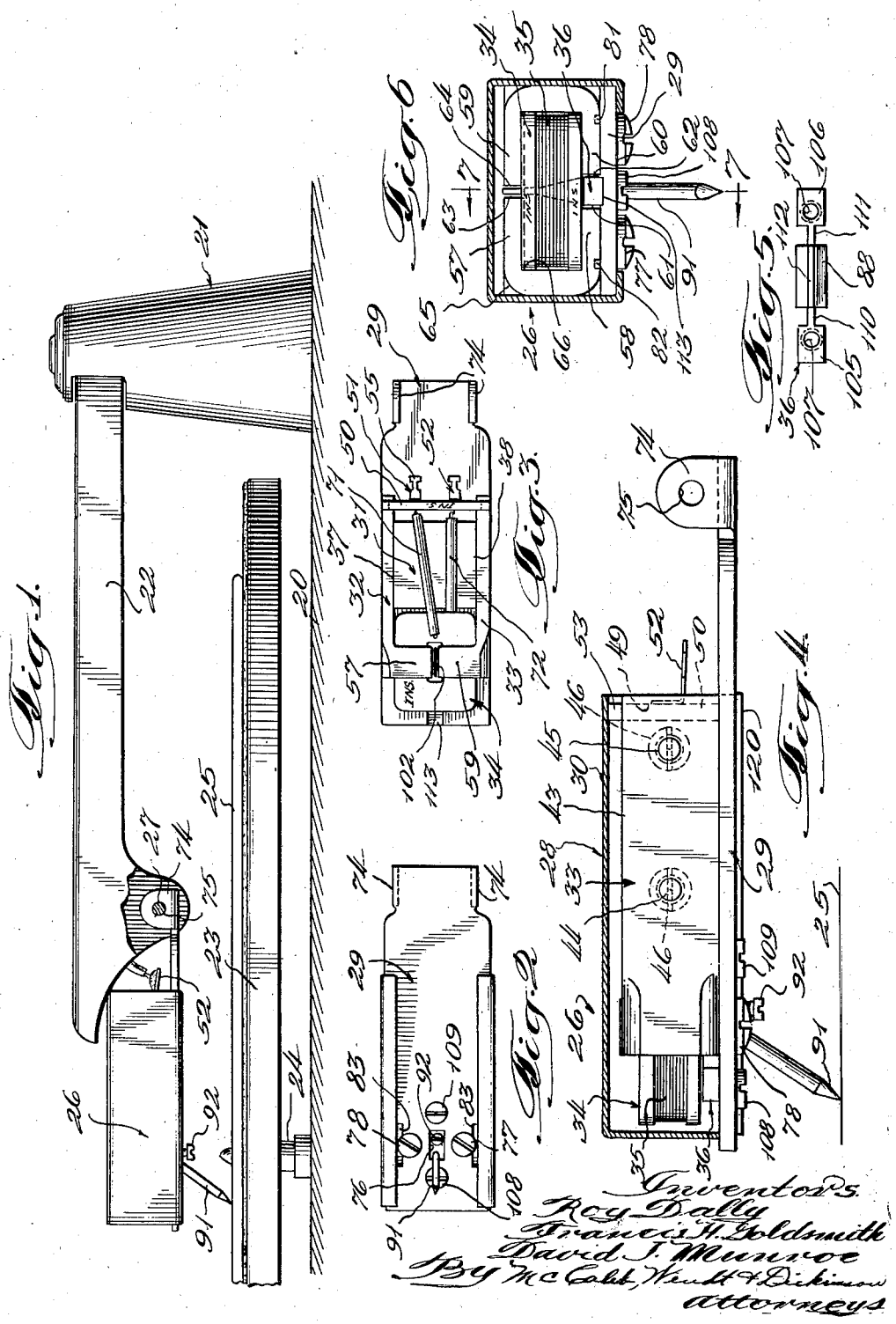
Dec. 17, 1946. R. DALLY ET AL 2,412,718

RECORDER

Filed Aug. 7, 1943 2 Sheets-Sheet 1



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RECORDER

Filed Aug. 7, 1943 2 Sheets-Sheet 2

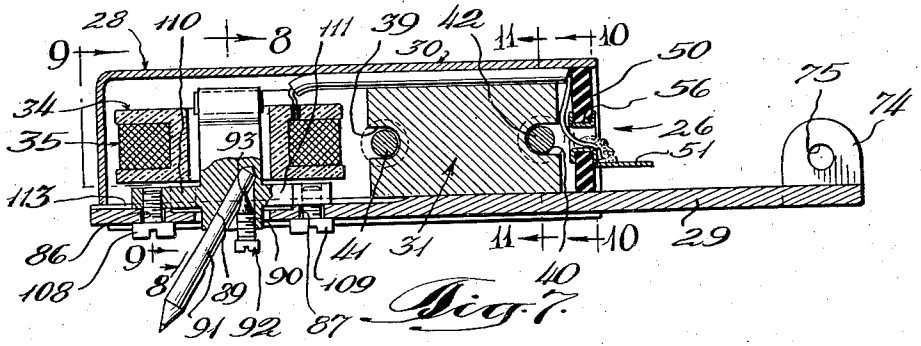


Fig. 7.

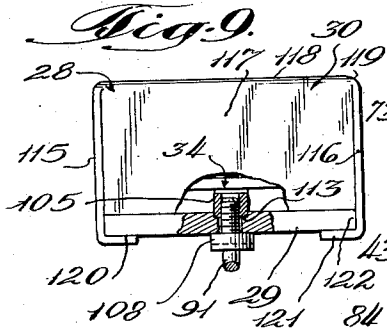


Fig. 9.

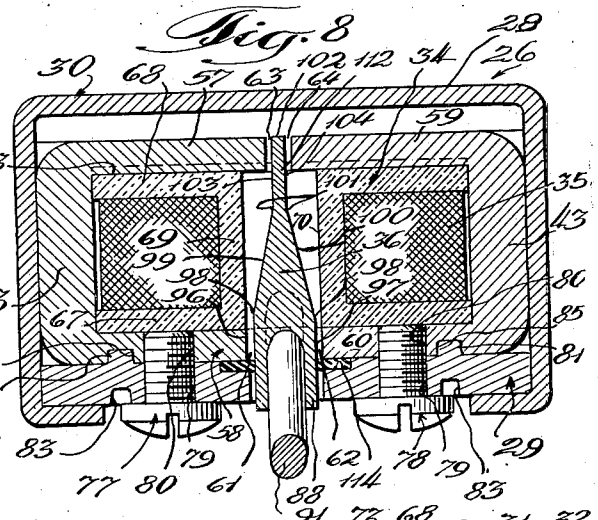


Fig. 8.

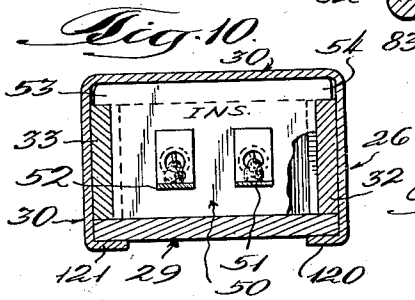


Fig. 10.

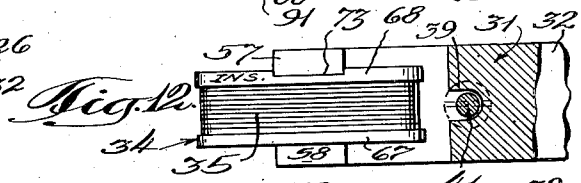


Fig. 12.

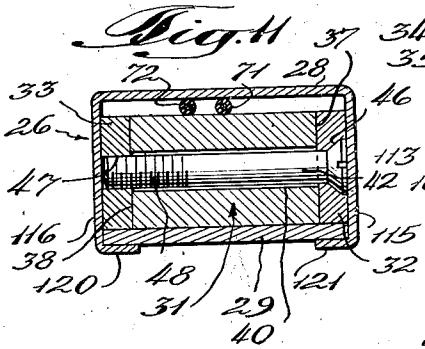


Fig. 11.

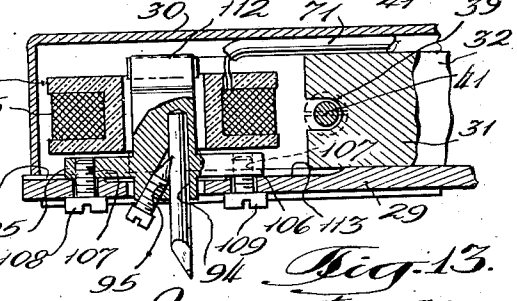


Fig. 13.

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UNITED STATES PATENT OFFICE

2,412,718

RECORDER

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Application August 7, 1943, Serial No. 497,778

14 Claims. (Cl. 179—100.41)

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The present invention relates to recorders for recording sound or other vibratory effects upon records such as phonograph records. The invention is equally applicable to recorders of the engraving type which utilize a cutting tool or recorders of the embossing type the stylus of which does not remove material from the record but merely displaces it.

One of the objects of the invention is the provision of an improved recording unit which is adapted to be used at extreme temperatures, such as for example —50° C. to +120° C.

Another object of the invention is the provision of an improved recorder unit which has stable characteristics at all of a relatively wide range of temperatures, such as those which might be encountered in winter in arctic regions and those which might be encountered in the hottest seasons in the tropical zone.

The recorders of the prior art which utilize rubber or other similar resilient material as a support for the armature or for damping material, are not suitable for use at extremely cold temperatures because under such conditions the rubber freezes or becomes more rigid so that it is practically solid and ordinary damping materials would also freeze or become substantially solid.

Under such conditions, knife edges will frost and change their characteristics, due to the collection of moisture, and the recorders of the prior art do not have stable characteristics at the extremes of temperature for which the present invention is adapted.

Another object of the invention is the provision of an improved recorder which records sound with high fidelity and with a minimum amount of distortion or divergence from fidelity, so that the sound may be faithfully reproduced by suitable high fidelity reproduction mechanism.

Another object of the invention is the provision of an improved recorder of the class described in which there is a better mechanical response for a minimum amount of electrical in-put than with the devices of the prior art, and in which the performance of the recorder will not vary over a long period of use under the most adverse conditions.

Another object of the invention is the provision of an improved recorder construction which is simple, compact, sturdy, and which has a minimum number of parts so that it may be manufactured at a low cost and so that it may be placed within the range of a vast number of users.

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Another object of the invention is the provision of an improved armature construction which takes the form of a resiliently mounted metal body having a predetermined mass with respect to the resilient characteristics of its mounting so that it is tuned to vibrate at a predetermined frequency.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawings in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are two sheets:

Figure 1 is a side elevational view showing a tone arm, turntable and recorder unit embodying the present invention;

Fig. 2 is a bottom plan view of the recorder unit;

Fig. 3 is a top plan view of the recorder unit with the housing removed;

Fig. 4 is a side elevational view of the recorder unit with the housing shown in section;

Fig. 5 is a plan view of the armature of the recorder unit;

Fig. 6 is an end view of the recorder unit with the housing in section to expose the mechanism of the unit;

Fig. 7 is a vertical sectional view taken on the plane of the line 7—7 of Fig. 6 looking in the direction of the arrows;

Fig. 8 is a sectional view on an enlarged scale, taken on the plane of the line 8—8 of Fig. 7 looking in the direction of the arrows;

Fig. 9 is an end elevational view in partial section, taken on the plane of the line 9—9 of Fig. 7 looking in the direction of the arrows;

Fig. 10 is a rear elevational view of the top portion of the recorder unit with the lower portion in section on the plane of the line 10—10 of Fig. 7 looking in the direction of the arrows;

Fig. 11 is a vertical sectional view taken on the plane of the line 11—11 of Fig. 7 looking in the direction of the arrows, showing the mode of support of the pole pieces on the magnet;

Fig. 12 is a fragmentary sectional view taken on the plane of the line 12—12 of Fig. 3 looking in the direction of the arrows; and

Fig. 13 is a fragmentary sectional view similar to Fig. 7 showing the construction when the recorder is of the engraving type rather than the embossing type of Fig. 7.

Referring to Fig. 1, 20 indicates a cabinet or other support for a tone arm column 21 which supports a tone arm 22 for pivotal movement on

a vertical axis. The support carries a turntable 23 on a turntable shaft 24 for supporting the record 25 and the tone arm 22 has the recorder unit 26 pivotally mounted upon the tone arm by means of the pins or shafts 27.

In other forms of tone arm which are mounted on the column 21 for vertical and horizontal movement, the recorder unit may be fixedly secured to the end of the tone arm.

The recorder unit 26 (Fig. 4) preferably comprises an outer housing 28 which is formed by the lower supporting plate 29 and the rectangular housing member 30. The mechanism of the unit preferably comprises a permanent magnet 31 (Fig. 3) in the form of a rectangular block of magnetic material of high coercive force such as for example Alnico provided with pole pieces 32, 33, spool 34, electrical coils 35, and armature 36.

The magnet 31 is preferably provided with ground plane surfaces 37, 38 for engaging the pole pieces 32, 33 so that the air gap may be accurately predetermined and the magnet is preferably formed with grooves 39, 40 (Fig. 7) located in each of its opposite sides for receiving the screw bolts 41, 42.

Grooves 39 and 40 may have flat side walls and half cylindrical end portions and are preferably slightly larger than the screw bolts to permit of some lateral and longitudinal adjustment. The Alnico of which the magnets are made is preferably cast in bars having oppositely disposed grooves 39 and 40 and the bars are cut off to length and provided with the accurately ground plane surfaces 37 and 38.

The pole pieces 32, 33 are similar in construction, but are oppositely located right hand and left hand members. They may be constructed of any suitable metal, such as cold rolled steel or soft iron, and may either be cast or made of sheet metal. Each pole piece has a rectangular body portion 43, which may be of the same width as the thickness of the magnet block 31.

The body portion 43 of each pole piece has a pair of spaced through bores 44, 45, one of which is countersunk at 46 for receiving the screw bolts 41, 42 and the heads thereof.

The apertures 47 in the pole piece 32, for example, may be threaded to receive the threaded end 48 of the ends of the screw bolts 41, 42, and by means of the screw bolts the two pole pieces are frictionally clamped on the magnet block 31.

The apertures 44, 45, and 47, 47 are suitably spaced from each other so that the screw bolts are located in the grooves 39 and 40 in the magnet block 31, with a slight amount of clearance between the bolts and the walls of the grooves for adjustment.

Each pole piece is preferably provided at its rear end with a groove 49 of rectangular cross-section slightly spaced from the end and adapted slidably to receive the rear wall 50, comprising a sheet of insulating fiber for supporting the connectors 51, 52. The fiber sheet is slightly deeper than the width of the pole piece bodies 43, and is provided with laterally projecting ears 53, 54, which effect a complete closure of that end of the housing in the assembly, as shown in Fig. 10.

The connectors 51, 52 may be similar in construction, and each may consist of a short strip of sheet metal, having a T-shaped end portion 55 for engagement with a conductor, the strip being secured to the fiber end wall 50 by a tubular rivet 56.

At its opposite end, each pole piece 32 or 33 is preferably formed with a pair of inwardly extending parallel flanges 57, 58, 59, 60, which serve as the pole pieces proper and which when assembled with the armature 36 and the magnet 31 provide an equal air gap clearance at 61, 62 at the fixed end of the armature 36 and also at 63, 64 which indicates the air gaps at the movable end of the armature 36.

The pole piece flanges 57, 58, 59, 60 are substantially rectangular in shape, the two upper flanges 57 and 59 being longer than the lower flanges 58 and 60 in order to provide the same air gap at 63, 64 on each side of the thin portion of the armature 36 as is provided on each side of the relatively thick portion of the armature 36 adjacent the pole piece flanges 60, 61.

When the pole pieces are formed of sheet metal, the outer corners at 65 between the body flange and the pole piece flanges will be rounded but the inner corners 66 will be ground or otherwise cut out to substantially rectangular form so as not to interfere with the seating of the spool 34 which is to be placed between them.

The spool 34 consists of an insulating spool which is preferably made of initially plastic moldable material and it has a pair of parallel end flanges 67, 68 (Fig. 8) carried by a central tubular portion 69. The tubular portion 69 has a through aperture 70 of substantially rectangular shape for passing the armature 36 with a suitable clearance so that the armature is not engaged in any way by the spool.

Spool 34 carries the insulated coils of conducting wire 35 preferably of enameled wire since a greater efficiency may be attained in some cases by such wire. The coils 35 may consist of a great number of turns of fine wire or a few turns of relatively heavy wire, since the impedance and the conductivity of the coil may be made any desired amount to suit the recorder for different purposes.

The ends of the coil 35 terminate in conductors 71, 72 (Fig. 3), which are connected to the connectors 51 and 52 by means of a drop of solder in the tubular rivet. The upper spool flange 68 (Fig. 12) is preferably formed with a relatively shallow groove 73, which extends diametrically across the upper face of this flange 68 for receiving the pole piece flanges 57, 59.

The cross section of this shallow groove 73 is substantially rectangular and complementary to the shape of the pole piece flanges 57, 59 so that the pole pieces must be slid laterally on the spool 34 and the spool fits inside the pole piece flanges 57—60 when the pole piece flanges 57, 59 are in the groove 73. Thus the spool 34 and the coil which it carries are positively anchored with respect to the pole pieces, which is of particular importance in a recorder where there is a tendency toward motion of the coil due to the varying voltage impressed on the coil.

The width of the spool flanges 68 between the pole piece bodies 43 is such that these flanges 68 fit between the pole pieces when they are secured to the magnet block 31, anchoring the spool against lateral movement as well as longitudinal movement.

The magnet and spool assembly thus far described is preferably carried by the bottom plate 29, which is constructed of non-magnetic material, such as brass or some other suitable material. This bottom plate may consist of a rectangular sheet of such metal, which is formed at its rear end by the upwardly extending ears 74 provided with pivot apertures 75 for pivotal mounting on the tone arm.

Adjacent its other end, the bottom plate 29 is provided with a rectangular aperture 76 (Fig. 2) of sufficient size to pass the larger end of the armature with a clearance and the aperture 76 is in substantial registry with the rectangular bore 70 in the spool 34. Bottom plate 29 may be secured to the magnet and pole piece assembly by means of the screw bolts 77, 78 passing through the apertures 79 in the bottom plate 29 and threaded into the threaded apertures 80 in the lower pole piece flanges 58, 60.

In order to assure the accurate air gap spacing of the accurately ground ends of the pole pieces, the bottom plate 29 is formed with a pair of rectangular spacer ribs 81, 82 which extend longitudinally of the bottom plate on the upper side thereof and which are accurately spaced from each other. These ribs may be formed by a pressing operation which leaves a corresponding groove 83 in the bottom plate above each rib.

Ribs 81 and 82 are accurately located with respect to grooves 84, 85 formed in the lower face of the pole piece flanges 58 and 60. When the screws 77, 78 have been partially driven into their bores, ribs 81, 82 may be pressed into grooves 84, 85 to effect an accurate and predetermined spacing of the pole piece faces at the air gaps 61, 62.

If desired, a similar spacing member, that is, another plate 29, may be used on the other side of the assembly with corresponding ribs and grooves, but in most cases the accurate spacing of the pole pieces for a predetermined air gap may be accomplished by merely utilizing spacing ribs and grooves on one side of the assembly.

The bottom plate 29 also supports the armature 36 and for this purpose bottom plate 29 (Fig. 7) is provided with a pair of spaced through bores 86, 87 located longitudinally of each other in the bottom plate and on opposite sides of the aperture 76.

The armature 36 is preferably of the mass or inertia tuned type, being formed with a lower thick body portion 88, which is substantially rectangular in plan and large enough only to provide sufficient body for permitting the formation of a stylus socket 89 and a screw threaded bore 90 side by side, the latter bore being at an angle to the stylus socket.

In the embossing type of recorder, with the stylus at an angle, as shown in Fig. 7, the stylus 91 is located in the socket 89, the socket extending, for example, at an angle of from twenty-eight to thirty degrees to the vertical, while the screw threaded socket or bore 90 may be vertical, and the threaded bore 90 intersects the stylus socket 89.

The set screw 92 has a pointed end 93, which may be of substantially conical shape, but which has an angularity less than that of the stylus socket; that is, less than twenty-eight degrees, so that the point 93, rather than the body of the screw 92, strikes the shank of the stylus 91.

As the shank of the stylus 91 may be of soft material, such as aluminum, the point 93 may cut a depression in the stylus shank, after which it will drive the stylus firmly into the end of the socket 89 and secure it very firmly against any movement with respect to the armature.

The stylus socket 89 is preferably a relatively close fit with the shank of the stylus 91 to facilitate this firm securement; but, in any event, the stylus is driven toward the end of the socket and toward that side of the socket which is opposite

to the screw 92, by driving the screw 92 home in its threaded bore 90.

In other embodiments of the invention, where the recorder is of the engraving type, the stylus socket 94 may be vertical, while the threaded bore 95 may be at the same angle to the stylus socket previously described.

The body portion 88 of the armature 36 is provided with the plane sides 96, 97, which extend upwardly past the pole piece flanges 58 and 60 into the spool bore 70. At the points 98 on each side of the armature 36, the armature in its preferred form has a wedge-shaped portion, its plane sides 99—100 tapering inward from both sides to the point 101.

From the points 101 to the end 102 of the armature, the armature takes the form of a very thin flat plate, having the plane sides 103, 104. The relative proportions of the armature parts with respect to the spacing of the pole piece flanges 57—60 is such that the air gaps at 61, 62, 63, 64 are all equal.

The construction, shape, and proportions of the parts of the armature may be made such that it will be tuned to vibrate at any desired resonant frequency, such as, for example, 5,000 cycles per second.

Armature body 88 is provided at its front and back with supporting flanges 105, 106, comprising the small rectangular portions integrally secured to the armature and provided with threaded bores 107 for receiving the screw bolts 108, 109. These supporting flanges 105, 106 for the armature are joined to the thick body portion 88 of the armature by intermediate torsion flanges 110, 111 (Figs. 5 and 7). These torsion flanges 110, 111 are also integral parts of the armature, and the supporting flanges 105, 106 and the torsion flanges may be rectangular in cross-section, and are relatively thin, being the size of the thin reed portion 112 of the armature (Fig. 8). The torsion flanges 110, 111 permit the armature to vibrate between its pole pieces due to the twisting of these torsion flanges under the forces which are applied to the armature by the magnet and coil assembly.

In order to assure the accurate location of the armature between the pole pieces with equal air gaps 63, 64 and 61, 62 on both sides of the armature, the bottom plate 29 is preferably provided wtih a longitudinally extending groove 113 of substantially rectangular cross section, which is located at such point, substantially midway between the side edges of the bottom plate on its upper face so that when the supporting flanges 105, 106 of the armature are secured in the groove 113, the armature is located midway between its pole pieces.

In order to prevent dust from entering the aperture 76, it may be surrounded by another depression 114 (Fig. 3), which may be rectangular in plan so that it surrounds the opening 76; and this depression may be slightly deeper than the groove 113 for the purpose of spacing the plate 29 from the torsion or hinge portions 110, 111 so that they are free of all restraint. This depression 114 may be filled with a sheet of resilient flexible material, such as some form of synthetic rubber-like material which is adapted to withstand the extremes of temperature to which this device is to be subjected.

The unit may be provided with a housing member 30 constructed of non-magnetic material or metal, such as brass, which cooperates with the bottom plate 29 and the fiber plate 50 to enclose

the mechanism of the unit. This housing member 30 may be box-like; that is, provided with substantially rectangular sides 115, 116, and end wall 117, forming an integral part of the top wall 118.

The side walls 115, 116 may be as long as the top wall 118 and they may be bent downwardly at right angles at 119 so that they are parallel to each other. The width of the side walls 115, 116 is preferably such that they may each carry a guide flange 120, 121 which is bent inward at right angles at the lower edge of each side wall and is located below the bottom plate 29 when the housing member 30 is slidably mounted on the unit.

The end wall 117 may be narrower so that it may extend only from the top wall 118 to the upper surfaces of bottom plate 29. The inner end of the housing 30 may be open and it will be closed by the fiber plate 50 when the housing is mounted on the unit.

Housing 30 may be mounted on the unit by sliding the assembly, which comprises the bottom plate and all of the other parts, endwise into the inner open end with the flanges 120, 121 underneath the bottom plate 29 until the bottom plate 29 is received in the slot 122 which is open between the end wall 117 and guide flanges 120, 121. Housing member 30 may be held in such position by frictional engagement.

The operation of our improved recorder is as follows: It may be constructed in a recorder of the engraving type with the needle vertical, as shown in Fig. 13, if desired, in which case the stylus or needle is intended to cut away the record in the pre-formed groove to record sound or other vibratory motion.

In other embodiments of the invention it may be constructed in the form of an embossing recorder with the stylus disposed at an angle as shown in Fig. 7 where it is only intended that the stylus shall displace a part of the material of the record at the groove where the recording is made.

The recording unit may be fixedly secured inside a tone arm which has a suitable weight and which is mounted for universal movement; that is, for movement across the record and for movement toward and away from the record. In other cases the recording unit may be pivotally supported on a tone arm which is merely provided with pivotal movement on a vertical axis, as the recording unit itself is mounted pivotally on the tone arm for pivotal movement about a horizontal axis, as indicated at 27 in Fig. 1.

Electrical impulses which are impressed upon the coil of the recorder by suitable source during the recording are, of course, modulated in accordance with the sound or other record to be made, and these electrical impulses cause variations in the flux in the armature, which react with the flux emanating from the poles of the permanent magnet to cause the armature to vibrate, due to the resilient characteristics of the torsion hinge portions and the mass of its parts, which are disposed at a predetermined distance from the axis of the vibratory motion.

During this vibration there is a torsion or twisting movement at the torsion portions or torsion hinges 110, 111 of the armature. The natural period of the armature depends upon the results desired, as it may be varied by varying the torsional characteristics of these torsion portions and the weight and thickness of the thin portion and other parts or proportions of the armature.

As the armature vibrates, the stylus which it carries is caused to vibrate, the movement of the stylus being a maximum at its cutting or embossing end, and this movement is in proportion to the variations in the sound or other record which is being made.

The present device has no knife hinges or other relatively movable parts which may have their characteristics changed by heat or cold or by frosting. It has stable characteristics over a wide range of extreme temperatures, both hot and cold. The unit does not have any damping material supporting the armature, as such material would be apt to freeze or become substantially rigid at low temperatures, and it would deteriorate at high temperatures.

The spacing of the pole pieces from each other and from the armature is accurately predetermined by means of the complementary grooves and ridges and mounting flanges on the pole pieces, bottom plate, and the armature attaching flanges, which also ensures a uniformity of the characteristics of the units when manufactured in mass production.

The entire armature and the stylus may be removed, if desired, to change the characteristics or repair the device, and the stylus itself is also readily removable, if necessary, for any purpose. The stylus is more firmly secured in its socket in this device than in the devices of the prior art of which we are aware, and the mass of the armature is greatly reduced by the use of our improved mode of securing the stylus to the armature.

The entire assembly is easy to manufacture and assemble, is sturdy, and capable of use for a long period of time without any necessity for repair. It is unlikely to be affected either by any jolts or jars.

While we have illustrated a preferred embodiment of our invention, many modifications may be made without departing from the spirit of the invention, and we do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of all changes within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States, is:

1. In a recording unit for recording sound and the like, the combination of a non-magnetic supporting plate with a permanent magnet of high coercive force and a pair of pole pieces, said pole pieces being formed with opposing pole faces carried by substantially U-shaped end portions and said magnet being clamped between body portions of said pole pieces, the assembly being supported by said supporting plate and secured thereto by threaded members, and the said pole pieces and plate being provided with complementary aligning and spacing ribs and grooves whereby the air space between pole piece faces is accurately predetermined and maintained, and a spool for supporting a coil, said spool having upper and lower end flanges fitting between the U-shaped pole piece end portions to anchor the spool against lateral movement.

2. In a recording unit for recording sound and the like, the combination of a non-magnetic supporting plate with a permanent magnet of high coercive force and a pair of pole pieces, said pole pieces being formed with opposing pole faces carried by substantially U-shaped end portions and said magnet being clamped between body portions of said pole pieces, the assembly being supported

by said supporting plate and secured thereto by threaded members, and the said pole pieces and plate being provided with complementary aligning and spacing ribs and grooves whereby the air space between pole piece faces is accurately predetermined and maintained, and a spool for supporting a coil, said spool having upper and lower end flanges fitting between the U-shaped pole piece end portions to anchor the spool against lateral movement, and said spool having grooves for parts of said pole piece end portions for anchoring the spool against longitudinal movement.

3. In a recording unit for recording sound and the like, the combination of a non-magnetic supporting plate with a permanent magnet of high coercive force and a pair of pole pieces, said pole pieces being formed with opposing pole faces carried by substantially U-shaped end portions and said magnet being clamped between body portions of said pole pieces, the assembly being supported by said supporting plate and secured thereto by threaded members, and an armature located between the pole piece faces and integral torsional means carried by said armature and fixedly secured to said supporting plate whereby movement of the armature is accompanied by distortion of an integral supporting part of said armature.

4. In a recording unit for recording sound and the like, the combination of a non-magnetic supporting plate with a permanent magnet of high coercive force and a pair of pole pieces, said pole pieces being formed with opposing pole faces carried by substantially U-shaped end portions and said magnet being clamped between body portions of said pole pieces, the assembly being supported by said supporting plate and secured thereto by threaded members, and an armature located between the pole piece faces and integral torsional means carried by said armature and fixedly secured to said supporting plate whereby movement of the armature is accompanied by distortion of an integral supporting part of said armature, said armature having a predetermined mass with respect to said integral torsional means for determining the vibrational characteristics of the armature.

5. In a recording unit for recording sound and the like, the combination of a non-magnetic supporting plate with a permanent magnet of high coercive force and a pair of pole pieces, said pole pieces being formed with opposing pole faces carried by substantially U-shaped end portions and said magnet being clamped between body portions of said pole pieces, the assembly being supported by said supporting plate and secured thereto by threaded members, and an armature located between the pole piece faces and integral torsional means carried by said armature and fixedly secured to said supporting plate whereby movement of the armature is accompanied by distortion of an integral supporting part of said armature, said armature having a predetermined mass with respect to said integral torsional means for determining the vibrational characteristics of the armature, and threaded means for securing said armature to said supporting member.

6. In a magnetic instrument having an armature movable in accordance with sound variations, a supporting and securing structure for a stylus carried by said armature, comprising a lower armature portion of sufficient size to provide a body for a pair of intersecting bores, one of said bores being relatively deep and serving as the socket for a stylus shank and the other of said bores being threaded to receive a set screw, said bores intersecting and the set screw engaging the said shank of the stylus, both of said bores extending upwardly into the bottom of the armature, said bores being located on an angle which is less than the angle of the point of the set screw whereby the extreme point of the set screw is adapted to engage the stylus shank to drive it into the socket and to secure it therein.

7. An armature assembly for a sound recorder comprising a supporting plate of non-magnetic material, said supporting plate being provided with an aperture for passing an armature part, a magnet and pole piece assembly carried by said plate and having upper and lower opposed pole piece faces spaced from each other a predetermined amount, an armature carried by said supporting plate between said pole piece faces, said supporting plate having a groove for receiving complementary parts of said armature whereby the armature is located in a predetermined central position between said pole piece faces.

8. An armature assembly for a sound recorder comprising a supporting plate of non-magnetic material, said supporting plate being provided with an aperture for passing an armature part, a magnet and pole piece assembly carried by said plate and having upper and lower opposed pole piece faces spaced from each other a predetermined amount, an armature carried by said supporting plate between said pole piece faces, said supporting plate having a groove for receiving complementary parts of said armature whereby the armature is located in a predetermined central position between said pole piece faces, and threaded members carried by said armature and supporting plate holding the said parts of said armature in said groove.

9. An armature assembly for a sound recorder comprising a supporting plate of non-magnetic material, said supporting plate being provided with an aperture for passing an armature part, a magnet and pole piece assembly carried by said plate and having upper and lower opposed pole piece faces spaced from each other a predetermined amount, an armature carried by said supporting plate between said pole piece faces, said supporting plate having a groove for receiving complementary parts of said armature whereby the armature is located in a predetermined central position between said pole piece faces, said pole pieces and said supporting plate being provided with complementary projecting parts and recesses for determining the spacing of said pole piece faces.

10. An armature assembly for a sound recorder comprising a supporting plate of non-magnetic material, said supporting plate being provided with an aperture for passing an armature part, a magnet and pole piece assembly carried by said plate and having upper and lower opposed pole piece faces spaced from each other a predetermined amount, an armature carried by said supporting plate between said pole piece faces, said supporting plate having a groove for receiving complementary parts of said armature whereby the armature is located in a predetermined central position between said pole piece faces, said pole pieces and said supporting plate being provided with complementary projecting parts and recesses for determining the spacing of said pole piece faces, and threaded means for securing the pole pieces to the supporting plate and also for securing the armature to said supporting plate.

11. In a magnetic recorder assembly, a support,

a magnet having opposed pole pieces carried by said support, and an armature, said armature comprising a vibrating portion, a torsional portion, and a supporting flange, said armature being secured to said support by means of said supporting flange with said armature located between the faces of said opposed pole pieces, an insulating plate carried by said support, and a housing comprising a box-like member having top, side, and end flanges and guide flanges adapted to be slidably engaged under said support, said end wall being spaced from said guide flanges, and said support having a projecting end portion to be received between said end wall and guide flanges.

12. In a magnetic sound equipment, the combination of a permanent magnet structure comprising a source of magnetomotive force and having a pair of parallel legs of magnetic material, said legs being provided with substantially U-shaped pole pieces opposing each other, an electric winding carried by a spool located in said U-shaped pole pieces, an armature comprising an integral metal member formed with a vibrating portion adapted to be located between the pole pieces, reduced torsional portions on each side of said armature, and attaching flanges carried by said torsional portions, a supporting plate of nonmagnetic material provided with a groove for receiving said attaching flanges of said armature and with threaded members for securing said armature to said supporting plate, threaded members for securing said supporting plate to one of the flanges of each of said pole pieces, said supporting plate and the adjacent flanges of each of said pole pieces having complementary aligning grooves and ridges for definitely determining the air gap space when said grooves and ridges are secured in engagement with each other by said threaded means.

13. In a chuck structure for sound equipment, the combination of a vibrating member provided with a body having a pair of bores, one of which extends substantially axially into said vibrating

member and the other of which extends at an acute angle to the first-mentioned of said bores, both said bores emerging at the free end of said vibrating member, the second of said bores being threaded, and a threaded member having a tapered sharp point, in the latter of said bores, the first of said bores containing a stylus having a relatively soft shank, said point being at such an angle that the extreme end of the point engages in said shank, driving said stylus against the opposite side of its bore, and causing said stylus to bottom firmly in its bore.

14. In an armature structure for sound equipment, the combination of a magnetic structure having pole pieces of substantially U shape with upper legs adjacent each other and lower legs adjacent each other, with a nonmagnetic member secured to two adjacent legs of said magnetic structure, and holding them in predetermined spaced relation, an armature of the inertia type adapted to vibrate at a predetermined tuned frequency, said armature having a relatively thin upper body portion spaced from the adjacent legs of the magnetic structure by a predetermined air gap on each side, and having a relatively thick lower body portion provided with a chuck also spaced from the adjacent legs a predetermined amount, which legs have a proportionately larger spacing from each other, the thin end of said armature being integrally secured to a pair of laterally extending torsional flanges which are thinner in the dimension transverse to the armature than in the dimension longitudinally of said armature, and are provided with a predetermined resilient characteristic, depending upon the mass of the armature and the frequency at which it is to vibrate, said torsional flanges being integrally joined to enlarged attaching flanges having bores for receiving threaded members that are secured to said supporting plate.

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