

H. T. SCOTT & L. J. PATTERSON.
 REPRODUCER FOR PHONOGRAPHS.
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1,040,030.

Patented Oct. 1, 1912.

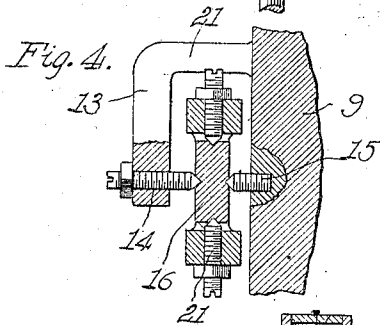
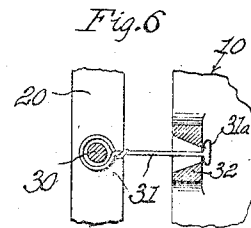
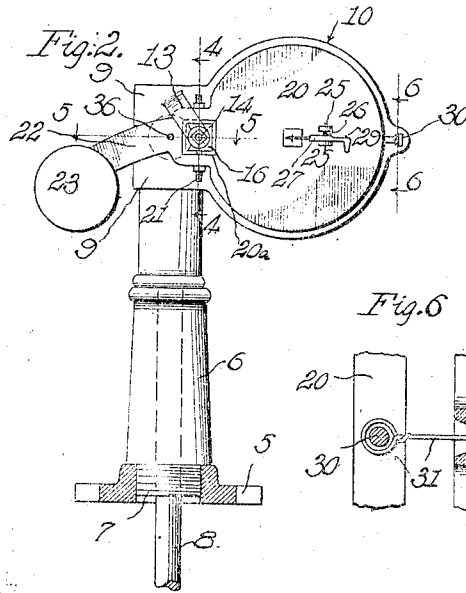
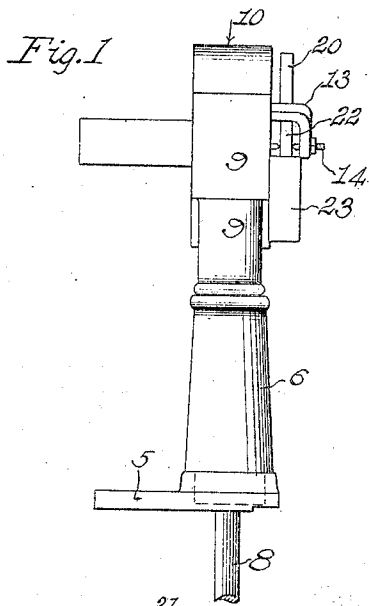


Fig. 3.

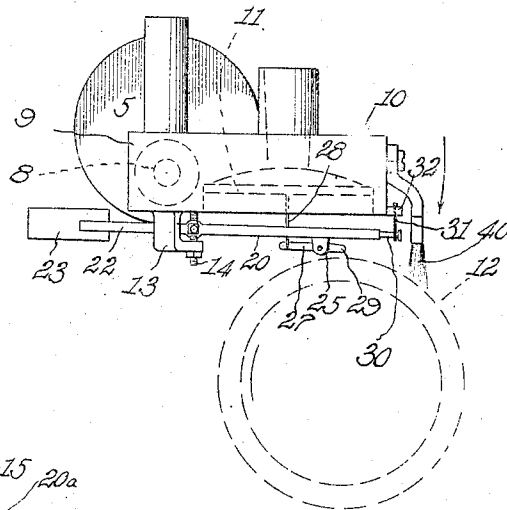
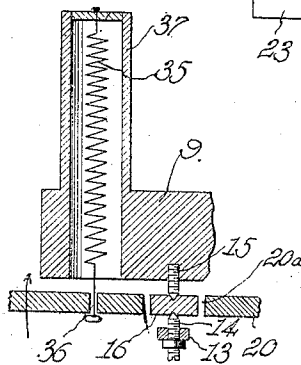


Fig. 5.



Witnesses.
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UNITED STATES PATENT OFFICE.

HARRY T. SCOTT AND LEO J. PATTERSON, OF LOS ANGELES, CALIFORNIA; SAID PATTERSON ASSIGNOR TO SAID SCOTT.

REPRODUCER FOR PHONOGRAPHS.

1,040,030.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed June 14, 1911. Serial No. 633,127.

To all whom it may concern:

Be it known that we, HARRY T. SCOTT and LEO J. PATTERSON, citizens of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Reproducers for Phonographs, of which the following is a specification.

This invention relates to a reproducer mechanism adapted particularly for use in connection with a cylindrical (Edison type) record held with its axis vertical.

In the ordinary type of phonograph the record is held horizontally and the reproducer engages the record sound groove which is approximately in a vertical plane. Our new reproducer is adapted for use when supported with the needle in position to engage with the sound groove approximately in a horizontal plane; and this necessitates a novel form of support and construction which we have embodied in our reproducer.

Our reproducer is particularly for use in connection with our automatic phonograph machine for which we have filed applications for United States Letters Patent on February 1st, 1911, bearing Serial No. 605,881, and May 27th, 1911, bearing Serial No. 629,892; but we may use this reproducer in connection with any machine which plays a record in a vertical position. This being the prime essential—playing the record in a vertical position—the salient features of our invention are embodied in the mechanism which enables us to hold the stylus, or reproducing point, in engagement with the sound groove in that position. We have provided a novel form of support, universal in its nature, for the stylus and we have provided means for holding the stylus in a normal position and for returning it to this normal position when it has been moved therefrom by the action of the sound groove. The stylus is allowed movement in all the directions necessary for following the sound groove accurately. These features will be best understood from consideration of the following specification and the accompanying drawings, in which:

Figure 1 is a side elevation of our improved reproducer. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view of the same. Fig. 4 is an enlarged detail section taken on line 4—4 of Fig. 2. Fig. 5

is an enlarged detail section taken on line 5—5 of Fig. 2. Fig. 6 is an enlarged section taken on line 6—6 of Fig. 2.

In the drawings 5 designates a base of any suitable proportions and size to suit the machine on which the reproducer is mounted. Mounted upon this base is a pillar 6, preferably screw threaded at 7 into the base so that it may be raised or lowered by rotation and the height of the reproducer carried above thus adjusted. A vertical shaft 8 passes through the pillar 6 and carries on its upper end a suitable block or other member 9 on which sound box 10 is mounted. Sound box 10 is mounted on block 9 at one side and is placed with its axis in a horizontal position so that diaphragm 11 therein is in a substantially vertical plane. The sound box rotates about the axis of vertical shaft 8 and is moved in the direction indicated in Fig. 3 to throw the stylus or reproducing point into engagement with a record (shown at 12 in dotted lines in Fig. 5). The sound box is of any ordinary construction; we have shown one of the general construction now in use on machines playing cylindrical records; its particulars of construction have no bearing on the present invention. Extending outwardly and downwardly from block 9 is an arm 13 which carries in its end a pivot screw 14 projecting inwardly toward the block (see Fig. 4). A pivot screw 15 is placed in block 9 directly opposite pivot screw 14 and these pivot screws support a pivot block 16 between them, the block turning in a vertical plane on the horizontal axis formed by the screws. Pivot block 16 may be, and is preferably, of some hard material, say hardened steel or a jewel. A stylus plate 20 is provided of the usual configuration, with the exceptions hereinafter noted, and carries the stylus in the ordinary manner. This stylus plate is provided with an aperture 20^a which surrounds pivot block 16 and it is provided with pivot screws 21 engaging with the pivot block and arranged on a vertical axis so that the stylus plate may have a horizontal movement around the pivot block. The stylus plate has an extension 22 carrying a counter-balance weight 23 on its end so as to balance the stylus plate on the horizontal pivot formed by screws 14 and 15 and to normally hold it in the position shown. Weight 23 is so placed that the center of gravity of the whole stylus plate

and extensions is preferably immediately beneath the horizontal pivot and thus has a tendency to bring the stylus plate to the position shown whenever it is displaced therefrom by vertical movement of either of its ends. The distance of the center of gravity below the horizontal pivot is preferably very slight so that there will be a very slight pressure tending to equilibrate the stylus plate and consequently a very slight pressure tending to move the stylus against the side walls (top or bottom) of the sound record groove.

On stylus plate 20 a pair of lugs 25 is placed and these lugs carry a small pivot pin 26 between them, and held vertically, on which the stylus lever 27 is mounted. Stylus lever 27 is connected by member 28 to diaphragm 11 and carries stylus point 29 on its outer end. This stylus point is adapted to be thrown into engagement with a record 12 by movement of the whole reproducing mechanism in the direction indicated in Fig. 3. It will be seen from Fig. 2 that the stylus lever does not occupy the full space between lugs 25, so that it is free to move vertically on the pivot pin 26 to a small extent without moving the stylus plate vertically. The stylus lever is normally gravitated against the lower lug 25 and will normally remain in this position unless there is a sharp upward movement of the stylus. In this case the stylus lever will move upwardly independently of the stylus plate and will consequently move more easily and with greater freedom to follow any vertical variations of the sound groove than if it were tightly placed between lugs 25. We mention this feature particularly as we note that in a late Patent, No. 991,424, where the stylus pivot pin 26 is horizontal, a small spring is utilized to hold the stylus lever against one of the lugs 25 and to thereby prevent any looseness and any noise arising from that looseness. In our construction gravity effects the desired result rather than a spring.

On the end of the stylus plate a pin 30 is placed and a small wire 31 encircles the pin and passes through a lug 32 in the relatively stationary sound box 10. An enlargement 31^a on the end of the wire prevents the stylus plate from moving away from the sound box at this point while allowing it a certain amount of movement independently of the sound box. The stylus plate is normally held in the position shown by means of a spring 35 attached at 36 to the stylus plate and on the opposite side of the pivotal point pin 30. Spring 35 is housed within a small tube 37 and normally pulls the stylus plate in the direction indicated in Fig. 5, thus holding the parts in the position shown in Fig. 6. The pull of spring 35 is sufficient to cause wire

31 to be pulled straight upwardly into the position shown in Fig. 6 and to thereby assist in holding the stylus plate in its correct position as regards rotation on the horizontal pivot formed by pivot screws 14 and 15. This aids in quickly bringing the stylus plate back to its normal position whenever it is carried out of that position by the action of the sound groove on the stylus; but it will be seen that, when the stylus plate is pushed back toward the sound box, as it always is when the stylus is in engagement with a record, then the stylus plate is free to move vertically on its horizontal pivot, at least so far as the action of spring 35 and wire 31 is concerned; for the wire is then loose and has no tendency to draw the stylus plate to its normal middle position. But there is a slight tendency, on account of the arrangement of the center of gravity of the stylus plate below its horizontal pivot, to bring the stylus point back to its normal position as regards vertical movement. Thus, while a record is being reproduced, there is a slight tendency, although sufficient, to bring the stylus point to its normal middle position and to arrange the stylus plate on the sound box in its normal position; while, when the record is removed from engagement with the stylus, there is a tendency of some greater degree exerted by spring 35 and the action of wire 31 to bring the stylus plate and stylus back to their normal positions. This arrangement has this advantage; that the stronger positioning force is rendered inactive while a record is being played and that there is consequently no great tendency for the stylus to bear disproportionately upon either the upper or the lower edge of the sound groove.

As one of the requisites for efficient action in our device is the relative immovability of the sound box, we may provide means for preventing the vibrations of the diaphragm being transmitted to the box. This is most conveniently done by increasing the inertia of the box in some manner, preferably by making the box or some attached parts of considerable weight.

In the sound box we have shown a small brush 40 mounted so as to be thrown into engagement with the record when the stylus engages the same. This brush cleans the record from any accumulated dust and causes a smoother reproduction than otherwise.

We have described a peculiar form of mechanism for supporting the sound box so that it can be moved to and from a record held in a vertical position. Although we have found this form and construction very convenient, we do not care to limit ourselves to this mode of supporting the sound box or other relatively stationary parts of the reproducer. What we do wish to claim is our

general structure for supporting the stylus, and specifically for supporting the stylus through the stylus plate, upon the sound box or other relatively stationary parts of the reproducing mechanism. The method of mounting the stylus upon the plate is old; it is in the method of supporting the stylus plate, irrespective of the method of stylus mounting, that our invention resides.

10 Broadly speaking, there is great utility in the mere mounting of the stylus plate in a vertical plane; so that it moves horizontally to and from the record. The pressure of the stylus point against the record is caused solely by the resilient means used to move the stylus plate horizontally. The weight of the stylus plate does not come on the record at all; and for this reason its mass may be greatly increased. (In the ordinary style of reproducer the stylus plate is termed a "floating weight" and is supported by the stylus resting on the record). The efficiency of transmission of vibrations from the stylus to the diaphragm depends largely on the non-participation of the stylus plate in such vibrations; in other words, the stylus plate should only move for variations in the surface of the record, while the stylus should individually, with relation to the stylus plate, follow the full variations of the sound groove. Immobility of the stylus plate with reference to the high speed sound vibrations can well be attained by increasing the mass of the stylus plate; and our method of relieving the record of the weight of the plate enables us to greatly increase its mass. (This cannot be done in the usual arrangement on account of the record having to bear the increased weight. In the usual arrangement of the stylus plate, the stylus plate mass and the pressure of the stylus on the record are inseparably correlated—it is impossible to increase one without increasing the other). In our mechanism the pressure of the stylus point on the record is typically determined solely by the tension of a spring; this may be varied to suit conditions, while the stylus plate may have sufficient mass that its inertia may make it relatively stationary.

Having described our invention, we claim:

1. A device of the character described, comprising a relatively stationary sound box having a diaphragm therein, a stylus plate pivotally mounted on the sound box to have pivotal movement in horizontal and vertical planes, the center of gravity of the stylus plate being arranged below the pivotal point of the stylus plate on the sound box, yielding means for holding the stylus plate horizontally away from the sound box, and a stylus movably mounted on the stylus plate and projecting horizontally therefrom and connected with the diaphragm in the

sound box, said stylus being arranged and moving on the stylus plate approximately in the horizontal plane passing through the pivotal point of the stylus plate on the sound box.

2. A device of the character described, comprising a relatively stationary sound box having a diaphragm therein, a stylus plate pivotally mounted on the sound box to have pivotal movement in horizontal and vertical planes, the center of gravity of the stylus plate being arranged below the pivotal point of the stylus plate on the sound box, yielding means for holding the stylus plate horizontally away from the sound box, means for limiting the movement of the stylus plate away from the sound box, and a stylus movably mounted on the stylus plate and projecting horizontally therefrom and connected with the diaphragm in the sound box, said stylus being arranged and moving on the stylus plate approximately in the horizontal plane passing through the pivotal point of the stylus plate on the sound box.

3. A device of the character described, comprising a relatively stationary sound box having a diaphragm therein, a pivot block supported on a horizontal axis on the sound box, said horizontal axis extending at right angles to the plane of the diaphragm in the sound box, a stylus plate arranged in a vertical plane adjacent the sound box, pivot members arranged along a vertical axis on the stylus plate and engaging the pivot block to allow the stylus plate a movement relative to the sound box about both a horizontal and a vertical axis, the stylus plate being arranged on one side of said pivot block, a weighted extension of the stylus plate extending on the other side of said pivot block, the arrangement being such that the center of gravity of the stylus plate and its extension falls approximately directly beneath the horizontal pivot of the pivot block on the sound box, a spring attached to the sound box and to the extension of the stylus plate and tending to rotate the stylus plate about its vertical axis and to move it away from the sound box, a link loosely engaging with the stylus plate and connected with the sound box and arranged in the horizontal plane determined by the horizontal axis of the stylus plate and adapted to limit the movement of the stylus plate away from the sound box, a stylus lever pivotally mounted on the stylus plate, a stylus carried on one end of the stylus lever, and connecting means between the other end of the stylus lever and the diaphragm in sound box.

4. In combination a reproducer comprising a relatively stationary sound box having a diaphragm therein, a pivot block supported on a horizontal axis on the sound box,

said horizontal axis extending at right angles to the plane of the diaphragm in the sound box, a stylus plate arranged in a vertical plane adjacent the sound box, pivot members arranged along a vertical axis on the stylus plate and engaging the pivot block to allow the stylus plate a movement relative to the sound box about both a horizontal and a vertical axis, the stylus plate being arranged on one side of said pivot block, a weighted extension of the stylus plate extending on the other side of said pivot block, the arrangement being such that the center of gravity of the stylus plate and its extension falls approximately directly beneath the horizontal pivot of the pivot block on the sound box, a spring attached to the sound box and to the extension of the stylus plate and tending to rotate the stylus plate about its vertical axis and to move it away from the sound box, a link loosely engaging with the stylus plate and connected with the sound box and arranged in the horizontal plane determined by the horizontal axis of the stylus plate and adapted to limit the movement of the stylus plate away from the sound box, a stylus lever pivotally mounted on the stylus plate, a stylus carried on one end of the stylus lever, connecting means between the other end of the stylus lever and the diaphragm in sound box, and a brush mounted on the sound box to engage a sound record when engaged by the stylus.

5. A device of the character described, comprising a frame, a stylus plate pivotally mounted thereon to have movement in both horizontal and vertical planes, the center of gravity of the stylus plate being below the pivotal support thereof, a stylus mounted on the plate and projecting its point horizontally, yielding means for moving the stylus plate horizontally, and a link extending horizontally between the frame and the stylus plate and loosely connected to both the frame and plate.

6. A device of the character described, comprising a relatively stationary sound box having a vibratory member therein, a vertically arranged stylus plate, a universal pivot on which the stylus plate is balanced, the stylus plate normally moving to and from the sound box in a horizontal plane about the pivot, a stylus mounted on the plate to move horizontally thereon, and connection between the stylus and the vibratory member.

7. A device of the character described, comprising a relatively stationary sound box having a vibratory member therein, a vertically arranged stylus plate, a universal pivot on which the stylus plate is balanced, the stylus plate normally moving to and from the sound box in a horizontal plane about the pivot, a stylus mounted on the plate to move horizontally thereon, connection between the stylus and the vibratory member, and resilient means moving the stylus plate about the pivot and in a direction away from the sound box.

8. A device of the character described, comprising a relatively stationary sound box having a vibratory member therein, a stylus plate mounted on the side of the sound box to have universal movement thereon, the center of gravity of the stylus plate being below its point of support, a stylus mounted on the stylus plate to move horizontally thereon to and from the sound box, a connection between the stylus and the vibratory member, and resilient means to move the stylus plate horizontally from the sound box.

In witness that we claim the foregoing we have hereunto subscribed our names this 8th day of June 1911.

HARRY T. SCOTT.
LEO J. PATTERSON.

Witnesses:

JAMES T. BARKELEW,
ELWOOD H. BARKELEW.