E. S. OLIVER.

ADAPTER STYLUS FOR PHONOGRAPHS.

APPLICATION FILED MAR. 3, 1915.

1,168,412.

Patented Jan. 18, 1916.

2 SHEETS—SHEET 1.

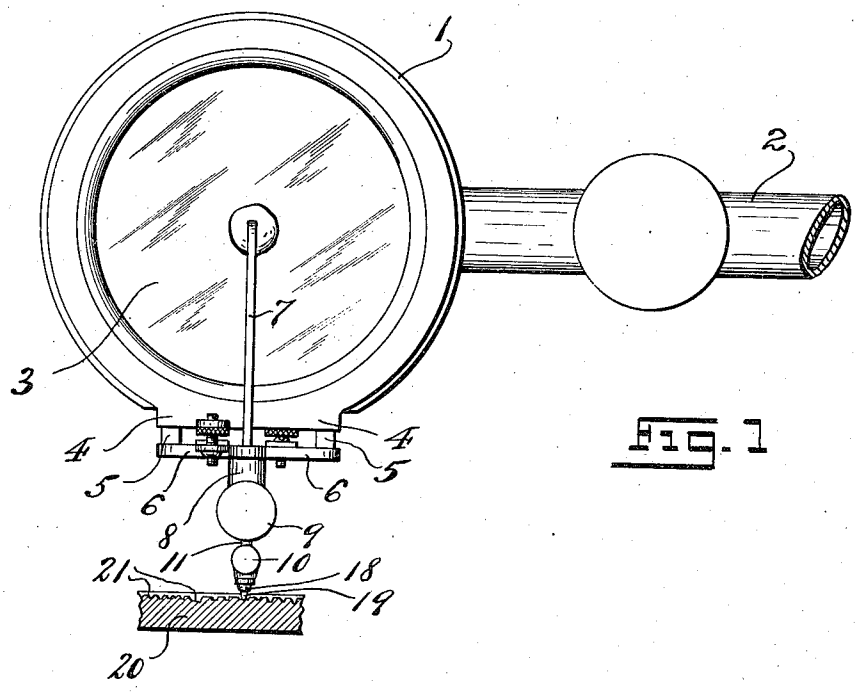

Fig. 1

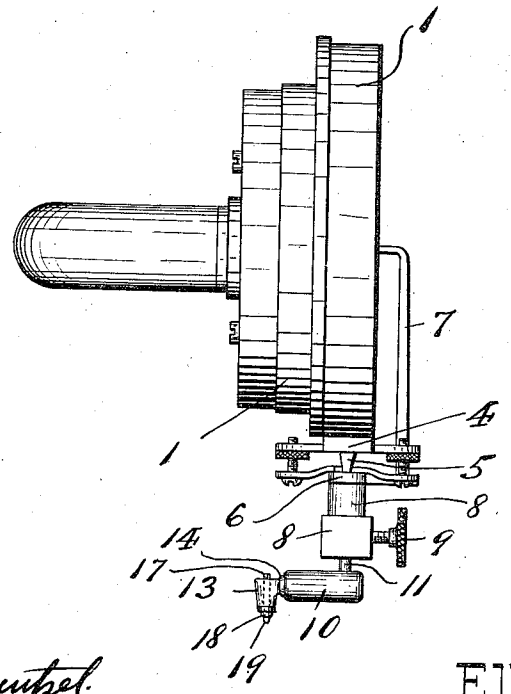

Fig. 2

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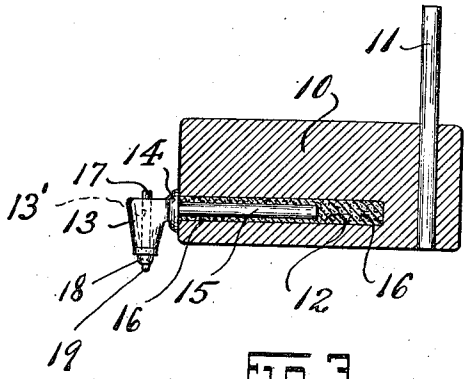

Fig. 3

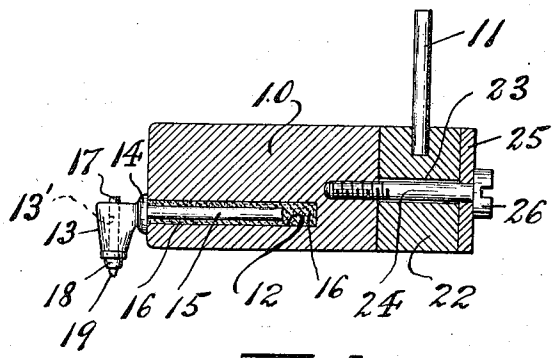

Fig. 4

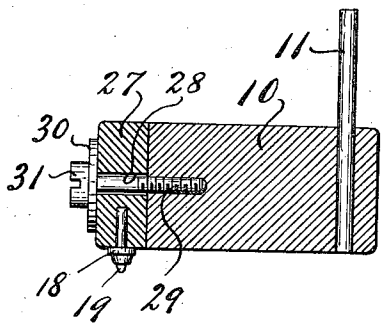

Fig. 5

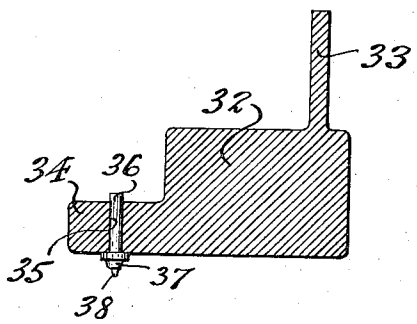

Fig. 6

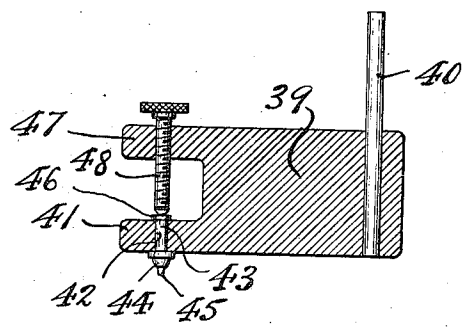

Fig. 7

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UNITED STATES PATENT OFFICE.

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ADAPTER-STYLUS FOR PHONOGRAPHS.

1,168,412. Specification of Letters Patent. Patented Jan. 18, 1916.

Application filed March 3, 1915. Serial No. 11,792.

To all whom it may concern:

Be it known that I, ELLIS S. OLIVER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Adapter-Styli for Phonographs; 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 characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in phonograph apparatus; and the invention has reference more particularly to an adapter stylus which will operate to transmit the vertical vibrations produced by the vertical indentations of a sound-record disk to produce horizontal vibrations of a diaphragm of a reproducing sound-box set in a vertical plane.

It is well known in the art that there are two types of sound-record impressions for phonograph disks, viz., the "hill and dale" impressions which consist of a series of vertical indentations or impressions formed in the face of the disk, which, when traveling against a sound-box stylus or needle, produce vibrations of the stylus in a vertical plane, or in the plane of the vertical axis of the stylus or needle; and the horizontal or lateral impressions which consists of a series of lateral or horizontal indentations or impressions formed in the face of the disk, which, when traveling against a sound-box stylus or needle, produce vibrations of the stylus in a direction parallel to the surface of the sound-record disk. Usually in a phonograph instrument arranged to play the former type of sound-record disk, the sound-box is positioned so that the diaphragm thereof lies in a horizontal plane and substantially parallel to the disk surface, and the vertical vibrations imparted to the stylus are transmitted directly to the diaphragm; and in a phonograph instrument arranged to play the latter type of sound-record disk, the sound-box is positioned so that the diaphragm thereof lies in a vertical plane and substantially at right angles to the disk surface, and the horizontal vibrations imparted to the stylus are transmitted indirectly through a pivoted vibrator-arm, to which the stylus is secured, to the diaphragm. Consequently the sound-box positioned and equipped for playing said latter type of sound-record disk cannot play or respond to the sound-record impressions of the former type of sound-record disk, since the vertical vibrations caused by such sound-record impressions cannot be transmitted through the ordinary stylus or needle and the pivoted vibrator-arm.

It is the principal object of my present invention, therefore, to provide an interchangeable or detachable adapter stylus adapted to be connected with the ordinary needle-socket of the vibrator-arm of a vertical sound-box, in place of the usual type of needle adapted to play horizontal sound-record impressions, so that, without other change, the vertical vibrations of the vertical or "hill and dale" sound-record impressions may be transmitted through such adapter stylus to the pivoted vibrator arm and vertical diaphragm of the vertical sound-box, so that the latter is adapted to reproduce the sounds recorded upon such type of sound-record disk.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the present invention.

With the various objects of the present invention in view, the same consists, primarily, in the novel and simple construction of a detachable or interchangeable adapter stylus for phonograph sound-boxes, hereinafter set forth; and, the invention consists, furthermore, in the several novel arrangements and combinations of the various parts thereof, as well as in the details of the construction thereof, all of which will be more fully described in the following specification, and then finally embodied in the claims which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a face view of a vertical sound-box, the vibrator-arm of which is equipped with the novel construction of adapter stylus made according to and embodying the principles of the present invention, in this view the said adapter stylus being shown in contact with the vertical sound-record impressions of a "hill and dale" sound-record disk, the latter being shown in section. Fig.

2 is an edge side view of said vertical sound-box so equipped. Fig. 3 is a longitudinal vertical section of an adapter stylus made according to and embodying the principles of the present invention, the same being drawn on an enlarged scale. Fig. 4 is a longitudinal section of a modified construction of said novel adapter stylus. Fig. 5 is a similar view of another modified construction of said novel adapter stylus. Figs. 6 and 7 are, respectively, longitudinal sections of still further modified constructions of the novel adapter stylus.

Similar characters of reference are employed in all of the hereinabove described views to indicate corresponding parts.

Referring now to the said drawings, the reference character 1 indicates a sound-box for playing sound-record disks, said sound-box being so connected with the tone-arm 2 of a phonograph apparatus as to be positioned vertically to dispose the diaphragm 3 thereof in a vertical plane at right angles to the horizontal plane of the sound-record disk adapted to be revolved beneath said sound-box.

Connected with the lower side 4 of said sound-box are the fulcrum-projections or points 5 upon which is fulcrumed the pivot-frame 6 of an upwardly extending vibrator-arm 7, the upper end of which is connected with the diaphragm 3 in the usual manner. Connected with and extending downwardly from said pivot-frame 6 is the needle or stylus socket 8, which receives and securely connects in operative relation to said vibrator-arm a needle or stylus adapted to contact operatively with the sound-record impressions of a sound-record disk. Said needle or stylus socket 8 is provided with the usual set-screw or lock-screw 9 for securing the needle or stylus in the socket 8.

When reproducing from a sound-record disk in which the sound-record impressions are of the horizontal or lateral form, a straight vertically extending needle or stylus is secured in the socket 8, the same being in vertical alinement with the fulcrum-projections or points 5, so that the lateral or horizontal vibrations imparted to the needle or stylus point cause a rocking of the pivot-frame 6 which transmits similar horizontal or lateral vibrations to the vibrator-arm 7 which in turn vibrates the diaphragm 3 to reproduce the recorded sounds from the sound-record impressions.

It will be apparent that, with the type of sound-box, constructed as above described, equipped with a straight needle or stylus as above mentioned, a sound-record formed with vertical or "hill and dale" sound-record impressions could not be played or its sound-record reproduced, since such vertical or "hill and dale" sound-record impressions would cause a vertical vibration of the needle or stylus point, that is a vibration parallel to the axis of the needle or stylus and in line with the fulcrum-projections or points 5. Consequently no rocking or oscillation of the vibrator-arm 7 would result, but merely a vertical rise and fall of the entire sound-box bodily, with no vibratory effect upon the diaphragm 3. It is therefore necessary to provide an adapter stylus, which can be used in place of the ordinary straight needle or stylus so that through such means either the vertical or "hill and dale" sound record impressions may be utilized to operate the diaphragm 3 to play or reproduce the sound-record. My present invention provides such an adapter stylus which is of novel and simple construction, and which may be interchangeably used in place of said straight needle or stylus in connection with the socket 8 of the vibrator-arm 7 of the same type of sound-box.

My novel adapter stylus comprises a horizontally extending main-body 10, of any desirable cross-sectional shape. Connected rigidly with and extending upwardly from one end of said main-body 10, and at right angles to the axis thereof, is a butt-piece or shank 11 of a proper diameter to be received or inserted in the socket 8 of the vibrator-arm 7, by which means the adapter stylus is operatively secured to the vibrator-arm 7 in substantially the same manner as an ordinary straight needle or stylus. Formed in the outer or free end of said main-body 10 is a longitudinally extending tubular opening 12. The reference character 13 indicates a stylus-head, the same having a shoulder 14 at one side from which extends a horizontal shank-piece 15. The said shank-piece 15 is smaller in diameter than the diameter of said tubular opening 12 into which said shank-piece 15 is inserted. Said tubular opening 12 is filled with a plastic or cementitious material 16 which will harden, but which when hardened possesses a certain limited degree of resiliency, and I have found in practice that shellac, collodion and asphaltum, are substances which provide the qualities I seek for this purpose, and no doubt there are many other similar substances which can be used for the purpose. Into this plastic or cementitious material the shank-piece 15 is pressed, so that it is surrounded thereby, and is thus securely affixed to said main-body 10, but is at the same time capable, by reason of such a manner of connection, of a limited resiliency relatively to said main-body 10 which results in a softening or sweetening of the tones produced by the sound-box diaphragm when vibrated by my novel adapter stylus. In other words the harshness, clang, and metallic sounds usually incident, more or less, to phonographic reproduction, is practically eliminated. Said stylus-head 13 is

provided with a verticaly extending opening or socket 13′ extending therethrough. Into this opening is inserted the upwardly extending tail-piece 17 of a stylus-point setting 18, which extends and is positioned in a plane below the under side of said main-body 10. The stylus-point 19 is fixed in said setting 18, and may be made of any suitable material, preferably of diamond or emerald.

The operation of my novel adapter stylus is as follows:—The butt-piece 11 is inserted in the socket 8 of the vibrator-arm 7 and locked rigidly thereto by means of the set-screw or lock-screw 9. When thus secured the main-body 10 extends horizontally beneath said sound-box and at right angles to the fulcrum-projections or points 5 thereof. As thus positioned the stylus-point 19 carried at the free end of said main-body 10 is off-set or positioned to one side of the pivot or fulcrum axis of the vibrator-arm 7. Now when a sound-record disk 20 provided with vertical or "hill and dale" sound-record impressions 21 is revolved beneath said stylus-point 19 and in contact therewith, a vertical vibration or oscillation of said stylus-point 19 is produced, which effects a vertical vibration or oscillation of the outer end of said main-body 10, but since the stylus-point 19 is off-set from the fulcrum-projections or points 5 of the sound-box this vertical vibration or oscillation when transmitted through said off-set horizontal main-body is translated into a horizontal vibration or oscillation of the socket 8, pivot-frame 6 and vibrator-arm 7, so that the upper end of the latter is vibrated horizontally to produce the proper vibratory effect of the diaphragm 3 of the sound-box. In simple terms instead of the vibration of said vibrator-arm 7 being effected by a simple lever oscillation, it is effected, as a result of the off-set construction of the adapter stylus, by a bell-crank lever oscillation.

Referring now to Fig. 4 of the drawings, I have illustrated a slight modification of the construction of my novel adapter stylus. In this construction I provide a means for pivotally associating the butt-piece or shank 11 to the main-body 10, so that if the vibrator-arm 7 does not happen to be positioned perpendicularly to the sound-record disk, by reason of any shifted position of the sound-box, the main-body 10 may be adjusted so that the stylus-point 19 may be properly presented perpendicularly to or vertically to the sound-record disk, which position is essential to its proper tracking and operation in connection with the impressions of the sound-record disk. To this end a butt-block 22 having a horizontal opening 23 therein is pivoted upon a clamp-screw 24 which screws into the end of the main-body 10. A washer 25 is interposed between the head 26 of said clamp-screw 24 and said butt-block 22. The butt-piece or shank 11 extends upwardly from said butt-block 22. Said butt-piece or shank 11 may be adjusted or accommodated to the angular disposition of the socket of the vibrator-arm, and when thus properly positioned the clamp-screw 24 is tightened thus firmly and rigidly binding the butt-block 22 and butt-piece 11 in the desired position.

The same result as immediately above described may be secured by means of the modified construction illustrated in Fig. 5 of the drawings. In this construction the butt-piece or shank 11 is affixed to the main-body 10, and to the outer end of said main-body 10 is connected an adjustable stylus-block 27, the same having a horizontal opening 28 and being pivoted upon a clamp-screw 29 which screws into the outer end of said main-body 10. A washer 30 is interposed between the head 31 of said clamp-screw and said stylus-block. The stylus-point setting 18 is inserted in said stylus-block so as to project its stylus point 19 downwardly therefrom. Said stylus-point 19 may then be adjusted to proper vertical or perpendicular relation to the sound-record disk by turning said stylus-block and clamping the same in the desired position by means of the clamp-screw, thus correctly positioning the stylus-point regardless of any angular disposition of the butt-piece or shank 11.

Referring now to Fig. 6 of the drawings, there is shown therein another modified construction of my adapter stylus, the same comprising a horizontal main-body 32 from one end of which extends outwardly and at right angles thereto an integrally formed butt-piece or shank 33. The forward end of said main-body 32 is provided with a reduced portion 34 in which is formed a vertically disposed opening 35 for the reception of the tail-piece 36 of a stylus-point setting 37 in which the stylus-point 38 is fixed. This arrangement provides a very cheap and simple construction of adapter stylus which embodies all the essential principles of my invention.

Referring now to Fig. 7 of the accompanying drawings, I have illustrated therein still another modified form of my novel adapter stylus. In this form I provide a horizontal main-body 39 from one end of which extends upwardly at right angles thereto a rigidly secured butt-piece or shank 40. Extending outwardly from the outer end of said main-body 39 is a reduced portion 41 provided with a vertical opening 42 in which is secured the tail-piece 43 of a stylus-point setting 44 having the stylus-point 45 affixed therein. The end of said tail-piece 43 projects above the upper sur-

face of said reduced portion 41 and is flanged or beaded as at 46. Also extending outwardly from the outer end of said main-body 39 is another reduced-portion 47 which is spaced above and away from said first mentioned reduced-portion 41. In said reduced-portion 47 is adjustably arranged an adjuster-screw 48 the free end of which may be moved into binding or clamping relation to the beaded end of said tail-piece of the stylus-point setting. If this adjuster-screw 48 is moved against said tail-piece and tightened the tendency is to prevent any loss of the vibratory effects of the stylus-point through lost motion and consequently a louder tone production at the diaphragm of the sound-box. If, however, the adjuster-screw 48 is loosened a consequent reduction of the force of the vibrations results, through lost motion in the mounting of the stylus-point setting, and consequently there is reduction of the force of the vibratory effects transmitted to the diaphragm of the sound-box and consequently a reduction of tone volume or loudness.

I am aware that some changes may be made in the various arrangements and combinations of the various devices and parts, as well as in the details of the construction thereof, without departing from the scope of my present invention. Hence, I do not limit my invention to the exact arrangements and combinations of the said parts as described in the foregoing specification, nor do I confine myself to the exact details of the construction of said parts as shown in the accompanying drawings.

I claim:—

1. An adapter stylus for phonograph sound-boxes having their diaphragms in planes substantially perpendicular to the sound-record disks to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, a stylus-head having a laterally extending shank, said body having a longitudinally extending opening extending inwardly from its outer end for the reception of said shank, means for securing said shank in said opening, a vertically disposed stylus-setting supported by said stylus-head, and a downwardly depending vertical stylus-point carried by said setting.

2. An adapter stylus for phonograph sound-boxes having their diaphragms in planes substantially perpendicular to the sound-record disks to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, a stylus-head having a laterally extending shank, said body having a longitudinally extending opening extending inwardly from its outer end for the reception of said shank, a plastic cementitious material having some resiliency filling said opening and surrounding said shank whereby the latter is secured in said body, a vertically disposed stylus-setting supported by said stylus-head, and a downwardly depending vertical stylus-point carried by said setting.

3. An adapter stylus for phonograph sound-boxes having their diaphragms in planes substantially perpendicular to the sound-record disks to be reproduced comprising a horizontal body, a vertical butt-piece extending upwardly from one end of said body, a vertical stylus-point extending downwardly from the opposite end of said body, and means permitting adjustment of said butt-piece relatively to the stylus-point as and for the purposes described.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 27th day of February, 1915.

ELLIS S. OLIVER.

Witnesses:
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FRED'K H. W. FRAENTZEL.