Dec. 28, 1943. H. L. HARTMAN ET AL 2,337,815

AUTOMATIC STOP MECHANISMS

Filed July 22, 1942 2 Sheets-Sheet 1

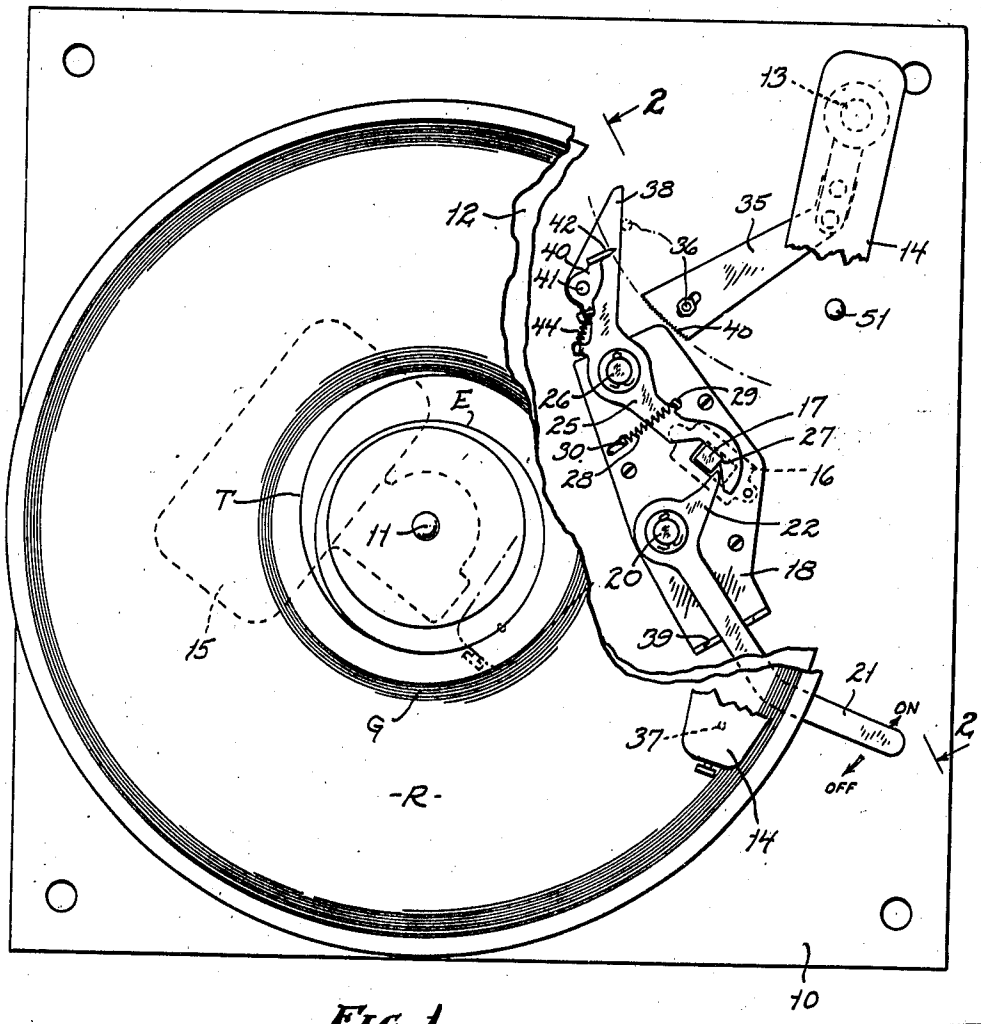


Fig. 1

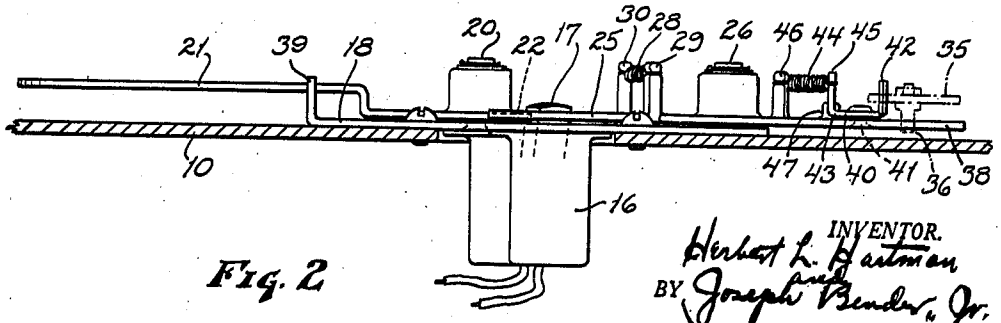


Fig. 2

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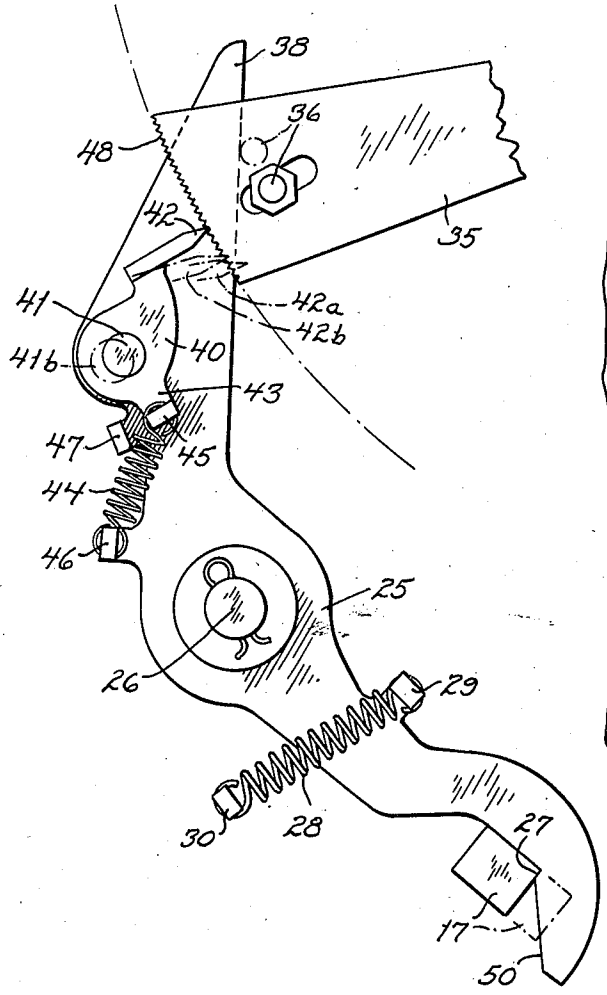


Fig. 3

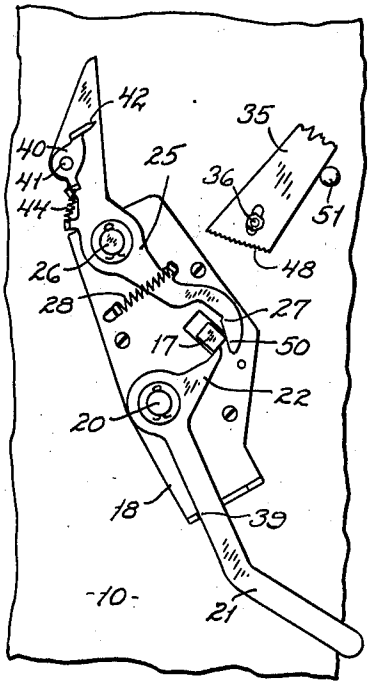


Fig. 4

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UNITED STATES PATENT OFFICE

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AUTOMATIC STOP MECHANISM

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Application July 22, 1942, Serial No. 451,935

3 Claims. (Cl. 192—119)

This invention relates to phonographs and relates more particularly to automatic stop mechanisms therefor.

Our invention relates further to the type of phonographs wherein the phonograph turntable carrying the sound records will be automatically stopped at the conclusion of the play of said records and wherein manually operable means are provided for re-starting the rotation of said turntable.

An object of our invention is to provide an automatic stop for phonographs of the type described which will be simple in operation, composed of relatively few parts, inexpensive to manufacture and efficient in use.

A further object of our invention is to provide means for accomplishing the purposes aforesaid, which means will not only be simple to manufacture but will be silent or substantially so in use.

Other objects of our invention and the invention itself will become more apparent by reference to the following description in connection with the accompanying drawings, in which drawings:

Fig. 1 is a top plan view of an embodiment of our invention.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1 and illustrates the stop mechanism in side elevation;

Fig. 3 is a diagrammatic top plan view of a portion of the mechanism on an enlarged scale, illustrating the parts in another position;

Fig. 4 is a view similar to a portion of Fig. 1 but showing the parts in still another operative position.

In the drawings, at 10 is illustrated a base plate, which is adapted to be mounted in a phonograph cabinet and which carries the usual turntable spindle 11 and turntable 12, as well as the tone arm spindle 13 and tone arms 14 adapted to be associated therewith. Mounted below the base plate is an electric motor geared to the turntable spindle 11 and controlled by an electric switch 16 to rotate the turntable, the throw lever 17 of the switch projecting upwardly through the base-plate 10 and a support 18 mounted thereon.

Our invention relates, as previously stated, to a combined automatic and manual control mechanism for the operation of the switch 16 through the throw lever 17 which permits the switch to be manually actuated to energize the electric motor 15 at the start of a record playing cycle and said switch to be locked in such actuated position until the completion of the playing of the record, the switch then being automatically released to stop the motor. The motor may further be stopped at any time during the playing of a record by means of the manual control.

It will be noted that the throw lever 17 of the switch 16 is, as illustrated, spring-biased toward the non-playing or "off" position, indicated by dotted lines in Figs. 1 and 3, and by full lines in Fig. 4. To move the switch to record playing or "on" position, a manually operated element in the form of a bell crank member is provided. This bell crank member is pivoted at 20 upon the support 18 and has an outwardly projecting long arm 21 extending beyond the outer periphery of the turntable 12 and a record "R" placed thereon so as to be readily accessible to the operator as a manually operated handle. A relatively shorter arm 22 of the bell crank member projects into the path of the throw lever 17 to the "on" position, shown in Figs. 1 and 3.

To lock the switch 16 in the said "on" record-playing position, we provide a latch member 25, which is pivoted on the support 18 at 26 and formed with a slight shoulder at 27 adjacent its throw lever engaging end. This latch 25 is constantly urged toward the switch, as by a tension spring 28 secured to upstanding ears 29 and 30, on the latch and the support respectively. Thus, when the throw lever 17 has been moved a sufficient distance to actuate the switch the shoulder 27 on the latch engages the throw lever, as illustrated in Figs. 1 and 3, and prevents its return.

To release the latch automatically, at the end of the record playing cycle, we utilize the movement of the tone arm 14 as it swings inwardly while following the playing groove "G" of the record. An arm 35 is secured to the tone arm spindle 13, thus partaking of the tone arm movements, and carries a depending pin 36 adapted to be adjustably positioned thereon. As the phonograph needle, indicated generally in Fig. 1 at 37, leaves the final convolution of the playing groove, and is moved inwardly by the usual spiral terminal groove, the pin 36 carried by the arm 35 engages an extension 38 of the latch member 25, as indicated in broken lines in Figs. 1 and 3.

A slight additional movement of the needle is then sufficient to swing the latch and withdraw the shoulder 27 from its locked engagement with the throw lever 17. The latter is thus freed and snaps back to its "off" position, under the influence of its own spring (not shown). In so doing, the throw lever 17 engages the shorter arm

22 of the bell crank and thus moves the longer arm 21 thereof to its original position illustrated in Fig. 4 where it remains resting against a stop 39 extending upwardly from the support 18.

An additional releasing means is preferably provided which will effect unlatching, in cases where records are not provided with the inwardly spiralling terminal groove described or where the groove does not extend inwardly a sufficient distance but is rather provided with an eccentric closed path, as shown at "E" in Fig. 1. In either of these cases the needle reverses its direction, as by meandering idly on the ungrooved inner portion of the record or by being oscillated by the eccentric groove, and we utilize the resulting reversal of movement of the arm 35 to effect the unlatching of the switch to de-energize the motor. As shown in the drawings, a pawl 40 is pivoted at 41 upon the extension 38 of the latch member 25 and is provided with a knife edge 42 and an arm 43. A light tension spring 44 extends between upstanding ears 45 and 46, on the arm 43 of the pawl 40 and latch 25 respectively, and said spring normally retains the arm 43 against an upwardly projecting stop 47 on the latch. The arm 35, which is carried by the tone arm spindle, is further provided with an arcuate end, concentric with the spindle and serrated as at 48.

When the latch 25 is in switch-locking position, the knife edge 42 of the pawl projects within the path of travel of the arm 35, as at 42*a* in Fig. 3, and thus the pawl is rocked counterclockwise about its pivot 41 by the arm 35 and engages the teeth 48 as the tone arm reproducing needle reaches the end of the playing groove "G." The pawl 40 is, at this time, in the full line position of Fig. 3 and the knife edge 42 engages the arm 35 and as the arm 35 continues its forward motion, the teeth 48 slip past the knife edge 42 one by one. Upon any slight reversal of direction, however, the knife edge is moved in a clockwise direction, Fig. 3, to a position such as shown in broken lines at 42*b* and the pivot 41 is forced backwardly to the position 41*b*. This movement of the pivot 41 by the arm 35 swings the latch 25 counterclockwise about its pivot 26 sufficiently to release the shoulder 27 from its contact with the throw lever 17, and the switch returns to its "off" position.

A third and manual means is preferably provided whereby the motor may be de-energized at any time by the operator. For this purpose, the latch member 25 is extended beyond the shoulder 27 to provide an oblique face 50 which is adapted to be engaged by the end of the bell crank arm 22. It will be noted in Fig. 1 that clockwise movement of the bell crank, by means of the handle 21, from the position there shown, will cam the oblique face 50 to the right. The latch member 25 will thus be turned counterclockwise about its pivot 26 to withdraw the shoulder 27 from the throw lever 17 to release the switch.

The throw lever 17 of the switch may be manually reset and automatically latched in position at any time after the tone arm has been swung outwardly a sufficient distance to cause the arm 35 to clear the knife edge 42 and thus to allow the latter again to project within the path of the arm's arcuate end. A stop pin 51 is preferably provided which, on being engaged by the arm 35, Fig. 4, limits the outward swing of the tone arm. It will also be noted that the turntable spindle 11 itself comprises an inward stop for the tone arm whereby the arm 35 is prevented from swinging so far as to cause the pin 36 to travel beyond the extension 38 of the latch 25.

Thus, it can readily be seen that we have provided a simple and efficient switch control for phonographs manually initiated and manually stopped at any time during a record playing cycle but which, in any event, at the termination of a record playing cycle, will be automatically stopped whether said record be provided with a terminal groove or not.

We have shown and described herein but a single embodiment of our automatic stop mechanism but it will be apparent that numerous changes and departures could be made from the form herein illustrated and described but without departing from the spirit of our invention and the scope of the appended claims.

We claim:

1. In a phonograph, the combination with a tone arm of an electric motor and switch means therefor whereby said motor may be energized to communicate movement to a turntable, of manually operable means comprising a handle portion and a switch engaging portion, latch means interposed between said manually operable means and an arm carried by said tone arm, said latch means having a shoulder portion adapted to lock said switch in motor operating position after said switch has been placed in such position by said manually operable means, means further carried by said latch means adapted to be contacted by said manually operable means to withdraw said shoulder from its locked engagement with said switch whereby said switch is restored to its "off" or non-operating position.

2. In a phonograph, the combination of manually operable means pivotally secured to a support mounted upon a phonograph base, said manual means being provided with a projecting tongue portion, an electric motor disposed beneath said support and having a motor switch associated therewith, said motor switch having a throw lever, said throw lever projecting through said support and adapted to be engaged by said tongue portion of said manual means whereby said throw lever is placed in "on" position whereupon said switch is engaged by locking means carried by latch means pivoted upon said support, an arm carried by said tone arm and extending laterally thereof, said laterally extending arm adapted to engage a portion of said latch means whereupon said latch means is rotated in a substantially counter-clockwise direction about its pivot, the locking means carried by said latch being moved out of contact with said throw lever and said throw lever being restored to an "off" position.

3. In a phonograph, a turntable, a turntable baseplate, a motor energizing switch, said switch mounted on the underside of the baseplate, a throw lever secured to said switch and adapted to actuate said switch wherefore the motor may be energized or de-energized as desired, said throw lever projecting upwardly through said base plate, manually operated control means mounted upon said base plate and adapted to contact said throw lever to cause said switch to be actuated, latch means associated with said throw lever, said manually operated control means comprising a bellcrank member having a pair of arm members, one arm member being relatively longer than said other arm, said longer

arm being manually operated to cause said shorter arm to be projected into the path of said throw lever engaging said throw lever and moving the same to "on" position, said latch means locking said throw lever in said "on" position by means of a shoulder portion provided on said latch means engaging said throw lever and retaining said shorter arm in engaged contact with the said lever, a tone arm, an arm carried by said tone arm adapted to contact said latch means at the conclusion of the playing cycle whence said latch is swung out of its locked position with said throw lever, the said lever under the influence of spring means associated therewith snapping back into its original spring biased "off" position carrying with it in its rearward movement the shorter arm of said bellcrank whereby the said longer arm of said bellcrank is returned to its original "off" position.

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