

(No Model.)

J. A. MALONEY.

PNEUMATIC ACOUSTIC TELEPHONE.

No. 338,994.

Patented Mar. 30, 1886.

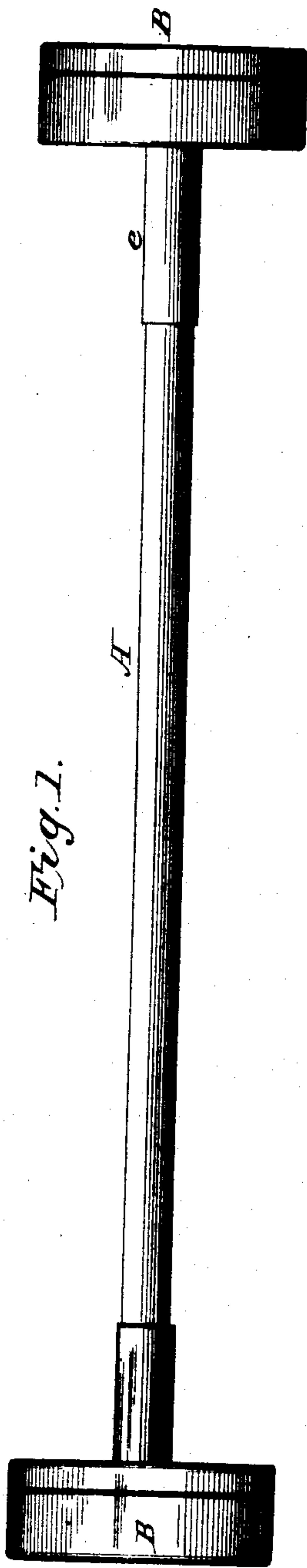


Fig. 1.

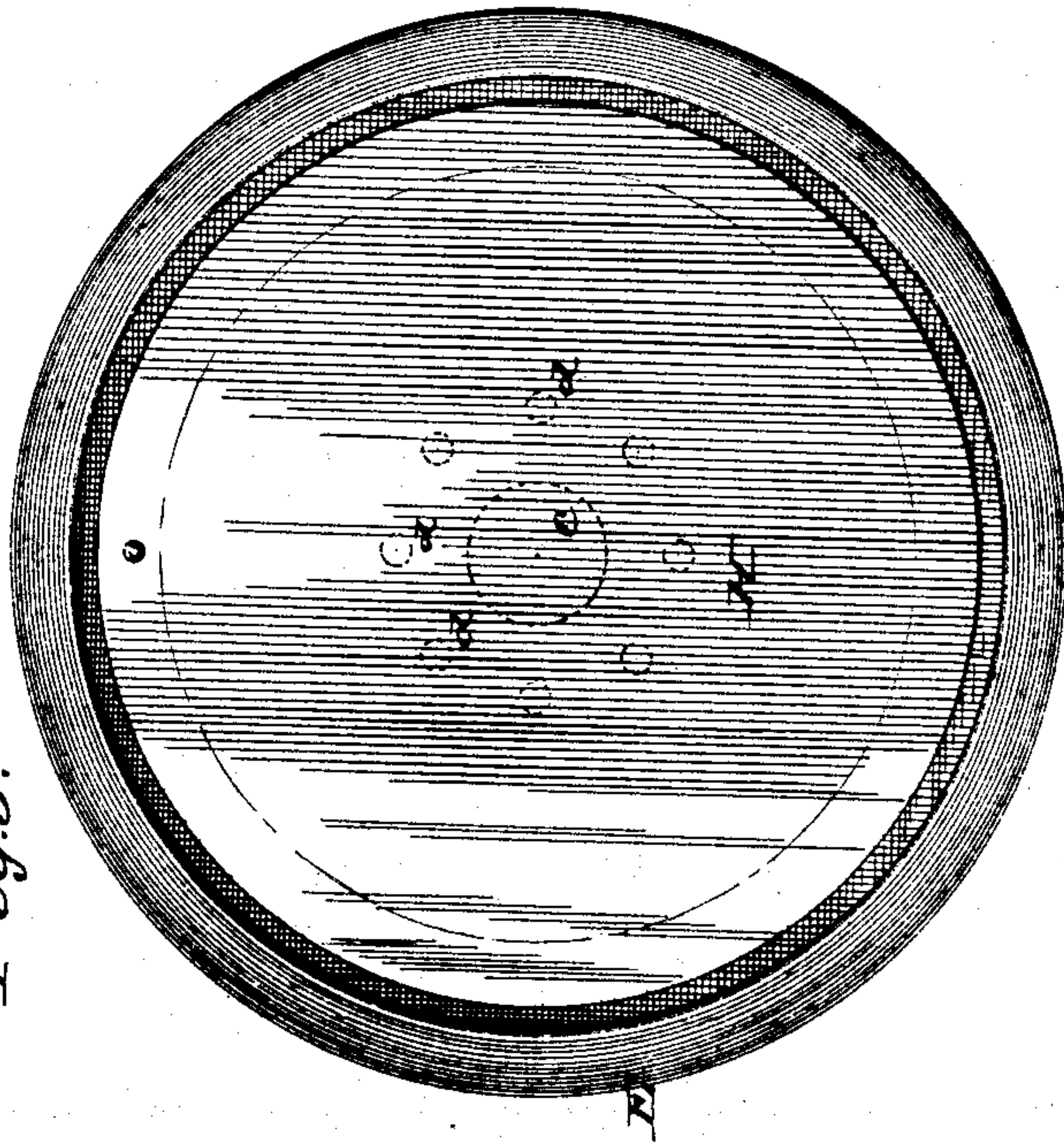


Fig. 3.

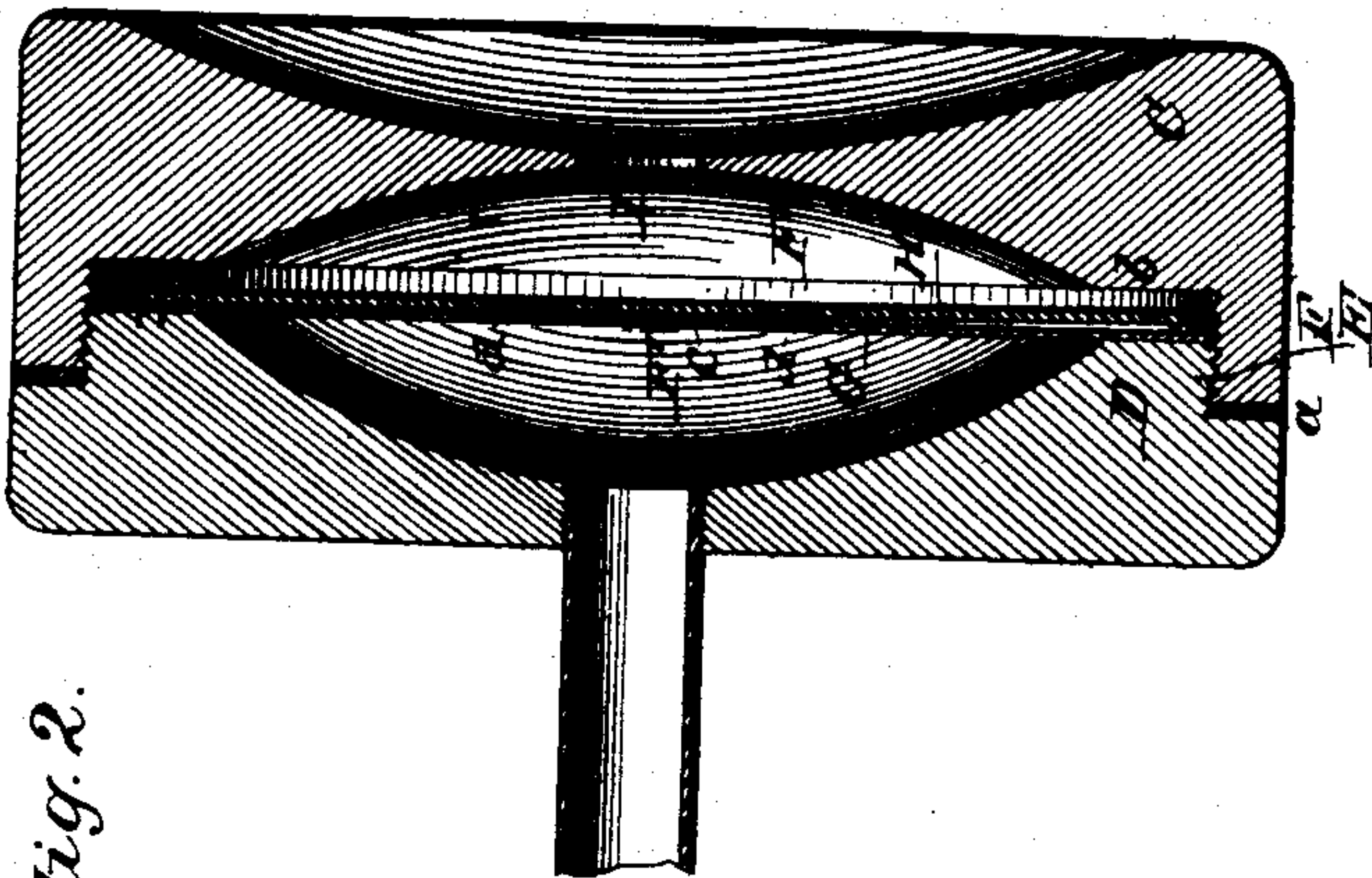


Fig. 2.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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OF ONE-HALF TO HENRY D. COOKE, OF SAME PLACE.

PNEUMATIC ACOUSTIC TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 338,994, dated March 30, 1886.

Application filed July 2, 1885. Serial No. 170,505. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. MALONEY, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic Acoustic Telephones; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a pneumatic acoustic telephone; and has for its object the construction of an instrument for conveying articulate or other sounds through tubes to a greater or less distance, so as to render them audible at any intermediate point in the line and at the extremities thereof.

Heretofore sounds have been conveyed through tubes containing confined air and fluids under pressure. At each end of the tube a fixed diaphragm has been located in a receiver or transmitter, and in each case the confined fluid has been made the medium of transmitting the sound-waves, produced by the human voice, being directed against the diaphragm from one end of the line to the other. These devices have been defective, in that great exertion is required on the part of the person desiring to transmit a message, as only loud sounds produced at one end of the line are rendered audible at the other, due to the loss incurred by the fixed diaphragm and the thus limited amount of its vibration, which proves a great annoyance to the person using the instrument and to others around it, and precludes the possibility of speaking to a person at a distance without having the conversation heard by others in the room from which the message is being transmitted. Extensive experiments in this line of invention have led me to the discovery that a diaphragm free to vibrate at its periphery is far more sensitive to the effects produced by the sound-waves striking it upon either side, than a diaphragm fixed at its periphery and vibrating only between its rigid boundaries, and makes it practicable to transmit messages given in whisper tones and render them audible at a great distance.

My invention consists in the construction hereinafter described, and particularly pointed out in the claims.

Reference being had to the accompanying drawings, which form a part of this specification, Figure 1 represents a side view of my invention; Fig. 2, a vertical section of the interchangeable transmitter and receiver on an enlarged scale, and Fig. 3 is a plan view thereof.

A represents a tube which may be of metal, paper, rubber, or other suitable material adapted for the purpose and the conditions under which it is to be used. At each end of the tube is secured an interchangeable transmitter and receiver, B, which is made in two parts, C and D, connected together by screw-threads at E with a packing interposed at *a*. Resonating-chambers F F' are formed in each section, (designated C and D,) between which is secured a fixed diaphragm, G, perforated by a central aperture, *c*, and a series of apertures, *d*. Upon the outside of the diaphragm G is placed a movable diaphragm, H, which is secured at one point only. The fixed diaphragm forms a support for the movable diaphragm, and the perforations in the former direct the sound-waves coming from the tube upon the center of the latter, thus causing the free diaphragm to vibrate in either direction by direct impact of sound-waves.

The part C of the transmitter and receiver is provided with an annular shoulder, *b*, between which and the fixed diaphragm the free portion of the movable diaphragm vibrates under the pulsations of the sound-waves transmitted through the tube A. An aperture, *i*, directs the impulses of the voice upon the diaphragms. The diaphragm H being fixed at one point in its circumference only, and having no obstructions resting upon its surfaces, is exceedingly sensitive, and vibrates under the slightest impact of sound-waves directed against it from either side.

The diaphragms may be made of paper, hard rubber, mica, thin metal or other suitable material adapted for the purpose. The movable diaphragm is made very thin, and being free to vibrate at its periphery is exceedingly sensitive, and in practice has been

found to transmit the most delicate sounds produced upon it and render them audible at a distance through a tube provided with a like instrument at its opposite end.

5 The transmitter is provided with a tube, *e*, which passes over the tube A and secures the two together.

Practice has demonstrated the fact that the instrument is equally as well adapted for a
10 transmitter as a receiver. This enables me to dispense with the mouth-piece and transmitter used in the ordinary telephones, and provides a very simple, cheap, and durable instrument.

Another advantage in my device is due to
15 the fact that in the use of the instrument the air contained in the tube and put in motion by the vibrations or pulsations of the diaphragms is not permitted to strike the tympanum of the ear of the person receiving the
20 message, which has a tendency to confuse and modify the tone of the speaker, and yet so arranged that through lack of rigidity of the diaphragm the most feeble sounds are reproduced, both as to quality and volume.

25 Having thus fully described my invention, what I claim is—

1. In a pneumatic telephone, means for transmitting and reproducing articulate or other sounds, consisting of an interchangeable trans-
30 mitter and receiver provided with a free or unobstructed diaphragm fixed at one point only, and operating in either direction by the impact of sound-waves, substantially as described.

35 2. Means for transmitting and reproducing articulate or other sounds, consisting of a tube containing free air, in combination with a free unobstructed diaphragm fixed at one point in its circumference only, and adapted to either
40 transmit or receive said sounds, substantially as described.

3. Means for transmitting and reproducing articulate or other sounds, consisting of an interchangeable transmitter and receiver pro-
45 vided with a fixed perforated diaphragm, and a free vibrating diaphragm fixed at one point only, substantially as described.

4. In a pneumatic telephone, means for transmitting and reproducing articulate or other sounds, consisting of a resonating-chamber, 50 and a free unobstructed diaphragm fixed at one point in its circumference only, and operating in either direction by impact of sound-waves, substantially as described.

5. Means for transmitting and reproducing 55 articulate or other sounds, consisting of a free unobstructed diaphragm fixed at one point only, in combination with two resonating-chambers, substantially as described.

6. Means for transmitting and reproducing 60 articulate or other sounds, consisting of a fixed perforated diaphragm and a free vibrating diaphragm fixed at one point only, in combination with a resonating-chamber, substantially as described. 65

7. Means for transmitting and reproducing articulate or other sounds, consisting of a fixed perforated diaphragm and a free vibrating diaphragm fixed at one point only, interposed between two resonating-chambers, substan- 70 tially as described.

8. The combination of a tube or sound conveyer containing free air with two interchangeable transmitters and receivers, each provided with a free diaphragm fixed at one 75 point only, and operating in both directions by impact of sound-waves, substantially as described.

9. An interchangeable transmitter and receiver composed of two sections, one of which 80 is provided with an aperture and an annular shoulder, in combination with a fixed perforated diaphragm and a free vibrating diaphragm fixed at one point only, substantially as described. 85

In testimony whereof I affix my signature in presence of two witnesses.

JAMES A. MALONEY.

Witnesses:

C. A. NEALE,
WM. E. DYRE.