

July 26, 1932.

O. WENDEROTH

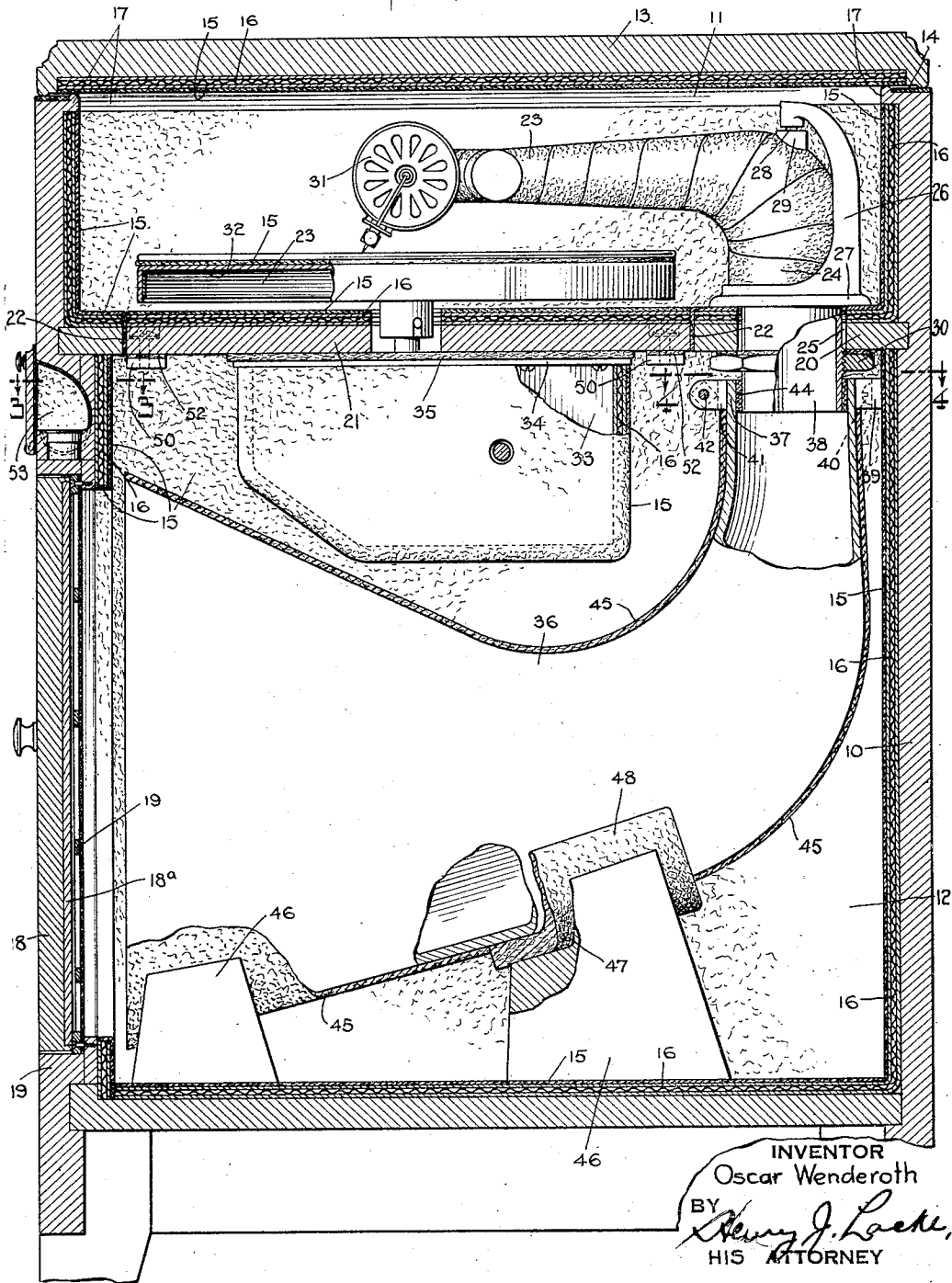
1,868,958

INTERFERENCE FREE SOUND REPRODUCING DEVICE

Filed July 30, 1929

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Fig. 1.



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Fig. 2.

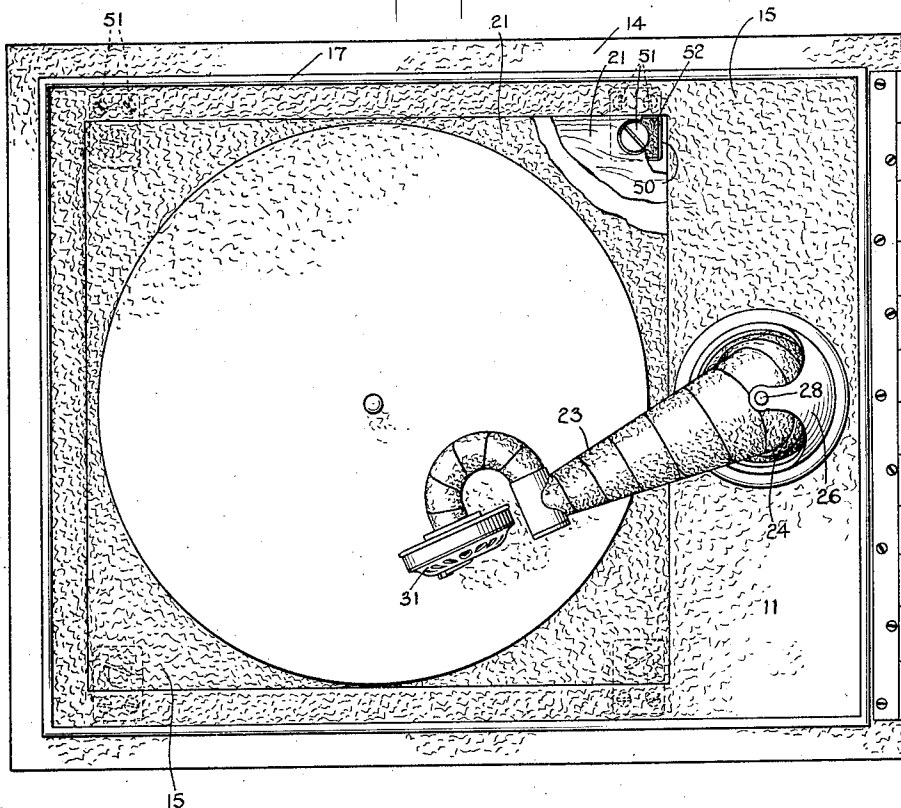


Fig 3.

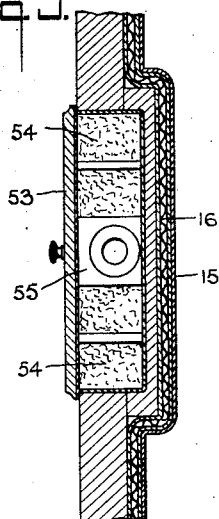
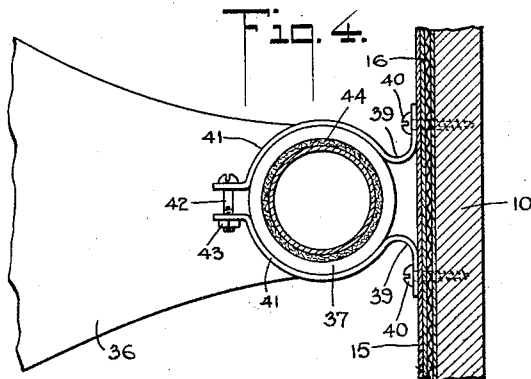


Fig. 4.



INVENTOR
Oscar Wenderoth
BY *reg. J. Locke,*
HIS ATTORNEY

UNITED STATES PATENT OFFICE

OSCAR WENDEROTH, OF NEW YORK, N. Y.

INTERFERENCE-FREE SOUND REPRODUCING DEVICE

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My invention relates to improvements in phonographs, radio speakers, and other sound reproducing devices.

An object of the invention is to conserve the purity and volume of the tones which originate in the reproducing system of a phonograph and the like and of the sound producing parts of a radio speaker, announcer and the like.

In present and prior phonographs, radio speakers, announcers and other reproducers, serious acoustical defects and limitations have been noted. These defects and limitations I designate herein as "interferences", and by this term I include the defects and limitations recognized in phonographic reproduction as "strident tones", non-uniformity of quality and volume of different registers within the range of reproduction, varying individually in different phonographs and makes of phonographs, giving rise to so-called "peaks", "dead spots", and the like. By the term "interference" I also include acoustical distortions which arise from varying causes, as will appear, and which deprive or suppress the reproduction of overtones as well as impress dissonant and/or discordant tones and/or noises.

I have discovered that such interferences arise from the following causes, the order of enumeration of these causes being without reference to their degree or relative importance; firstly, the vibrations originating in the reproducing system of a phonograph and the sound producing or emitting parts of a radio speaker and the like in turn set up vibrations in the material forming the reproducing system, in whole or in substantial part thereof; secondly, the vibrations originating in the reproducing system or the sound producing parts by communication with the air within the turntable well, in the instance of a phonograph, set up vibrations of the wall materials, thereby superimposing such vibrations upon the original vibrations; thirdly, that the body or material of the tone horn is integral with the cabinet or housing and is deprived of free acoustical resonance with the original vibrations by reason of such improper construction; fourthly, the vibra-

tions set up in the tone horn give rise in turn to vibrations of the walls and other parts of the chamber or chambers enclosing or adjacent the tone horn; sounds and/or noises extraneous of the phonograph, radio speaker, and the like are permitted to enter the reproducing or sound producing system or parts.

Aside from the interferences arising from extraneous sounds or noises and that due to defective structural relation of the tone horn, the above stated and other interfering vibrations are engendered in parts which are accessory to the reproducing and amplifying system proper and are of or included in the construction of the cabinet or other enclosure for the reproduction and amplifying system proper.

Stated broadly, my invention overcomes the above stated and other interferences by precluding or at least minimizing vibrations of the cabinet and other accessory parts by forming of or having the inner walls provided with sound absorbing and/or sound insulating material, thereby suppressing the vibrations of the materials of the reproducing system or sound producing parts, by constructing and mounting the tone horn to have its amplifying portion acoustically free of the walls and other accessory parts, and by positively excluding from the reproducing system or sound producing parts all extraneous sounds and noises.

Further features and objects of the invention will be more fully understood from the following detailed description and the accompanying drawings, in which

Fig. 1 is a vertical sectional elevation of a phonograph embodying preferred forms of my invention, applied to a phonograph;

Fig. 2 is a top plan view of the turntable well of the phonograph of Fig. 1;

Fig. 3 is a sectional elevation on line 3—3 of Fig. 1; and

Fig. 4 is a sectional elevation on line 4—4 of Fig. 1.

As above indicated, my invention is applicable to all forms of sound reproducing devices and accordingly my invention is not limited to any particular adaptation to phonographs generally nor to the particular

structure indicated in the drawings for carrying out my invention.

As illustrated in the drawings, the cabinet 10 of the phonograph is shown of conventional type and comprises generally an upper section 11, usually called the turntable well, and a lower section 12, usually called the tone horn chamber. The turntable well, as usual, is illustrated as provided with a cover 13 which is hinged at its one side, as indicated at 14.

As will appear, the rigidity of the body, i. e. walls of the phonograph or other sound reproducing device is attained by the use of suitable material, such as wood, similar to prior and present day practice, but, as appears more fully hereinafter, rigid material such as metal may be employed, in combination with suitable sound absorbing and/or sound insulating materials. Thus, as is illustrated particularly in Figs. 1 and 2, and as applied to a conventional type of phonograph cabinet, the selected rigid material is shown as the outer material of the cabinet walls and the material for attaining the objects of my invention applied as inner material, or as facings, or linings, upon or of the inner faces of the rigid material.

As one material for obtaining certain of the objects of my invention, I illustrate the layer 15 of felt, of sufficient thickness to serve as a sound absorbing medium. In the drawings, I have further shown the conjoint use of suitable sound insulating material such as corrugated board 16 of paper stock, or the like, or other sound insulating material of cellular or "dead air" spaces, or of non-cellular formation, as will be understood by the art. With the conjoint use of such sound absorbing and sound insulating materials, the combined thickness of the same may be reduced, as compared with the use of a single material serving as the sound absorbing and/or sound insulating medium.

Such sound proofing and sound insulating construction is illustrated in the drawings as applied to or upon all inner faces of the turntable well, including the four vertical walls, in which instances the wood or other rigid material of these walls are preferably recessed to receive such medium and also to provide a rim or beading 17 extending as the effective upper edge of the turntable well, the rigid material of the cover 12 being also recessed at its inner faces to receive the sound proofing material 15 and/or the sound insulating material 16, the dimensions of length and width of the cover recess extending beyond the beading 17 whereby the upper edges of the beading 17 engage the sound proofing and/or sound insulating material, when the cover 13 is in its closed position.

Such structural relationship precludes the entry into the turntable well of sounds or noises extraneous of the phonograph repro-

ducing system, as referred to elsewhere herein, as well as attaining the above stated objects of sound proofing and sound insulating.

Such construction also enables the thus closed interior of the turntable well to adjust itself to varying atmospheric conditions, as will be now apparent.

Such sound proofing and insulating materials are illustrated similarly applied to the inner walls of the tone horn chamber 12, in this instance, Fig. 1 indicating the sound proofing material 15 of felt and the sound insulating material 16 of cellular material. The door or doors 18 of the tone horn chamber, hinged to swing in a horizontal plane, or otherwise suitably adjustably supported from the front vertical wall 19 of the cabinet may also be provided with sound proofing and/or sound insulating materials.

Any suitable grill for concealing the opening of the tone horn may be employed.

My invention is more fully realized by the use of the sound proofing and/or sound insulating materials for the partition 20, usually including a central removable board or panel 21 between the turntable well 11 and the tone horn chamber 12, the sound proofing material being similarly indicated at 15 and the sound insulating material 16, such sound proofing and sound insulating material is preferably also continued over the edge faces of the removable board 21 adjacent the edge faces of the body or the partition 20, as is indicated at 22.

As one manner of effectually suppressing vibrations normally imposed upon the metal or other material of the sound box, tone arm and like parts of the reproducing system of a phonograph or the like, I apply suitable material such as tape 23, wholly or partially about the tone arm and the like, by enveloping the same under pressure, shrinking or like procedure. In the illustrated conventional type of tone arm, the same is swiveled at its lower end 24 to a collar 25, the swiveling being about a pivotal arm 26, provided with a lower, horizontally extending flange 27, and carrying at its upper end a pivot or swivel pin 28, received within a recessed boss 29 or equivalent. Such collar 25 is usually locked in position by the lock nut 30 applied on the lower face of the partition 20. Pursuant to my invention, the sound proofing and/or sound insulating material or materials, 15, 16 are shown interposed between such flange 23 and the partition 20, and between the lock nut 30, and at other clearances between such rigid material parts. Similarly, in the further attainment of my invention, substantial preclusion of interference is had by applying under pressure tape or the like, about the circular edge, the opposite faces and other portions of the sound box 31.

In like manner, the turntable 32 of metal or like rigid material is precluded from act-

ing as a diaphragm and causing the record disk to similarly act as a diaphragm, or otherwise contributing interfering vibrations by applying sound proofing material 15 and/or sound insulating material 16 upon the upper face of the turntable, and in the instance of the use of felt alone as such material, the thickness of the felt is substantial and sufficient for attaining the above stated purposes; such sound absorbing and/or proofing material is also applied upon under surfaces and the edge of the turntable.

When the turntable or equivalent is driven by clockwork mechanism, usually enclosed within a housing 33 or separate chamber which may be of steel or the like, its walls are precluded from acting as diaphragms or otherwise transmitting interference and the vibrations arising from the movement of the motor parts suppressed, by means of sound proof material 15 and/or sound insulating material 16, applied similarly to the same, including the contiguous faces between the upper edges 34 of the housing or chamber 33 and the bottom face of the partition 20, and/or of the partition board 21, as is indicated in this instance at 35.

The tone arm, turntable, and other parts of the reproducing system may be formed wholly or partly of material per se possessing relatively low inherent vibration, in which arrangement the sound absorbing and/or sound insulating material may be reduced to minimum thickness or omitted.

One type of tone horn is indicated at 36, which may be of the regulation or other approved construction; in all instances of which my invention is applicable. As indicated above, the tone horn is per se constructed and arranged to have free amplifying action, and as one manner of carrying out my invention, I have shown its upper or neck portion 37 of the tone horn secured to the lower end 38 of the collar 25 as an acoustical nodal point, namely, by the use of a combined bracket and clamp; the bracket portion of which, indicated at 39, is secured by screws 40 or the like to any suitable rigid support, such as the rear wall of the tone horn chamber 12; such bracket 39 is shown comprising the oppositely disposed clamping arms 41, 41, the free ends of which are adjustably clamped by means of the screw 42 and nut 43; the neck 37 of the tone horn 36 is sound proofed and/or sound insulated from the collar 25 by the material indicated at 44, see Figs. 1 and 4, similarly as above stated.

The body of the tone horn 36 is wrapped under pressure with vibration retarding material, and/or covered with sound absorbing and/or sound insulating material or materials, as indicated at 45.

Where any support or supports supplemental to the above stated nodal support at the

inner end 37 of the tone horn 36 may be required or desired, particularly for retaining the tone horn in position during shipment and/or other removal from one location to another location, such supplemental support may be had by interposing sound proofing and/or sound insulating material between the rigid portion or material of such support and its engagement with the material per se of the tone horn 36, as by the use of supplemental supporting blocks or the like indicated at 46, which may rest upon the sound proofing and/or sound insulating material 15, 16, at the bottom of the tone horn chamber 12, such supporting elements 46 further having on its engaging, i. e., upper face 47 sound proofing and/or sound insulating material indicated at 48, to sound proof and/or sound insulate such face or faces 47 from the material of the tone horn 36 proper.

In further attainment of my invention, all parts of metal and other relatively rigid and of inherently vibratory character whether required or employed in the cabinet construction or otherwise accessory or incidental to the reproducing system proper and the tone horn proper, are precluded from vibrating or otherwise contributing interference and/or restricting the range, the quality or timbre or affecting any overtones, and/or other forms of interference, by having their sound exposed surfaces covered with sound absorbing and/or sound insulating materials, similarly as above. As instances of such feature, I illustrate the connection and support of the removable panel 21 relative to the partition 20, comprising the bracket 50 and removable screws 51, provided with sound absorbing and/or sound insulating material as is indicated at 52, 52, see Figs. 1 and 2, interposed between rigid materials wherever employed; similarly the stylus or needles are precluded from contributing interference, by locating the receptacle for the fresh and used needles at a location acoustically extraneous of the reproducing and sound amplifying system proper. For example, such receptacle 53 may be located within an outer portion of the cabinet wall, as indicated in Fig. 1, conveniently at the front of the cabinet; such receptacle 53, see Fig. 3, may comprise several sub-compartments 54 for the fresh needles and a central compartment 55 for used needles. It should be further noted that sound absorbing and sound insulating material 15, 16, see Figs. 1 and 3, are interposed between the reproducing and sound amplifying system proper and the interior of the receptacle 53.

In a like manner, my invention is adaptable for radio speakers, electrical and other forms of announcers and in all other types of sound reproducing and sound producing devices, normally wholly or partly enclosed

within cabinets, casings, housings or the like, including portable phonographs.

Whereas, I have described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the spirit of the invention.

I claim:—

1. In a sound producing device embodying an actuated sound producing element and accessory parts for the support of the same, and a housing for said actuated element and said accessory parts, said housing having walls of material normally set in vibration upon actuation of said sound producing element, and sound absorbing and sound insulating material disposed on faces of said housing directed toward said actuated sound producing element for precluding vibration by said accessory parts in interference of the vibrations produced by said actuated element.

2. In a sound producing device embodying an actuated sound producing element and accessory parts for the support of the same, and a housing for said actuated part and said accessory parts, said housing being self-enclosed and formed of material normally set in vibration upon actuation of said sound producing element, and sound absorbing and sound insulating material disposed on substantially all the inner faces of said housing directed toward said accessory parts for precluding vibration by said accessory parts and said housing in interference of the vibrations produced by said actuated element.

In testimony whereof I have signed this specification this 21st day of January, 1929.

OSCAR WENDEROTH.