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Lee

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[54] **DEVICE FOR REMOVING DUST FROM A GRAMOPHONE RECORD**

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[52] **U.S. Cl.** **274/47**

[51] **Int. Cl.** **G11b 3/58**

[58] **Field of Search** 274/47

[56] **References Cited**

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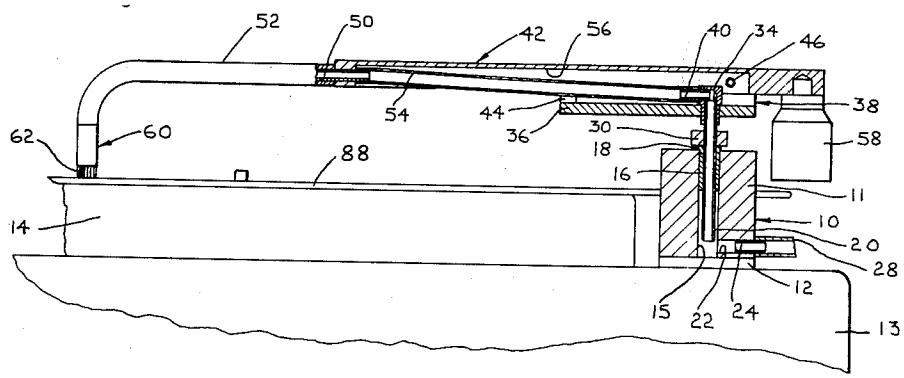
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[57] **ABSTRACT**

A device for removing dust from a gramophone record during the playing thereof includes a support which is arranged to be attached to the fixed base of a turntable of a record playing apparatus, and a brush which is arranged to track across the upper surface of a record mounted on the turntable, the fibres of the brush engaging in the record groove. The brush is provided on a pick-up nozzle which forms one end of an air duct means mounted on the support, the other end of the air duct means being connected in operation to a vacuum pump.

8 Claims, 3 Drawing Figures



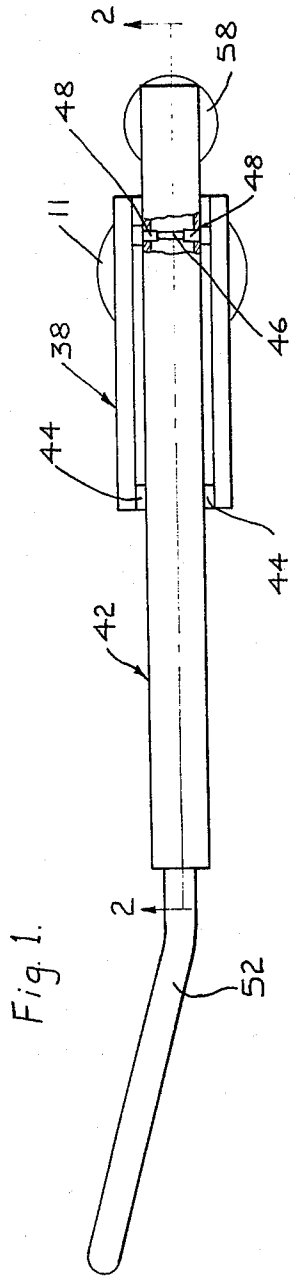

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Fig. 1.

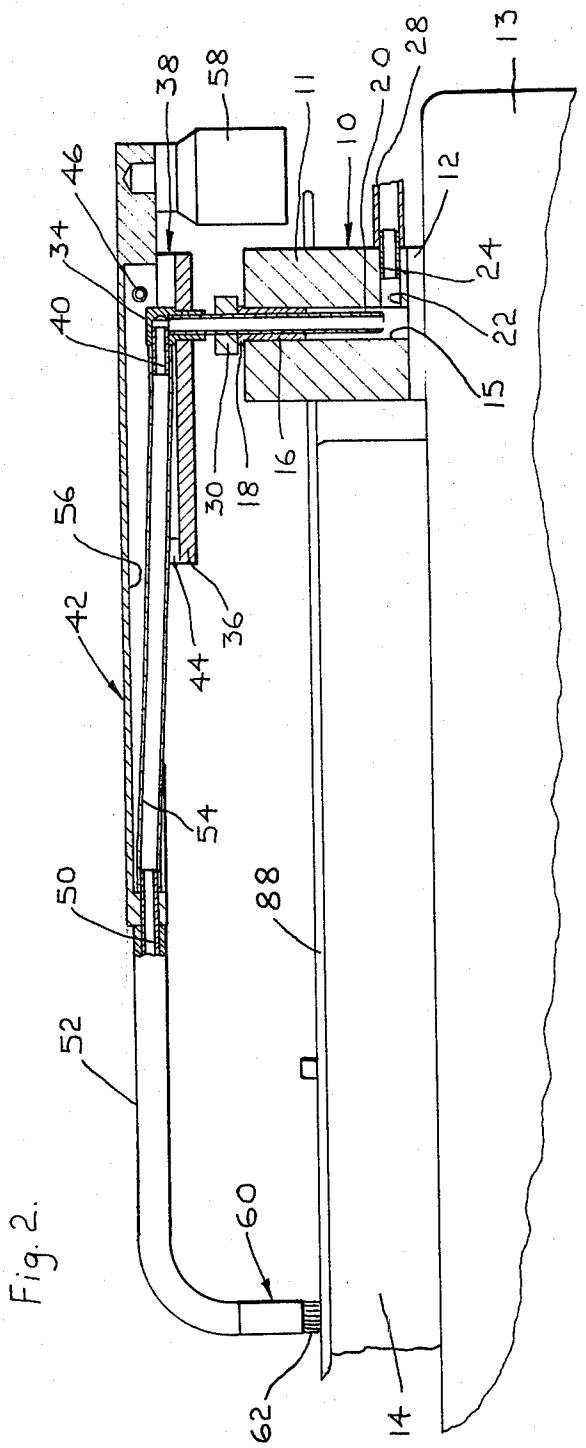
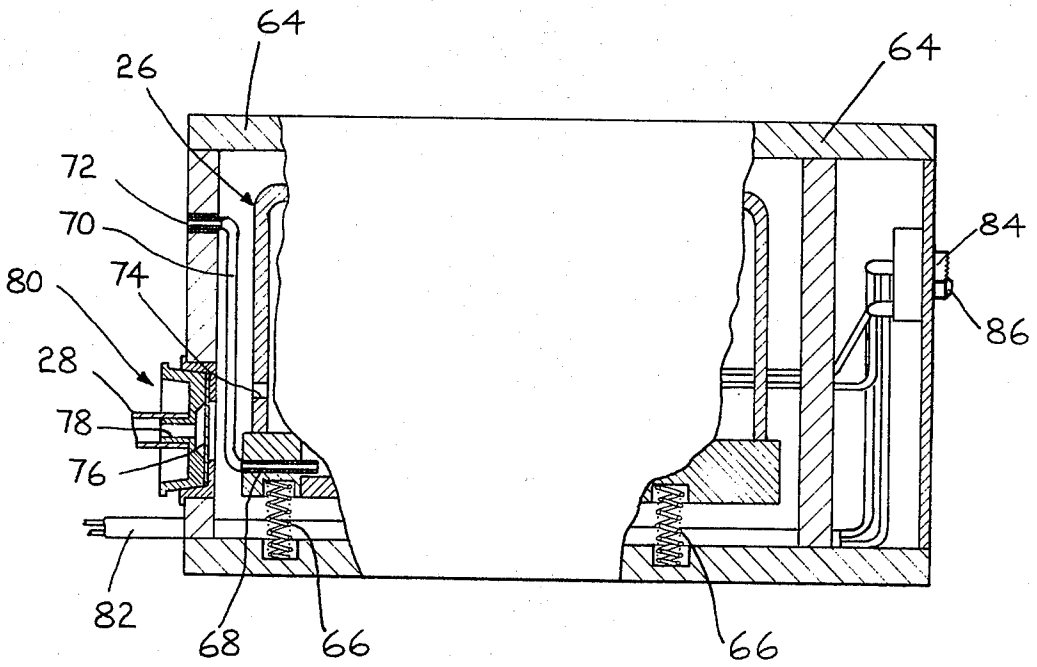

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Fig. 2.

Fig. 3



DEVICE FOR REMOVING DUST FROM A GRAMOPHONE RECORD

BACKGROUND OF THE INVENTION

In order to obtain high quality reproduction from a gramophone record, care must be taken in cleaning the record so at to remove as far as possible all dust which has accumulated on the playing surface during storage and handling of the record. The present invention relates to a device for removing dust from the playing surface of a gramophone record during the actual playing thereof.

A known device for removing dust from a gramophone record includes a brush mounted on the end of an arm similar to a gramophone pick-up arm, the arm being pivotally mounted on a support which is arranged to be attached to the fixed base of a turntable of a record playing apparatus. The brush is arranged to rest on a record to be played, and as the record is played the brush tracks across the record by virtue of the fibres of the brush engaging in the record groove. One of the problems experienced with this known device is that the pressure needed to be exerted by the brush on the record in order to achieve satisfactory cleaning thereof is such as to bring about a significant slowing down of the record, with a consequent adverse effect on the quality of reproduction.

SUMMARY OF THE INVENTION

The present invention relates to a device for removing dust from a gramophone record during the actual playing thereof, the device including a brush provided on a pick-up nozzle which brush is arranged to track in operation across the upper surface of the record. The pick-up nozzle forms one end of an air duct means mounted on support means which is adapted for attachment to the turntable base of the reproduction apparatus for the record, the other end of the air duct means being connected in operation to a vacuum pump.

In one embodiment of the invention, the air duct means includes a tubular shaft which is rotatably mounted in said support means, and further includes a flexible tube which is disposed between the pick-up nozzle and the tubular shaft. The flexible tube is at least partly housed in an arm member which is pivotally mounted on a support member secured to the tubular shaft, the axis about which the arm member pivots being substantially perpendicular to the axis about which the tubular shaft rotates. With this embodiment, the weight of the device supported by the gramophone record is only about 0.5 gram, compared with about 3 to 5 grams with known devices. As a result, it has been found that the present device slows a record down by only about a quarter or third as much as a known device. Moreover, in view of the lower force exerted by the brush on the record, very fine fibres may be used for the brush of the present device, which enables more effective engagement in the record groove and thereby more efficient cleaning. It has also been found that by applying suitable sound-proofing techniques to the vacuum pump, e.g. by mounting it in a sound-attenuating enclosure, the pump is sufficiently quiet as to be unnoticeable in operation of the device.

In line with the above discussion, the principal object of the present invention is to provide a device for removing dust from a gramophone record during the playing thereof which does not bring about any significant slowing down of the record.

Another object of the present invention is to provide a device for removing dust from a gramophone record by means of a brush having very fine hairs which make more effective engagement in the record groove, and thereby effect more efficient cleaning, compared with known brush devices.

Additional features and advantages of the present invention will become apparent and fully understood from a reading of the following description taken together with the annexed drawings, in which:

FIG. 1 is a plan view of a dust removing device in accordance with the present invention;

FIG. 2 is a part sectional side elevational view showing the dust removing device of FIG. 1 mounted on a record playing apparatus, the section being taken along the line 2—2 in FIG. 1; and

FIG. 3 is a part sectional, side elevational view showing a vacuum pump mounted in a sound attenuating cabinet, for use with the dust removing device of FIGS. 1 and 2. Referring to FIGS. 1 and 2 of the drawings, the dust removing device includes support means **10** incorporating a cylindrical metal member **11** having a permanently magnetized base **12** adapted to be attached by magnetic attraction to a fixed ferromagnetic base **13** of a turntable **14** of a gramophone record playing apparatus. It should be understood that other means of attachment to the turntable base **13**, such as for example a self-adhesive pad, could be used instead of the magnetized base **12**. The member **11** is provided with a vertically extending bore **15**, in the upper end of which is inserted a vertically extending bush **16** of polytetrafluoroethylene (PTFE), the upper end of bush **16** being provided with a circumferential flange **18** which abuts against the upper surface of the cylindrical member **11**. A stainless steel tubular shaft **20** is rotatably mounted in the bush **16**. The lower end of the tubular shaft **20** communicates with a horizontally extending bore **22** formed in the lower part of the cylindrical member **11**. A metal connector tube **24** is mounted in the bore **22**, one end of the tube **24** projecting outside the cylindrical member **11** and being adapted to be connected in operation to an electromagnetically operated vacuum pump **26** (FIG. 3) by means of a rubber tube **28**. An adjustable collar **30** of plastics material fits tightly around, but is slidable relative to, a portion of the tubular shaft **20** projecting above the support means **10**. The collar **30** grips the tubular shaft **20** with the lower surface of the collar **30** bearing against the circumferential shoulder **18** of the bush **16**. It should be understood that the collar **30** serves both as a low friction bearing for the tubular shaft **20**, permitting rotation of the latter relative to the support means **10**, and also as a means for adjusting the height of the shaft **20** relative to the support means **10**.

The upper part of the tubular shaft **20** passes through, and is secured by means of a connector member **34** to, the base **36** of a horizontally extending metal channel member **38**. The upper end of the shaft **20** communicates via the connector member **34** with a short, horizontally extending connector tube **40** mounted within the channel member **38**. A generally horizontally extending, rigid arm member **42** of plastics material is pivotably mounted on the channel member **38** so as to extend along, and project beyond both ends of, the channel member **38**. Two resilient stop mem-

bers 44 are secured to the base of the channel member 38. The members 44 provide a cushioned support for arm member 42 when the dust removing device is removed from the record playing apparatus, the members 44 being respectively adapted to engage with the lower side edges of the arm member 42 and thereby prevent those edges from hitting the base of the metal channel number 38. The arm member 42 is pivotably mounted on the channel member 38 by means of a horizontal stainless steel pin 46 which extends between the sides of the channel member 38; two PTFE bushes 48 which are inserted in cylindrical recesses in the arm member 42 and which are rotatably mounted on the pin 46 serve as bearing means for the arm member 42. One end of the arm member 42 is secured by means of a connector tube 50 to one end of an aluminium tube 52 which is bent in such a manner that the end remote from the arm member 42 projects generally vertically downwards. The connector tube 50 is connected to the connector tube 40 by means of a flexible tube 54, e.g. of rubber. The flexible tube 54 is partly housed in a recess 56 extending along the major part of the length of the arm member 42. A stainless steel counterweight 58 is secured to the lower surface of that end of the arm member 42 remote from the aluminium tube 52.

A nozzle member 60 of plastics material is secured to the downwardly projecting end of the aluminium tube 52. The nozzle member 60 is provided with a brush 62 formed by nylon fibres secured to and projecting downwardly from the nozzle member 60, the fibres being disposed round the whole circumference of the nozzle member. The fibres have a diameter of approximately 0.025 millimetre.

Referring now to FIG. 3, the vacuum pump 26 is of the reciprocating type and of conventional design and is enclosed in a wooden cabinet 64, the pump 26 being resiliently mounted on springs 66. The cabinet 64 serves to attenuate the noise of the pump 26 in operation and is designed so that the pump 26 is inaudible at a distance of two metres from the cabinet 64. The outlet 68 of the pump 26 is connected by means of a flexible tube 70 to an outlet tube 72 extending through the wall of the cabinet 64. An inlet orifice 74 in the wall of the pump 26 communicates with the interior of the cabinet 64 which in turn communicates via an air filter 76 with an orifice 78 in an inlet means 80 mounted in the wall of the cabinet 64. The orifice 78 is adapted to be connected in operation via the flexible tube 28 to the connector tube 24 of the dust removing device shown in FIGS. 1 and 2.

The pump assembly is provided with an electrical supply lead 82, an on-off switch 84, and an indicator lamp 86 for indicating when electrical power is being supplied to the pump 26.

It should be understood that a vacuum pump of the centrifugal fan type could be used instead of the reciprocating type pump 26.

In operation of the dust remover device, the support means 10 is attached by means of its magnetic base 12 to the base 13 of the turntable 14 of the gramophone record playing apparatus, a record 88 to be played and cleaned being in position on the turntable 14. The mode of attachment of the dust remover device to the record playing apparatus is such that the nozzle member 60 is disposed immediately above the record 88 with the brush 62 lightly resting thereon. The brush 62 is movable across the upper surface of the record 88, from the periphery of the record to the centre thereof, by virtue of the rotational mounting of the stainless steel tubular shaft 20 in the support means 10. Further, by virtue of the pivotable mounting of the arm member 42 in the channel member 38, the nozzle member 60 is free to move in operation in a generally vertical direction and can thereby follow any slight undulatory movement of the upper surface of the record 88.

Prior to the record 88 being played, the nozzle member 60 is positioned adjacent the periphery of the record, and the vacuum pump 26 is switched on. During the playing of the record 88, the nozzle member 60 tracks across the record towards the centre therof by virtue of the fibres of the brush 62 engaging in the groove in the upper surface of the record, and in the course of such tracking movement the upper surface of the record 88 is cleaned by the brush 62 and by the vacuum pump 26 sucking dust from this surface via the flexible tube 28 and connector tube 24 and the air duct means formed by the nozzle member 60, the aluminium tube 52, the connector tube 50, the flexible tube 54, the connector tube 40, the stainless steel tubular shaft 20, and the connector member 34.

The apparatus enables the accomplishment of the objects and advantages mentioned above, but variations of the embodiment of the invention disclosed herein may occur to those skilled in the art. It is contemplated that all such variations, not departing from the spirit and scope of the invention hereof, are to be construed in accordance with the following claims.

What is claimed is:

1. A device independent of a tone arm for removing the dust from a gramophone record during the playing thereof, said device comprising a support means adapted to have its bottom removably attached to a reproduction apparatus for the record, a downwardly directed dust pick-up nozzle, a brush mounted on the end of said nozzle, which brush is arranged to bear in operation against the upper surface of the record to support the nozzle, means for creating a vacuum, air duct means extending from said pick-up nozzle into and through said support means and thence from above the bottom of the support means to the vacuum creating means so as not to interfere with the removable attachment of the device to the reproduction apparatus, said air duct means being mounted on said support means in such a manner as to permit movement of said pick-up nozzle across the upper surface of the record while the nozzle is being supported by the brush, and the fibres of said brush being of such cross-section that in operation of said device the tips thereof engage in the groove of the upper surface of the record and thereby bring about tracking movement of said pick-up nozzle across the record as the record is played, said vacuum creating means serving during such tracking movement to suck dust from said surface of the record via said air duct means.

2. A device according to claim 1, in which said air duct means includes a tubular shaft which is rotatably mounted in said support means, and a flexible tube which forms part of said air duct means between said pick-up nozzle and the tubular shaft, said flexible tube being at least partly housed in an arm member which is pivotally mounted on a support member secured to the tubular shaft, the axis about which the arm member pivots being substantially perpendicular to the axis about which the tubular shaft rotates.

3. A device according to claim 2, including an adjustable collar which tightly surrounds, but is slidable along, the tubular shaft, the collar bearing against said support means and serving as a bearing for the tubular shaft, permitting rotational movement of the shaft relative to said support means, and also as a means for adjusting the position of the tubular shaft relative to said support means.

4. A device according to claim 1, in which said support means has a permanently magnetized base.

5. A device according to claim 1, in which the fibres of said brush have a diameter of approximately 0.025 millimetre.

6. The combination of a device according to claim 1, in which the vacuum creating means is a vacuum pump, and in which the air duct means includes a flexible tube.

7. The combination according to claim 6, in which the vacuum pump is mounted in an enclosure adapted to attenuate the noise of the pump in operation.

8. The combination according to claim 7, in which the vacuum pump is resiliently mounted in said enclosure on spring means.

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