

AMENDED SPECIFICATION.

Reprinted as amended under Section 8 of the Patents and Designs Acts, 1907 to 1928.

PATENT SPECIFICATION

Convention Date (United States): Oct. 6, 1928.

326,931

Application Date (in United Kingdom): Jan. 26, 1929. No. 2,578/29.

Complete Accepted: March 27, 1930.



COMPLETE SPECIFICATION (AMENDED).

Improvements in and relating to Supports for Electrical Sound-reproducing Devices.

We, COLUMBIA GRAPHOPHONE COMPANY, LIMITED, a Company organized and existing under the laws of Great Britain, of 102—108, Clerkenwell Road, London, E.C. 1 (assignees of FRANK LUSHBAUGH CAPPS and JOHN OSGOOD PRESCOTT, both citizens of the United States of America, and both care of Columbia Phonograph Company, Inc., Bridgeport, State of Connecticut, United States of America), do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in means for supporting electrical devices for reproducing sound from records, commonly known as "pick-ups".

The object of the invention is to provide a support which will permit the device to pivot thereon in such a manner that it may float evenly over a record and which will allow the device to be readily removed or placed upon the record when desired.

The invention consists in a support for an electrical sound-reproducing device comprising a forked arm mounted for rotation about a vertical axis and adapted to carry internally wire leads or like connections between the pick-up and other parts of the apparatus, with means by which the pick-up or reproducing device may be mounted bodily between the arms of the fork for movement in a vertical plane.

Further features of the invention will hereinafter appear and be pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a plan view of the pick-up and the pick-up arm and base or mounting for the latter, in accordance with the invention;

Figure 2 is a side elevational view

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thereof, the dotted lines showing the position of the pick-up when it is swung back to inoperative position;

Figure 3 is a central longitudinal sectional view through the arm and its supporting base;

Figure 4 is an enlarged detail sectional view showing the parts separated;

Figure 5 is a view looking into the downturned end of the pick-up arm;

Figure 6 is a view looking downwardly on the base; and

Figure 7 is a plan view of the securing means or key for readily securing the arm and its base or mounting together.

Referring in detail to the drawing, the improved pick-up arm 6, is secured to and mounted for movement in a horizontal plane on a base 7, in a manner to be described. At its outer end the arm 6 is bifurcated to provide spaced apart, horizontally extending arms 8 and 9 between which is mounted a pick-up 10 of any preferred form or construction.

Bearing screws 11 are carried by the outer ends of the arms 8 and 9. These screws have their ends shaped to provide centres entering bearings in the sides of the pick-up 10 adjacent the rear end thereof and are secured in adjusted positions as by lock screws 39. Pick-up 10 is free to rock up and down on the screws 11 to compensate for high and low spots on a record and when not in use may be swung back to the inoperative position shown in dotted lines in Figure 2.

A projection 12, on the arm 8, carries a rubber or other bumper or pad 13 for limiting the downward movement of the pick-up, as shown in Figure 2. In that figure the pick-up is shown with its stylus or needle 14 engaging a disc sound record fragmentarily shown at 15 as mounted on any suitable turntable, fragmentarily shown at 16, the turntable being driven by any suitable means not shown. When

the pick-up is thrown back to inoperative position it rests on the arm as shown by the dotted lines in Figure 2.

The arm 6, is hollow and open on its under side as shown in Figure 3. This structure enables the arm to be die cast and provides a structure through which the wires 18 from the pick-up 10 may be easily and quickly threaded. At its forward end, the arm is provided with an opening 17 through which the wires 18 pass.

Approximately midway of the length of the arm a bridge 19 is provided for strengthening the arm and for holding the wires 18 within the arm. This bridge or rib 19 is cast with the arm and is provided with an opening 20 through which wires 18 pass. The rear downturned end of arm 6 is so cast as to provide a passage 21 for the wires 18, this passage continuing through the base or mounting 7.

A web 22 is cast with the rear portion of arm 6 and fixed into, or integral with, the enlarged portion 23 of the web is a pin 24, the pin being located centrally of the downwardly extending rear cylindrical portion of the arm. This pin 24 is used as a pivot for the arm and as a means for connecting the arm to base 7. At its lower end (Figure 4) the pin is grooved as at 25 for a purpose to be described.

The base 7 includes a securing flange 26 having spaced screw openings 27 and an upwardly and inwardly curved cylindrical portion 28. At 29 the base receives the lower portion of arm 6 and the bead 30 of said arm acts as a limiting guard. Three webs are provided in the base 7, one of said webs, 31, being of slightly greater height than the other two webs designated 32.

An enlargement 33 is formed at the juncture of the webs and this enlargement provides a bearing surface against which enlargement 23 engages when the arm and base are assembled. Enlargement 33 is provided with an opening 34 extending through its length for the reception of pin 24. When the base and arm are to be assembled it is but necessary to insert pin 24 through the opening 34 and slip a spring key or securing means 35 over the pin, the intermediate portions 36 of the key engaging in the groove 25 in the pin. In this manner and due to contact between portion 23 and 33 the arm is secured to the base against any movement except a turning movement. Means other than groove 25 and key 35 may of course be used.

Pin 24 fits snugly but easily turnably in the opening 34 and means are provided for limiting the turning movement of the

arm relative to the base. Such means is necessary to prevent the cutting of the wires 18 such as would happen if the arm were given a complete rotary movement on or while connected to the base. There is further necessity for limiting the movement of the pick-up arm on the base in order to prevent damage to a record or to the pick-up when the needle passes the centre of the record and the direction of movement of the record is against the needle instead of from it. In the opposite direction, the limit of movement is necessary to prevent striking the pick-up 10 against the interior of the cabinet.

With this in view, the lower end of the arm 6 is cut away to provide a notch 37 and this notch straddles the higher rib 31 of the base. The arm may be swung about pin 24 as a pivot until either side of the notch 37 is brought into engagement with the rib 31. As clearly shown in Figure 5, the opening through the arm is almost a complete circle and as shown in Figure 6, the opening through the base is substantially a half circle. The notch 37 is a trifle less than a quarter of a circle and it is therefore impossible, when the parts are assembled, to move the arm relative to the base for a sufficient distance to cut the wires 18 or to damage the record or pick-up in the manner previously mentioned.

From the foregoing description, it will be apparent that we have provided a pick-up and support or arm therefor which may be readily and quickly assembled. It is but necessary to adjust the bearing screws 11 to position the pick-up 10. After that the wire is threaded through the arm as already described and the base and arm connected.

In connecting the base and arm, the pin 24 is inserted in opening 34 and the parts pushed together and rotated a short distance relatively until notch 37 receives the upper portion of web 31. When that occurs the pin 34 will be projecting below the part 33 a sufficient distance to permit the key 35 being slid against said part and into position bearing against the adjacent portion of the base to prevent upward movement of the pin and arm, and with its portions 36 in the groove 25 of the pin.

By constructing our pick-up arm in the manner described, that is, hollow for substantially its entire length and open on its under side, we have a structure which lends itself to die casting. This enables cheaper manufacture and yet the appearance of the arm is unimpaired, as is likewise its ability to function. The connection at the front through which the opening 17 is provided and the bridge portion

19 serve to strengthen the arm. Further, this structure provides holding or supporting means for the cable 18, whereby to retain it within the arm.

5 In addition, this hollow construction has the advantage of being light in weight and, therefore, offers little inertia to the lateral movement of the arm which is actuated in this direction by the co-action
10 between the delicately mounted needle and the abrasive surface of the record. Owing to the large opening 21 through the rear end of the arm and through the base, the arm has perfect freedom in a wide lateral motion, and the danger of
15 cutting the cord or cable 18 is avoided.

It is also pointed out that the parts may be easily and quickly assembled and disassembled, and yet they are securely
20 mounted to avoid rattle. This means of connecting the parts also insures that they are in their proper relative positions, since, unless the upper portion of the rib 31 is received in the notch 37, pin 24 will
25 not project sufficiently below the opening 34 to permit the key 35 to be properly positioned.

By our peculiar structure of light weight or small mass of pick-up arm, short swivel, and the horizontal position
30 of the pick-up, we have relieved the delicately mounted armature from stresses tending to impair the motion of the armature in responding to the lateral undulations of the groove corresponding to
35 sound waves. This stylus in connection with the armature has two forces acting upon it; one, the result of the spiral groove in motion impelling the entire mass of pick-up and pick-up arm from periphery to centre. This force has no relation to sound reproduction; the other, the
40 result of the undulations in the side walls which correspond to the sound waves. When the stylus and armature may
45 respond without restraint to these sound wave undulations, the reproduction approaches most nearly the original. This ideal motion of the stylus and armature, however, is somewhat impaired by
50 the force mentioned above which is the result of the spiral impelling the pick-up toward the centre. The greater the mass or inertia of the pick-up and pick-up arm, the greater will be the impairment of
55 sound reproduction due to the interference with the vibrations of the stylus and armature in response to the sound wave undulations at either wall of the groove. We have, by our structure, reduced the
60 amount of this interference to a minimum.

There is a decided advantage in having a short swivel for the pick-up 10. When
65 the pick-up swivels vertically about a

point at the rear end of its supporting arm, the weight to be moved includes a considerable part of the arm and the inertia is correspondingly large. Not only does this necessitate considerable tension in the armature but its flexibility is impaired
70 and response is sluggish. In the present invention, by light mounting and a shorter swivel for vertical movement, we are enabled to maintain lively response
75 with light tension in the armature, while the reduction of weight borne by the record reduces unnecessary wear and undesirable surface scratch and noise.

We are aware that it was proposed prior to the date of this Application to pivot a
80 pick up between the branches of a horizontally swinging forked arm in such a manner that the pivotal axis of the pick up passes through the body of the latter to give it partial equilibrium about that
85 axis, and such is not claimed per se herein.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that we make
90 no claim herein to anything claimed in our prior Patents Nos. 300,704 and 298,685 but what we claim is:—

1. A support for an electrical sound-reproducing device comprising a forked arm mounted for rotation about a vertical axis and adapted to carry internally wire leads or like connections
95 between the pick-up and other parts of the apparatus, with means by which the pick-up or reproducing device may be mounted bodily between the arms of the fork for movement in a vertical plane.
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2. A support as claimed in Claim 1 wherein said arm is mounted upon a base, the arm having a notch on its lower end adapted to co-operate with a projection on said base whereby to limit movement of the arm relatively to the base.
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3. A support as claimed in Claim 1 or 2 and mounted upon a base, a pin carried by one of the parts adapted to be received within an opening carried by the other of said parts whereby the arm is pivotally
115 mounted upon the base.

4. A support as claimed in Claim 3 wherein the pin is carried by said arm and is adapted to project through and beyond an opening in said base, means being provided for engaging the lower end of the pin to retain the parts in assembled relation.
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5. A support as claimed in Claim 4 wherein said means comprises a spring member having arms adapted to cooperate with a groove on the projecting portion of said pin.

6. A supporting arm adapted for use in

with an electrical sound-reproducing device as claimed in any preceding claim, said arm being substantially hollow and open on its under side.

- 5 7. A supporting arm as claimed in Claim 6, said arm being an integral die cast structure and comprising a substantially horizontal and substantially vertical portion, and being hollow and
10 open on its under side as regards the horizontal portion, and having an opening through said vertical portion registering with the opening in the horizontal portion.

- 15 8. A supporting arm as claimed in

Claim 7 mounted upon a base, said base having an opening therein which together with openings in the substantially vertical portion and in a web or webs in the substantially horizontal portion are
20 adapted to receive and support a wire associated with an electrical sound-reproducer and retain it within the hollow portion of said arm.

9. A supporting arm substantially as
25 described or as illustrated in the accompanying drawings.

Dated this 26th day of January, 1929.
MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]

