

(No Model.)

C. LANGDON-DAVIES.

SYSTEM OF TELEPHONY AND TELEGRAPHY.

No. 351,367.

Patented Oct. 26, 1886.

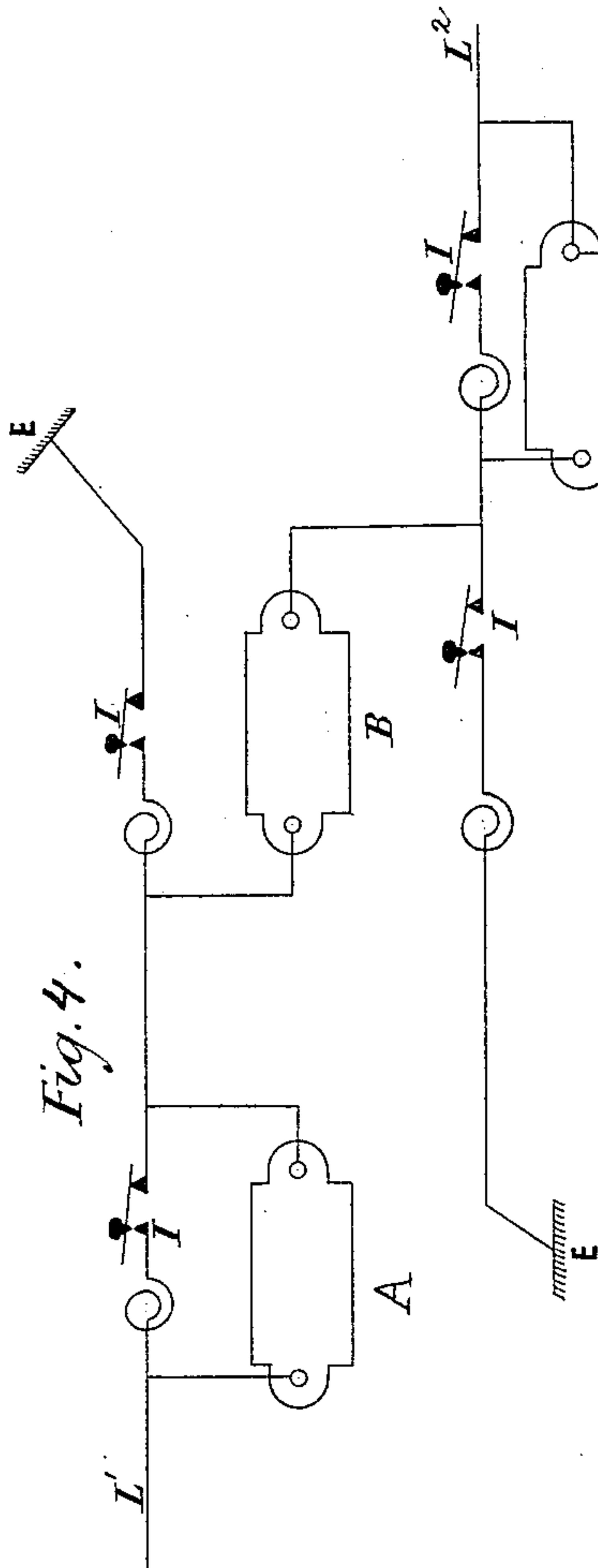


Fig. 4.

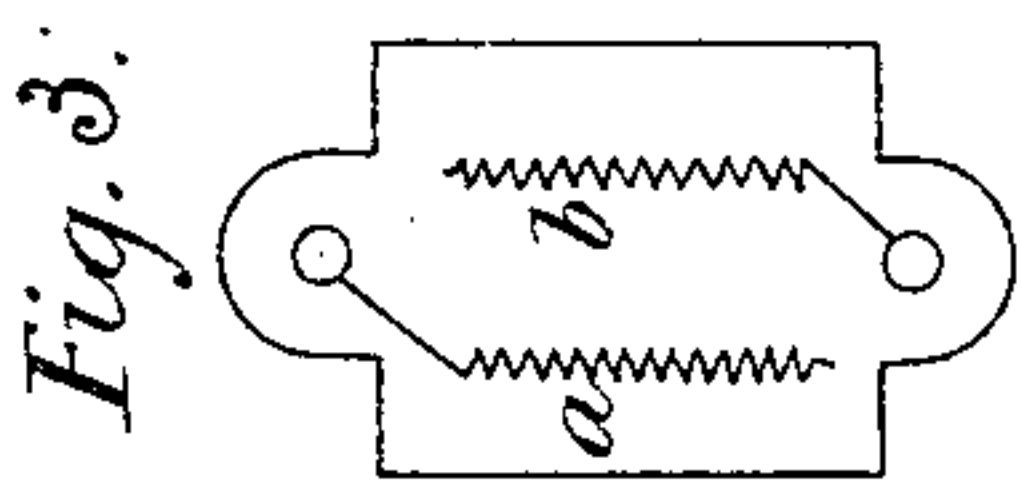


Fig. 3.

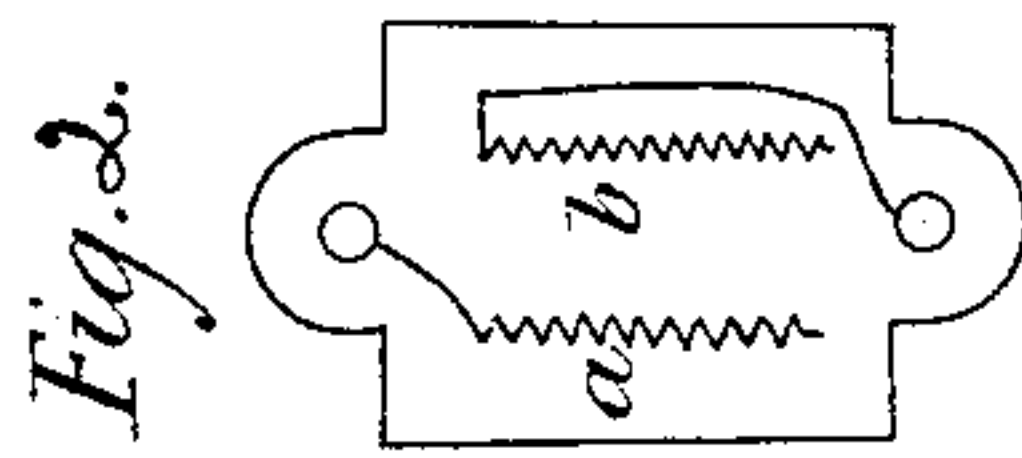


Fig. 2.

Fig. 7.

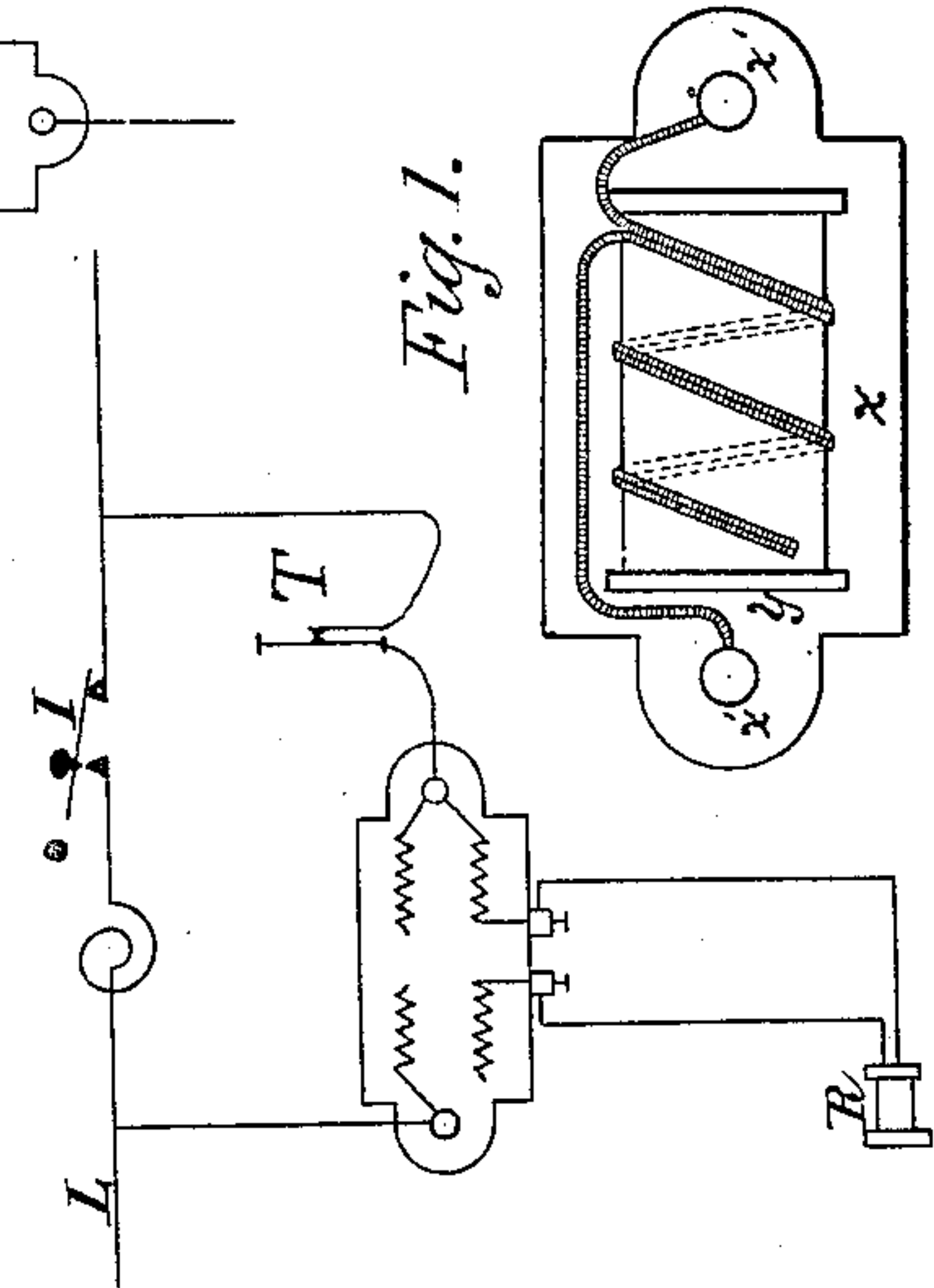


Fig. 6.

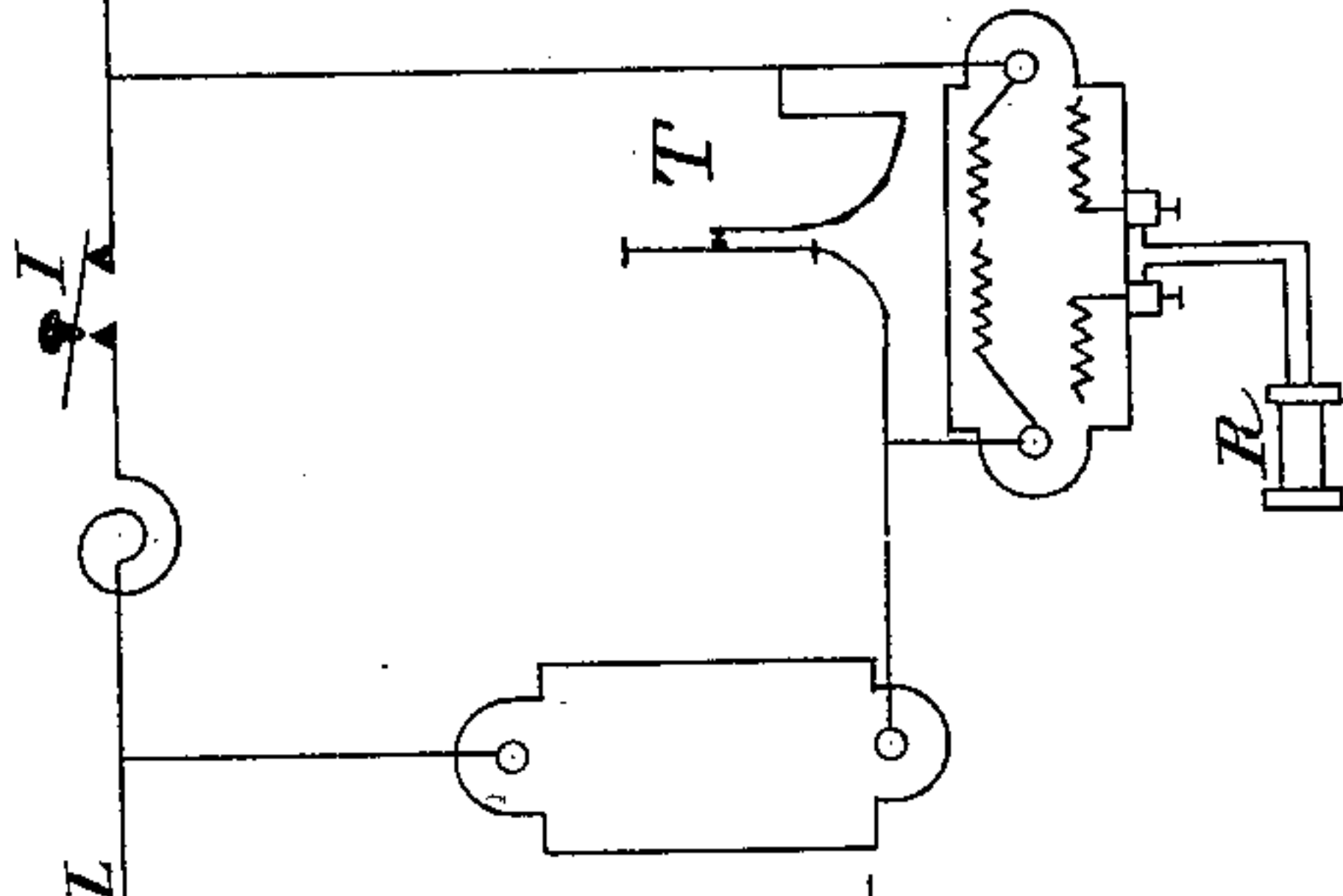


Fig. 5.

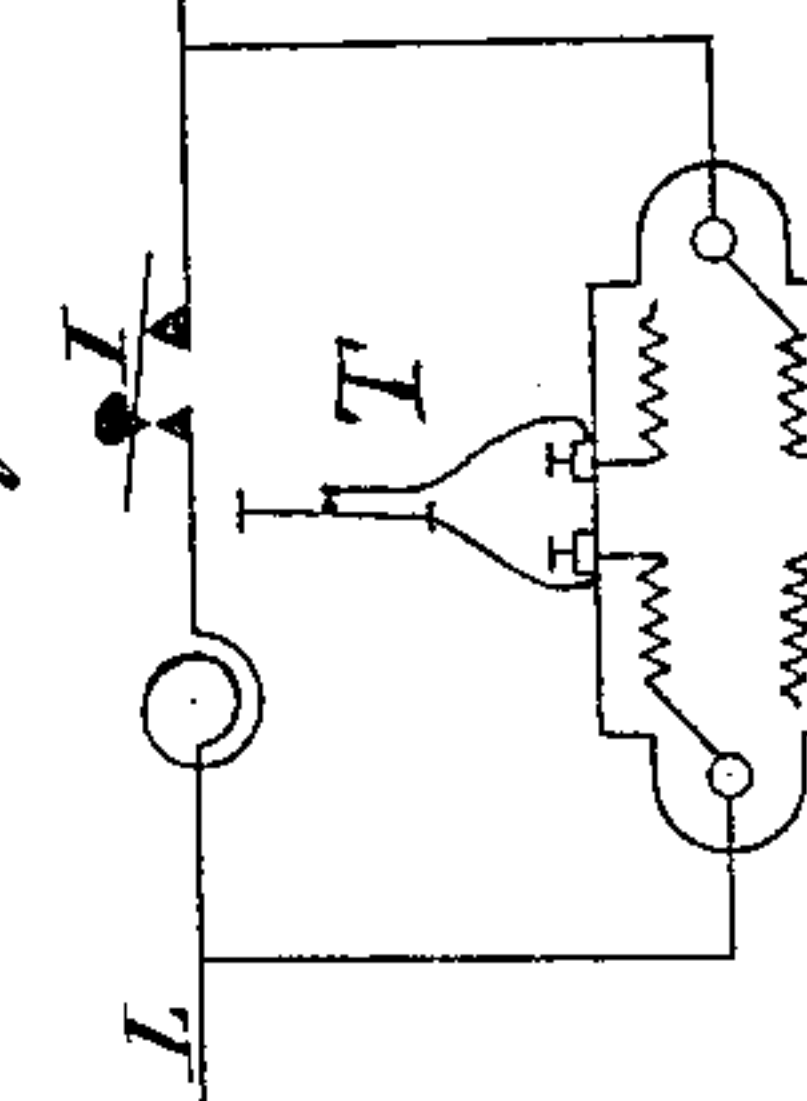


Fig. 8.

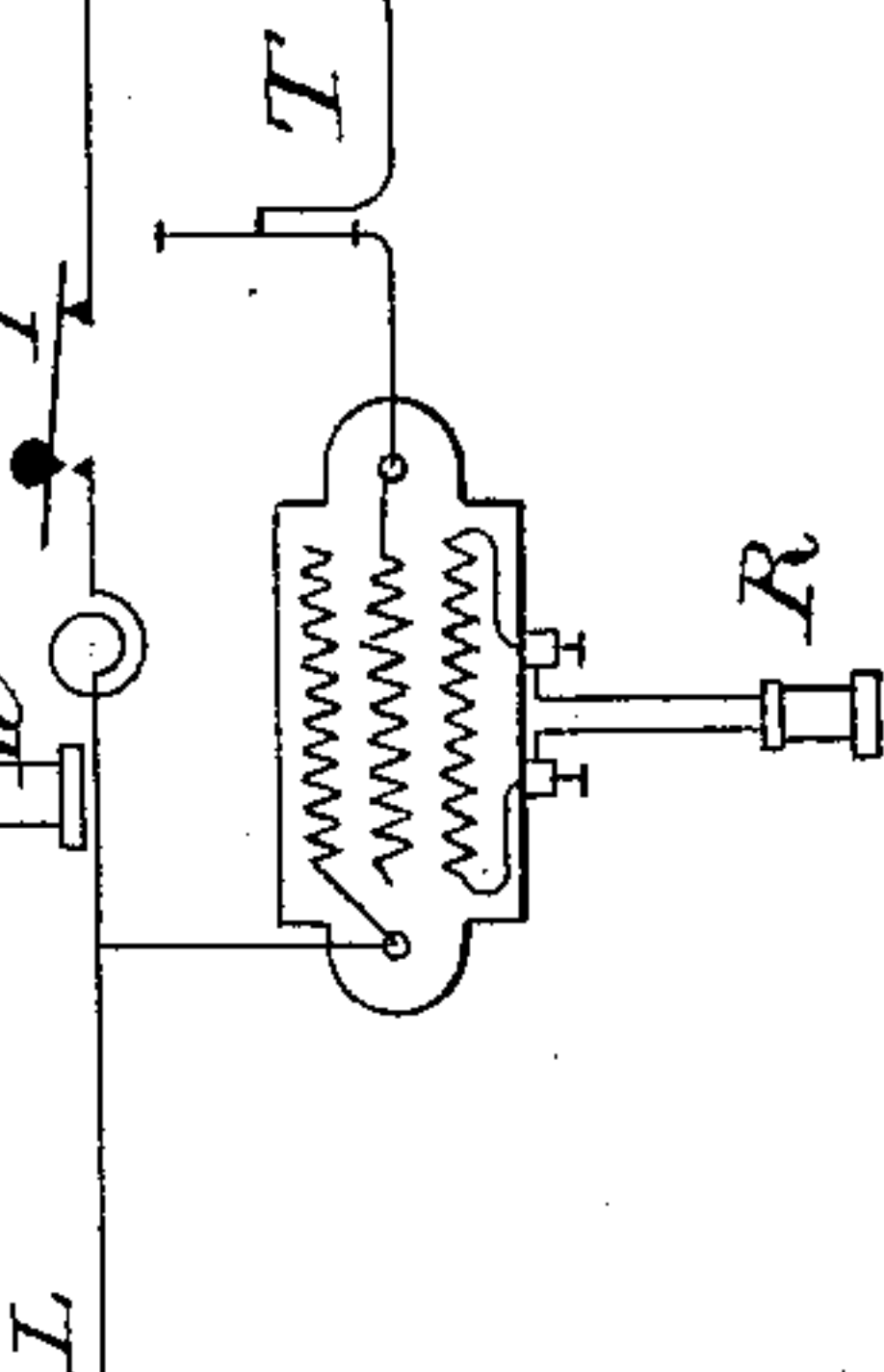
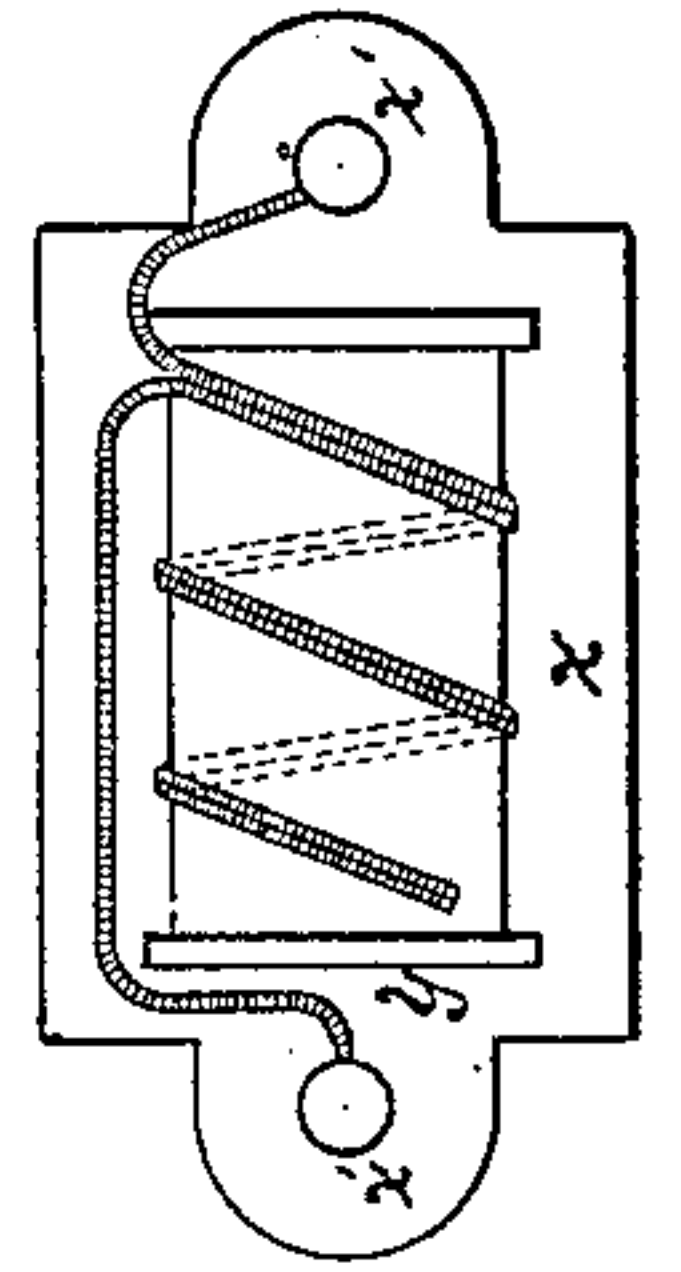


Fig. 1.



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UNITED STATES PATENT OFFICE.

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SYSTEM OF TELEPHONY AND TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 351,367, dated October 26, 1886.

Application filed July 13, 1885. Serial No. 171,414. (No model.) Patented in England August 4, 1884, No. 10,990; in France June 10, 1885, No. 169,485; in Germany June 16, 1885, No. 35,657; in Belgium June 27, 1885, No. 69,419; in Italy June 30, 1885, No. 18,620; in Portugal July 8, 1885, No. 995; in East Indies July 16, 1885, No. 98; in Spain December 7, 1885, No. 7,936; in Norway December 31, 1885, and in Austria January 16, 1886, No. 33,699.

To all whom it may concern:

Be it known that I, CHARLES LANGDON-DAVIES, a subject of the Queen of Great Britain, residing at 110 Cannon Street, London, England, electrician, have invented certain new and useful Improvements in Telephony and Telegraphy, of which the following is a specification.

The invention has been patented to me in Great Britain by Letters Patent No. 10,990, dated August 4, 1884; in France, No. 169,485, dated June 10, 1885; in Germany, No. 35,657, dated June 16, 1885; in Belgium, No. 69,419, dated June 27, 1885; in Austria, No. 33,699, dated January 16, 1886; in Italy, No. 18,620, dated June 30, 1885; in Spain, No. 7,936, dated December 7, 1885; in Portugal, No. 995, dated July 8, 1885; in Norway, (no number,) dated December 31, 1885; and in the East Indies, No. 98, dated July 16, 1885.

The object of this invention is to use line-wires in which ordinary telegraphic communications are already being carried on for the additional purpose of telephony or for additional telegraph services on the same wire, and incidentally to increase the strength of the telephonic impulses so as to permit of long-distance telephony on either telegraphic or telephonic wires.

I use a special instrument, hereinafter described, which permits the passage of electrical sounds, but arrests the passage of electrical currents, or at any rate of such currents as are capable of actuating ordinary telegraphic instruments. The said instrument consists of two or more conductors (such as copper wire) insulated from each other throughout their entire length and then bound together with silk or other suitable material. The duplex or multiple wire thus prepared is wound upon a bobbin. A convenient form consists of a coil of double wire having two strands of, say, No. 30 Birmingham wire-gage, and being about five hundred yards long, more or less. One end of each strand is insulated and the other end carried to a terminal. By means of this instrument I connect line-wires, the one to the other, and I connect telephonic or harmonic

transmitting or receiving instruments with line-wires in such manner that telephonic or harmonic impulses pass freely, while currents are arrested.

I would here state that I am aware that condensers have before been used to facilitate simultaneous telegraphic and telephonic communication by the same line-wire. I therefore make no claim to the use of condensers; but my claims, hereinafter set forth, are limited to the use for this and analogous purposes of the special instrument which I have described, which differs entirely from a condenser not only structurally, but also electrically. In this instrument the surfaces have great extension in one direction only, or, in other words, the conductors are approximately linear, whereas a condenser is made up of conductors having broad superficies along which the electricity is propagated in a wholly different manner.

Figure 1 is a plan of the special instrument which I thus employ in simultaneous telegraphy and telephony. It is in appearance simply a base-board, *x*, carrying a wooden bobbin, *y*, on which covered wires *z* are wound, and one end of each wire is brought out to a clamping-post, *x'*. Figs. 2 and 3 are diagrams representing the instrument in two slightly-different forms. Fig. 4 is a diagram representing the application of the instrument to which the preceding figures relate, to connect together line-wires employed for ordinary telegraphic purposes, so as to adapt them for use also for telephonic and harmonic telegraphy. Figs. 5 to 8 are diagrams representing the connection of line-wires with telephonic transmitting and receiving instruments.

In Figs. 2 and 3, *a* and *b* represent two long insulated wires wound side by side, as already described, upon a bobbin of wood or other insulating material. One end of each wire is connected with a binding-post and the other remains unconnected. This figure shows two adjacent ends, which are left unconnected, and the instrument may be so used; but experience shows that much better results are obtained when the connections are made in the way

which Fig. 2 indicates—that is to say, when one of the two wires together wound upon the bobbin is connected by its inner end to one binding-post and the other wire by its outer end to the other binding-post.

In Fig. 4, telegraphic lines are shown coupled together for simultaneous telephonic use, or it may be for harmonic telegraphy, and a branch line is coupled with them. At A the instrument is applied as a shunt. At A it is represented applied as a shunt to the ordinary telegraph-instruments, I, at a telegraph-station. It here serves to maintain the continuity of the line for telephonic purposes, or for harmonic telegraphy, whether the ordinary telegraph-key be opened or closed, and whether the key be opened or closed telephonic communication or harmonic telegraphy can be carried on past the ordinary telegraph-instruments. It is necessary that ordinary telegraph-instruments, I, shunted by my instrument at A, should have a certain resistance—say about one hundred and fifty ohms. Increasing that resistance even to infinity does not affect the action of my instruments; but reducing it so as to adjust it approximately to the minimum resistance necessary to permit the desired action of the telephone has the additional advantage of reducing the noise of the telegraph in the telephone. At B my instrument is shown applied to effect continuity between two line-wires, L^1 and L^2 , which for ordinary telegraphic purposes remain separate and independent circuits. As will be seen, one of its binding-posts is connected with each of the line-wires to be coupled, and the telephones on the one line can speak with telephones on the other, although for telegraphic purposes the lines remain distinct. At C two of my instruments are shown applied to connect a branch telephone-wire or a branch harmonic telegraph-wire with an ordinary telegraph-wire. One of my instruments shunts the ordinary telegraph-instruments, as at A, while the other brings in the branch line without making any connection by which telegraphic currents can travel.

Any telephone-station on either of the lines, indicated in Fig. 4, can speak with all the other stations. The arrangement is also available for the same purpose on exclusively telephonic circuits.

The way in which I use my instrument to connect telephone receivers and transmitters with telegraph-line wires is shown by the Figs. 5 to 8.

For connecting telephone-instruments it is advantageous to use a double connecting-bobbin, which I make by winding on a bobbin about one thousand yards of two-wire strand, as previously described. The middle of the strand is brought out and divided and the ends taken to four terminals, as indicated at Fig. 4, which illustrates also the way in which the connecting-bobbin is used in connecting the secondary coil of the transmitting-telephone

marked T and the telephone-receiver marked R. In the arrangement here shown, there being four wires wound side by side upon the connecting-bobbin, there are eight ends. Six of these are taken to binding-posts while two remain unconnected. The connections may be traced as follows: The line-wire on one side of the ordinary telegraph-instruments, I, is connected to the outer end of one of the four insulated wires on the bobbin, and the secondary coil of the telephone-transmitter T (which may be of any ordinary construction) is connected with the inner end of the same wire, and also to the inner end of another wire, which at its farther or outer extremity remains unconnected. The telephone-receiver is connected in a precisely similar way through my instrument to the telegraph-line on the other side of the ordinary telegraph-instruments, I. These connections, however, may be much varied, as is illustrated, for example, by the Figs. 6 and 7, in which the same letters of reference being employed no further description is required. The essential feature in all these arrangements is that there is no metallic continuity from the line on one side of the ordinary telephone-instruments to the line on the other through either the telephone-receiver or the telephone-transmitter. I sometimes wind my connecting-bobbins with three wires, each separately insulated from the others, then bound together, as previously described, and wound upon a bobbin to a length of, say, five hundred yards.

Fig. 8 shows a three-wire bobbin applied as a shunt to the ordinary telegraph-instruments to connect telephonic instruments. Here one end of each of two of the wires is insulated, and the third wire is closed into a circuit through the telephone-receiver R. It will be observed that in this arrangement the telephone-receiver has no metallic connection with the line-wire. If the bobbins contain wires in addition to those of which the uses have already been described, as may advantageously be the case, these wires are connected up into circuits needing no external connections.

By the above-described means any ordinary telephone may be attached to any ordinary telegraph-line, and the two communications worked simultaneously; and, further, any instrument for transmitting telegraph-signals by means of harmonic or instantaneous alternating currents or impulses may also be added to the ordinary telegraphs, and the two communications worked simultaneously on the same wire without affecting each other.

I claim—

1. The combination of two telegraphic line-wires and a bobbin on which two or more insulated wires are together wound, such line-wires being connected each with one extremity of one of the wires on the bobbin, the other ends of the bobbin-wires being unconnected, whereby without establishing metallic con-

tinuity between the line-wires telephonic or harmonic impulses are enabled freely to pass, substantially as described.

2. The combination of the bobbin on which
5 two or more insulated wires are together wound, the line-wires connected each with one extremity of one of the wires on the bobbin, the other ends of the bobbin-wires being unconnected, and sound transmitting and receiving
10 instruments connected in open circuit with the

line-wires, whereby telephonic or harmonic impulses are enabled freely to pass, while disturbing currents are arrested or prevented, substantially as described.

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