N. H. HOLLAND.

PHONOGRAPH.

APPLICATION FILED APR. 14, 1914.

1,283,771. Patented Nov. 5, 1918.

Fig. 1.

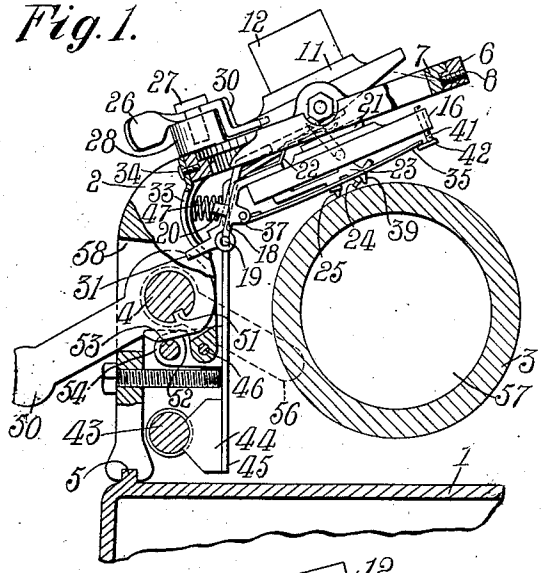


Fig. 2.

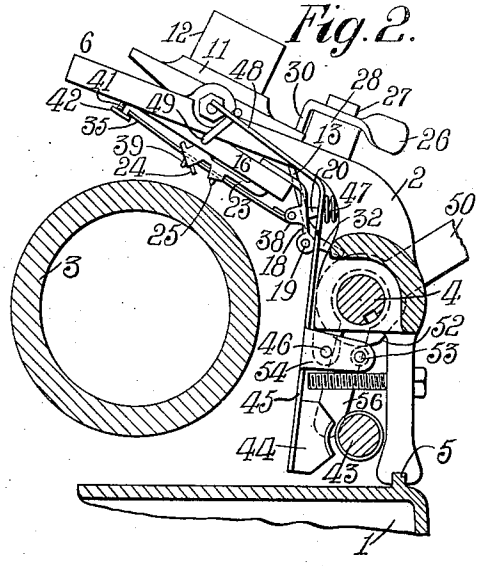


Fig. 3.

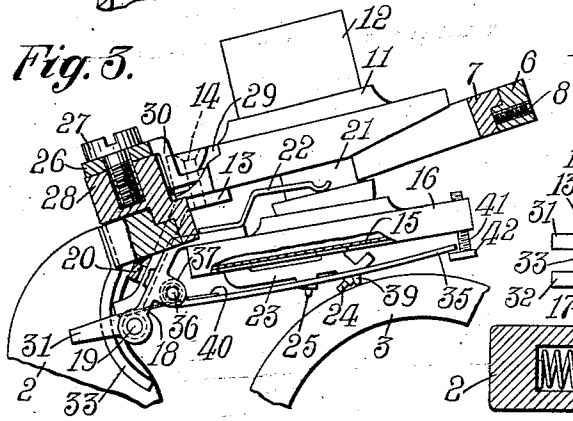


Fig. 4.

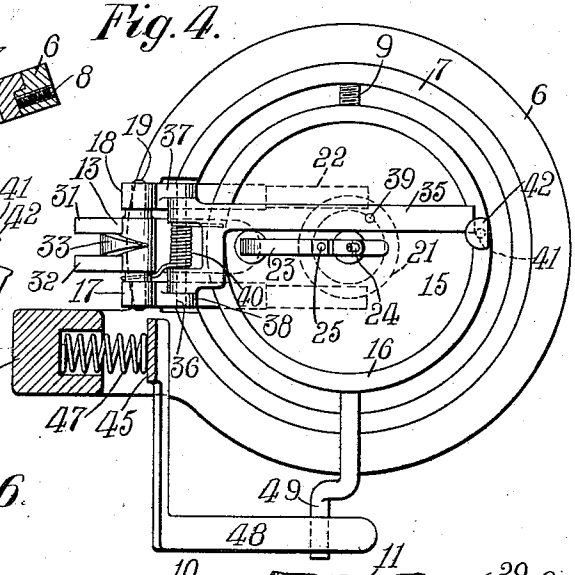


Fig. 6.

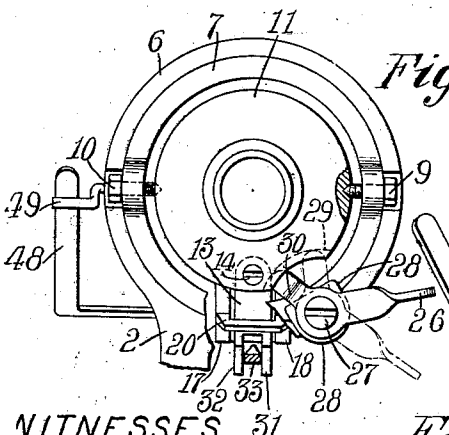


Fig. 7.

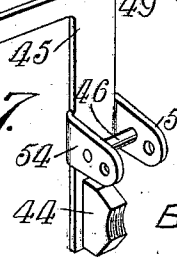
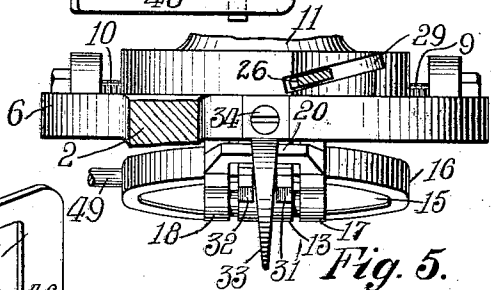


Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

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PHONOGRAPH.

1,283,771. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed April 14, 1914. Serial No. 831,695.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, Essex county, New Jersey, have made certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to such phonographs as are suitable both for recording and for reproducing sound waves.

The principal object of my invention is to provide an improved device of this character in which a single sound box is provided with both a recording stylus and a reproducing stylus, the styli being preferably so mounted that the reproducer stylus is movable laterally when in operative position to permit the same to readily follow the record groove regardless of the lateral irregularities therein, whereas the recording stylus is firmly held against lateral movement when in operative position. The means for holding the recording stylus against lateral movement are preferably thrown into operation automatically when said stylus is moved into operative position. A further object of my invention is to provide the sound box with an improved device arranged to track the record blank when the recording stylus is in operative position so as to take part of the weight of the sound box off the stylus, this device being inoperative when the reproducer stylus is in position for engagement with the record and thereby permitting the full downward pressure of the sound box to hold the reproducer stylus in engagement with the record. Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a view partly in section and partly in side elevation of a phonograph embodying one form of my invention, the reproducing stylus being shown in operative position;

Fig. 2 is a view similar to that of Fig. 1 but taken from the opposite end of the phonograph and showing both styli in elevated or inoperative position;

Fig. 3 is an enlarged view partly in side elevation and partly in section of a part of the apparatus shown in Fig. 1, the recording stylus being shown in operative position;

Fig. 4 is a bottom plan view of the device shown in Fig. 3, the record cylinder being omitted;

Fig. 5 is a rear elevation of the device shown in Fig. 3 with some of the parts omitted or broken away;

Fig. 6 is a top plan view partly in section of the greater part of the apparatus shown in Fig. 1; and

Fig. 7 is a perspective view of a detail of construction.

In all the views, like parts are designated by the same reference numerals.

Referring to the drawing, the reference numeral 1 indicates the frame of the phonograph, and the numeral 2, the sound box carriage. The carriage is suppported for movement longitudinally of the sound record or blank 3 as by a guide rod 4 and a guide rail 5. The guide rod 4 is mounted for oscillation in suitable standards (not shown) formed upon the frame 1 at opposite ends of the phonograph. The guide rail 5, as shown, is formed integrally on the top of the frame 1. The carriage 2 has a forwardly extending annular portion 6 in which a ring 7 is secured, as by a set screw 8. The ring 7 carries alined pivots 9 and 10, these pivots having their axes extending diametrically through the ring 7 parallel to the axis of the record cylinder 3. The pivots, as shown, are threaded into the ring 7 and have conical inner ends engaging correspondingly shaped recesses in the sound box body member 11. The latter has a neck 12 whereby the same is adapted to be connected to the usual horn or other sound conveyer and has a downwardly and rearwardly extending arm 13 pivotally secured thereto for lateral movement, as by means of a screw 14. The usual vibratory sound box diaphragm 15 is mounted in a casing 16 which is provided with arms 17 and 18 arranged on opposite sides of the arm 13 and pivotally connected thereto, as at 19. A U-shaped part 20 connecting the arms 17 and 18 and extending over the arm 13 is adapted to engage the latter and limit the downward movement of the diaphragm casing. The interior of the casing 16 is connected

with the neck 12 of the body 11 by means of a hollow tubular connection 21 resting upon the top of the casing 16 and held in engagement therewith, as by means of a spring 22. The diaphragm 15 has connected thereto a stylus arm 23 which carries a recording stylus 24 and a reproducing stylus 25, the axes of the styli 24 and 25, as well as the axis of the arm 23 being located in a plane extending diametrically of the diaphragm at right angles to the pivots 9 and 10. The position of the styli is such that by moving the sound box in the proper direction about the pivots 9 and 10 either stylus may be lowered into engagement with the cylinder 3 and the other stylus simultaneously raised out of engagement with the said cylinder. To facilitate the shifting of the sound box to bring the proper stylus in operative position, I preferably provide a lever 26 pivotally connected, as by a screw 27, to the upper face of a projection 28 extending upwardly from the ring 7. The axis of the pivot 27 extends at right angles to the axes of the pivots 9 and 10, and the forward end of lever 26 engages in a cam slot 29 inclined at an angle to the path of movement of the said lever, so that by moving the said lever about its axis the sound box may be oscillated on the pivots 9 and 10 to effect the desired positioning of the styli with respect to the cylinder 3. The inclination of the slot 29 is such that, except during the manual operation of the lever 26, the latter prevents movement of the sound box about the pivots 9 and 10. Movement of the lever 26 in either direction is limited by the engagement of the downwardly extending portion 30 thereof with the projection 28, as shown by the full and dotted line positions of the said lever in Fig. 6.

In order that the recording stylus may be held against lateral movement when the same is in operative position, I preferably provide the lower end of the arm 13 with spaced parallel projections 31 and 32 arranged on opposite sides of a downwardly and inwardly tapering wedge-shaped member 33 secured to the ring 6, as by a screw 34. The member 33 is of such a shape that when the reproducing stylus 25 is in engagement with the cylinder 3, as shown in Fig. 1, the narrow portion of the member 33 is located between the projections 31 and 32 and the arm 13 and the parts carried thereby, including reproducing stylus 25, are free to move laterally about the axis of the pivot 14. When the sound box is moved by the lever 26 to bring the recording stylus into operative position, the projections 31 and 32 automatically move upwardly along the wedge 33, and when the recording stylus 24 is in engagement with the cylinder 3, as shown in Fig. 3, the projections 31 and 32 engage the opposite inclined faces of the wedge 33, as shown in Fig. 4, and thereby effectively prevent lateral movement of the arm 13 and the parts carried thereby, including the recording stylus 24. Movement of the sound box by the lever 26 to bring the reproducing stylus into operative position automatically causes the projections 31 and 32 to move downwardly with respect to wedge 33, so that when the reproducing stylus is in operative position, it is again freely movable in a lateral direction about pivot 14.

In reproducing a sound record, it is desirable that the reproducing stylus should be held in engagement with the record with considerable force to prevent the same from being thrown off the record surface by the sound waves of considerable depth. The recording stylus, however, will be caused to cut too deeply and will be subjected to too much strain if it is weighted or pressed against the record blank with force suitable for holding the reproducing stylus in engagement with the record. I accordingly provide a construction wherein a part of the weight or downward pressure of the parts by which the reproducer stylus is held in engagement with the record is counterbalanced when the recording stylus is in engagement with the record blank. The construction in question comprises an arm 35 pivoted as at 36 to lugs 37 and 38 formed on the arms 17 and 18, the arm 35 carrying a rounded point or "ball advance" 39 arranged to bear on the cylinder 3 a slight distance to one side of the recording stylus when the latter is in engagement with the said cylinder. A spring 40 encircling the pivot 36 and bearing at one end upon the arm 35 and at the other end upon the arm 13 tends to move the arm 35 and the casing 16 away from each other with a substantially constant force, so that when the projection 39 engages the cylinder 3 it acts through the arm 35 and spring 40 to support or counterbalance a definite part of the weight of the casing 16 and the parts carried thereby. Downward pressure on the recording stylus is accordingly reduced to an extent depending upon the tension of spring 40. A screw 41 threaded into the forward end of the casing 16 has a head 42 adapted to support the arm 35 and prevent the projection 39 from engaging the record when the reproducer stylus is in operative position (see Fig. 1).

The carriage 2 and the parts carried thereby may be fed along the cylinder 3, as by a feed screw 43 adapted to be engaged by the feed nut 44, which is carried by lever 45 pivoted, as at 46, to the carriage 2. A spring 47 interposed between the upper end of the lever 45 and the carriage 2 tends to move said lever about its pivot to force the nut 44 firmly into engagement with the

screw 43. The upper end of the lever 45 is provided with an inclined portion 48 which is arranged to engage the under side of an arm 49 secured to the diaphragm casing 16 to lift the said casing and the parts carried thereby away from the cylinder 3 when the lever 45 is moved to disengage the feed nut 44 from the feed screw 43. By reason of this construction the styli may be moved out of engagement with the cylinder 3 simultaneously with the disengagement of the feed producing means 43 and 44. The lever 45 may be moved against the pressure of the spring 47 by means of a hand lever 50 splined, as shown at 51, to the oscillating guide rod 4 and having a cam surface 52 arranged to engage a pin 53 supported between parallel arms 54 and 55 projecting from opposite sides of the lever 45. Secured at the end of guide rod 4 is an arm 56 which is positioned, as shown in Fig. 1, to prevent the placing of a record cylinder 3 upon, or the removal of the same from the record support 57 when the lever 45 is in the position corresponding with the lowered positions of the styli. By lifting the arm or lever 50 from the position shown in Fig. 1, the arm 56 is moved out of the path of the cylinder 3, as shown in Fig. 2, and at the same time lever 45 is rotated by the coaction of the cam surface 52 with the pin 53 to cause the inclined portion 48 to engage the projection 49 and raise the styli away from the support 57 and cylinder 3, so that the record cylinder or blank may be readily placed upon or removed from the support 57 without damage either to the styli or the record or blank. As hereinbefore stated the feed nut 44 is disengaged from the feed screw 43 simultaneously with the above described movement of the styli away from the record support. By lowering the arm or lever 50, the arm 56 is again brought into cylinder obstructing position, and the lever 45 is moved by the spring 47 to cause the feed nut 44 to engage the feed screw 43 and to permit the casing 16 and parts carried thereby to fall by gravity into operative relationship to the cylinder 3. The lever 50 passes through a slot 58 in the carriage 2 and the movement of the said lever may be limited by its engagement with the ends of this slot.

Numerous modifications may be made in the structure herein disclosed without departing from the spirit of my invention, and it is accordingly to be understood that I am not limited to the exact details herein shown and described.

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

1. In a device of the class described, the combination of a diaphragm, pivoted supporting means therefor, a recording stylus and a reproducing stylus connected to said diaphragm, means for tilting said supporting means to place either stylus in operative position, said diaphragm being movable laterally with respect to said supporting means when said reproducing stylus is in operative position, and means automatically thrown into operation by placing said recording stylus in operative position for preventing such lateral movement of said diphragm when said recording stylus is in operative position, substantially as described.

2. In a device of the class described, the combination of a diaphragm, a casing therefor, a recording stylus and a reproducing stylus connected to said diaphragm, a pivoted member to which said casing is connected, said casing being movable toward and away from said member, and means for tilting said member about its pivotal axis to place either stylus in operative position and to remove the other stylus from operative position, substantially as described.

3. In a device of the class described, the combination of a diaphragm, pivoted supporting means therefor, a recording stylus and a reproducing stylus connected to said diaphragm, and means pivoted for movement about an axis at an angle to the pivotal axis of said supporting means for tilting said supporting means about the pivotal axis thereof to place either stylus in operative position and to remove the other stylus from operative position, substantially as described.

4. In a device of the class described, the combination of a diaphragm, pivoted supporting means therefor, a recording stylus and a reproducing stylus connected to said diaphragm, and means pivoted for movement about an axis at an angle to the pivotal axis of said supporting means and having a cam action on said supporting means for tilting said supporting means about the pivotal axis thereof to place either stylus in operative position and to remove the other stylus from operative position, substantially as described.

5. In a device of the class described, the combination of a diaphragm, pivoted supporting means therefor, a recording stylus and a reproducing stylus connected to said diaphragm, and a single member for tilting said supporting means about the pivotal axis thereof to place either stylus in operative position, and for holding said supporting means against any movement about said axis when either stylus is in operative position, substantially as described.

6. In a device of the class described, the combination of a sound box provided with a recording stylus and a reproducing stylus, means coacting with said sound box

for positively moving either stylus into operative position and the other out of operative position, and means arranged to track a record blank and to support part of the weight of said sound box when the recording stylus is in operative position, said tracking means being inoperative when the reproducer stylus is in operative position, substantially as described.

7. In a device of the class described, the combination of a sound box provided with a recording stylus and a reproducing stylus, means coacting with said sound box for moving either stylus into operative position and the other out of operative position, means arranged to track a record blank when the recording stylus is in operative position but not when the reproducing stylus is in operative position, and a spring tending to resist downward movement of said sound box with respect to said tracking means, substantially as described.

8. In a device of the class described, the combination of a diaphragm, a casing therefor, a recording stylus and a reproducing stylus connected to said diaphragm, a pivoted member to which said casing is connected, said casing being movable with respect to said member, means for tilting said member about its pivotal axis to place one stylus in operative position and to remove the other stylus from operative position, and means for lifting said casing with respect to said pivoted member to move both styluses out of operative position, substantially as described.

9. In a device of the class described, the combination of a diaphragm, movably mounted supporting means therefor, a recording stylus and a reproducing stylus connected to said diaphragm, means for tilting said supporting means to place either stylus in operative position, said diaphragm being movable laterally with respect to said supporting means when said reproducing stylus is in operative position, and means automatically rendered operative by placing said recording stylus in operative position for preventing such lateral movement of said diaphragm, substantially as described.

10. In a device of the class described, the combination of a diaphragm, pivoted supporting means therefor, a recording stylus and a reproducing stylus connected to said diaphragm, means for placing either stylus in operative position by movement of said supporting means only about its pivotal axis, said diaphragm being movable laterally when said reproducing stylus is in operative position, and means automatically rendered operative by placing said recording stylus in operative position for preventing lateral movement of said diaphragm, substantially as described.

11. In a device of the class described, the combination of a sound box provided with a diaphragm, a recording stylus and a reproducing stylus rigidly connected with said diaphragm, means coacting with said sound box for moving either stylus into operative position and the other out of operative position, and means arranged to track a record blank and to support part of the weight of said sound box when the recording stylus is in operative position, said tracking means being inoperative when the reproducing stylus is in operative position, substantially as described.

This specification signed and witnessed this 10th day of April, 1914.

NEWMAN H. HOLLAND.

Witnesses:

WILLIAM A. HARDY,

MARY J. LAIDLAW.