

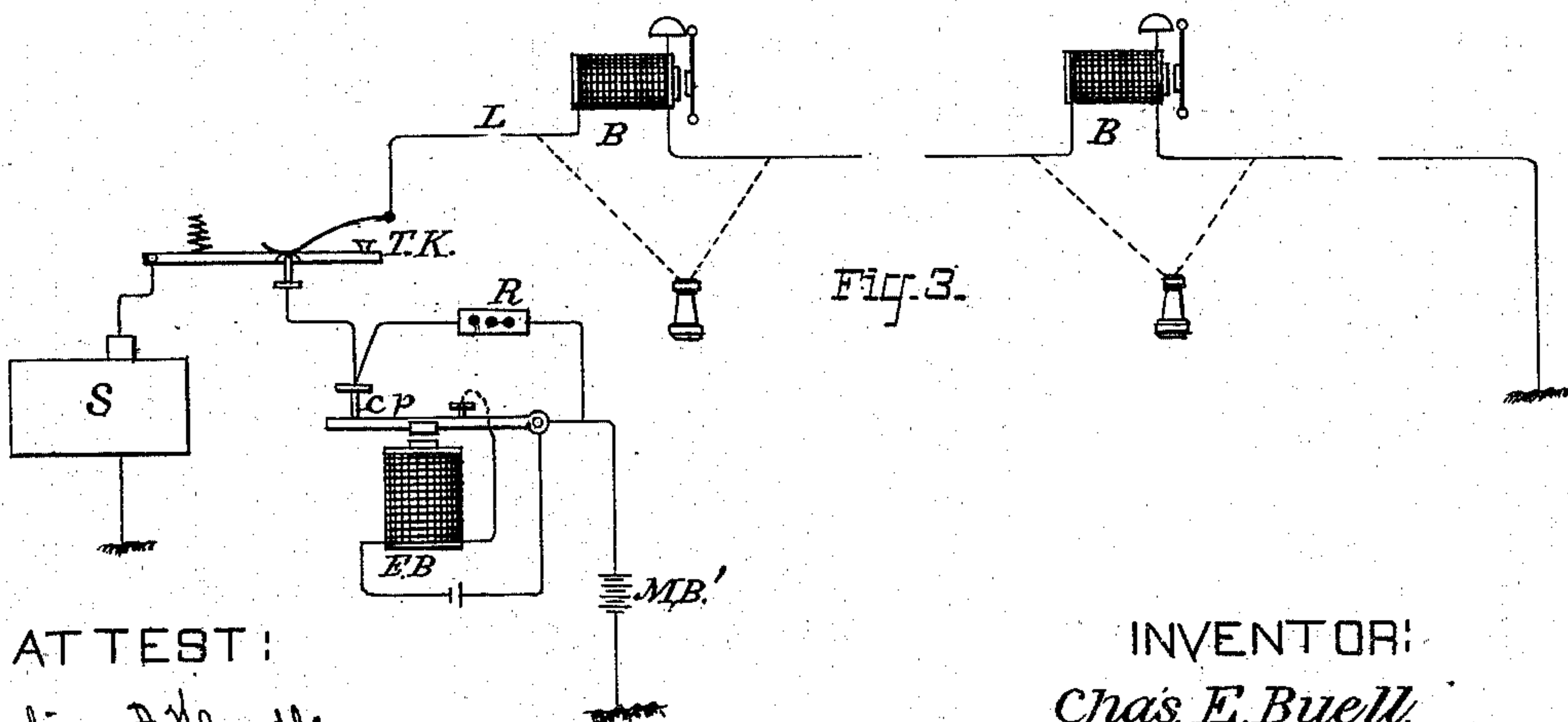
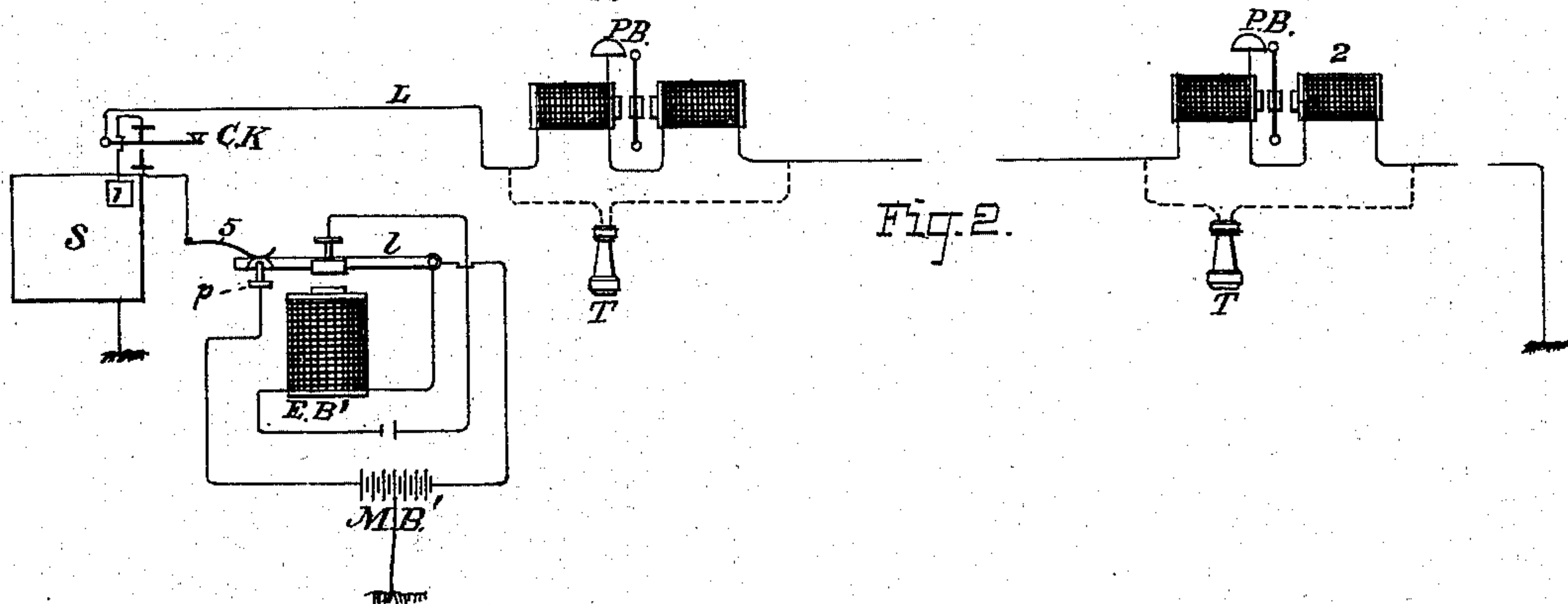
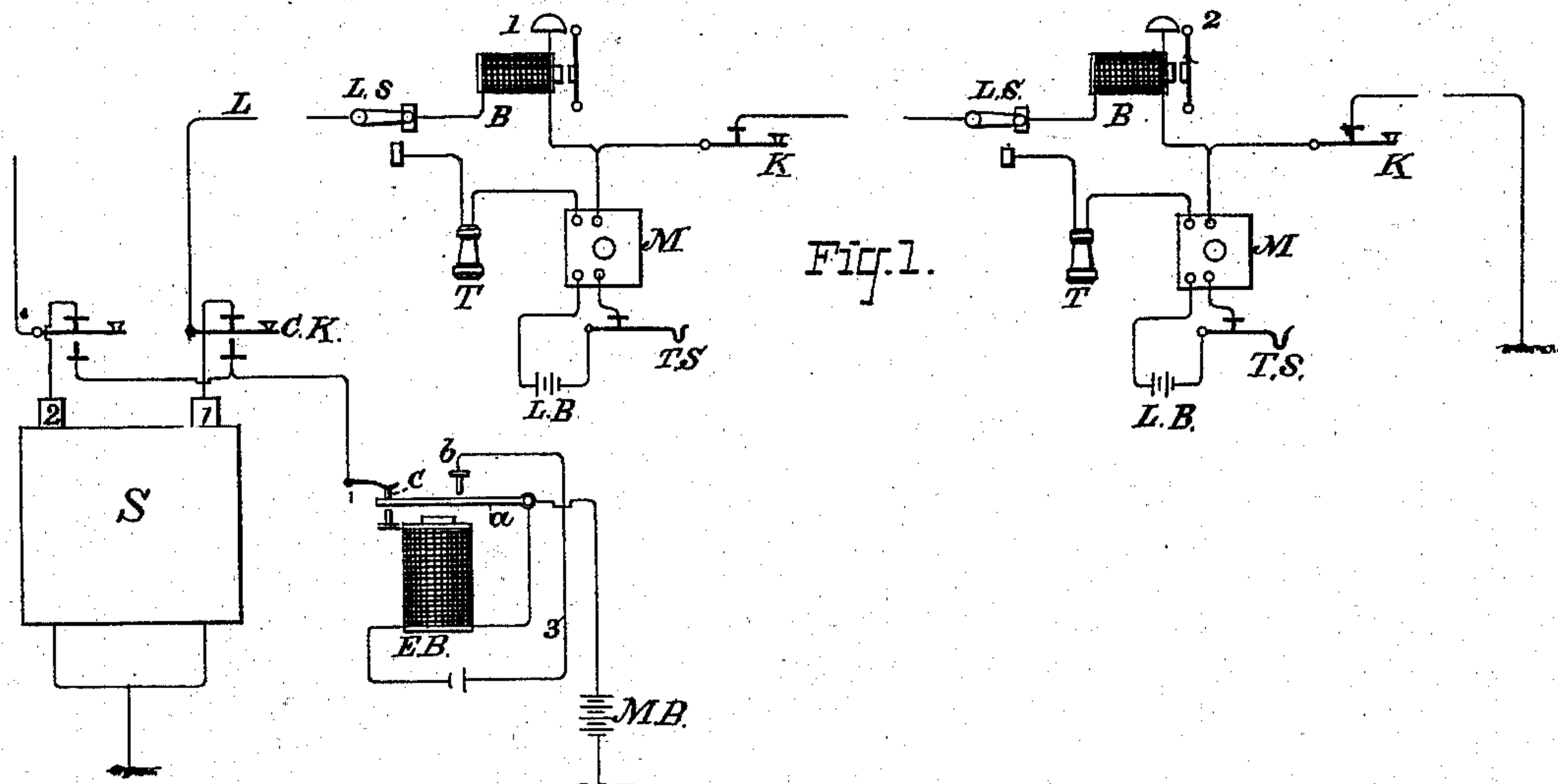
(No Model.)

C. E. BUELL.

ELECTRIC SIGNAL APPARATUS.

No. 249,296.

Patented Nov. 8, 1881.



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ELECTRIC SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 249,296, dated November 8, 1881.

Application filed June 11, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Electric Signal Apparatus, of which the following is a specification.

The general object of my invention is to afford a means whereby a continuous ringing or vibrating signal may be given at a subscriber's station of a telephone-line, without the use of local batteries or circuits, by the simple pressure of a circuit-controlling key at the central office.

A further object of my invention is to combine vibrating signals with a telephone or other circuit without disturbing the continuity of said circuit when signals are made, thus enabling telephone-signals to be sent upon a line used for other purposes.

Figure 1 of the accompanying drawings is a diagram of circuits and apparatus upon a telephone-line. S represents a central-office switch-board of any preferred construction, and L one of a number of telephone-lines connected thereto. 1 and 2 are subscribers' stations, each provided with an ordinary tap-bell, B, normally in the main-line circuit. The other devices are also of ordinary construction, and are represented as follows: L S, line-switch for disconnecting the bell and connecting in the telephone; T, receiving-telephone; M, transmitter; L B, local battery for transmitter; T S, telephone gravity-switch; and K, a call-key. At the central office E B represents an electromagnet, whose armature is kept in continuous vibration by means of the circuit closing and breaking stop *a* in the local battery-circuit. At every vibration of the armature the spring circuit-closing points *c* are made and broken, thus making and breaking the circuit of a main-line battery, M B, which is connected through said points with the front stop of a key, C K, through whose back stop the line L is connected to the switch-board S, as shown. The depression of said key disconnects the line from the switch-board and connects it to the

automatic vibrator, and so long as said key remains depressed a series of pulsations from battery M B are sent to line through points *c*, thus producing a continuous or vibratory signal in the tap-bells at subscribers' stations.

In Fig. 2 I have shown devices for producing a series of reversed electrical impulses upon a telephone-line, each station of which is provided with a polarized tap-bell, P B, of any preferred construction, without breaking the continuity of said line. E B' is the electromagnet of the automatic electro-magnetic vibrator. M B' is a split main battery connected to earth, as shown, and with one terminal joined to the armature-lever *l* of E B', and the other to a contact-point, *p*, which enters a perforation in the armature-lever wherever said lever is depressed. A circuit-closing spring, 5, rests upon the lever directly over the perforation. When said lever is depressed the spring rests upon the contact *p*, while at the same time the contact of the spring with *l* is broken. When the lever is retracted the spring is lifted from the stop *p* by the lever. As will be seen, neither contact is broken before the other is made, while the effect upon the battery M B' is to put its sections alternately to line, but with reversed poles, thus transmitting a series of reversed impulses. C K is the key which disconnects the line from the switch S and connects it to the automatic circuit-reverser. The reversed impulses produce a continuous ringing in the polarized bells P B, so long as the key C K is depressed, in a well-known manner.

In Fig. 3 I have shown a continuity-preserving key, T K, for disconnecting the line from the switch-board and connecting it to the vibrator. The construction of this key is substantially the same as that of the armature-lever *l*, Fig. 2, and its operation will be readily understood. The vibrator in this case sends impulses of varied strength without breaking the continuity of the circuit. This is accomplished by means of the resistance R, placed in a derived circuit around the point *c p*. The vibrating armature of B alternately shunts the resistance from the circuit and throws it into

the circuit of the main-line battery M B', with the effect of alternately increasing and diminishing the strength of the main-line current without disturbing its continuity. By this arrangement I am enabled to send vibrating signals over a circuit which is used also for other purposes. When such signals are made by reversal of currents the devices for other uses should be constructed and arranged to be actuated by varying the circuit's tension, and when the signals are produced by varying the tension of the circuit the devices for utilizing the line for other uses should be adapted to respond to reversals of the currents. In either case the employment of continuity-preserving switches and keys in the system is desirable.

It is obvious that the necessary vibrations, pulsations, or reversals of the current may be produced by other devices besides the electromagnetic devices shown—as, for instance, clock-work, rheotomes, or such like apparatus.

I do not desire to limit myself to the transmission of reversed impulses by continuity-preserving devices, as such impulses may be also sent by apparatus which breaks the circuit at each change of polarity; nor do I desire to limit myself to the employment of a continuity-preserving key with the particular vibrator shown in Fig. 3, as such key may be also employed with the arrangements shown in Figs. 1 and 2.

I do not claim in this application the combination of a continuously-acting pole-changer and means for connecting the pole-changer to any one of several lines centering in a switch-board, said lines containing bells adapted to be operated by reversed electric impulses, as a claim to such a combination is contained in one of my prior applications.

What I claim is—

1. The combination, at one station of a telephone or telegraph line, of an automatic electro-magnetic vibrator, a main-line battery controlled thereby, a circuit-closing key for connecting said battery with the line through the contacts of the vibrator, and at another station or stations of said line tap-bells of ordinary construction, the whole so arranged that when the key is depressed electrical impulses from the main-line battery are sent to line in rapid succession, thus producing a vibratory signal in the bell or bells, substantially as described.

2. In a telephone-exchange system, a telephone-line provided at each subscriber's station with a tap-bell normally in the circuit, and at a central office, a switch interposed between the line and the switch-board, circuit-connec-

tions from said switch to an automatic electro-magnetic vibrator, and a main battery whose circuit is through contact-points controlled by said vibrator, the whole so arranged that while the key is depressed the telephone-line is cut off from the switch-board, and electrical pulsations in rapid succession are conveyed to the line from the main battery and vibrator, thus producing vibratory signals in the tap-bells at the various subscribers' stations.

3. In a telephone signaling apparatus, an automatic electro-magnetic vibrator, continuity-preserving circuit-closing points connected to a main-line battery and to a key, and circuit-connections from said key to a main line, provided at one or more points with tap-bells, the whole so arranged that when said key is depressed electrical pulsations are sent to line in rapid succession from the battery without breaking the circuit, so as to produce vibratory signals in the tap-bells, substantially as described.

4. At a central-office telephone-station, a continuity-preserving key provided with circuit-connections to a switch-board, to a line provided with tap-bells, and to a branch line containing a main battery whose circuit is through the continuity-preserving points of an automatic vibrator, the whole arranged, substantially as described, so that when the key is depressed the line is cut off from the switch-board and connected to the branch, passing through the points of the vibrator without interrupting the circuit, while at the same time electrical impulses from the main-line battery are sent to line through the continuity-preserving points, and the bells are made to give vibratory signals.

5. The combination, substantially as described, of a perforated key-lever, a spring resting upon said lever, a contact-stop entering said perforation and arranged to make contact with the spring when the key is depressed, and circuit-connections to line and to two independent branches to earth, one of which contains a battery and contact-points of an automatic vibrator, substantially as described.

6. The combination, substantially as described, with a constantly-vibrating armature-lever, of circuit-connections from said lever and its contact-stop to a battery, to a key controlling the circuit of said battery, and to a derived circuit around the lever and its contact containing a resistance.

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Witnesses:

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