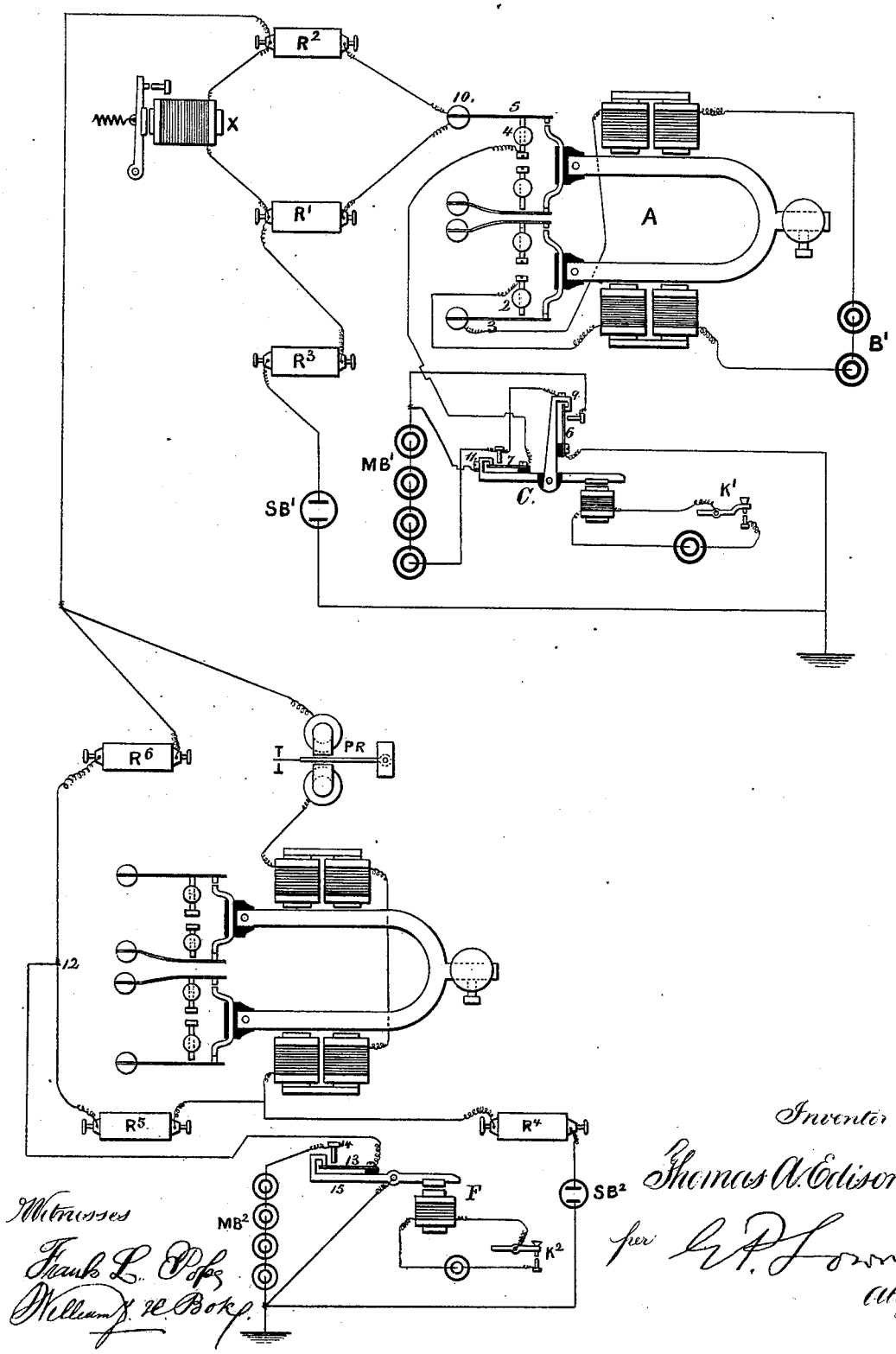
T. A. EDISON.

Acoustic Telegraph.

No. 235,142. Patented Dec. 7, 1880.



Witnesses

Frank L. Pope

William H. Bok

Inventor

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y.

ACOUSTIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 235,142, dated December 7, 1880.

Application filed September 30, 1876.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the State of New Jersey, have invented an Improvement in Acoustic Telegraphs, (Case No. 125,) of which the following is a specification.

In my Patent No. 198,089, granted December 11, 1877, vibrating reeds are actuated by electro-magnets in local circuits and move contact-points for opening and closing the battery-circuits and varying the tension on the line.

In my present invention I make use of a circuit preserving and reversing key at one station, a polarized relay at the other station, a key to bring into action additional battery-power and cause a response in a bridge-relay at the distant station. This has before been accomplished in telegraphs. I, however, make use of a circuit-breaker or pulsator in the main line operated by a tuning-fork, and this causes a corresponding vibration of another fork at the distant instrument by the action of electro-magnets in the bridge-wire. By this arrangement I am able to operate the usual duplex telegraph, and, at the same time, obtain synchronous movements at the two ends without one system interfering with the other.

In Letters Patent No. 185,507, granted to me, two tuning-forks at each end act, in connection with the transmitting and receiving devices, to direct the messages sent to the proper receiving-instruments.

In my present improvement the tuning-fork at the transmitting end causes the vibration of a similar tuning-fork in the bridge-wire of the receiving-instrument, and has nothing to do with the messages sent by the keys from either end.

The two tuning-forks vibrating in exact unison are available for any synchronous movement, or for any other duty in connection with telegraphy—such, for instance, as manipulating the connections of another wire, as set forth in my aforesaid Patent No. 185,507.

A is the fundamental tuning-fork, whose two magnets are placed in one local circuit, containing the battery B′, which circuit is interrupted by the movement of the fork itself at the points 2 and 3.

R′ and R^2 are resistance-coils, which form one side of the Wheatstone balance.

X is the common relay, placed in the bridge-wire.

R^3 is a resistance-coil, which serves to form the artificial line, and is used for balancing the effect of the battery M B′ on the relay X.

S B′ is a large secondary battery, used for the purpose of creating extra currents to neutralize those produced up the line, and thus preserve the balance. The two sides of the balance meet at 10, and then proceed to the points 4 and 5, where the whole line is interrupted at each vibration of the fork A. From 4 it passes to the current-reversing transmitter C, entering at the spring 7, which rests (when the key K′ is open) against the prong 11, thence to the zinc pole of M B′, from the carbon pole to the prong 9, through to spring 6 to the earth, thus putting the zinc pole to the line.

When key K′ is closed the connection is changed in C, and the carbon pole of the battery is put to line. These reversed currents pass through the two sides of the balance R′ and R^2, and over the main and artificial lines, but do not pass through the bridge-wire containing relay X; hence this relay works perfectly independent of the current from M B′. These reversals pass over the line to the distant station, and there set in motion the tongue of the polarized relay P R, which is placed, along with the acoustic instrument G, in the bridge-wire of another balance. These reversals serve to transmit the necessary signals from key K′ to the polarized relay P R to transmit one message, and these reversals act as constant currents to the acoustic instrument, as its magnets are unpolarized and cannot discriminate between the two currents; hence it responds only to the total interruptions in the circuit by the fundamental fork A at the points 4 and 5. These interruptions, owing to their immense rapidity compared to the rate of signaling, do not affect the polarized relay P R.

R^5 and R^6 are two resistance-coils, which form the two sides of the Wheatstone balance, R^4 and S B^2 forming the artificial line. The two sides of the balance are connected at 12, and thence to the transmitter F, which, if the key

K^2 is open, enters at the spring 13, thence through the lever 15, against which its end rests, to the earth. In this position the battery M B^2 is disconnected and the relay X at the distant station is open. If, now, the key K^2 be closed the point 14 comes in contact with the spring 13, separating it from 15, and connects the line to the battery, and thence to earth. This current passes to the distant station and closes the relay X, but does not pass through the bridge-wire containing the polarized relay P R or the fork G; hence these are never affected by the current from M B^2. The effect of the total interruption of the circuit at 4 and 5 of A does not in the least affect the reception of signals on X. Thus I am enabled to transmit and receive two messages over a wire at the same time that I am transmitting and receiving a series of non-signaling currents, which serve to synchronously vibrate two acoustical instruments.

The tuning-forks A and G are provided with extra points and springs, for use in operating one or more local circuits containing similar acoustical instruments, making the same number of vibrations or multiples thereof. Any number of tuning-forks, like G, may be inserted at intermediate stations, the local points of which can be used in connection with local forks for regulating purposes on other wires.

I will mention that reverse currents could also be sent through R^6 and R^5 over the line, to affect a polarized relay inserted in the bridge-wire with X if the former is provided with suitable devices to prevent a mutilation of the signals by the reversals.

In my application for a patent Case No. 99 the signals are made by two circuit-preserving keys, one of which varies the tension of the electric current, and the other reverses the polarity of the current.

In my application No. 132 there is a circuit preserving and reversing key in the main line, and a polarized relay in the bridge; also, a pulsator of the current in the form of a tuning-fork that is kept in vibration by an electro-magnet in a local circuit, and there is a key and shunt connection, whereby the vibrations from the pulsator upon the line are controlled, and signals are received by a reed at the distant station that pulsates in harmony with the tuning-fork. This construction is adapted to the transmission through the same circuit of messages by the Morse system and the electro-harmonic or telephonic system. These features are therefore expressly disclaimed from this present application.

In my Case No. 133, patented July 22, 1879, No. 217,781, there is a polarized relay, a magnet responding to rise and fall of tension, and a reed or telephone in the bridge, and circuit-preserving keys that reverse the polarity and produce rise and fall in electric tension, a tuning-fork vibrator, and a key that short-circuits the current around the said vibrator. I also disclaim the same from this application.

I claim as my invention—

The combination, in one telegraphic circuit, of circuit-preserving keys, one of which reverses the polarity and the other increases or decreases the battery-power, a polarized relay and receiving-relays in the respective bridge-wires, two vibrators and their actuating electro-magnets, the helix of one of which is in the main-line circuit, and the helix of the other is in a local circuit, and a circuit-breaker in the local circuit operated by its pulsator, substantially as specified, whereby the two tuning-forks are caused to pulsate synchronously entirely independent of and without reference to the telegraphic communications by the respective keys, substantially as specified.

Signed by me this 26th day of August, A. D. 1876.

THOS. A. EDISON.

Witnesses:

GEO. T. PINCKNEY,

CHAS. H. SMITH.