

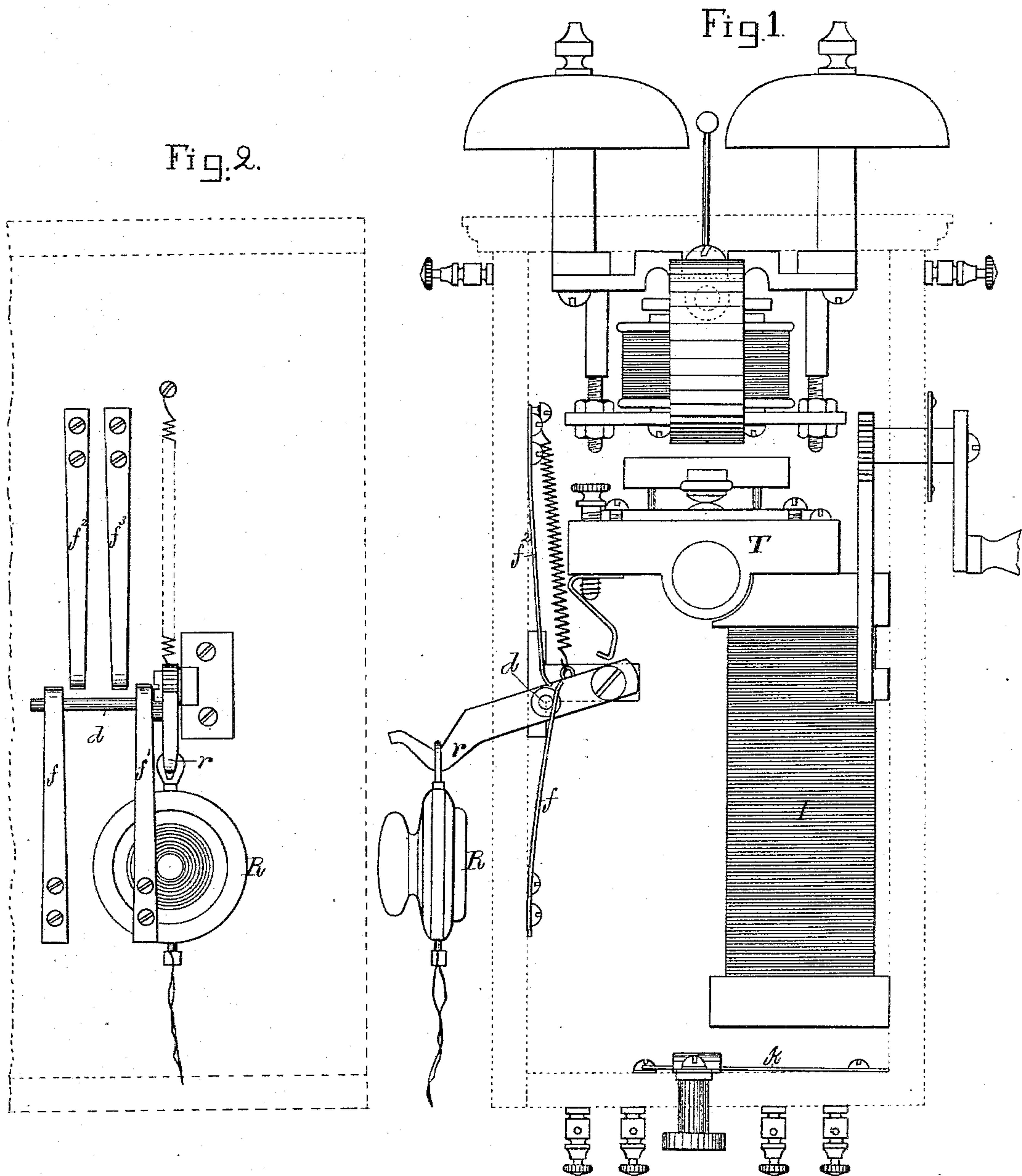
(No Model.)

2 Sheets—Sheet 1.

A. E. DOLBEAR.
TELEPHONE SYSTEM.

No. 325,659.

Patented Sept. 8, 1885.



Witnesses.

Lauritz N. Möller.

John R. Snow.

Inventor.

Amos E. Dolbear

J. E. Magnadice
his atty.

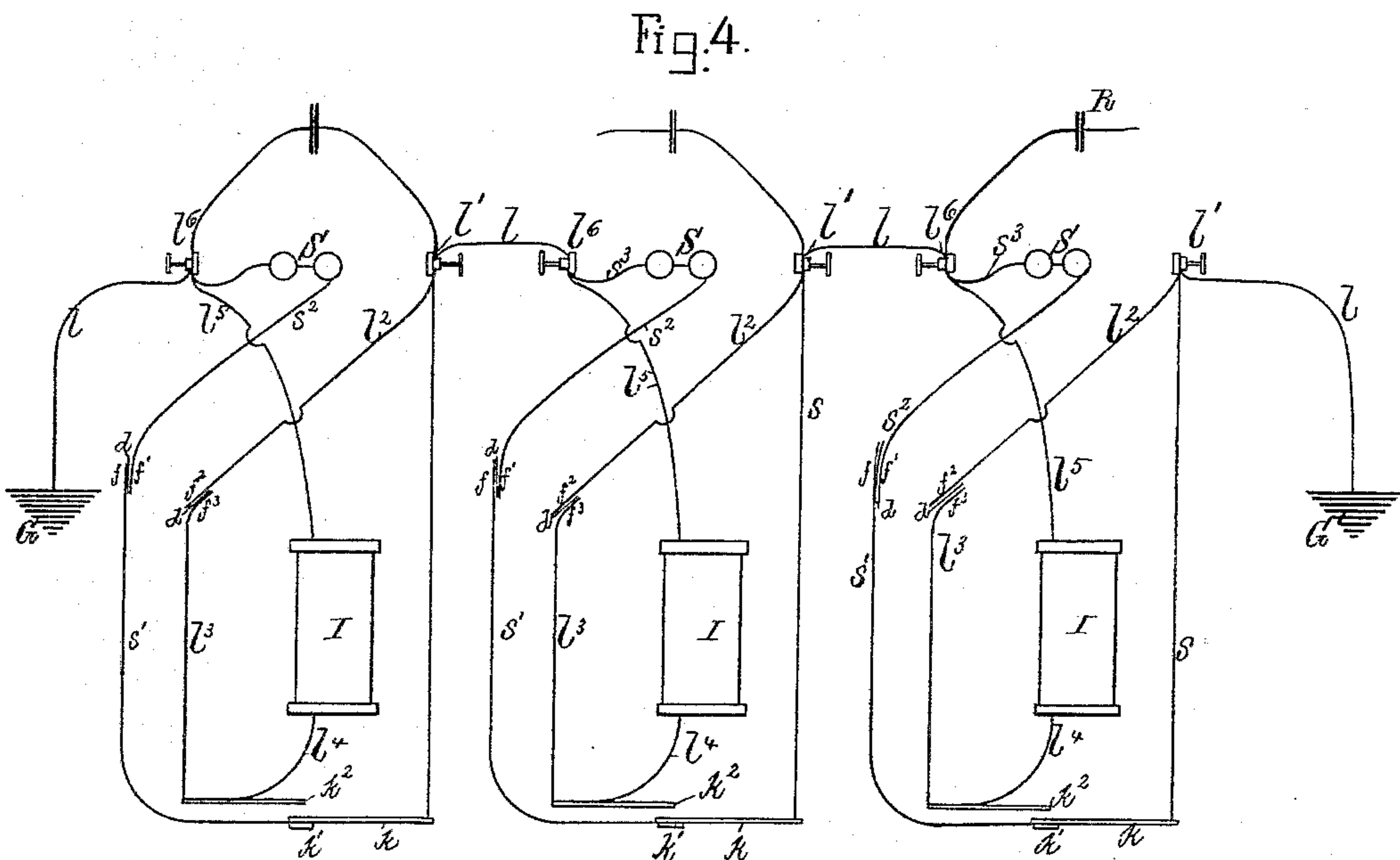
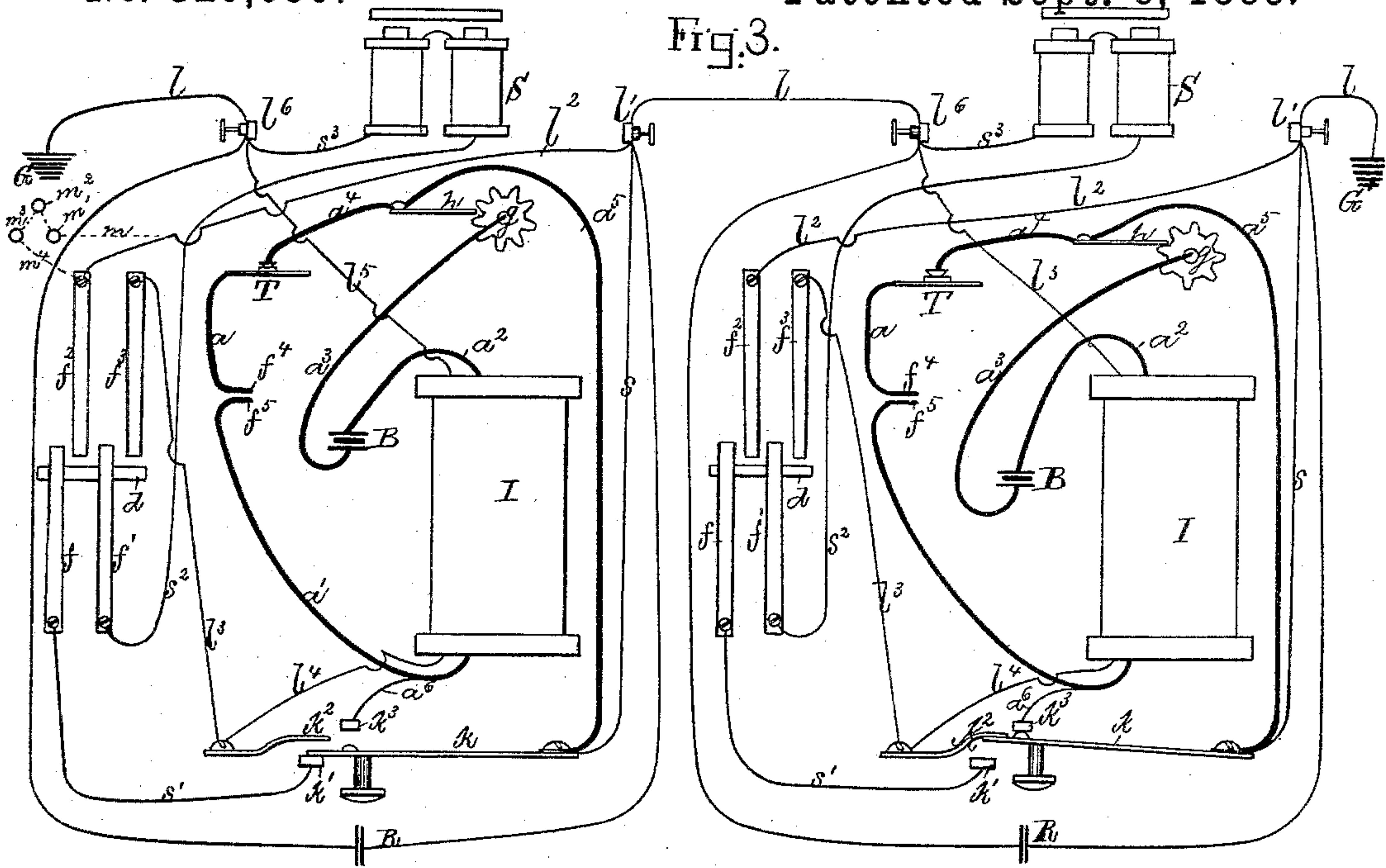
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John R. Snow.

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UNITED STATES PATENT OFFICE.

AMOS EMERSON DOLBEAR, OF BOSTON, MASSACHUSETTS.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 325,659, dated September 8, 1885.

Application filed April 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, AMOS EMERSON DOLBEAR, of Boston, (Somerville,) in the county of Middlesex and State of Massachusetts, have
5 invented certain Improvements in Telephone Systems, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to that class of tele-
10 phones described in my Patents No. 239,742, dated April 5, 1881, and No. 240,578, dated April 26, 1881.

In the drawings, Figure 1 is a front elevation, and Fig. 2 a side elevation, of the apparatus used at each station. Figs. 3 and 4 are
15 diagrams to show more clearly the arrangements of circuits new with me.

The apparatus, as shown in the drawings, consists of the transmitter T, receiver R, induction-coil I, battery B, signaling mechanism S, primary circuit $a a'$, &c., line or secondary circuit $l l'$, &c., and signal-circuit $s s'$, &c., which, of course, forms part of the line or
20 secondary circuit when in use. These circuits should be provided with proper switches, by which the transmitter may be cut out of the primary circuit when that circuit is used for charging the receiver-plates or for signaling, and the signaling mechanism be cut out of
25 the line when conversation is carried on, and the primary circuit must be provided with a proper circuit-closer, by which the primary circuit is made and broken, in order to induce currents in the line, and thereby operate the signaling mechanism, (and charge the receivers when my receivers are used.)

In practice all the receivers R are on their hooks r until a station (say station 1) is called, and as long as the receiver R of station 1 is on its hook r the rod d , carried by hook r , is in contact with the two springs $f f'$, and consequently the line is closed from binding-post l' , by which the line connects with the apparatus on one side, through signaling mechanism S to binding-post l'' , by which the line connects with the apparatus on the other side, the circuit extending through wire s , key $k k'$, wire s' , switch $f d f'$, wire s'' , and wire s''' ; and as line l is grounded at each end, there is a complete circuit from
30 the secondary coil of each station through the signaling mechanism of all the other stations

on the line. At the calling-station—say station 2 of Fig. 3—the caller presses upon the knob of key k , and thereby forces k into contact with k'' and k''' , which breaks contact between k and k' , (for the purpose of throwing out his own signaling mechanism S.) He then operates circuit-closer $g h$, making and breaking the primary circuit B, a^3 , $g h$, a^5 , $k k^3$, a^6 , and a^2 , thereby inducing currents in the line l , which actuate the signaling mechanism S at station 1, (and all others in the line,) as before described. After station 1 has been called and answered, the receivers are taken
55 from their hooks, which closes switch $f^2 d f^3$, and also closes switch $f^4 f^5$ in the primary circuit. The primary is then through B $a^2 a'$ $f^5 f^4 a T a^4 h' g^2 a^3$, and the secondary circuit is complete from G through $l l^6 l^5 l^4 l^3 f^3 d f^2$ $l^2 l' l$ through all the stations on the line to G'.

In case there be only two stations in the line, as in Fig. 3, both receivers will of course be off their hooks when the line is in use for conversation. That example of my invention
65 illustrated in the drawings is therefore limited, practically, to private lines, for all the stations must be called to call any of them, and each must take its receiver off its hook to learn which is wanted. In case of a large
70 number of stations on one line, especial circuit-breakers will be used at each station and provision made for individual calls. In this case, if station 3 call station 1, Fig. 4, the line for conversation between 3 and 1 will be
75 through $s k k' s' f d f' s^2 S s^3$ of station 2 and of all other stations not called.

This invention relates to the utilization in telephone-lines of the primary circuit and its battery for calling, and to a special arrangement of my receiver with a closed circuit; and these features can be better shown in the arrangement for private lines than in the more complicated arrangements where a central office is used or where individual calls—that
80 is, especial circuit-breakers—are in the primary of each station; hence it is deemed unnecessary to describe here the details of those more complicated arrangements.

Of course, if magneto-receivers be used, they
85 must be in the complete circuit above described. For example, as shown by the dotted lines $m m' m^2 m^3 m^4$, where that part of the line marked l^2 is supposed to extend by line m to

m' , thence through the magneto-receiver m^2 to post m^3 , and thence by m^4 to switch f^2 , instead of direct to switch f^2 ; but when my receivers are used one plate of each receiver must be in electric connection with that part of the line which extends between the generating secondary coil and some other secondary coil in the line, while the other plate of the receiver may be grounded or may be in electric connection with the line, as described in my Patent No. 240,578, above named; for, as my system of telephony depends wholly upon the electromotive force on the line, and has nothing to do with current strength, one plate of the receiver must be connected with a part of the line at a high electric potential, the other plate being grounded or otherwise arranged so that the difference of potential between the two plates may be sufficient.

One feature of my invention consists in the combination of a transmitter and a circuit-breaker with the battery and helix of the primary circuit of an inductorium, the secondary of which contains a call-bell, S, or other signaling mechanism, as well as suitable telephonic instruments, whereby the battery is enabled to be used either for calling or for conversation; and this part of my invention is adapted for use with magneto-receivers m^2 , as well as with my receivers R.

Another feature of my invention consists in the combination of two or more secondary coils with two or more of my receivers R in the manner described, so that one plate of each receiver shall be connected to a point in the line which is separated from the ground by one of the secondary coils or equivalent high resistance, for it will be seen that the potential at any point on the line between the secondary coil at the transmitting-station (by which the current in the line is generated) and the secondary coil at the receiving-station through which the current must pass to ground depends (other things being equal) upon the resistance of the latter secondary coil; and as it is essential that the plates of my receiver shall differ widely in potential, one of them must be connected to some point of the line between the generating secondary coil and the resistance.

It will be clear that that part of the primary marked a^4 may connect directly with a^3 , instead of through $h g$, as shown, and also that the details may be otherwise largely varied, as my invention does not relate to the details, but to the combination of the inductoriums and their transmitters with the circuit-breaker

in the primary and signaling and telephone instruments in the secondary circuits of the inductoriums, and the connection of one plate of my receiver with that portion of a grounded line or circuit otherwise closed whose potential depends upon a resistance in the line.

In Fig. 4 I have illustrated three stations in one line; but it will be seen that all the terminal stations of any line will be substantially as shown in Figs. 3 and 4, and all intermediate stations substantially as shown by the intermediate station in Fig. 4.

By the arrangement of devices shown in the drawings I am enabled to charge the dielectric coating of the plates of the receivers R; but this formed the subject-matter of another application for United States Patent and of my English Patent No. 5,870 of 1882.

What I claim as my invention is—

1. In combination, two or more inductoriums, each having two primary circuits, a transmitter in one primary circuit of each inductorium, a circuit-breaker in the other primary circuit of each inductorium, and signaling-instruments and receivers in the line formed by the secondaries of the inductoriums, as set forth.

2. In combination, two or more inductoriums, the secondaries of which form a line grounded at each end, signaling-instruments in that line, and a circuit-breaker in the primary of each inductorium, the operation of the circuit-breaker at either station causing induced currents in the line and operating the signaling-instrument in the line at a distant station, substantially as described.

3. An inductorium having in its primary circuit both a transmitter and an apparatus for rapidly making and breaking the circuit, and both a signaling-instrument and a receiver in its secondary circuit, whereby the sudden makes and breaks of the primary circuit induce in the secondary currents sufficient to operate the signaling-instrument, as set forth.

4. In combination, two or more inductoriums, the secondaries of which form a closed-line circuit and the primaries of which contain telephonic transmitters, with one or more receivers, each consisting of two plates, one plate of each receiver being connected to the line at a point between two secondary coils, substantially as described.

AMOS EMERSON DOLBEAR.

Witnesses:

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J. R. SNOW.