C. B. REPP.

PHONOGRAPH.

APPLICATION FILED FEB. 15, 1917. RENEWED APR. 8, 1919.

1,323,317. Patented Dec. 2, 1919

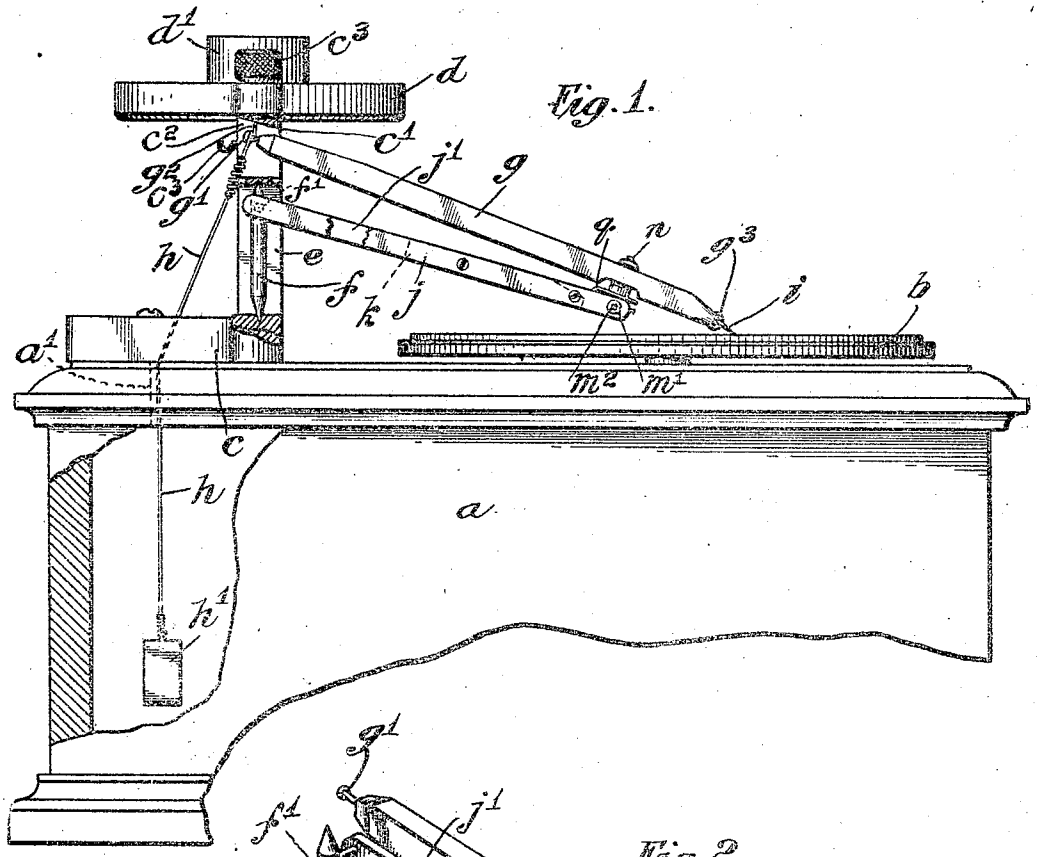


Fig. 1.

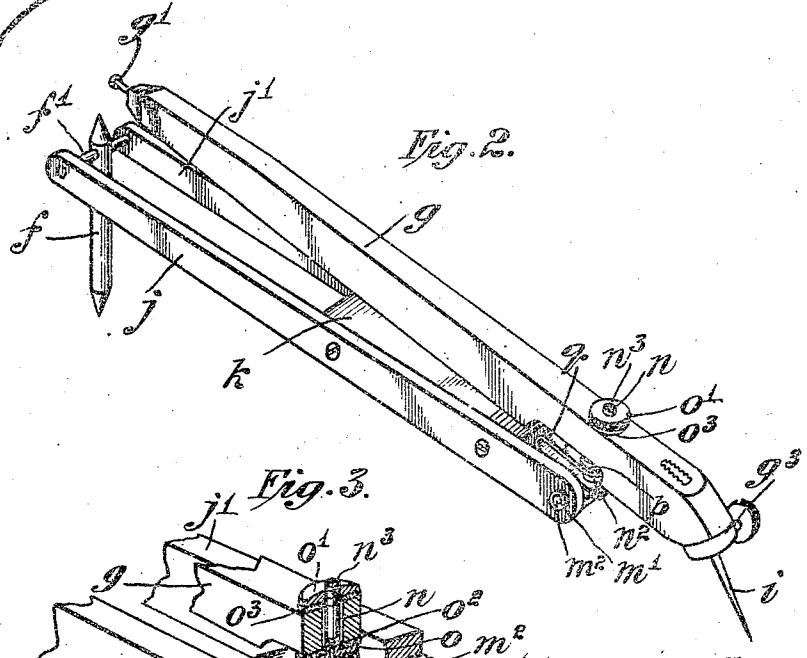


Fig. 2.

Fig. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF PLAINFIELD, NEW JERSEY.

PHONOGRAPH.

1,323,317. Specification of Letters Patent. Patented Dec. 2, 1919.

Application filed February 15, 1917, Serial No. 148,699. Renewed April 8, 1919. Serial No. 288,658.

To all whom it may concern:

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to phonographs and more particularly to improvements in the type of phonograph patented to me in and by United States Letters Patent No. 1,156,931, dated October 19, 1915.

In phonographs made in accordance with said Letters Patent, the transmitter or vibrator arm has one end connected to the diaphragm by a flexible connection, normally tensioned in a manner to apply tensioning stress to the diaphragm; and the other end thereof, connected to a pivotal supporting arm through the medium of a weighted block of sufficient bulk to insure the desired engagement between the stylus and a record and at the same time, to absorb such vibrations as might be transmitted from the vibrator arm to its supporting arm, or vice versa, with a resultant development of false vibrations in the diaphragm resulting in blasts, loss of timbre in the reproduction, or loss in the volume of the reproduction because of a division of the vibrations developed by the record. While the structure shown in said Letters Patent has been extensively used, and has been found to give highly satisfactory results, nevertheless experience has demonstrated that there is a tendency, after prolonged use, toward the development of vibrations in the transmitter arm due to lost motion in the connecting means between the weighted block and the transmitter arm, and between said block and the supporting arm.

The object of my present invention is to provide a phonograph possessing the advantageous characteristics of the phonograph of my aforesaid Letters Patent, but wherein the transmitter arm will be so connected with the supporting arm as to avoid all likelihood of the development of such lost motion between these parts, through wear or slight inaccuracy in the dimension of parts, as will result in the development of vibrations in said transmitter arm due to a relative movement of the transmitter arm and the supporting arm while the stylus is traversing a record. I secure these results by having the weight for the supporting arm positioned between the point of pivotal support of said supporting arm and the end of said arm to which the transmitter arm is attached, and by connecting said transmitter arm directly to said supporting arm while subjecting it to the action of a spring, normally held under tension by said connecting means, and automatically taking up any lost motion which may be present by reason of the necessary looseness of fit of the coöperating parts, or by such looseness resulting from wear. The connecting means between the transmitter arm and its supporting arm are so insulated as to minimize likelihood of the development of vibrations through the impact of different parts of such connections with each other and the transmission of vibrations from one of these arms to the other through said means.

My invention consists primarily in a phonograph embodying therein a stationary sound box having a diaphragm therein, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal weighted supporting arm and connections between said supporting arm and said transmitter arm embodying therein a bar pivotally mounted adjacent the free end of said supporting arm, a spring interposed between said bar and said transmitter arm, and means pivotally connecting said transmitter arm and said bar and placing said spring under tension; and in such other novel features of construction and combination of parts as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—

Figure 1 is a side elevation of a portion of a phonograph embodying my invention.

Fig. 2 is a perspective view of the transmitter arm and its supporting arm removed from the machine; and

Fig. 3 is a view in perspective showing the connecting means between the transmitter arm and the supporting arm in section.

Like letters refer to like parts throughout the several views.

In the accompanying drawings, I have illustrated the invention as applied to a phonograph having an ordinary box cabinet and adapted for use with an exposed horn,

although the form of cabinet and the amplifying mechanism used, is immaterial to the invention.

In the drawings, *a* indicates an ordinary box cabinet having revolubly mounted thereon a record supporting disk *b* driven by any desired form of motive power. Carried by the top slab of the said cabinet *a*, is a sound box supporting frame *c* consisting of two diametrically oppositely disposed pillars or standards c' c^2 upon which the sound box *d* is rigidly mounted by means of nuts, such as c^3. The sound box *d* is provided with the usual diaphragm (not shown) and with a sound outlet nipple d' by means of which a suitable amplifying mechanism (not shown) is placed in communication with the air space within the sound box.

Mounted upon the frame *c* is a yoke *e* having, at the top thereof, a bearing which is in alinement with the axis of the sound box *d*, the base of said standard being provided with a similar bearing. Mounted in said bearings, is a stud *f* having pivotally mounted thereon one end of a supporting arm, the axis of said pivot supporting said arm being perpendicular to the axis of said stud.

The vibrations developed by the indicated sound waves upon a record, are transmitted to the diaphragm through a wooden transmitter or vibrator arm *g*, one end of which is provided with a stud g' connected, by means of the flexible strand g^2 with the diaphragm. Connected with the stud g' is a flexible strand *h* passing through an opening a' in the cabinet and having connected therewith suitable stress developing means, such as the weight h'. In this manner the flexible connection g^2 is normally held under tension, and tensioning stresses are applied to the diaphragm therethrough in a direction opposite to the direction of movement of the sound vibrations in passing from the transmitter arm to the diaphragm.

One of the standards or pillars as c^2 is provided with a hook c^5, over which the strand *h* may be passed to vary the direction of the application of stresses to the diaphragm, so that the phonograph may be used either for reproducing from lateral or from vertical cut records. The free end of the transmitter or vibrator arm *g*, is provided with a suitable mount g^3 for the reproducing stylus or point *i*, the character of which stylus or point may vary according to the type of record with which the machine is to be used.

Intermediate the stylus mount and the stud g^2, the transmitter or vibrator arm *g* is connected to the supporting arm heretofore referred to by a universal connection so as to permit said arms to have simultaneous movement under the control of the record while compensating for any variance in the angular relation of said transmitter or vibrator arm and its supporting arm due to the adjustment of the machine for different types of records or a variance in the arcs described by said arms respectively, due to a difference in the points of pivotal supports for said arms.

All the characteristics heretofore referred to, are old and well known in this art, with the exception that heretofore in machines of this type, it has been the practice to use three pillars or standards instead of two as in the present machine. It is desired to note, however, that in actual practice, it has been found that the quality of the reproduction is enhanced by using only two pillars instead of three, and by having the sole support for the diaphragm consist of two diametrically opposite pillars or standards as described.

My present invention in addition to the arrangement of the sound box support above referred to, consists in the construction of the supporting arm and the manner of connecting said arm with the transmitter arm.

The supporting arm heretofore referred to consists of two parallel bars *j*—*j'* having firmly secured between same adjacent one end thereof, a weighted block *k*. The bearing pin *f'* carried by the stud *f* is journaled in bearings adjacent one end of the bars *j*—*j'*. Pivotally mounted in the other end of the bars *j*—*j'* is a cross bar *m*, an elastic bushing *m'* being disposed between each trunnion m^2 and its bearing in said arms. In this manner the transmission of vibrations from, or to, the bars *j*—*j'* through the medium of bar *m* is prevented.

The transmitter or vibrator *g* is connected to its supporting arm by means of a bi-part pivot, one section *n* of which is carried by said arm *g* and the other section *n'* of which is carried by the bar *m*. The axis of the pivot *n*—*n'* is perpendicular to that of the bar *m* so that a universal connection is afforded between the arm *g* and its supporting arm.

To minimize likelihood of a transmission of vibrations through the pivot *n*—*n'*, to or from, the bar *m*, I provide the section *n'* of this pivot with an elastic bushing n^2—and also interpose a suitable elastic washer between the head of said pivot and the face of said bar *m*.

The two sections *n*—*n'* of the pivot connecting the supporting arm and transmitter or vibrator arm, have a screw threaded connection. One of these sections, as *n*, is provided with an enlarged head *o* bearing upon the under side of the arm *g*, said section being held firmly in relation to the arm *g* by means of the nut *o'*, suitable sound insulating washers o^2 and o^3 being positioned between said enlarged head, and said nut respectively and said arm.

To avoid any movement of the vibrator or transmitter arm g with relation to its supporting arm, excepting those pivotal movements resulting from the manner of connecting the two arms, I include this connecting means, a spring interposed between the arm g and the bar m, which spring is spaced away from said arm and said bar by means of elastic or other sound insulating washers such as p—p'. I have found in actual practice that I secure a most satisfactory result by using a U-shaped leaf spring q, the pivot section n' and the insulating bushing n^2 carried thereby, passing through both arms of said spring so as to cause the connection of the sections n and n' of the said pivot to tension the spring in a manner to normally have a tendency to separate the arm g, and the bar m carried by the supporting arm. By this construction the arm g adjacent the mount g^3 is adapted to have free movement about its pivotal supports, the axes of which are perpendicular to each other. The various sound insulating bushings and washers, reduce to a minimum likelihood of the division of vibrations developed in the arm g, or of the transmission of free vibrations from the supporting arm to said arm g, thus preserving not only the desired volume of reproduced sound, but also preserving the timbre of the reproduction.

I have found in actual practice that to avoid the development of blasts in the reproduction it is essential that the pivot section n be provided with a vent opening n^3, to prevent the imprisonment of air within said pivot section, although this expedient is not absolutely essential since a highly satisfactory reproduction can be secured without this opening. It is preferable, however, to avoid the imprisonment of air within the section n when applying the pivot section n', in the interest of the quality of the reproduction.

In machines of the general characters to which my invention relates, the pin g' is rarely in axial alinement with the stud f but is always positioned between same and the diaphragm. In consequence of this condition, movement of the arm g and the arm j—j' of the supporting arm, are not identical, there being a constant readjustment of the relation of these arms by means of the universal pivot connection between same.

The manner of connecting the transmitter or vibrator arm g with its supporting arm not only permits the shifting of the end of said arm g adjacent the diaphragm to adapt the machine for use with records having different cuts indicating the sound waves to be reproduced, but also permits that constant variance in the relation of the transmitter or vibrator arm g and its supporting arm, resulting from the movement of the said supporting arm about the axis of the stud f under the control of the record and through the transmitter or vibrator arm.

The various bushings and washers of elastic material, (rubber, leather or other like substance) have the sole function of preventing the development of vibrations, or the transmission of vibrations through the connecting means between the transmitter or vibrator arm and its supporting arm.

During movement of the arm g about the axis of the pivot n—n' the sections n—n' will both turn, the pivot sections n always remaining fixed and rigid, with relation to the arm g however, and the pivot section n' turning with relation to the bar m. The spring q will at all times take up any looseness developed during the operation of said pivot sections n—n', and adjust itself to both said arm g and said bar m. The shoulders upon the bar m are provided to prevent rotation movement of said spring q.

It is not my intention to limit the invention to the precise details of construction shown in the drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent is:—

1. A phonograph embodying therein a stationary sound box having a diaphragm therein, a transmitter or vibrator arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal weighted supporting arm, and connections between said supporting arm and said transmitter or vibrator arm embodying therein a bar pivotally mounted adjacent the free end of said supporting arm, a spring interposed between said bar and said transmitter or vibrator arm, and means pivotally connecting said transmitter or vibrator arm and said bar and placing said spring under tension.

2. A phonograph embodying therein a stationary sound box having a diaphragm therein, a transmitter or vibrator arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal, weighted supporting arm and connections between said supporting arm and said transmitter or vibrator arm embodying therein a bar pivotally mounted adjacent the free end of said supporting arm, a looped, flat spring and a pivot composed of two parts connected by means of screw threads, one part of which is carried by said transmitter or vibrator arm and the other part of which is carried by said bar and passes through both arms of said spring whereby said spring will be tensioned in connecting said transmitter or vibrator arm with said bar.

3. A phonograph embodying therein a stationary sound box having a diaphragm therein, a transmitter or vibrator arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal, weighted supporting arm, connections between said supporting arm and said transmitter or vibrator arm embodying therein a bar pivotally mounted adjacent the free end of said supporting arm, a spring interposed between said bar and said transmitter or vibrator arm and means pivotally connecting said transmitter or vibrator arm and said bar and placing said spring under tension and sound insulating means between said bar and said supporting arm, between said means pivotally connecting said transmitter or vibrator arm and said bar and said arm and said bar respectively, and between said last named means and said spring.

4. A phonograph embodying therein a stationary sound box having a diaphragm therein, a transmitter or vibrator arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal, weighted supporting arm and connections between said supporting arm and said transmitter or vibrator arm embodying therein a bar pivotally mounted adjacent the free end of said supporting arm, a looped, flat spring and a pivot composed of two parts, one part of which is carried by said transmitter or vibrator arm and has a screw threaded opening therein having a vent opening leading therefrom, and the other part of which is carried by said bar, passes through both arms of said spring and is provided with a screw threaded end adapted to coöperate with the screw threads of said other part, whereby said spring will be tensioned in connecting said transmitter or vibrator arm with said bar.

5. A phonograph embodying therein a stationary sound box having a diaphragm therein, a transmitter or vibrator arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal stud, the axis of which is in substantial alinement with that of said diaphragm, a pivotal connection between said stud and said supporting arm, the axis of which is perpendicular to that of said stud and a universal connection between the free ends of said supporting arm and said transmitter or vibrator arm, including therein a spring normally held under tension and adapted to exert a constant pressure upon both of said arms in opposite directions.

In witness whereof I have hereunto affixed my signature this 18th of January, 1917, in the presence of two subscribing witnesses.

CLINTON B. REPP.

Witnesses:
CLARICE FRANCK,
BERTHA MUDLER.