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FEED MECHANISM FOR PHONOGRAPH RECORDERS

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FIG. 1

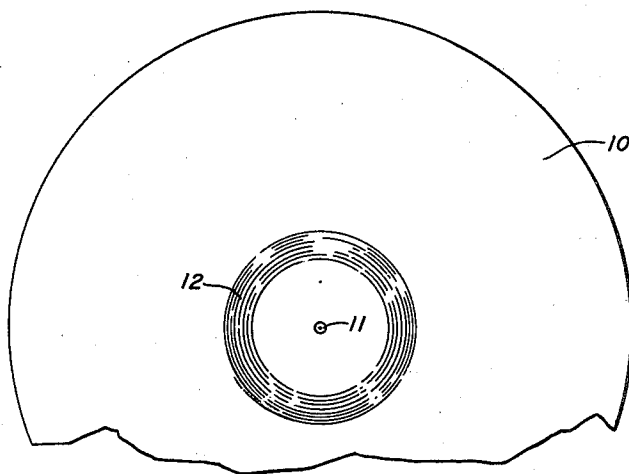


FIG. 2

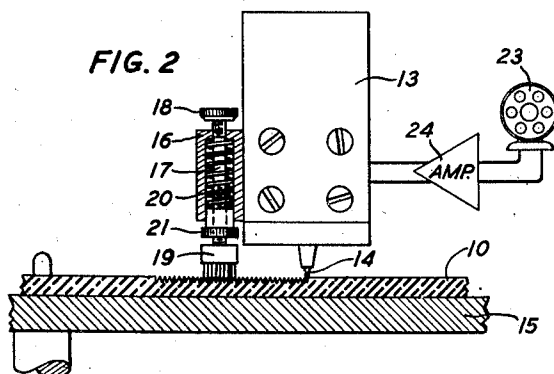
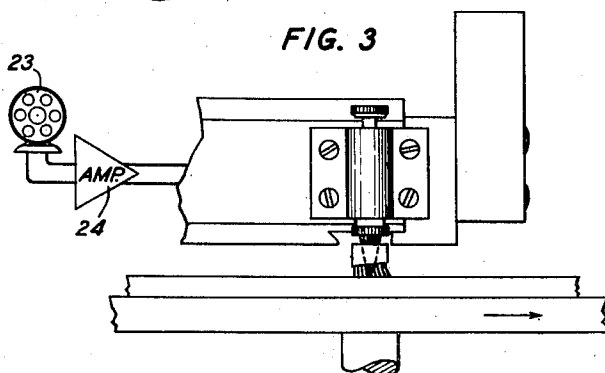


FIG. 3



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FEED MECHANISM FOR PHONOGRAPH
RECORDERS

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Application September 1, 1933, Serial No. 687,739

8 Claims. (Cl. 274-13)

This invention relates to recording phono-
graphs and particularly to the stylus feed
mechanisms thereof.

The chief mechanical distinction between a
recording phonograph and a reproducing phono-
graph is the provision of a recorder feed mech-
anism in the former whereby the recording
stylus is driven evenly across the record blank
to cut a spiral groove in its surface. This feed
mechanism is usually in the form of a lead
screw synchronized with the turntable drive,
and is necessarily complex and expensive.
Unless the mechanism is originally installed in
a phonograph the machine ordinarily can not
be used to record sound. In a number of in-
stances, however, it would be desirable to use
the same machine for both recording and repro-
ducing purposes and if absolute simplicity is not
achieved in the design of the recorder feed
such a combination is not feasible.

A simple form of stylus feed for a recorder
that has been proposed in the past is a pre-
grooved record blank having a plain spiral
groove cut in its surface which is followed by a
recording stylus and modified thereby in accord-
ance with the movement of the stylus. Al-
though this type of blank does eliminate the
usual feed mechanism and thus removes the
mechanical distinction between the recording
and reproducing phonograph it has this dis-
advantage in that the recording action of the
stylus is restricted and influenced by the walls
of the feed groove with a consequent infidelity
of recording. To feed the recorder by means
of a follower and groove concentric with the
record groove, but external to the record to
eliminate this disadvantage requires additional
linkages and mechanisms which are undesirable.

The object of this invention is a means for
feeding a recorder across a record blank which
uses a minimum of mechanisms and does not
cause the recording stylus to operate in pre-
formed grooves.

The theory on which this invention is based
is similar to that underlying the action of a
threading die in cutting a thread. A portion
of the thread is first cut under pressure and
the portion of the thread so formed then be-
comes a guide for the die in cutting the remain-
der of the thread, each fragment of the thread
as it is cut being used to cut an additional new
fragment.

According to this invention, therefore, the
record blank is pregrooved over a small portion
of its margin and this pregrooved portion coats

with a follower rigidly secured to the recorder,
the stylus of which cooperates with the uncut
portion of the blank and as the blank is rotated,
the follower moves across the blank under the
action of the groove already formed and thus
causes the stylus likewise to move, thereby cut-
ting a fresh groove which in turn is used by
the follower to cut additional grooves. This
action is automatic and continues until the
recorder is lifted from the record or the rotation
of the record is stopped.

A preferred form of the invention is illus-
trated in the accompanying drawing in which:

Fig. 1 is a plan view of a record pregrooved
in accordance with this invention;

Fig. 2 is a front elevation of a recorder show-
ing the novel driving means attached thereto;
and,

Fig. 3 is a side elevation of the recorder and
driving means of Fig. 2.

The record blank 10 of Fig. 1 may be either
rigid or flexible, provided, however, that it is
made of a material which is sufficiently tough
to withstand the rubbing action of the novel
driving means without an appreciable change in
the form of its surface, and particularly, in the
form of the groove cut therein. It need not be
a disc, but may take other shapes, such for ex-
ample, as a cylinder. The blank 10 is apertured
at 11 to receive a centering pin in the usual
manner. At the outer margin of the central
portion of the record blank is stamped or other-
wise formed a plain spiral groove 12. The pitch
of the spiral is made the same as the pitch at
which it is desired to record, since it is this
short section of the groove that starts the re-
corder across the remaining portion of the rec-
ord blank and determines the pitch of the groove
to be cut. With the plain groove located as
shown, the recorder is fed from the center out-
ward. This is the preferred location for the
groove because it then occupies a portion of the
blank which is ordinarily useless for recording
purposes and it therefore does not encroach upon
any of the space that can be used for recording
purposes.

The number of turns of the plain groove 12
necessary for the operation of this invention is
determined by the width of the novel driving
member hereinafter described and the distance
between the driving member and the stylus of
the recorder. This is best shown by a reference
to Fig. 2. In this figure, 13 is a phonograph
recorder, preferably of the electrical type, which
is actuated by sound controlled electrical cur-

rents generated in a pick-up 23 and strengthened in amplifier 24. The support for the recorder may be either a sliding carriage or a pivoted arm and since both varieties are well known in the art and are equally effective in the operation of this invention no support is shown. A recording stylus 14 driven by the recorder 13 is shown in the groove of the record blank 10, and for the sake of completeness, a turntable 15 is shown supporting the record blank.

Secured to the side of the recorder 13 is a guide 16 for a vertical pin 17 by virtue of which the pin 17 is free to move vertically, but is restrained horizontally, with respect to the stylus 14. The pin extends above and below the guide 16. At its upper end is a shoulder formed by a knurled nut 18 which limits the downward motion of pin 17. The greater portion of guide 16 is bored to a larger diameter than the diameter of pin 17 to receive the machined shank 25 of an adjusting nut 21 which is threaded over the lower portion of pin 17, and in the space between the pin 17 and guide 16 is a helical spring 20 which serves to maintain a steady downward pressure upon the slidable adjusting nut 21.

At the lower end of pin 17 is secured the principal driving means for the recorder 13. It is comprised of a small brush 19 having an area of approximately one quarter of a square inch in contact with the groove in the record blank 10. The bristles of the brush are of uniformly varying length with an average length of about $\frac{1}{8}$ inch and arranged so that the shortest bristles enter the groove first. This form of brush has been found to produce the least chattering and the most positive driving action. The diameter of the individual bristles is small enough to enable the bristles to enter the groove. The bristles should be softer than the record blank material over which they are rubbed so that the material is not scratched or deformed by the rubbing action. Although the driving force derived from each bristle is small, enough bristles are contained in the brush to provide the requisite driving force for the recorder.

The driving means is shown and described as a brush, but I have found that any fibrous material, such, for example, as felt, with a sufficient area in contact with the groove may be used for this purpose.

From the position of the driving member 19 relative to the stylus 14 it is now apparent that the grooved portion 12 of the record 10 should extend from the stylus 14 to a point just beyond the left hand edge of driving member 19 so that there is a continuous groove under stylus 14 and under the whole of driving member 19.

To maintain a uniform pitch the driving member 19 and the stylus 14 should both lie on, and follow, a common radius of the record blank 10. The space between driving member 19 and the stylus 14 should be as small as possible to lessen the amount of space used for the blank groove 12.

The operation of the device requires no more skill than is necessary to operate an ordinary phonograph. The pregrooved record 10 is placed upon turntable 15 and is centered thereon by slipping centering pin 22 through aperture 11. Next, stylus 14 of recorder 13 is set near the outer edge of the grooved portion 12 which, by virtue of the rigid connection between the stylus and driving member 19, automatically places the latter upon the grooved portion 12 also. The

apparatus is now ready for use and all that is necessary to drive the recorder across the record blank is to rotate the turntable. Before actually recording, however, but while the record blank is rotating, it is advisable to wait until stylus 14 coacts with the uncut portion of the blank 10 so that the stylus cuts or records uninfluenced by any preformed groove. The driving member 19 first coacts with the preformed groove 12, but it soon leaves this groove and enters the groove just cut by the stylus, which continues smoothly from the end of groove 12, and derives its driving force from the walls of the stylus-cut groove just as it did from the walls of the preformed groove. The feeding action then continues as long as the driving member 19 is in contact with the groove and the record blank is rotating. To stop the feeding action it is necessary either to stop the rotation of the record blank or to raise the recorder and the attached driving member 19 from the record blank.

It is apparent to those skilled in the art that this invention is susceptible of many variations and its scope therefore is not to be limited by the illustrative example set forth above, but it is to be defined entirely by the appended claims.

What is claimed is:

1. In combination, a recorder, a rotatable partially grooved record blank and means for using the groove in the record blank to drive the recorder across the remainder of the uncut record blank while the latter is rotating.

2. A rotatable partially pregrooved record blank, a self-feeding recorder comprising a stylus cooperating with the uncut portion of the record blank, and a follower member secured to the stylus and cooperating with the grooved portion of the record blank, whereby the stylus is driven across the record blank by the action of the walls of the groove upon the follower member when the record blank is rotated.

3. A rotatable record blank having less than fifty per cent of the usable surface thereof cut with a plain groove, means engaging the grooved portion of the record blank, a recording stylus connected to said means and cooperating with the uncut portion of the record blank, whereby said means is caused to drive the recording stylus across more than fifty per cent of the surface of the record blank by the action of the walls of the groove upon the means when the record blank is rotated.

4. A rotatable record blank containing a spiral groove of less turns than the number of turns of the proposed recording, a recorder cooperating with the record blank, a feed mechanism for the recorder comprising a multiple stylus member secured to the recorder and cooperating with the grooved portion of the record blank, whereby the recorder is driven uniformly across the surface of the blank when the latter is rotated.

5. A rotatable partially grooved record blank, a recording stylus cooperating with the record blank and means comprising a brush secured to the recording stylus and engaging the grooved portion of the record blank for driving the recorder across the uncut portion of the record blank when said record blank is rotated.

6. A rotatable record blank containing a grooved portion at a margin thereof of less turns than the number of turns of the proposed record-containing portion, a groove recorder

cooperating with the uncut portion of the blank, means for feeding the recorder laterally comprising a pad of fibrous material secured to the recorder and cooperating with the grooved portion of the blank whereby the pad and the recorder are driven uniformly across the record blank when the latter is rotated.

7. A rotatable disc record blank, a groove on the record blank located at a portion of the blank normally unused for recording because of the low linear velocity obtaining thereat, a follower engaging the groove, a recorder cooperating with the uncut portion of the record blank and means for securing the follower to the recorder whereby the recorder is driven across the record blank when the latter is rotated.

8. In combination a recording stylus, a disc record blank, means for rotating the record blank and means for driving the stylus across the surface of the blank, said means comprising a brush secured to the stylus and adapted to move perpendicularly to the record blank surface to follow undulations therein, a spiral groove located within the normally unused central portion of the record blank and of a sufficient number of turns to cause it to extend continuously under the stylus and brush and spring means for maintaining contact between the brush and groove when the stylus coacts with the record blank, whereby the walls of the groove are used to feed the brush and stylus laterally.

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55	130
60	135
65	140
70	145
75	150