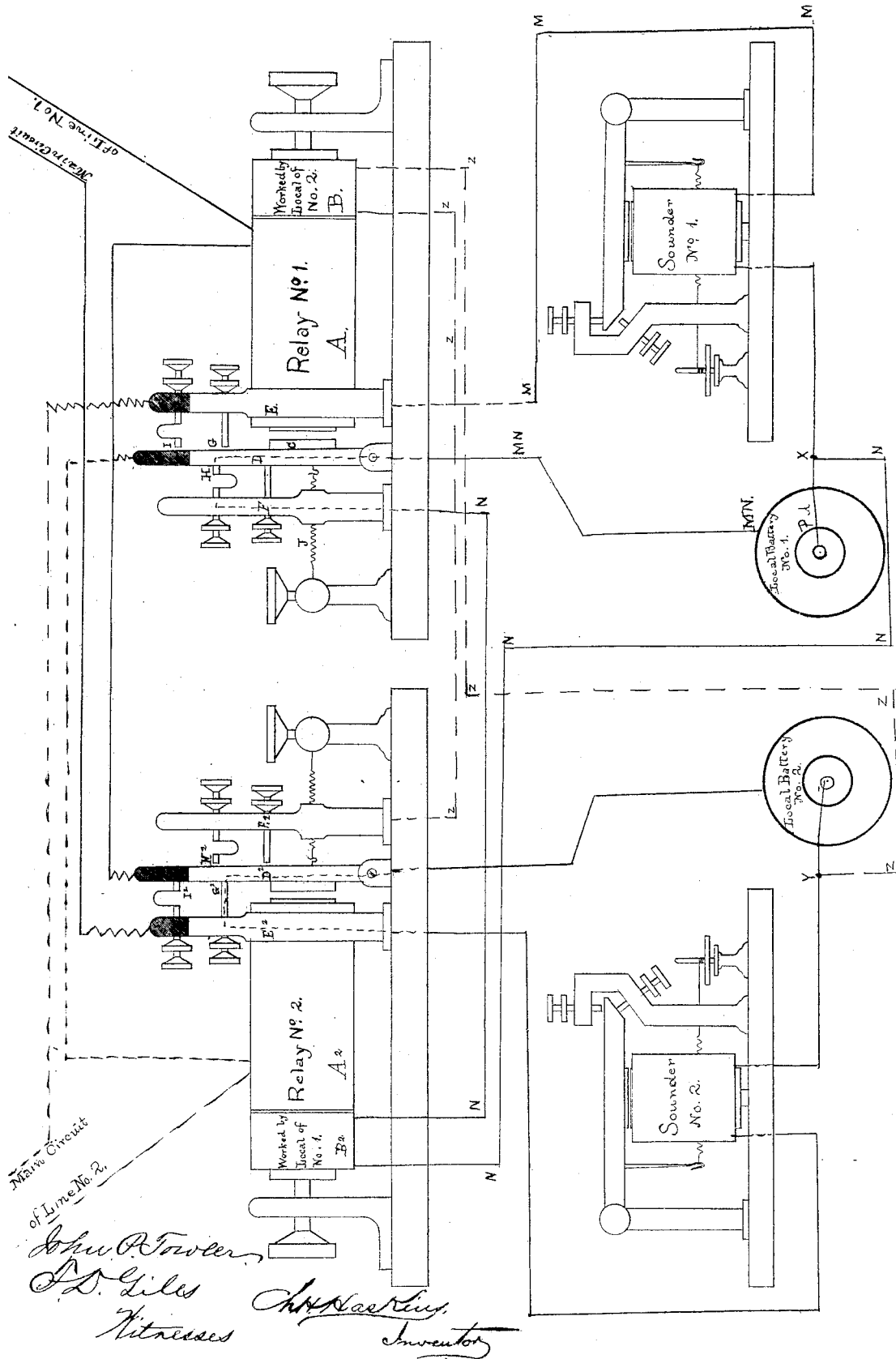


CHARLES H. HASKINS.

Improvement in Automatic Telegraph Repeaters.

No. 115,314.

Patented May 30, 1871.



UNITED STATES PATENT OFFICE.

CHARLES H. HASKINS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN AUTOMATIC TELEGRAPH-REPEATERS.

Specification forming part of Letters Patent No. 115,314, dated May 30, 1871.

To all whom it may concern:

Be it known that I, CHARLES H. HASKINS, of the city of Chicago, county of Cook and State of Illinois, have invented a new and Improved Form of Automatic Telegraph-Repeaters; and I do hereby declare that the following is a full and exact description, to wit:

The object of this repeater is to repeat what is received at any office upon one telegraph-circuit on to a second circuit, simultaneously with its receipt, signal for signal, and to enable an operator at any office on the second or receiving circuit to interrupt or "break" the sending operator on the first or sending circuit; and send or write to him, the operators on the separate circuits writing to each other through the repeater with as much ease and freedom as if both circuits were but one. Reference being had to the accompanying drawing, it will be seen that the circuit of No. 1, main line, after passing through the spools or helices of relay No. 1, crosses to relay No. 2, attaching to the top of the armature-lever D^2 ; thence crossing at I^2 on the bow-spring to the top of standard E^2 , the circuit returns to battery and ground, or elsewhere, as may be desired. Main circuit No. 2, in like manner, after passing through its own relay (No. 2) crosses to the armature-lever E of relay No. 1, across bow-spring I , (when closed,) to standard E , and thence outward to battery and ground, or where desired. The repeating then is done by the relays themselves. Each time that the main circuit of No. 1 is closed the current on that line, passing through the coils or helices of relay No. 1, magnetizes its core and attracts armature C , thus closing armature-lever D against bow-spring I and closing the circuit of main line No. 2, which, in its turn, closes each instrument or main circuit No. 2, thus repeating the dot or character made on circuit No. 1. But when No. 1 circuit is opened again the core of relay No. 1 becomes demagnetized. The armature C and lever D being drawn back by spring J , No. 2 main circuit is broken at I . Relay No. 2 is now demagnetized, and its lever, falling back, would break main circuit No. 1 at I^2 . Then, both lines being broken, one at I and the other at I^2 , neither line could be used. It is, therefore, necessary to hold the receiving re-

lay closed while the other is writing, that the sending circuit may not be broken at the point I or I^2 of the receiving relay. To accomplish this result, and at the same time allow the receiving side to break and write at will, I have made the following devices and arrangement of circuits: The helices of each relay-magnet are wound with two sizes of wire, separated from each other by a thin partition. The larger portion of each leg of the core is wound with fine insulated wire, and these constitute the ordinary relay. Back of these helices, next the yoke or strap connecting the two legs of the core, I wind on each leg a helix of coarse wire suitable for local circuits.

To more fully illustrate the running of the circuits, I have shown in the drawing the "sounders" and local batteries of each line or circuit.

Operation.

No. 1 line is shown repeating on to No. 2. The circuit of No. 1 line being open, the armature of relay No. 1, C , and its lever D , are drawn back by spring J , and main line No. 2 is open at I . Relay No. 2, however, is held closed by the local current from the local battery No. 1, which, being broken at G on relay No. 1, passes from the positive pole P^m of local battery No. 1 to x ; and, instead of passing through local sounder No. 1, (as it would if the point G on relay No. 1 was closed,) it passes along wire N to the coarse-wire helices of relay 2, and thence to relay 1, up the back-post F to the bow-spring H , thence, down armature-lever D , back to battery, thus magnetizing the core of relay 2 and holding armature-lever D^2 against bow-spring I^2 , keeps the main circuit of 1 closed at that point. The bow-springs I and H on each relay are so adjusted that before one spring is released from contact with armature-lever D , when that lever is moving, the other spring is brought in contact, so that there is a moment when the springs are both in contact with the lever, and thus, when the armature-lever of the sending relay is vibrating, before the main circuit of No. 2 leaves relay No. 2, the local circuit of No. 1 is thrown through it, and thus the core of the receiving relay is continually magnetized and its armature held closed alternately by its own main

current and the local current of the other line. Thus the sending circuit is kept closed at I², and the repeating at I continues.

To Break.

The operator on line No. 2 opens his key, thus breaking the main circuit. No 1 being open, his local current flowing by the route described and through back portion of relay 2, holds 2 still closed. But when operator on line No. 1 closes his main circuit his armature is attracted. The lever D moves up, breaking the local at H, and thus demagnetizing the core of relay No. 2, whose armature-lever D² is instantly drawn back by spring J², making contact with bow-spring H². The current from local battery No. 2, leaving battery P o, runs to Y, thence, on wire Z, to local helices of relay 1, thence to relay 2, up back-post F², down armature D², and back to battery, making a magnet of the core of relay No. 1, attracting its armature-lever D, and closing the main circuit of relay No. 2, at I, thus "giving the circuit" to operator on line No. 2. The only precaution necessary in connecting the main and local wires to the repeating relays is to be sure that the currents on both the sets of helices on the relay cores run in

the same direction; otherwise the two currents, before one is broken and after the other is closed, running in opposite directions, through the coils of either relay, will neutralize each other, destroying the attraction of the core, and allowing the spring to pull back the armature-lever, thus breaking the main circuit of opposite line on the bow-spring I².

I do not claim the invention of automatic repeaters, as they are now in use, of various forms; neither do I claim as my invention the winding of electro-magnets with two or more coils or helices of wire, for this has been done in many forms, for various purposes; but

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

1. The combination of the electro-magnetic cores with two helices of separate circuit, the helices being wound about opposite ends of the core, and directly around the core itself, substantially as and for the purpose set forth.

2. The combination of an extra coil or helix on the relay with a mechanism for repeating by the relay armature-lever, substantially as and for the purposes specified.

Witnesses: CH. H. HASKINS.
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