March 24, 1942. R. W. MILLER 2,277,344

PHONOGRAPH PICKUP

Filed May 24, 1940

FIG. 2.

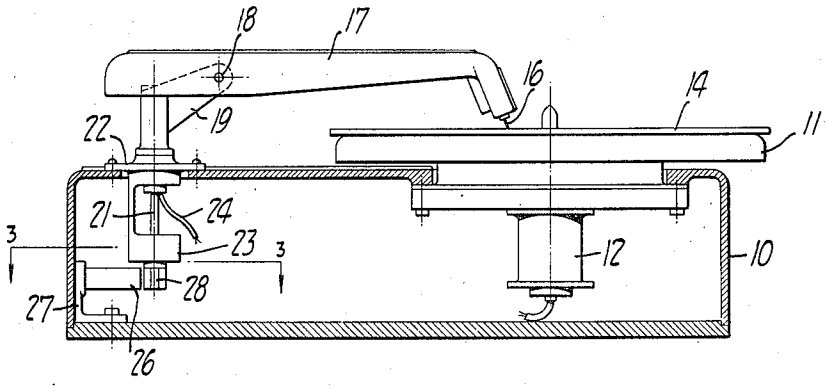
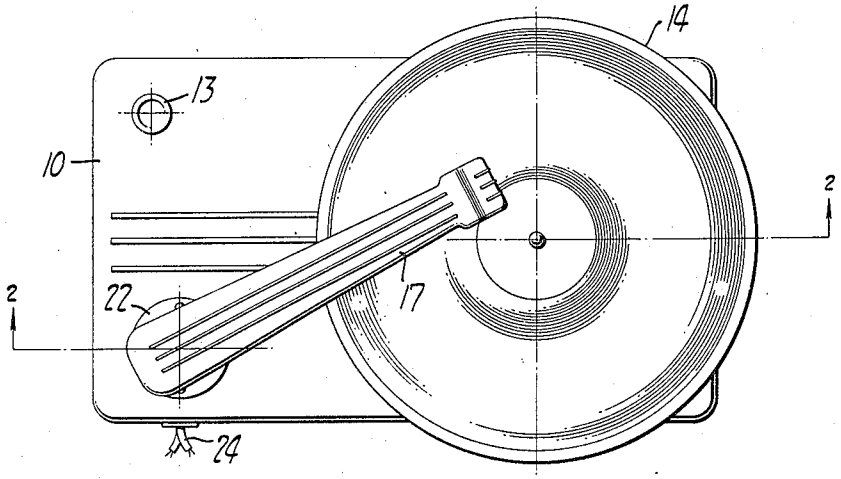


FIG. 1.



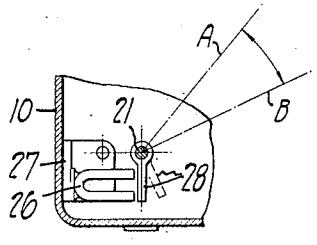


FIG. 3.

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PHONOGRAPH PICKUP

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Application May 24, 1940, Serial No. 337,002

5 Claims. (Cl. 274—1)

This invention relates to phonograph pickup devices and is concerned more particularly with an improved device of this character in which the swinging movement of the pickup arm in following the record is controlled to provide improved operating characteristics.

It is an object of the invention to provide improved control means for the pickup arm of a phonograph.

Another object of the invention is to provide an improved device of the character referred to wherein the pickup arm of a phonograph is subjected to a force urging it radially inwardly with reference to the record to reduce wear on the record and on the needle of the pickup device, as well as to provide improved sound reproduction characteristics.

Other objects and advantages of the invention will be apparent from the following description of the embodiment thereof selected for illustration, in which:

Figure 1 is a plan view of a phonograph embodying the invention;

Figure 2 is a sectional elevation of the mechanism, the view being taken in planes indicated by the line 2—2 in Figure 1.

Figure 3 is a fragmentary horizontal section taken as indicated by the line 3—3 in Figure 2.

Referring to Figures 1 and 2, the phonograph selected for illustration includes a cabinet or case 10 on which a turntable 11 of conventional construction is suitably journaled for rotation under control of a suitable constant speed electric motor 12. The motor 12 may be started or stopped by means of a suitable switch mechanism having a control button 13. The turntable 11 is adapted to receive a record 14 of conventional construction for engagement by a needle 16 carried by a pickup or tone arm 17 of suitable construction. The pickup arm 17 is pivoted about a transverse axis 18 for vertical swinging movement to and from engagement with a record, the pivotal axis 18 being carried by a bracket 19 on an upright shaft 21 which is journaled in suitable bearings 22 and 23 carried by the case 10. The sound vibrations picked up by the needle 16 and the tone arm 17 may be carried as by a cable 24 to a suitable sound reproduction mechanism of conventional construction.

It is common knowledge that during the playing of a record, such as indicated at 14, the needle 16 and the tone arm 17 are carried radially inwardly by the spiral sound groove in the record as the record is played, so that the needle 16 tends to ride the outside edge of the sound groove. This effect increases toward the center of the record. As a result, the needle does not have the proper contact with the bottom of the sound groove. Also, when a record is played repeatedly as in commercial coin-controlled phonographs, the groove becomes worn and the needle tends to jump from one convolution of the groove to the next adjacent convolution.

In accordance with the instant invention the above disadvantageous features are overcome by providing means for applying a force to the tone arm without adding frictional resistance to its movement and to so apply the force and control its application that the force increases as the needle approaches the center of a record. In this way the force applied counteracts the varying amount of drag applied to the needle and the tone arm as they travel from the outer edge of a record toward the center thereof. Preferably the force applying means is in the form of a magnet 26 which is conveniently mounted by bracket 27 adjacent the lower end of the shaft 21. Shaft 21 carries an armature 28 for cooperation with the magnet 26.

The dotted line position of the armature 28 in Figure 3 corresponds to the line A which indicates the position of the tone arm 17 when the needle is at the beginning of the sound groove of the record, while the full line position of the armature 28 corresponds to the angular position (line B) of the tone arm when it is near the end of the sound groove of the record and close to the center of the record. The strength of the magnet 26 is preferably such that the force applied through the armature 28 to the shaft 21 will maintain the needle 16 at the bottom of the sound groove or slightly riding the radially inward side of the groove. Also, while the record is being played, the armature approaches the magnet so that the force applied by the magnet becomes proportionately larger to counteract the increasing drag as the tone arm moves inwardly of the record.

By virtue of the above arrangement the needle can always be maintained at a desirable location in the sound groove to obtain a faithful sound reproduction, while at the same time the problem of jumping of the needle on a worn record to cause repeated playing of a groove convolution is avoided. It will be noted that because the needle and the groove are maintained in proper playing relation, wear on both of these elements is substantially reduced so that the life and usefulness of both records and needles is materially increased.

While I have shown my invention as embodied in a simple type of phonograph, it is also useful with other types such as commercial coin-controlled phonographs.

I claim:

1. In a phonograph having a turntable for holding a record and a needle-carrying pickup arm for cooperation with a record on the turntable, the combination of an armature mounted for swinging movement with the pickup arm and magnetic means for continuously exerting a force on said armature to urge the needle-carrying end of the pickup arm radially inwardly with reference to said turntable throughout the range of movement of said pickup arm in traversing a record.

2. In a phonograph having a turntable for holding a record and a needle-carrying pickup arm for cooperation with a record on the turntable, the combination of an armature mounted for swinging movement with the pickup arm and magnetic means for continuously exerting a force on said armature to urge the needle-carrying end of the pickup arm radially inwardly with reference to said turntable, said armature and said magnet being constructed and arranged to provide for increasing influence of the magnet on the armature as the pickup arm approaches the centre of the turntable.

3. In a phonograph having a record-carrying turntable, a needle-carrying pickup arm for cooperation with a record on said turntable, an upright shaft carrying said pickup arm, and means for applying a force to said pickup arm tending to cause swinging movement thereof inwardly with reference to the record to provide a force which increases proportionally as the needle-carrying end of the pickup arm travels radially inwardly toward the center of the turntable, said force-applying means and said pickup arm being so related and arranged that the force applied is operative in the same direction with respect to the pickup arm for all playing positions thereof.

4. In a phonograph having a record-carrying turntable, a needle-carrying pickup arm for cooperation with a record on said turntable, an upright shaft carrying said pickup arm, and magnetic means cooperatively related to said shaft for supplying a force urging the needle-carrying end of said pickup arm radially inwardly with respect to said turntable throughout the range of movement of said pickup arm in traversing a record.

5. In a phonograph having a record-carrying turntable, a needle-carrying pickup arm for cooperation with a record on said turntable, an upright shaft carrying said pickup arm, and means including a magnet element and an armature element cooperatively related to said shaft for supplying a force urging the needle-carrying end of said pickup arm radially inwardly with respect to said turntable throughout the range of movement of said pickup arm in traversing a record, one of said elements being mounted for movement with said shaft, and the other of said elements being mounted adjacent said first-named element, said elements being related to provide for continuous force on said shaft and said pickup arm throughout the range of movement of said arm while traversing a record.

RAY W. MILLER.