

Feb. 20, 1945.

A. L. BARNES

2,369,938

PHONOGRAPH RECORD REPEATER

Filed Jan. 9, 1943

2 Sheets-Sheet 1

Fig. 1.

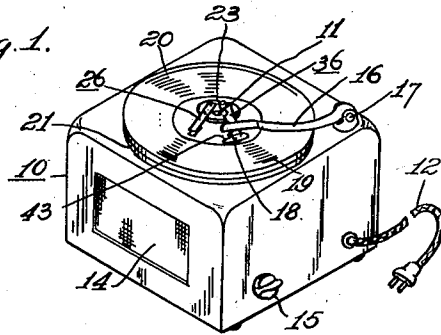


Fig. 2.

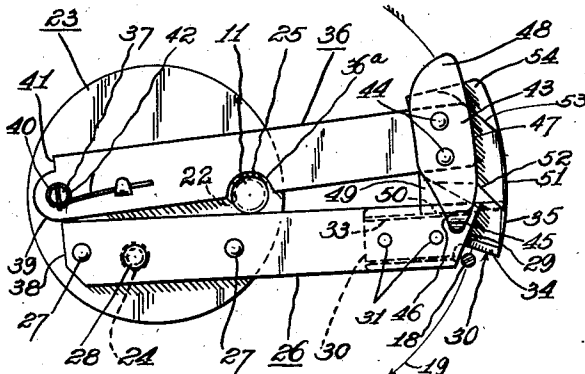


Fig. 3.

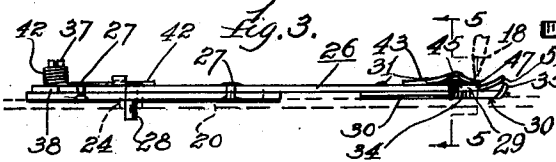


Fig. 4.

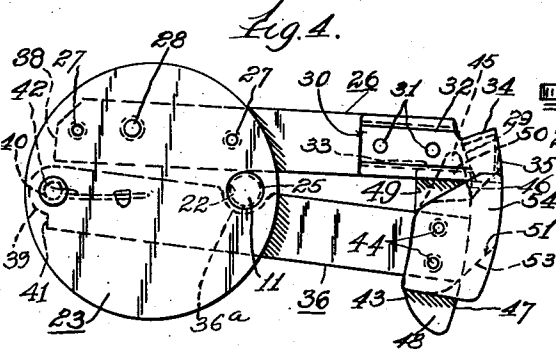


Fig. 5.

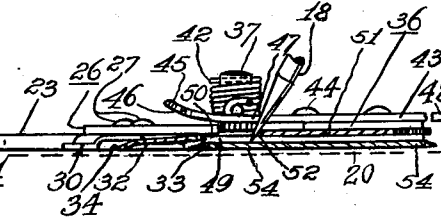


Fig. 6.

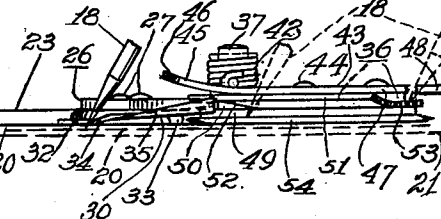
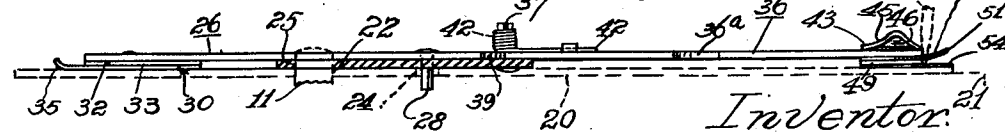


Fig. 7.



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2 Sheets-Sheet 2

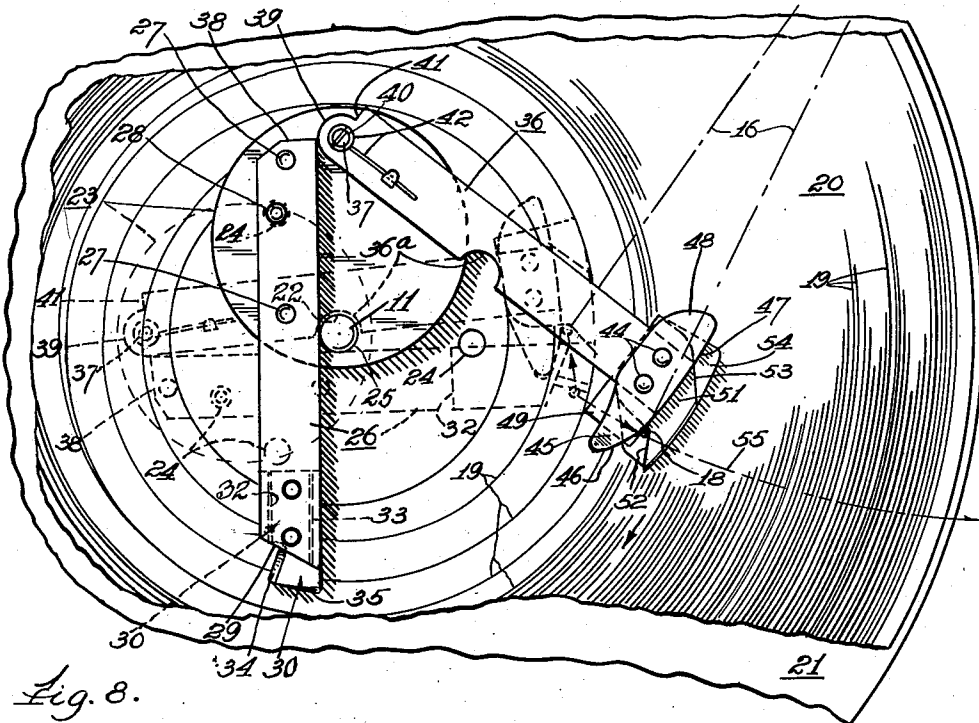


Fig. 8.

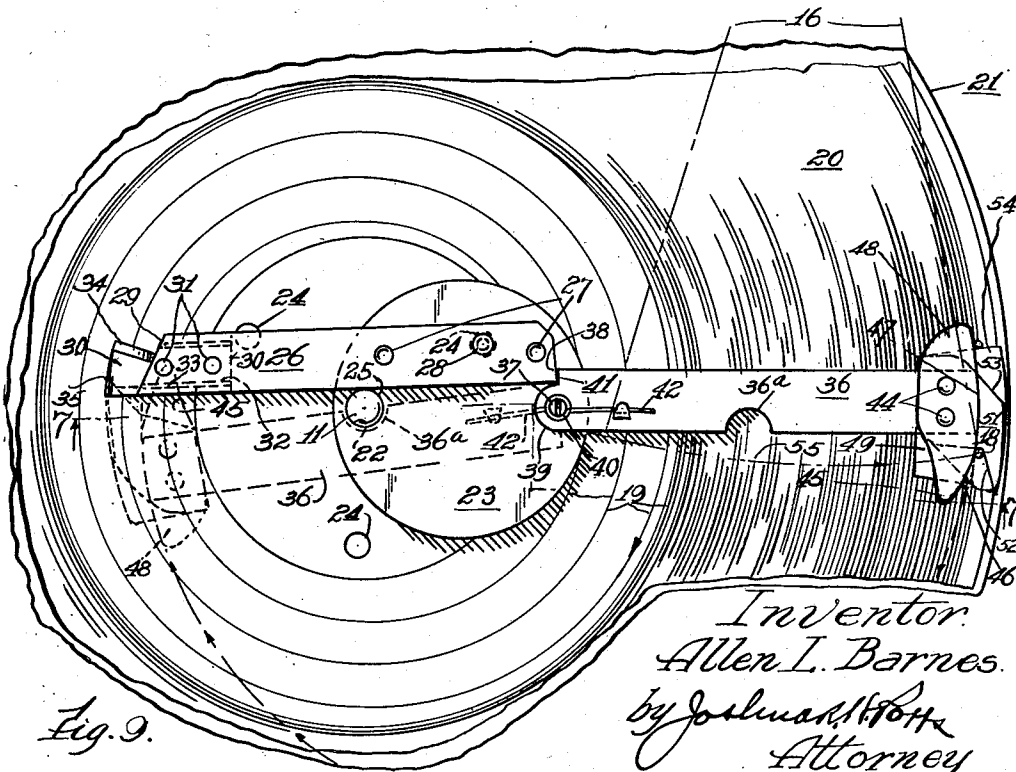


Fig. 9.

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UNITED STATES PATENT OFFICE

2,369,938

PHONOGRAPH RECORD REPEATER

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Application January 9, 1943, Serial No. 471,819

4 Claims. (Cl. 274—15)

My invention relates to record repeaters for phonographs, and more particularly to devices for automatically repeating the playing of a record for graphophones, or gramophones, using a record of the flat disk, or wafer type, and capable of use on record players driven by a spring or electrical motor and having any approved type of sound box or acoustic reproducer, as used on mechanically or electrically driven phonographs, with or without an electrical pickup.

The object of the invention is to provide a record repeater for disk or wafer records, or tablets having an undulated, spiral sound track, or groove, which may lead into a concentric groove in which the recording needle would continue to travel were there no repeating device to lift the tone arm, pickup device, sound box, or acoustic reproducer and needle, when the playing of a record is completed and to move and replace the needle on the record at the outside or beginning of the recording groove to cause replaying, or repeating thereof any number of times.

Another object of the invention is to provide a novel, simple and durable record repeater which rotates with the record and will not interfere with the playing, replaying, or repeating of a record, and which will prevent injury to records and needles by causing the gradual raising of the needle off of, and at a very slight elevation from, and out of contact with the record in line and in the same arc with the record groove, whether of the hill and dale, or lateral cut type, and support or maintain the needle in such position from the time when the playing of the record is finished until the needle is again deposited at the beginning point of the sound groove, that is, the needle is lifted off of and out of contact with the record at a slight elevation when the needle reaches the inner end of the sound groove and the tone or pickup arm is swung outwardly as the record continues to turn, or revolve with the turntable of the machine on which it is supported, and is gradually released and lowered to replace the needle on the record at the outer end of the sound groove, from a very low, or lower elevation than that to which it is initially raised so that injury to the needle or record is prevented and the playing of the record may be continued or repeated.

Still another object of the invention is to provide a novel record repeater which has a supporting arm for the needle that will positively extend, or swing the tone arm, or pickup and

needle outwardly across the sound track, or groove in an arc concentric to the pivot of the tone arm, or pickup, so as to prevent the needle from repeatedly tracking, traveling or moving around the inner portion of the groove, or concentric portion at the inner end of the spiral groove and keep the same from jumping the groove or playing one part of the record over and over as often happens with other devices.

Another and further object is to provide a repeater embodying an anchoring member, or supporting base adapted to be mounted on the turntable and shaft on top of the record and having means to engage one or more holes in the latter to cause the member, or base, to turn with the turntable and record, the member having a rigid arm with means at the outer, or free end thereof to engage, or receive, raise, and guide the needle and tone arm off of the record and onto the receiving and supporting portion of a swingable arm normally held in receiving position against one edge of the rigid arm, which swingable arm supports and carries the tone arm and needle outwardly by continued revolving of the turntable until limited, or stopped in its movement by the rigid arm in position to release and place the needle in the sound groove at the outer end, or beginning point thereof, after which the swingable arm automatically swings back inwardly to its initial and normal position against the rigid arm to again serve its function and act as before.

Another object of the invention is to provide a repeater having a supporting base with a rigid arm mounted thereon as or substantially in the position of the chord of an arc and extended therefrom, and also a swingable arm pivoted on the base and spring held against the rigid arm, with means to take the impact of the swingable arm against the rigid arm, and in which the anchoring member, or supporting base has a radius shorter than the radii of the arms so that the needle will clear the edge of the base when on the innermost portion of the sound groove, but will be properly received in the needle engaging, elevating and raising means, irrespective of the exact location of the groove, so that the device will always be positive in operation.

Further objects and advantages will appear and be brought out more fully in the following specification, reference being had to the accompanying drawings, in which:

Fig. 1 is a perspective view of a phonograph, showing my record repeater in position.

Fig. 2 is an enlarged top plan view of the repeating device.

Fig. 3 is an edge view of the device as shown in Fig. 2.

Fig. 4 is a bottom plan view of the device.

Fig. 5 is an enlarged detailed section of the repeater, taken on the line 5—5 of Fig. 3, but with the guide finger in elevation and with the needle at the starting point of the arc in which it swings outwardly across the record for replacement at the beginning of the sound groove.

Fig. 6 is an elevation corresponding to Fig. 5 and looking in the same direction, but showing the position of the needle in approaching the repeating device, at the position when it starts to swing outwardly and at the point where the needle drops off and reengages the record.

Fig. 7 is a diametrical sectional elevation taken on the line 7—7 of Fig. 9 and showing the repeater at the extreme open stage immediately before the release of the swinging arm to close under the action of its spring.

Fig. 8 is a top plan view of the repeater in position and about one-quarter of the way open, and

Fig. 9 is a top plan view of the repeater as shown in Fig. 8, but completely open and ready to return to a closed position, as illustrated in Fig. 7.

Referring more particularly to the drawings, 10 designates the phonograph of any suitable type, driven by a spring or electrical motor, but shown as of the electrical pickup type, having a vertical turntable shaft 11 driven by an electrical motor having an extension cord, or cable 12, with a plug 13 at the end thereof adapted to be plugged into a wall socket of a house wiring. It also has an amplifier, horn, or loudspeaker 14 and a switch 15 for controlling the operation of the motor and other electrical apparatus connected to the tone arm, or pickup 16, which is pivoted to swing horizontally and vertically as at 17, at which point connection is made with the amplifier, or loudspeaker and electrical equipment, by operation of the switch 15. The tone arm has a sound box, or acoustic reproducer, but in the present instance, it is illustrated as of the electrical pickup type having a reproducing needle 18 which operates in the sound track, or groove 19 of a disk or wafer record 20, adapted to be mounted on a turntable 21 and having a central circular opening 22 designed to fit over the motor shaft 11.

The repeater consists of an anchoring member, or supporting base 23 shown to be preferably in the form of a circular plate of metal, or any other suitable material so as to deflect and prevent injury to the needle in case it should strike the edge thereof. The record has at least one, that is, one or more holes 24 arranged equidistantly from the center hole 22, and may be three in number, arranged in a triangular series at the apices of an isosceles triangle. The plate also has a circular hole 25 near its edge to receive the shaft 11 when the plate is engaged thereon upon the record.

A rigid arm 26 is fixed to the plate 23 at one end in substantially the position of a chord of an arc of the plate and is shown anchored by rivets, or the like 27, and provided with a headed pin, or stud 28, in an intermediate position and extending down through an aligned hole in the plate to engage one of the holes 24 in the record. The rigid arm 26 extends outwardly beyond the periphery of the plate 23 and is inclined or

beveled as indicated at 29. An extension or spring plate 30 is provided beneath the arm 26 to extend below the bottom face thereof, and this may be formed by a strip riveted, or otherwise secured as at 31 to the arm 26, and may be embossed or pressed up as at 32 to provide additional thickness, together with a channel 33, constituting a contact shoulder, or bumper for a purpose to be hereinafter described. The extension 30 projects beyond the beveled end 29 of the arm 26 and has an oppositely beveled and sharp entering edge 34 normal thereto, while its outer edge 35 is convexly arcuate and slightly turned up, or inclined to deflect the needle entering thereon inwardly. The edge 34 is adapted to contact with or lie closely adjacent the upper face of the record so that the needle may readily pass thereon.

Also mounted upon the plate 23 in slightly divergent relation to the arm 26 is a swingable arm 36 which is pivoted on an upright pin 37 secured to the plate 23 adjacent its edge opposite shaft 11 and with its axial center in line with the end 38 of the rigid arm 26. For this purpose, the swingable arm 36 has a semi-circular portion 39 adjacent the end 38 concentric to the pivot axis and a hole 40 by which the swingable arm 36 is pivotally mounted on the pin 37. This semi-circular edge 39 extends partially across the pivoted end of the arm 36 from the inner edge of the latter so as to form a radial stop shoulder 41 adapted when the arm 36 swings outwardly, or the rigid arm 26 swings away from the arm 36 by the continued rotation of the base plate, arm and record with the turntable, to strike the inner portion of the end 38 and limit the outward swing of arm 36 as seen in Fig. 9. However, the arm 36 is normally held toward the arm 26 as by means of a spring 42 mounted on the pivot pin 37 and connected at one end to the arm 36 and anchored at its opposite end to the pin. This arm 36 also has a cut-out or recess 36a to accommodate the shaft 11 and prevent the arm from striking the same.

At the free end of the arm 36 a transverse elongated guide finger 43 is provided, the same being riveted, or otherwise fastened transversely of the arm 36 as indicated at 44. This finger is oppositely tapered at its ends and its tapered front or lead end 45 extending toward the rigid arm 26 is turned, or slightly curved upwardly as shown, while its outer edge 46 is convex to meet the outer edge 47 and its opposite end 48 projects beyond the opposite edge of the arm 36. A crossarm or strip 49 is also riveted at 44 to the arm 36, but beneath the same and the end 50 thereof is designed to engage in the channel 33 which forms a stop to limit the movement of the arm 36 toward the arm 26. An upper spring plate 51 is also riveted at 44 to the arm 36 between the bottom of the latter and the crossarm, or strip 49 and may be substantially diamond-shaped or an oblique parallelogram with its forward end 52 beveled, or inclined oppositely to the beveled end 29 of the arm 26 and also diverging from the beveled, or curved end 46 of the guide finger 43, while the opposite end 53 is beveled or inclined substantially parallel to the end 52, and this spring plate is inclined or curved upwardly at its outer edge portion to throw the needle inwardly the same as the spring plate 30 at 35, and has its outer edge following the same curvature substantially concentric to pivot 37. Plate 51 at the front thereof is thus positioned to overlies plate 30 at the back of the latter and plate 51 at

the front is positioned substantially in line with the plane of the arm 26 which passes under the end 45 of the finger 43. A spring plate 54 is rigidly fastened beneath the strip 49 as by means of the rivets 44 and has its outer edge on the same arc, or curvature as the plates 30 and 51. This plate 54 is thus disposed in spaced relation beneath the plate 51 and underlies the crotch or V-notch formed by the divergent edges 46 and 52 so that when the needle passes off of the plate 30 it will pass onto the plate 54 so as to support the needle off of the record at a slight elevation to be in such a position that it will be held in the crotch against the beveled end 52 of the plate 51 and the corresponding beveled edge 46 of the guide finger 43 with sufficient friction to swing the arm 36 outwardly on its pivot from a position coextensive with the arm 26 as seen in Fig. 2 to the positions shown in Figs. 8 and 9 substantially in alignment with or extended from the arm 26, or retain the arm 36 so that the arm 26 may rotate or swing with the plate 23 independently of or moved away from the arm 36 as the latter revolves with the record and turntable by reason of being rigid, or held against rotation independently of the record. However, when the shoulder 41 strikes the end 38, the needle will ride up on the plate 51 and slip off of the same to a position of lower elevation upon the plate 54 to prevent it from injuring the record in dropping down and then pass off onto the record without injury to the latter. This is due to the fact that the plate 54 is very thin with tapered ends and the needle would be elevated such a slight degree as to be practically negligible.

In the operation of the device, it is fastened on the record by the base plate or disc 23 engaging the shaft 11 at the hole 25 and with the depending pin 28 in a hole 24 of the record 20. The needle 18 of the one arm or pickup 16 is then placed in the sound track, or groove 19 at the outside to play the record. As the record is played and the table and record revolve, the needle moves inwardly in the spiral sound groove 19 to swing the tone or pickup arm 16 inwardly in the arc 55. When the needle approaches the inner portion of the sound groove it will clear the edge of the anchoring member, or supporting base formed by the circular plate 23 due to the fact that the radius from the center of the shaft 11 and the hole 25 is shorter than the radial extension of the arms 26 and 36 at the diametrically opposite side of the plate 23. Thus as shown in dotted lines in Figs. 8 and 9 and in Figs. 2, 3, 5 and 6, the needle will strike the inclined or beveled edge 34 of the plate 30 at the outer end of the arm 26 and ride up on the same guided by the beveled end 29 of the arm 26 and the beveled edge 46 of the finger 43 so as to pass onto the plate 54 in leaving the plate 30 and engage in the V-notch, or crotch, formed by the oppositely divergent edges 46 and 52. At this point, the needle will exert sufficient pressure against the arm 36 to move it away from arm 26, or hold it at its outer end, while the inner pivoted end continues to rotate, thus causing the outer end to swing outwardly to the outer portion of the record and sound groove, while the arm 26 rotates with the record and plate 23 until the arms are in alignment instead of coextensive, or substantially parallel and the shoulder 41 engages the end 38 to restrain the arm 36 against further swinging outwardly momentarily and thus cause the needle by reason of the continued movement, or rotation of the arm 26 and the inner pivoted

end of the arm 26 with the plate 23, turntable and record to cause the arm 36 to rotate therewith and cause the plate 51 to pass under the needle or the needle to pass over the plate 51 and on to the plate 54 at its projecting rear end and consequently be deposited on the record at the outer end of the sound groove so that the record will be repeated, or replayed as it continues to turn. When the needle is released from the crotch of the beveled ends 46 and 52, it will immediately slide over the plates 51 and 54, or permit the latter to pass therebeneath so that the arm 36 can swing toward the arm 26 under the action of the spring 42 until the forward edge of the strip 49 engages the shoulder 33 when the parts are again in normal position to act as described for causing a repeating or replaying of the record as before. Attention is also directed to the fact that by making the hole or holes 24 in the record larger than the pin 28, sufficient or slight play may be allowed the plate, or disk 23 and parts mounted thereon, especially the rigid arm 26, so as to allow movement to said arm 26 with the plate 23 when the needle 18 engages the inclined and beveled edge portion 34 and rides up on the lifting plate or toe portion 30 of the arm 26 and then engages the elevated plate 51 at the edge 52 and guide finger 43 at the edge 46 and crotch of the V-notch 52 to hold the arm 36 while the arm 26 turns with the plate 23, record 20 and turntable 21, to cushion the engagement at such points.

In practice, the device as shown in Figs. 1 to 4, inclusive, is placed on the shaft 11 and record 20 with the hole 25 receiving the shaft and the pin 28 engaging a hole 24 in the record so as to rotate therewith when the motor shaft 11 and turntable 21 are driven. This mounts the device in position extending substantially diametrically of the center portion of the record and the substantially parallel but slightly divergent arms 26 and 36 extending radially so that the plate or toe portion 30 and the notch are in circumferential alignment with the spiral groove or concentric circular groove at the inner end of the sound track or groove 19. After the motor is started as by the switch 15, the tone or pickup arm 16 is swung to place the needle 18 at the outer end of the sound groove 19 with the table 21 and record 20 revolving with the motor shaft 11 to play the record. When the playing is finished the needle 18 at the inner portion of the groove 19 will clear plate 23, but engages and rides up on the toe portion or lifting plate 30 as seen in full lines in Fig. 6 and is guided by the inclined portion 35 against beveled portions 46 or 52 into the notch and onto the portion of the plate 54 therebeneath as seen in Fig. 5 and in the intermediate dotted line position in Fig. 6. This holds the arm 36 against turning with shaft 11, table 21, plate 23, arm 26 and the action of the spring 42 tending to hold it toward the arm 26 with the bumper edge 50 of strip 49 engaging the shoulder 33 and permits these parts to separate and the arm 26 and the inner end of the arm 36 to continue to turn with the record, table and motor shaft while the outer end of the arm 36 is held against rotation and swings outwardly across the record away from arm 26 and shaft 11 until the arms 26 and 36 are fully spread apart in opposite radial positions, or substantially in alignment radially or diametrically of the record as seen in Figs. 7 and 9, and swings the needle 18 with the arm 16 on the arc 55 to move the needle 18 to the outer end of the sound groove 19. In this position,

when the shoulder 41 strikes the end, edge, or stop shoulder 38 as shown in Fig. 9, further movement of arm 36 relative to arm 26 or spreading thereof is arrested so that the needle 18 moves over the upper plate 51, drops down on the plate 54 and slides onto the record or vice versa as the record turns and the plates 51 and 54 are held and into the groove thereof for repeating or replaying of the record. This releases the arm 36 and under the action of the spring 42 which has been placed under tension by the spreading of the arms 26 and 36, the arm 36 is returned to its normal position adjacent the arm 26 until and when the bumper edge 50 of strip 49 engages the shoulder 33 to again place the parts in position to act as just described.

It should also be noted from Figs. 2 and 4 that the inclined beveled edge portion 34 extends in a direction in back of or offside with respect to the shaft 11, to prevent turning of the device and especially the pivoted or swinging arm 36, to the left or clockwise instead of toward the right or anti-clockwise away from the arm 26 as the latter turns with the supporting or base plate 23, record 20, turntable 21 and shaft 11, sliding of the needle off of the arm extension or toe portion 30 and jamming against the adjacent free end of the rigid arm 26. This is also prevented by the beveled or inclined diagonal or oblique edge 29, thus insuring that the needle 18 will engage in the crotch of the V-notch between edges 46 and 52 and cause the needle to move to the outer portion of the record 20 and sound groove 19 with the arm 36 of plate 23 as the latter continues to turn.

It is also to be understood that the base plate may be otherwise suitably mounted on the record to rotate therewith eccentrically of the shaft, and that the repeating means may engage a needle or other protrusion or depending member on the tone arm to raise the latter and the playing needle from the record, move or swing the tone arm outwardly to the outer portion of the record and sound groove, and then deposit or lower the tone arm for reengagement of the playing needle with the record sound groove at such point for replaying of the record.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a record repeater a base, means for mounting said base on a record to rotate there-

with during playing of said record, a pair of arms carried by said base, one of said arms being fixed while the other arm is movable relative to the fixed arm, said fixed arm having a free end projecting beyond said base, means on said free end for picking up a needle off of said record, said movable arm also having a free end, means on said free end of said movable arm for receiving said needle from the free end of said fixed arm, and stop means associated with said receiving means and adapted for cooperation with said needle whereby engagement of said stop means by the needle causes movement of said movable arm to swing said needle outwardly of said record.

2. In a record repeater a base, means for detachably mounting said base on a record to rotate therewith during playing of said record, a fixed arm carried by said base and having a free end projecting beyond said base, means on said fixed end for picking up a phonograph needle after playing of said record, a swinging arm pivotally mounted on said base and also having a free end, means on said free end of said swinging arm for receiving said phonograph needle from the free end of said fixed arm, and stop means associated with said receiving means and adapted for engagement by said needle to cause said swinging arm to swing outwardly and move said needle outwardly of said record.

3. In a record repeater a base, means for causing said base to rotate with a record during playing of said record, a fixed arm on said base and having a free end projecting beyond said base, a pickup plate carried by the free end of said fixed arm for picking up a phonograph needle off of said record, a movable arm carried by said base that is movable relative to said fixed arm, said movable arm also having a free end, a receiving plate carried by said free end of said movable arm and adapted to receive said needle from said pickup plate, and upraised stop means carried by said receiving plate adapted to be engaged by said needle to cause movement of movable arm relative to said fixed arm.

4. In a record repeater a base, means for detachably mounting said base on a record to rotate therewith during playing of said record, a fixed arm on said base having a free end projecting beyond said base, a pickup plate on said free arm for picking up a phonograph needle off of said record, a swinging arm pivotally mounted on said base and having a free end projecting beyond said base, a receiving plate on the free end of said movable arm and which receiving plate is adapted to receive said needle from said pickup plate, and upraised stop means on said receiving plate adapted for engagement by said needle to cause swinging movement of said swinging arm.

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