

No. 774,482.

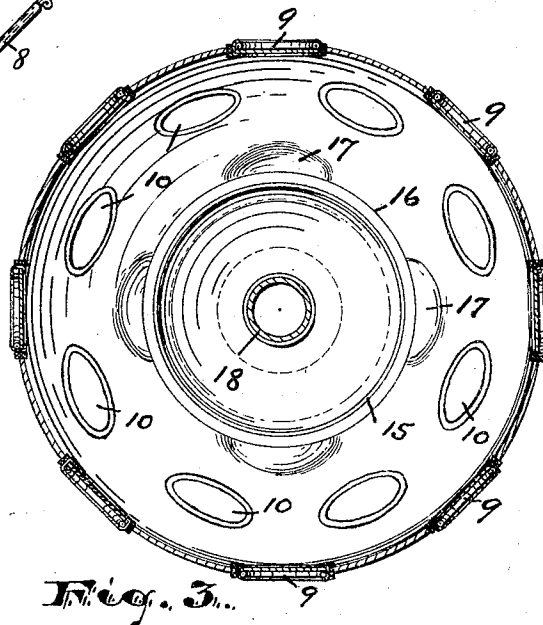
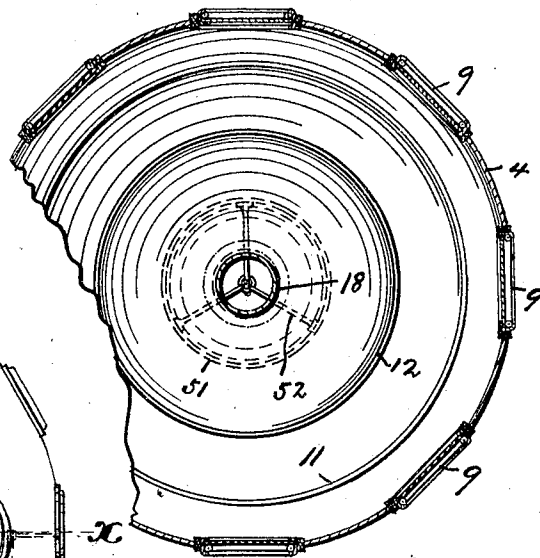
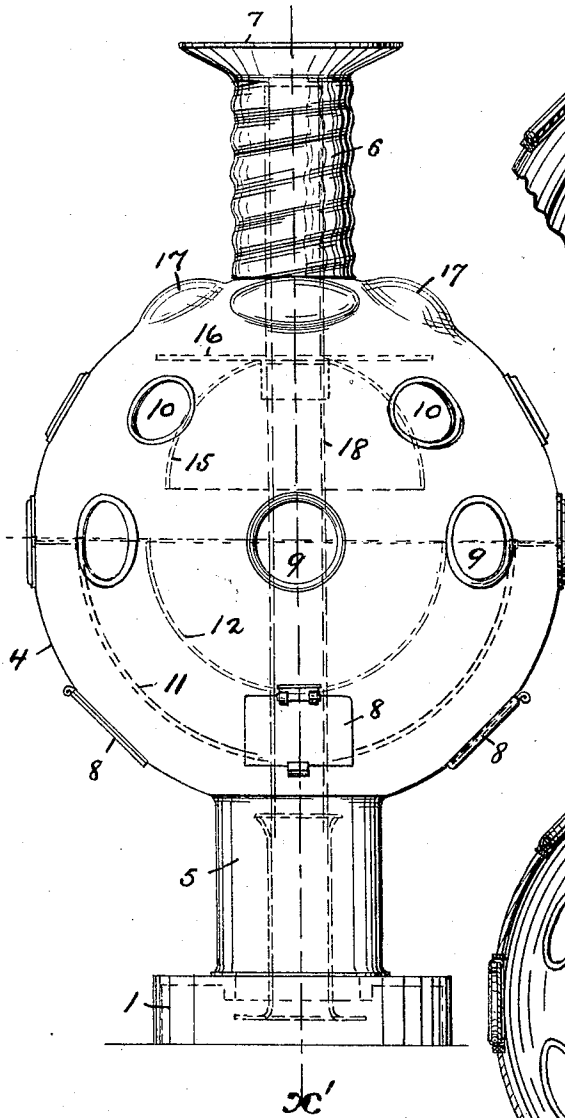
PATENTED NOV. 8, 1904.

N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

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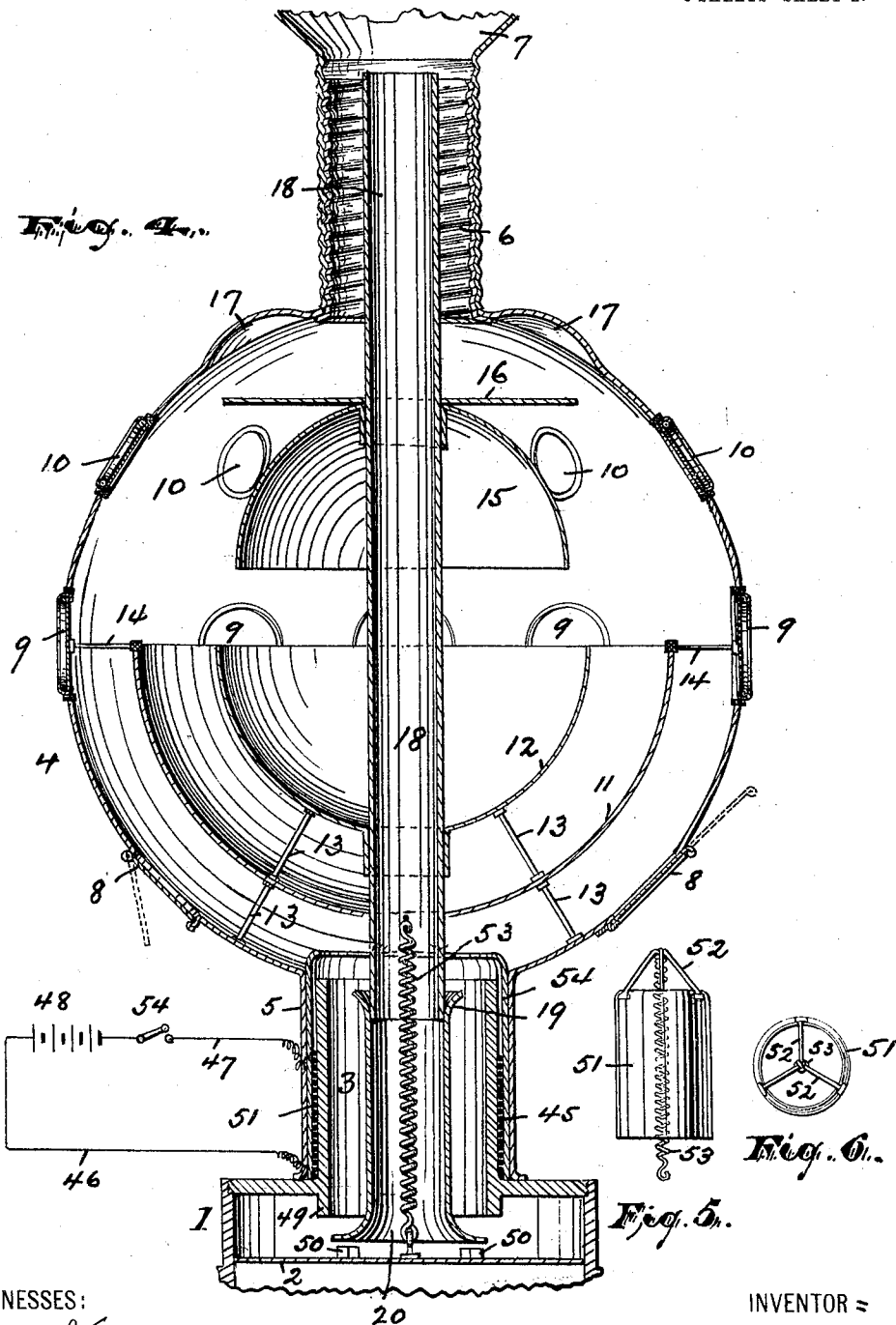
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5 SHEETS—SHEET 2.



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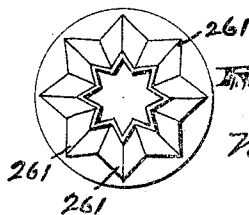
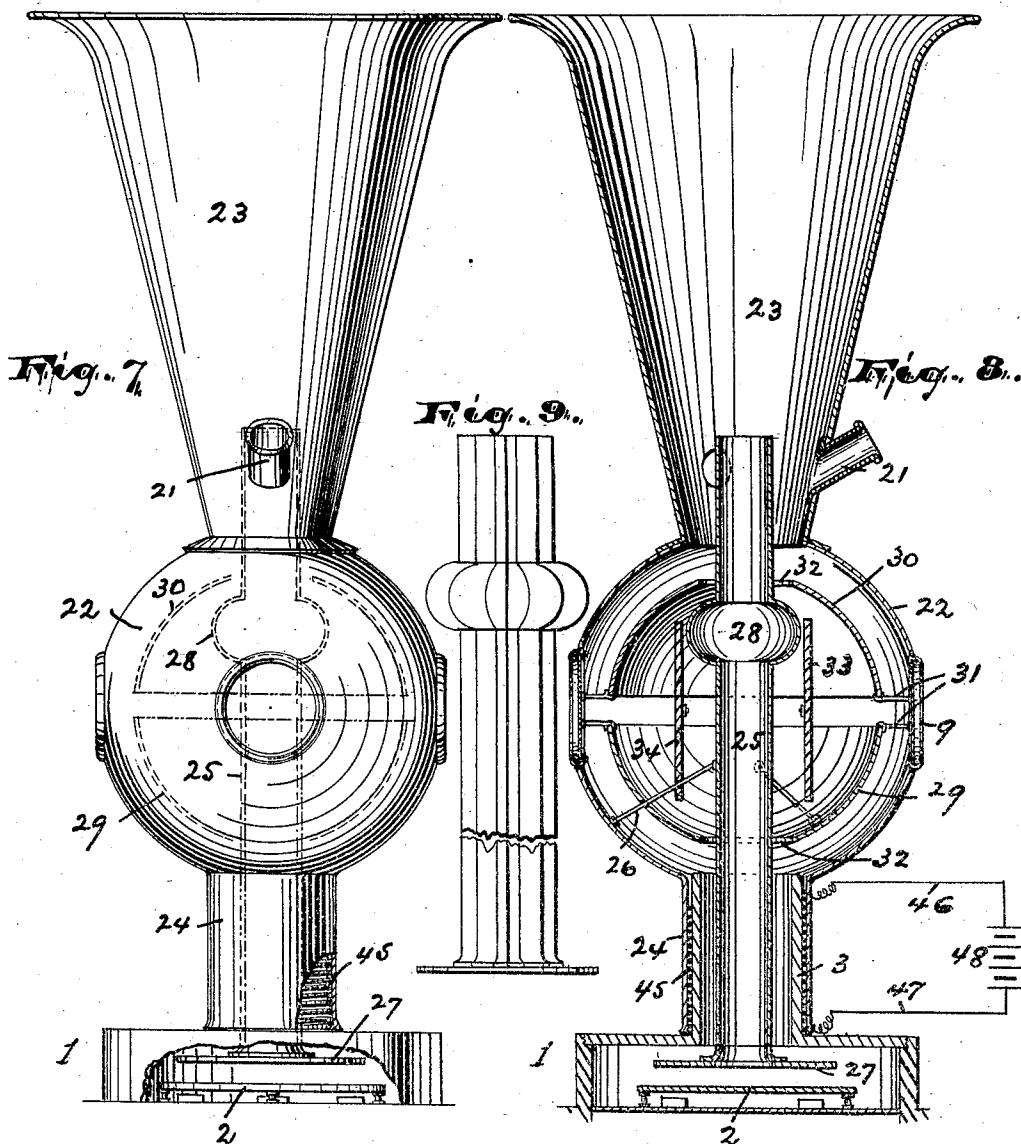
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5 SHEETS—SHEET 3.



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Fig. 10.

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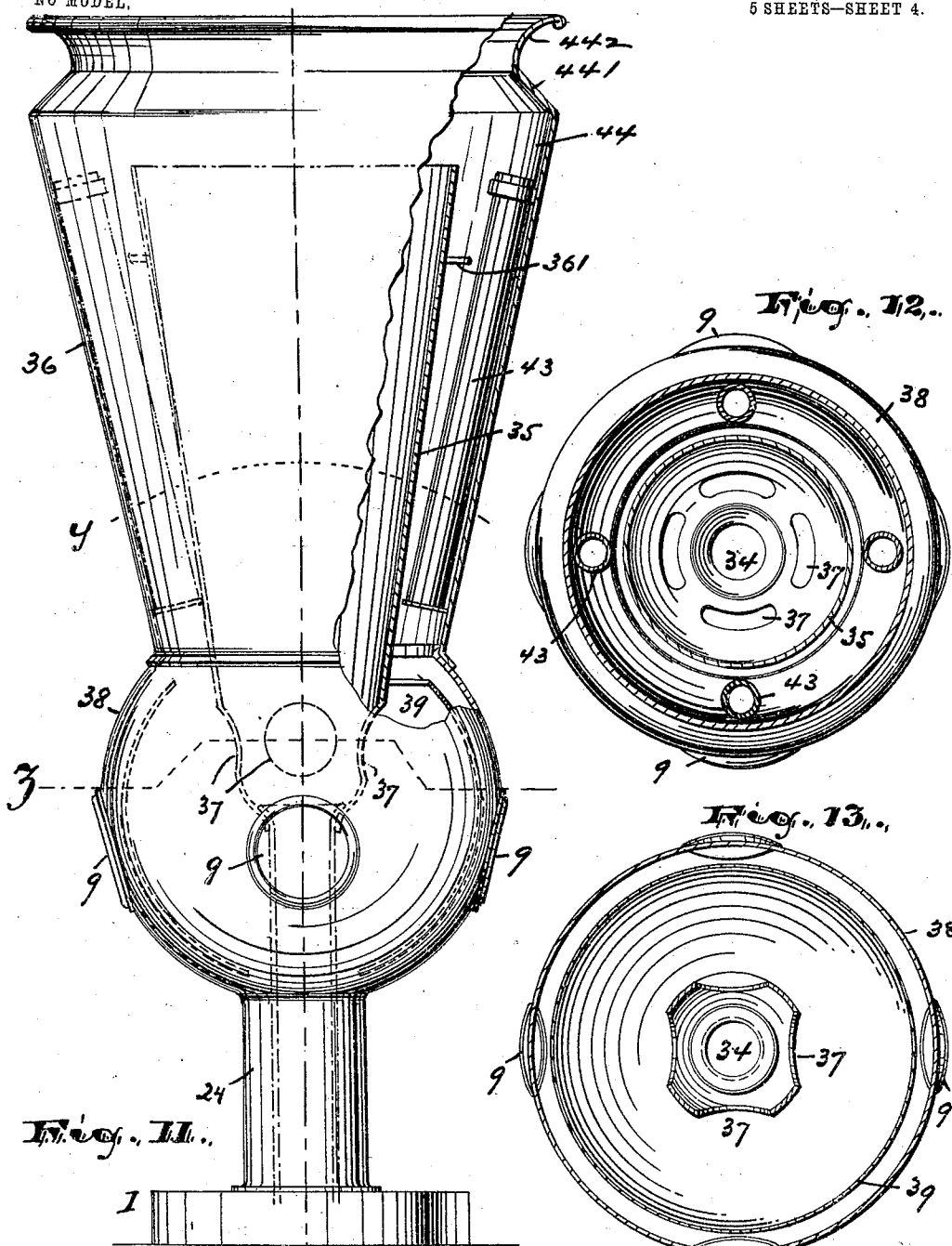
PATENTED NOV. 8, 1904.

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APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 4.



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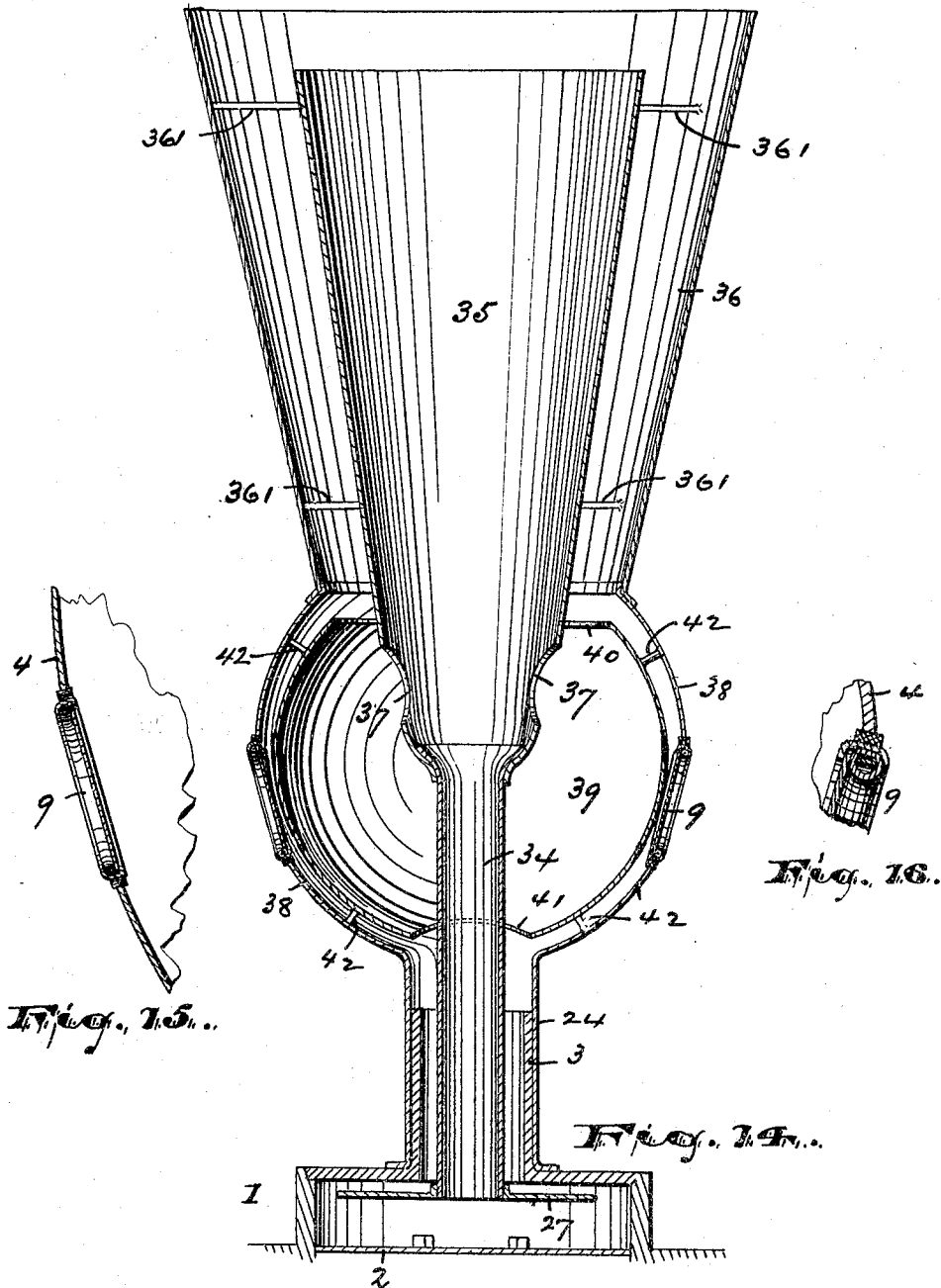
PATENTED NOV. 8, 1904.

N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 23, 1903.

NO MODEL.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

NATHAN L. LEWIS, OF NEW YORK, N. Y.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 774,482, dated November 8, 1904.

Application filed February 28, 1903. Serial No. 145,554. (No model.)

To all whom it may concern:

Be it known that I, NATHAN L. LEWIS, a citizen of the United States, residing at New York city, in the borough of Manhattan and State of New York, have invented and produced new and original Improvements in Talking-Machines; 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, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The objects of this invention are to provide an amplifying and conducting device which can be employed in connection with the horns of talking-machines for improving the sound both in tone and volume, to thus secure a distinct and accurate reproduction from the talking-machine or to enable the perfect record to be made; to provide a construction which can be fitted to any machine between the usual speaker and the horn, receiving at opposite points the said parts, to thus improve the efficiency of the talking-machine, and to obtain other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

The invention consists in the improved amplifying and conducting device for talking-machines and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like figures of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of my improved device in its preferred form; and Figs. 2 and 3 are cross-sectional views upon line *x*, Fig. 1, looking toward the opposite ends of the device, respectively. Fig. 4 is a longitudinal central section of the device as on line *x'*, Fig. 1. Fig. 5 is a side elevation of a certain sleeve detached, and Fig. 6 is a plan of the same. Fig. 7 is a side elevation of a modified form of my improved device combined with a horn, and Fig. 8 is a central longitudinal section of

the same. Fig. 9 is a side elevation of a certain interior tube, and Fig. 10 is a plan of the same. Fig. 11 shows a modified combination of my device with a horn; and Figs. 12 and 13 are cross-sectional views of the same upon lines *y* and *z*, respectively. Fig. 14 is a longitudinal central section upon line *y'*, Fig. 11; and Figs. 15 and 16 are enlarged portions of said section, showing more clearly the manner of mounting certain diaphragms.

In said drawings, 1 indicates the usual sound-box or speaker of a talking-machine having the flexible diaphragm 2 and at the top a cylindrical neck 3. To said neck is applied my improved device, which consists of a substantially spherical body portion 4, having at opposite points tubular extensions or necks 5 6, one of which, as 5, is adapted to receive the neck of the sound-box, and the other, 6, to receive a horn 7, preferably by screwing, as shown in Figs. 1 and 4 more particularly. The said spherical body portion 4 is formed, preferably, of sheet metal, and at the lower part of its walls or next the neck 5 are doors 8, permitting access to the interior. Around the great circle of said sphere formed by a plane perpendicular to the line joining the two necks 5 6 is a series of diaphragms 9, formed of very thin sheet metal, mica, or some other material more flexible than the walls of the body portion. There is also between said series of diaphragms 9 and the horn-receiving neck 6 of the device another circular series of similar diaphragms 10.

That part of the interior chamber of the body portion 4 which is adjacent to the sound-box-receiving neck is occupied by concentric hemispherical diaphragms, as 11 12, supported from the walls of the body portion by stays 13, the edges of the inner diaphragm, as 12, being preferably left free, as shown, while the outer one has its edges connected by stays 14 to the centers of the diaphragms 9. In the opposite end portion of the spherical body part 4 is preferably arranged a small hemispherical diaphragm 15, having at its base a plane circular diaphragm 16, terminating at its edges short of the walls of the body. Protuberances 17 may be formed in the walls

of the body portion 4 adjacent to the constricted parts of its interior passage to further improve the sound, if desired.

Diametrically throughout the body portion 4 extends a tube 18, which is disposed centrally and longitudinally of the necks 5 6, as shown, terminating at its extremities substantially flush therewith. This tube is preferably jointed within the sound-box-receiving neck, as at 19, for greater convenience. Furthermore, the said tube is flared at its ends 20 adjacent to the diaphragm 2 of the sound-box 1 and adapted to receive from said diaphragm a certain portion of the sound-waves and conduct the same directly through the device to the horn 7 without adding to or subtracting from them. Other sound-waves enter the body portion 4 of the device through the passage around said tube 18 and are by the diaphragms above described amplified and conducted into the horn 7 through the neck 6. The said diametrically-disposed tube 18 passes through the centers of the various diaphragms described, and the two diaphragms 15 16 are shown supported thereby, although they might, if preferred, be supported by stays, as the others are shown.

In practice my improved device may sometimes be permanently connected to the neck 30 of a horn, as shown in Figs. 7, 8, 11, and 14, thus exhibiting only one neck—viz., the one, 24—for connection to the talking-machine. Tubular branches 21 may be provided upon the throat of the horn for attachment of tubes or other horns.

In Figs. 7 to 10, inclusive, 22 indicates the body portion of the device, and 23 a horn combined therewith. The central tube 25 is in this construction shown supported by arms 26 from the walls of the body portion and has at its sound-box end an annular lateral flange 27 and adjacent to the neck of the horn 23 a peripheral enlargement 28. The interior diaphragms of my device in this construction are shown consisting of two hemispherical diaphragms 29 30, slightly separated at their edges and connected by stay-rods 31 or other suitable means to the series of diaphragms 9 set in the walls of the body portion. Where said hemispherical diaphragms 29 30 surround the tube 25 they are apertured, as at 32, and within the said two diaphragms 29 30 are parallel circular diaphragms 33 34 on opposite sides of the central tube 25 and extending across the plane of division of the hemispherical diaphragms. Under some conditions the central tube in this construction may be made star-shaped in cross-section, as shown in Figs. 9 and 10, and in this case the supporting or stay rods 26 may be dispensed with, and the angular projections 261 at the sides of the tube engage directly the necks of the device to hold said tube in alinement.

In Figs. 11 to 14, inclusive, I have shown

further modification of my idea, consisting in the central tube 34 being flared at its outer end 35 parallel with the horn 36 and having said flared end either permanently or removably supported from the inner walls of the horn, as by stays 361 or any suitable form of collar or the like. The throat of the flared portion may be apertured, as at 37, if desired. In this construction the body portion 48 of my device is shown as containing a single substantially globular diaphragm 39, truncated at opposite points to form apertures 40 41 to receive the central tube 34. The said diaphragm 39 is supported at points near said apertures by stays 42, extending to the inner walls of the body portion. In Fig. 11, moreover, tubes 43 are shown laid on the inner surface of the horn 36 and extending longitudinally thereof to a point close to the spherical body portion 48 of the amplifying device. Furthermore, in Fig. 11 I have shown the horn 44 provided at its mouth with a contracted outlet instead of the usual straight lip and flaring horn commonly used. This construction is obtained by applying to the end of the horn a converging flange 441, beyond which a lip 442 projects. The effect of this is to concentrate and improve the tone of the sound production.

By my improved device the sound-waves are in their passage through and impact against the various diaphragms described reinforced or amplified, so that the sound production of the machine loses its metallic effect and is made natural and strong.

In connection with the use of my improved device I may secure increased tension of the sound-box diaphragm by winding upon the neck of the same a coil 45, of wire, connected at its ends 46 47 to a battery 48, whereby the neck of the sound-box serves as an electromagnet, said neck being preferably extended, as at 49, and the diaphragm having fixed to it magnetic blocks 50 to be attracted by said magnet. In this construction a sleeve or casing 51 is slipped over the wires 45 upon the neck of the sound-box, so that the latter will not become disarranged, the neck of the amplifying device then receiving said sleeve 51. If preferred, arms 52 may extend inward from the top of the sleeve 51 through the walls of the central tube of the trumpet and form a tripod, from which a spiral spring 53 may depend through the said central tube and be fastened at its lower end to the center of the sound-box diaphragm. This will enable added tension to be given the sound-box diaphragm besides the magnetic means, or by placing a switch 54 in the circuit of said magnet either device can be used independent of the other for reproduction of sound.

Although I have shown and described my invention as applied to the sound reproduction of talking-machines, it will nevertheless be understood that it is equally applicable for the

recording of sound. In this case, however, a portion of the tubes and diaphragms may be dispensed with and the body portion of the device used directly in conjunction with the magnetic tension means described for securing telephonic action of the recording-diaphragm. Furthermore, although I have shown and described my device as spherical in shape, or substantially so, it will be understood that other shapes may be employed, the diaphragm being made to conform thereto.

Various modifications and changes of detail construction other than those specifically set forth may be employed without departing from the spirit and scope of the invention, and I do not wish to be understood as limiting myself by the positive descriptive terms employed except as the state of the art may require.

Having thus described the invention, what I claim as new is—

1. A phonograph horn or trumpet having an enlarged and subdivided amplifying and conducting chamber secured to the throat or neck piece thereof for improving the sound-transmission, said chamber having double walls separated by an air-space and being itself subdivided.

2. The combination with a horn for talking-machines, having a conoidal bore, of an enlarged amplifying and conducting chamber located at the throat of said horn, said chamber having separated double walls and being subdivided interiorly, and reinforcing-diaphragms in said chamber.

3. An amplifying and conducting device for talking-machines, providing an interior chamber and having at opposite sides means for connection to a speaker and horn, and reinforcing-diaphragms in said chamber presenting a central passage in alinement with said connecting means.

4. An amplifying and conducting device for the reproduction of sound, providing an interior chamber and having at opposite sides means for connection to a horn and speaker, respectively, and reinforcing-diaphragms secured to the walls of said chamber and lying within the same.

5. The combination with a phonograph horn or trumpet, of an amplifying sound-box secured to the throat or neck of the horn, diaphragms secured at separate points to the inner surface of the said amplifying-box and forming therewith double walls, and a sound-conducting tube passing through said box.

6. The combination with a phonograph horn or trumpet, of an amplifying sound-box adapted to be secured to the throat or neck of said horn, diaphragms mounted in the walls of said box, other diaphragms concaved and forming with the box double walls and a sound-conducting tube extending through the said box.

7. The combination with a conoidal horn or trumpet for talking-machines, of an enlarged

amplifying sound-box at the throat of said horn, reinforcing-diaphragms in said sound-box, and a central tube extending through the sound-box and having a flaring end projecting into the said conoidal horn.

8. An amplifying device for talking-machines, comprising a spherical body portion provided at opposite sides with means for connection to a sound-box and horn respectively, and segmental spherical diaphragms mounted in said body portion and having parts of themselves free to vibrate.

9. An amplifying device for talking-machines, comprising a spherical body portion provided at opposite sides with connection means for a sound-box and horn, respectively, circular resilient diaphragms mounted in the outer walls of said body portion, and segmental spherical diaphragms inside said body portion and partially supported by stay-rods extending to the centers of said first-mentioned diaphragm.

10. In an amplifying device for talking-machines, the combination of a spherical body portion having at opposite sides means for connection to a sound-box and horn, respectively, a tubular passage extending centrally through said body portion between said means for connection, and diaphragms arranged in said body portion around the said tube.

11. In an amplifying device for talking-machines, the combination with a spherical body portion having at one side a neck to receive a sound-box and being at the opposite side joined to a conoidal horn, a tube extending centrally through said body portion and its neck and flaring at the opposite end into said conoidal horn and segmental spherical diaphragms mounted in said body portion around the said central tube.

12. In an amplifying device for talking-machines, the combination with a spherical body portion having at one side a neck to receive a sound-box and being at the opposite side joined to a conoidal horn, a tube extending centrally through said body portion and its neck and projecting into said horn, of diaphragms mounted in said body portion around said tube and being free at portions of their area to vibrate.

13. The combination with a sound-box for talking-machines, having a diaphragm mounted therein and an exterior neck, of a wire coiled around said neck and being in circuit with a battery or source of electric energy, whereby said neck becomes an electromagnet, and magnetic pieces fastened to said diaphragm and adapted to be attracted by said electromagnet.

14. The combination with a sound-box having a neck 3, and a vibratory diaphragm, of a sleeve 51, slipped over said neck, arms 52, projecting inward from the edges of said sleeve to a common point and a spiral spring extending from the point of meeting of said

arm and being attached to the diaphragm, said spring being under tension.

15. The combination with a sound-box having a neck and a vibratory diaphragm, of a sleeve 51, slipped over the neck, supporting means arranged in said sleeve, and a spiral spring extending from said supporting means to the said diaphragm.

16. A phonograph horn or trumpet comprising a conical body portion having at its mouth an inwardly-converging annular flange.

17. A phonograph horn or trumpet, having

a wide mouth at one end and a neck-piece or throat at the other end, and neck-pieces or tubes projecting from the conoidal body of the horn.

In testimony that I claim the foregoing I have hereunto set my hand this 6th day of February, 1903.

NATHAN L. LEWIS.

Witnesses:

RUSSELL M. EVERETT,
CHARLES H. PELL.