

No. 842,028.

PATENTED JAN. 22, 1907

E. F. SHUE.

SOUND RECORDING AND REPRODUCING MECHANISM.

APPLICATION FILED SEPT. 18, 1905.

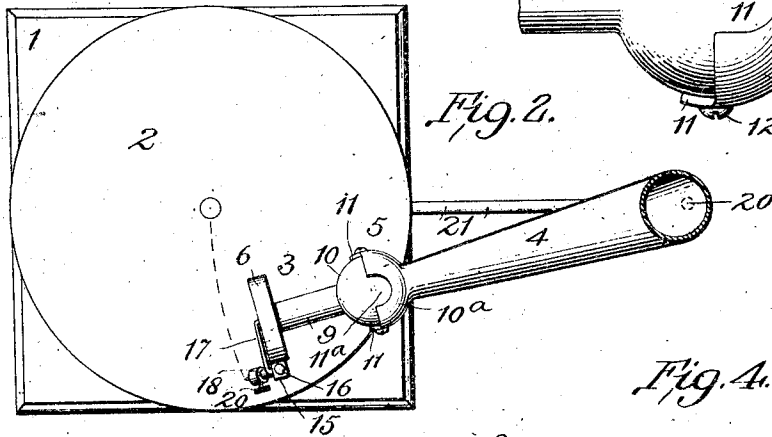
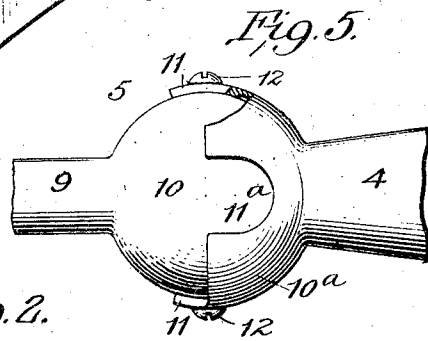
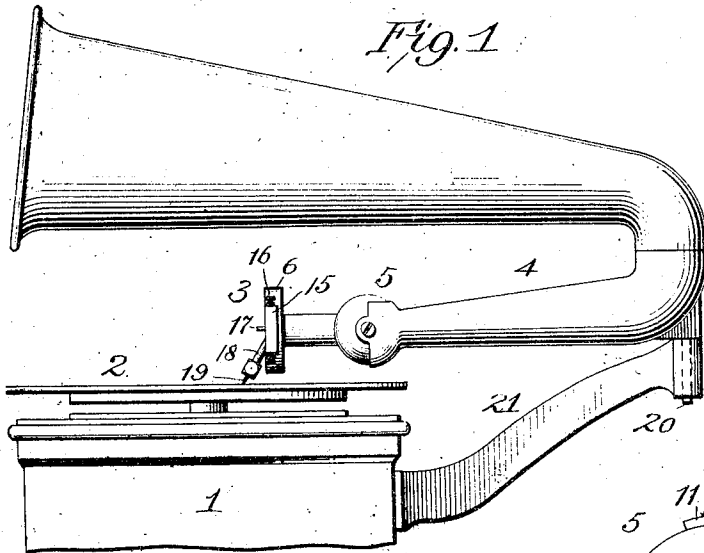
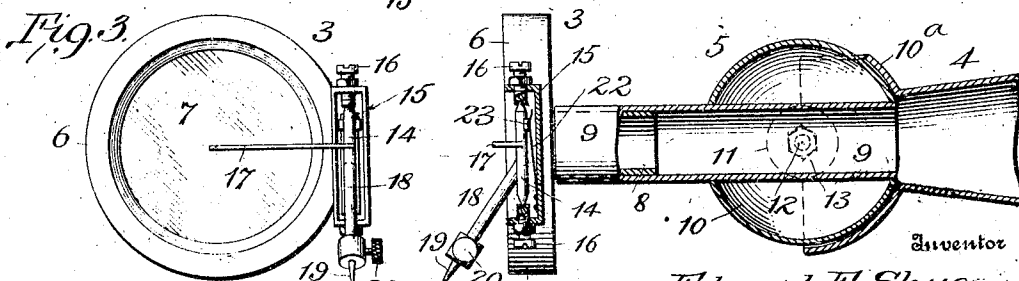


Fig. 4.



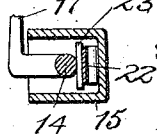
Inventor

Edward F. Shue.

Witnesses

W. B. Budge.
O. W. Holmes.

Fig. 6.



By

Sidney P. Hellingeworth

Attorney

UNITED STATES PATENT OFFICE.

EDWARD F. SHUE, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND RECORDING AND REPRODUCING MECHANISM.

No. 842,028.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed September 18, 1905. Serial No. 278,968.

To all whom it may concern:

Be it known that I, EDWARD F. SHUE, a citizen of the United States, residing at Washington, District of Columbia, have invented new and useful Improvements in Sound Recording and Reproducing Mechanisms, of which the following is a specification.

This invention relates to talking-machines, more particularly to that type in which a flat disk is employed for receiving a record in the form of a laterally wavy spiral groove of uniform depth cut into the disk by a stylus operated by a vibrating diaphragm.

The object of the invention is to improve the reproduction of recorded sound by providing suitable means of simple and positive construction attached to the diaphragm of a talking-machine which will cause the recording or transcribing stylus to travel in a direction at a right angle to the vibratory movement of the diaphragm and with a shorter amplitude of vibration. With this construction is combined a straight uninterrupted passage for the sound-waves from the diaphragm for a sufficient distance to prevent them from being broken or muffled before they are bent out of their course.

The invention further consists in the construction, combination, and arrangement of parts, such as will be fully described hereinafter and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of a portion of a talking-machine with my invention applied thereto. Fig. 2 is a plan view of the same. Fig. 3 is a front view of the sound-box and recording and reproducing mechanism on enlarged scale. Fig. 4 is a side view of the same, partly in section. Fig. 5 is a plan view of a detail of the invention. Fig. 6 is a sectional view on the line *a a* of Fig. 4.

The numeral 1 indicates the usual box or case, in which is placed the operating mechanism for rotating the record-disk 2. The recording and reproducing mechanism is indicated at 3, attached to the horn 4 or other sound-receiver by means of a ball-joint 5.

The recording and reproducing mechanism 3 comprises a sound-box 6 of the usual cylindrical form, carrying a vibratory diaphragm 7, and a tube 8, projecting centrally from the rear of the sound-box in a straight line and opening thereinto behind the diaphragm.

On one side of the sound-box 6 and sub-

stantially in the plane of the diaphragm 7 is journaled a vertical pivot or shaft 14, preferably contained within a casing 15. The ends of said pivot are pointed and rest in sockets 60 formed in the ends of adjusting-screws 16, passing through the top and bottom of the casing 15. In place of the casing lugs may project from the side of the sound-box to receive the screws. Secured to the vertical pivot 14 is a stylus-lever 25, one arm 17 extending horizontally in front of the diaphragm 7 and attached thereto at its center and so shaped that it will pass around the edge of the sound-box without touching it. 70 A second or stylus arm 18 projects downwardly and forwardly at an angle to said pivot in the direction of rotation of the record-disk and forms a right angle with the arm 17 when seen in plan. The stylus-arm 18 carries a stylus 19, adjustable within said arm 18 and secured thereto by a thumb-screw 20. The stylus-arm 18 and stylus 19 are in the same vertical plane as the pivot 14, but at an angle thereto, as clearly illustrated 80 in Figs. 1 and 4. As thus arranged the stylus 19 as it follows the wavy groove in the record-disk oscillates the vertical pivot 14 in a horizontal direction, which in turn vibrates the horizontal arm 17 and the diaphragm 7, 85 to which said arm is attached.

It is to be observed that the point of attachment of the arm 17 to the diaphragm is at a greater distance from the axis of the pivot 14 than is the point of the stylus 19. 90 This is important from the fact that when the machine is making a record the amplitude of vibration of the stylus-point is less than that of the diaphragm, from which it follows that when the record is reproduced 95 the stylus has a shorter distance to travel than would be the case if the arms 17 and 18 extended an equal distance from their axis. By this construction a better and purer tone is produced and the "life" of the record-disk 100 is increased.

To restrain the amplitude of vibration of the stylus 19 and return the diaphragm 7 to normal position, a flat spring 22, secured to the casing 15 near its lower end, extends upwardly and bears against a bar or plate 21, attached to the pivot or shaft 14. (See Figs. 4 and 6.)

A sleeve 9, forming a part of the horn 4 or other sound-receiver and adapted to slide or 110 fit over or within the tube 8, has secured to it one of the elements of the ball-joint 5, the

other element 10^a being attached to the small end of the horn 4. The inner element 10 on the sleeve 9 consists of a thin sphere, preferably of metal, mounted on the end of said sleeve which passes entirely through the sphere, as indicated in Fig. 4. The outer element 10^a is of hemispherical form, with projecting lugs 11 slightly thicker than the rest of the element on each side and a socket or cut-away portion 11^a on the top. (See Fig. 5.) The elements 10 and 10^a are so arranged that when assembled they do not contact except at the pivoted points and can be moved relatively to each other in a vertical direction only on screw-pivots 12, which pass through the lugs 11 and into the spherical element 10, where they are held by nuts 13. By this means friction is reduced to the minimum.

Instead of screws and nuts any other equivalent means may be employed to pivotally join the elements 10 10^a on a horizontal axis. The horn is pivoted at 20' to its support 21, said pivot being in the same vertical plane as the center of the record-disk, so that as the stylus travels inwardly from the periphery of the disk it will describe an arc (see dotted line, Fig. 2) passing through the axis of the record-disk. It is to be observed that the stylus does not lie in the axis of the sound-box, but outside thereof, which arrangement tends to draw the recording and reproducing device toward the center of the record-disk as the latter rotates.

From the construction above described it will be noted that a straight unobstructed passage-way for the sound-waves is produced, free from curves and other impediments which tend to break up and muffle the sound produced by the vibrating diaphragm. The joint 5 as formed permits the stylus to move with great freedom in a vertical direction, but holds it firmly against any side play, so that it is compelled to accurately follow the

wavy groove on the record-disk when reproducing sound and when inscribing a record to form a groove exactly in harmony with the vibrating diaphragm. The end of the horn at its attachment to the element 10^a is slightly larger than the end of sleeve 9 to permit the sound-waves to enter the horn without obstruction.

The stylus 19 may be readily removed from the record-disk by swinging the recording and reproducing mechanism 3 in an upward direction on the joint 5, where it is held by the socket 11^a, into which the sleeve 9 enters.

Having thus described my invention, I claim—

1. In a sound recording and reproducing mechanism, a sound-box, a vertically-disposed diaphragm mounted therein, a stylus-lever pivotally mounted upon said sound-box and having its pivotal axis in the same plane as that of the diaphragm, one arm of said lever connected to said diaphragm and the other or stylus arm of said lever projecting downwardly at an acute angle to the axis of said pivot and having its free end nearer to said pivotal axis than the free end of the first-mentioned arm of said lever.

2. In a sound recording and reproducing mechanism, a sound-box, a vibratory diaphragm therein, a vertical pivot lying in the plane of said diaphragm, a stylus-lever mounted on said pivot, one arm of which lever is attached to the diaphragm, the other and shorter arm carrying a stylus, and a centering-spring attached at one end to said sound-box and bearing at its other end against a flattened portion on the pivot.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

EDWARD F. SHUE.

Witnesses:

HUGH M. STERLING,
C. C. BURDINE.