Jan. 13, 1942. T. M. WRIGHT 2,270,179

TONE ARM TRIP MECHANISM FOR PHONOGRAPHS

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Fig. 1.

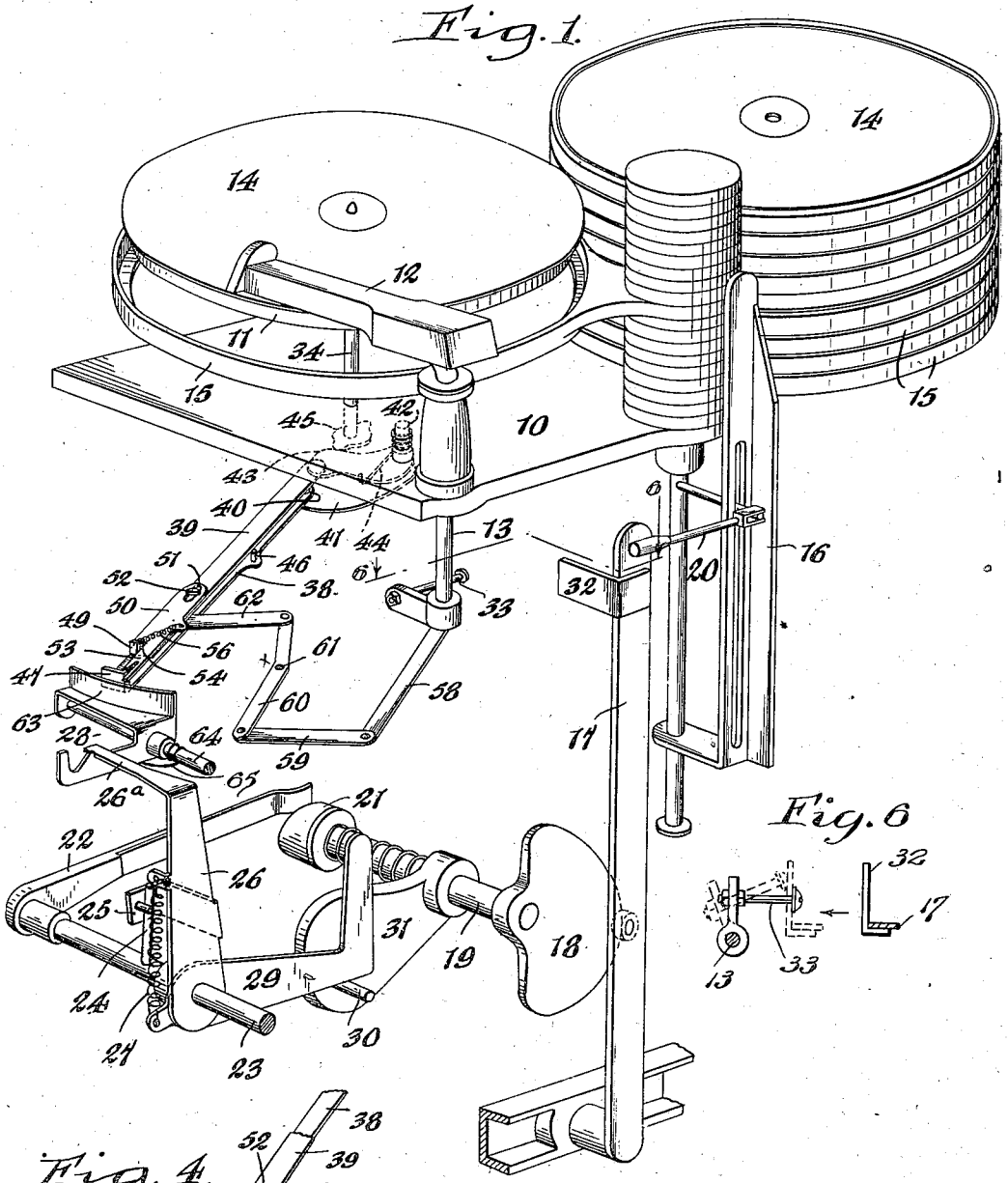
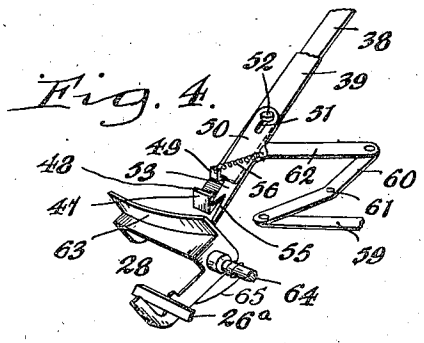


Fig. 6

Fig. 4.



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Fig. 2.

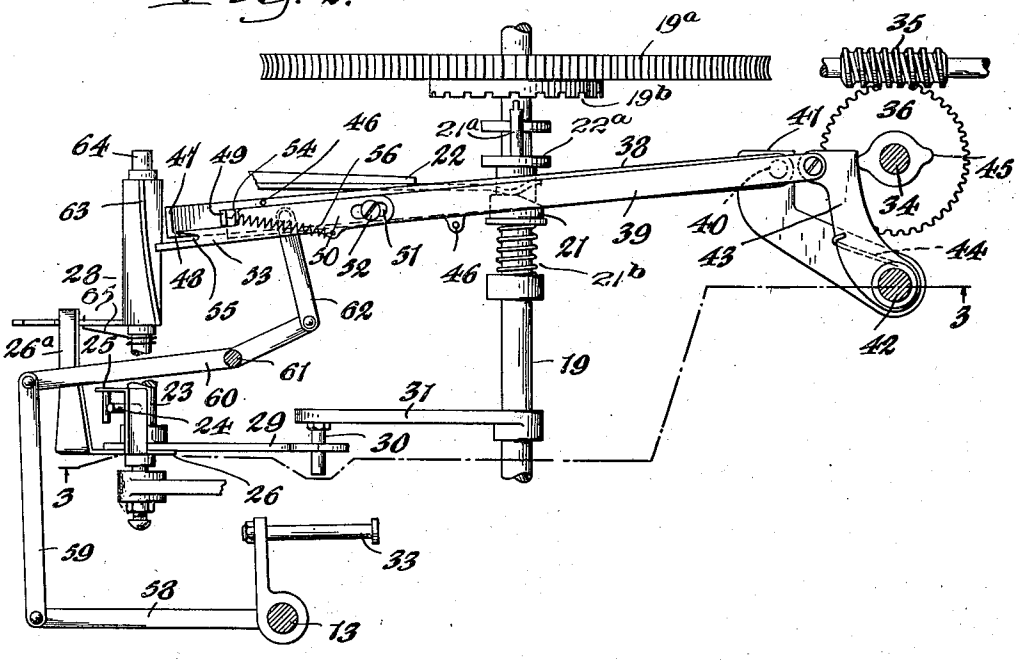
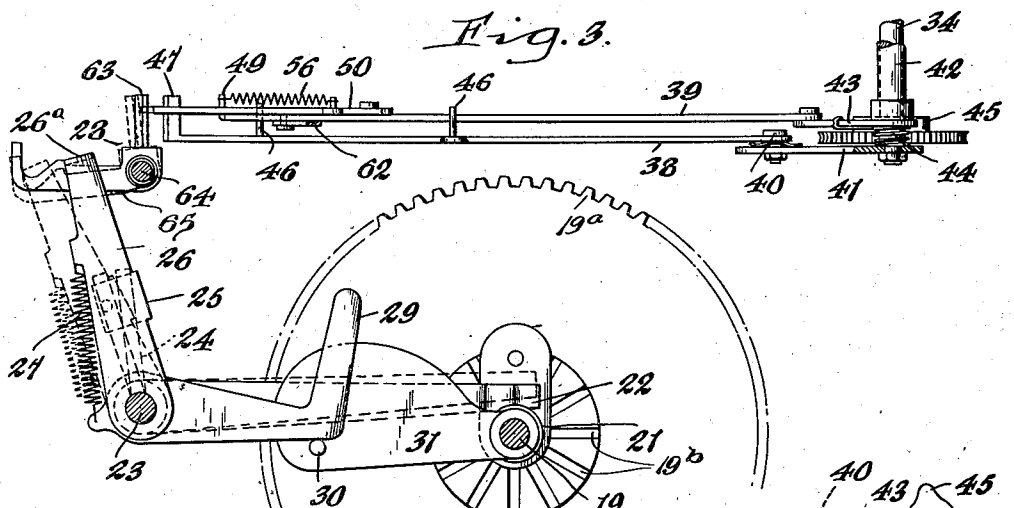


Fig. 3.



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2,270,179

TONE ARM TRIP MECHANISM FOR PHONOGRAPHS

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Application March 17, 1939, Serial No. 262,463

6 Claims. (Cl. 274—1)

This invention relates to certain new and useful improvements in tone arm trip mechanisms for phonographs for automatically controlling the restoration of the tone arm and the actuation of other parts of the instrument to initial or starting position at the completion of playing a record.

It has for one of its objects to provide a trip mechanism of this character which is so designed as to be effectually actuated upon an abnormal inward swing of the tone arm, as when its stylus encounters the terminal groove of the record or even a record which has no such groove.

Another object of the invention is to provide a simple, reliable and positive tone arm trip mechanism which is operatively associated with and governed from the turntable-axis and tone arm axis to normally effect an idling or non-effective action of such mechanism, as during the playing of a record, and to automatically impart an effective tripping stroke thereto at the end of the playing of the record.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a fragmentary perspective view of an automatic phonograph showing my improved trip mechanism associated therewith. Figure 2 is a top plan view, partly in section, of the trip mechanism, the same being shown in its idling or non-tripping position. Figure 3 is a cross-section taken on line 3—3, Figure 2. Figure 4 is a fragmentary perspective view showing the trip mechanism in tripping position. Figure 5 is a fragmentary plan view of the trip-governing elements and associated parts, showing the position of the trip pawl in its instroke position, preparatory to being displaced to a tripping position. Figure 6 is a fragmentary horizontal section taken on line 6—6, Figure 1.

Similar characters of reference indicate corresponding parts throughout the several views.

By way of example, my tone arm trip mechanism has been shown in connection with an automatic selective phonograph of the type shown in the Wilcox Patent No. 2,002,236, dated May 21, 1935, 10 indicating the platform or supporting frame of the phonograph chassis, 11 the turntable, 12 the tone arm or reproducer mounted on an upright post 13 for lateral swinging movement over the selected record. Each record 14 may be carried in a horizontally-swinging tray 15 which is adapted to be selectively swung from a stack position at one side of the turntable to an operative position over the turntable. A vertically-adjustable selector yoke 16 is adapted for coupling engagement with one or another of the record trays to selectively swing it from the carrier stack to a position over the turntable and this swinging of the yoke is effected through the medium of a vertically-swinging lever 17 operated by a cam 18 fixed on a driven cam or operating shaft 19 and connected at its upper end by a link 20 with such yoke. A suitable clutch 21 controls the rotation of the cam shaft, the clutch being released during the playing of a record and being engaged to rotate the cam shaft and restore the record-changing mechanism including the carriers 15 as well as the tone arm to its initial position. A clutch-actuating lever 22 is fixed on an oscillatory shaft 23 having a radial rod 24 projecting therefrom in operative relation with a lug 25 formed on an actuating arm 26 pivoted to such shaft and having a spring 27 applied thereto for urging it in a direction to bring its lug in abutting relation with the rod to effect engagement of the clutch. At its upper end the arm 26 has a lateral projection 26a which is adapted to be latched in clutch-releasing position to a pivoted tappet or latch member 28 associated with and governed by the improved tone arm trip mechanism. The spring 27 is connected at its lower end to a substantially L-shaped lever 29 pivoted to the shaft 23 and engageable with a pin 30 projecting from a cam 31 applied to the shaft 19. In the playing position of the phonograph, the cam-pin 30 holds the latching arm 26 in a position to place the spring 27 under tension, so that when a record has completed its play and the tone arm trip mechanism is rendered operative to release it from latched engagement with the arm-projection 26a, the spring will thereupon actuate the latching arm in a direction to rock the shaft 23 and shift the clutch-actuating lever 22 to a position to effect the automatic engagement of the clutch 21 and thereupon render the record-changing mechanism operative to restore the played record to the stack and return the tone arm to its initial position. The return of the tone arm to its initial position may be effected simultaneously with the swinging of the carrier back to the stack by the lever 17 and for this purpose the latter has a projection 32 arranged to engage an arm 33 applied to the lower end of the tone arm post 13.

As shown in Figure 2, the turntable-spindle 34 may be driven by a worm and worm wheel 35 and 36, respectively, the worm being driven from

an electric motor or other source of power. Likewise, the clutch-controlled operating shaft 19 may be driven by a similar worm meshing with a worm wheel 19a having an annular row of notches 19b in one face thereof with one or another of which a pin 21a on the shiftable sleeve 22a of the clutch 21 is adapted to engage. A spring 21b normally urges the sleeve in a direction to bring its pin into engagement with a companion notch in the worm wheel 19a.

The improved tone arm trip mechanism is so designed that it is operatively associated with and governed by the combined movements of the tone arm and turntable-spindle about their respective axes, so that during the normal playing of the record the tone arm moves uniformly inwardly and the movement of the turntable-spindle merely imparts an idling motion to the trip mechanism without effectually actuating it to a trip position. However, whenever the abnormal inward swing is imparted to the tone arm, as when the playing of the record is completed, an effective stroke is imparted to the trip mechanism to actuate it to a trip position and shift the clutch to its operative or engaged position to render the record-changing mechanism operative and to restore the tone arm to its initial position. In the preferred embodiment of this trip mechanism shown in the drawings, it is constructed as follows:—

The numerals 38 and 39 indicate parallel superposed trip-governing elements which are mounted for relative linear and lateral movement in a substantially horizontal plane, the lower element 38 having a friction pivot connection 40 with a bracket plate 41 applied to a post 42 depending from the platform 10 adjacent the turntable-spindle 34. As shown in Figures 1 and 2, these elements are disposed generally radially relatively to the spindle-axis and in opposing endwise relation to the pivoted tappet 28. The upper trip-governing element 39 is pivotally connected at its inner end to a horizontally-swinging arm 43 pivoted to the post 42 and having a spring 44 engaging the same for constantly urging said arm to rock in a direction toward the turntable-spindle. Mounted on the latter is a cam 45 with which the arm 43 engages so that during the rotation of the spindle the rock arm is intermittently rocked in and out and the attached trip-governing element 39 is reciprocated in a like direction relative to the companion trip element 38, both trip elements, however, being caused to jointly swing laterally about their respective pivots, in response to the tone arm movements as hereinafter described. Relative lateral displacement of the trip elements 38, 39 is limited in each direction by pins 46 rising from opposite sides of the lower element 38 for edgewise engagement with the upper trip element. At its outer free end the lower trip element terminates in an upstanding lug or shoulder 47 which is provided at one edge with an inwardly-facing tooth-like projection 48, while the companion upper trip element 39, which is somewhat shorter than the lower trip element, terminates at its outer free end in an upstanding lug or shoulder 49.

Pivotally mounted on and adjacent the outer end of the upper trip-governing element 39 for pivotal and longitudinal movement relative thereto is a tripping pawl 50 for actuating the tappet 28 to clutch-releasing position and connected through a longitudinal slot 51 with a pivot screw 52 borne by the upper trip-governing element. The outer or free end of this pawl has an extension 53 resulting in an outwardly-facing shoulder 54 which is disposed in alinement with the lug 49 of such element to abut against the same in the tripped position of the pawl, as shown in Figure 4. Formed at the outer end of this pawl-extension 53 is a substantially V-shaped notch or throat 55, which is adapted to move into and out of register with the tooth-like projection 48 on the lug 47 during the reciprocating movements of the trip-governing element 39. A spring 56 connected to this pawl and the lug 49 of the upper trip-governing element serves two functions, firstly, to normally urge the pawl longitudinally outwardly with its notched end in cooperating relation with the tooth-like projection 48, and, secondly, to laterally swing the pawl about its pivot 52 so that the inner edge of its extension 53 bears against the opposing edge of the lug 49, as shown in Figures 1 and 2. During the playing of the record the spindle-cam 45 reciprocates the upper trip-governing element 39, and during this period the pawl 50 is maintained in substantially alining relation thereto with the spring 56 urging the pawl in a direction to bring its V-shaped throat 55 into registering engagement with the lug-tooth 48. The relationship of the pawl-pivot 52 and its mating slot 51 is such that during the in-stroke movement of the reciprocating element 39, the pivot abuts the inner end of the slot and shifts the pawl lengthwise therewith to free the notched end thereof from the tooth 48, as shown in Figure 5. During the out-stroke movement, the pawl is freed from abutting engagement with its pivot and is urged by the spring 56 into engagement with said tooth, as shown in Figure 2. This movement of the parts initiated by the spindle-cam is merely an idling one and there is no lateral displacement of the tripping pawl effected until an abnormal movement of the tone arm takes place, as when entering the extension groove in the record, at which time an abnormal lateral displacement of the upper trip-governing element 39 together with the tripping pawl 50 is effected to bring the parts to a trip-operating position.

The lateral displacement of the trip-governing element 39 and its associated pawl 50 is preferably initiated from a connection between the tone arm post 13 and such trip-governing element. As shown in Figures 1 and 2, this connection consists of an arm 58 radiating from the lower end of the tone arm post 13 to turn therewith and connected by a link 59 to one arm of a horizontally swinging lever 60 pivoted intermediate its ends at 61 and having its other arm connected by a link 62 with the upper pawl-governing element 39. By this construction, during the uniform inward swing of the tone arm, as while playing the record, this lever and linkage connection imparts a gradual laterally-swinging movement to the upper element 39 and due to the operative relation between the pawl 50 and the lower trip-governing element 38, the latter is simultaneously displaced with the companion element 39. However, in response to a smart inward swing of the tone arm beyond that effected by that of the playing grooves of the record, the lever and linkage connection abnormally displaces the trip-governing element 39 to swing it and the pawl 50 to a position wherein the notched end of the pawl is disengaged from and out of register with its latching tooth 48 and the spring 56 immediately acts to project the pawl outward

to a tripping position, as shown in Figure 4. In this connection the tappet 28 has a flange 63 thereon disposed in the projecting path of travel of the outer end of the pawl, whereby such tappet is swung about its pivot 64 to release it from latched engagement with the actuating arm 26 and cause the spring 27 connected thereto to rock the clutch-governing lever 22 from its clutch-releasing position to the position for enabling the clutch to be automatically urged to its engaged position.

At a predetermined time in the record-changing cycle, the lever 22 swings down by gravity into engagement with the cam surface of the shiftable clutch element, shown in Figure 2, to effect the release of the clutch and at the same time rock the shaft 23 in a direction to swing the arm 26 to its initial position to bring its projection 26a into latched engagement with the tappet 28.

A spring 65 coiled about the pivot 64 and engaging the underside of the tappet 28 normally urges the latter to its latching position shown in Figure 1.

I claim as my invention:

1. A trip mechanism for the tone arm of a phonograph, comprising a latch member for releasably latching an actuatable part of the phonograph in a normal position, a pair of superposed trip-governing elements generally radiating from the turntable spindle toward said latch member and pivoted for laterally swinging movement, one of said elements being displaceable longitudinally relative to the companion element, means adapted for rotation with the turntable-spindle and operatively engageable with said longitudinally-displaceable element for imparting idling reciprocating movements thereto, a trip device mounted on said longitudinally-displaceable element for movement relative thereto and projectable at a predetermined time into tripping engagement with the latch member, a spring connected to said trip device for normally maintaining it in a non-tripping position and at another time urging it to a trip-seeking position, and means adapted for connection at one end to the tone arm and at its other end to said trip device for moving the latter to a displaced position wherein said spring acts to urge the trip device to a tripping position upon an abnormal inward-swinging movement of the tone arm.

2. A trip mechanism for the tone arm of a phonograph, comprising a latch member for releasably latching an actuatable part of the phonograph in a normal position, a combined linear and laterally movable trip member disposed in operative relation with said latch member for shifting it to a released position, means including a rock arm and cam operatively connecting said trip member with said turntable-spindle for imparting a constant linear movement to such member to and from a given position, and an operative trip-initiating connection between the tone arm and said trip member for laterally displacing the latter upon an abnormal inward-swinging movement of the tone arm and at a predetermined time in the linear movement of such member.

3. A trip mechanism for the tone arm of a phonograph, comprising a latch member for releasably latching an actuatable part of the phonograph in a normal position, relatively movable trip-governing elements disposed between the turntable-spindle and the latch member, a trip member mounted on one of said relatively movable elements for movement into and out of releasable engagement with the companion element and for independent movement when released into tripping engagement with said latch member, a spring applied to said trip member for urging it to a trip-seeking position, means adapted for rotation with the turntable-spindle for imparting uniform relative movements to said trip-governing elements, and means adapted for connection to the tone arm for initiating the movement of the trip member to a trip-seeking position at a predetermined time in the relative movements of the trip-governing elements and upon an abnormal inward-swinging movement of the tone arm.

4. A trip mechanism for the tone arm of a phonograph, comprising a latch member for releasably latching an actuatable part of the phonograph in a normal position, a releasable trip device engageable with said latch member for shifting it to a released position, spring means associated with said trip device for urging it to a tripping position when the same is released, means operatively engageable with the trip device for normally preventing its movement to a released tripping position, and combined reciprocating and laterally-swinging trip-governing means interposed between the latch member and the turntable spindle and on which said trip device is mounted, means adapted for connection to said spindle to rotate therewith and impart reciprocating movement to said trip-governing means, and means adapted for connection at one end to the tone arm and at its other end to said trip-governing means for laterally-swinging the latter and the trip device to a released tripping position upon an abnormal inswinging movement of the tone arm.

5. A trip mechanism for the tone arm of a phonograph, comprising a latch member for releasably latching an actuatable part of the phonograph in a normal position, relatively movable trip-governing elements disposed between the turntable-spindle and the latch member, said elements being pivoted adjacent said spindle for joint lateral-swinging movement, means adapted for connection to said spindle and operatively connected to one of the trip-governing elements for reciprocating it periodically toward and from said latch member, a pivoted trip member mounted on said reciprocating element for movement therewith in one direction to and from coupling engagement with the companion trip-governing element, a spring connected to said trip member for yieldingly urging it in the opposite direction to a trip-seeking position, and an operative connection between the tone arm and said reciprocating trip-governing element for laterally swinging the latter gradually during the normal inward swing of the former, said conection, during an abnormal inward swing of such arm, causing a smart lateral displacement of the reciprocating trip-governing element and the trip member from coupling engagement with the companion trip element and causing said spring to urge said trip member into tripping engagement with said latch member.

6. A trip mechanism for the tone arm of a phonograph, comprising a latch member for releasably latching an actuatable part of the phonograph in a normal position, relatively movable trip-governing elements disposed between the turntable-spindle and the latch member, said elements being pivoted adjacent said spindle for

joint lateral-swinging movement and each having a stop shoulder adjacent the free end thereof, means adapted for connection to said spindle to turn therewith and operatively connected to one of the trip-governing elements for reciprocating it periodically toward and from said latch member, a trip member having a pivotal, sliding connection to said reciprocating element and having shoulders thereon complementary to said first-named shoulders, a spring connected to said trip member for yieldingly urging it normally to a position to bring its shoulders into contacting engagement with the companion shoulders of said reciprocating element, one set of complementary shoulders latching the trip member against pivotal movement and being disengaged at a predetermined time in the stroke of such reciprocating element to permit the release of the trip member, and leverage means between the tone arm and said reciprocating element for governing the pivotal movement of the trip member from its latched shoulder-engaged position to its tripping position upon an abnormal inward swing of the tone arm.

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