

No. 705,829.

Patented July 29, 1902.

T. A. EDISON.  
REPRODUCER FOR SOUND RECORDS.

(Application filed Nov. 8, 1901.)

(No Model.)

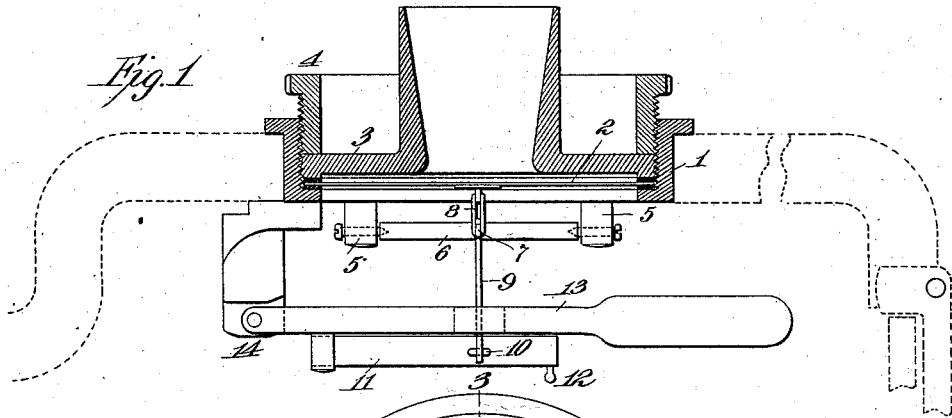


Fig. 2

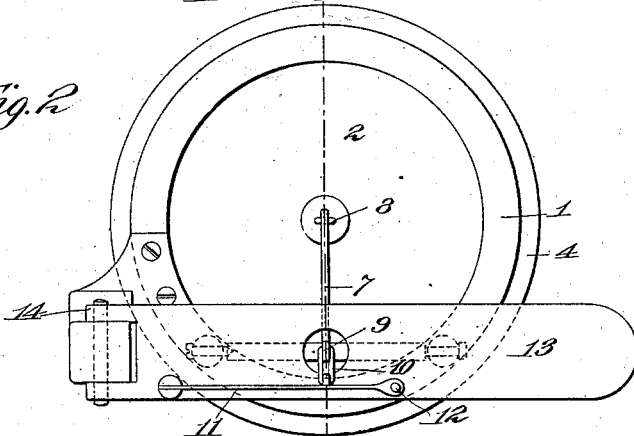


Fig. 3

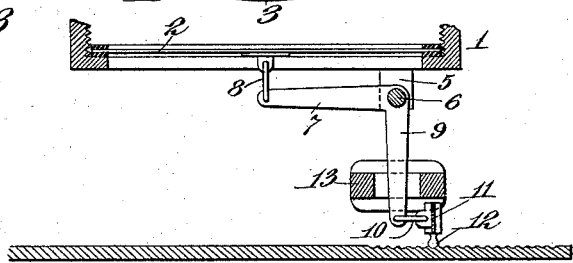


Fig. 4

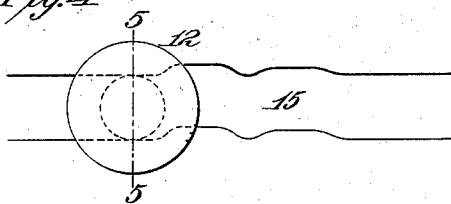
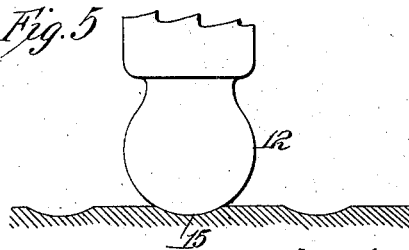


Fig. 5



Witnesses:

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# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

## REPRODUCER FOR SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 705,829, dated July 29, 1902.

Application filed November 8, 1901. Serial No. 81,535. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, Essex county, State of New Jersey, have invented a certain new and useful Improvement in Reproducers for Sound-Records, (Case No. 1,066,) of which the following is a specification.

In an application filed on even date herewith I describe certain improvements relating to apparatus and methods for forming a sinuous sound-record groove of substantially uniform depth and width, the groove presenting transversely the arc of a circle at all portions of its length. My present invention has reference to an improved reproducing device adapted particularly for effecting reproductions from records of this kind or duplicates thereof, but which may be conveniently and effectively employed in connection with sound-records as now made, wherein the record is in the form of a sinuous groove. By making a sinuous sound-record groove of circular cross-section I am enabled to employ a reproducing-stylus which shall have an extended bearing portion, and hence which will be as durable as a phonographic reproducer. This reproducing device may be either spherical in form, or when the sound-record is formed at a low speed or is representative of notes of high pitch or great volume, so that the sinuosities of the groove will be crowded closely together, the reproducer may be of the form which I describe in my reissued Patent No. 11,857, dated September 25, 1900, wherein the longitudinal dimension of the bearing-surface is less than its transverse dimension.

My principal object is to provide an improved reproducer adapted to accurately track all the portions of a sinuous record-groove having curved sides and bottom and which shall have a sufficiently-extended bearing-surface to reduce wear to a minimum.

A further object is to provide details of construction in the connections between the diaphragm and the reproducer for tracking a sinuous record-groove which will improve the efficiency and sensitiveness of the device.

To this end the invention consists, essentially, of a reproducer arranged to vibrate in a plane parallel with the record-surface and which engages a sinuous record-groove of

curved cross-section, said reproducer presenting in its transverse dimension a curve corresponding substantially with that of the record and in its longitudinal dimension a curve of greater or less or of the same diameter. In other words, my improved reproducer for the purpose may be either spherical in form or ellipsoid, with the major axis extending either perpendicular to or parallel with the record-surface. With records taken at a relatively high speed where the sinuosities of the record-groove are relatively extended I prefer to employ a reproducer which is spherical in form; but with low-speed records or ones which are representative of notes of high pitch or large volume, where the sinuosities of the record-groove are crowded closely together, I prefer to employ a reproducer of the special form described in my said reissued patent, wherein the transverse dimension is greater than the longitudinal dimension.

In effecting the secondary objects of my invention I employ a reproducing apparatus wherein the stylus is carried on a spring mounted on a pivoted compensating weight, and which spring is so connected to the diaphragm as to permit the compensating weight to always maintain the stylus in engagement with the record-groove with the desired pressure, irrespective of any mechanical irregularities or eccentricities in the record, whereby the reproducer as a whole may be carried in guides like an ordinary phonographic reproducer instead of imposing its weight on the stylus, as with the reproducing devices for the purpose which have been used before my invention with records of this kind.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical sectional view through the reproducing device, illustrating a spherical stylus; Fig. 2, a bottom plan view of the same; Fig. 3, a transverse section on the line 3 3 of Fig. 2; Fig. 4, a greatly-enlarged detail view showing a portion of a sinuous record-groove with a spherical reproducer engaging the same, illustrating in dotted lines the portion of the reproducer which engages the groove; and Fig. 5, a section on the line 5 5 of Fig. 4.

In all of the above views corresponding parts are represented by the same numerals of reference.

1 is an internally-threaded ring which is carried by a suitable supporting-arm, as shown in dotted lines, and which contains a diaphragm 2, held in place between a pair of elastic gaskets by a disk 3, secured in position by a clamping-ring 4. The horn or listening tubes are connected with the disk 3 in the usual way. Pivoted in bearings 5 on the under side of the ring 1 is a rock-shaft 6, which forms the pivot of a bell-crank lever, the horizontal arm 7 of which is connected by a link 8 to the center of the diaphragm and whose vertical member 9 is connected by a link 10 to a spring 11, carrying the reproducing-stylus 12. The spring 11 is mounted on the compensating weight 13, which at one end is pivoted to a bearing 14, secured to the under side of the ring 1. The pivot between the compensating weight 13 and the bearing 14 permits the compensating weight to move in a vertical plane, to thereby allow the reproducing-stylus to engage the record-groove with the desired pressure irrespective of any mechanical variations or eccentricities therein. These movements of the compensating weight are of course slight, and any variations of the link 10 to either side of its normal horizontal position result only in a minute movement of the spring 11, the tension of which will be increased or reduced to an infinitesimal extent and without affecting the reproduction in any way.

The reproducing-stylus presents a curved bearing-surface which engages the curved groove 15 in the record. As shown, the stylus may be spherical in form, though of less diameter than an ordinary phonographic reproducer, since the record-groove is considerably deeper than the normal depth of a phonographic-record groove. Such a reproducing-stylus offers an extended bearing-surface, (see Fig. 4,) so that wear will be reduced to a minimum. Instead of using a spherical reproducer it will be understood that a reproducer of the type described by me in my said reissue patent may be employed with efficient results when the sinuosities of the record-groove are crowded closely together, or if the record is taken at high speed, so that the curves composing the record are of relatively great diameter, the reproducer may be actually ellipsoidal in form, with the major axis extending parallel with the record-surface and in the line of the record-grooves.

In operation the compensating weight 13 presses the stylus into engagement with the record-groove with a sufficient pressure to permit the groove to vibrate the stylus in a horizontal plane, which vibrations will be communicated to the diaphragm through the bell-crank lever. If the record possesses mechanical imperfections, as is likely to be the case, and the record-groove is not on a true horizontal plane, the compensating weight

will correspondingly rise or fall, but will always keep the stylus in engagement with the bottom of the record-groove. Preferably the connections between the spring 11 and the diaphragm 2 are so proportioned that the spring will be always maintained under slight tension, so that the links 8 and 10 will be always subjected to stress, whereby any lost motion will be avoided and the diaphragm will accurately respond to the vibrations of the stylus.

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

1. In a phonograph, the combination with a sinuous grooved record, of a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, an arm for carrying said stylus and vibrating with respect to a support extending substantially perpendicular to the record-surface, a diaphragm, and connections between said arm and the diaphragm, substantially as set forth.

2. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, and connections between said stylus and diaphragm, substantially as set forth.

3. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a stylus presenting a curved extending bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, connections between said stylus and diaphragm, and a compensating weight for engaging the stylus with the record and for compensating for mechanical variations or eccentricities in the latter, substantially as set forth.

4. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, connections between said stylus and diaphragm, and a compensating weight which carries the stylus for engaging the stylus with the record and for compensating for mechanical variations or eccentricities in the latter, substantially as set forth.

5. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a spring maintained under a normal tension, connections between said spring and diaphragm, and a reproducer carried by the spring for engaging the record and vibrating in a plane parallel to the record-surface, substantially as set forth.

6. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a pivoted compensating weight, a spring carried by said compensating weight and maintained under ten-

5 sion, connections between said spring and diaphragm, and a reproducer carried by the spring for engaging the record and vibrating in a plane parallel to the record-surface, substantially as set forth.

7. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a spring maintained under a normal tension, a bell-crank lever between said spring and diaphragm, and a reproducing stylus carried by said spring and vibrating in a plane parallel with the record-surface, substantially as set forth.

8. In a reproducer for effecting reproduc-

tions from a sinuous grooved record, the combination of a diaphragm, a pivoted compensating weight, a spring carried by said weight, a bell-crank lever between said spring and diaphragm, and a stylus carried by said spring and vibrating in a plane parallel with the record-surface, substantially as set forth.

This specification signed and witnessed this 24th day of October, 1901.

THOS. A. EDISON.

Witnesses:

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