Aug. 18, 1942. F. RIEBER 2,293,220

STYLUS HEAD MOUNTING

Filed Aug. 2, 1941

Fig. 4

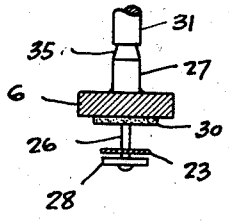



Fig. 1

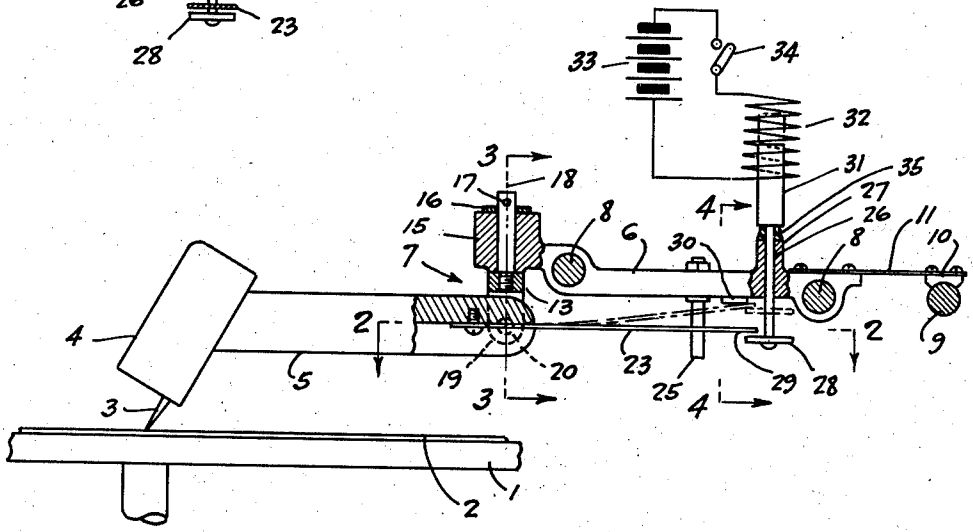



Fig. 3

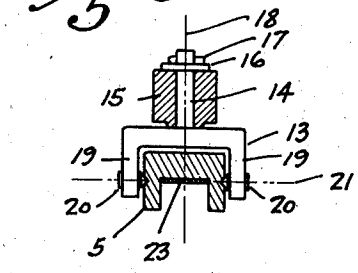
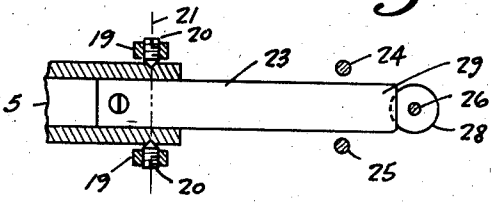



Fig. 2




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## STYLUS HEAD MOUNTING

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11 Claims. (Cl. 274—1)

In commercial recording machines, such as used for making records of dictation, air craft communications, and the like, it is frequently necessary to play back or reproduce some or all of the material just recorded. For this purpose, such machines are often equipped with a single head carrying a record engaging stylus, which by appropriate switching of the amplifier connections can be caused optionally to act as a recorder in response to modulations received from a microphone or to operate as a reproducer, to affect a speaker in response to undulations of a record.

When making a record, the stylus forms the record groove and hence must be positively advanced across the record surface in exact accordance with the movement of the feed mechanism. In reproducing a record, however, while it is still desirable to positively advance the stylus over the record, a limited freedom of movement between the feed mechanism and the stylus is required, in order that the stylus be permitted accurately to follow the record grooves. Such freedom of movement is conveniently termed "lateral compliance."

Further, it is obviously necessary that the stylus exert a considerable pressure on the record when cutting or embossing a record; but when playing back a previously made record, the pressure should be quite light.

It is an object of this invention to provide an improved mechanism for changing the condition of a stylus head to prevent or to allow such freedom or lateral compliance.

It is another object of this invention to provide improved mechanism for altering the pressure exerted by the stylus on the record.

Devices for locking such heads against lateral compliance usually involve some sort of a constraint against motion of the head about an axis; as for example a centering arrangement, such as a pin seating in a V-notch. The stylus is correspondingly forced into a definite position with respect to the feed mechanism, and is maintained in that position while the constraint is effective. Nevertheless, after the record groove is provided with the undulations forming the record, the position of the stylus under the constraint is apt to be slightly incorrect for the reproducing position. This may be due to a slight eccentricity of the groove, or other causes. Therefore the operation of locking will almost certainly cause a slight lateral movement of the stylus on the record. Since record grooves are commonly spaced in the neighborhood of 150 per inch, it will be readily apparent that even a very slight movement will be sufficient to injure the groove, and the movement may easily be sufficient to cause the stylus to cross from one groove to the adjoining groove and permanently injure the record.

It is accordingly another object of the invention to provide mechanism of the character described which will lock the head against lateral compliance without causing any lateral movement of the head.

It is still another object of this invention to provide mechanism of the character described of increased simplicity and ease of operation.

This invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown a form in the drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

In the drawing:

Figure 1 is an elevation in a generally schematic form illustrating the invention; and

Figs. 2, 3 and 4 are sectional views as taken on the correspondingly numbered planes of Fig. 1.

A phonograph turntable is indicated by 1, and may be of any well known or preferred type, serving to carry a record 2. Although a disc form of record is shown, the mechanism about to be described is equally applicable to a cylindrical record, or a record in the form of a loop.

The stylus 3 which cooperates with the record surface is shown, for example, as carried by an electrical type stylus head 4. This head is of a type which will function either as a recorder or a reproducer, suitable circuits being provided by means of which it may be optionally connected to a microphone or a speaker through a suitable amplifier. Such heads and circuits are well known to those skilled in the art, and accordingly will not be further described.

The head 4 is mounted on a short arm 5 which is attached to a carriage 6 by a pivoted connection 7. Carriage 6 may be supported for movement parallel with the surface of record 2 by spaced parallel rods 8 suitably supported as on the frame of the phonograph (not shown). The carriage 6 is caused to travel along rods 8 and thus traverse the record by means of a feed screw

9, engaged by a frictional nut 10 mounted on carriage 6 by a resilient arm 11.

The feed screw 9 is rotated at a definite angular velocity with regard to the angular motion of the turntable by appropriate mechanism (not shown). Thus the stylus follows a spiral track extending between the periphery of the record and a point near the center of the record.

The pivoted connection 7 (shown most clearly in Fig. 3) includes a clevis 13 with a shank 14 supported in a suitable bore in a boss 15 on the carriage 6 by a washer 16 and a pin 17 on top of the boss. Accordingly clevis 13 is rotatable about an axis 18 normal to the surface of the record 2. In the legs 19 of clevis 13 are alined pivot points 20 engaging opposite sides of arms 5. The axis 21 of pivots 20 is substantially parallel to the record surface. Pivots 20 may conveniently be hardened cone pointed screws.

When head 4 is functioning as a reproducer, the stylus 3 must follow the spiral groove on the record surface. Since the position of this groove may not at all times coincide with the position of the stylus as determined by movement of carriage 6 in response to feed screw 9, the head 4 must have some freedom of motion laterally of the record with respect to the carriage. This so called "lateral compliance" is provided by slight angular movement of head 4, arm 5 and clevis 13 about axis 18. Similarly stylus 3 must be free to follow undulations of the record surface in a generally vertical direction; such movement is permitted head 4 and arm 5 with respect to clevis 13 and carriage 6 about axis 21. Stylus 3 is thus enabled to follow all deviations of the record groove without undue wear or damage to the groove. At the same time, the advance of carriage 6 carrying the head 4 relieves this groove of the necessity of moving any substantial mass.

When head 4 is acting as a recorder, the stylus 3 is called upon to form the spiral groove in response to the advance of carriage 6, hence no "lateral compliance" or movement of head 4 about axis 18 can be tolerated. However, since now the stylus 3 should be urged against the record 2, axis 21 must still be active to provide a fulcrum about which a force may be transmitted to push the stylus downwardly. Further, an increase in the pressure of stylus 13 (supplemental to gravity) against the record 2 is required.

For the purpose of thus altering the operating conditions of the head 4, a spring finger 23 is secured on arm 5, extending away from the head and beyond the axis 21. This finger 23 is without effect when the head is reproducing other than to restrict the lateral freedom of movement to a reasonable amount. Thus, pins 24 and 25 extend downwardly from carriage 6, a short distance on opposite sides respectively of finger 23. These pins by engaging one side or the other of finger 23 serve to limit the movement of the finger, arm 5 and head 4, when for example the head 4 is lifted manually about axis 21 to remove and replace a record on the turntable 1.

A plunger 26 is slidably mounted for vertical movement on carriage 6 in boss 27 and carries an abutment 28 at its lower end, adapted to engage the free end 29 of finger 23 when the plunger 26 is raised. When the plunger 26 is in its lower position abutment 28 is entirely clear of finger 23. When the plunger 26 is raised, abutment 28 engages end 29 of finger 23, and flexes the finger 23 until end 29 engages a friction pad 30 of fibre or felt or the like on carriage 6 as shown in broken lines, Fig. 1.

Means are provided for causing plunger 26 to urge the extremity 29 of finger 23 against pad 30 with sufficient force to maintain arm 5 and connected parts against movement about axis 18 in response to forces incident to recording. Thus head 4 is moved accurately by carriage 6, stylus 3 forming the record groove. At the same time, the upward flexing of finger 23 exerts a downward force on head 4, and augments the pressure exerted by stylus 3 on the record.

It will be noted that the surfaces of pad 30 and finger 23 which contact are plane, thus the force urging them together has no tendency whatever to move the finger, arm 5 and head 4 laterally of the record, about axis 18.

One mechanism for moving plunger 26 and spring finger 23 upwardly and maintaining the latter in engagement with pad 30 may comprise electromagnetic means. Thus, plunger 26 carries a core 31, of magnetic material, on its upper end. Core 31 cooperates with a solenoid, diagrammatically shown at 32, adapted to be energized from any convenient source, such as battery 33, controlled by a manually operable switch 34.

When it is desired to use stylus head 4 for reproducing, switch 34 is allowed to remain open, deenergizing coil 32. Plunger 26 will then remain in its lower position, without affecting spring finger 23. When it is desired to record, switch 34 is closed, energizing coil 32 which causes plunger 26 to rise to its upper position, flexing spring finger 23 and urging it against pad 30. This locks the head 4 against lateral compliance and increases the pressure of stylus 3 on the record. It is to be understood that on occasions when it is necessary to lift the stylus out of engagement with the record, upon replacing it on the record, the head should be positioned so that finger 23 is approximately intermediate the pins 24 and 25.

In order to prevent any slight blow or shock to the head 4 when the plunger 26 is allowed to drop to its lower position, a resilient ring or bumper 35 formed of rubber for example may be provided on boss 27 to act as a stop for core 31.

What is claimed is:

1. A stylus head, arranged to cooperate with a record, a carriage arranged to move the head transversely of the record, means forming a pivotal support for the head on the carriage, said support permitting movement of the head to or from the record surface, a spring finger attached to the head and having a free end, a plunger carried by the carriage and optionally movable with respect thereto, said plunger being adapted upon movement to engage the free end of the spring finger, flexing the spring and urging the head about said pivotal support.

2. A stylus head, arranged to cooperate with a record, a carriage arranged to move the head transversely of the record, means forming a pivotal support for the head on the carriage, said support having a pair of pivotal connections, said connections having axes respectively parallel with and transverse to the record surface, means for urging said support toward the record surface comprising a spring finger on said head, means on the carriage for optionally flexing the finger, and means on the carriage adapted to be engaged by the finger when flexed to prevent lateral movement of the head with respect to the carriage.

3. In a stylus head mounting, a carriage arranged to move transversely of the record surface, means connecting the head for movement

with the carriage comprising means whereby the head may have limited lateral movement with respect to the carriage, as well as movement to and from the record surface, means to secure the head against lateral movement with respect to the carriage comprising a resilient member attached to the head, a friction pad on the carriage, and means to flex said member and urge it into engagement with said pad, said member being so arranged that the flexing urges the head toward the record surface.

4. In a stylus head mounting, a carriage arranged to move transversely of the record surface, means for supporting the head on the carriage including a pivotal connection about which the head may move transversely of the record, and means to restrain said head against movement about said pivot, comprising a resilient member attached to the head, a friction pad on the carriage, and means for urging said member into engagement with the pad.

5. In a stylus head mounting, a carriage arranged to move transversely of the record surface, means for supporting the head on the carriage including a pivotal connection about which the head may move transversely of the record, and means to secure said head against movement about said pivot, said means serving to secure said head in a lateral position as determined solely by the engagement of the stylus with the record.

6. A stylus head for cooperation with a record, a carriage arranged for movement transversely of the record, said head being pivotally carried by the carriage whereby the head may move independently of the carriage, a spring finger attached to the head and arranged to affect the movement of the head with respect to the carriage when flexed, and means for flexing said finger, said means including a plunger on the carriage and electromagnetic means for moving said plunger.

7. In a stylus head mounting, an arm to which the head is attached, a pivotal support for the arm, said support being so arranged that the head can move toward or away from the record surface, a leaf spring secured at one end on said arm and extending in a generally radial direction from the arm with respect to said pivot, and means for flexing said spring to cause it to exert a force urging said arm about its pivot.

8. In a mounting for a stylus head, said stylus head being arranged for cooperation with a record surface, a carriage arranged for movement transversely of the record surface, and a support on the carriage for the head, permitting universal movement of the head with respect to the carriage, said support comprising a pair of pivotal connections, the axes of said connections being normal with respect to each other.

9. In a stylus head structure adapted to operate optionally as a recorder head or as a reproducer head, a movable carriage upon which the head is supported, means for providing lateral compliance for the head with respect to the carriage, and means for optionally restraining the head against lateral movement, comprising a pair of members respectively carried by the head and by the carriage and having cooperating frictional surfaces, said surfaces being capable of operative engagement for any position of the head with respect to the carriage, within the limits of movement permitted by said lateral compliance, and means to bring said surfaces into engagement.

10. In a stylus head structure adapted to operate optionally as a recorder head or as a reproducer head, a movable carriage upon which the head is supported, means for providing lateral compliance for the head with respect to the carriage, and means for optionally restraining the head against lateral movement, comprising a pair of members respectively carried by the head and by the carriage and having cooperating frictional surfaces, one of said members being resilient and capable of exerting a pressure on the head when the surfaces are in frictional engagement, and means to bring said surfaces into engagement.

11. In a stylus head structure adapted to operate optionally as a recorder head or as a reproducer head, a movable carriage upon which the head is supported, means for providing lateral compliance for the head with respect to the carriage, and means for optionally restraining the head against lateral movement, comprising a pair of members respectively carried by the head and by the carriage and having cooperating frictional surfaces, one of said members being resilient and capable of exerting a pressure on the head when the surfaces are in frictional engagement, said surfaces being such as to permit operative engagement for any position of the head with respect to the carriage, within the limits of movement permitted by said lateral compliance, and means to bring said surfaces into engagement.

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