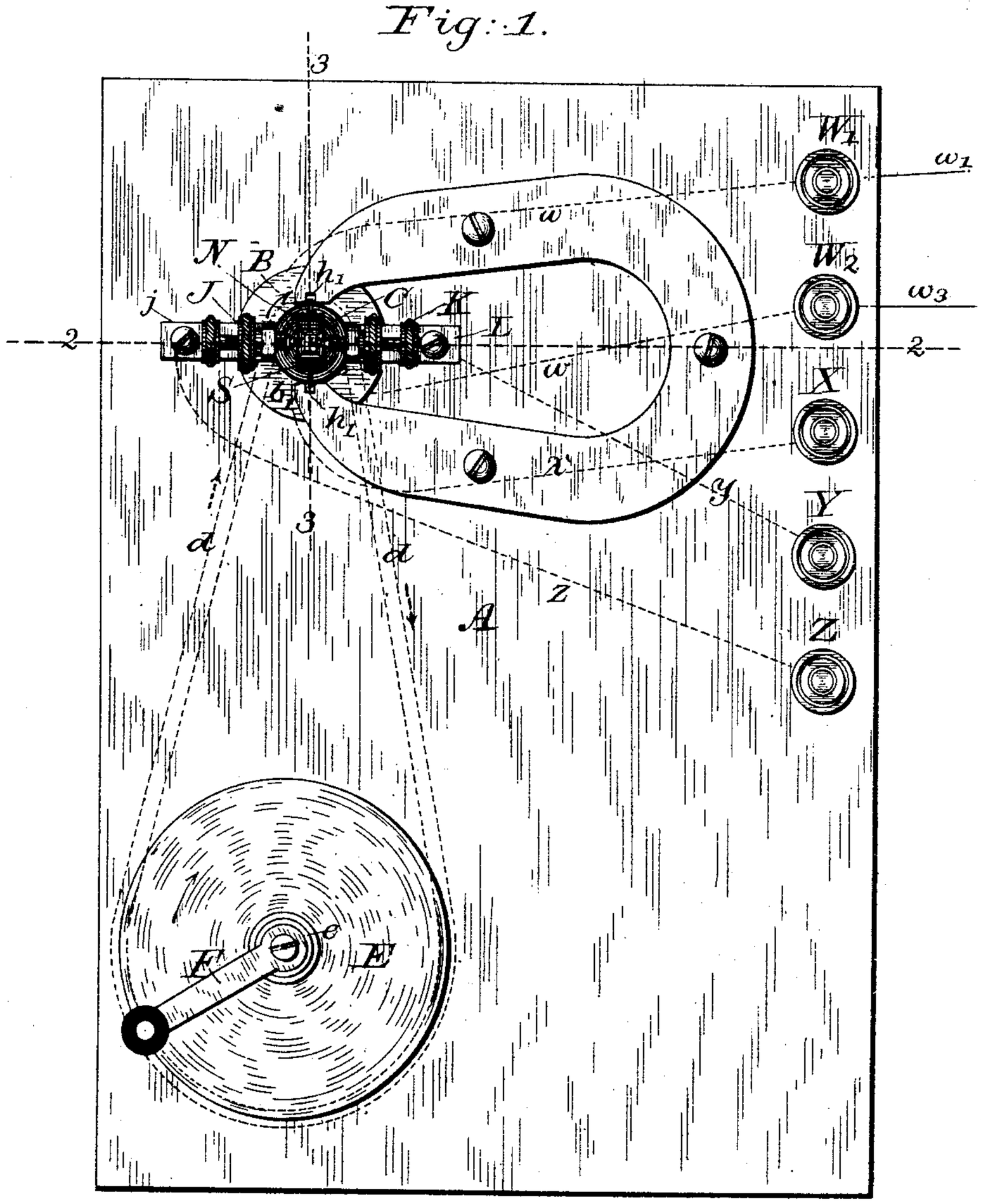
(No Model.) 2 Sheets—Sheet 1.

G. SMITH.

TELEGRAPHIC RECEIVING INSTRUMENT.

No. 259,225. Patented June 6, 1882.

Fig: 1.



Witnesses:

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Muller & Earl

Inventor:

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Frank L. Poe

(No Model.) 2 Sheets—Sheet 2.

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Fig: 2.

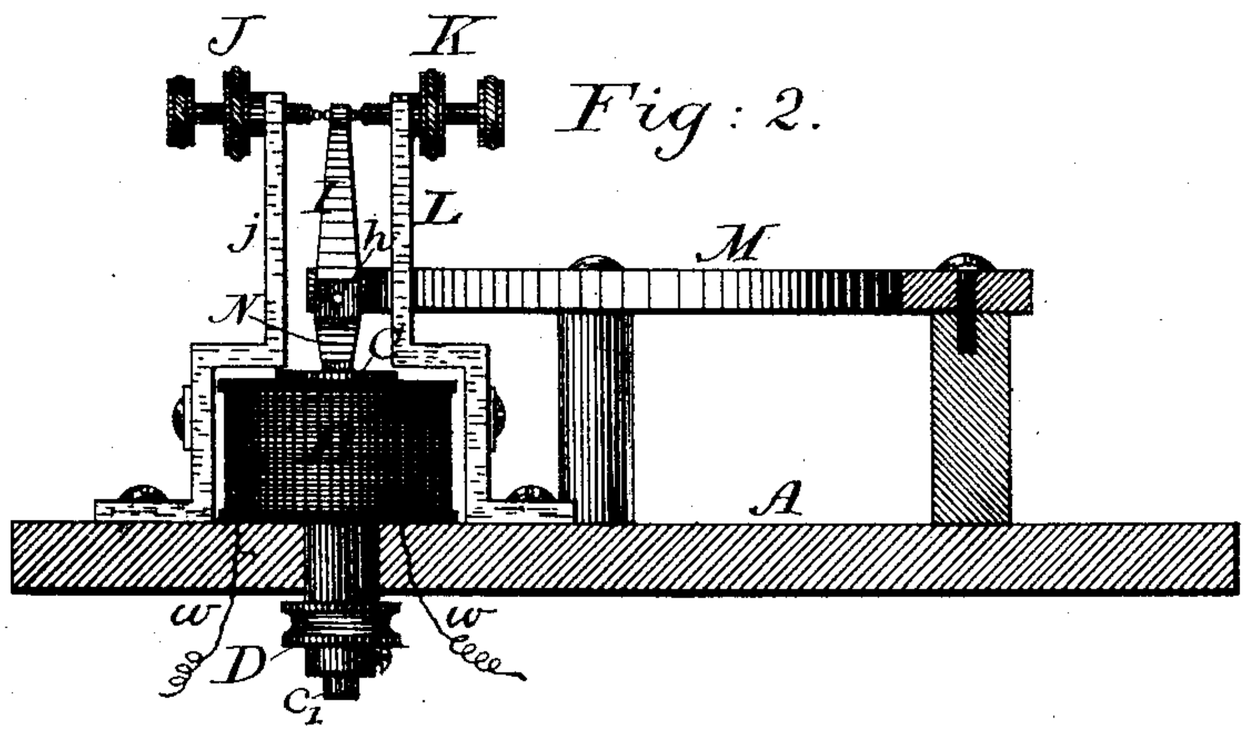
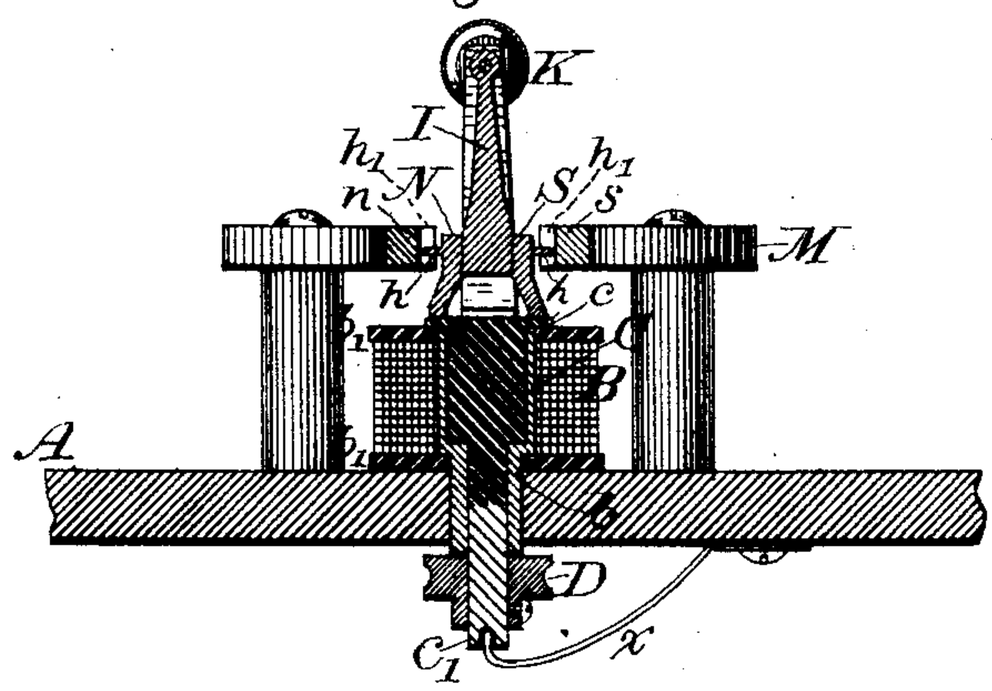


Fig: 3.



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UNITED STATES PATENT OFFICE.

GERRITT SMITH, OF ASTORIA, NEW YORK.

TELEGRAPHIC RECEIVING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 259,225, dated June 6, 1882.

Application filed February 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, GERRITT SMITH, a citizen of the United States, residing at Astoria, in the county of Queens and State of New York, have invented certain new and useful Improvements in Telegraphic Receiving-Instruments, of which the following is a specification.

The general object of my invention is to attain a greater degree of rapidity and certainty of action in telegraphic receiving-instruments than has been possible with the apparatus hitherto employed for that purpose, and to provide an instrument which is especially adapted for use upon long or imperfectly-insulated telegraph-lines, and also in cases where unusual rapidity of signaling is required. These ends I attain by actuating the armature and its attached arm or lever, which produces audible sounds, carries a recording stylus or pen, or serves to open and close an independent electric circuit, through the instrumentality of a constant mechanical power which is made to act upon said armature alternately in opposite directions, and is controlled in respect to the direction of such action by means of electromagnetism.

In a pending application for Letters Patent I have described and claimed an apparatus of this general character, in which the vibrating armature is actuated in one direction by motion communicated by means of friction from a constant motor, and in the opposite direction by a retracting-spring. In another pending application for Letters Patent I have described and claimed an improvement upon the said apparatus, in which the movements of the armature in both directions are effected by the mechanical action of the constant motor, the direction of such action being controlled by means of an electric current of alternating polarity.

My present invention comprises certain improvements in the mechanical organization of the last-named apparatus, whereby its construction is rendered more simple, its moving parts of less weight, and its operation more rapid and efficient.

In the accompanying drawings, Figure 1 is a plan view of an apparatus embodying my invention. Fig. 2 is a vertical transverse section of the same, taken in the plane of the dotted line 2 2; and Fig. 3 is a vertical longitudinal section through a portion of the same, taken in the plane of the line 3 3.

In the drawings, A represents a suitable base, upon which the various parts of the apparatus are mounted.

B is a helix or coil of thin insulated wire, which is wound upon an upright hollow spool or bobbin, *b*, the flanges *b' b'* of which are preferably formed of hard rubber or other insulating material.

C is a cylinder of magnetic metal, preferably of soft iron, fitting closely within the central opening of the hollow bobbin *b*, but capable of rotating freely upon its axis. The cylinder C forms the core of the helix B. It preferably has a flange, *c*, formed upon its upper end. From the lower end of the cylinder C projects a spindle, *c'*, upon which is fixed a small pulley, D, beneath the base A. A belt or band, *d*, passes around the small pulley D, and also around a large pulley, E, which is mounted in the same plane underneath the base A, as shown in dotted lines in Fig. 1. A crank, F, is affixed to that portion of the shaft *e* of the pulley E which projects above the base, by means of which crank it may be turned by the hand by the receiving-operator in the direction indicated by the arrow. When the crank F is thus turned the soft-iron cylinder C, which forms the core of the hollow helix B, is caused to rotate rapidly in the direction indicated by the arrows in Fig. 1. The upper surface of the cylinder C is polished, and is, moreover, carefully turned and fitted, so as to revolve as accurately as possible in a horizontal plane.

N and S are two small upright armatures, preferably of soft iron, which are mechanically united together by brazing or otherwise securing them to an interposed rigid arm, I, of brass or other non-magnetic metal, by means of which said armatures are magnetically insulated from each other. The lower extremities of the armatures N and S respectively rest upon and are in frictional contact with the plane surface of the cylinder C, but at diametrically-opposite points upon or near its periphery. The ends of the armatures in contact with the cylinder may with advantage be made slightly convex. An axis, *h h*, passes through

the armatures N and S at the point where they are affixed to the arm I, and the extremities of this axis turn in vertical slots *h' h'*, which are formed in the faces of the poles *n s* of a permanent artificial magnet, M.

It is obvious that the armature system, being thus mounted in slotted bearings, will be supported by the cylinder C, and hence that there will exist at all times a rubbing contact between the armatures N and S and the surface of the cylinder C, while at the same time any lateral motion of the axis *h h* will be prevented. The arm I plays between fixed limiting-stops J and K, which may with advantage be made adjustable, as shown in Figs. 1 and 2. Thus the armatures N and S and the rigid arm I, to which they are attached, are capable of moving freely in a vertical plane upon the horizontal pivot or axis *h h;* but the extent of this motion is limited by the action of the stops J K upon the arm I, which is mechanically united with the armatures and moves with them. The armatures N and S are polarized by induction, receiving north and south polarity, respectively, from the poles *n* and *s* of the permanent magnet M by reason of their proximity thereto.

The helix B terminates in the projecting wires *w w*, which are electrically connected to the binding-screws W' W², and serve to form a connection with the main line.

When the apparatus is to be used as a relay or repeater the armature-lever I is electrically connected by means of the wire *x* with the binding-post X, and in like manner the standard L is connected by means of the wire *y* with the binding-post Y, and the standard *j* may also be connected by the wire *z* with the binding-post Z.

The apparatus thus constructed is placed in the circuit of a telegraph-line, the connections being completed in the ordinary manner by means of a wire, *w'*, connecting the binding-post W' with the earth at the receiving-station, while the line-wire *w*³, coming from the transmitting-station, is attached to the binding-post W².

The operation of the apparatus is as follows: When a telegraphic communication is to be received upon the instrument the soft-iron cylinder C, which forms the core of the helix or coil B, is caused to rotate upon its axis in the direction indicated by the arrow. This may be effected by turning the crank F in a proper direction, as hereinbefore explained. So long as no electric current whatever traverses the coil B the friction between the ends of the armatures N and S and the rotating surface of the cylinder C will be merely that due to the weight of the armature system, together with the attractive force derived from its polarization by the permanent magnet M. Hence the friction of the moving cylinder C tending to drag the armature N in one direction will be counteracted by an equal tendency on the part of the same cylinder to drag the armature S in an opposite direction, inasmuch as they respectively rest upon opposite points upon its periphery. The combined armature system and its attached arm I will therefore tend to remain in a position midway between the limits of movement due to the position of the contact-stops J and K. When, however, an electric current is transmitted through the line, as by the closing of a battery-circuit at the transmitting-station, the cylinder C instantly becomes magnetic under the influence of its enveloping coil. If we assume the cylinder to exhibit north polarity under the influence of this current, the attraction between it and the armature S will be increased, as they are now of unlike polarity, while the attraction between it and the armature N will simultaneously be diminished, for the reason that the latter are now of unlike polarity. Hence the friction between the armature S and the periphery of the cylinder will be augmented and the former will be dragged in the direction of the arrow until the arm I is arrested by its contact with the stop K, in which position it will remain as long as a current of like polarity continues to traverse the coil, or until the action is reversed by the transmission of a current of opposite polarity from the sending-station. When such reversal of a current upon the line takes place the mechanical action of the instrument is also reversed, for the reason that the cylinder C now assumes south polarity and tends to attract the armature N and to repel the armature S. Consequently the former is dragged in the opposite direction until the armature I comes in contact with the opposite stop, J.

It is usually found preferable in practice to make use of a train of wheel-work of well-known construction, driven by a coiled spring or other maintaining-power, for producing the necessary rotation of the cylinder C, and thus the attendant is relieved from the necessity of turning the crank F during the reception of a communication.

The apparatus has been shown in the drawings in a form more particularly adapted for use as a relay or repeater, in which case the terminal wires of an independent main or local circuit, including a sounder, register, or other receiving-instrument, are connected to the binding-screws X and Y. When arranged in this manner the independent circuit, whether local or main, will be opened and closed in the same manner as by the armature-lever of an ordinary telegraphic relay.

It is obvious that the ordinary telegraphic signals may be distinguished by the ear while the instrument is in operation, in the well-known manner heretofore practiced by expert telegraphists, the requisite sounds being produced by the vibration of the arm I between the fixed stops J and K.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of a permanent magnet and two mechanically-united polarized armatures, which latter are maintained in permanent fric-

tional contact with a moving surface of magnetic metal, and receive unlike polarity by induction from the respective poles of the permanent magnet.

2. The combination, substantially as hereinbefore set forth, of two mechanically-united polarized armatures having unlike polarity, maintained in permanent frictional contact with a surface of magnetic metal moving in opposite directions at their respective points of contact therewith, and a magnetizing-coil which acts to induce magnetic polarity in or upon said surface.

3. The combination, substantially as hereinbefore set forth, of a permanent magnet and two mechanically-united polarized armatures, which latter are maintained in permanent frictional contact with a surface of magnetic metal moving in opposite directions at their respective points of contact therewith, and a magnetizing-coil which acts to induce magnetic polarity in or upon said surface.

4. The combination, substantially as hereinbefore set forth, of two mechanically-united polarized armatures having unlike polarity, maintained in permanent frictional contact with a surface of magnetic metal moving in opposite directions at their respective points of contact therewith, a magnetizing-coil which acts to induce magnetic polarity in or upon said surface, an arm rigidly attached to both said armatures, and stops for limiting the movement of said arm and armatures in each direction.

5. The combination, substantially as hereinbefore set forth, with a moving surface of magnetic metal, of an armature or armatures in frictional contact therewith, and an axis for said armature or armatures movable in slotted bearings, constructed substantially as described.

In testimony whereof I have hereunto subscribed my name this 7th day of February, A. D. 1882.

GERRITT SMITH.

Witnesses:

CHARLES A. TERRY,

MILLER C. EARL.