July 25, 1944. L. THOMPSON 2,354,558

STYLUS HEAD MOUNTING FOR DICTATING MACHINES

Filed Oct. 29, 1942

Fig:1.

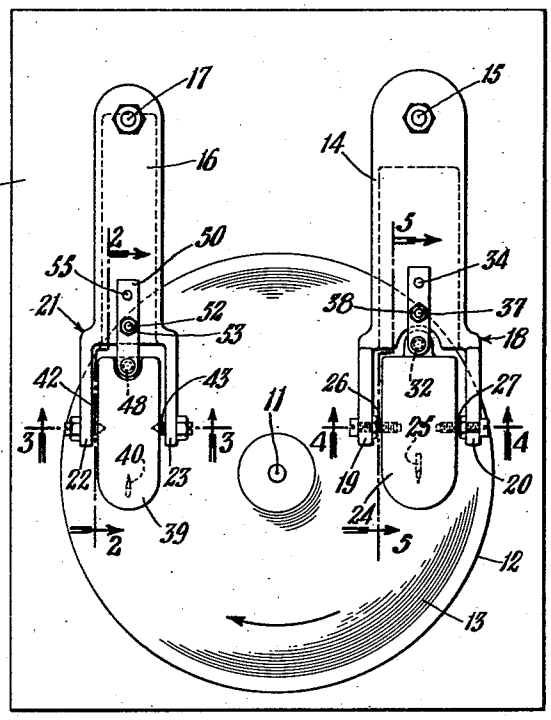


Fig:2.

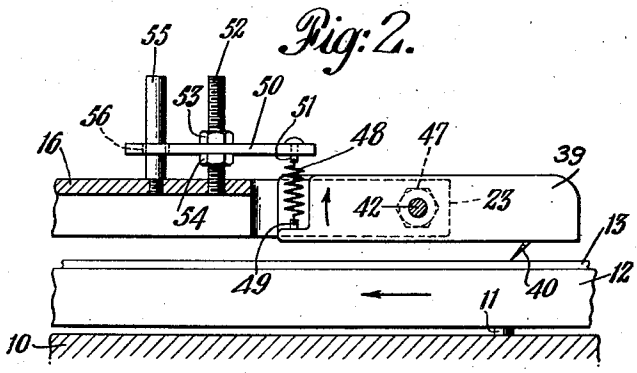


Fig:3.

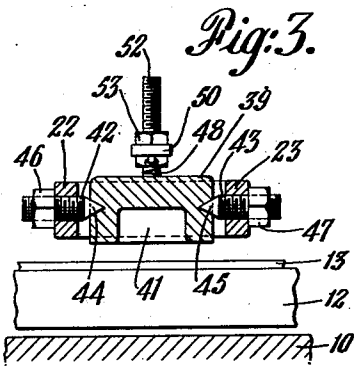


Fig:5.

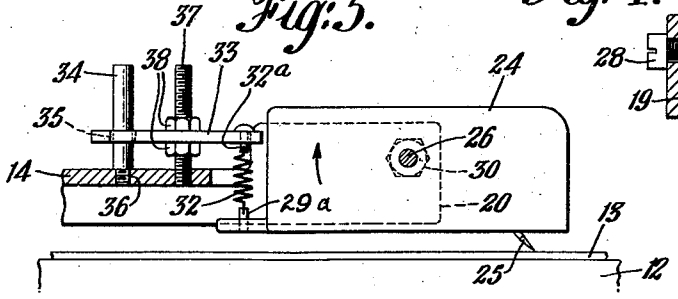
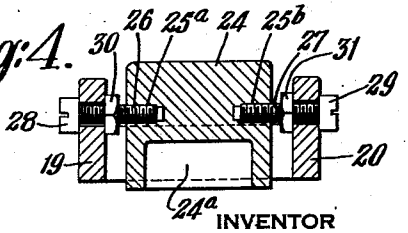


Fig:4.



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STYLUS HEAD MOUNTING FOR DICTATING MACHINES

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8 Claims. (Cl. 274—24)

This invention relates to phonographs, and more particularly to a dictating machine having a recording apparatus and a reproducing apparatus each of which employs a record-engaging stylus carried by a head which is pivoted to rotate about its center of gravity, said head being forced against the record only by the pressure of a spring, whereby the effects of gravity will be completely eliminated and said stylus will engage the record with constant pressure at all times.

In the use of phonographic equipment in mobile vehicles it is very difficult to insure that the pressure between the stylus and the record will be maintained uniform in view of the frequent changes in speed, direction, and inclination of said vehicle. This is especially the case with aircraft which may at times be flying completely upside down.

One purpose of the present invention is to avoid the above and other disadvantages by providing an apparatus where the pressure of both the recording and the reproducing styluses upon the record will be applied entirely by means of springs, and where the effect of gravity will be eliminated by pivotally mounting the stylus-holding heads at the centers of gravity thereof.

This method of mounting the stylus head at its center of gravity insures that the pressure on the record will be maintained absolutely uniform regardless of the position and motion of the vehicle in which the apparatus is located. Moreover, since the center of percussion of a stylus head is very close to its center of gravity, any shocks which may be transmitted directly to said head will be less effective in distributing the stylus than if applied at other points.

Another advantage of mounting the stylus head at its center of gravity results from the fact that the moment of inertia of said head will thereby be reduced to the minimum, thus enabling the stylus to follow very rapidly small vertical irregularities in the material. This is particularly important in the use of reproducer pickups because it aids materially in "tracking." For example, with a dictating machine of the type described in my prior patents, Reissue No. 22,183 of September 22, 1942, and No. 2,250,242 of July 22, 1941, if a lump of dirt happens to obstruct the stylus of the recording head, the stylus will move vertically up over said lump and pass down on the other side without "jumping" out and thus would not disturb the shape or continuity of the groove.

A further factor of advantage of the present invention is that in recording sound upon thin disk records, the phenomenon known as "rippling" is greatly reduced. "Rippling" is caused by a slight wrinkling of the thin material of the record immediately ahead of the stylus, which wrinkling is periodically released giving rise to a repeated vertical motion of the stylus which may produce a serious undesired modulation in the groove being recorded. This modulation will give rise to sounds which may be characterized by "gurgle," "fuzziness," or "hoarseness," when the record is played back by the reproducing apparatus.

A further object of the present invention is to provide improved damping means applied to the pivotal mounting of the recording head for reducing the natural period and amplitude of vibration of said head. The reduction of the moment of inertia mentioned above will also act to still further dampen the vibration and result in additional ripple reduction.

A further object of the present invention is to provide an improved recording and reproducing phonograph in which the spring pressure of the recording head stylus and the reproducing head stylus upon the record will be readily adjustable.

A still further object of this invention is to provide a recording and reproducing apparatus of the above nature which will be relatively inexpensive to manufacture, simple in construction, 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 have been illustrated on the accompanying drawing two forms in which the invention may be conveniently embodied in practice.

In the drawing:

Figure 1 represents a top plan view of an improved disk record dictating machine having recording and reproducing arms mounted to exert constant pressure on the record at all times.

Figure 2 is a longitudinal view partly in section through the reproducer arm, taken along the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a transverse sectional view of the same, taken along the line 3—3 of Figure 1.

Figure 4 is a transverse sectional view of the recording arm taken along the line 4—4 of Figure 1.

Figure 5 is a longitudinal view partly in section of the recording arm taken along the line 5—5 of Figure 1, looking in the direction of the arrows.

Referring now to the drawing wherein like reference numerals designate the same parts throughout the several views, the numeral 10 in-

dicates the base of a cabinet for housing a dictating machine which includes a turntable spindle 11 and a turntable 12, upon which rests a thin disk record 13 preferably made of aluminum or plastic sheet material.

Mounted to swing in a fixed horizontal plane over the surface of the record 13 is a relatively wide recording arm 14 which is made hollow for the purpose of lightening the weight thereof. The arm 14 is connected at its rear end to a vertical pivot pin 15 located adjacent the rear of the cabinet base 10.

A relatively narrow hollow reproducer or pick-up arm 16 is also mounted to swing in a fixed horizontal plane over the surface of the record about a vertical pivot 17 also located near the rear of the cabinet.

The forward end 18 of the recording arm 14 is forked to provide a pair of widely spaced arms 19 and 20 which support a recording head 24.

The reproducer arm 16 also has a forward forked end 21 providing a pair of more closely spaced arms 22 and 23, which form a pivotal bearing for a pickup carrying head 39.

The recording head 24 and the pickup head 39 are both provided with open bottom cavities 24a and 41 respectively to reduce the weight and inertia of said heads. The recording head 24 is provided with a recording stylus 25, and the pickup head 39 with a reproducing stylus 40 respectively, as clearly shown in the drawing.

The forked ends 18 and 21 of the recorder arm 14 and the pickup arm 16 respectively are adapted to embrace the recording head 24, and the pickup head 39 respectively, and said heads are pivotally mounted in the forked arms 19, 20 and 22, 23 respectively, in such a manner that said heads 24 and 39 are supported substantially at their centers of gravity.

By means of this construction it will be seen that irrespective of the position or condition of motion of the appaartus, the weights of the recording head 24 and the reproducing head 39 will at no time exert any pressure upon the disk record 13—the necessary stylus pressure on said record being exerted solely by a recording head tension spring 32 and a pickup head tension spring 48, which springs are adapted to pull upward on the rear of said heads 24 and 39, as clearly shown in Figures 2 and 5.

In order to dampen the vibratory movements of the recording head 24 and thus reduce the "rippling" effect referred to above, the opposite sides of said head are provided with tapped sockets 25A and 25B for frictionally receiving a pair of alined horizontal screws 26 and 27 (see Figures 1 and 4) having heads 28 and 29 located in abutment with the exterior surfaces of said forked arms 19 and 20. The screws 26 and 27 are adapted to be maintained in adjusted positions by means of a pair of lock nuts 30 and 31 located on the inner sides of said forked arms 19 and 20.

It will thus be seen that the threads of the screws 26 and 27 will have a large "playless" frictional bearing contact in the surrounding tapped sockets 25a and 25b, of the recording head 24, and will thus dampen the vibration of said recording head 24 while at the same time providing a sufficiently free oscillating mounting therefor.

The tension spring 32 (shown in Figure 5) is connected at its bottom end to an upstanding eye 29a located near the base of the rear of the recording head 24, and is attached at its upper end to an apertured pin member 32a depending from a raised spring-adjusting bar 33.

The bar 33 is mounted for adjustable vertical movement at its rear end upon a smooth guide rod 34 upstanding from the recording arm 14, said rod passing loosely through an aperture 35 in the rear of said bar 33 and being screwed at 36 into said arm 14.

The adjusting bar 33 is provided with a central adjusting screw 37 screwed at its lower end into a tapped aperture in the recording arm 14. The adjusting bar 33 is held in adjusted position by means of a pair of nuts 38, 38 located in abutment with the bar 33 above and below the surface thereof.

The pickup-carrying head 39 with its pickup stylus 40 is mounted for free oscillation substantially about its center of gravity by means of a pair of short screw rods 42 and 43 which are screwed into tapped holes in the arms 22 and 23 of the forked pickup arm 16.

The short screw rods 42 and 43 are provided with inwardly facing conical tips 44 and 45 which engage in similarly shaped conical holes formed in opposite sides of the pickup head 39. The screw rods 42 and 43 are adapted to be held in rigid adjusted positions by means of a pair of lock nuts 46 and 47 which engage the exterior surfaces of the forked arms 22 and 23.

The pickup stylus 40 is adapted to be pressed against the record at all times with a uniform pressure through the instrumentality of the coiled spring 48 which is secured at its lower and upper ends to an apertured post 49 and eye lug 51 respectively. The post 49 extends upwardly from the rear extension of the base of the pickup head 39 while the lug 51 extends downwardly from the forward part of an adjusting bar 50 similar to the spring adjusting bar 33 previously mentioned.

The adjusting bar 50 is provided with a central adjusting screw 52 screwed at its lower end into a tapped aperture in the pickup arm 16. The adjusting bar 50 is held in adjusted position by means of a pair of nuts 53 and 54 located in abutment with said bar above and below the surfaces thereof. At the rear of the bar 50, provision is made of an unthreaded post 55 loosely fitted within an aperture 56 in the arm 16, said post 55 being reduced at its lower end and screwed into an aperture in said arm 16.

Since the recording stylus pressure is of the order of several ounces, it will be seen that the frictional screw mounting of the recording head is a definite asset, and provides desirable dampening of the recording head without harmful frictional restraint.

On the other hand, since the reproducing stylus pressure is only about one-half an ounce, the cone-bearing mounting of the pickup head 39 reduces to the minimum the amount of friction therein and provides the necessary full freedom in oscillation for accurate and faithful reproduction.

Operation

In operation, whenever the user desires to record dictation or other sounds on the disk record 13, the turntable motor will be started for rotating said record, and the stylus 25 of the recording head 24 lowered in position thereupon. During recording, the pickup head 39 will of course be raised from the record. After the dictation has been completed and it is desired

to replay the recorded matter, the recording stylus will be raised from the record and the pickup stylus lowered thereupon.

It will be understood from the above construction, that since the recording arm 14 and the pickup arm 16 are mounted to swing in fixed horizontal planes, the weights of said arms will be supported by the shafts 15 and 17, and that the only pressure exerted upon the record 13 will be that due to the tension springs 32 and 48 respectively.

While there have been disclosed in this specification two forms in which the invention may be embodied, it is to be understood that these forms have been 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 phonograph, a driven turntable, a disk record supported thereon, an arm swingable in a plane parallel to said record, the free end of said arm being forked, a stylus carrying head pivotally mounted substantially at its longitudinal center of gravity in the forked end of said arm for swinging movement over said disk record, and spring means for symmetrically connecting said arm to the transverse center of the rear of said head for urging the stylus of said head against the surface of said record, whereby the effect of gravity upon said head will be eliminated and said stylus will engage the record with constant pressure at all times.

2. In a phonograph, a driven turntable, a disk record supported thereon, a pickup arm mounted to swing in a plane parallel to said record, said arm having a forked free end, a stylus-carrying pickup head pivotally mounted substantially at its center of gravity in the forked free end of said arm and adapted to swing over said record, and a spring for connecting the center of said arm to the center of the rear portion of said head for urging the stylus against said record, whereby the effect of gravity upon said head will be eliminated and said head will be maintained in symmetrical position.

3. In a phonograph, a driven turntable, a disk record supported thereon, a pickup arm mounted to swing in a plane parallel to said record, and having a symmetrical bifurcated rear end, a stylus-carrying pickup head pivotally mounted substantially at its center of gravity within the sides of the rear end of said arm, and adapted to swing over said record, and a spring for connecting the top of said arm to the bottom of said head at the longitudinal center line of said arm and head for urging the stylus against said record, whereby the effect of gravity upon said head will be eliminated.

4. In a phonograph, a moving record supported thereon, a recording arm mounted to swing in a plane parallel to said record, said arm having a bifurcated free end, a stylus-carrying recording head pivotally mounted substantially at its center of gravity in said free end, said recording head being provided with a pair of alined screws projecting from opposite sides thereof, and the sides of the bifurcated end of said arm being provided with threaded bearing sockets fitting closely upon said projecting screws, the friction between said screws and said bearing sockets serving to dampen the oscillations of said recording head.

5. A phonograph as set forth in claim 1 in which means are provided for adjusting said spring means to vary the pressure of said stylus upon said record.

6. In a phonograph, a driven turntable, a disk record supported thereon, an arm mounted to swing in a plane parallel to said record and having a forked rear end, a unitary stylus-carrying head pivotally mounted substantially at its center of gravity and embraced in the forked end of said arm and adapted to swing over said record, a spring connected to the center of the rear of said head for urging said stylus against said record, and a spring adjusting bar connected to said spring and adjustably connected to said arm, whereby said stylus will be forced against said record solely by the pressure of said spring and said head will be maintained in symmetrical position within said forked end.

7. In a phonograph, a driven turntable, a disk record supported thereon, an arm mounted to swing in a plane parallel to said record, a stylus-carrying head pivotally mounted substantially at its center of gravity in the free end of said arm and adapted to swing over said record, a spring connected to the rear of said head for urging said stylus against said record, a spring adjusting bar connected to said spring and adjustably connected to said arm, whereby said stylus will be forced against said record solely by the pressure of said spring, said spring adjusting bar having a pair of apertures and a smooth rod connected to said arm and passing freely through one of said apertures, and a threaded rod also secured to said arm and passing through the other of said apertures, said threaded rod being adjustably connected to said bar by a pair of nuts secured on said threaded rod and located in abutment with the upper and lower surfaces of said bar.

8. In a phonograph, a rotating disk record, an arm mounted to move in a plane parallel to said record, a stylus-carrying head pivotally mounted substantially at its center of gravity in said arm and adapted to move over said record whereby the effect of gravity upon said head will be eliminated, and a spring for connecting the center of said arm to the center of the rear portion of said head for urging the stylus against said record.

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