No. 842,707.

PATENTED JAN. 29, 1907.

O. G. ROSE.

ATTACHMENT TO HORNS FOR SOUND REPRODUCING INSTRUMENTS.

APPLICATION FILED MAR. 22, 1906.

Fig. 1.

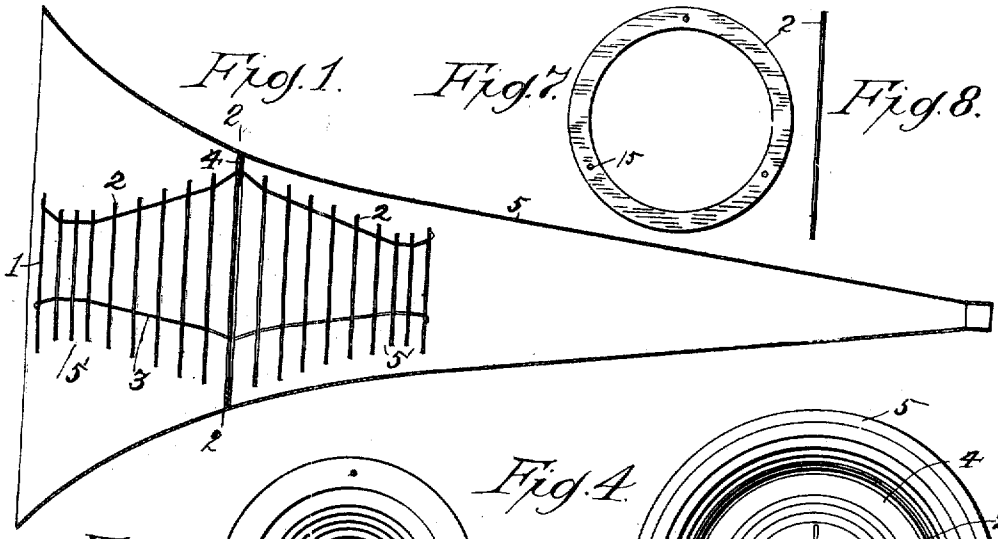


Fig. 7.

Fig. 8.

Fig. 2.

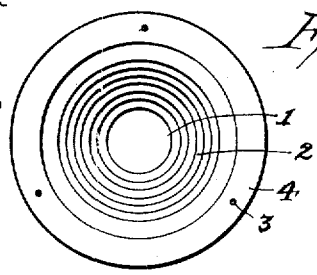


Fig. 4.

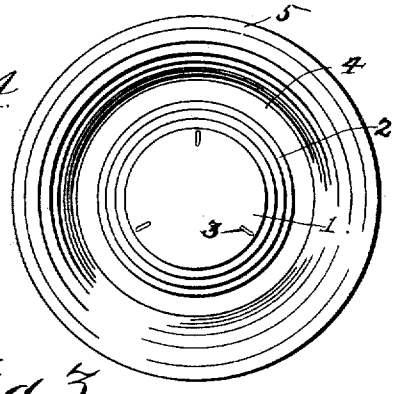


Fig. 3.

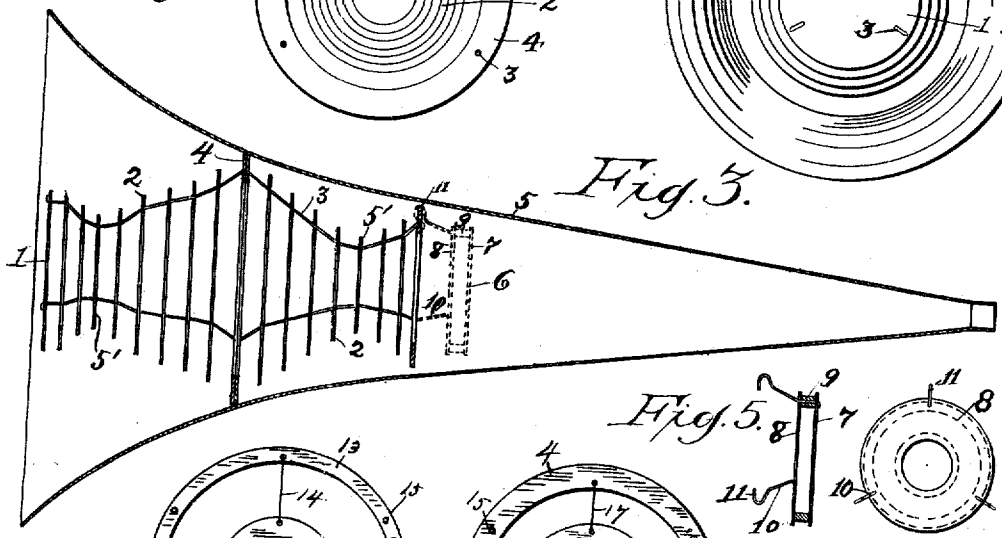


Fig. 5.

Fig. 6.

Fig. 9.

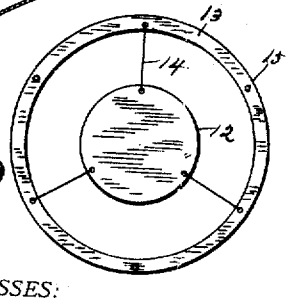
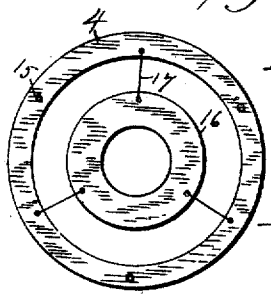


Fig. 10.



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ATTACHMENT TO HORNS FOR SOUND-REPRODUCING INSTRUMENTS.

No. 842,707. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed March 22, 1906. Serial No. 307,413.

To all whom it may concern:

Be it known that I, OVEREND G. ROSE, a citizen of the United States, residing at Camp Meeker, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Attachments to Horns for Sound-Reproducing Instruments, of which the following is a specification.

My invention relates to certain improvements in horns for sound-reproducing instruments—such as phonographs, graphophones, and disk talking-machines—and it has for its object the projection and analysis of the sound as it passes through the horn.

As generally constructed the horns for sound-reproducing instruments are open or unobstructed throughout their length and are attached to the sound-box of the instrument in such a manner that when the diaphragm of the reproducer is vibrated the sound apparently comes from the interior of the horn and is correspondingly cramped or blurred, which renders it difficult to understand the human voice or to distinguish or separate the tones of the different instruments from each other.

I have discovered that by providing the horn, preferably at or near its outer end, with a compound diaphragm, which I shall call a "projector and sound-analyzer," the sound is repeated, as it were, from the diaphragm of the sound-box and caused to apparently come from the mouth or outer end of the horn. In addition to this the tones of the different instruments are analyzed or separated, so that those of each instrument are caused to be repeated by and to apparently come from a portion of the diaphragm corresponding, respectively, with the relative positions that the instruments were stationed from the recording apparatus when the record was made—that is, the instruments that were situated at the least distance from the recorder will appear as coming from the outer or more exposed portions of the diaphragm, while those that were located at a greater distance will appear as coming from the portions of the diaphragm located within the horn or at a greater distance from its mouth or outer end. By reproducing or transmitting the sound in this manner the vibrations from my diaphragm are more evenly distributed, and therefore more distinctly heard in all directions from the mouth of the horn than where the horn is open or unobstructed throughout its length, and by separating the tones of the instruments from each other a much more pleasing effect is produced than when the tones of all of the instruments are commingled promiscuously and projected more directly in the line of the axis of the horn.

An embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a horn for sound-reproducing instruments provided with one form of my invention. Fig. 2 is a transverse sectional view of the attachment, taken on the line 2 2 of Fig. 1. Fig. 3 is a view similar to Fig. 1, showing a different form of the invention. Fig. 4 is a plan view looking into the mouth of the horn. Fig. 5 is a transverse sectional view of a sound-box for the attachment. Fig. 6 is a plan view of the same. Fig. 7 is a plan view of one of the disks, and Fig. 8 is an edge view of the same. Figs. 9 and 10 are modifications.

In the form of my invention shown in the drawings it consists of a plurality of disks 1 and 2, secured parallel to each other at a suitable distance apart by retainers, as wires or connectors 3. The disks are of different diameters and all are annular except the end ones in the form shown in Fig. 1 and only the front one in the form shown in Fig. 3, which thereby closes the passage formed by the openings in the other disks. The disks are arranged in two series, which taper from the larger or central disk 4 toward the ends, and the disk 4 is of such a diameter that when it is placed within the mouth or open end of a horn 5 the front or imperforate disk 1 will stand at a short distance from a plane passing through the outer edge of the bell or rim of the horn.

Instead of having the taper extend gradually entirely to the end or last disk of the attachment I have secured the best results by slightly increasing the size of the last disk and, in some instances, of one or two disks adjacent thereto, thereby forming a contraction of a greater or less degree, as shown at 5′, adjacent to the end, and with the longer horns I have also found it desirable to use a sound-box upon the inner end of the attachment, as shown at 6 in dotted lines in Fig. 3.

The disks can be made of any suitable material, as metal, fiber, vulcanite, leather, and may be of any desired size and thickness, the central one being preferably thicker

than the others to secure the necessary strength for supporting the others, and they can be located at any suitable distance apart, but in actual use I have secured very marked and agreeable results by using eight disks upon each side of the central or supporting disk 4, exclusive of the end disks or the sound-box where the latter is used in place of the inner or what I shall call the "tone-disk," and by placing the outer or what I shall call the "focusing-disk" five-sixteenths of an inch from the outer edge or rim of the horn and the fixed or central disk 4 six and three-fourths of an inch inward from the rim. The distance that the disks should be placed apart varies from three-fourths of an inch to seven-sixteenths, according to the length of the horn, three-fourths being preferably in a thirty-inch horn and one-half an inch in horns only twenty-four inches long. The internal diameters decrease regularly by one half an inch from the central disk, which is six inches toward each end except the first disk each side of the central one, which decreases one inch, and the last two disks at the end, which are of the same size—that is, two inches at the outer end and two and a half inches at the inner end. The external diameters decrease in substantially the same ratio, the width of the disk or ring at any point being three-quarters of an inch, thus making the outside diameter one and a half inches greater than the inside diameter. In narrow horns the inner or what I shall call the "projection disks" may be made smaller and arranged to decrease in size more rapidly from the central disk, and the last or tone disk is preferably imperforate, the same as the outer or focusing disk, as shown in Fig. 1.

With horns thirty inches or over in length it has been found desirable to use an open or annular disk for the last disk upon the inner end and to use in connection therewith the sound-box 6, which consists of two annular disks 7 and 8, that are spaced apart by the rim 9, and preferably connected with the last inner disk by arms 10. The inner ends of the arms are bent into hooks 11, so as to be connected with or detached from said inner disk when desired. The openings in the disks 7 and 8 are of different diameters, with the one having the larger diameter arranged toward the inner or smaller end of the horn.

In case the ordinary focusing or tone disk cannot be used, as where the bell or horn is too narrow or contracted or from any other cause, the human voice or other sounds made close to the recorder can be focused at the mouth of the horn by suspending a small imperforate vibrating focusing-disk 12 in front of the last of the perforated disks. This disk is preferably of the same diameter as the aperture of the last annular disk and may be suspended in any desired manner; but I prefer to suspend it from a ring 13 by wires 14, preferably very small or hair-like. The ring 13 is preferably in the form of a narrow annular disk which is supported upon the ends of the wires 3 by means of the regular supporting-holes 15. In other cases the sound-box 6 may be dispensed with and very satisfactory results obtained by suspending a vibrating annular disk 16 in the aperture of one or more of the projecting disks, and especially in the central disk 4, preferably by means of small wires 17.

In using the attachment as above described it is inserted in the larger end of the horn as far as it will go until the central disk engages with the interior of the horn in a plane at right angles to the axis of the horn, which will hold the other disks substantially concentric within the horn, but at a sufficient distance therefrom to permit of the passage of the sound-waves from the reproducer at the smaller end. Where it is desirable to use the sound-box 6, it is secured to the inner end of the attachment before the latter is inserted into the horn. The reproducing instrument is then started, which will cause sound-waves to be generated that will traverse the horn until they meet the inner or projection disks, and are thereby forced through the aperture of the central or supporting disks, and from there the waves will pass to the outer or analyzing disks which terminate with an imperforate focusing-disk nearly in a line with the rim of the horn. When the sound is projected and analyzed in this manner, the tones of the different instruments will come from the different analyzing-disks and apparently in the same relative distance from each other and from the mouth of the horn that the instruments occupied when making the record. For instance, the trombones and cornets are generally placed at the greatest distance from the recording instrument and their tones will be given out by the disks lying nearest the middle of the attachment. The tubas and altos are placed at about half of that distance from the recorder and their tones will come from the disks substantially half-way between the central disk and the rim of the horn. The piccolos and snare-drums are still closer to the recording instrument and their tones will come from the disks almost at the end of the analyzer, while the singer or speaker having stood within a few inches from it and the clarionets having been blown across the mouth of the recording-horn those tones will come from the focusing-disk at the forward end of the attachment. The splitting up or separating of the mass of sound that comes from the reproducing-horn in this manner into the sound of the respective instruments and then focusing the sounds at the same relative distance that the instruments were from the record when they were being played makes the sounds more

natural and distinct than they otherwise would be, for the reason that my attachment destroys the over tones and metallic resonance, and being produced close to the mouth of the horn enables the audience to hear as well twenty or thirty feet or more behind the horn as in front. The human voice being focused in or thrown off from the disk which is located almost in a plane with the rim of the horn will cause it to sound all over the room or hall, and the articulation is rendered clear and distinct and so natural that individual voices can be readily recognized.

Although I have shown and described my invention in the form in which I have secured the most desirable results, I do not wish to be limited to the exact number and sizes of the disks nor to the specific distances that they are apart. Nor do I wish to be limited to annular disks, as other forms may be used and flat spiral coils may also be substituted for the disks, and flexible connectors may be substituted for the rigid wires, thereby permitting of the device being collapsed or folded together, which result may also be secured in the spiral form without any connector at all.

What I claim is—

1. An attachment for the horns of sound-reproducing instruments, comprising a cage-like structure composed of a series of flat disks arranged in parallel planes and connected together, and adapted to be held as a complete structure within the horn.

2. In a sound analyzer for phonograph-horns, a plurality of annular disks and an imperforate disk arranged at a distance from each other and adapted to be secured in the horn, the annular disks decreasing in internal and external diameter toward the forward end and the imperforate disk being arranged at the smaller end.

3. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance from each other and adapted to be secured in the horn, the apertures in said disks decreasing in diameter from the middle toward each end.

4. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance from each other and adapted to be secured in the horn, said disks decreasing in external and internal diameters from the middle toward each end.

5. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance from each other and adapted to be secured in the horn, an imperforate disk at the forward end and a sound-box at the inner end.

6. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks of variant diameters, and wires for holding them at a distance from each other with their centers in the axis of the horn.

7. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance apart and adapted to be secured in the horn, and an imperforate disk at the forward end and a sound-box at the inner end, said box comprising two annular disks and a rim therebetween, and arms provided with hooks for securing it in position.

8. The combination with a phonograph-horn, a plurality of annular disks in the larger end thereof, said disks being at a distance from each other and decreasing in diameter from the middle toward each end, the middle disk engaging with the horn for supporting itself and the other disks at substantially right angles to the axis of the horn and with their peripheries out of contact with the horn.

9. The combination with a phonograph-horn, of a plurality of annular disks in the larger end thereof, and an annular disk in the aperture of one or more of said larger disks.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 1st day of March, 1906.

OVEREND G. ROSE.

Witnesses:
M. R. SEELY,
F. M. BARTEL.