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THREAD REMOVING AND DISK CLEANING MECHANISM

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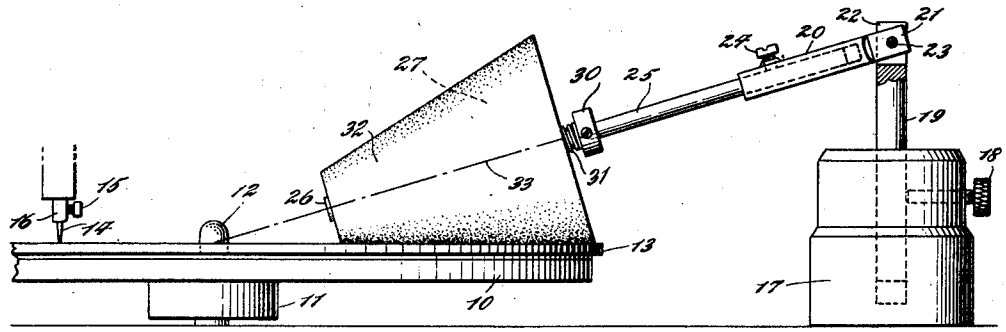


Fig. 1.

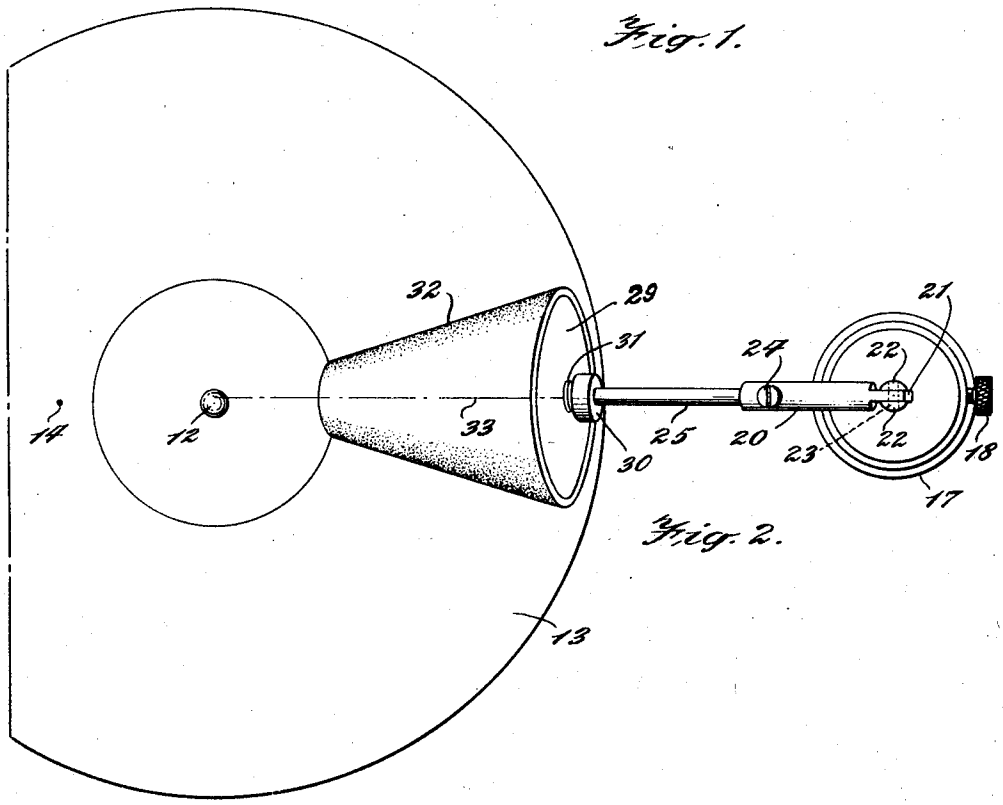


Fig. 2.

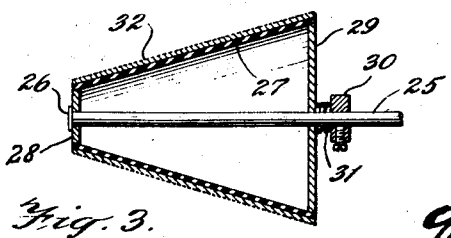


Fig. 3.

INVENTORS

Gabriel Weiss

Leo Frank

BY

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THREAD REMOVING AND DISK CLEANING MECHANISM

Gerhart Weiss and Len Frank, New York, N. Y.

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12 Claims. (Cl. 15—97)

The present invention relates to cleaning devices for disks, and more particularly to mechanism for removing the threads and chips from recording blanks during the process of cutting the same and also for cleaning the said recordings and the copies thereof in ordinary use.

It is the general object of the invention to provide a simple and inexpensive mechanism which can remove threads, chips, dust and the like from disks and records without damage to the surface thereof.

During the cutting of records there are usually formed long threads of the removed material and likewise smaller chips of such material. It is important to prevent these threads and chips from returning to the needle because accumulation thereof at the needle will interfere with the proper cutting of the record and cause imperfections in the cutting, such as scratches, jumps, and the like, and may even injure the needle itself.

It is accordingly one of the major objects of the present invention to provide mechanism which will automatically remove the threads and chips as they are formed, such mechanism including a rotatable roller which picks up the threads and chips from the surface of the record, and which is so disposed and constructed that the threads wind themselves around the surface of the roller as they meet the latter.

It is a specific object of the invention to provide a cleaning mechanism having a roller or brush so constructed and arranged as to be driven by the disk or record itself. More particularly, it is one of the objects of the invention to provide a mechanism which is capable of utilizing the electric charge generated on the threads or chips as they are cut by the needle during the grooving of a record, and also the static electricity developed on the surface of the roller by frictional forces, for causing adherence of such threads and chips to the roller surface, the electrostatic forces thus acting to effect a large part of the thread removing and disk-cleaning operation. Heavy pressure of the cleaning roller against the surface of the disk or record is thus rendered unnecessary, and possible scratching or marring of the disk surface of the latter thereby reduced to a minimum.

It is a further object of the invention so to construct the cleaning roller or brush that, if desired, its surface speed at any point is substantially the same as the surface speed of the disk or record at the corresponding point so that there is substantially no relative movement between the roller and disk along the points of contact except for a selected, slight speed differential which may be produced at will in a manner described hereinafter.

It is a further object of the invention to provide a cleaning and thread removing mechanism which requires no inter-gearing with the driving mechanism of the turntable for the record or disk and which need not form any permanent part of the record cutting mechanism or of the reproducing phonograph, but can be easily placed into operative position with but the simplest of manipulation and can be as easily removed therefrom.

Other objects of the invention will appear as the description thereof proceeds, and the features of novelty will be set forth in the appended claims.

The accompanying drawing illustrates a satisfactory embodiment of the invention, but the same is to be understood as being presented solely by way of example, and not as indicating the scope of the invention. In said drawing,

Fig. 1 is a side elevation showing our improved cleaning and thread-removing mechanism in operative position for removing the threads and chips formed during the cutting of a record;

Fig. 2 shows a plan view of the arrangement shown in Fig. 1, while

Fig. 3 shows a section through the cleaning roller.

Referring to the drawing, the numeral **10** represents a turntable of known construction resting upon a support **11** which is rigid with and driven by a shaft **12** extending above the turntable **10** and serving to center a disk or record **13**, all as well understood in the art. The shaft **12** is driven in the usual manner by a constant speed motor (not shown). At **14** there is shown a cutting needle clamped by a screw **15** within a holder **16** and controlled in known manner to cut a spiral groove upon the surface of the record **13**. During this cutting operation, there are produced long thin threads of wax or resin (or of any other material of which the surface of the record is composed) and also smaller particles or chips, and it is the function of the mechanism about to be described to remove these threads and chips from the surface of the record as soon as they reach the roller to prevent their returning to the needle and interfering with the operation of the latter, and thereby prevent injury to the record or to the needle or both.

The cleaning and thread removing mechanism of the present invention comprises a relatively heavy base **17** whose weight is sufficient to prevent its being displaced or rotated by the action of the disk or record on the cleaning roller, which will shortly be described. Adjustably mounted within the base **17**, and held in fixed position by a set screw **18** is a standard **19**, to whose upper end is pivoted a sleeve member **20**, the latter having a reduced end portion **21** received by the spaced ears **22** at the upper end of the standard **19**, a pivot pin **23** passing through

the inter-fitted parts. Secured within the sleeve 20 and fixed therein by a set screw 24 is a rod 25 having an enlarged end or collar 26. A cleaning roller 27, in the form of a frustum of a cone, is mounted upon the free end of the rod 25, the smaller end of the roller bearing against the enlarged end or collar 26 of the rod 25. The roller is of hollow construction as is shown in Fig. 3, and is mounted loosely upon the rod 25 so as to be capable of rotating freely thereon. The roller consists of a conical portion indicated at 27 and of the circular end plates 28 and 29. To prevent creeping of the roller upon the shaft 25, there is provided upon the latter an adjustable and removable collar 30, and if desired there may be arranged a light spring 31 between the collar and the end wall 29 of the roller.

The roller is provided with a surface 32 of mohair cloth, felt, silk, soft cotton, or any other suitable material, preferably electrically non-conducting, capable of holding particles of wax or resin, dust, and the like, either solely by mechanical action or by electrostatic action or both. If desired, a brush with very fine, thickly mounted hairs can be employed. In general we prefer to employ a surface for the roller which has the capacity for causing the threads, chips and other particles to adhere thereto by mechanical action, even though the generated static electricity may be sufficient of itself to cause adherence to the roller.

The roller itself may be made of wood, molded resin or other plastic parts, and the like, and should in general be made as light as possible in order not to place any undue load on the operating mechanism for the record. It may be made also of light metal, in which case care should preferably be taken to insulate the surface covering of the roller from the metal to enable static electricity to collect on such covering. If desired, the rod 25 may itself be made of non-metallic material, for example, Bakelite or other resin.

One of the important features of the present invention resides in the configuration of the roller 27. As already indicated, this roller is conical in shape, and in its preferred form, the angularity of the roller is so determined that when its axis is disposed in a vertical plane passing through the center of the record, the axis of the roller, represented by the line 33, passes through such center of the record at the surface of the latter. In other words, the apex or vertex of the cone is then located at the center of the record or turntable. The cone is a right angular cone, i. e., a cone of revolution, and by reason of the structural feature just described, the radii of the larger and smaller ends of the cone (which includes the surface covering) bear the same proportion to each other as the radii of the circular zones on the record contacted by the outer and inner ends of the cone. In the position of the roller just described, therefore, there is substantially no relative movement between the cone and record at any point along the line of contact therebetween.

The operation of the mechanism will be clear from the foregoing, but may be briefly set forth as follows. The base 17 is positioned at a suitable distance from the record and turntable and the roller 17 is then lowered gently into position upon the record with its axis lying approximately, or if desired exactly, within a radial plane. As the roller engages the surface of the record, it is driven by the record itself. As the needle 14 continues to cut the record groove, the chips or threads are picked up by the roller as they pass beneath it and wind themselves about the surface of the roller. By reason of the frictional engagement between the record and roller, and by reason of the electric charge on the cut threads resulting from the cutting, and further because of the nature of the material of which the record and roller surface are composed, electrostatic forces are developed which act to attract the particles to the roller surface, and with the mechanical holding action exerted by the threads or hairs on the roller surface, the threads and particles adhere firmly to the roller surface. Particles will adhere to the roller even if they contact only an already attracted particle, with the result that the record is quickly and efficiently cleaned without the necessity for exerting any considerable wiping pressure thereon. No damage to the surface of the record can therefore result, and there will likewise be no interference with the cutting of the record, and hence no breaks or jumps in the recording. Since the roller at any particular point on its surface has approximately the same surface speed as the corresponding point on the record, there is substantially no relative movement between the roller and record, so that the roller does not wipe the collected particles against the record surface.

It is sometimes desirable to produce a slight drag between the roller and record so as to obtain an increased degree of frictional wiping action. To accomplish this, the axis of the roller is placed slightly to one side of the center of the record when viewed in plan. As shown in Fig. 2, the roller may be slightly advanced with reference to the clockwise rotation of the record. If desired, of course, the roller may be placed in a slightly retarded position with reference to the direction of rotation of the record.

The length of the roller is preferably made to correspond to the cut or active surface of the record. Thus, in the case of a twelve inch record, assuming the center of name plate to be about four inches in diameter, the length of the roller will be about 4 inches; and in the case of a sixteen inch disk, the length of the roller will be approximately six inches. On the other hand, for a ten inch record, the roller will be about three inches long. Different size rollers can be mounted upon the standard 17 by means of the sleeve 20 and set screw 24. However, one size of roller can be used for all records, a long roller being permitted to extend beyond the periphery of a small record, while a short roller is moved radially inward as the cutting of a large record proceeds.

Where, because of the material of which the roller is constituted, it bears too heavily upon the record, the reduced end 21 of the sleeve 20 can be extended upon the side of the fulcrum pin 23 opposite the sleeve 20 and provided thereon with a counterweight which may be made adjustable so as to adjust the pressure of the roller upon the record. As the construction of an adjustable (i. e., slidable) counter-weight is per se well known, it has not been thought necessary to illustrate it.

From the above, it will be seen that we have provided a simple and efficient cleaning and thread removing device for records and the like, which is driven only by frictional contact with the records. While we do not wish to be understood as being committed to this theory, it is our belief that this frictional contact creates electro-

static forces which assist very materially in the removal of threads and smaller particles from the surface of the record and in causing them to cling to the roller, the longer threads becoming wound around the roller as soon as they reach the latter. After the cleaning operation is completed, the cleaning mechanism can be removed without the necessity for disconnecting any parts.

While we have described our preferred cleaning device in connection with the cutting of the grooves of a record, it will be obvious that the device can be employed equally well for the cleaning of records in the home (where the reproducing needle digs the caked dust particles out of the grooves), particularly as the mounting of the cleaning mechanism requires no manipulative skill whatever. After the cleaning of a record or a number of records, the brush can itself be readily freed from adhering particles, and is then ready for re-use.

While we prefer that the cone have the angularity above described, it will be obvious that the advantages of our conical construction, such as the feature that substantially the same relative speeds between roller and record exist along the whole line of contact therebetween, can be secured in large degree if the angularity of the cone varies somewhat from that which is characterized by the intersection of the axis of the cone with the center of the record when such axis lies in operative position in a radial plane.

Other variations from the specific form of the invention illustrated may be resorted to within the scope of the appended claims without departing from the spirit of the invention.

We claim:

1. Cleaning apparatus for records and the like, comprising a base adapted to be positioned adjacent to a turntable upon which a record is supported, a conical cleaning roller adapted to be placed upon the record to be driven directly thereby, and means pivotally connecting said roller to said base, said base being capable of resisting the force exerted by the record on the roller.

2. Cleaning apparatus for records and the like, comprising a base adapted to be positioned adjacent to a turntable upon which a record is supported, a conical cleaning roller adapted to be placed upon the record to be driven directly thereby, the angularity of the cone being such that when the roller rests upon the record, the axis of the cone passes through the center of the record, and means pivotally connecting said roller to said base, said base being capable of resisting the force exerted by the record on the roller.

3. Cleaning apparatus as set forth in claim 2, wherein the surface of the roller is constituted of a fibrous, nonconducting surface, whereby static electricity collects thereupon as a result of frictional contact with the record surface.

4. Cleaning apparatus for records and the like, comprising a base adapted to be positioned adjacent to a turntable upon which a record is supported, a rod pivotally connected at one end to the base, and a conical cleaning roller rotatably mounted upon said rod and adapted to be lowered into frictional engagement with the record upon the turntable, the angularity of the roller being such that when the roller rests in its operative position upon the record, the axis of the roller passes through the center of the record.

5. Cleaning apparatus as set forth in claim 4, wherein the surface of the cleaning roller is constituted of a non-conducting, fibrous material, and wherein the roller is made of electrically non-conducting material, whereby the static electricity generated by the frictional contact between the roller and the record collects upon the surface of the record.

6. Cleaning apparatus for records and the like, comprising a base adapted to be positioned to one side of a turntable upon which the record is supported, a rod pivotally supported upon the base, and a conical roller loosely mounted upon the rod and adapted to be positioned upon the record to be driven thereby; the radii of the ends of the cone bearing substantially the same ratio as the radii of the zones on the record contacted by the respective cone ends.

7. Cleaning apparatus as set forth in claim 6, including an adjustable collar on the rod adjacent to the large end of the cone, and a spring bearing against the collar and against the large end of the cone.

8. Cleaning apparatus as set forth in claim 6, wherein the surface of the cone is provided with a layer of mohair and wherein the conical surface and the end plates of the cone are made of an electrically non-conducting material.

9. The combination with a turntable for a record or the like, of a base positioned to one side of the turntable, a rod connected to the base, and a conical roller rotatably mounted upon the rod, said roller resting directly upon the surface of the record with its axis to one side of the center of the record.

10. The combination as set forth in claim 9 wherein the radii of the end plates of the roller bear approximately the same ratio as do the radii of the zones of the record contacted by the end portions of the roller.

11. Cleaning apparatus for records and the like, comprising a base adapted to be positioned to one side of a turntable upon which the record is supported, a sleeve member pivotally supported at one end upon the base, a rod adjustably connected to said sleeve, and a conical roller loosely positioned upon the rod and adapted to be positioned upon the record to be driven thereby; the radii of the ends of the cone bearing substantially the same ratio as the radii of the zones on the record contacted by the respective cone ends.

12. Cleaning apparatus for records and the like, comprising a base including a vertically adjustable standard and adapted to be positioned to one side of a turntable upon which the record is supported, a sleeve member pivotally mounted upon the upper end of the standard, a rod connected to said sleeve, and a conical roller loosely positioned upon the rod and adapted to be positioned upon the record to be driven thereby; the radii of the ends of the cone bearing substantially the same ratio as the radii of the zones on the record contacted by the respective cone ends; the connection between the rod and the sleeve being adjustable for positioning the roller properly upon the record.

GERHART WEISS.
LEN FRANK.