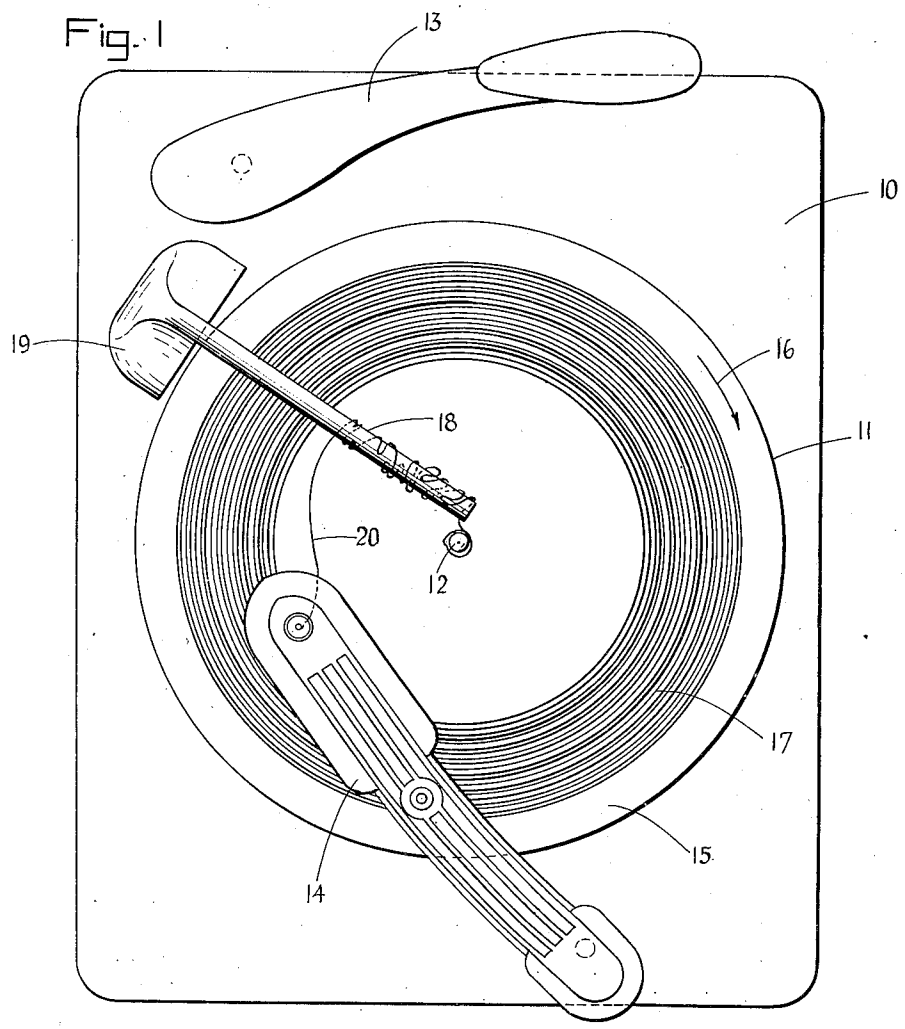
Jan. 11, 1944. L. B. GLASER ET AL 2,338,842

PHONOGRAPH RECORDING

Filed May 28, 1941

Fig. 1



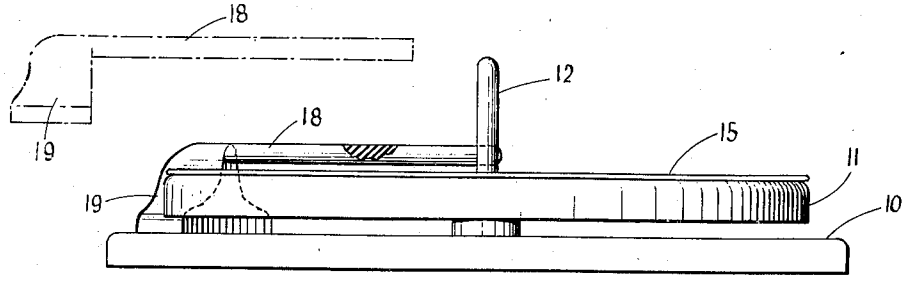




Fig. 2

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Patented Jan. 11, 1944

2,338,842

# UNITED STATES PATENT OFFICE

2,338,842

## PHONOGRAPH RECORDING

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Application May 28, 1941, Serial No. 395,528

6 Claims. (Cl. 274—47)

This invention relates to phonograph recording and particularly to the stripping or removing of the shavings or thread which are cut and severed from the record by the cutting stylus in the recording operation.

The shavings or thread which are cut and severed from the record by the cutting stylus have been a constant source of trouble in professional and home recording of phonograph records. These shavings, in the form of an unbroken thread, are thrown off by the cutting stylus inwardly onto the record surface. The unbroken thread (of substantial tensile strength) as it is cut from the record deposits itself in cumulating concentric rings on the record surface and in doing so attaches itself and tenaciously clings to the face of the record. It often occurs that a section of this thread works itself loose from the record surface and migrates towards the cutting stylus and engages the same, with the result that the thread exerts a pull sufficient to dislodge or move the cutting stylus and its arm from the record, thus causing an interruption or break in the recording operation.

To obviate this encountered difficulty, numerous suggestions have been made and many devices have been used, all designed to remove the shavings or thread from the seat of trouble. In professional recording, a suction device is used to suck up the thread immediately after it is cut, and blower devices have also been employed to blow the thread towards the center of the record before it attaches itself to the record surface. In semi-professional and home recording, the thread is usually brushed towards the center of the record by the operator, various means being employed for this purpose such as felt pads lightly impregnated with oil, metal fixtures lined on their bottoms with felt which rests on the surface of the record during recording, brushes of light texture, or, as it is usually done, by a sweeping motion of the operator's finger. Suction and blower devices are, however, too expensive for home recording purposes. Brushes and equivalent devices are usually only successful on very good recording blanks which have a highly polished low friction surface and are ineffective on recording blanks used in home recording practice. Generally speaking, brush devices are difficult to handle and to operate because the thread clinging to the record surface is difficult to dislodge by brushing practice, and the use of these brushes requires constant attendance on the part of the operator. Furthermore, on recording machines with light power driving mechanisms, the engagement of the turntable by the brushing devices is apt to cause intermittent changes of speed of the turntable, resulting in the faulty reproduction known as "wow."

In order to eliminate this encountered trouble in recording, records are sometimes made by the method of cutting from the inside out instead of from the outside in. Since, due to the construction of the cutting stylus, the shavings are thrown inwardly towards the center of the record and, therefore, towards the already cut section thereof, the trouble is thus largely, but not altogether, avoided if the record is cut from the inside out.

We have discovered that there is generated on or imparted to the thread in the cutting and severance thereof from the record an electrostatic charge, and that it is due to this charge thereon that the thread attaches itself and tenaciously clings to the face of the record resisting efforts to dislodge and remove the same. We have further found that by electrostatically charging a body or an element with a charge opposite to that generated on or imparted to the thread in the cutting operation, and by positioning the thus electrostatically charged body or element above the record, the cut thread is electrostatically attracted to the said charged body and thereby readily releases itself and is removed from the record surface. With the use of such an electrostatically charged element, the thread no longer winds itself cumulatingly in concentric rings on the record surface but is removed therefrom within a cycle of rotation of the record, the thread depositing itself upon and wrapping itself about the charged element, from which it may then be readily stripped or removed. We have found that such an electrostatically charged element completely solves the problem, thus obviating the use of suction, blower or brushing devices. The prime object of our present invention, therefore, relates to the method of stripping the thread from the record based upon these discoveries, and to the device employed in practicing this method.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, the invention further consists in the method and device hereinafter sought to be defined in the claims and described more in detail hereinbelow in connection with the appended drawing, in which:

Fig. 1 is a plan view of a phonograph recording apparatus of the home recording type, showing the invention applied thereto; and

Fig. 2 is a view of the same with certain parts

removed, showing the electrostatically charged body in operative and in displaced positions.

A conventional form of phonograph recording machine (of the home recording type) is illustrated in the drawing. This machine may comprise a support 10, a turntable 11 rotatably mounted thereon and operated by any suitable motive means (not shown) provided with a central metallic record receiving spindle 12, a reproducing unit 13 shown in its inoperative position mounted on said support 10, and a recording or cutting unit 14 also mounted on said support 10 and shown in an operative position. As illustrated in the drawing, the recording or cutting unit 14, which may comprise any conventional cutter arm embodying a cutting stylus, is shown operating upon a record 15 which is moving in the direction indicated by the arrow 16, the record grooves already cut being indicated as 17.

As hereinbefore described, the shavings which are cut and severed from the record by the cutting stylus in producing the record grooves 17, in the form of an unbroken thread, are thrown off by the cutting stylus inwardly on to the record surface and the thread deposits itself in cumulating concentric rings on the record surface as the record is rotated, and in doing so the thread attaches itself clingingly to the face of the record.

We have discovered as aforesaid that there is generated on or imparted to the thread in this cutting and severance thereof from the record, an electrostatic charge and that it is due to this charge that the thread attaches itself to the face of the record resisting efforts to remove the same. We have found that this charge is a positive charge, and that by electrostatically charging a body or an element with an opposite charge, namely, with a negative charge, and by positioning the thus oppositely charged body above the record and at the recording area thereof, the cut thread is electrostatically attracted to the thus charged body and thereby releases itself from the recording surface and is removed therefrom.

This method of electrostatically stripping the thread from the record may be carried out in a variety of ways. We have found one of the simplest ways of accomplishing this is to provide a body which may be separate from the phonograph elements and which may be quickly moved to operative or inoperative position. In its simplest form, such a body may comprise a rod 18 preferably made of a suitable insulating material, on which a negative charge can be created, carried by or if desired made integral with a base support 19. The material of this electrostatically charged element may, for example, be rubber or resin, but we have found that a polished Styrene effectively yields the desired results. The rod 18 and its base support 19 are so constructed that when the base is positioned on the phonograph support 10 the rod 18 is positioned spacedly above the record (for example, about one-quarter of an inch) and extends inwardly in a general radial direction over a substantial part of the recording surface. Preferably the rod 18 is of such a length that its inner end is positionable near the central metal spindle 12 for a purpose to be described. This positioning and arrangement of the electrostatically chargeable element is illustrated in the drawing, in Fig. 2 of which the element 18 is shown both in operative (full line) and in displaced (dot-and-dash line) positions.

When a recording is to be made, the rod element 18 is rubbed with a cloth, such as an ordinary handkerchief, or held against the edge of the turntable and thereby becomes electrostatically charged. It is found that the charge created is sufficient to last for the recording of a complete record. So charged, it is placed in the position shown in Figs. 1 and 2 of the drawing and the cutting or recording of the record is then begun. As the record is cut, the shaving or thread indicated as 20 (see Fig. 1) thrown inwardly by the cutting stylus no longer winds itself cumulatingly in concentric rings clinging to the record surface, but is removed therefrom within a single cycle of rotation of the record, as shown in Fig. 1 of the drawing. As soon as this thread in the rotation of the record approaches and passes under the charged rod 18, it is attracted thereto releasing itself from the record surface and the thread wraps itself about the rod 18 depositing itself completely thereon. As soon as a part of this thread now on the charged rod reaches the central spindle 12 and becomes engaged thereby, the thread winds itself about the spindle 12 in the rotation of the latter, as shown in Fig. 1 of the drawing, and in doing so is stripped or removed from the rod 18. As the operation continues, both of these actions take place, namely, the attraction of the thread to and the wrapping of this thread about the charged rod 18, and the stripping of the same from the rod by the rotating spindle 12. The recording of the entire record may be accomplished without any further attendance to the behavior of the cut thread, since it is stripped or removed from the record as it is produced.

This method may manifestly be carried out in a variety of ways. Instead of providing a separate chargeable element and arranging the same as above described, the chargeable element may obviously be attached as by means of a clip to the cutter arm, moving therewith over the recording area. While it is most convenient to use an insulating material for the chargeable element, it is apparent that metallic bodies may be used similarly located or positioned as described, and that such metallic bodies could be continuously supplied with a charge by frictional means operated by the rotation of the turntable. The device illustrated in the drawings, because of its simplicity and easy handling, is one of the preferred means for carrying out the method of the invention.

The method of the present invention, the means employed therewith and the results and advantages produced thereby will, in the main, be fully apparent from the above detailed description thereof. By means of this method the shavings or thread are readily released and removed from the record, completely solving the problem and thus eliminating the need of suction, blower or brush devices. We have found that brush contacting means such as is disclosed in our co-pending application Serial No. 395,529, filed May 28, 1941, may also be employed in applying the new discoveries, but the method of the present invention is preferred because of the inductive action of the means employed, permitting the chargeable element to be spaced above the record without contacting the same and thus without any possibility of marring the surface of the record or affecting the speed of the turntable. The brush contacting means of our co-pending appli-

cation is in essence an electrical brush means, and although it engages the record surface, does not act as a brush in the mechanical sense and does not materially mar the record or interfere with the record operation.

It will be apparent that changes may be made in the carrying out of the method and in the means employed therefor, without departing from the essence of the invention defined in the following claims.

We claim:

1. The method in phonograph recording of stripping the thread cut from the record by the cutting stylus which consists in electrostatically charging an element with a charge opposite to that imparted to the thread in the cutting and severance thereof from the record and positioning the thus electrostatically charged element above the record, whereby the cut thread is attracted to said electrostatically charged element and removed from the face of the record.

2. The method in phonograph recording of stripping the thread cut from the record by the cutting stylus which consists in electrostatically charging a rod of insulating material with a charge opposite to that imparted to the thread in the cutting and severance thereof from the record, and positioning the said electrostatically charged rod over the record and the recording area thereof, whereby the cut thread is attracted to and deposits itself upon said electrostatically charged rod.

3. The method in phonograph recording of stripping the thread cut from the record by the cutting stylus which consists in electrostatically charging a rod with a charge opposite to that imparted to the thread in the cutting and severance thereof from the record, and positioning the said electrostatically charged rod above the record and generally radially over the recording area thereof with the inner end of the rod near the central metal spindle of the phonograph turntable, whereby the cut thread is attracted to, deposits itself upon said electrostatically charged rod and is stripped therefrom by said central spindle.

4. A device for stripping the thread cut from the record by the cutting stylus in phonograph recording comprising a support and an element thereon electrostatically chargeable with a charge opposite to that imparted to the thread in the cutting thereof from the record, the said electrostatically chargeable element being carried by the support so as to be positionable above the record and the recording area thereof during the recording operation.

5. A device for stripping the thread cut from the record by the cutting stylus in phonograph recording comprising a supporting base and a rod thereon electrostatically chargeable with a charge opposite to that imparted to the thread in the cutting thereof from the record, the said rod being carried by the supporting base and extending therefrom so as to be positionable above the record and generally radially over the recording area thereof during the recording operation.

6. A device for stripping the thread cut from the record by the cutting stylus in phonograph recording comprising a support and rod of an insulating material electrostatically chargeable with a charge opposite to that imparted to the thread in the cutting thereof from the record, the rod being carried by the support and extending therefrom so as to be positionable above the record and over the recording area thereof during the recording operation.

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