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E. W. GENT

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PHONOGRAPH RECORDING MACHINE

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FIG. 1

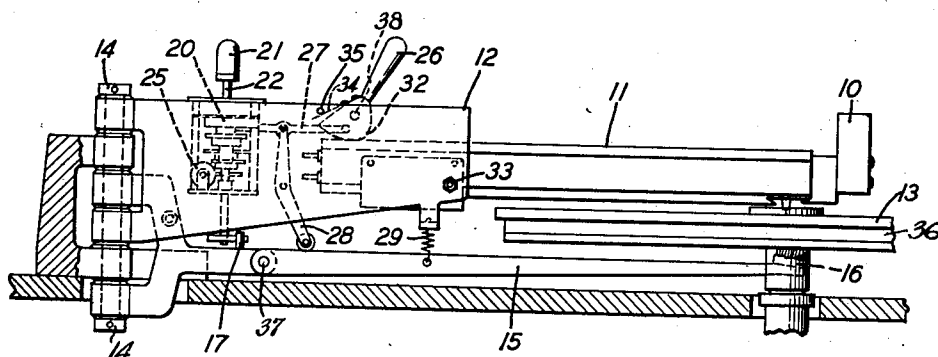


FIG. 2

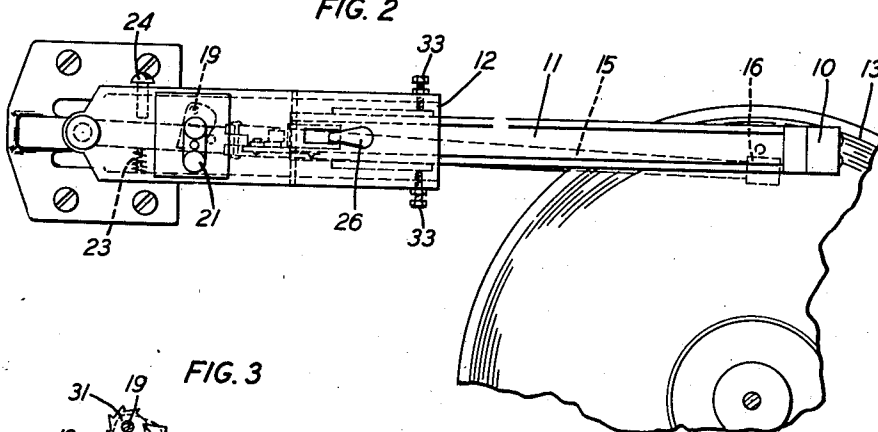


FIG. 3

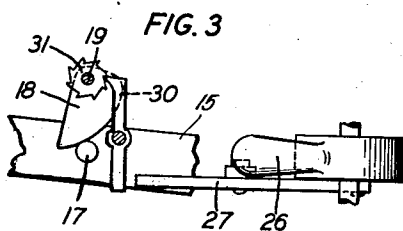
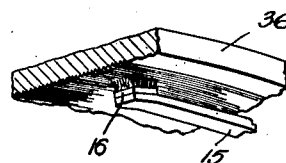


FIG. 4



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PHONOGRAPH RECORDING MACHINE

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6 Claims. (Cl. 274—13)

This invention relates to phonograph recording machines and particularly to those using the pivoted type of recorder, that is, the type wherein the recorder is mounted upon a pivoted arm which is slowly rotated simultaneously with the record blank to form a spiral groove thereon.

In playing a record it is desirable to place the reproducing needle in the proper groove on the record as quickly as possible and without omitting any of the recorded matter. The most convenient way of accomplishing this is by making the first few grooves of greater pitch than is normally required for recording so that they will be readily visible and accessible. By this means the reproducing needle can be set down over a relatively large area and still find its way quickly into the proper groove. The difficulty in this method arises in forming a large pitch initial groove in the record. Ordinarily this requires the equivalent of two or more recorder feed mechanisms which are almost duplicates, with special mechanisms for linking them together to make the transition from one to the other smooth and gradual.

The object of this invention is to provide a simple recorder feed mechanism which is capable of imparting to the recorder a gradually diminishing initial velocity which becomes constant at the velocity for recording sound.

In its general form this invention comprises a recorder mounted on a movable support and driven through an intermediate member by a device moving at constant speed, the intermediate member being capable of giving the effect of expanding or contracting so that the distance between the recorder support and driving device can be varied at the beginning of each recording thereby providing a means for changing the initial pitch of the grooves of a record.

In the accompanying drawing which illustrates a preferred form of the invention,

Fig. 1 is a plan view of a recorder arm and drive of the pivoted type with the rapid spiral forming mechanism incorporated thereon;

Fig. 2 is a corresponding elevation of the recorder arm, drive and spiral forming mechanism;

Fig. 3 is an enlarged view of the releasing device for the mechanism; and

Fig. 4 is an enlarged perspective of the feed mechanism for the recorder arm.

Referring to the drawing, 10 is a recorder of any suitable construction mounted on a short arm 11 which is pivotally mounted on arm 12 to permit the recorder to be raised or lowered with respect to the record blank 13. The arm 12 is

pivoted for horizontal motion at 14. About the same pivot 14 is rotatably mounted a driving arm 15 at the free end of which is located a means for imparting uniform angular velocity to the arm. In the present invention this means comprises a brush 16 adapted to engage a plain spiral groove engraved in the underside of the record blank support 36. The individual bristles of the brush enter the groove and are driven laterally by its walls at a speed determined by its pitch. The recorder is therefore made to cut a similar groove in the record blank.

The driving force is transmitted to the recorder 10 through pin 17 on the brush arm 15 cooperating with cam 18 which is secured to arm 12. The principal function of the cam 18, however, is not merely to drive the recorder arm 12 but to vary the distance between its axis of rotation 19 and pin 17 at a predetermined rate thereby imparting to the recorder arm 12 an additional angular velocity greater than that available in brush arm 15. This additional angular velocity is utilized in forming the rapid spiral groove.

In order to drive the cam 18 a spring 20 is used. The spring is wound by means of handles 21 secured to shaft 22 which is geared to cam 18 so that the handles and cam rotate together. The details of the gearing are not shown but they may be obtained from U. S. Patent No. 1,155,640 to G. Brown dated October 5, 1915. A spring 23 insures constant contact between pin 17 and cam 18 and thus the recorder arm 12 is returned to its starting position relative to the driving arm 15 when the cam is rotated. A stop 24 on the recorder arm 12 prevents the cam from rotating too far when the cam is forming the starting spiral and the governor 25 regulates the angular velocity of the cam.

In order to record, the turntable 36 is rotated, the feed mechanism is started and the recorder is lowered on to the record blank. For the purpose of this invention, any constant speed turntable drive can be used and hence for the sake of simplicity none is shown. To start the feed mechanism, however, brush 16 must be raised and for this purpose a lever 26 is provided. This lever, through link 27 and toggle 28, releases driving arm 15 which is thereby rotated about pivot 37 by the action of spring 29 until the brush 16 engages the feed grooves underneath turntable 36. Toggle 28 cooperates with a pawl 30, which is actuated by the same motion of the lever 26, and releases a ratchet 31 to permit the rapid spiral forming mechanism to begin operating. Simultaneously, with the release of ratchet 31,

recorder 10 is lowered by the action of cam 32 which forms a part of lever 26. The arm 11 supporting the recorder is pivoted at 33 and is maintained in contact with cam 32 by means of its unbalanced weight so that as lever 26 is actuated and the cam is rotated, the arm moves with it thereby permitting recorder 10 to be lowered on to the record blank. The lever 26 is provided with a leaf spring 34 to allow the recorder to move vertically under impulses imparted to it by any undulations in the record surface, and a stop 35 to prevent the recorder from being lowered too far. The spring 34 acts as a shock absorbing medium between vertically immovable in 35 and vertically pivoted arm 34 which contacts cam 32 eccentrically to its center of rotation 38 and tends to rotate it clockwise against the pressure of spring 34.

To operate the recorder the spring 20 is wound by turning the handles 21 clockwise until cam 18 permits arm 15 to strike stop 24. This requires about a quarter turn of the shaft 19. As shown in the drawing, the direction of the recorder feed is from the edge of the record to the center and the recorder is accordingly swung over towards the edge of the record preparatory to cutting a groove. Next, lever 26 is pushed to the right until the recorder arm begins to move laterally, indicating that brush 16 is in contact with its feed groove. Lever 26 is then moved a little more slowly in the same direction until the stylus of the recorder strikes the record blank, at which point the rapid spiral mechanism is automatically released and the stylus is seen to move quite rapidly for a short time and then to slow down to a constant recording speed. At this point, the sound controlled electrical currents to be recorded can be sent through the recorder and the feed mechanism operated as usual until the record is finished.

If it is desired to record a number of individual recordings on the same blank it is possible by means of this invention to provide each recording with a rapid spiral starting groove. All that is required is the winding of the spring 20 and the setting of the stylus over the desired starting point of the recording. Upon advancing lever 26 as before, the same cycle of events occurs and the groove is again formed. The feed mechanism shown is particularly well adapted to provide a starting groove at any point on the record blank because of the large number of bristles in contact with the feed groove. Other feed mechanisms, such as gear and sector mechanisms can also be used, but these do not provide as large a range of possible starting points because of the relatively small number of teeth usually employed in such devices.

It will be noted that the transition from the spring drive to the ordinary feed is controlled by the contour of cam 18 and can be made as gradual as desired merely by suitably shaping the cam. This is a very desirable feature since, by its use, shocks to the recorder stylus due to the cessation of the rapid spiral forming mechanism are minimized and hence extraneous noises are eliminated from the record.

What is claimed is:

1. In a recording machine, a record blank, a

rotatable support therefor, a recorder adapted to cooperate with the record blank, a pivoted support for the recorder, driving means for the recorder comprising a driving arm rotatable at a substantially uniform rate about the axis of rotation of the recorder support, and means for rotating the recorder support relative to the driving arm, whereby the recorder is caused to move across the record at a decreasing rate of speed which becomes constant when the speed of the driving arm is reached.

2. A phonograph recorder comprising a turntable, means for rotating the turntable, a record blank mounted on the turntable, a recorder adapted to cooperate with the record blank, a pivoted support for the recorder and driving means for the support, whereby the recorder is fed across the record blank to form a groove therein having a coarse starting pitch changing gradually into a fine recording pitch, said driving means comprising a plurality of driving mechanisms each adapted to impart a different motion to the recorder.

3. Driving means for a recorder comprising two arms pivoted about substantially the same axis, one of said arms comprising the support for the recorder, means between the arms for producing relative motion therebetween, means for driving the free arm at a uniform rate, a release mechanism for initiating the operation of the first mentioned means simultaneously with the second mentioned means whereby the recorder will be caused to move at a relatively high speed which gradually diminishes until the uniform speed of the second driving means is reached.

4. Driving means as in claim 3, the means between the arms for producing relative motion therebetween being a cam and a follower.

5. A phonograph recorder comprising a record blank, a turntable therefor, a recorder adapted to cooperate with the record blank, a pivoted supporting arm for the recorder; driving means for the recorder comprising a grooved disc concentric with and secured to the turntable, a brush member cooperating with the groove disc and secured to an arm pivoted about the same axis as the recorder support, and means for transmitting the motion of the driving arm to the recording arm, said means comprising a plate cam driven from a spring on the recorder arm and a follower on the driving arm, whereby the speed of the arm is augmented according to the shape of the cam, and unitary means for initiating the motion of the driving arm, the recorder arm and cam.

6. In a recording machine a record blank, a rotatable support therefor, a recorder adapted to cooperate with the record blank, a pivoted support for the recorder, driving means for the recorder comprising a driving arm rotatable at a substantially uniform rate, and means for rotating the recorder support relative to the driving arm whereby the recorder is caused to move across the recorder blank at different speeds.

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