

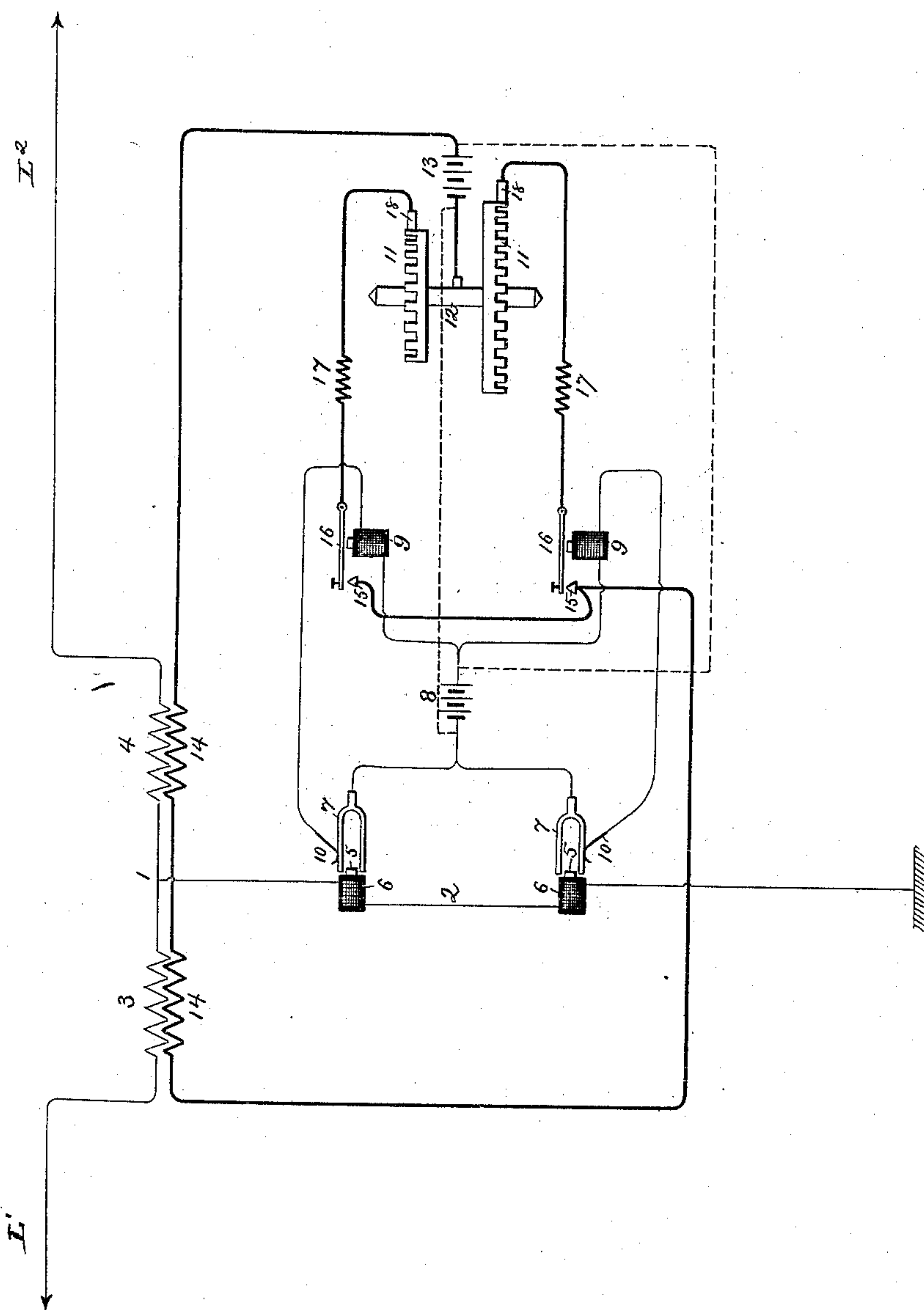
(No Model.)

F. VAN RYSELBERGHE.

REPEATER FOR HARMONIC TELEGRAPHS.

No. 370,576.

Patented Sept. 27, 1887.



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UNITED STATES PATENT OFFICE.

FRANÇOIS VAN RYSSELBERGHE, OF BRUSSELS, BELGIUM.

REPEATER FOR HARMONIC TELEGRAPHS.

SPECIFICATION forming part of Letters Patent No. 370,576, dated September 27, 1887.

Application filed May 2, 1887. Serial No. 236,844. (No model.)

To all whom it may concern:

Be it known that I, FRANÇOIS VAN RYSSELBERGHE, a citizen of Belgium, residing at Brussels, Belgium, have invented certain new and
5 useful Improvements in Repeaters for Harmonic Telegraphs, of which the following is a specification.

My invention relates to repeaters for tone or harmonic telegraph systems; and it has for
10 its object to improve the construction and arrangement of such devices, so that they are rendered simple, cheap, and effective, and so that they may be operated by the expenditure of the least possible energy, and in carrying
15 out these objects of my invention I make use of certain devices constructed and arranged substantially as more particularly described hereinafter.

In the accompanying drawing I have illustrated diagrammatically so much of a tone or harmonic telegraph, including the repeating-station, as is necessary to a clear understanding of my invention.

In such drawing, L^1 and L^2 represent two
25 main lines connected to distant stations, on which impulses or variations in electrical potential are produced by suitable transmitting devices arranged in any ordinary or desired manner, and at the repeating-station the said
30 lines are joined at a point marked 1, and are connected to earth by a branch line, 2. On each side of the branch line the main lines are arranged to form the secondaries 3 4 of induction-coils, or of other equivalent transforming
35 devices—such as a condenser—and in the branch line 2 are arranged a number of receiving-instruments. (Shown in the present instance as consisting of a core, 5, the coils 6 of which are included in the branch line, said
40 core operating upon a tuning-fork, 7, to produce vibrations therein, in accordance with someone of the transmitting devices arranged at the distant stations.) It will be understood, of course, that these receiving-instruments are
45 adjusted to vibrate at a rate of speed in substantial unison with some one set of impulses sent over the line by the corresponding transmitting-instrument.

A local circuit, including the battery 8 and
50 magnet 9, is connected at one pole to the base of the fork 7, and the other pole is connected

to a circuit-controller, 10, arranged so as to be acted upon by the fork 7, when vibrating under the influence of currents sent through the coils 6, and operating on the core 5. 55

A suitable circuit-breaker or current-varying device (shown in the present instance as consisting of a circuit-breaking wheel, 11, mounted upon a rotating axle, 12) is arranged in circuit with the battery 13, one pole of 60 which is connected directly to the axle 12, and the other pole includes the primaries 14 of the induction coils, or equivalent devices, and terminates in a contact-point, 15, of the circuit-closing device or key 16, and thence, passing through a small resistance, 17, terminates in a brush, 18, bearing upon the toothed circuit-breaker 11. This circuit-breaker is rotated by any suitable means, so as to produce a series of impulses or vibrations in exact unison with the series of impulses sent from the transmitting-station and received by the tuning-fork 7, and as said fork is vibrated under the influence of impulses sent from the transmitting-station it will in turn control the magnet 9, which operates to open and close the local circuit through the circuit-breaker 11 and the primaries of the repeating-station. 75

In order to produce the best results, I have found that the source of electro-motive force, 80 13—which of course may be a battery, dynamo-machine, or other generator—should have practically no internal resistance, and that the primaries 14 should also have a very low resistance, as near to zero as possible, and 85 whatever resistance is necessary is preferably interposed in the local circuit at a point, 17, between the key and the circuit-breaking wheel. Especially is this the case when a number of circuit-breaking wheels are connected 90 with the same source of electro-motive force, as by this arrangement, when two or more keys are operated simultaneously, the resistance of the whole force of the battery is reduced in a well-known manner, and each series of impulses is transmitted to the line with substantial equal force, and the vibrations or variations in electrical potential can be maintained upon the line without substantial interference. 95

It will be understood that the variations of potential from the transmitting-station are so 100

rapid that the tuning-fork 7, vibrated thereby, will operate upon the circuit-controller 10 in a manner so as to continuously energize magnet 9, and the key 16 will therefore be closed as long as the tuning-fork 7 is vibrated under any given signal—as a dot or a dash—and at the same time the circuit-breaker 11 will produce a like rate of vibrations in the primaries 14.

It will be seen that the whole of the electromotive force of the vibrations coming from the transmitting-line will not pass through the branch 2, a part of such force continuing to the other main line in proportions according to the resistance of the branch and the said main line, and if the direction of the induced currents produced in the induction-coil 4 is the same as that coming from the line L' the repeater will operate to add to the weakened impulses or vibrations coming from said transmitting-station new impulses or vibrations from a new source of electric energy in unison with the original force, and by this means I am enabled to utilize a part of the original energy to charge the second line, as well as the additional energy, generated at the repeating-station.

It is evident, of course, that there need be but one source of electric energy at the repeating-station, and the batteries 8 and 13 may be combined and branches therefrom may operate the circuit-closing key and the circuit-breaker 11, as indicated in dotted lines.

While I have shown only two receiving-instruments and corresponding relay or repeating instruments, it is evident that any number may be used by simply duplicating the parts shown, and by including in the local circuit the primaries 14 of both of the secondaries 3 and 4 the apparatus may be used to repeat from either terminal to the other, either alternately or simultaneously. In the latter instance, of course, it is understood that the transmitting-instrument at the opposite stations must produce a different series of vibrations or undulations in the line.

While I have shown my repeating-station arranged upon a line over which tone or harmonic signals are sent, it is evident that the same line may be utilized to convey the ordinary Morse signals simultaneously with the tone signals, as the receiving-instrument in the branch 2 will not operate under the ordinary Morse signal currents, and the induced or harmonic signals will not affect the Morse instruments.

What I claim is—

1. In a tone or harmonic telegraph, the combination of two main lines joined at a repeating-station, a branch circuit connecting both said lines to earth, and receiving-instruments in said branch circuit, substantially as described.

2. In a tone or harmonic telegraph, the combination, with two main lines joined at a repeating-station, of a branch connecting both said circuits to ground, receiving-instruments in said branch, and transmitting devices in a local circuit at said station, the said local circuit being controlled by the receivers in the branch, substantially as described.

3. In a tone or harmonic telegraph, the combination of transmitting-instruments arranged in a local circuit including the primaries of induction coils, the secondaries of which are respectively located in the main line, and receiving-instruments controlling said transmitting devices and connected to both the main lines, whereby messages may be repeated in either direction over said main lines, substantially as described.

4. In a tone or harmonic telegraph, the combination of a local circuit, the circuit-breaker or controller device in each branch circuit, keys controlling said branches, resistances in each branch, and receiving-instruments controlling the keys, substantially as described.

5. The combination, with two main lines joined at a repeating-station and a branch connecting the junction to ground, of receiving-instruments in said branch, local circuits including tone-transmitting devices, keys in said local circuits, and magnets for operating the keys, the said magnets connected to be operated by the receiving-instruments, substantially as described.

6. The combination, with two main lines joined at a repeating station, and each including a secondary coil of an inductorium, of a branch connecting said lines to ground, a local circuit, including a primary for each line, tone-transmitting devices in said local circuit, and receiving-instruments in the branch controlling the local circuit, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANÇOIS VAN RYSSELBERGHE.

Witnesses:

F. L. FREEMAN,
WM. A. HARRIES.