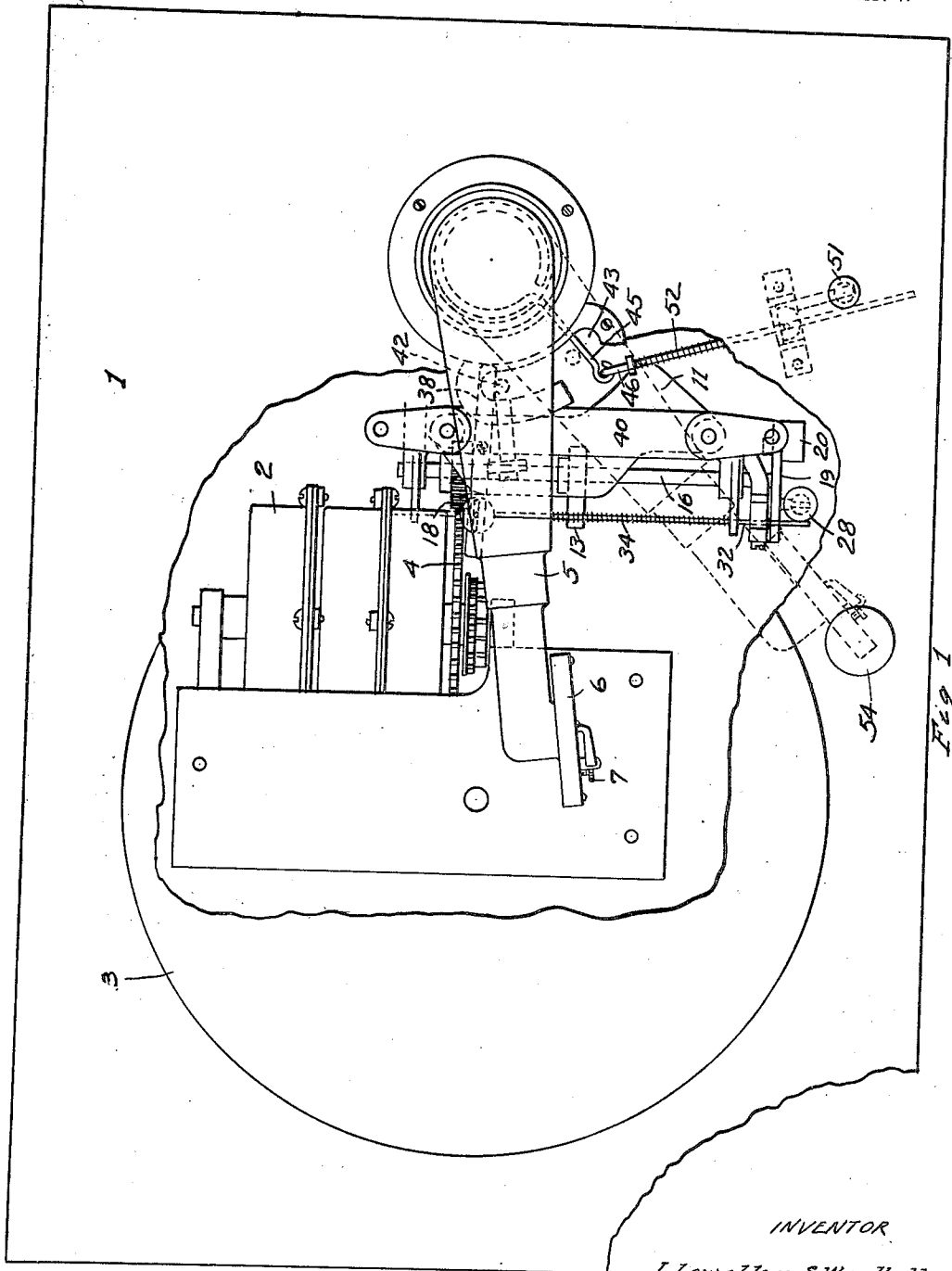


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REPEATING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED OCT. 10, 1919.

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Patented Oct. 3, 1922.
4 SHEETS—SHEET 1.



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Fig. 2.

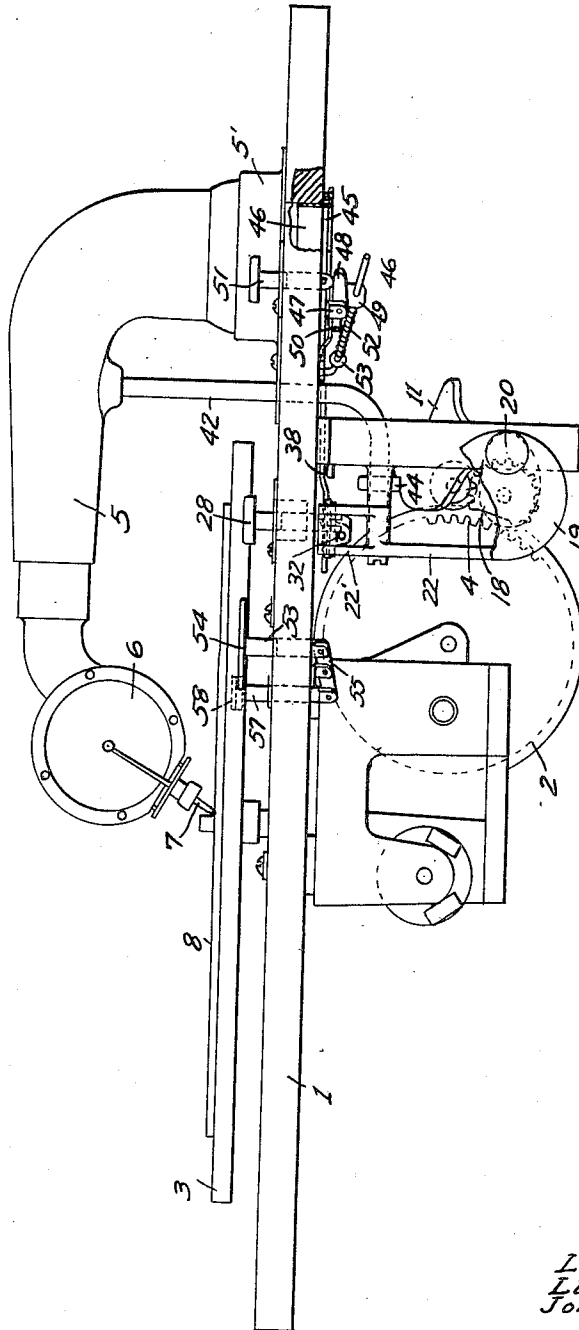
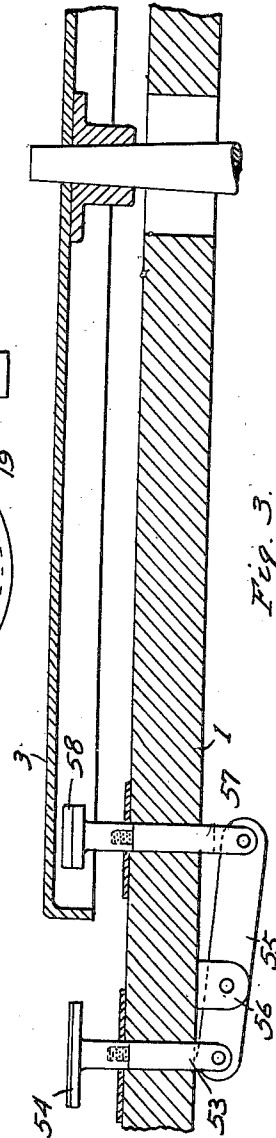


Fig. 3.



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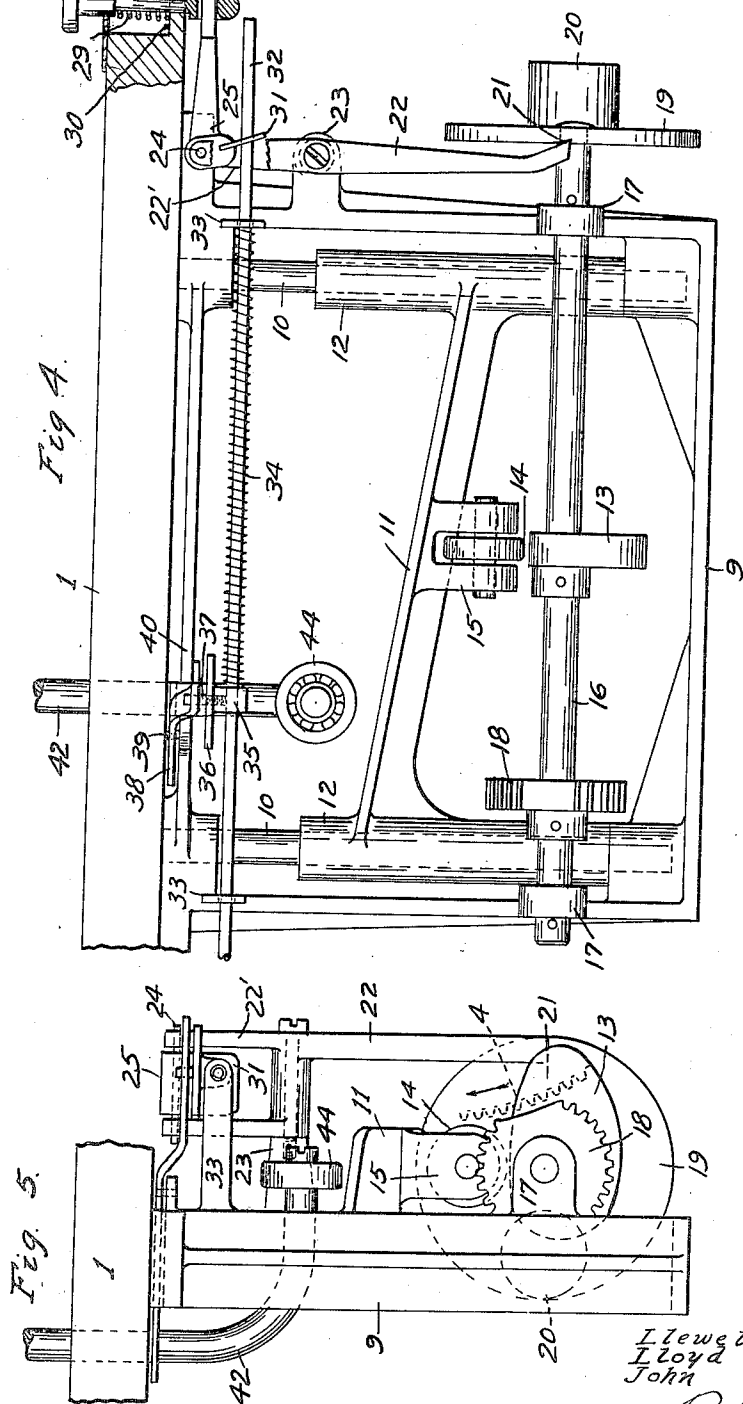
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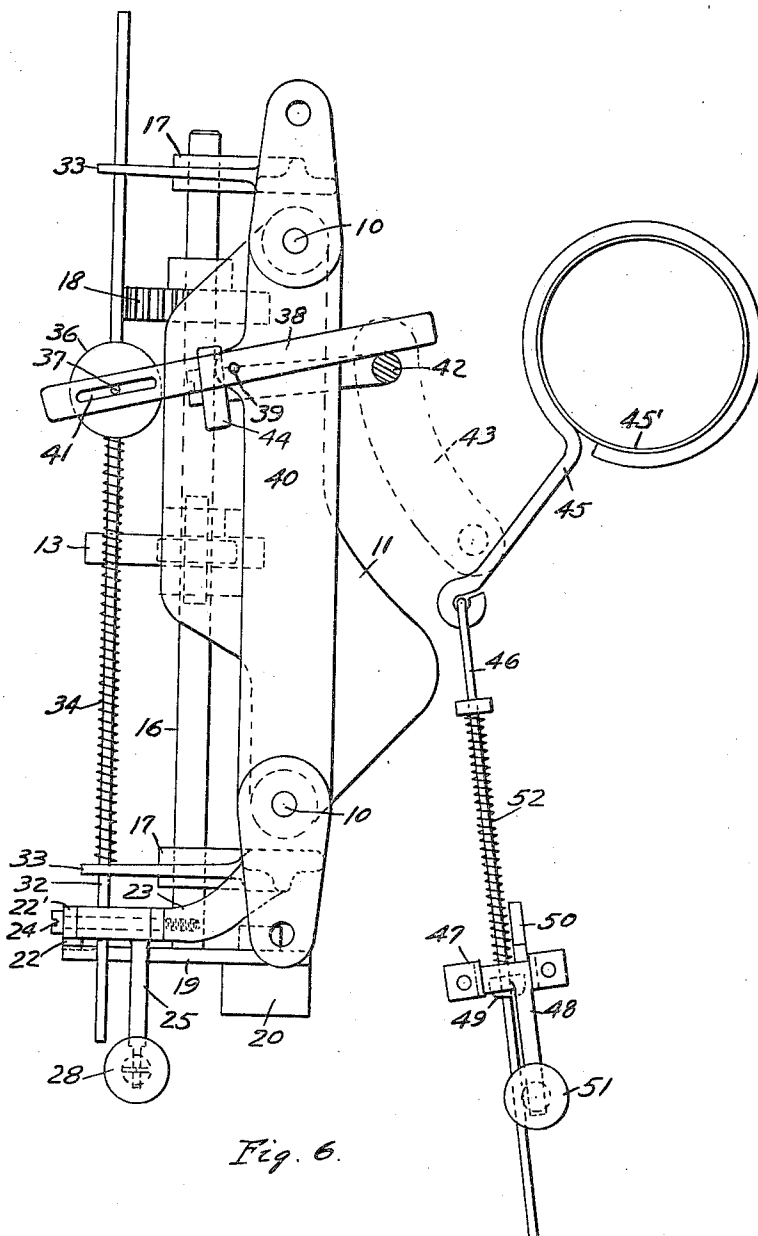


Fig. 6.

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UNITED STATES PATENT OFFICE.

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REPEATING MECHANISM FOR PHONOGRAPHS.

Application filed October 10, 1919. Serial No. 329,742.

To all whom it may concern:

Be it known that we, LLEWELLYN S. WOODHULL, LLOYD M. PRENTICE, and JOHN H. RICE, citizens of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Repeating Mechanism for Phonographs, of which the following is a specification.

This invention relates to phonographs and particularly to means for controlling action of the tone arm of such instruments.

The invention has for its principal object the provision of means for intermittent operation by the driving motor of a phonograph, whereby the tone arm of the instrument may be caused to automatically return and repeat the rendering of a record.

Another object of the invention is to provide in such a device manually adjustable means to limit within predetermined points the effective engagement of the tone arm upon the record so as to cause said arm to traverse such selected portion of the record and repeat the rendition thereof.

A further object is to provide means for controlling the return movement of the tone arm whereby upon completion of the rendering of a record the tone arm may be returned so as to clear the record and position the needle upon a brake actuating pad to automatically stop the motor of the instrument.

In attaining the above objects the invention contemplates the employment of a vertically reciprocatory inclined run-way arranged for intermittent driving engagement with the motor and adapted to engage and impart a raising and return movement to the tone arm, together with adjustable controlling stops and trips for limiting the swinging movement of the tone arm and for effecting establishment of the driving connections for raising and returning said arm to its initial or normal positions.

A preferred structural embodiment of the features of this invention is illustrated in the accompanying drawings, in which,

Fig. 1 is a plan view of a phonograph centrally broken away to show the relation of the motor and tone arm to the controlling mechanism of the present invention, the tone arm being shown in full lines in position to

initiate a return movement and indicating by dashed lines the arm at rest upon the brake pad in the idle position.

Fig. 2 is a side elevation of the parts in the position shown in Fig. 1.

Fig. 3 is an enlarged sectional view through the turn table and motor board showing the brake and its actuating pad in elevation.

Fig. 4 is an enlarged detail in elevation of the vertically movable inclined run-way and mechanism for imparting movement thereto.

Fig. 5 is an end elevation of the parts shown in Fig. 3.

Fig. 6 is an enlarged plan of the repeating mechanism, as shown in Fig. 1, with the tone arm and motor of the instrument omitted.

Referring now to the parts in the drawings by the characters of reference leading thereto, 1 represents the top or motor board of a phonograph and 2 a common type of motor connected in the usual way for driving engagement with the turn table 3 through a gear 4, and from which the repeating mechanism of this invention is also driven. The tone arm indicated at 5 is universally pivotally mounted in a boss 5' on the motor board and carries a sound box 6 and needle 7 adapted to travel in the usual way upon a record 8 mounted on the turn-table 3.

Secured to and depending from the under side of the motor board intermediate the motor and pivotal axis of the tone arm is a rectangular frame 9 having spaced vertically parallel guide posts 10 at opposite ends thereof, and extending between these guide posts is an inclined vertically reciprocatory run-way 11 having sleeves 12 at opposite ends thereof, which freely embrace said posts respectively and serve to guide said run-way in the vertical movement. Movement is imparted to the run-way 11 by a cam 13 engageable with an anti-friction roller 14 journaled in a bearing bracket 15 depending centrally from the under side of said run-way, said cam being keyed to a shaft 16 which is journaled in bearings 17 at opposite ends of the frame 9. Movement is imparted to intermittently rotate the shaft 16 by a mutilated gear 18 keyed thereon in position to mesh with the driving gear 4 of

the motor, and also fixed on this shaft at one end thereof is a disk 19 carrying upon its outer face an eccentrically mounted weight 20 and having formed in its inner face diametrically opposite said weight a tooth or notch 21 engageable with the toothed end of a pawl 22 pivotally mounted near its upper end on a bracket 23 of the frame 9. By this means the pawl acting counter to the rotative tendency of the weight upon the shaft normally retains the mutilated gear out of mesh with the driving gear 4 with the cam also in the idle position as clearly shown in Figs. 4 and 5.

To provide means for releasing the pawl from the disk by movement of the tone arm 5 so as to allow the weight 20 by gravity to initiate movement of the shaft 16 and establish the gear 18 in driving engagement with the gear 4 to cause a rotation of said shaft and movement of the cam to raise the run-way 11, and by which a return movement of the tone arm is effected, the following mechanism is employed:

Pivotally mounted between the terminals 22' of the bifurcated upper end of the pawl 22 upon a pin 24 extended therethrough, is a bell crank 25, one arm of which extends horizontally and is loosely received at its free end 25' within a transverse aperture 26 formed through the lower end of a vertical plunger 27 which extends through the motor board 1 and is provided at its upper end with a push button 28 by which the plunger may be depressed to actuate the bell crank. A coiled spring 29 interposed between the button 28 and a counter-bored seat 30 in the motor board yieldably retains said plunger normally retracted and exerts an upward lifting force upon the arm 25' of the bell crank. The other arm of said bell crank is extended by a comparatively thin plate 31 having a transverse aperture therethrough which freely receives one end of a horizontal push rod 32 and normally acts to bind upon and grip said rod when tilted thereon under the influence of the spring pressed plunger 27, whereby an operative engagement is established for releasing the pawl 22 through movement of the push rod in one direction. This push rod is slidably mounted in brackets at opposite ends of the frame 9, and is embraced by a coiled spring 34, which, abuts at one end against a fixed bracket 33 and at its opposite end against a collar 35 having a disk-like flange 36 through which a screw threaded stud 37 is extended into binding engagement with said rod. Said spring acting through the collar tends to move the rod 32 to the left (with reference to Fig. 4) and this tendency is normally resisted by the bell-crank 25.

A trip-lever 38, pivotally mounted intermediate its ends as at 39 to a cross member

40 of the frame, extends at one end across the face of the disk 36 to prevent rotation of the rod 32 and is provided with a slot 41 which receives the stud 37 and forms a sliding pivotal connection through which motion of the lever is imparted to move the rod longitudinally. (See Fig. 6.) The free end of the lever 38 is extended across the arcuate path of travel of the tone arm 5, and is adapted to be engaged and shifted by the upright portion of a right angled shift arm 42 which is secured at its upper end to the tone arm eccentric to the axis thereof, and extending through an opening 43 in the motor board is provided at its lower horizontal end with an anti-friction roller 44 disposed in vertical alinement above the inclined run-way 11, by which it is adapted to be engaged and raised with the upward movement thereof, and upon which it travels downwardly by gravity, the direction of inclination of the run-way relative to that of travel of the tone arm being such as to impart a reverse movement to said arm after raising the same upon reaching the limit of its initial travel through engagement with the trip-lever 38.

To provide adjustable means for limiting the reverse movement of the tone arm so as to properly position the needle upon the record when repeating a rendition thereof, and also to make provision for so positioning and supporting the tone arm as to automatically effect the stopping of the mechanism upon completion of the rendition of a record, the following mechanism is employed:

A stop arm 45, looped at one end and pivotally embracing a flanged sleeve 45' mounted in the under face of the motor board concentric with the axis of the tone arm, is extended radially therefrom across the opening 43 in said board and across the path of travel of the shift arm 42 with which it is adapted to engage and limit the return movement of the tone arm. (See Figs. 1, 2 and 6.) Pivotally connected at one end to the free end of the stop arm 45 is an adjusting rod 46, and pivotally mounted in a bracket 47 secured to the under face of the motor board is a bell crank 48, one extension of which is formed of a comparatively thin plate 49 transversely apertured to receive the rod 46 upon which it is adapted to bind when tilted angularly thereon under the influence of a spring 50 stressed to act upon the bell crank eccentrically to its pivotal axis. The opposite extension of said bell crank is engaged by a button headed plunger 51 extended vertically through the motor board and adapted when depressed to tilt the bell crank against the tension of the spring 50 and release the plate 45 from binding engagement with the rod 46, which, under influence of a coiled spring 52 com-

pressed between said plate and a collar 53 on said rod will be caused to slide longitudinally in a direction to move the stop arm 45 toward the shift arm 42 where it will be held fixed in adjusted position upon release of the plunger 51.

Mounted to move vertically through the motor board adjacent the turn table 1 and in the arc of travel of the needle in the outward return movement of the tone arm (see Fig. 3), is a plunger 53 having a padded disk head 54 adapted to be engaged by the needle and to be depressed by the weight of the tone arm when at rest. Pivotally connected at one end to the lower end of this plunger is a lever 55 which is fulcrumed intermediate its ends to a bracket 56 on the motor board and pivotally connected at its opposite end to a vertically movable plunger 57 extended through the motor board and carrying a brake pad 58 positioned to normally clear the under face of the turn table 3, but adapted to engage and brake the same through movement of the lever 55 by the plunger 53 when depressed by the weight of the tone arm thereon.

Having described the structural arrangement of parts, the operation of the mechanism will now be understood as follows:

With the tone arm at rest in the position indicated by dotted lines in Fig. 1, a record is placed upon the turn table and the latter is set in motion by the motor upon release of the brake plunger 57 through the raising of the tone arm from the plunger 53. The tone arm is then swung inwardly to position the needle in line with the end of the record, the button 28 is depressed to release the rod 32, which, by the action of the spring 34, will be moved in a direction to swing the free end of the trip lever 38 against the shift arm 42, and upon release of said button said lever will be held in its set position, when the tone arm may then be moved to the outer marginal edge of the record and the needle placed thereon to operate in the usual way.

Upon arrival of the needle at the end of the record in its travel across the face thereof, the shift arm 42 will be caused to engage and impart to the lever 38 movement to shift the rod 32 slightly in the direction of the button 28. The bell crank 25 participates bodily in this movement, being restrained from rocking by the binding engagement of the plate 31 with said rod 32, which engagement is maintained by the spring 29. Through the bodily movement of the bell crank, the upper end of the pawl 22, on which said bell crank is pivoted, is moved correspondingly with the rod 32 and said pawl is thus swung out of engagement with the disk 19, allowing the weight 20 to turn the shaft 16 sufficiently to establish the gear 18 in engagement with the driving gear 4 of the motor. Upon rotation of the shaft the

cam 13 acting upon the roller 14 imparts a vertically reciprocating movement to the run-way 11, and as said run-way approaches the limit of its upward travel it engages the roller 44 of the shift arm 42, raising said arm together with the tone arm and needle. As soon as the needle is raised clear of the record, the weight of the tone arm being transferred to the roller 44, said roller is caused to travel by gravity down the inclined face of said run-way thereby swinging the tone arm while elevated outwardly across the record to its initial position where it will be retarded by engagement of the arm 42 with the stop arm 45, and then lowered into position with the needle resting upon the brake-actuating pad 54 and applying the brake 58 to the turn table simultaneously with the lowering of the run-way by the cam in completing its rotation, at which time the pawl 22 will have engaged the disk 19 and the gear 18 will be held with its mutilated portion adjacent the driving gear in position for re-engagement.

To set the device so as to cause the tone arm to repeat a rendition, said arm is first positioned above the record to present the needle at such point as may be desired to commence the rendering thereof, the button 51 is then depressed, releasing the bell crank grip 49 from engagement with the rod 46, which latter under the influence of the spring 52 is moved longitudinally in a direction to swing the stop arm 45 against the shift arm 42, when by releasing the button 51 said rod and stop arm will be held in adjusted position and the tone arm is then lowered to engage the needle with the record for operation. Upon the needle reaching the end of the record the shift arm 42, engaging the trip lever 38, will set in motion the mechanism for raising and returning the tone arm, as before described, and as said tone arm reaches the limit of its return movement through engagement of the arm 42 with the stop arm 45, the needle will be gently lowered upon the record to its initial position by the gradual action of the cam in lowering the run-way, and a repetition of the rendering of the record will follow.

It will be apparent from the foregoing that by adjusting the lever 42 and stop arm 45 out of the path of travel of the shift arm 42, the tone arm will be free to operate in the ordinary manner and may be manually shifted to and from the record and brake actuating pad to simultaneously effect the starting and stopping of the instrument thereby. It will also be understood that by adjusting the trip lever and stop arm relatively and to the shift arm upon pre-positioning the tone arm with the needle at the beginning and ending of any selected portion of the record, such portion may be rendered and repeated, or the tone arm may be

caused, upon completing the rendering of such portion, to engage the brake actuating pad and automatically stop the instrument.

What we claim is:

- 5 1. In a device of the character described, in combination with the driving motor of a phonograph, means comprising an inter-
mittently operated mechanism actuated by
said driving motor, a vertically recipro-
10 catory run-way adapted to be raised and lowered by said intermittently operated mechanism, a member carried by the tone arm of the instrument adapted to engage and travel
upon said run-way to raise and reverse the
15 travel of said tone arm to lower it to the initial position, controlling means releasable by engagement with said member to initiate movement of said intermittently driven mechanism, and means to limit the return
20 movement of said tone arm relative to a record.
2. In a device of the character described, in combination with the driving gear of a phonograph, a shaft carrying a mutilated
25 gear for intermittent operation by said driving gear, a cam on said shaft, a vertically reciprocatory run-way actuated by said cam, a shift arm carried by the tone arm of the instrument adapted to be engaged by and to
30 travel upon said run-way to raise, return and lower said tone arm, a weighted disk exerting rotative tendency on said shaft, a pawl restraining said shaft counter to said weighted disk, and tripping means actuatable by said
35 shift arm to release said pawl and initiate movement of said shaft to establish said mu-

tilated gear in driving engagement with said driving gear.

3. In a device of the character described, the combination with the tone-arm of a 40 phonograph, of a support attached to said tone-arm, an inclined run-way arranged beneath said support and vertically reciprocatory to engage the same and raise the tone-arm from the record, the inclination of the 45 run-way being such as to induce travel of the tone-arm upon said run-way to its initial position, and means for automatically raising and lowering said run-way in predetermined positions of the tone-arm. 50

4. In a device of the character described, the combination with the tone-arm of a phonograph, of a support attached to said tone-arm, an inclined run-way arranged beneath said support and vertically recipro- 55 catory to engage the same and raise the tone-arm from the record, the inclination of the run-way being such as to induce travel of the tone-arm upon said run-way to its initial position, mechanism for vertically recipro- 60 cating said run-way, actuating means for said mechanism, a releasable drive connection between said actuating means and actuating mechanism, and means for auto- 65 matically establishing said drive connection in a predetermined position of the tone-arm.

In testimony whereof we sign this specification.

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