(No Model.)

# W. W. JACQUES.

## COMBINED TELEGRAPHY AND TELEPHONY.

No. 485,279. Patented Nov. 1, 1892.

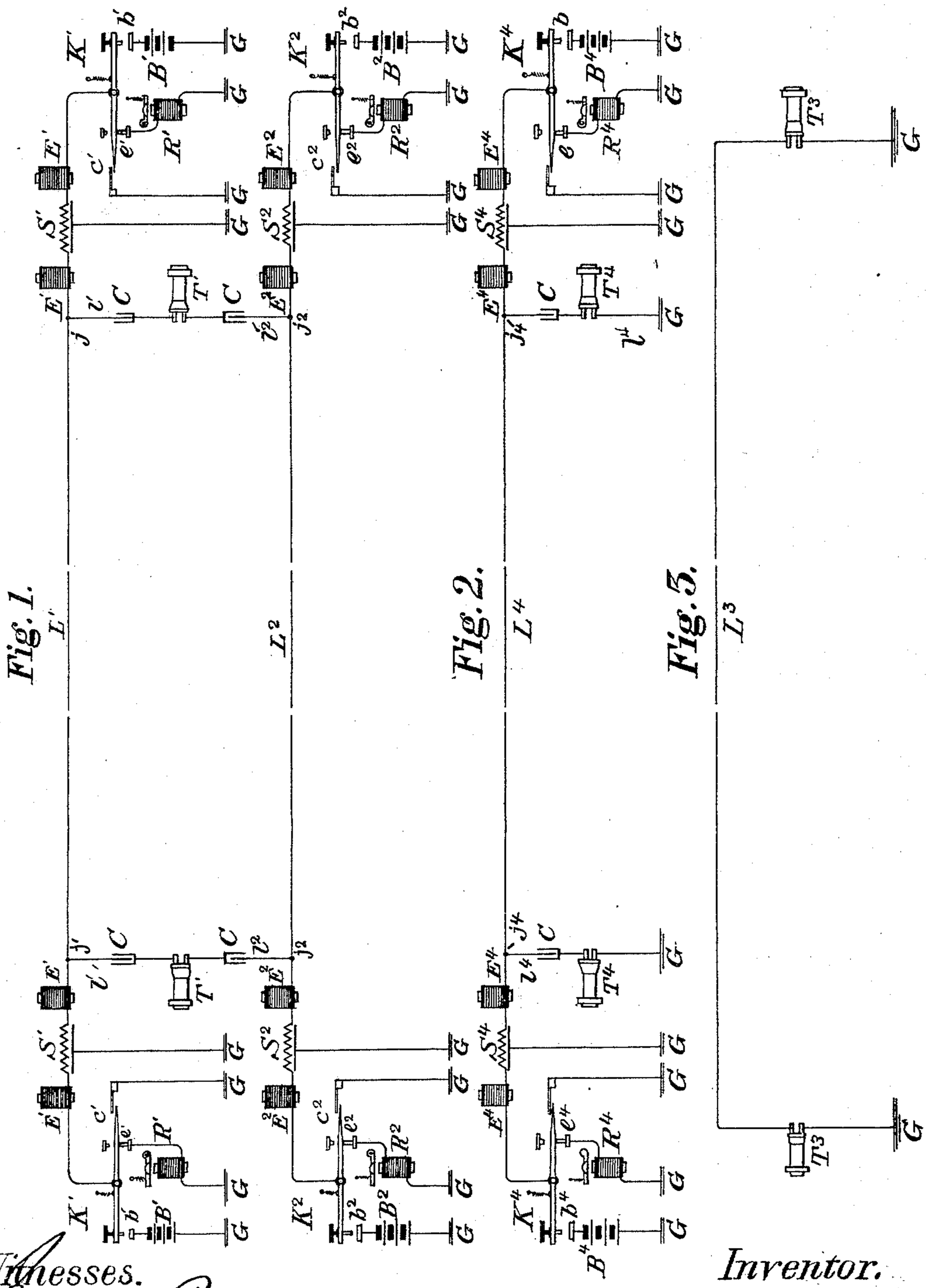


Fig. 1.

Fig. 2.

Fig. 3.

Witnesses.
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# UNITED STATES PATENT OFFICE.

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## COMBINED TELEGRAPHY AND TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 485,279, dated November 1, 1892.

Application filed April 8, 1892. Serial No. 428,339. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. JACQUES, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Combined Telegraphy and Telephony, of which the following is a specification.

The invention relates to the use of the same or neighboring line-wires for both telegraphing and telephoning; and its principal feature consists in the employment, in a telegraph-circuit between the main-line wire and the source of electric energy of the telegraph apparatus, of a combined electrostatic inductive resistance and electro-magnetic inductive resistance whereby electric disturbance of the telephone-current by the telegraph-current is prevented, whether the two currents travel the same or adjoining line-wires. Where the same line is used for both telegraph and telephone, an additional advantageous effect results from the employment of the combined resistances in diminishing the waste of telephone energy. Either the electrostatic inductive resistance or the electro-magnetic inductive resistance by itself, without the other in the telegraph-circuit, will diminish the disturbance in the telephone-circuit that would be occasioned by the telegraph-circuit if neither resistance were inserted; but I believe that it is only by the employment of both of said resistances in the telegraph-circuit that the click of the telegraph apparatus becomes inaudible in the telephone-circuit. Moreover, whereas if but one of the said resistances be employed in the telegraph-circuit the responses of the relay at the farther end of the line to the signals transmitted are so sluggish that telegraphy is with difficulty practiced with sufficient rapidity for ordinary purposes. No substantial delay results in sending and receiving telegraph-signals if both of said resistances be employed.

The invention consists, further, in combinations and sub-combinations employing said combined resistances, as hereinafter set forth.

The electrostatic inductive resistance used in practicing this invention is generally known to electricians as the "Muirhead condenser." In this description I retain the name under which the instrument is manufactured and sold by its inventor. The electro-magnetic inductive resistance which I have used consists of a coil of wire in the circuit, surrounding a bundle of wires, as a core. The addition of an electro-magnetic inductive resistance of one hundred ohms resistance and ten thousand ohms apparent resistance to a Muirhead condenser of one hundred ohms resistance and ten microfarads capacity will produce an instrument that will prevent interference between any telegraph and telephone circuits. An instrument embracing such a combination of inductive resistances is impermeable to telephone-currents, and, while easily permeable to a telegraph-current, takes out of a telegraph-current that property by virtue of which it may set up disturbing induced currents in telephones wherever placed.

In the drawings, Figure 1 is a diagram illustrating the application of my invention to two line-wires which are employed separately for the transmission of telegraph-signals and together for the simultaneous transmission of telephone-signals. Fig. 2 is a diagram illustrating the application of my invention to a single line-wire employed for the simultaneous transmission of telegraph and telephone signals and sounds. Fig. 3 represents a grounded telephone-circuit in the neighborhood of one or both of the circuits of the other figures.

The same letters represent like parts in the same or different figures, numerals being added to the letters to indicate the different electric circuits and the wires and apparatus respectively pertaining thereto. The apparatus shown at one end of a line-wire is the duplicate of apparatus shown at the other end.

L′ and L² are two line-wires.

K′ and K² are keys for transmitting telegraph-signals.

B′ and B² are batteries, and R′ and R² are relays or receivers of telegraph-signals.

E′ and E² are electro-magnetic inductive resistances, and S′ and S² are Muirhead condensers or electrostatic inductive resistances.

T′ represents a set of telephone apparatus, including variable-contact transmitter, receiver, battery, &c. As usual in such cases,

the Bell hand-telephone is shown as the symbol for said group of telephone apparatus, and under some conditions the said hand-telephone would answer the purposes of this invention.

The two sets of telephone apparatus T′ T′ are in a metallic circuit, their connecting-wires $l'$ and $l^2$ making connection with the main-line wires L′ and L² at $j'$ and $j^2$, respectively. Condensers C are placed in each of the telephone-wires $l'$ and $l^2$, as shown. The resistances E′ and E² and S′ and S² are placed between the junctions $j'$ and $j^2$, above mentioned, and the telegraph apparatus of their respective lines; but for the purposes of this invention they might be located between the batteries B′ B² and the make-and-break contact-points of the respective keys K′ K².

C is an ordinary condenser, and G is a ground in all the figures.

L³ is an independent line-wire with a grounded telephone T³ at each end.

In the operation of the apparatus thus far described the line-wires L′ and L² are used independently of each other for transmitting and receiving telegraph-signals, and, along with the two loops $l'$ $l^2$ $l'$ $l^2$, they form a metallic circuit, over which telephony is practiced at the same time. The combination of resistances E′ and S′ or E² and S², each combination in its own line and at the end of the line from which the telegraph-signals are sent, so smooths or rounds off those signals that they are not heard in either of the two telephones T′ T′, and for the same reason telegraph-signals made in the lines L′ and L² will not be heard in the telephones T³ T³ of the independent telephone-line L³ nor in the telegraph and telephone line L⁴—that is, supposing that the several lines, L′ L², L³, and L⁴ (shown in the several figures) are neighboring lines. The condensers C prevent the battery-currents from passing through the telephones. Magneto-generators may be employed in place of the batteries.

L⁴ is an independent line-wire having at each end apparatus similar to that already described, consisting of battery B⁴, telegraph-key K⁴, relay or receiver R⁴, an electrostatic inductive resistance S⁴, and electro-magnetic inductive resistances E⁴ E⁴. At each end, also, T⁴ is a telephone grounded in a branch line $l^4$, connected with the main line at $j^4$ and containing a condenser C. Description of the mode of operation of line L⁴ is unnecessary.

In all the lines L′, L², and L⁴, used for simultaneous telegraphy and telephony, two electro-magnetic inductive resistances are shown in combination with an electrostatic inductive resistance. Two, placed as shown—one on each side of the electrostatic resistance—are better than one; but one will give good results. If, however, but one electro-magnetic inductive resistance is used, it should be placed between the electrostatic inductive resistance and the telephone.

It perhaps should be observed that the combination of an electrostatic inductive resistance and an electro-magnetic inductive resistance in any of the lines would have the same effect to prevent the telegraph apparatus of that line from disturbing telephones of another line if there were no telephone connected with the line containing the said combination of resistances, and in no case is it material upon which side of the make-and-break contact-point of the key the said combination of resistances is placed. It is only essential that it be placed between the battery and the junction of the telephone branch wire or loop with the line-wire, or, if there be no such branch or loop, between the battery and that portion of the main-line wire lying in the neighborhood of other telephone-lines.

In some instances the electro-magnetic inductive resistance may be embodied in a telegraph-sounder.

It is obvious that it will be within this invention to use but one of the line-wires L′ L² for telegraph purposes. In such case the telegraph apparatus and the resistances may be omitted on the other line.

The telegraph apparatus shown in Fig. 1 is provided with grounded contacts $c'$ $c^2$, which in operation, respectively, are transiently closed after the breaking of the battery-contacts $b'$ $b^2$ and before the closing of the relay-contacts $e'$ $e^2$ to cause the charge on the line to pass to earth. Where the same line, with the interposition of the combined inductive resistances, as above described, is used for simultaneous long-distance telegraphy and long-distance telephony, this earth contact of the telegraph-key is often of great advantage.

I claim—

1. The combination of an electrostatic inductive resistance and an electro-magnetic inductive resistance in an electric circuit, substantially as described.

2. The combination, with a telegraph line-wire at each end, of telegraph apparatus, and an electrostatic inductive resistance, and an electro-magnetic inductive resistance, substantially as described.

3. The combination, with a line-wire, telegraph apparatus at each end of said line-wire, grounded branch wires, and telephone apparatus and condensers in said branch wires, of, also at each end of said line-wire, an electrostatic inductive resistance and electro-magnetic inductive resistance between the source of electric energy of the telegraph apparatus and the junction of the said line-wire with one of said branch wires, substantially as described.

4. The combination, with two line-wires and telegraph apparatus at each end of one or both, two telephone-loops, and telephone apparatus and condensers in said loops, of an electrostatic inductive resistance and an electro-magnetic inductive resistance interposed at each end of one or both of said line-wires between the source of electrical energy of the telegraph apparatus at that end and the junc-

tion with one of said loops, substantially as described.

5. The combination, with a line-wire or line-wires, telegraph apparatus therein, and a telephone-circuit imposed thereon by branch wires or loops, substantially as described, of combined electrostatic and electro-magnetic inductive resistances between the sources of electrical energy in said telegraph apparatus and the junctions, or either of them, of said telephone-circuit and said line wire or wires, substantially as described.

6. The combination, with a line-wire or line-wires, telegraph apparatus therein, and a telephone-circuit imposed thereon by branch wires or loops, substantially as described, of combined electrostatic and electro-magnetic inductive resistances between the sources of electrical energy in said telegraph apparatus and the junctions, or either of them, of said telephone-circuit and said line wire or wires, the transmitting-keys of said telegraph apparatus being each provided with battery-relay and earth contacts, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 5th day of April, 1892.

WILLIAM W. JACQUES.

Witnesses:

GEO. WILLIS PIERCE,

JOSEPH A. GATELY.