No. 803,109. PATENTED OCT. 31, 1905.

I. KITSEE.

TRANSMISSION OF INTELLIGENCE WITH THE AID OF ELECTRIC ENERGY.

APPLICATION FILED SEPT. 17, 1904. RENEWED MAY 4, 1905.

2 SHEETS—SHEET 1.

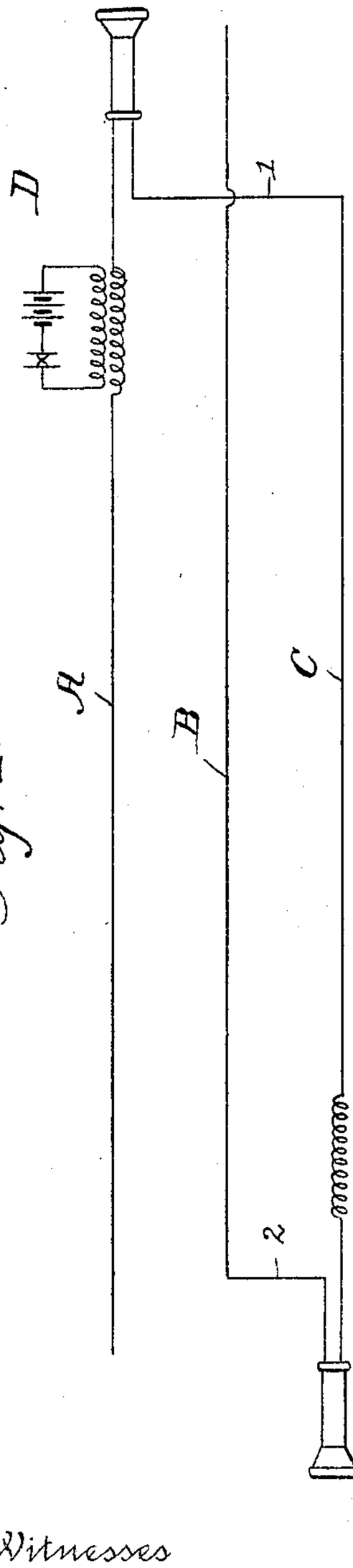

Fig. 1.

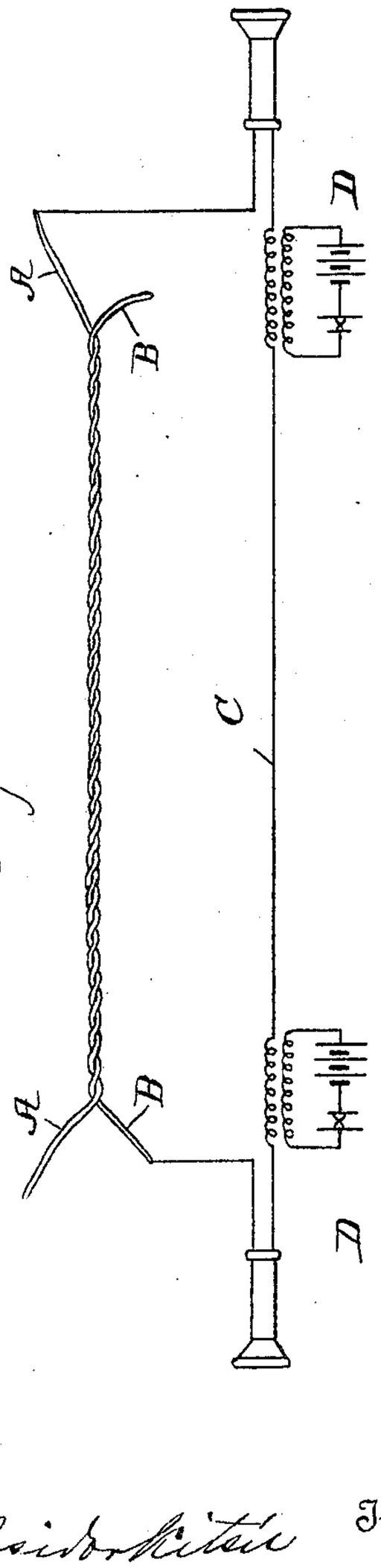

Fig. 2.

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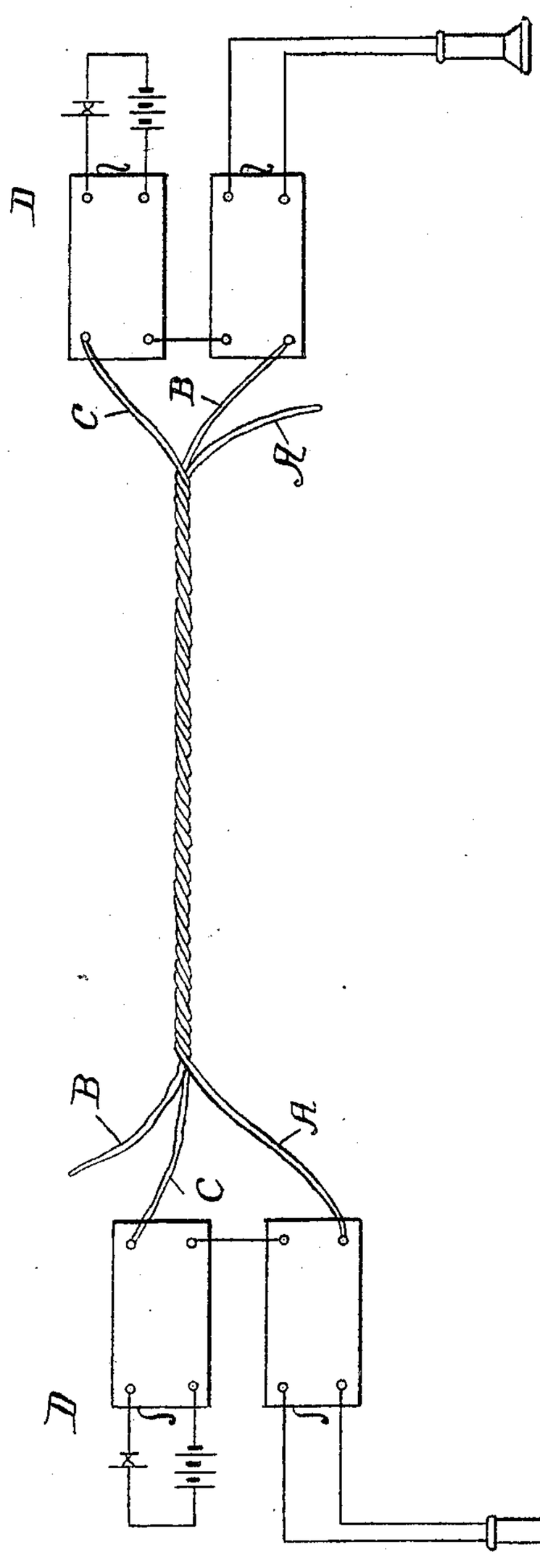
Fig. 3.



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TRANSMISSION OF INTELLIGENCE WITH THE AID OF ELECTRIC ENERGY.

No. 803,109. Specification of Letters Patent. Patented Oct. 31, 1905.

Application filed September 17, 1904 Renewed May 4, 1905. Serial No. 258,890.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in the Transmission of Intelligence With the Aid of Electric Energy, (Case No. 220,) of which the following is a specification.

My invention relates to an improvement in the transmission of intelligence with the aid of electric energy, and has more special reference to long-distance telephonic transmission.

In general, my invention comprises the construction and use of such a line that the effects of induction are utilized to increase the quantity and quality of transmission and which it is probable are combined to some extent with the effects of static capacity in bringing about the remarkable results attained. The construction referred to involves a line or cable which comprises a plurality of relatively insulated or conductively-separated wires which are twisted in intimate relation with one another and are therefore at no point in metallic contact. The wires for one line or a single circuit are preferably three in number and of a comparatively small gage. I have found that three strands of No. 28 insulated wire have given extremely satisfactory results in actual open-air tests for distances of several miles. These strands are twisted into intimate relation with each other, so as to make approximately four or five complete turns to the inch for each strand. These twisted wires should preferably extend for the whole length of the line, the opposite ends of the separate wires being connected to the instruments or apparatus at each end of the line or at any two stations, the other opposite ends of two wires being left free.

I do not herein desire to advance any particular theory as to the causes and actions of the transmitting currents or impulses in my line which produce the great advantages in quantity, quality, and efficiency of the electric transmission. Suffice it to say that electric induction, both self and mutual, plays an important part in the transmission and is probably modified by and coöperates with static capacity to a greater or less extent.

I do not wish to be understood as being limited to the details, arrangements, and sizes herein set forth, for they may be varied to suit the different conditions of any particular line or number of lines included in a single circuit or cable. Neither do I wish to be understood as being limited to the transmission of intelligence in the application of my invention, for it is evident that the same may be utilized in the transmission of power electrically by alternating or intermittent currents.

Referring to the drawings, Figures 1, 2, and 3 are diagrammatic views of transmitting-circuits embodying my invention.

A B C are the lines of transmission, one terminal of the line A being connected, through wire 1, with the interposition of the usual transmitting and receiving instruments, to one terminal of the line C, the other terminal of the line C connected, through wire 2, with the interposition of the usual transmitting and receiving instruments, to one terminal of the line B. One terminal of the line A and one terminal of the line B remain free. In Fig. 1 these three lines A B C are shown as running parallel to each other. In Fig. 2 the arrangement of connecting all three wires to each other is the same as in Fig. 1; but the lines A and B are twisted, and the line C is running parallel to the twisted pair. In Fig. 3 all three lines A B C are twisted together.

In Figs. 1 and 2 the receiving and transmitting devices are illustrated in conventional signs and are designated as an entirety by the letters D D. In Fig. 3 I have substituted a different type of transmitting and receiving devices; but they are designated by the same letter D, and as these devices do not form part of this application and as it is immaterial what type of devices is used I do not deem it necessary to go into detail of the construction of such devices. It suffices to say that the transmitting devices embrace microphones and the receiving devices ear-phones.

In my experiments I have found that if sound is transmitted over a line constructed as illustrated in Fig. 1 the received impulses are very weak. If a line as illustrated in Fig. 2 is substituted for that as shown in Fig. 1, then the transmitted speech can be heard distinctly and clearly; but if the arrangement as illustrated in Fig. 3 is substituted, the results far exceed the previous transmissions.

It is necessary for me to add that the closer and shorter the turns in the twisted wires the better the transmission. I may also add that some of the experiments were carried on with a cable wherein about twenty metallic circuits, each consisting of the usual two con-

ductors, were in actual service, and no interference between the lines as described and the other metallic circuits took place.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a circuit for transmitting varying electric currents, a line comprising three insulated conductors, one terminal of one conductor connected, with the interposition of transmitting and receiving devices, to one terminal of a second conductor, the other terminal of said second conductor connected, with the interposition of transmitting and receiving devices, to one terminal of a third conductor, one terminal of the first and one terminal of the third conductor remaining free.

2. In a circuit for transmitting varying electric currents, a transmitting-line comprising three insulated conductors, each consisting of a series of successive convolutions, each series having inductive relation with the other, the three conductors connected to each other so as to form an open circuit, one free end of which terminates at or near one station and the other free end of which terminates at or near a second station.

3. In a circuit for transmitting varying electric currents, a transmitting-line comprising three insulated conductors, each consisting of a continuous series of inductive convolutions, each series having inductive relation with the other for the entire length of the line, the three conductors joined together so as to form one open circuit and sets of apparatus inserted in said line.

4. In a circuit for transmitting electric currents, a line comprising three insulated conductors twisted in intimate relation with each other, one conductor having one end connected, with the interposition of transmitting and receiving apparatus, to one end of a second conductor, the second end of said second conductor connected, with the interposition of transmitting and receiving apparatus, to one end of a third conductor.

5. In a circuit for transmitting varying electric currents, a line comprising three insulated conductors twisted in intimate relation with one another and having not less than four complete turns to the inch, two of said three conductors connected at one station to the necessary apparatus, one of said two conductors and the third conductor connected to the necessary apparatus at a second station more or less remote from the first station.

6. In a circuit for transmitting varying electric currents a line comprising three insulated conductors twisted in intimate relation with each other, two conductors having each one end connected to a separate station and the third connected with one end to one of said stations, and with the second end to the second of said stations more or less remote from the first-mentioned station.

7. In a circuit for transmitting varying electric currents a line comprising three insulated conductors twisted together in intimate relation with one another, said wires being inductively separated through their entire length and being connected together at the terminals in a manner so as to form one open circuit.

8. In a circuit for transmitting varying electric currents, a line comprising three insulated conductors connected together at their terminals in a manner so as to form one continuous electric circuit open at both ends and transmitting and receiving devices inserted in said circuit, the three conductors in inductive relation to each other.

9. A line for electrically transmitting intelligence consisting of three conductors insulated from each other but inductively related to each other, said three conductors connected together in a manner so as to form one continuous circuit and devices operatively connected to said circuit.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 14th day of September, A. D. 1904.

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
H. C. YETTER.