(No Model.) 2 Sheets—Sheet 1.

J. J. BARRIER & F. T. DE LAVERNÈDE.

TELEPHONE.

No. 344,153. Patented June 22, 1886.

Fig. 1.

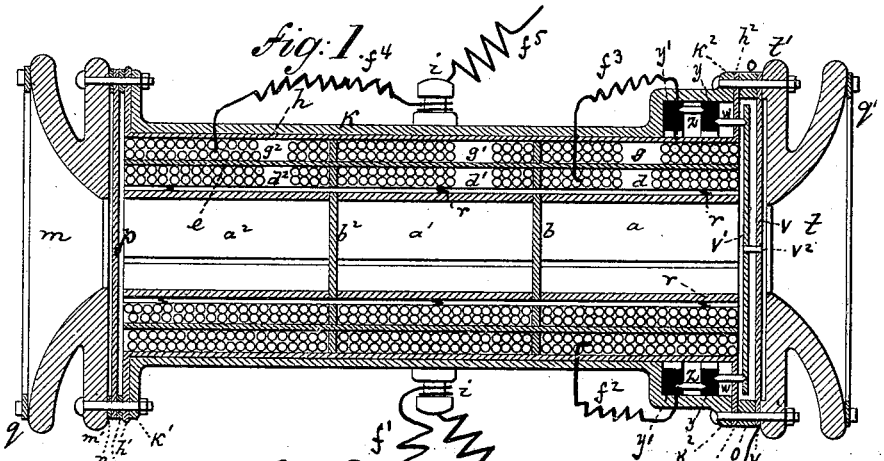

Fig. 2.

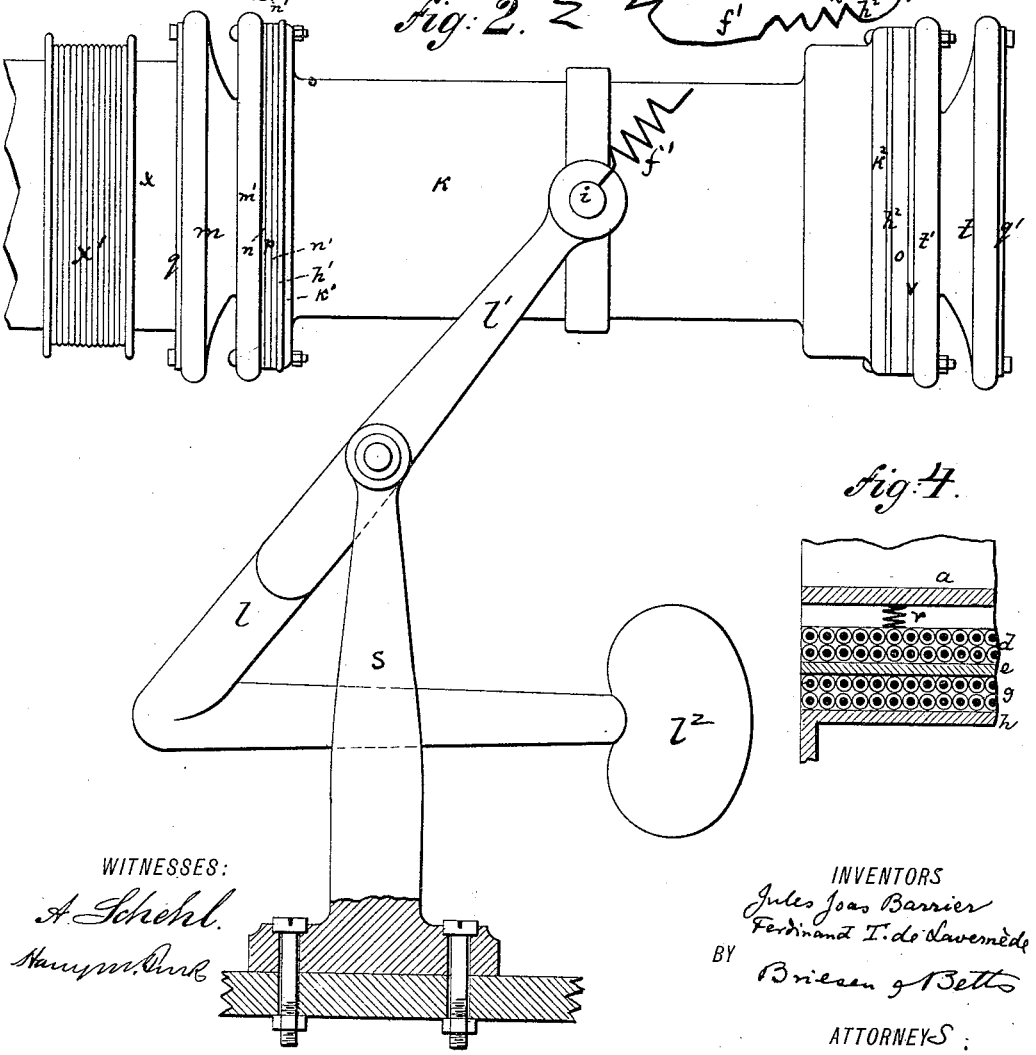

Fig. 4.

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Hamm. Dick

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(No Model.) 2 Sheets—Sheet 2.

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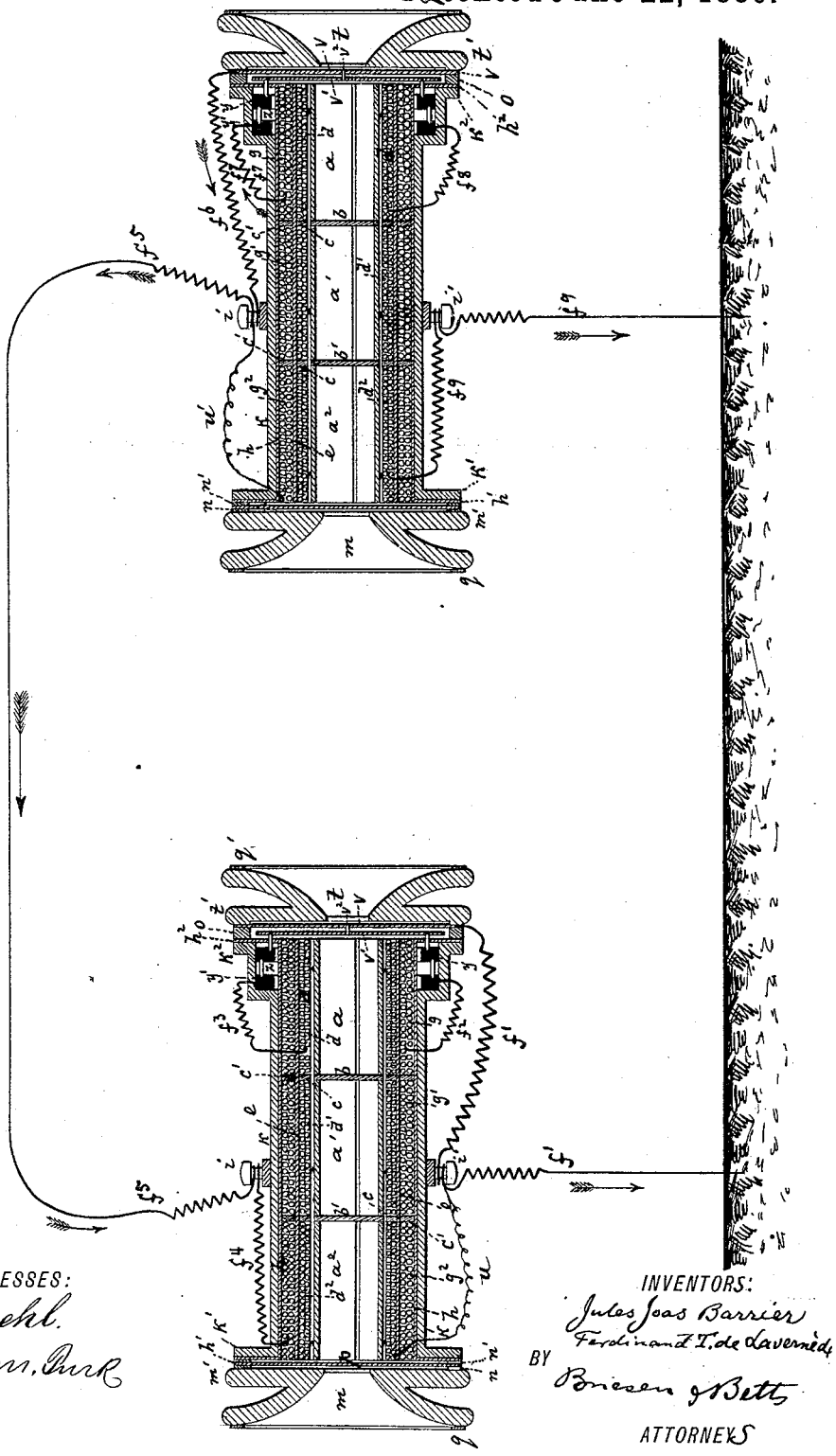

Fig. 3.

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UNITED STATES PATENT OFFICE.

JULES JOAS BARRIER AND FERDINAND TOURVIEILLE DE LAVERNÈDE, OF PARIS, FRANCE.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 344,153, dated June 22, 1886.

Application filed September 1, 1882. Serial No. 70,856. (No model.) Patented in France July 25, 1882, No. 150,286; in Belgium July 31, 1882, No. 58,628, and in England August 8, 1882, No. 3,763.

To all whom it may concern:

Be it known that we, JULES JOAS BARRIER and FERDINAND TOURVIEILLE DE LAVERNÈDE, citizens of France, and residents of Paris, France, have invented a new and Improved Telephone, (for which we have obtained an English patent, No. 3,763, dated August 8, 1882, a French patent, No. 150,286, dated July 25, 1882, and a Belgian patent, No. 58,628, dated July 31, 1882,) of which the following is a full and correct specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal central section of our new telephone. Fig. 2 is a side view of the same, showing it mounted on a support. Fig. 3 is a central longitudinal section of the telephone, showing the transmitter and the receiver; and Fig. 4 is a detailed longitudinal section of part of instrument, which shows the manner of suspending the tubular magnets.

The object of this invention is the construction of a combined microphone and magneto-telephone without the use of a battery, the operative current being produced by magneto-induction and modified or varied by the microphone, as will hereinafter appear.

In Fig. 1 of the drawings the details of the construction of our improved implement are shown as follows: There are two series of insulated coils, $d\ d'\ d^2$ and $g\ g'\ g^2$, the latter series surrounding the former, but separated therefrom by a tube, *e*, of magnetic material. In place of said tube *e*, we may use a series of magnetic wires collected to form an annulus surrounding the series of coils $d\ d'\ d^2$. It will be understood that the coils $d\ d'\ d^2$ are connected with each other in series, although such connection is not indicated in the drawings. The same is true of the coils $g\ g'\ g^2$. The coils so connected are separated from each other by insulating-rings $c\ c'$. Within the inner series of coils are arranged three sectional magnets, $a\ a'\ a^2$, which are tubular and split longitudinally, also separated from each other by insulating material, $b\ b^2$. These magnets are connected with the interior of the coils $d\ d'\ d^2$ by light flexible structures, such as springs *r*, by which they are held centrally within said coils, but are allowed a lengthwise motion within the same. Surrounding the outer series of coils is a flanged tube, *h*, which may be of magnetic material, and the same is enveloped by the similarly-flanged tube *k*. To these flanges, by screw-bolts passing through the same, are secured the mouth and ear pieces *t m*, *t* forming the mouth-piece of the transmitter, and *m* the ear-piece of the receiver end of the instrument. A diaphragm, *p*, of magnetic material, is secured between the mouth-piece and the body of the instrument, suitable insulating-rings, *n'*, being interposed on either side of said diaphragm, as usual.

Between the outer end of the body of the instrument and the mouth-piece *t* is clamped a diaphragm, V, which must be of conducting material, and is preferably made of iron. A central pin, V^2, connects this diaphragm with a diaphragm, V', made of similar material, which operates the microphone, as will presently appear.

The microphone consists of two carbon rings, *y y'*, separated from each other by a number of carbon pins, *z*, which are pointed at both ends and enter suitable depressions in the rings *y y'*. The ring *y'* is fixed to the shell *k*, while ring *y* is loosely supported between pins *z* and another series of pins, *w*, which with their pointed ends enter small depressions on the other side of the ring *y*, and similar depressions or holes near the edge of diaphragm V'. While we have stated that the pins *z* and *w* are made of carbon, we have also tried selenium for this purpose. It will now be apparent that sound-waves impinging upon the diaphragm V will set the diaphragm V' into vibration, and if the same is made of magnetic material the approach to and the recession from the end of magnet *a* of said diaphragm will cause the series of magnets to participate in the movements of said diaphragm by reason of the magnetic attraction between the same. At the same time the edge of diaphragm V', acting through pins *w* upon carbon ring *y*, will cause a corresponding vibratory motion of the microphonic elements, and any current which at the time may pass through said microphone will be varied accordingly.

Two trunnions, *i i'*, secured to shell *k*, sup-

port the whole instrument in bearings provided in one end of lever l'. Each lever is itself pivoted upon a standard, s, and is provided with a heavy knob, l^2, for reversing the instrument, as will be presently explained. To the face of each mouth-piece is secured an iron ring, $q\ q'$, constructed to fit the end of an electro-magnet, $x\ x'$, the coil of which, x', is in a signaling-circuit. Normally the receiving end of the telephone faces the end of magnet $x\ x'$, and if it is desired to communicate with a distant station the pressure of the hand upon knob l^2 will withdraw said end of the instrument from the magnet, reversing the former and generating a momentary current in the coil of the electro-magnet, whereby a distant signaling apparatus is operated.

The speaking-circuits are as follows: In the left-hand side instrument in Fig. 3 diaphragm V is connected with trunnion i', and with the ground by wires f'. One end of the series of coils $g\ g'\ g^2$ is connected with carbon ring y' by wire f^2, the other end of said series of coils being connected to trunnion i, and with the line by wires $f^4\ f^5$. Carbon ring y' is also connected with one terminal of coils $d\ d'\ d^2$ by wire f^3, the other terminal of said coils being connected with trunnion i, and thereby to ground by wire u. In the right-hand side instrument in Fig. 3 diaphragm V is connected with trunnion i by wire f^6, and with the line by wire f^5. Ring y' is connected with one terminal of coils $d\ d'\ d^2$ by wire f^8, the other terminal being connected with trunnion i and ground by wires f^9. Said ring y' is also connected with one terminal of coils $g\ g'\ g^2$ by wire f^7, the other terminal being connected by wire u' with trunnion i, and thereby to the line.

The operation of the instrument will now be apparent. It will be seen that on the left-hand side coils $d\ d'\ d^2$ are in the local circuit with the microphone and diaphragms, while coils $g\ g'\ g^2$ are in the line-circuit, which also includes the microphone. On the right-hand side coils $g\ g'\ g^2$ are in a local circuit, including the microphone, while coils $d\ d'\ d^2$ are in the line-circuit, which also includes the microphone. Speaking against the transmitter end of any one of the instruments, the vibrations of the coils thereby induced will generate currents both in the local and in the line circuit. These currents will react upon each other, and will be modified by the microphone in accordance with the vibrations of the diaphragms. Thus modified, the current will reach the distant station, pass through one series of coils, and vary the magnetism of the cores of the instrument at that station, which in turn will react upon the receiving-diaphragm.

We claim as our invention and desire to secure by Letters Patent—

1. A combined magneto-telephone and microphone, consisting, essentially, of flexible suspended magnets having endwise motion, a receiving-diaphragm operated thereby, and a transmitting-diaphragm operating the same, in combination with a microphone operated by the transmitting-diaphragm, substantially as described.

2. A combined magneto-telephone and microphone, consisting of an inductorium having a flexible suspended core, receiving and transmitting diaphragms in inductive proximity thereto, and a microphone both in the local circuit of one coil of the inductorium and in the line-circuit of the other coil of the inductorium, substantially as described.

3. A combined transmitter and receiver telephone, provided with ring-armatures at either end and reversibly mounted upon trunnions, an electro-magnet arranged in the line with said telephone and in inductive proximity to said armatures, and a singnaling-circuit including the coils of said magnet, substantially as described.

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