(No Model.)

J. GEARY.

TELEGRAPH INSTRUMENT.

No. 438,233. Patented Oct. 14, 1890.

Fig. 1.

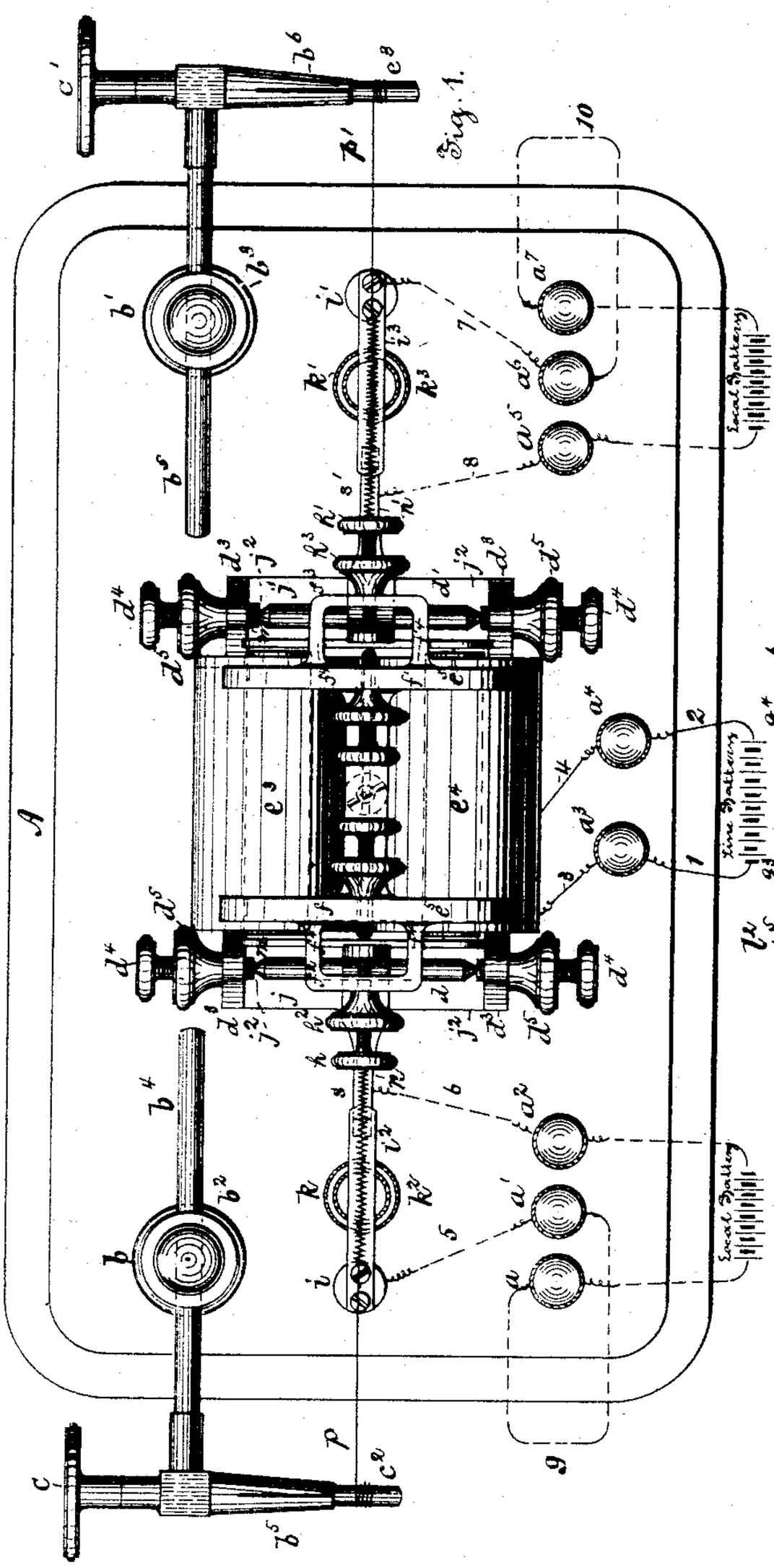
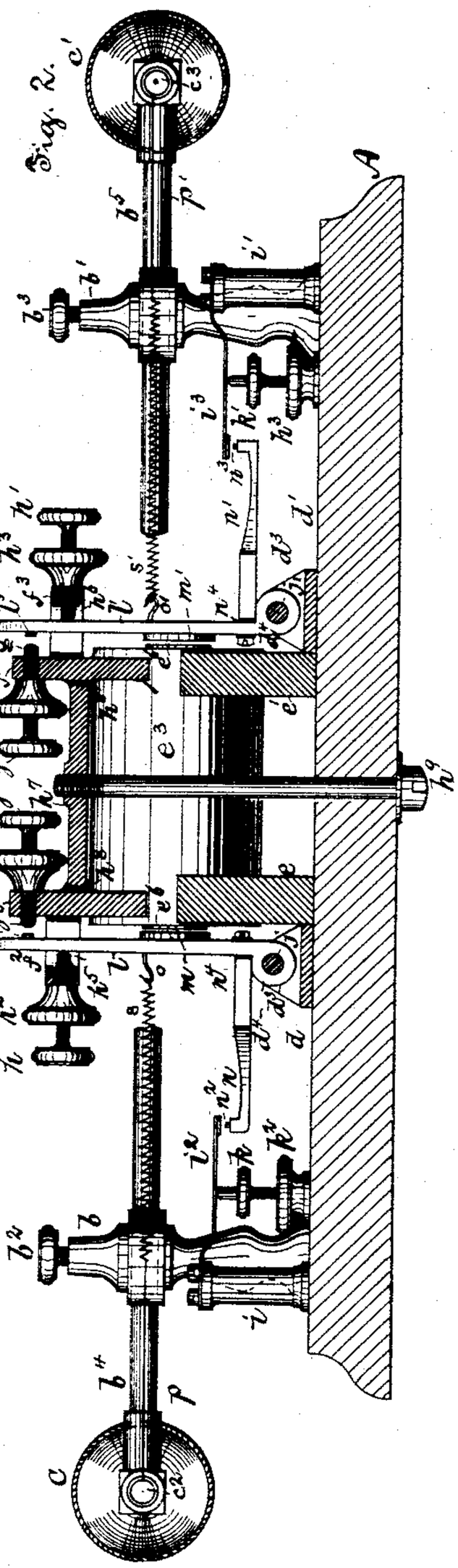


Fig. 2.



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UNITED STATES PATENT OFFICE.

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TELEGRAPH-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 438,233, dated October 14, 1890.

Application filed January 11, 1890. Serial No. 336,630. (No model.)

To all whom it may concern:

Be it known that I, JOHN GEARY, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electro-Magnetic Devices for Telegraph-Instruments, Relays, &c., of which the following is a specification.

My invention relates to certain new and novel features in the construction and arrangement of electric magnetic devices for actuating telegraph-instruments, relays, &c.

The principal object of my present invention is to provide a simple, compact, and durable electro-magnetic device for transmitting signals or makes and breaks from a main or line circuit either to one or to both of two series of receiving-instruments located in local circuits, as is hereinafter more fully described; and to this end my invention consists of an electro-magnetic device for telegraph-instruments, consisting of one or more similarly-wound electro-magnets interposed in the main or line circuit and having one or more adjustable armatures applied to the respective poles thereof and said armatures adapted to make and break either one or both of two series of local circuits.

The nature and characteristic features of my present invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part thereof, and in which—

Figure 1 is a top or plan view of a relay embodying the features of my invention, and Fig. 2 is a vertical central section therethrough.

Referring now to the drawings, A is a base-plate or support.

a, a', a^2, a^3, a^4, a^5, a^6, and a^7 are binding-posts secured to the frame A. b and b' are similar supports secured to the base-plate A and provided with horizontal apertures and with set-screws b^2 and b^3.

b^4 and b^5 are rods passing through the horizontal apertures in the supports b and b' and retained in proper position therein by means of the set-screws b^2 and b^3. These rods are respectively provided with divided or spring bearings b^5 and b^6.

The thumb-screws c and c', provided with insulating-spindles c^2 and c^3, are held in position by means of the divided or spring bearings b^5 and b^6.

d and d' are plates secured to the base-plate A and provided with tapped or threaded lugs d^3.

d^4 are thumb-screws provided with set-screws d^5 and having conical bearings countersunk in the extremities or points thereof.

e and e' are bearing-blocks for supporting the electro-magnets e^3 and e^4. The coils of these electro-magnets e^3 and e^4 are enveloped in hard-rubber or other preferred insulating-housings, and are so wound as that like poles are formed at the adjacent ends thereof. The cores e^5 and e^6 of the electro-magnets project for a short distance outside of the insulating-housings.

f and f' are similar saddle-pieces for retaining the electro-magnets in position, provided, respectively, with U-shaped extensions f^2 and f^3.

f^4 are insulating-gaskets interposed between the saddle-pieces f and f' and the U-shaped extensions f^2 and f^3.

g and g' are thumb-screws passing horizontally through the saddle-pieces f and f' and provided with set-screws g^3 and g^4 and with conducting-points g^5 and g^6.

h and h' are thumb-screws passing horizontally through the U-shaped extensions f^2 and f^3 and provided with set-screws h^2 and h^3 and with insulating-points h^5 and h^6.

h^7 is a strip of metal or other suitable material secured at the respective ends thereof to the saddle-pieces f and f' and electrically insulated therefrom by means of the interposed hard-rubber or other preferred insulating-gaskets h^8.

h^9 is a bolt or screw passing through the base-plate A and strip h^7 for retaining the electro-magnets and their supporting-frames in proper position upon the base-plate A.

i and i' are terminals secured to the base-plate A and supporting thin contact-springs i^2 and i^3.

k and k' are thumb-screws secured into the base-plate A and provided with set-screws k^2 and k^3 for retaining them in proper position.

The shafts j and j', of insulating material,

provided with conical extremities j^2, oscillate freely in the conical bearings countersunk in the extremities of the thumb-screws d^4. The similar vertical vibrating arms l and l', provided with the contact-points l^2 and l^3, are keyed or otherwise secured to the oscillating shafts j and j', respectively.

The armatures m and m' and the horizontal vibrating arms n and n', provided with the contact-points n^2 and n^3, are secured to the vertical arms l and l', respectively.

n^4 are insulating-gaskets, of hard rubber or other analogous material, interposed between said horizontal and vertical arms.

o and o' are hooks secured to the arms l and l'.

s and s' are spiral springs respectively secured at one extremity thereof to the hooks o and o' and at the opposite extremity to the insulating-cords p and p'. These cords are adapted to be wound on or off the insulating-spindles of the thumb-screws c and c' for increasing or diminishing the tension of the spiral springs s and s', and consequently the resistance offered by the armatures m and m' to the attraction of the electro-magnets e^3 and e^4, as is hereinafter more fully set forth.

1 and 2 are wires or other preferred conductors connected to the binding-posts a^3 and a^4 and forming a portion of the line or main circuit.

3 and 4 are wires or other preferred conductors secured to the binding-posts a^3 and a^4 and leading to the coils of the electro-magnets e^3 and e^4 for including the latter in the line-circuit.

5 and 7 are wires leading from the terminals i and i' to the binding-posts a' and a^6, respectively.

The wires 6 and 8 lead from the horizontal vibrating arms n and n' to the binding-posts a^2 and a^5, respectively.

The dotted lines shown at the left-hand side of Fig. 1 and numbered 9 represent a local circuit, hereinafter called "local circuit No. 1," and the dotted lines shown at the right-hand side of Fig. 1 and numbered 10 represent a local circuit, hereinafter called "local circuit No. 2."

In practice it is frequently necessary or desirable to cause the relay to make and break more than two local circuits, and this result may be readily attained in several well-understood ways—for example, by including the vertical vibrating arms l and l' and the thumb-screws g and g' in two local circuits.

In use the various parts of the relay are adjusted in the usual and well-understood manner, care being exercised to have the resistance offered by one of the armatures m or m' to the attractive force of the energized electro-magnets e^3 and e^4 exceed the resistance offered by the other of said armatures, in order that when the electro-magnets are energized in a certain degree one of said armatures may be attracted to the cores thereof, and when the electro-magnets are energized in a greater degree both of said armatures may be attracted to the cores thereof. This differential resistance offered by the armatures m and m' to the attractive force of the energized electro-magnets e^3 and e^4 may be readily attained and controlled by turning the thumb-screws c or c' either to the right or to the left, and consequently increasing or diminishing the tension of the spring s or of the spring s', as desired. If the resistance offered by the two armatures to the energized electro-magnets is equal, then the two armatures will be equally attracted to the cores thereof.

Now for the sake of further describing my invention and the application thereof it will be assumed that the resistance offered to the attractive force of the electro-magnets e^3 and e^4 by the armature m' exceeds the resistance offered by the armature m thereto. An operator desiring to communicate with or signal a station located in the local circuit No. 1 causes a current, by means of a "Morse" key, or in any other preferred manner, having a certain maximum intensity, to traverse the main or line circuit either continuously or intermittently. This current, traversing the conductors 3 and 4 and the coils of the electro-magnets e^3 and e^4, energizes both ends of the cores e^5 and e^6, and the energized cores attract the armatures m and m' to the respective extremities thereof, but since the resistance offered to this attraction by the armature m is less than the resistance offered by the armature m' the former is drawn forward and the latter remains substantially at rest. The forward movement of the armature m oscillates the shaft j, thereby raising the horizontal arm n and establishing a good electrical contact between the contact-point n^2 and the spring i^2, whereby the local circuit No. 1 is closed. It is well understood that the closing of the local circuit may be caused to give a signal—for example, to actuate a so-called "sounder" or other preferred type of receiving-instrument. As soon as the main or line circuit is broken the electro-magnets e^3 and e^4 cease to be energized and the spring s draws the armature m backward, breaking the contact previously existing between the spring i^2 and the contact-point n^2, whereby the local circuit No. 1 is broken. Thus the succession of makes and breaks occurring in the main or line circuit are reproduced in the local circuit No. 1.

An operator desiring to communicate with stations located in local circuits No. 1 and No. 2 accomplishes this result by so increasing the intensity of the current traversing the main or line circuit and the coils of the electro-magnets e^3 and e^4 as that the energized electro-magnets attracting both armatures m and m' forward actuate them to make and break both the local circuits No. 1 and No. 2 in the manner above described.

The local circuit No. 2 may be operated singly, instead of the local circuit No. 1, by making the resistance offered to the attract-

ive force of the electro-magnets e^3 and e^4 by the armature m exceed the resistance offered thereto by the armature m'. This result may be readily accomplished by decreasing the tension of the spring s' and increasing the tension of the spring s by means of the thumb-screws c and c'.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination, in a telegraph-instrument, of a main-line circuit and battery, two similarly-wound electro-magnets included in said circuit, local circuits and batteries, two armatures applied to the poles of said magnets and included in said local circuits and said armatures and horizontal vibrating arms provided with contact-points secured to vertical arms, gaskets interposed between said horizontal and vertical arms, hooks connected with said vertical arms, and springs secured at one extremity to said hooks and at the opposite extremity to insulating-cords adapted to be wound off or on spindles to increase or diminish the tension of said springs and consequently the resistance offered by the armatures in the local circuits to the attractive force of the magnets in the main-line circuit, all arranged and operating in the manner and for the purposes shown and described.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JOHN GEARY.

Witnesses:
GEO. W. REED,
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