Feb. 6, 1923. 1,444,477

W. H. MILLER

PHONOGRAPH

Filed July 5, 1921

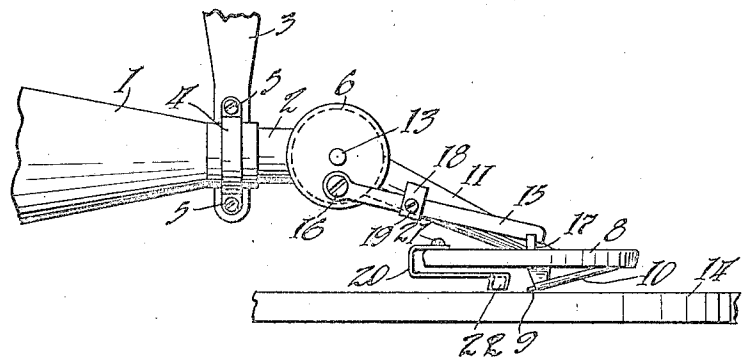


Fig. 1

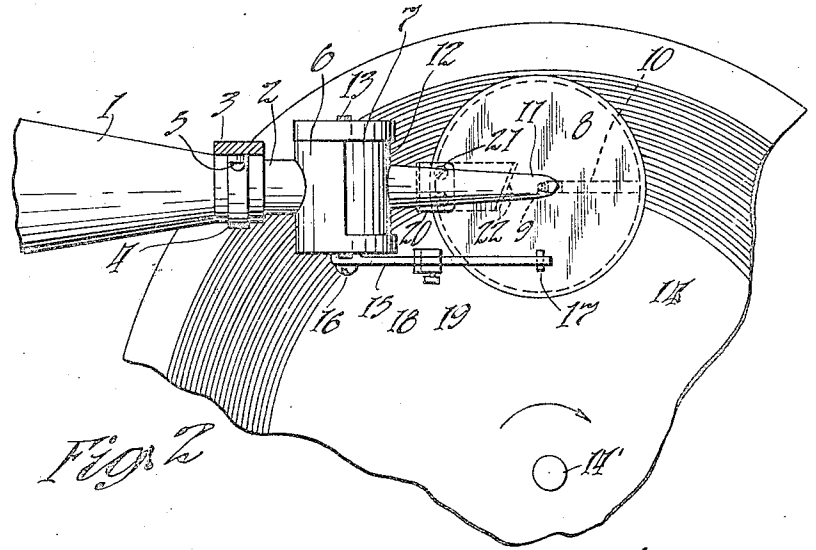


Fig. 2

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by
William A. Hardy.
Its Atty.

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UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, NEW JERSEY.

PHONOGRAPH.

Application filed July 5, 1921. Serial No. 482,364.

To all whom it may concern:

Be it known that I, WALTER H. MILLER, a citizen of the United States, and a resident of Orange, Essex County, New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, and more particularly to phonographic recording devices, being in some aspects an improvement on the invention disclosed in Patent No. 1,350,616, granted to me on Aug. 24, 1920.

In the cutting of the sound record groove in making a phonograph record, the cutting tool or recording stylus removes the material of the record tablet in the form of thin shavings and fine particles. These shavings and particles have a decided tendency to gather or bunch together on the surface of the record tablet, and any appreciable accumulation thereof, upon being carried around on the surface of the tablet in the path of the recording stylus, may seriously affect and impair or even wholly prevent the operation of the latter. In regular phonograph recording studios this objectionable feature is usually overcome by directing an air blast onto the record tablet at a point adjacent the recording stylus. The employment of such means in home recording devices, for which my invention is especially designed, would, however, be impracticable and objectionable because of the expense involved and also the resulting dispersement and scattering of the shavings and particles cut from the record tablet in the recording operation.

One of the principal objects of my invention resides in the provision of simple and inexpensive means for effectively preventing all appreciable accumulations of material cut from the record tablet in the recording operation, from reaching or being carried to the point of engagement of the recording stylus and tablet, whereby the foregoing objections will be obviated.

Another, and also one of the principal objects of my invention, is to provide in a device of the character described, a simple and novel construction and arrangement for effectually preventing during the operation of the device, all chattering or vibration of the recording stylus, other than that produced by the sound waves to be recorded.

Other features of my invention reside in the construction of parts and combinations of elements hereinafter more fully described and claimed.

In order that my invention may be more clearly understood, attention is directed to the drawing accompanying and forming a part of this specification, and in which:

Figure 1 is a fragmental view in side elevation, of a phonographic recording device embodying my invention, showing the parts in operative position with respect to a record tablet; and

Fig. 2 is a fragmental plan view of the device shown in Figure 1.

Referring to the drawing, reference character 1 represents the horn or sound conveyor of my improved recording device, provided at its small end with a cylindrical portion 2. The sound conveyor 1 is mounted rigidly on a traveling carrier 3 in a substantially horizontal position, as by means of a strap 4 embracing the cylindrical portion 2 of the conveyor and secured to a vertical portion of the carrier by screws 5. A transversely extending hollow cylindrical casing 6, having a portion of its cylindrical wall cut away as indicated at 7, is rigidly secured, as by brazing, to the end of the cylindrical portion 2 of the conveyor and communicates therewith.

The recorder proper comprises a diaphragm support or casing 8, in which the usual diaphragm (not shown) is suitably mounted, and a recording stylus 9 carried by the stylus supporting arm or bracket 10, the latter being preferably secured to the diaphragm, at the center and adjacent the edge thereof, in the usual manner. An inclined sound conveying tube 11 is rigidly secured at one end to the top of the diaphragm casing 8 and communicates with the latter, and has rigidly secured to its other end and in communication therewith, a transversely extending tubular member 12. The tubular member 12 is mounted within the casing 6 for turning movement, pivots 13 provided on the ends of the member 12 taking loosely into openings in the center of the end walls of the casing 6. It will thus be seen that the recorder is mounted on the conveyor for vertical swinging movement about a horizontal axis coincident with the axis of the casing 6, and that all sounds entering the conveyor or horn 1 will be con-

veyed to the diaphragm casing 8, it being understood that the wall of member 12 is provided with a cut-away portion (not shown) to establish communication between such member and the conveyor 1.

The device is shown in the drawing in operative position with the stylus 9 of the recorder engaging the flat tablet or disk 14 to cut a sound record groove therein. The tablet 14 is rotated about the axis of the vertical spindle 14′ so that the portion thereof which is engaged by the stylus travels relatively to the latter in the direction indicated by the arrow in Fig. 2. The diaphragm casing and diaphragm are now in a substantially horizontal position or substantially parallel to the record tablet 14, and the casing 8 and the parts carried thereby are free to move up and down with respect to the sound conveyor 1 about the axis of the casing 6 to allow the stylus 9 to follow the large surface irregularities of the tablet.

In recording devices such as described, a chatter or vibration, in addition to the vibration due to the sound waves, is frequently imparted to the recording stylus, this generally being caused by the resistance of the material of the record tablet to the cutting of the record groove by the stylus. Such a chattering seriously impairs the operation of the stylus and results in an imperfect, blurred record. I have found that this chattering may be effectually prevented by applying to the diaphragm casing a slight extraneous pressure. While there are various ways in which this extraneous pressure may be applied, I preferably apply the same by means of an arm or finger 15 having its upper end pivoted at 16 to one end of the casing 6, and resting or bearing freely at its lower end, under the action of gravity, on the top of the diaphragm casing 8. The lower end of the arm 15 is preferably provided with a piece of felt 17 or other resilient sound and vibration deadening material, for engagement with the top of the casing 8. To enable the effective extraneous pressure on the casing 8 to be properly regulated, a weight 18 is adjustably secured to the arm 15, as by means of a set-screw 19. It is important that the pivotal connection 16 between the arm 15 and casing 6 be located eccentrically of the pivotal axis about which the diaphragm casing 8 is mounted to swing, as otherwise the action of the arm or finger 15 in preventing chattering of the stylus 9 during the recording operation will be much less effective. This I believe to be due to the fact that by reason of the pivotal connection 16 being eccentric to the pivotal axis about which the diaphragm casing swings, any pivotal movement of said casing will result in a slight lateral or transverse sliding movement of the lower end of arm 15 on the top of the casing and accordingly the arm will then exert a lateral or sidewise thrust or pressure as well as a direct downward or normal pressure upon such casing.

Reference character 20 represents an arm or bracket, which may be conveniently formed of sheet metal, secured at one end as by screws 21, to the top of the diaphragm casing 8 and extending from its point of connection forwardly, then downwardly, and then rearwardly beneath the casing 8 towards the stylus 9. At its other free end the bracket 20 is formed into a flat substantially vertical portion 22 constituting a guard which, with reference to the direction of rotation of the tablet 14, extends transversely and is positioned a considerable distance in advance of the stylus 9. The lower edge of the guard 22 is sufficiently above the lower cutting end of the stylus, so that when the recording device is in operative position, as shown, the guard will not quite engage the surface of the record tablet 14. During the recording operation all appreciable accumulations of the material cut from the record tablet 14, will, if carried around on the surface of the latter and in the path of the stylus 9, strike the guard 22, and be deflected laterally thereby to a different surface portion of the tablet. Such accumulations of material will thus be effectually prevented from being carried against the recording stylus 9 and thereby impairing the operation thereof. The guard 22 is preferably inclined, with respect to the record grooves and the corresponding radius of the tablet 14, so as to more positively laterally deflect the accumulations of shavings and particles cut from tablet. Preferably, though not necessarily, the inclination of the guard 22 is as shown in the drawing, whereby the material cut from the tablet and carried around thereby will upon striking the guard, be deflected laterally and outwardly thereby and away from the surface portion of the tablet not yet recorded upon.

It is to be understood that the embodiment of my invention shown and specifically described herein, is subject to various changes and modifications in the construction and arrangement of parts without departure from the spirit of the invention or the scope of the appended claims. Moreover, my invention is not limited in its application to devices for recording on any particular form of record tablet.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is as follows:—

1. In a device of the class described, a sound conveyor, a recorder including a diaphragm casing, said casing having communication with said conveyor and mounted for oscillatory movement, and means for applying to said casing a slight extraneous pressure to prevent vibrations of the record-

ing stylus other than those due to the sound waves transmitted to the recorder, said means comprising a member bearing on said casing and so arranged as to slide on such casing upon oscillatory movement of the latter.

2. In a device of the class described, a sound conveyor, a recorder including a diaphragm casing, said casing having communication with said conveyor and mounted for oscillatory movement, and means comprising a member bearing freely on the casing for applying to said casing a slight extraneous pressure to prevent vibrations of the recording stylus other than those due to the sound waves transmitted to the recorder, said means having provision whereby the effective extraneous pressure thereof on the recorder may be adjusted.

3. In a device of the class described, a phonograph recorder, comprising a diaphragm casing, a carrier therefor with which the recorder is movably connected, and means for applying to said casing a slight extraneous pressure to prevent vibrations of the recording stylus other than those caused by the sound waves transmitted to the recorder, said means being so arranged that upon movement of said casing such extraneous pressure will be applied to the casing both laterally and normally with respect thereto.

4. In a device of the class described, a phonograph recorder, a carrier therefor with which the recorder is movably connected, and means for applying to said recorder a slight extraneous pressure to prevent vibrations of the recording stylus other than those caused by the sound waves transmitted to the recorder, said means comprising an arm or finger pivoted at one end about an axis fixed with respect to said carrier and resting on the recorder at its other end.

5. In a device of the class described, a sound conveyor, a recorder including a diaphragm casing having pivotal connection with said conveyor about a substantially horizontal axis and having communication with said conveyor through such pivotal connection, and an arm or finger mounted at one end for pivotal movement about an axis fixed with respect to said conveyor, the other end of said arm resting upon said diaphragm casing.

6. In a device of the class described, a recorder including a diaphragm casing, a carrier with which the recorder is connected for pivotal movement, and an arm or finger mounted at one end for pivotal movement about an axis fixed with respect to said carrier and eccentric to the axis of the pivotal connection between the carrier and recorder, the other end of said arm resting upon said diaphragm casing.

This specification signed this 2nd day of July 1921.

WALTER H. MILLER.