(No Model.)

C. A. BELL.

JET MICROPHONE OR APPARATUS FOR TRANSMITTING SOUNDS BY MEANS OF JETS.

No. 336,082. Patented Feb. 16, 1886.

FIG. 1.

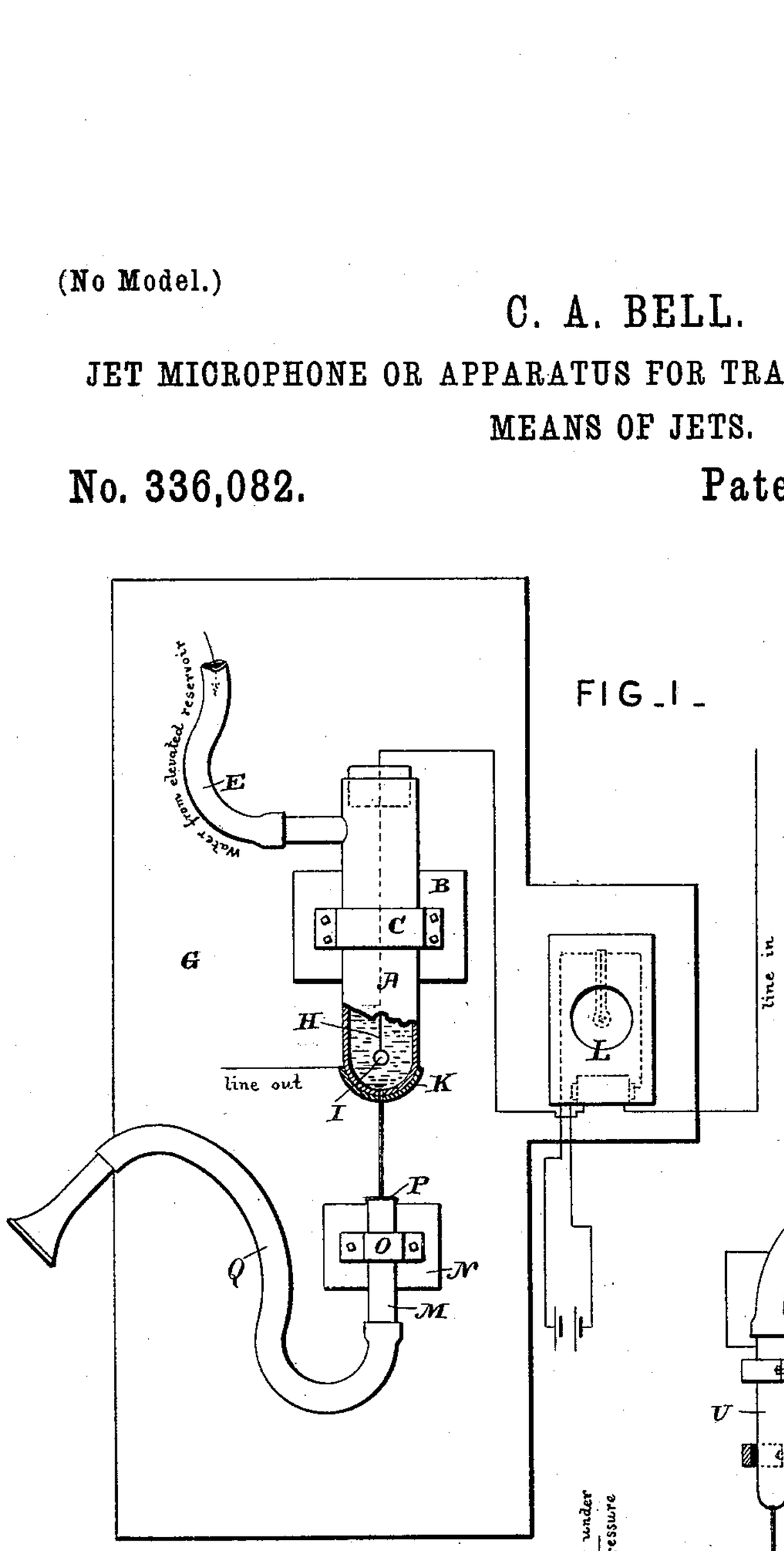


FIG. 3.

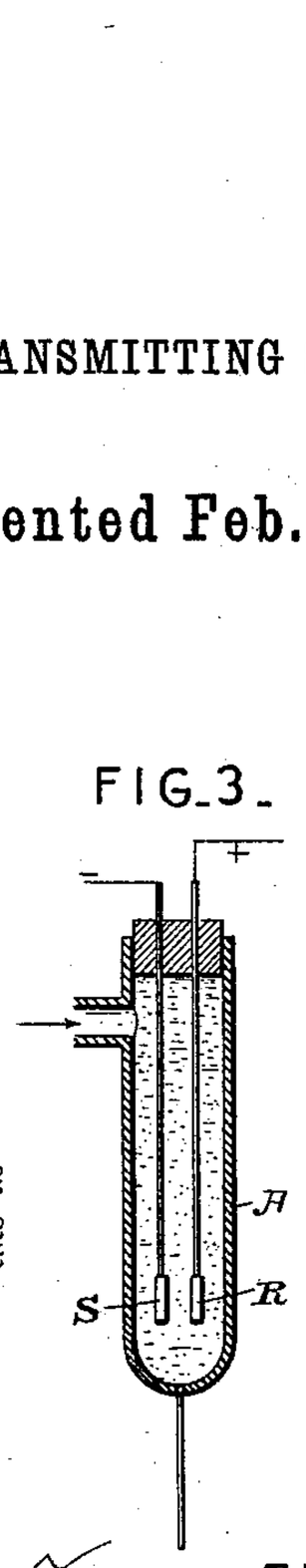


FIG. 4.

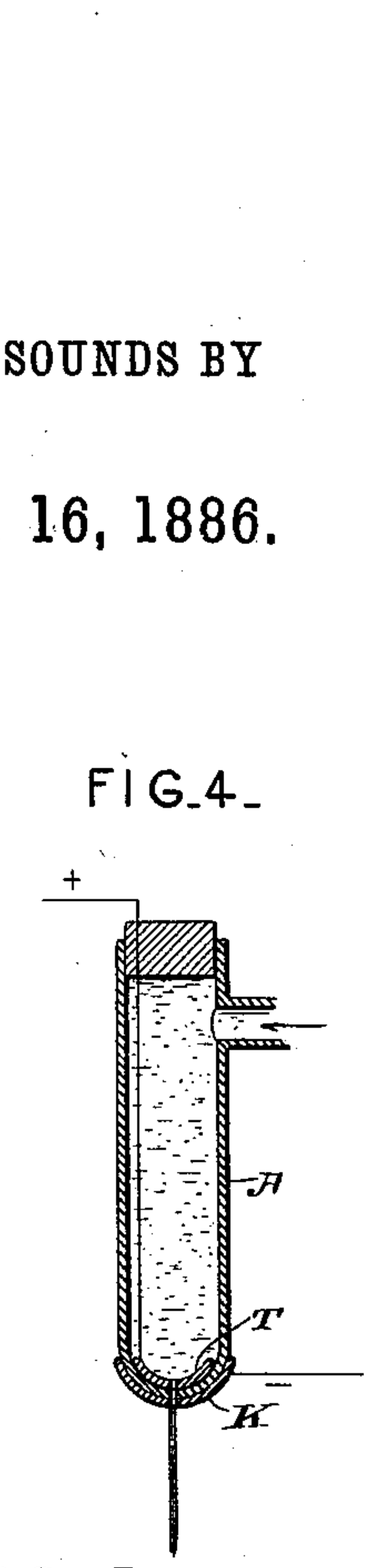
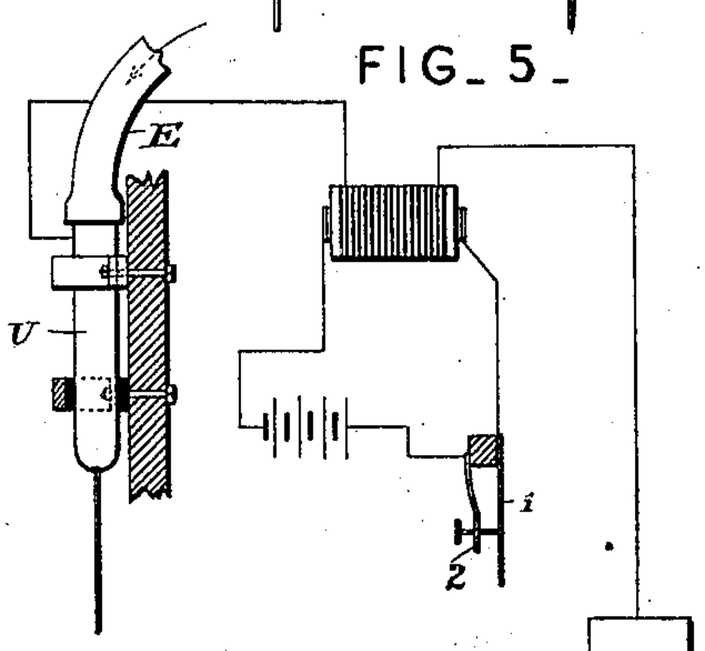


FIG. 5.



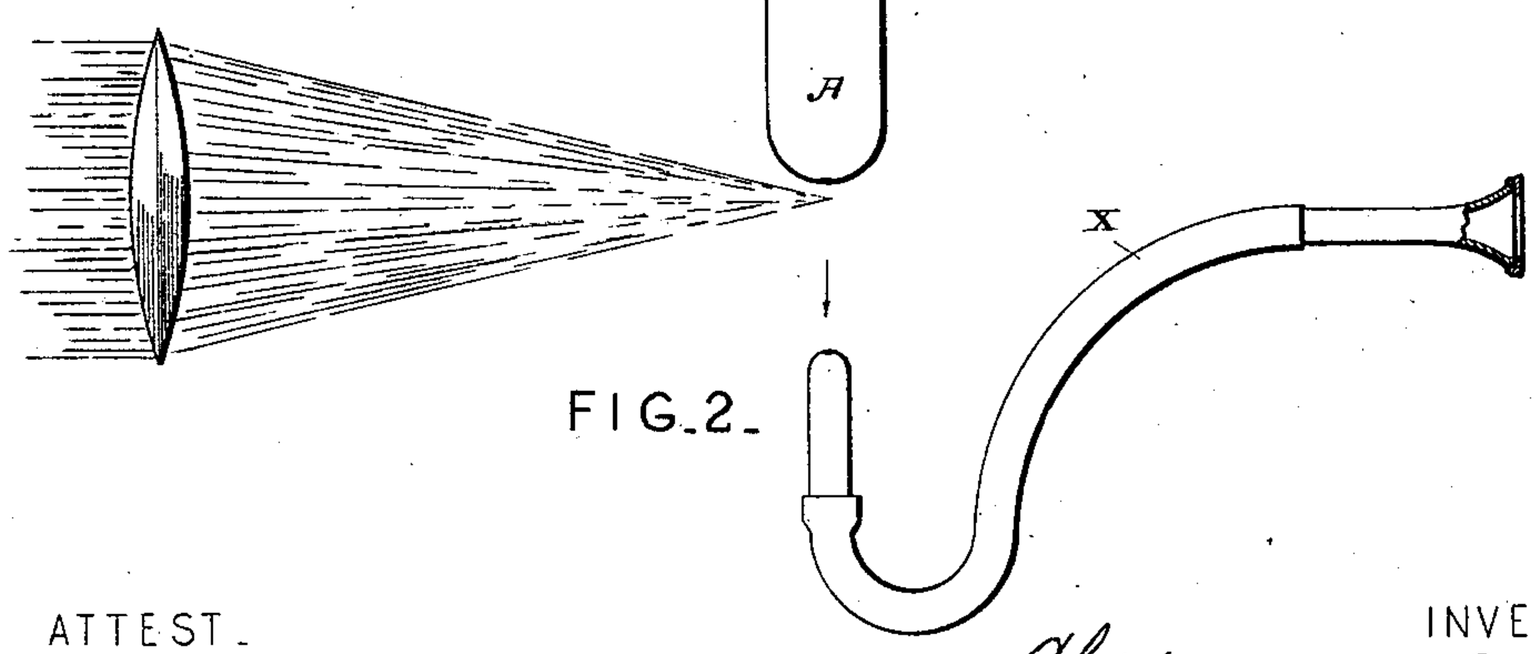


FIG. 2.

ATTEST.

Geo. T. Smallwood

J. Henry Kaiser.

INVENTOR.

Chichester A. Bell

By Pollok

Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

CHICHESTER A. BELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

JET MICROPHONE OR APPARATUS FOR TRANSMITTING SOUNDS BY MEANS OF JETS.

SPECIFICATION forming part of Letters Patent No. 336,082, dated February 16, 1886.

Application filed May 1, 1884. Serial No. 129,948. (No model.)

To all whom it may concern:

Be it known that I, CHICHESTER A. BELL, of Washington, in the District of Columbia, have invented a new and useful Improvement in Jet Microphones or Apparatus for Transmitting Sounds by means of Jets, which improvement is fully set forth in the following specification.

The invention has reference to new methods of and means for impressing forced movements or vibrations upon a jet or column of fluid issuing under pressure from a contracted orifice, and may be considered as in part an improvement upon or modification of methods and means for that purpose described in my application of even date herewith, officially numbered 129,946, for methods of and apparatus for transmitting, reproducing, and recording speech and other sounds or signals, and for other purposes. In said application it is shown that a sensitive jet may have impressed upon it sound vibrations corresponding in form to sound-waves, and may convey the same to a suitable body or medium acted upon by it, and description is also given of many applications of a jet-translating apparatus for impressing these and other vibrations upon a suitable body or medium.

Many ways of impressing the forced movements upon the jet are therein described, but it is unnecessary to rehearse them here.

The present invention consists in impressing the vibrations upon the jet by the direct action upon the jet-fluid (gas or liquid) of an imponderable medium, such as light and other forms of radiant energy or electricity, (including magnetism,) and specially by the latter. These movements may take the form of sound-waves, and may be utilized for the transmission, recording, or rendering visible of speech and other sounds; or they may represent other signals or messages, such as tones, the dots and dashes of the Morse alphabet, and so on. If the jet is to be acted upon by radiant energy, it is preferably rendered more absorptive of such energy. If it is to be acted upon by electricity, such preliminary preparation is not as necessary, although it may be resorted to. The peferred way of acting upon the jet by electricity is to discharge a current through the jet-fluid, but there are other ways.

The invention also consists in imparting vibration to the jet-fluid by a vibratory body immersed in said fluid behind the jet-orifice.

In the accompanying drawings, Figure 1 shows a station apparatus for electric-telephone lines constructed in accordance with the invention; Fig. 2, a jet-receiver for photophone-lines, and Figs. 3, 4, and 5 various arrangements for causing the imponderable medium to act upon the jet-fluid.

Referring to Fig. 1, the jet-tube A is supported in a groove in the block B by means of a cross piece or strap, C, and is supplied with liquid (preferably water) from an elevated reservoir through the flexible tube E, a cock or other suitable means serving to control the pressure or head. The block B and the shelf on which the reservoir is supported are made fast to the back board, G. Immersed in the liquid in the jet-tube is the metal wire H, covered with insulating material, and terminating in a ball, I, which is not protected. The wire and ball are suspended from a stopper, which closes tightly the upper end of the jet-tube. The best material for the ball and wire is platinum; but other metals or conducting material may be used. The lower end of the jet-tube, at K, is covered with metal (preferably platinum) almost to the orifice in the end of tube A, which is of glass. The ball I and coating K are connected in secondary circuit of an induction-coil, so that the liquid will be subjected to the action of high-tension currents. These being discharged through the liquid, impress upon the jet vibrations which correspond to the electric impulse. The secondary circuit shown constitutes the main line, and the apparatus being the same at the several stations undulatory currents are produced thereon corresponding in form to sound-waves, and the vibrations impressed upon the jet are similar thereto. As shown, a telephone-transmitter, L, of ordinary or suitable construction, varies the circuit of a local battery, including the primary of the induction-coil. The vibrations impressed upon the jet may be received in any ordinary or suitable way. As shown, a tube, M, is supported by a cross-piece, O, in a groove in the face of block N, fastened to the back board, and the jet plays upon a membrane, P, of thin sheet-rubber secured over the upper end of the tube. A hearing-tube, Q, conveys the sound to the ear. The tubes

A M are so adjusted that the continuous portion of the jet acts upon the stretched membrane. The discharge of the currents between the electrodes I K not only acts upon the liquid directly, but may also cause a vibration of the electrode I, which assists in imparting vibration to the jet.

In Fig. 3 the electrodes R S are both suspended in the liquid. They are in the form of flat plates, and are both capable of vibration. It is not necessary that the current should be passed through the liquid. The electrification thereof will alone vary the jet. Thus in Figs. 1 and 3 an insulating instead of a conducting liquid—as, for example, paraffine-oil—may be used, or in Fig. 1 the outer electrode may be omitted.

In Fig. 2 a lens is arranged to concentrate a beam of radiant energy upon the jet at the orifice in the tube. The gas which forms the jet is or may be rendered more absorptive of the radiant energy by charging it with water or other vapor. The beam is preferably concentrated upon the jet; but it may be transmitted to the gas behind the jet-orifice through the transparent walls of the jet-tube. The radiant beam may be varied, intermitted, or thrown into vibrations similar in form to sound-waves in any ordinary or suitable way. The vibrations or forced movements of the jet are received by the ear-tube X, but may evidently be received in other ways, as described in my other applications of even date herewith.

In Fig. 4 the inner electrode, T, forms a coating inside the jet-tube, near the jet-orifice.

In Fig. 5 the jet-tube U is of metal, and from one terminal of the secondary circuit of an induction-coil, which circuit is at the other end connected to ground. The charged primary circuit of the coil is adapted to be opened and closed intermittently by a rheotome comprising a tuned reed, 1, connected with one terminal of the circuit, and a contact-spring, 2, connected with the other. In both these devices the electrification of the liquid causes the vibration of the jet without assistance from a vibratory device or devices immersed in the jet-liquid, although there may be a mechanical vibration imparted from one or both electrodes. It is evident that a vibrating device immersed in a jet-fluid can be used to vibrate the jet by mechanical vibration alone.

In operating with the apparatus shown in Figs. 1, 3, and 4 a liquid of low conductive capacity (high resistance) is preferred. An insulating-liquid—such as paraffine-oil—might, however, be used. With the apparatus shown in Fig. 5 an insulating-liquid is preferred.

Having now fully described my said invention and the manner of carrying the same into effect, what I claim is—

1. The method of impressing forced movements upon jets by subjecting the jet-fluid to the direct action of an imponderable medium, such as hereinbefore named, substantially as described.

2. The method of impressing forced vibrations upon a jet by subjecting the jet-fluid to the direct action of an imponderable vibratory medium upon which the desired vibrations have been impressed, substantially as described.

3. The improvement in transmitting speech and other sounds and signals consisting in causing an imponderable medium to act directly upon the fluid composing a jet, and thereby impressing upon said jet forced movements representing the intelligence to be conveyed, substantially as described.

4. The improvement in transmitting or transferring forced movements from an imponderable medium to another medium consisting in impressing said movements upon a jet composed of a liquid by the direct action of said imponderable medium upon the jet-liquid, and causing the jet to act upon the second or receiving medium, substantially as described.

5. The method of impressing forced movements or vibrations upon a jet by electrifying the jet-fluid in a variable manner, substantially as described.

6. The method of transferring forced movements or vibrations from one medium to another, consisting in producing a jet with a liquid and electrifying in a variable manner the jet-liquid, substantially as described.

7. The method of impressing forced movements or vibrations on a jet by discharging a variable current of electricity through the jet-fluid, substantially as described.

8. The method of impressing forced movements or vibrations on a jet by vibrating a device or devices immersed in the jet-fluid, substantially as described.

9. The method of impressing forced movements or vibrations on a jet by variably electrifying the jet-fluid, and at the same time and in a corresponding manner vibrating a device or devices immersed in the jet-fluid, substantially as described.

10. In transmitting speech and other intelligence by jets, the improvement consisting in subjecting the jet-fluid, near the jet-orifice, to the direct action of an imponderable vibratory medium, such as specified, and causing the jet to act upon the receiving medium at a distance from the jet-orifice, substantially as described.

11. In a jet translating apparatus, the combination, with means for producing a jet, of means for subjecting the jet-fluid to the direct action of an imponderable vibratory medium, substantially as described.

12. In a jet translating apparatus, one or more electrodes included in circuit with a transmitter of vibrations, in combination with means for producing a jet, said electrodes being in contact with the jet-fluid, substantially as described.

13. The combination, with the jet-tube, of a vibratory device or devices placed in said tube for communicating vibrations to the jet fluid, substantially as described.

14. The combination, with the jet-tube, of one or more electrodes placed in said tube, substantially as described.

15. The combination, with the jet-tube and supply-tube, of one or more electrodes arranged to be in contact with the jet-fluid, the line or circuit connected therewith, and a transmitter in the said line or circuit, said electrodes operating to impress vibrations upon the jet from said tube, according to the variations in potential on the electrodes, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHICHESTER A. BELL.

Witnesses:
C. J. HEDRICK,
PHILIP MAURO.