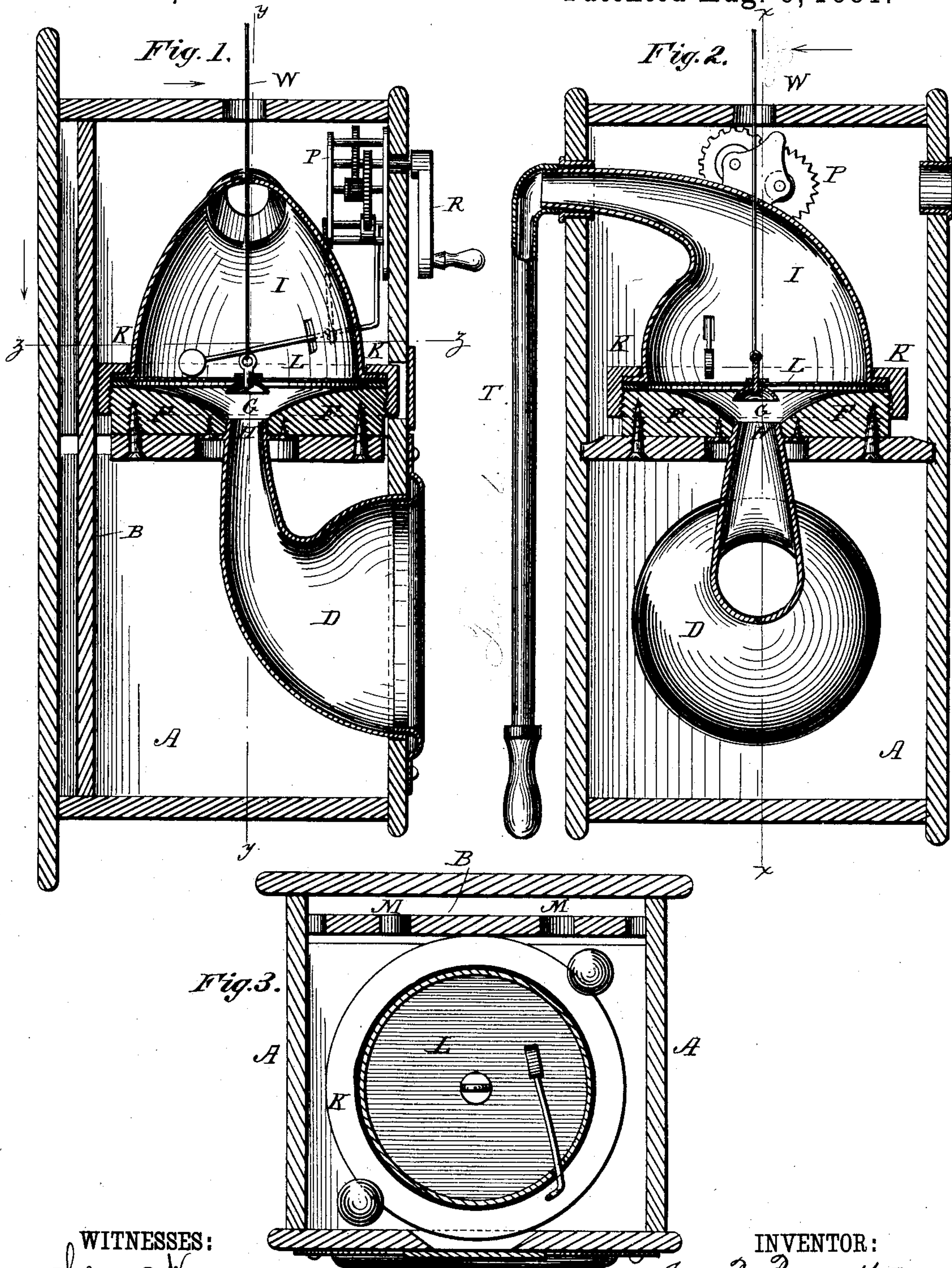


(No Model.)

J. B. BENNETT.  
ACOUSTIC TELEPHONE.

No. 245,436.

Patented Aug. 9, 1881.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## ACOUSTIC TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 245,436, dated August 9, 1881.

Application filed May 27, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN B. BENNETT, of San Luis Obispo, in the county of San Luis Obispo and State of California, have invented a new and Improved Acoustic Telephone; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section through the line  $xx$  of Fig. 2, looking in the direction of the arrow. Fig. 2 is a vertical section through the line  $yy$  of Fig. 1, looking in the direction of the arrow. Fig. 3 is a horizontal cross-section through the line  $zz$  of Fig. 1.

My invention relates to an acoustic or mechanical telephone in which certain improvements, the nature of which will hereinafter appear, render the instrument more efficient in giving a louder and clearer sound than has hitherto been obtained, and of such construction that it can be placed in almost any place or position required.

Referring to the accompanying drawings, A represents the outside box or case. The object of this box or case is to intensify the sound, and also to give the instrument a more ornamental appearance.

I prefer to make the case with a false back or side, B, in which appropriate openings M render it a sounding-box; but it need not necessarily be made with this false back or side, for it is evident that if the case A is properly constructed, the material selected with due regard to its sounding qualities, it will greatly assist in increasing the sound, while the supplemental sounding box or board B will greatly assist the case A in intensifying the sound, which is the principal object of the case, as in this way I obtain the proper surroundings for the otherwise comparatively weak power of mechanical telephones. I can further improve the character of the case A as a sounding-box, and prevent resonance, &c., that would in a measure interfere with the composite vibrations when speaking by making suitable apertures in the case, preferably in the front or sides.

D represents the speaking-tube, one end of which is connected directly to and is in open relation with the chamber G and vibrator L, the other or outer end being in convenient po-

sition to speak into. This outer end may be enlarged flaringly, as shown, or be provided with a flaring mouth-piece, the object in view being to concentrate the sound-waves upon the vibrator L at or near its center. This tube D is represented as curved, and can be made from metal, hard rubber, papier-maché, wood, or other substance. It can also be a curved or straight flexible tube that can be curved at pleasure; or it can be made with an elbow and angled; or it can be part flexible and part metal or other substance.

My object in using a tube that I can curve, as described, is this: In mechanical or acoustic telephones the line or wire should extend at right angles from the diaphragm or vibrator. When the speaking-tube is straight and placed in a convenient position to speak into or hear from (which would be a horizontal position, or at a very slight angle only from the horizontal) the line or wire must necessarily extend from it horizontally, or with but a slight angle from the horizontal, and would consequently in most cases be in the way, and the places in which the instrument could be placed would be limited to the few positions where there would be no objection to the wire extending out from it horizontally. By curving the speaking-tube the wire or line can extend upward from the diaphragm or vibrator to any desired height, to the ceiling, or through the roof, if desirable, and then turned to whichever direction required. As will be seen, the line in this way can be kept entirely out of the way and the instruments placed in almost any required position.

There will be a few instances where a straight tube can be used to some advantage, and the line leading out horizontally from the diaphragm. Consequently I do not confine myself strictly to a curved or angled tube.

Within the case A, and connected directly or indirectly with the tube D, or forming a part of the same, is the piece or plate F, with a suitable opening, H, where it is in connection with the speaking-tube D. The inner or upper surface of the piece F forms one wall of the concentrating-chamber G, the vibrator or diaphragm forming the other wall or side. The recess or chamber G can be formed in the piece F, or may be formed by placing a band, ring, or washer of suitable diameter and thickness



between the outer edge of the upper surface of the piece F and the vibrator L, so as to keep them separated the required distance.

As the piece F forms the wall of the concentrating-chamber G, it should be of a non-vibratory character, firm and solid, so as to resist the sound-vibrations caused in the chamber G when talking into the tube D, so that the full force of the vibrations shall be expended on the vibrator L. For this purpose I use a thick piece of wood or hard rubber, but do not confine myself either to the substance used or to the thickness of the same. Neither do I confine myself to any particular form of the piece F, as it may be circular, square, oblong, &c., providing the chamber G thereon is formed perfectly round where it is in connection with the diaphragm. Neither do I confine myself to any particular method of holding the vibrator L in position so as to cover or form one side of the chamber G, with which the speaking-tube D is in open relation; but the method I prefer is by means of the flanged ring K, which can be provided with threads to engage with other threads formed on the circumference of the piece F, so that it can be screwed up tightly, the flange of the ring holding the vibrator L tightly in position; or I can form small lips or inward projections on the ring K, to engage in grooves and notches formed on the circumference of the piece F, or can secure the piece F by small bolts, screws, or their equivalents. The piece K need not necessarily be round, except that portion that bears directly or indirectly against the vibrator or diaphragm L.

I represents a hearing-tube, shaped, after the manner of the speaking-tube, something like a curved funnel, with the larger end in open relation with the diaphragm L from the opposite side to that of the speaking-tube D and chamber G. This tube receives from that side of the diaphragm all the sound-waves caused by the vibrations of the diaphragm and focalizes them to the smaller end, where they are received into the flexible tube T, which is attached thereto. The tube T is provided with an appropriate ear-piece, which can be applied to the ear. The tube I is held in position, so that its larger end is directly over and in open relation with the diaphragm L, by the piece or ring K, to which it may be secured; or it may be secured to the piece F, holding the diaphragm L in position between the chamber G and the larger end of the tube I. The tube need not always be curved, but can extend through the end of the case A.

The advantage of having both speaking and hearing tubes is, first, in its convenience, the operator being able to hear immediately upon ceasing to speak, and to speak at once upon ceasing to hear; but the additional advantage in this telephone is in the improved shape of the two tubes.

In mechanical telephones where the intensity of the sound is determined by the favorable surroundings, by which it is not decreased af-

ter being transmitted, it is necessary that these surroundings be adapted to that end. With this in view it will not do to obstruct any of the waves caused by the agitation of the vibrator or diaphragm. They must be collected and transmitted to a given point. But if the same tube is used both to speak and hear through, this object is not obtained, because it is found that the best form of a tube in which to speak is one which tapers inwardly toward the vibrator or diaphragm, so that the sound-waves may be focused directly upon its center; but when such a tube is used to hear through, the waves from the vibrator are obstructed, except at its center, and then those that pass through are not focused, but, on the contrary, are scattered out and lose their force.

In my invention I have provided separate tubes with the best shapes for each purpose. The speaking-tube D concentrates the sound upon the center of the diaphragm, while the hearing-tube I receives the waves from the full surface of the diaphragm and focuses them toward its smaller end, whence they are conveyed to the ear by the flexible tube T, with its ear-piece attached.

W represents the line which is connected to the vibrator or diaphragm L at or near its center.

In using the instrument we speak into the tube D, the sound-waves striking the vibrator L, causing it to vibrate. The line W, being connected with the vibrator, transmits the vibrations to the vibrator of the other instrument, causing it to vibrate and reproduce the original sounds.

In respect to the case of the instrument I would state that I do not confine myself to any particular shape for the same, as it can be either oblong, square, circular, or of any other desired form.

For calling the telephone at the other end of the line, I place a clock-alarm gear, P, in the case and extend its hammer through a small slot in the hearing-tube, so as to strike against the diaphragm. This alarm-gear I provide with a handle, R, outside of the case, by turning which the hammer is made to sound an alarm on the diaphragm and call the other telephone. Instead of putting this hammer inside the hearing-tube, I may place it outside and cause it to strike against the hearing-tube itself.

Having thus described my invention, what I claim is—

1. In an acoustic or mechanical telephone, the combination of the speaking-tube D, opening into the concentrating-chamber G, and the hearing-tube I, adapted to fit over the diaphragm L from the opposite side to the chamber G, and gradually contracted, so as to concentrate the sound-vibrations and deliver them to the ear-piece or flexible tube T, substantially as described.

2. In a telephone, the combination, with the diaphragm, of a speaking-tube and hearing-



tube arranged upon opposite sides of the diaphragm, the said speaking-tube being arranged to converge toward the center of the diaphragm and the hearing-tube being arranged to cover  
 5 the diaphragm at its end and converge away from the said diaphragm, as and for the purpose described.

3. In a telephone, the combination, with the diaphragm, of a tapering hearing-tube arranged upon the opposite side to that which  
 10 receives the impulses of the voice, and with its wider end concentric in relation to the diaphragm, substantially as shown and described.

4. The tapering and concentrating tube I, having a flexible tube, T, at its smaller and  
 15 outer end and its inner and larger end curved and inclosing the diaphragm L, whereby the vibrations received by the diaphragm are conveyed away, substantially as described.

5. In combination with the diaphragm L and hearing-tube I, the heavy disk or plate F, arranged between the diaphragm and speaking-tube, and having its top concaved to form a  
 20 basin or chamber, G, and connected with the diaphragm and hearing-tube by the flanged ring K, substantially as and for the purpose described.

6. In combination with the diaphragm L, disk F, having vocalizing-chamber G, and the

funnel-shaped hearing-tube I, the curved speaking-tube D, in open relation with the diaphragm B and the attached line, substantially as and  
 30 for the purpose described.

7. In combination with the mechanical telephone herein described, consisting of the tubes  
 35 D and I, disk F, with vocalizing-chamber G, diaphragm L, and line, the outside case or box, A, acting as a sounding-box, substantially as described.

8. In combination with the mechanical telephone herein described and the sounding-box  
 40 A, the supplemental sounding-box formed by the false back B, substantially as described.

9. The speaking-tube D, with its flaring mouth-piece, in combination with the heavy  
 45 non-vibrating disk F, having vocalizing-chamber G, diaphragm L, line W, and sounding-box A, substantially as described.

10. The combination of a curved speaking-tube, D, a disk or plate, F, having a concentric  
 50 trating-chamber, G, in open relation to the speaking-tube and the diaphragm L, substantially as shown and described.

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Witnesses:

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