Feb. 27, 1951 D. F. BALMER ET AL 2,543,655

RECORDING PICKUP HAVING TORSION RODS

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Fig. 1

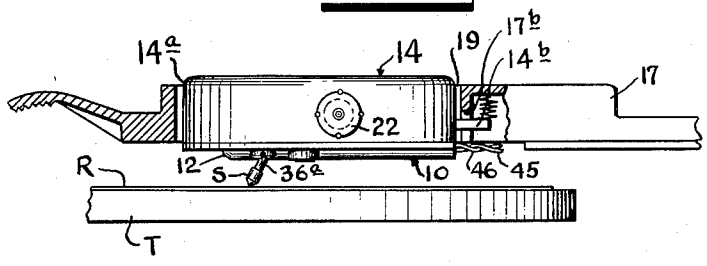


Fig. 2

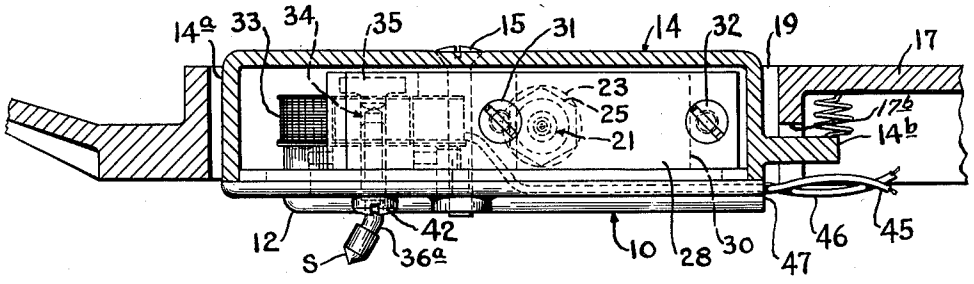
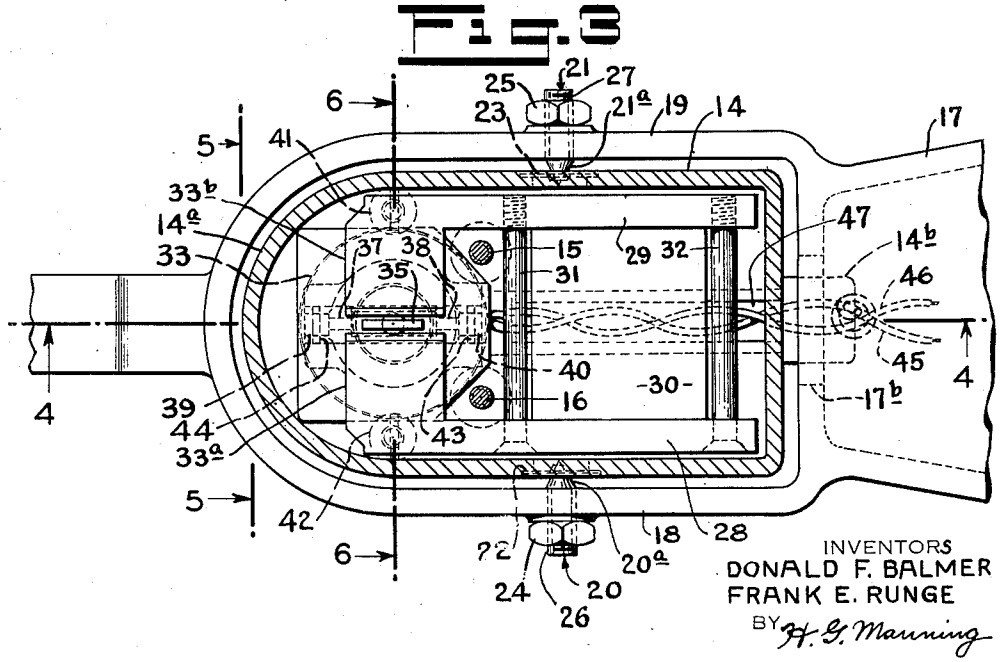


Fig. 3



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Fig. 4

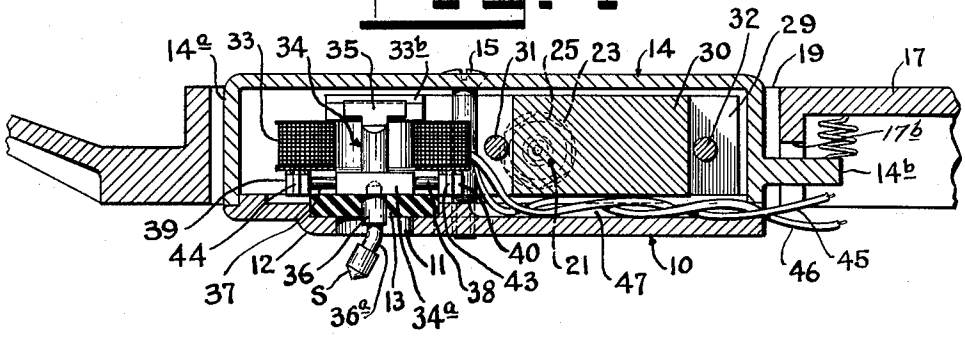


Fig. 5

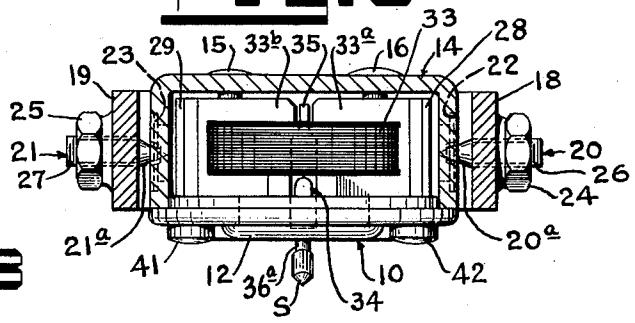


Fig. 8

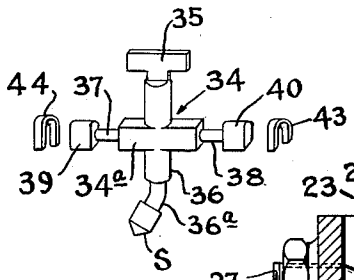


Fig. 6

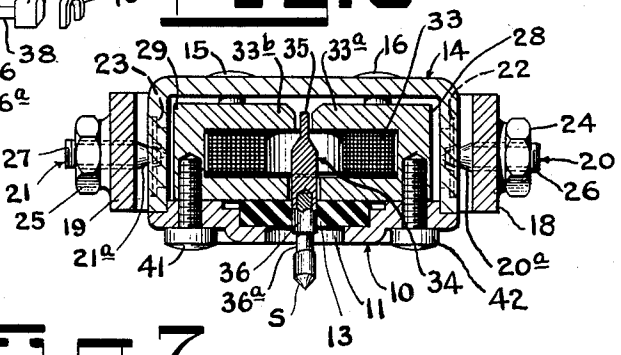
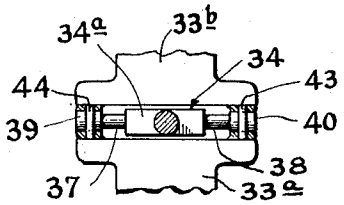


Fig. 7



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RECORDING PICKUP HAVING TORSION RODS

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Application March 11, 1947, Serial No. 733,744

8 Claims. (Cl. 179—100.41)

1

This invention relates to improvements in phonographic recording apparatus, and more particularly to an improved electromagnetic sound recording head in which a stylus-carrying armature is pivotally mounted within a fixed magnetic field and is energized electrically by a surrounding coil in accordance with the sound vibrations to be recorded.

The present invention is an improvement over that disclosed in the prior Patent No. 2,222,342, issued November 19, 1940 to Lincoln Thompson, entitled "Electromagnetic Sound Recorder," and a prior application to Lincoln Thompson entitled "Phonographic Recording Head" filed December 7, 1945, Serial Number 637,376.

One object of the present invention is to provide a recording head of the above nature having a relatively small-sized light weight one-piece armature pivoted on a horizontal axis within a magnetic field, and in which the top of said armature is quite thin and is located in a smaller air gap than the bottom of said armature so that a stronger permanent magnetic flux will be produced at the top than at the bottom thereof.

A further object is to provide a sound recording head of the above nature, in which the armature is provided with a pair of integral outwardly-extending resilient torsion rods having a pair of integral end blocks which are rigidly soldered between the faces of the magnet pole pieces and are spaced centrally therebetween by a pair of non-magnetic U-shaped shims.

A further object is to provide a sound recording head of the above nature having a pair of yieldable side bearing disks for supporting said head on its center of gravity between the sides of a forked recording arm.

A further object is to provide an improved electromagnetic sound recording head of the above nature, which will be relatively simple in construction, inexpensive to manufacture, compact, ornamental in appearance, and very efficient and durable in use.

With these and other objects in view, which will appear as the description proceeds, there has been illustrated on the accompanying drawing one form in which the invention may conveniently be embodied in practice.

In the drawings,

Fig. 1 represents a side vertical view, partly in section, of the sound recording head, as it appears when resting upon a thin disk record, and pivotally mounted in a recording arm.

Fig. 2 is a longitudinal sectional view, shown on a larger scale, of the recording head with the casing and recording arm shown in section.

Fig. 3 is a top view of the same, with the recording head shown in section.

Fig. 4 is a longitudinal sectional view of the same, taken along the line 4—4 of Fig. 3.

Fig. 5 is a transverse sectional view, taken along the line 5—5 of Fig. 3.

Fig. 6 is a transverse sectional view, taken along the line 6—6 of Fig. 3.

Fig. 7 is a fragmentary top view of the armature with the upper portion thereof shown in section, and illustrating how said armature is mounted.

Fig. 8 is a perspective view of the armature and spacing shims.

Referring now to the drawings in which like reference characters denote corresponding parts throughout the several views, the numeral 10 indicates a flat non-magnetic base having a depressed circular seat 12 near its forward end, which seat is provided with a round hole 11. The seat 12 is adapted to receive a yieldable apertured damping member 13.

The base 10 is provided with a hollow top cover casing 14 having a semi-circular forward section 14*a*, and a horizontal stop finger 14*b* on the rear thereof. The cover casing 14 is adapted to be connected to the base 10 by means of a pair of vertical headed holding screws 15, 16.

The recording head is mounted at its center of gravity within the sides 18, 19 of a yoke on the front end of a recording arm 17 which has a rear depending shoulder 17*b* for engagement with the stop finger 14*b* previously mentioned. The sides 18, 19 of the yoke are adapted to support a pair of horizontal pivot pins 20, 21 having conical inner ends 20*a*, 21*a*, which are adapted to engage a pair of flexible spring metal diaphragm disks 22, 23 seated at their outer peripheries in the opposite vertical sides of the cover 14 and being unsupported at their central sections.

The pivot pins 20, 21 are secured in adjusted position by means of a pair of lock nuts 24, 25 screwed upon threaded outer sections 26, 27 of said pins.

In order to provide a permanent magnetic field for a vertical armature 34, provision is made of a pair of L-shaped magnetic pole pieces 28, 29 rigidly secured in abutment with the sides of a rectangular rear magnetic block 30, by means of a pair of horizontal clamping screws 31, 32, located at the front and rear of said magnetic block, respectively.

The pole pieces 28, 29 are adapted to embrace

a cylindrical ring-shaped coil 33 mounted on a vertical axis, and held rigidly in operating position by means of a pair of inwardly-extending U-shaped side sections 33*a*, 33*b* integral with the forward portions of said pole pieces.

The armature 34 is mounted to vibrate on a horizontal axis and has a socket section 36 at the bottom thereof for receiving an angular stylus-holding rod 36*a*. The socket section 36 is tightly embraced by the damping block 13, and the rod 36*a* has a diamond-tipped stylus S at the lower forwardly-inclined end thereof. The armature 34 is also provided with a wide flat top thin portion 35, which is adapted to be located in a small air gap between the closely spaced sections 33*a*, 33*b* of the pole pieces 28, 29. The armature 34 is also provided with a pair of integral opposed torsion rods 37, 38 extending longitudinally from an intermediate block 34*a*, and having integral end blocks 39, 40 which are rigidly soldered between the lower inwardly-extending arms of the U-shaped side sections 33*a* and 33*b* of the pole pieces 28, 29. The intermediate rectangular block 34*a* is located in a relatively wide air gap at the bottom of the U-shaped side sections 33*a*, 33*b* of the pole pieces 28, 29, as shown in Fig. 7.

Provision is also made of a pair of vertical headed attaching screws 41, 42 for holding the bottom of the base 10 upon the U-shaped depending sections 33*a*, 33*b* of the pole pieces 28, 29.

In order to centralize the blocks 39, 40 accurately between the pole pieces, provision is made of a pair of inverted U-shaped non-magnetic guide shims 43, 44 embracing said blocks 39, 40 and embedded in the solder which joins said blocks to the pole pieces 28, 29.

The coil 33 is adapted to be connected to the amplifier of a photographic dictating machine, not shown, by means of a pair of lead wires 45, 46 which are received within a longitudinal groove 47 in the rear of the base 10.

Operation

In operation, a flux of steady permanent magnetic lines of force will pass across the upper and lower gaps of the magnet between the forward ends of the pole pieces 28, 29, and through the armature 34—the magnetic circuit being completed through the rear magnet block 30. The stylus 34*a* will be caused to vibrate laterally to produce an undulating spiral groove in a record R mounted on a turntable T in accordance with the electrical oscillations received in the coil 33 which is energized by the recorder amplifier.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In a phonographic sound recording head, a magnet having a pair of L-shaped pole pieces comprising forward spaced centrally recessed inwardly extending side sections, said side sections having upper and lower pairs of opposed end faces above and below the recesses defining upper and lower air gaps, a stylus-holding armature located between said pole pieces, an armature-actuating coil disposed in the recesses of said pole pieces and embracing said armature, said armature having a pair of resilient oppositely extending torsion rods disposed between said pole pieces below said recesses and each comprising an integral end portion rigidly and directly attached to said lower pair of end faces.

2. The invention defined in claim 1, in combination with a recording arm, said recording head being embraced by a cover casing secured thereon, and having a pair of opposed spring metal disks supported at their peripheries in the sides of said cover casing, said disks being disposed on a transverse axis passing through the center of gravity of said head, said recording arm being provided with a pair of conically shaped inwardly-extending pivot pins for engaging said disks for resiliently pivotally mounting said head on said arm.

3. The invention defined in claim 1, in which said upper air gap is small in relation to said lower air gap, said upper and lower gaps embracing upper and intermediate sections of said armature, respectively.

4. The invention defined in claim 1, in which said recording head is provided with a flat base, and has a hollow cover casing secured thereto for embracing said magnet and said armature, said recording head being pivotally mounted in a recording arm having a depending portion, said casing having a rearwardly-extending stop finger for engaging said depending portion.

5. The invention defined in claim 1, in combination with a recording arm, said recording head being embraced by a cover casing secured thereon and having a pair of opposed resilient yieldable members disposed on a transverse axis passing through the center of gravity of said head, said recording arm being provided with a pair of conically-shaped inwardly-extending pivot pins engaging said members for pivotally mounting said head on said arm.

6. The invention as defined in claim 1, in which said end portions of said torsion rods comprise blocks fitted between and soldered to said pole pieces.

7. In a phonographic sound recording head, a magnet having a pair of L-shaped pole pieces comprising forward spaced centrally-recessed inwardly extending side sections providing upper and lower air gaps, a stylus-holding armature located between said pole pieces, an armature-actuating coil disposed in the recesses of said pole pieces and embracing said armature, said armature having a pair of resilient oppositely extending torsion rods disposed between said pole pieces below said recesses, the outer ends of said torsion rods comprising blocks fitted between and soldered rigidly to said pole pieces, each of said blocks being centralized between said pole pieces by an inverted U-shaped shim member embracing said blocks, said shim member being shorter than said block.

8. In a phonographic sound recording head, a magnet having a pair of L-shaped pole pieces comprising forward spaced centrally recessed inwardly extending side sections providing upper and lower air gaps, a stylus-holding armature located between said pole pieces, and an armature-actuating coil disposed in the recesses of said pole pieces and embracing said armature, said armature having a pair of resilient oppositely extending torsion rods disposed between said pole pieces

below said recesses, said torsion rods being integrally provided with blocks soldered rigidly to said pole pieces, and shims which embrace said blocks to centralize said blocks between said pole pieces.

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