

Aug. 26, 1924.

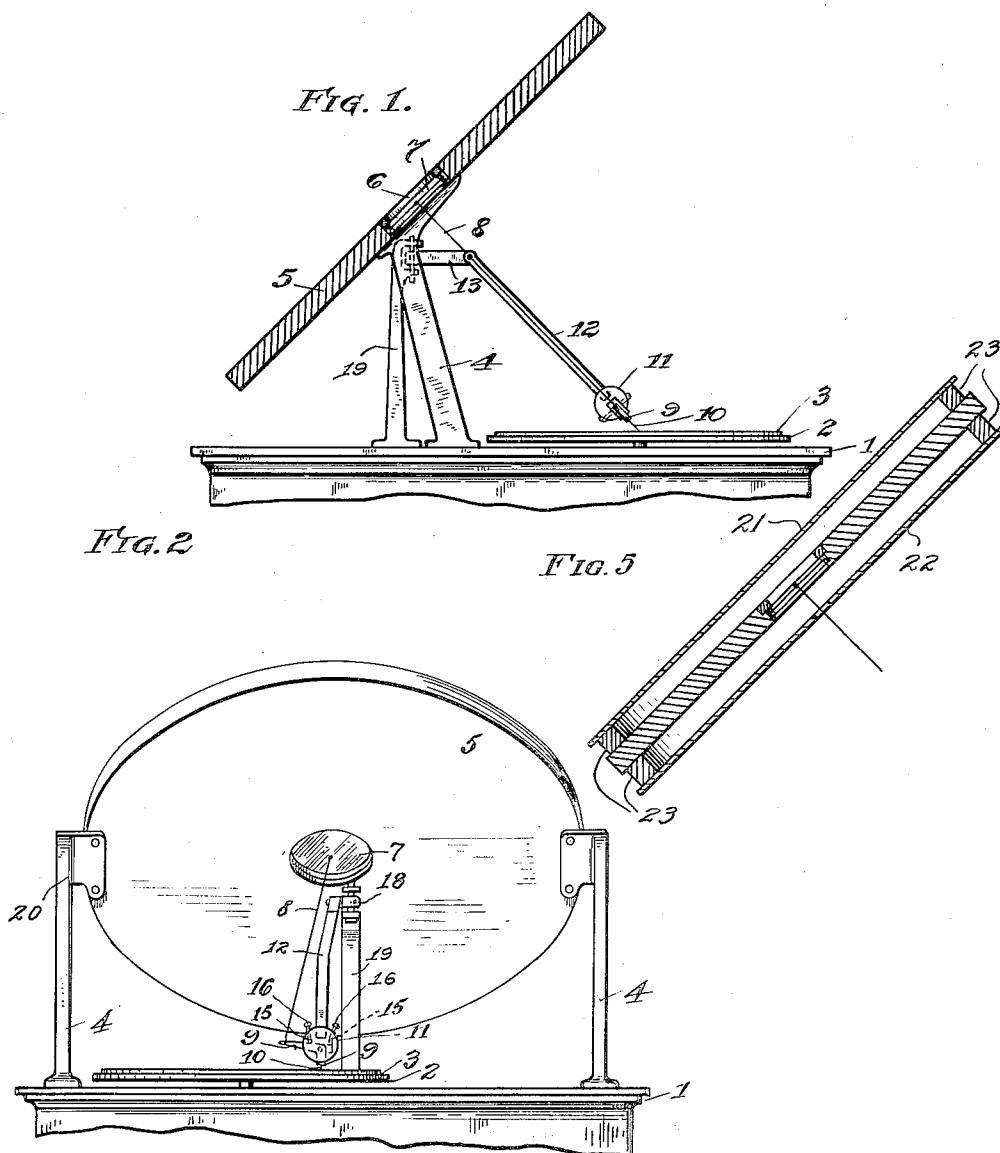
1,506,562

L. R. BUTTON

SOUND REPRODUCING DEVICE

Filed Dec. 20, 1919

2 Sheets-Sheet 1



INVENTOR.
L. R. Button
BY John H. Roney
ATTORNEY.

Aug. 26, 1924.

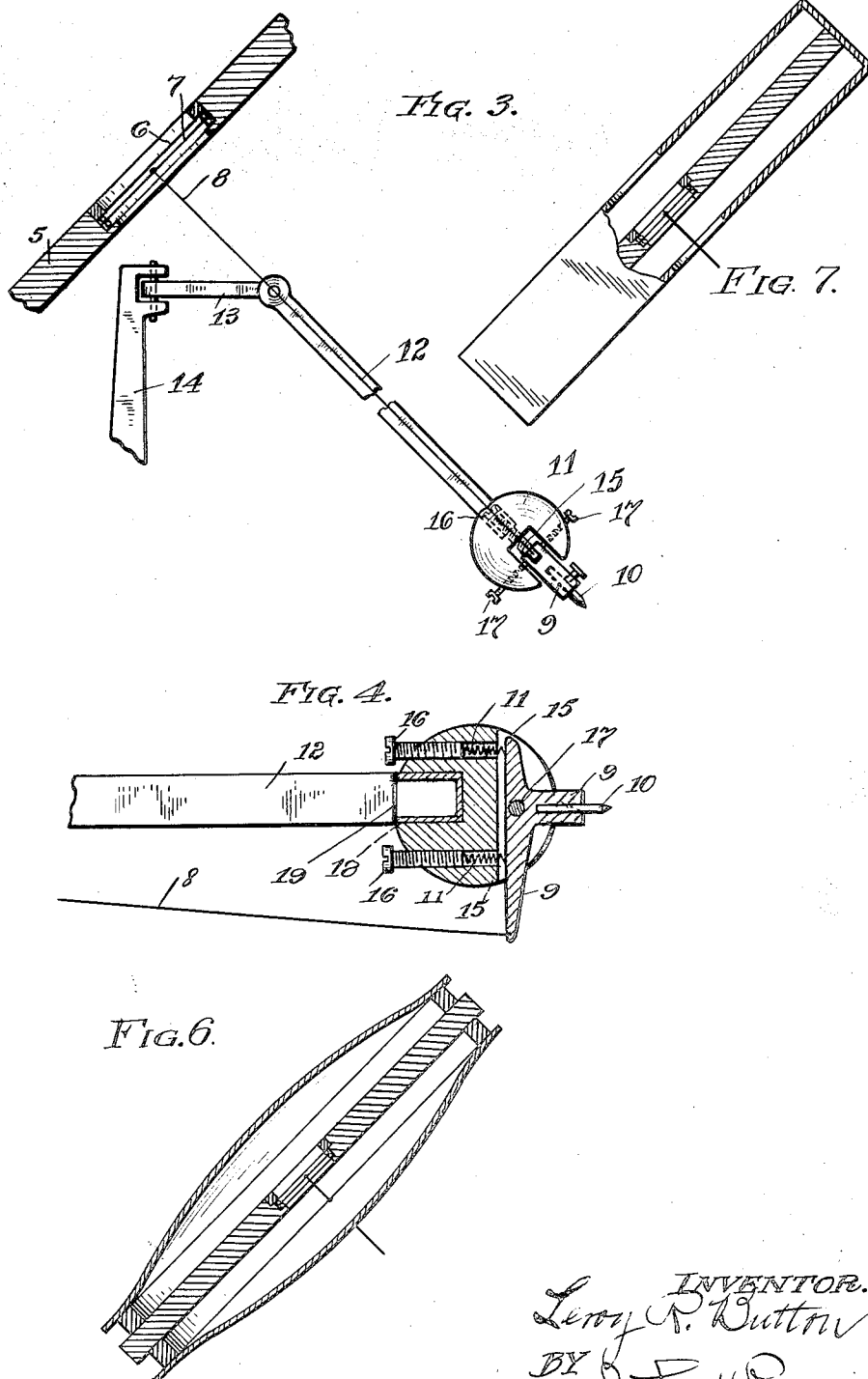
1,506,562

L. R. BUTTON

SOUND REPRODUCING DEVICE

Filed Dec. 20, 1919

2 Sheets-Sheet 2



INVENTOR.
Leroy R. Button
BY John H. Poirer
ATTORNEY.

UNITED STATES PATENT OFFICE.

LEROY R. BUTTON, OF KITTANNING, PENNSYLVANIA.

SOUND-REPRODUCING DEVICE.

Application filed December 20, 1919. Serial No. 346,373.

To all whom it may concern:

Be it known that I, LEROY R. BUTTON, a citizen of the United States, residing at Kittanning, in the county of Armstrong and State of Pennsylvania, have invented a new and useful Improvement in Sound-Reproducing Devices, of which improvement the following is a specification.

My invention relates to improvements in so-called phonographs or sound reproducing devices.

The objects of my invention are, first, to produce a device of this kind, in which a tone arm, horn or megaphone construction is dispensed with and in which simplicity of construction with a maximum degree of efficiency is attained; secondly, the production of a device which can be readily adapted to either a vertically or laterally cut record and which reproduces sound with a maximum of exactness, clearness and volume.

I accomplish these objects by means of a device which comprises the following novel features of construction, viz.: A diaphragm, preferably of small diameter, mounted in a plate of comparative thickness and large area and preferably formed of non-resonant material, the said plate serving to keep separate and distinct the vibrations or sound waves produced by the two sides of the diaphragm, thereby preventing the sound waves produced by either side of said diaphragm from counteracting, confusing or interfering with those produced by the other side, thus utilizing the sound waves produced by both sides of the diaphragm and thereby producing exactness, clearness and a maximum volume of sound without the use of a tone arm, horn or megaphone construction; a flexible, vibrant transmitter connected directly to the diaphragm at one end and to a stylus holder at the other end, for the purpose of conveying to the diaphragm the vibrations produced by the contact of the needle or stylus with the recorded sound waves in the record, the flexibility of said flexible, vibrant transmitter permitting of its being moved either lat-

erally or vertically without the use of a joint or hinge for such purpose, which would be necessary in a non-flexible transmitter; means for tensioning the flexible, vibrant transmitter from the needle holder to the diaphragm by mounting the needle holder in a supporting arm, capable of swinging either laterally or vertically, and so arranged that the transmitter is placed under tension when the arm is dropped to place needle in playing position on the record, and the tension is released when the arm is raised out of playing position, thereby relieving the tension on the diaphragm, except when in actual use, the position of said supporting arm being at such an angle in relation to the record that changes from vertical cut record reproduction to lateral cut record reproduction, or vice versa, can be accomplished with but one adjustment.

The entire sound reproducing device is above the base or phonograph top on which it is mounted, leaving the entire surface of said base clear and practically unobstructed, with the exception of a small portion to which the supports for the reproducer and the supporting arm are secured, thus permitting the sound to be projected out in all directions without impediment, and leaving the entire lower part of the cabinet, with the exception of a small portion occupied by the motor, available for storage place for records, accessories, etc.

The said device is hereinafter more specifically described, reference being had to the accompanying drawings, forming part hereof, in which is illustrated one form in which the invention may be used in practice. In said drawings,

Fig. 1 is a central transverse section of my improved device and a side elevation of a fragmentary portion of the phonograph case.

Fig. 2 is a front elevation of a part of the same.

Fig. 3 is an enlarged view, partly in section, of the sound reproducer and support for needle holder arm.

Fig. 4 is a plan view of a fragmentary

portion of the needle holder, arm, sound transmitting vibrator, and needle.

Fig. 5 is a central transverse section of the diaphragm and its holder and sounding boards attached on either side thereof.

Fig. 6 is a central, transverse section of the diaphragm and its holder, showing a modified form of sounding boards.

Fig. 7 is a view, partly in section, of a modified form of sound reproducer.

Referring to said drawings, 1 is the top 1 of the usual phonograph case, wherein is supported, in the usual manner, the rotary disk, 2, on which the record, 3, is carried, 4 is a bracket or standard, secured to said top, 1, to which near the upper end, is secured the circular member, 5, which is comparatively thick and formed preferably of non-resonant material, and is provided with the centrally disposed orifice, 6, in which the peripheral edge of the diaphragm, 7, is secured. The said diaphragm is preferably as shown of small diameter, as compared with the circular member 5, and is connected to the needle holder 9, by means of a flexible, vibrant, sound transmitting member, 8. The needle 10 is carried by the needle holder 9. The said diaphragm, 7, is formed of any suitable material which will respond to the vibrations of the needle conveyed thereto through the holder, 9, and the flexible, vibrant, sound transmitting member, 8. The said member, 8, is formed of any suitable flexible material, as for instance, cord, fine wire, or a chain, and is normally maintained under tension, as shown in Fig. 1 of the drawings, by springs 11 of either the expansion or compression type, or any other suitable means, inserted between the needle holder 9 and the screws 16, in the end section 12, the tension being adjusted to the proper degree by the adjusting screws, 16, which are threaded into said end section, 12. The lower end of the arm 13 is connected to the end section, 12, which latter is provided with a recess or cylindrical cavity, 15, to receive the same, said cavity being lined with the insulating material, 16'. The needle holder, 9, to which the flexible member, 8, is connected, is mounted in the end section, 12, by any suitable bearing, preferably a pivotal bearing with adjusting screws, 17. The upper end of arm, 13, is connected to a swinging bar, 18, which is laterally hinged to a standard, 19, near the upper end thereof, and directly below the center of the diaphragm. The said arm is connected to said swinging bar by means of a hinge or pivot joint. This swinging bar, with hinge directly below the center of the diaphragm, permits a lateral movement of the arm and flexible member across the record, without increasing or decreasing the tension of the flexible member, the hinge connecting the

swinging bar and the arm permitting a vertical movement of the arm and flexible member, thereby releasing the tension of the flexible member, and the consequent tension on the diaphragm when said arm is raised out of playing position. The angle at which the arm is placed, in relation to the record, permits the adjusting of the apparatus to a suitable position for playing either vertical cut or lateral cut records, the change from a vertical cut to a lateral cut, or vice versa, being accomplished simply by a quarter turn of the end section, 12, on the end of the arm 13. The supporting arm, 13, and swinging bar, 18, are so shaped as to permit the flexible member, 8, to be in alignment with the center of the hinged connection between said supporting arm and swinging bar, when in position for playing either vertical cut or lateral cut records. Said arm, 13, may be equipped with a weight capable of being moved up or down said arm, for the purpose of adjusting to a proper degree of contact between the stylus and recorded sound waves in different makes of records. The connection between the supporting arm, 13, and end section, 12, may be equipped with a device for locking the end section with stylus in exact position for playing either lateral or vertical cut records.

The circular member, 5, is insulated from supporting bracket, 4, by means of insulating material, 20, placed between said parts as indicated, or in any other suitable manner. The said diaphragm and circular member may be enclosed between sounding boards, 21, 22, as shown in Fig. 5, formed of any suitable resonant material, such as thin sheets of wood which are attached to said circular member by gluing blocks, 23, between said parts, or in any other suitable manner, and said sounding boards may be grooved the shape indicated in Fig. 6, or in any suitable manner, or the said diaphragm and circular member 5 may be enclosed within a sounding chamber, as indicated in Fig. 7, such chamber being glued to said circular member around the entire circumference, the sounding boards on either side of the chamber having openings opposite the diaphragm or otherwise suitably constructed and attached.

Having described my invention, what I claim and desire to secure, by Letters Patent, is:

The combination with a phonograph case, a diaphragm carrier consisting of a comparatively large disc-like member having a small central opening, means for mounting the carrier on top of said case, a diaphragm mounted within the opening of the carrier, an arm, means for mounting one end of said arm on the top of said case directly below the center of the diaphragm

to permit free lateral swinging movement
of the arm, a second arm mounted on the
first arm for vertical swinging movement
of the free end of said second arm, an armed
5 needle holder pivotally and adjustably
mounted in the outer end of the arm, and
a flexible member connecting an arm of the
needle holder with the diaphragm.

In testimony whereof, I have hereunto
signed my name in the presence of two sub- 10
scribing witnesses.

LEROY R. BUTTON.

In the presence of—

R. E. BALL,
J. TALBERT.