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PHONOGRAPH HORN.
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1,002,205.

Patented Aug. 29, 1911.

2 SHEETS—SHEET 1.

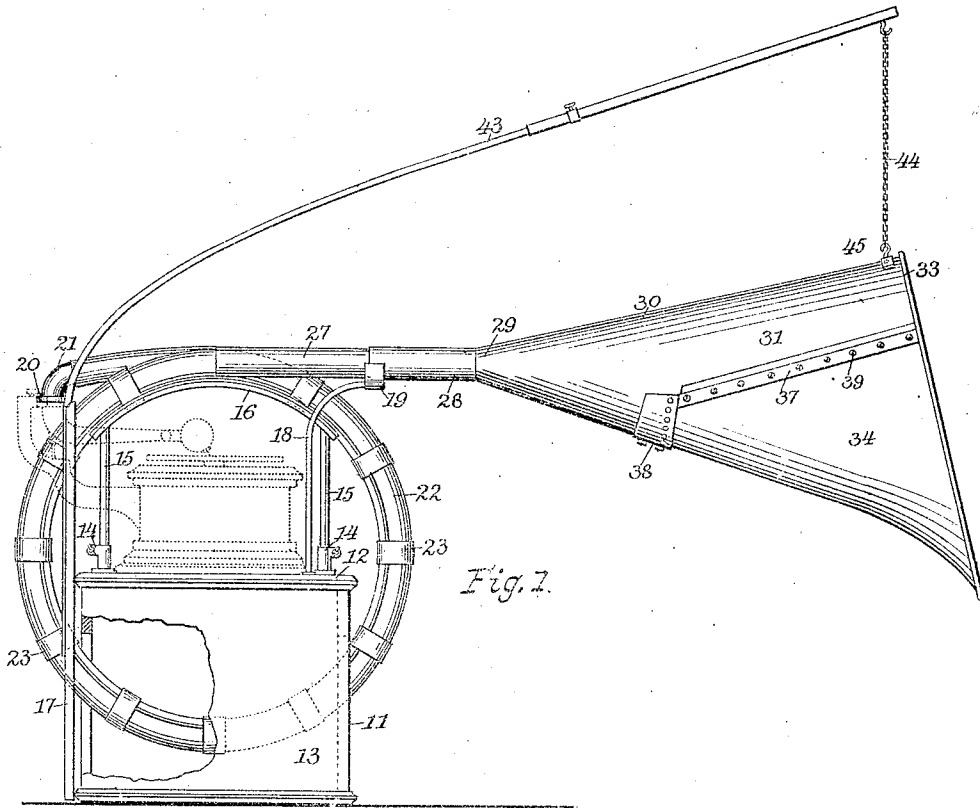


Fig. 1.

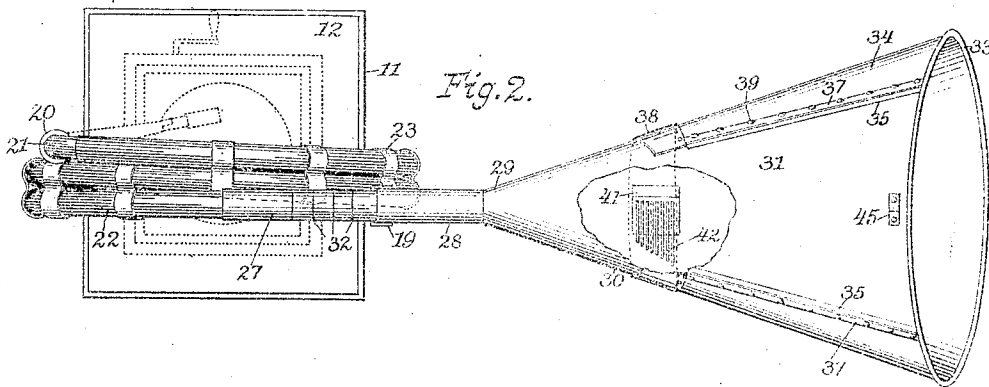


Fig. 2.

Witnesses,

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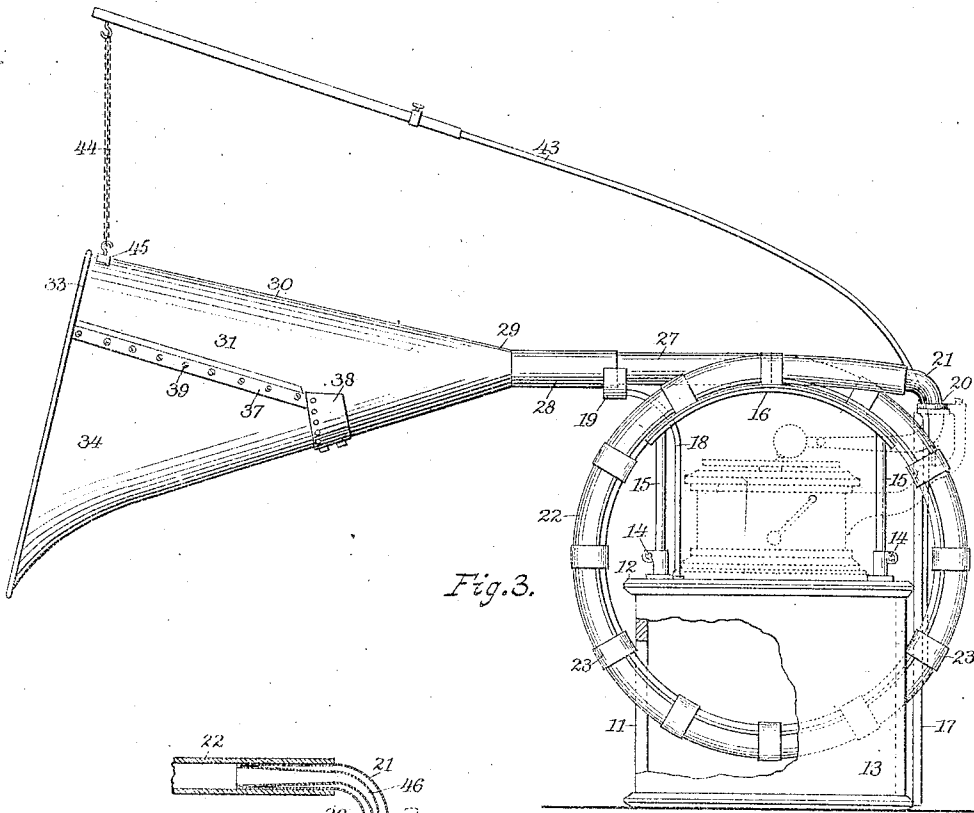


Fig. 3.

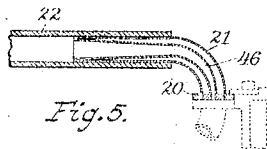


Fig. 5.

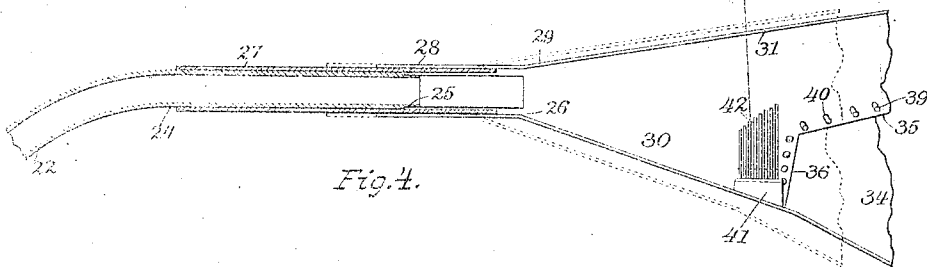


Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

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PHONOGRAPH-HORN.

1,002,205.

Specification of Letters Patent. Patented Aug. 29, 1911.

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To all whom it may concern:

Be it known that I, MILES G. GRAHAM, a citizen of the United States, residing at Albany, Albany county, New York, have
5 invented a new and useful Improvement in Phonograph-Horns, of which the following is a specification.

My invention relates to phonograph horns, or, more broadly, to sound amplifying and resonating devices such as are used
10 on phonographs or other sound reproducing machines.

It is intended to produce a device which shall greatly amplify, purify and resonate
15 the sounds emitted from such machines; which shall particularly adapt such machines to reproduce music originally rendered by an orchestra, whether brass, string or full, as well as the human voice
20 either speaking or singing; and which shall be adjustable as to some of its parts, so as to adapt it more exactly to different uses.

To this end, it consists of many novel features, which may be combined as shown; or
25 they may be, in some cases, employed singly in connection with other well known horns; or they may be united in smaller combinations, *i. e.*, certain parts may be advantageously used without others.

In the example of my invention which I have selected for illustration, Figures 1, 2
30 and 3 are respectively, a left side elevation, a top plan view and a right side elevation of the device, all partly broken away, and all showing in dotted lines the phonograph
35 or like machine, which forms no part of my invention; Figs. 4 and 5 are partial longitudinal vertical sections of the two end portions of my device.

In the drawings, 11 designates a bench or stand, shown as consisting of a top 12 and
40 two side legs or supports 13, having an opening between them. On the top 12 of the stand are secured two sockets 14, carrying two vertically adjustable legs 15, which
45 support a saddle 16 of arc-shaped, trough-like form. Also secured to the stand 11 is a vertical standard 17, adapted by any well known means, not shown, to detachably
50 engage a horn supporting rod, as will hereafter appear. From the top 12 of the stand rises a rod 18, at the free end of which is a semi-circular horn supporting bracket 19.
55 The stand 11 is intended to support any form of sound recording or reproducing

machine, shown in the present instance as a "Victor" phonograph. To the coupling member of the phonograph is detachably secured in the usual manner, a cooperating
60 coupling member 20, which will of course vary in style to fit the particular machine employed. The tube 21, which is integral with or secured to the member 20, is fitted snugly within the end of a long coiled tube
65 22, preferably made of rubber, under which term I include rubber coated fabric, as ordinary hose pipe. As shown, the coil consists of a plurality of turns of equal diameter and of a size to encircle the phonograph or like instrument, the ends of the
70 coil extending tangentially, one to engage with the coupling device, the other with a horn, as hereafter described. I have found it advantageous to make this tube of not less than one inch interior diameter and 16
75 feet long, the length of the lowest "C" closed diapason pipe of an organ, though tubes of 8, 4 or 2 feet, or indeed of any multiple of 2 feet, possess certain advantages. I have also found that the resonating
80 or sound carrying capacity of the rubber tube is increased by impregnating its inner surface with a suitable resinous or gum-bearing solution. To this end, I preferably introduce into the tube a quantity of
85 hemlock-spruce oil, turn the tube so as to bring the oil into contact with the entire surface, allow a proper time, say 3 to 5 days, for absorption, and pour out the residue. The tube 22 is coiled so as to loosely
90 embrace the stand top 12 and secured by metal bands 23. The free, tangential, end 24 of the tube 22 is exteriorly cut away to form a portion 25 of reduced diameter, over which is secured a short tube 26 of
95 thin flexible material, as goldbeater's skin, which projects beyond the end of the tube 22. Secured over this tangential end 24 of the tube 22 is a metal sleeve 27, which also projects beyond the end of the tube; but
100 not so far as does the flexible tube 26, which by reason of the reduction of the tube 22, and the consequent annular space between the parts 26 and 27, is free to vibrate for almost its entire length, see Fig. 4. A telescopic sleeve 28, which has a snug sliding fit on the sleeve 27, is integral with or securely connected to the smaller or throat
105 end 29 of a conical horn 30, the body portion 31 of which is best made of copper.

while the sleeve 28 is preferably made of sheet brass, or other metal or alloy. On the sleeve 27 is a series of marks 32 forming a graduated scale for conveniently adjusting or readjusting the longitudinal relations of the tube 22 and the horn 30, see Fig. 2.

A considerable portion of the forward or mouth end of the horn body 31, is cut away, or omitted in making, as shown in Figs. 1, 2, 3 and 4, and a stout circular metal hoop 33, the arc of which corresponds to that of the remaining metal segment, is rigidly secured to the end thereof. The partially flaring conical shape of the horn is restored or completed by means of a segment or gusset of parchment, vellum or like material 34, which is tightly stretched and secured to the free part of the hoop 33 and to the edges 35, 36 of the body 31 of the horn. I preferably secure the segment 34 at the edges of the body 31 by means of flat bars 37 and a curved plate 38, between which and the body 31 the parchment is engaged, the parts 37, 38 being held to the body by small bolts 39 playing in slots 40 in the body 31. By the use of these elongated slots 40, I am enabled at any time to take up any slack or wrinkles which may occur in the segment 34.

Within the metal body portion of the horn 30, and preferably at the rear of the flexible segment or gusset 34, I rigidly secure a block 41 of metal, which supports one or more vibrating gongs 42. I prefer to employ a harmonic series, in the present instance an octave, of such gongs, which may be of desired form, preferably coiled bars, such as are used in cathedral clocks, see Figs. 2 and 4.

As shown in Figs. 1 and 3, the horn 30 is supported at its throat end by the bracket 19, in which the sleeve 28 slides, and at its mouth end by a telescopic rod 43 detachably engaged with the rod or standard 17 and carrying at its free end a chain or cord 44 connected to a loop 45 secured to the upper side of the horn. In practice I find it advantageous to make the horn without the usual flaring metal portion at the mouth end, *i. e.*, with an approximately continuous taper from end to end except as to the parchment portion.

In Fig. 5 of the drawings, I have shown an additional device which I may employ in order to still further amplify the sound. It consists of a tapered tube 46 within the coupling tube 21 and with its smaller end secured to the member 20 so as to register with the aperture therein. The tube 46 may be tapered throughout its length, as shown, or at least at its free end, which is snugly embraced by the tube 21, the tubes 21 and 46 being thus held in concentric relation.

It will be seen that my device in its en-

tirety constitutes what may be called an "orchestraphone," that is a sound purifying, resonating and tonalizing device adapted to reproduce tones of every pitch and timbre, so that it is particularly adapted to music originally produced by an orchestra containing instruments of various sorts. This adaptation is achieved by the use of the long semi-flexible tube through which the sounds pass and in which scratching and like disagreeable noises appear to be taken up; by the employment of a great variety of vibrating substances, from the light and delicate membrane 26 to the heavy gongs 42, which are acted upon and seem to accentuate notes at different points of the scale; and by the adjustability of the horn 30, by which the membrane 26 may be held within the sleeve portion 28 of the horn or thrust forward a considerable distance into the throat end of the horn itself.

As already stated, the different features of my device as described act cumulatively, so that substantial gains in tone power and sweetness may be obtained even where certain of them are omitted. Hence, I do not wish to be limited to the use of the entire combination shown, or otherwise except as set forth in the claims. It is also clear that many mechanical changes may be made in my device without departing from the spirit of my invention. Thus, the vertical arrangement of the coiled tube, the provision for separating the stand, coil, horn, etc., for packing and for their easy reassembling, and other features of the sort, are within the province of the mechanic.

It will be understood that my device may be used in producing records as well as in sound reproduction, and that the phrase "sound amplifying device" is used in its broad sense, as including any modification of the tone. The phrase "talking machine" is also used in certain of the claims in its broad sense to include any machine for the production or reproduction of sound records.

What I claim is:

1. In combination, a talking machine; and a sound amplifying member therefor, including a coupling member, a rubber connecting tube attached to said coupling member, the interior surface of said tube being coated with a sound resonating material, and a tapered horn, independent of and connected with the free end of said tube.

2. In combination, a talking machine; and a sound amplifying device therefor, including a coupling member, a rubber connecting tube attached to said coupling member, the interior surface of said tube being coated with a gum-bearing solution, and a tapered horn, independent of and connected with the free end of said tube.

3. In combination, a talking machine; and a sound amplifying device therefor, including a coupling member, a rubber connecting tube attached to said coupling member, the interior surface of said tube being coated with a resinous solution, as hemlock-spruce oil, and a tapered horn, independent of and connected with the free end of said tube.

4. In a sound amplifying device, a rigid, non-collapsible, tapered horn in two parts, one of which is of rigid material and extends the entire length of the horn, and the other of which is of flexible material and of less length than the horn, said rigid part being provided with means for holding said flexible part in permanent stretched position.

5. In a sound amplifying device, a rigid, non-collapsible, tapered horn in two parts, one of which is of metal and extends the entire length of the horn, and the other of which is of tegumentary material and of less length than the horn, said metal part being provided with means for holding said tegumentary part in permanent stretched position.

6. A sound amplifying device including a tube of substantial length; a tube of vibrating membrane secured at the free end of said first named tube; and a tapered horn also mounted at the free end of said first named tube and surrounding said membranous tube.

7. A sound amplifying device including a tube of substantial length; a relatively short tube of thin flexible material, as gold-beater's skin, secured at the free end of said first named tube; and a tapered horn also mounted at the free end of said first named

tube and surrounding said membranous tube.

8. A sound amplifying device including a tube of substantial length; a tubular vibrating membrane secured at the free end of said tube and extending therebeyond; and a tapered horn slidingly mounted on the free end of said tube, whereby said membrane may have longitudinal movement within the throat of said horn.

9. A sound amplifying device including a tube of substantial length; a sleeve surrounding the free end of said tube; a tubular vibrating membrane secured at the free end of said tube, said membrane being of less diameter than said sleeve and projecting therebeyond; and a tapered horn slidingly mounted on said sleeve.

10. In a sound amplifying device, a coupling member having a central aperture; an outer tube rigidly secured to said member; and an inner tapered tube having its smaller end secured to said member and connected with said aperture and having its free flared end located within said outer tube.

11. In a sound amplifying device, a coupling member having a central aperture; an outer tube secured to said member; and an inner tapered tube having its smaller end secured to said member and having its free flared end located within and bearing against said outer tube, whereby said tubes are held in concentric relation.

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Witnesses:

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