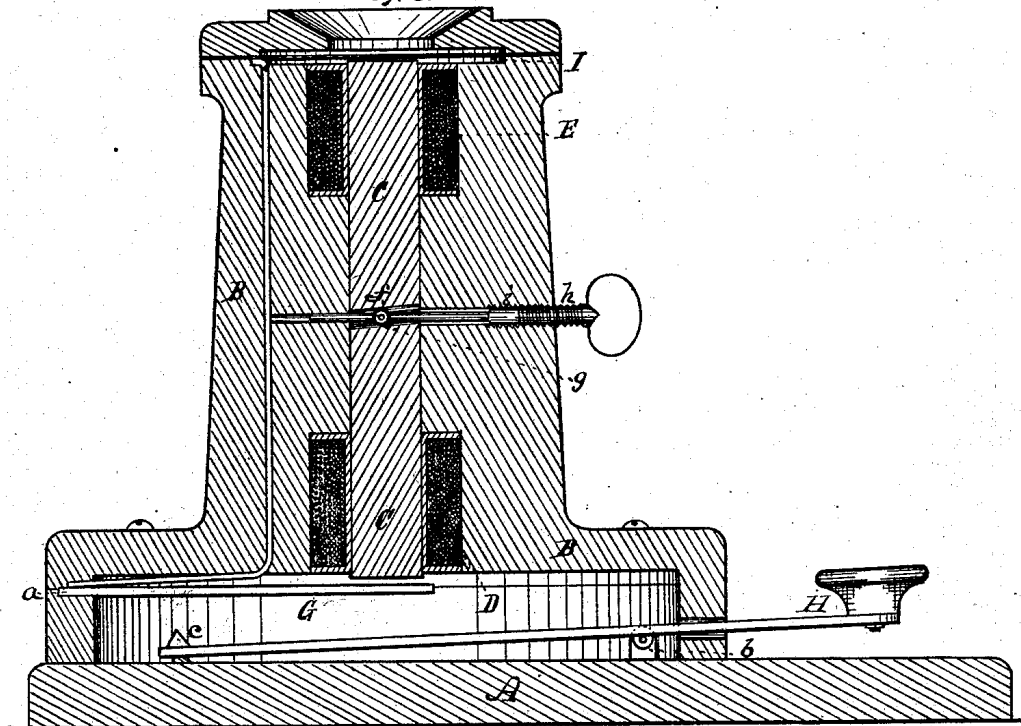
No. 238,212.

Patented March 1, 1881.

*Fig. 1.*



*Fig. 2.*



WITNESSES,

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# UNITED STATES PATENT OFFICE.

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## MAGNETO-ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 238,212, dated March 1, 1881.

Application filed June 17, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. BROWN, of Washington, in the county of Washington and District of Columbia, have invented a new and Improved Magnetic Telegraph; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

In the drawings, Figure 1 is a top view of my improved telegraph-instrument, and Fig. 2 a central vertical section thereof in a plane cutting from front to back.

Like letters designate corresponding parts in both figures.

The purpose of my improvement is to dispense with galvanic batteries in telegraphing, and thereby to save a large expense in operating, and also to simplify and lessen the cost of telegraph-instruments. Another purpose effected is a greater distinctiveness in the signals produced, thereby conducing to facility and certainty in reading messages.

My invention consists in the method and means by which a permanent magnet is employed as the sole generator of the electric current whereby the signals are transmitted, substantially as hereinafter specified.

With this invention sound-symbols are employed to indicate the language conveyed, using the Morse time-alphabet or any other on the same principle. Since the magnetic telephone transmitting articulate speech is dependent on the vibrations produced by the voice acting on the diaphragm-armature of a magnet, the force of which is comparatively small, the distance to which intelligence can be conveyed thereby is not great. Besides, the publicity necessarily given in transmitting messages by this means is incompatible with the confidential nature of telegraphic as well as other correspondence; but by means of my invention the force capable of being given to the armature-vibrations is almost unlimited, and the distance to which the sounds thereby produced can be conveyed by the simple magneto-electro current is correspondently great.

For the transmitter I combine with a permanent magnet and the current-generating coil surrounding the same a vibratory reed-armature and a hammer-key to communicate the

sound-vibrations thereto. By the term "reed-armature" I mean any suitable armature fixed at one end, having the remainder thereof free to vibrate, thus producing by its vibrations a pitch or tone of its own, as distinguished from a diaphragm-armature, which, being confined at its opposite edges, has no essential tone of its own, but responds to any tone, sound, or noise that the electric waves acting on the magnet may produce; and by a "hammer-key" I mean a mechanical striker acting against the reed-armature and actuated by hand.

For the receiver I employ a diaphragm-armature with a magnet and coil, to respond instantly to the making and ceasing of the current waves or vibrations. It may be a separate instrument—a simple receiving-telephone; but I prefer to combine it in one instrument with the transmitter, employing one permanent magnet with the reed-armature and hammer-key at one end or pole and the diaphragm-armature at the other end or pole thereof; and I use either one coil or two branch circuit-coils around the two poles of the magnet.

I will now describe specifically the combined transmitting and receiving telegraph-instrument represented in the accompanying drawings.

Upon a base, A, and within a suitable case, B, a permanent magnet, C, is mounted. It may be a simple straight magnet, arranged vertically, as shown, or it may be a compound magnet of any required power and convenient form, and arranged to best suit the operator. Around the lower end of the magnet is a current-generating coil, D, and around the upper end is a coil, E. The two coils are to be in the line-circuit, but are preferably in separate branch circuits, for the special purpose hereinafter specified.

Beneath the lower pole of the magnet is secured a reed-armature, G, fixed at a convenient point, *a*, to the base or case, and arranged at the proper distance from the pole, that being the least that will allow the amplest vibrations of the armature without coming in contact with the magnet.

Upon the base is mounted, on a pivot, *b*, a hammer-key, H, the hammer *c* of which is caused, by the depression of the outer end, *d*, of the key, to strike upward against the reed-

armature. The hammer *c* is properly made nearly pointed, or, better, with an edge extending transversely to the armature. The hammer is made to strike the armature at a nodal point or line, so that not only will the armature give a clearer, fuller tone when the hammer strikes it momentarily—as for producing the short signals in the Morse alphabet—but when the hammer is held against the armature—as for producing the long signals of the said alphabet—a harmonic is produced, and the vibrations of the armature continue nearly as ample and forcible as those produced by a momentary impulse. The nodal point preferred is either one-quarter, as shown in the drawings, or one-third of the distance from the fixed end of the armature, although one-half of the distance might be the arrangement; but though the octave harmonic is clearer and fuller than any other, the common multiple with the foundation tone being the smallest, yet the greater length of the free end of the armature, when the hammer strikes only one-fourth or one-third of the distance from its fixed end, produces more ample vibrations, which can be transmitted to a greater distance. A special advantage of this arrangement of the hammer to strike a nodal line of the armature, aside from considerations relating to the force and clearness of the vibrations and the simplicity of the construction of the instrument due thereto, consists in the superior distinctiveness of the prolonged sounds of the alphabet, they being in reality different in tone from the short sounds, thereby rendering the signals much more readily distinguished, the element of pitch being added to that of time as a distinctive mark. The circuit of the current-generating coil *D* is arranged to include both the hammer and the reed-armature, so that when the hammer is down the circuit is broken, and when the hammer strikes the armature the circuit is thereby closed. The great advantage of this construction lies in this, that at the moment when the hammer is separated from the armature the vibrations of the armature instantly cease to be transmitted along the line, while the vibrations themselves continue, whereby more prompt and complete cessation of the sounds is effected at the receiver; but since the vibrations of the armature continue the hammer keeps up a more forcible vibration thereof than it could if the armature should come to rest between the strokes of the hammer. Another advantage is, that the current-generating coils are all shunted out of the line-

circuit except that of the instrument transmitting the message, thereby avoiding the resistance which would arise from these coils.

The diaphragm-armature *I* for the receiver is arranged as in ordinary telephones, and needs no further specification. The magnet is adjusted in relation to this armature by a suitable adjusting device, most conveniently arranged near the middle of the magnet, as represented. The construction shown consists of a transverse slightly-inclined hole, *f*, through the magnet, in which moves a ball or disk, *g*, just fitting the hole, and mounted on a screw-shaft, *h*, arranged at right angles to the magnet, the screw *i* causing the ball or disk to travel forward or backward in the hole, thereby raising or lowering the magnet. The adjustment of the magnet to the upper armature will not ordinarily disturb the relative positions of the magnet and the lower armature, since the adjustment of the latter is not required to be so exact and delicate as at the receiving-armature; but the fixed holder of the reed-armature or the armature alone may be made adjustable in any convenient way.

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

1. In a transmitting-telegraph, the combination of a permanent magnet, *C*, current-generating coil *D*, reed-armature *G*, and hammer-key *H*, substantially as and for the purpose herein specified.

2. The combination of a permanent magnet, *C*, current-generating coil *D*, reed-armature *G*, and hammer-key *H*, arranged to strike the said armature on a nodal point or line, substantially as and for the purpose herein specified.

3. The current-generating circuit, arranged to include the key-hammer and the reed-armature, so that it is closed when the hammer comes in contact with the armature, and is broken when the hammer recedes therefrom, substantially as and for the purpose herein specified.

4. The combination, in one telegraph-instrument, of a permanent magnet, *C*, current-generating coil *D*, current-receiving coil *E*, reed-armature *G*, hammer-key *H*, and diaphragm-armature *I*, substantially as and for the purpose herein specified.

The foregoing specification signed by me this 9th day of June, 1880.

JOHN S. BROWN.

Witnesses:

JOHN T. ARMS,  
GEO. I. HILL.