T. A. EDISON.

PHONOGRAPHIC RECORDING AND REPRODUCING MACHINE.

APPLICATION FILED MAR. 16, 1907.

939,992

Patented Nov. 16, 1909.

Fig. 1

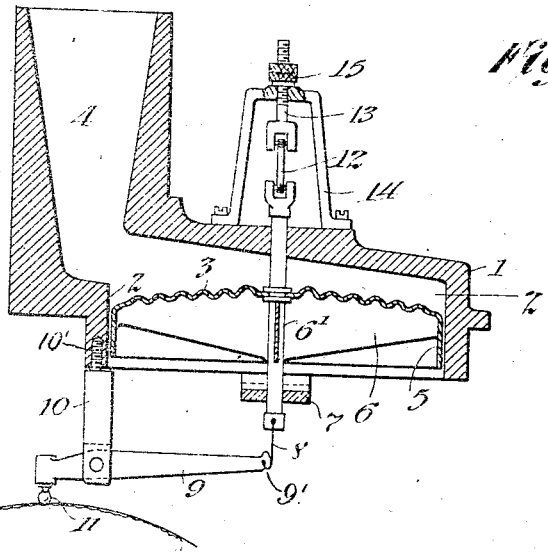


Fig. 3

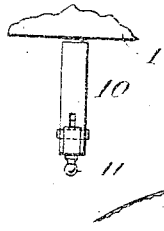
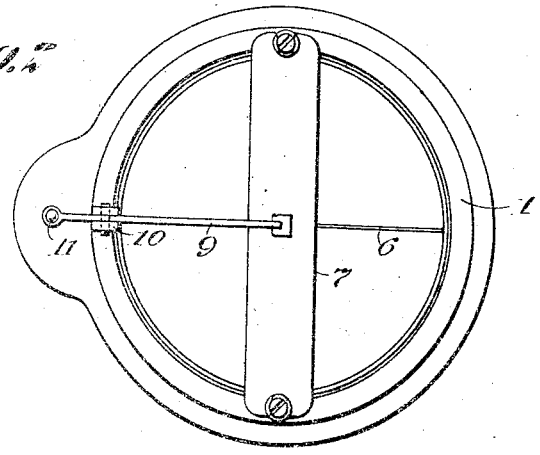


Fig. 2



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UNITED STATES PATENT OFFICE.

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

PHONOGRAPHIC RECORDING AND REPRODUCING MACHINE.

939,992. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed March 16, 1907. Serial No. 362,596.

To all whom it may concern.

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

In an application for Letters Patent Serial No. 362,597 filed on even date herewith, I describe and claim certain improvements in phonographic recording and reproducing mechanism, in which I make use of a vibrating piston which connects with the stylus lever and wherein an independent tension device is employed for maintaining the stylus in engagement with the recording or record surface. I point out in said application the advantages of a vibrating piston as compared to a diaphragm, and I illustrate two specific forms of devices embodying the new improvements, one form, specifically claimed therein, employing a compensating weight so that the fulcrum of the stylus lever will be always maintained in proper relation to the record surface notwithstanding mechanical variations or eccentricities therein, and the other employing no compensating weight as may be done if the surface is fairly true. I propose in the present application to describe and claim the device embodying the said improvements in which the compensating weight is dispensed with.

In the accompanying drawing forming part of this specification—Figure 1 is a vertical sectional view of a reproducing mechanism embodying my improvements; Fig. 2, a bottom view of the same, and Fig. 3, a detail view of the hinge connection between the stylus lever and the casing.

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

The casing 1 is made preferably of aluminum, and is formed with a bore 2 turned as true as possible, and in which works the vibrating piston 3. Leading from the casing 1 is a passage 4 which connects with the usual horn. The piston 3 is made preferably of metallic magnesium so as to be as light as possible, and is formed with a convexed, corrugated main portion, with a depending flange 5 as shown, and preferably with three or four radial ribs 6, cemented in place, so as to be very stiff. It fits very closely within but does not touch the bore 2 (say within .0005 of an inch) so that it vibrates freely but practically no opportunity is offered for loss of air pressure around its edges. Connected with the center of the piston 3 is a light magnesium or aluminum tube 6^1 which is guided by bearings in the casing and in a bridge piece 7, so as to center the piston within the bore 2. The lower end of the tube 6^1 is connected to the stylus lever 9 by means of a very flexible steel band 8 which passes around the curved end of the stylus lever and is inserted and firmly held in a slot 9′ therein. The tendency of the spring 8 to straighten out maintains the parts in a state of tension. The stylus lever 9 is fulcrumed within the depending lug or finger 10, secured to the casing 1 by a swivel connection at screw 10^1 as shown, so as to permit the stylus 11 to track the record even when the groove is slightly out of line as is generally the case under commercial conditions.

A spring 12 is connected to the upper end of the tube 6′ so as to keep the stylus always in engagement with the record or recording surface. Since the piston 3, as compared to a diaphragm, is capable of movements of relatively enormous amplitude, the spring 12 will keep the stylus in its proper engagement with the record, notwithstanding variations that would be fatal if a diaphragm were used without a compensating weight. The upper end of the spring, which is shown as a small rubber band, connects with a rod 13 movable in a yoke 14 and adjusted by nuts 15 so that the tension of the spring may be properly regulated as desired. The tension of the spring 12 exerts a constant stress on the connections between the piston and the stylus lever, and also on the fulcrum of the stylus lever, so as to prevent lost motion or rattling of the parts. The stylus 11 is mounted on the lever preferably nearer its fulcrum than is the free end of the lever, so that the vibrations of the stylus will be correspondingly amplified at the piston, and the latter can therefore be vibrated through a relatively great amplitude so as to obtain loud reproductions.

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

1. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable

therein, a stylus lever having a fixed pivot, a stylus mounted thereon, connections between the said lever and one face of the piston, and a spring device attached to the other face of the piston and the casing for maintaining the stylus in engagement with the recording or record surface, substantially as set forth.

2. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot, a stylus thereon, connections between the stylus lever and the piston including a tension device, a second tension device for maintaining the stylus in engagement with the recording or record surface, and means for adjusting the latter tension device, substantially as and for the purposes set forth.

3. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot, a stylus thereon at one side of the pivot, connections between the stylus lever on the other side of the pivot and the piston, and maintaining the stylus in engagement with the record surface, and adjusting means for the tension device, a tension device exerting upward stress on the piston and through said connections on the end of the stylus lever remote from the stylus, and thus maintaining the stylus in engagement with the record surface, substantially as set forth.

4. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot, a swivel for said pivot, a stylus on the stylus lever, connections between the lever and piston, and a tension device mounted above the said piston and exerting an upward pull on the same, for maintaining the stylus in engagement with the record or recording surface, substantially as set forth.

5. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot and having a curved forward end, a stylus mounted on the stylus lever near its other end, a spring encircling the curved end of the stylus lever, and secured to the stylus lever and to the piston, and a tension device for maintaining the stylus in engagement with the record or recording surface, substantially as and for the purposes set forth.

6. As a new manufacture, a vibrating piston for phonographic recording or reproducing apparatus made of sheet metal, formed with a corrugated convexed body and with its periphery turned down all around to form a depending flange adapted to fit within a cylindrical bore, said piston also being provided with radial ribs, extending substantially at right angles to the general surface of the piston, substantially as and for the purposes set forth.

This specification signed and witnessed this 25th day of February 1907.

THOMAS A. EDISON.

Witnesses:
FRANK L. DYER,
FRANK D. LEWIS.

Correction in Letters Patent No. 939,992.

It is hereby certified that in Letters Patent No. 939,992, granted November 16, 1909, upon the application of Thomas A. Edison, of Llewellyn Park, Orange, New Jersey, for an improvement in "Phonographic Recording and Reproducing Machines," an error appears in the printed specification requiring correction as follows: Page 2, lines 26–29, the words "and maintaining the stylus in engagement with the record surface, and adjusting means for the tension device," should be stricken out; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of December, A. D., 1909.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.