T. A. EDISON.

MEANS FOR REPRODUCING SOUND.

APPLICATION FILED DEC. 8, 1909.

1,056,517. Patented Mar. 18, 1913.

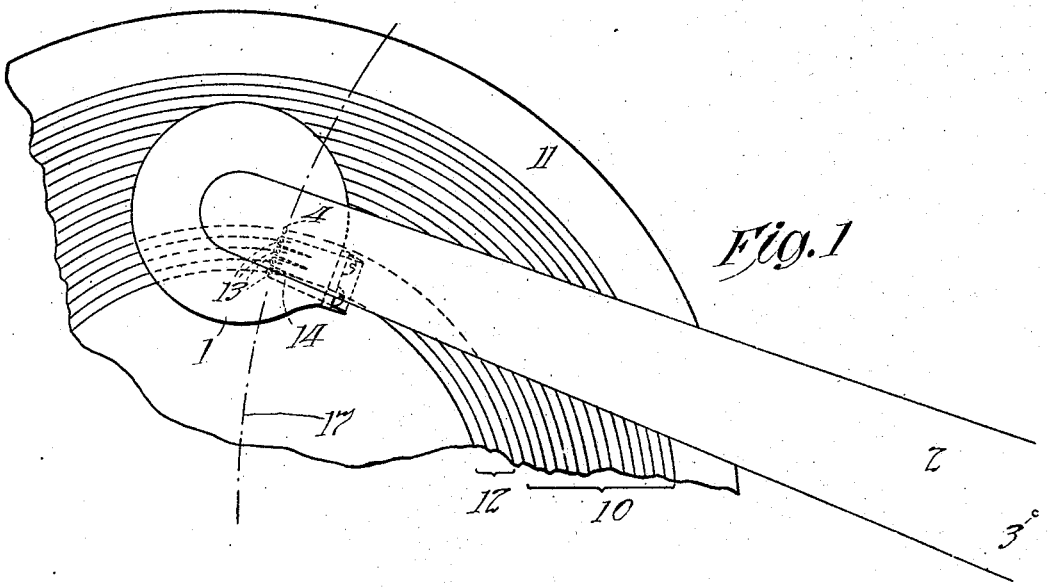
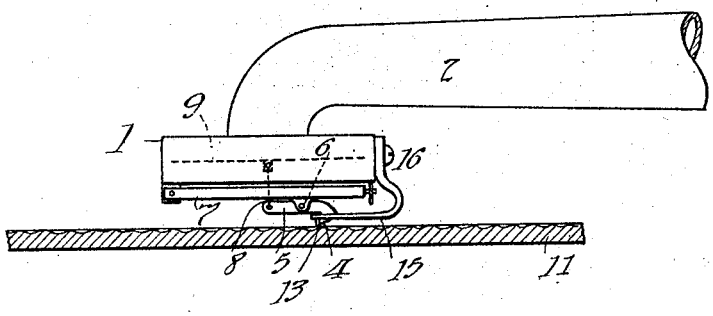


Fig. 1

Fig. 7



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UNITED STATES PATENT OFFICE.

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MEANS FOR REPRODUCING SOUND.

1,056,517. Specification of Letters Patent. Patented Mar. 18, 1913.

Application filed December 8, 1909. Serial No. 532,075.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Means for Reproducing Sound, of which the following is a description.

My invention relates to a method and means for reproducing sound from a record of the same upon a traveling tablet, and the object of my invention is to provide a novel and efficient method for propelling the means which is vibrated in accordance with the sound undulations of the record along the same, and a suitable apparatus for carrying out the said method.

Other objects of my invention will appear in the following specification and appended claims.

My invention is particularly adapted to the feeding of a sound box carrying a diaphragm or other vibratory means and the reproducing stylus for vibrating the latter across the spiral grooves of a disk sound record, although it may be adapted to correspondingly feed the same parts transversely of the record grooves formed on the surface of a revolving cylinder. Also, my invention is particularly applicable for use in connection with the reproduction from a sound record, the sound undulations of which are of the vertical or "hill and valley" type, although it also may be used in connection with a record having lateral undulations. For purposes of illustration, I have shown in the accompanying drawings an apparatus in which reproduction is made from vertical undulations formed on the surface of a rotating disk.

It is old in the art to vibrate a stylus by and in accordance with the lateral undulations of the record groove of a disk record and to propel the stylus along the record by and in accordance with the record groove itself. It is also old to propel a stylus across the face of a disk record having vertical sound undulations recorded thereon by means of a mechanical feed. It has not been feasible, however, to propel a stylus along the spiral track of a record having vertical undulations formed upon a disk or other record surface by the sole means of the engagement of the stylus itself with the record groove, because of the fact that the walls of a record groove having vertical undulations are so sloping that it is extremely difficult to keep the stylus within the groove while feeding the stylus by engagement with the walls of the groove. Because of the slope of the record walls, the stylus is very apt to jump across from one groove to the next if a mechanical feed is not provided. This can be remedied to some extent by greatly increasing the weight upon the stylus, but this results in undue wear upon the record and upon the stylus. I overcome these difficulties by providing a plurality of bearing surfaces adapted to travel within the grooves of a sound record, which bearing surfaces are connected to propel the sound box and vibratory means carried thereby from the record groove, these bearing surfaces being provided only for the purpose of feeding the stylus along the groove, and not being connected to vibrate the diaphragm. By the provision of a plurality of these feeding devices, the difficulty experienced on account of the sloping walls of the groove when a single bearing surface following the groove is relied upon to feed the device, is overcome. I preferably use for these feeding devices a plurality of sapphires or other suitable bearing surfaces carried by the ends of the teeth of a comb supported in line with the stylus beneath the sound box, this comb being connected to the sound box to propel the same, and being adapted to contact the record yieldingly. Preferably, also, I mount these feeding surfaces to the rear of the stylus in the line of progression of the sound box across the record grooves, and provide a number of feeding grooves having no sound undulations impressed thereon in advance of the first record groove, so that the reproducing stylus may be placed in the first record groove when the reproduction is started.

Referring to the accompanying drawings, illustrating one embodiment of my improved apparatus whereby my method may be carried out, Figure 1 represents a partial plan view of the same; and Fig. 2 a corresponding side elevation partly in section.

Referring to the drawings, the sound box

1 is carried by the tone arm 2 which is pivoted in the well known manner at 3. Preferably, the stylus 4 is carried by stylus lever 5 pivoted as shown at 6 or in any well known manner to floating weight 7 pivotally connected to sound box 1 in the well known manner. The tail of stylus lever 4 is connected as shown at 8 in the well known manner to the diaphragm 9 or other vibratory means carried by sound box 1. Stylus 4 is adapted to follow the sound undulations of the record grooves 10 formed on disk 11. Preferably I form the spiral record 10 in such a direction that the stylus is fed from the innermost record groove toward the periphery of the disk. I also preferably form a spiral groove 12 having a number of turns, but having no sound undulations formed thereon on the innermost side of record grooves 10 and extending into or forming a continuation of the same. It is, however, obvious that, if desired, the record could be formed to feed the sound box from the outside toward the center of the disk in which case the non-record-bearing grooves 12 would be placed between the periphery of the disk and the outermost record bearing groove.

The feeding devices are shown as a number of small styluses or members formed with bearing surfaces shaped for engagement with the record groove, as shown at 13. These points may be formed of sapphire or other suitable material and are carried at the ends of teeth 14 of comb 15, this comb being preferably formed as a leaf spring extending below floating weight 7 and secured to the body of sound box 1, as shown at 16. These feeding devices 13 are preferably positioned to travel along approximately the same arc 17 as does stylus 4 in its movement transverse to the record grooves. When it is desired to reproduce from the record, the arm 2 is positioned so that stylus 4 engages the first record groove 10 while feeding devices 13 engage the auxiliary or false grooves 12. The spring material of which comb 15 is formed yields slightly so that stylus 4 engages the records and bears the greater part of the weight of sound box 1 and connected parts. Any number of points 13 desired may be provided, and these may engage adjacent or non-adjacent grooves as desired. When record disk 11 is set in rotation, sound box 1 is fed across the record by the engagement of feeding devices 13, first with the false grooves 12 and then with the record grooves 10. While comb 15 yields somewhat in a direction at right angles to the surface of the record, it is unyielding in a direction parallel to the record, consequently, the engagement of teeth 13 with the groove feeds sound box 1 across the record. Comb 15 is not connected to the diaphragm and hence the vibration of members 13 by the undulations of the record groove do not affect the sound as reproduced by the reproducer.

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

1. In a sound reproducing apparatus, the combination of a traveling surface having a sound record groove formed thereon, a reproducing stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for engagement with said record groove and adapted to be propelled by the same, and connected to propel said vibratory means but not to vibrate the same, substantially as described.

2. In a sound reproducing apparatus, the combination of a traveling surface having a sound record groove formed thereon in spiral lines, a reproducing stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for simultaneous engagement with a plurality of the lines of said record groove and adapted to be propelled by the same, and connected to propel said vibratory means but not to vibrate the same, substantially as described.

3. In a sound reproducing apparatus, the combination of a traveling disk having a sound record groove formed thereon in spiral lines, a reproducing stylus shaped for engagement with the record groove, an arm pivoted to swing across the lines of the record groove, vibratory means carried by said arm and connected to said stylus, and means shaped for engagement with said record groove and adapted to be propelled by the same and connected to propel said arm, substantially as described.

4. In a sound reproducing apparatus, the combination of a traveling surface having a sound record groove formed thereon, a reproducing stylus shaped for engagement with the record groove, a sound box mounted free to move across the record, vibratory means carried thereby, connections between said stylus and vibratory means for vibrating the latter, means shaped for engagement with the record groove and connections between said means and sound box for propelling the latter, said connections being yielding in a direction transverse to the record surface, substantially as described.

5. In a sound reproducing apparatus, the combination of a traveling surface having a sound record formed thereon in spiral grooves, a feeding groove to one side of said record grooves and forming a continuous

spiral therewith, a reproducer stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for engagement with said feeding and record grooves and adapted to be propelled by the same, and connected to propel said vibratory means, but not to vibrate the same, substantially as described.

6. In a sound reproducing apparatus, the combination of a traveling record having a vertically undulating spiral record groove thereon, a reproducing stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for simultaneous engagement with a plurality of the grooves of the record and adapted to be propelled by the same, and connected to propel said vibratory means but not to vibrate the same, substantially as described.

7. In a sound reproducing apparatus, the combination of a sound box, vibratory means carried thereby, a reproducing stylus connected to said vibratory means, a comb carried by said sound box and having bearing surfaces adapted to track the record, substantially as described.

8. In a sound reproducing apparatus, the combination of a sound box, vibratory means carried thereby, a floating weight, a stylus lever pivoted to said weight carrying a stylus and connected to said vibratory means, a comb having bearing surfaces on the ends of the teeth thereof adapted to track parallel grooves of the record, and spring means secured to said sound box for positioning said comb below said weight and in line with said stylus, substantially as described.

This specification signed and witnessed this 4th day of December, 1909.

THOMAS A. EDISON.

Witnesses:
DYER SMITH,
JOHN M. CANFIELD.