Aug. 13, 1940. O. A. HOKANSON 2,211,423

TONE ARM TRIP MECHANISM FOR PHONOGRAPHS

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Fig. 1.

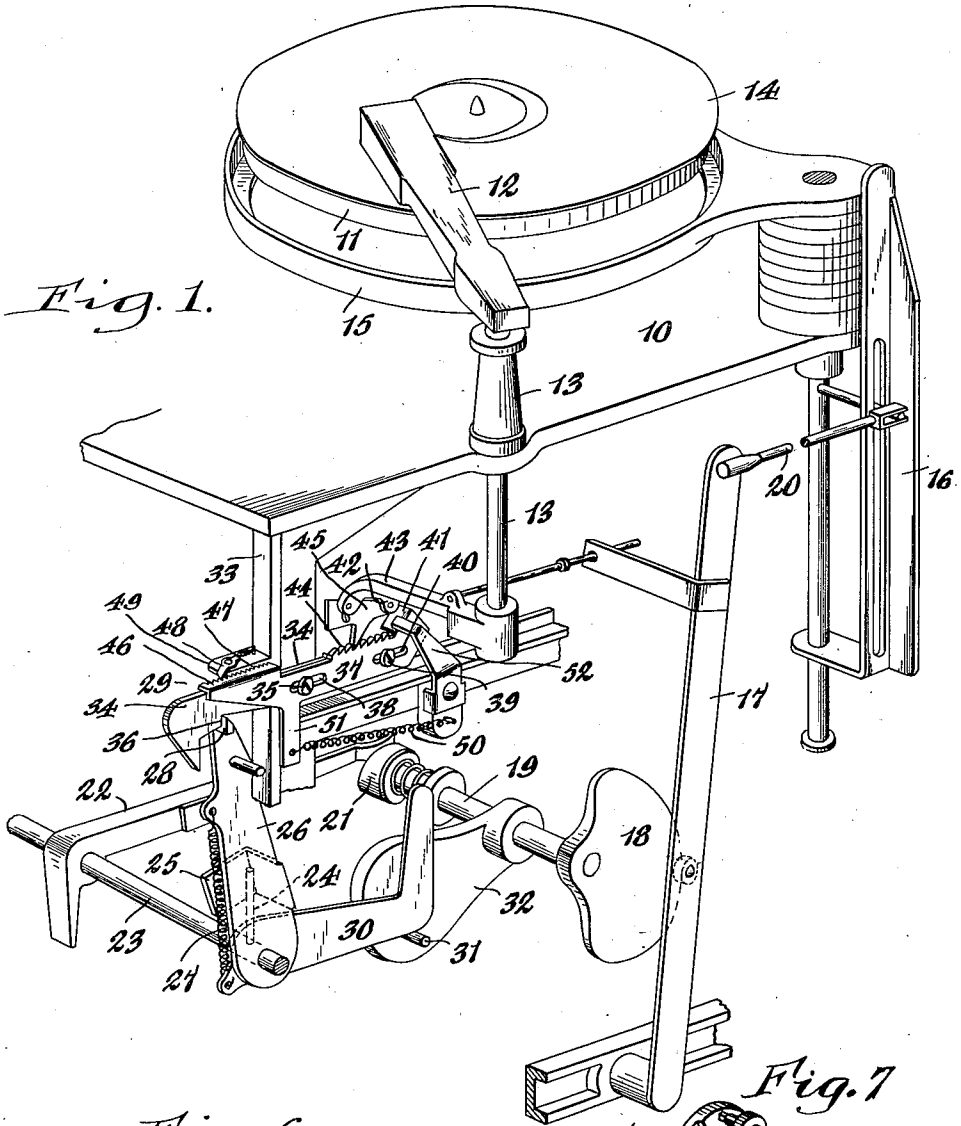


Fig. 6.

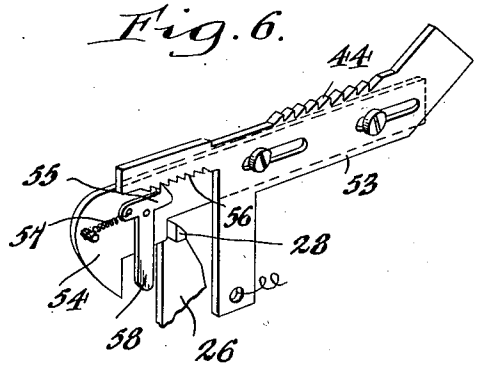
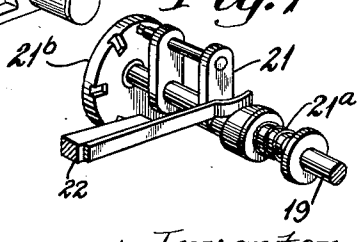


Fig. 7



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TONE ARM TRIP MECHANISM FOR PHONOGRAPHS

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Fig. 2.

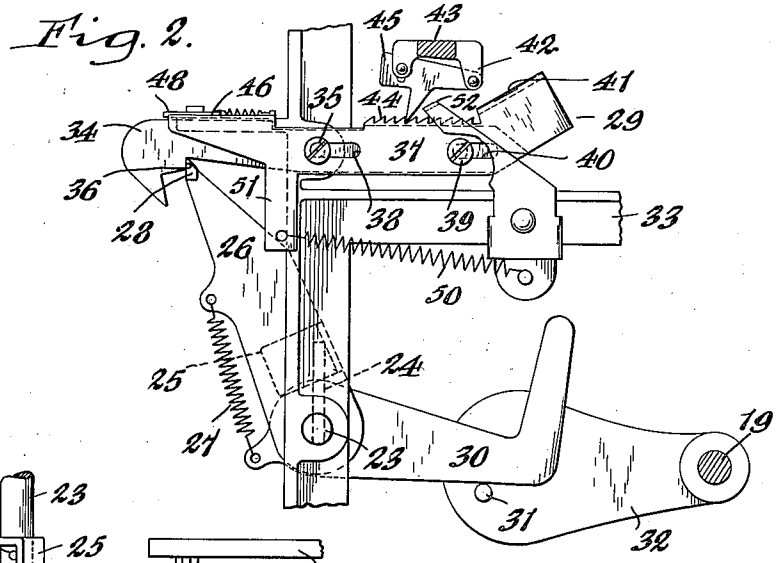


Fig. 3.

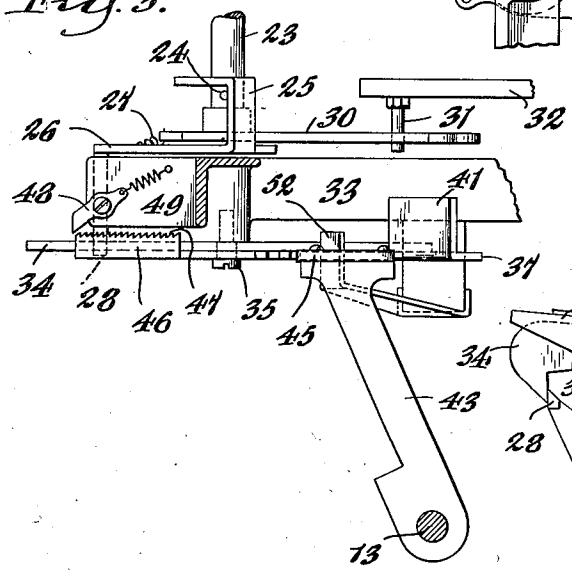


Fig. 4.

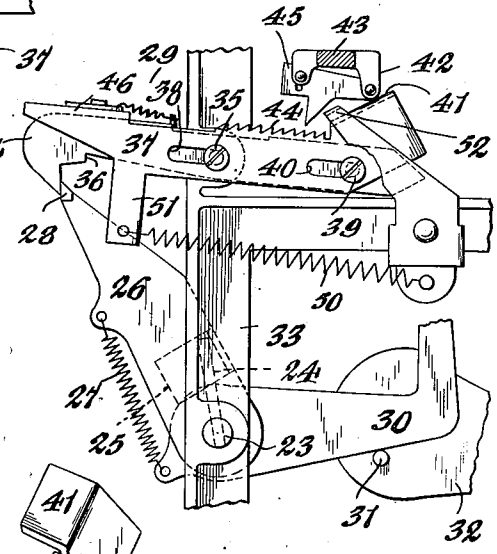
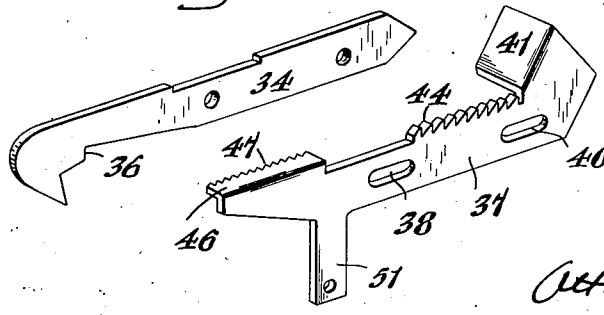


Fig. 5.



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UNITED STATES PATENT OFFICE

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TONE ARM TRIP MECHANISM FOR PHONOGRAPHS

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Application July 18, 1938, Serial No. 219,681

12 Claims. (Cl. 274—1)

This invention relates to certain new and useful improvements in the tone arm trip mechanisms of automatic phonographs for initiating the restoration of the tone arm and 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 has been designed more particularly for use with phonograph records having either the spiral-lead-in or eccentric type of extension groove at the termination of the recording groove, and wherein the trip mechanism is actuated only by the inward stroke or movement of the tone arm effected by its stylus encountering such extension groove.

Another object of the invention is to provide a tone arm trip mechanism which is simple, compact and inexpensive in construction, and which is positive and reliable in operation and not liable to get out of order.

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 mechanism showing my improved tone arm trip mechanism associated therewith. Figure 2 is a side elevation of the trip mechanism with the parts in their normal latched or record-playing position. Figure 3 is a top plan view of the same. Figure 4 is a view similar to Figure 2 but showing the parts in tripped or unlatched position after the playing of a record. Figure 5 is a detached, separated perspective view of the latch bar and trip member of the mechanism. Figure 6 is a fragmentary perspective view of a modification of the latch bar and trip member. Figure 7 is a fragmentary perspective view of the clutch mechanism.

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

By way of example, my invention has been shown in connection with an automatic phonograph of the multi-selective type, 10 indicating the platform or supporting frame of the phonograph chassis, 11 the turntable, 12 the tone arm or reproducer assembly mounted on an upright post 13 for lateral swinging movement over the turntable. As shown in Figure 1, each record 14 may be carried by a companion horizontally-swinging record 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 for playing the record in the manner shown in the Wilcox Patent No. 2,002,236, dated May 21, 1935. 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 lever 17 operated by a cam 18 mounted on a driven cam or operating shaft 19 and connected at its upper end by a link 20 with such yoke. A suitable clutch, such as that shown in Figure 7, and consisting of a shiftable clutch member 21 applied to the cam shaft 19 and having a spring 21^a acting thereon for constantly urging it against the driven clutch member 21^b, 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 initial position. A clutch-actuating lever 22 cooperating with the shiftable clutch member 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 said shaft and having a spring 27 applied thereto for urging it in a direction to bring its lug 25 in abutting engagement with the rod 24. At its upper end the arm 26 has a tooth-like projection 28 which is adapted to be latched to my tone arm trip mechanism indicated generally by the numeral 29. The spring 27 is connected at its lower end to an L-shaped lever 30 pivoted to the oscillating shaft 23 and engageable with a pin 31 projecting from a cam 32 applied to the shaft 19. In the playing position of the phonograph, the clutch 21, 21^b is disengaged and the cam-pin 31 holds the arm 26 in a position to place the spring 27 under tension, so that when the record has completed its play, the tone arm trip mechanism is rendered operative to release it from latched engagement with the arm-tooth 28, whereupon said spring actuates the arm 26 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 member 21 with the companion member 21^b, and thereupon the restoration of the record-changing mechanism, as well as the tone arm, to initial position.

My improved tone arm trip mechanism is adapted for actuation by the customary center record-extension grooves of the spiral-lead-in or

eccentric type and is designed to function or be tripped after the record has been played solely by an in-movement of the tone arm. In the spiral-lead-in type of groove the tone arm is swung smartly inward to operate the trip mechanism, and in the eccentric type of extension groove the tone arm is oscillated in and out and at a given time during an inward stroke of such oscillating action operates the trip mechanism to unlatch it from the actuating arm **26**. This trip mechanism is preferably constructed as follows:

Mounted on a depending support or framepiece **33** of the phonograph chassis for releasable latching engagement with the actuating arm **26** is a vertically-swinging latch bar or dog **34** pivoted intermediate its ends at **35** and provided at its outer end with an inwardly-facing shoulder **36** for retaining engagement with the tooth **28** on the actuating arm and which arm governs or initiates the restoring movements of the phonograph parts to starting position after a record has been played. Coaxially pivoted to swing with the latch bar, and adapted for independent linear or longitudinal adjustment relative to the latter in seeking a tripping position, is a trip member **37** which is disposed alongside the latch bar, being pivotally supported intermediate its ends on the pivot **35** through a slot **38** and having a screw and slot connection **39, 40** at its inner end with the latch bar, whereby to guide the trip member longitudinally of the latter and yet compel its pivotal movement with such latch bar. On the upper side of its inner end the trip member **37** has an inclined trip lug or flange **41** with which a tappet lug **42**, formed on a tappet arm **43** secured to the tone arm post **13**, is adapted to engage on the in-movement of the tone arm to rock the trip member and latch bar downwardly to a released or unlatched position.

Inwardly of this trip lug **41** and in the upper edge thereof, the trip member **37** has a longitudinal row of upright ratchet teeth **44** with which a pivoted feed pawl **45** borne by the tappet arm **43** engages and functions to advance the trip member step by step to a trip-seeking position during the oscillations of the tone arm after its stylus encounters an eccentric type of extension groove. The opposite end of the trip member has a laterally-bent flange **46** overhanging the adjoining edge of the latch bar **34** and such flange has a longitudinal row of horizontal ratchet teeth **47** therein with which an escapement pawl **48** is adapted to engage, such pawl being mounted on a lateral extension **49** of the support **33**. A spring **50** connected at one end to a depending lug **51** of the trip member **37** and at its other end to an adjoining part of the phonograph chassis serves to resist movement of the trip member and latch bar out of normal latched position and further to constantly urge the trip member longitudinally inwardly or in a direction wherein its connecting slots **38, 40** abut at their outer or left hand ends (viewing Figure 1) against the pivot **35** and screw **39**, respectively. In this position of the trip mechanism, the pawl **48** clears the outer end of the flanged-tooth portion **46** of the trip member as it likewise does after a tripping operation, so that during the return swinging movement of the trip member and latch bar this pawl **48** will not interfere with the restoration of these parts to their initial set position. During the travel of the feed pawl **45** over the inclined portions of the ratchet teeth **44**, the companion pawl **48** retains the trip member **37** in respective adjusted positions against longitudinal displacement by the spring **50** and for this purpose the flange-teeth **47** thereof are preferably of less pitch and more in number than the teeth **44**.

Should it be desired to effect a manual tripping of the trip mechanism, I provide a stationary tappet **52** properly disposed in the path of longitudinal travel of the inclined lug **41** of the trip member **37**, so that when the tone arm **13** is picked up and swung outwardly the trip member will be shifted longitudinally outwardly because of the ratchet and pawl connection **44, 45**, and when its trip lug encounters the tappet **52** the trip member and latch bar **34** will be rocked downwardly about their common pivot **35** to unlatch the actuating arm **26**.

In the modification of the trip mechanism shown in Figure 6, the latched bar **53** and trip member **54**, are substantially identical with the corresponding members heretofore described, but in this form of the invention the inward displacement of the trip member is prevented by an escapement pawl **55** pivoted to the outer end of the latch bar and disposed for engagement with a row of ratchet teeth **56** applied to the lower edge of the tail end of the trip member **53**. A spring **57** attached to this pawl constantly urges it into engagement with the ratchet teeth. This pawl has a depending tail **58** which is disposed in the path of movement of the tooth **28** of the actuating arm **26** so that when the actuating arm is released, due to a tripping of the trip mechanism, said tooth encounters the pawl-tail and holds the pawl out of engagement with the companion ratchet teeth **56**. When the trip mechanism and the actuating arm **26** are restored to their initial position, the escapement pawl **55** is urged toward the lower edge of the ratchet tooth end of the trip member.

In operation, when the tone arm reaches the extension groove at the termination of the playing groove of the record, assuming the extension groove to be the spiral-lead-in type, the tappet lug **42** encounters the inclined trip lug **41** on the trip member **37** during the in-swing of the tone arm, to thereby rock the trip member downwardly and unlatch it from the arm **26**. Immediately upon completion of this tripping action, the spring **50** restores the latch bar **34** and the trip member **37** to their initial position, and during this movement it also forces the trip member to the right to its normal position. When the trip member is shifted to its normal position, and its flanged end **46** swung downwardly, such end bearing the horizontally-disposed ratchet teeth **47** is positioned clear of the cooperating pawl **48** so that there is no interference in this restoring movement of the parts. When an eccentric type of lead-in groove is encountered by the tone arm needle, the pawl **45** ratchets over the teeth **44** of the trip member **37** and gradually forces such lever to the left, and the pawl **48** cooperates with the ratchet teeth **47** to hold the trip member in such feed position. At a predetermined time during the oscillating movements of the tone arm, the tappet lug **42**, on an in-movement of the tone arm, encounters the inclined trip lug **41** on the trip member and causes the latter to rock downwardly to release it from latched engagement with the actuating arm **26**.

I claim as my invention:

1. In an automatic phonograph, a tone arm for playing records having extension grooves of either the spiral-lead-in or eccentric type, a releasable actuating means including operative connections

with the tone arm for initiating its restoration to initial position after playing a record, a pivoted latch bar normally latched with said actuating means, and trip means operatively connected to said latch bar and in cooperative relation with said tone arm for pivoting the latch bar from latching engagement with said actuating means only during an inward travel of such arm in the record extension-grooves of either of the aforesaid types, said trip means including a trip member pivoted alongside the latch bar for movement therewith into and out of latching position and for linear movement thereto in seeking a tripping position, and means movable with the tone arm and engageable at a predetermined time with the trip member for advancing it to trip-seeking position and at a subsequent time engageable with said trip member on an in-movement of the tone arm in the center extension groove of the record for jointly pivoting said latch and trip members to an unlatching position.

2. In an automatic phonograph, a tone arm assembly pivoted to swing laterally for playing records having extension grooves of either the spiral-lead-in or eccentric type, the tone arm assembly swinging smartly inward when its stylus encounters a spiral-lead-in-groove type of record and oscillating in and out when its stylus encounters an eccentric-groove type of record, a releasable actuating member for initiating the restoration of the tone arm to its initial outward position after playing a record, a shiftable latch bar latched with said actuating member during the playing of a record, and trip means for shifting the latch bar from latching engagement with said tone arm assembly restoring member after the playing of a record, said trip means including a trip member operatively connected to said latch bar for movement relative thereto to a trip-seeking position and tappet and pawl members operatively connected with the tone arm assembly to move therewith, said pawl being engageable with the trip member during oscillating movements of the tone arm for shifting said trip member to a trip-seeking position toward said tappet, the latter actuating said trip member and latch bar to released position either during a smart inward movement of the tone arm assembly or during an inward stroke of the oscillating in and out movement of such tone arm assembly.

3. In an automatic phonograph, a tone arm assembly pivoted to swing laterally for playing records having extension grooves of either the spiral-lead-in or eccentric type, the tone arm assembly swinging smartly inward when its stylus encounters a spiral-lead-in-groove type of record and oscillating in and out when its stylus encounters an eccentric-groove type of record, a releasable actuating member for initiating the restoration of the tone arm to its initial outward position after playing a record, a shiftable latch bar latched with said restoring member during the playing of a record, and trip means for shifting the latch bar from latching engagement with said tone arm assembly restoring member after the playing of a record, said trip means including a trip member operatively connected to said latch bar to move therewith to and from a latching position and free to move relatively to the latch bar in seeking a tripping position, said trip member having a row of ratchet teeth thereon, and a cooperating tappet disposed in the operating path of said latch trip member in seeking a tripping position and having a pawl thereon engageable with the ratchet teeth of the trip member to advance the latter to a tripping position, said tappet and companion pawl being operatively connected with the tone arm assembly to move therewith for actuating said trip member and latch bar to released position either during a smart inward movement of the tone arm assembly or during an inward stroke of the oscillating in and out movement of such assembly subsequent to the pawl advancing the trip member in step by step fashion to a position in operative tripping relation with said tappet.

4. In an automatic phonograph, a tone arm assembly for playing records having extension grooves of either the spiral-lead-in or eccentric type, a releasable actuating member including operative connections to the tone arm assembly for initiating its restoration to initial position after playing a record, a pivoted latch bar normally latched with said releasable actuating member, a coaxially pivoted trip member having connections between it and said latch bar for compelling a joint pivotal movement of such parts into and out of latching position and permitting an independent, adjustable linear movement of the trip member relative to the latch bar in seeking a tripping position, means applied to the tone arm assembly and operatively connected with said trip member for advancing it to a predetermined tripping position in response to the tone arm movements on its entering the extension groove of the record, and tappet means connected with the tone arm assembly to move therewith into tripping engagement with said trip member on an in-movement of the tone arm in the record-extension-groove.

5. In an automatic phonograph, a tone arm assembly for playing records having extension grooves of either the spiral-lead-in or eccentric type, a releasable actuating member including operative connections to the tone arm assembly for initiating its restoration to initial position after playing a record, a pivoted latch bar normally latched with said releasable actuating member, a coaxially pivoted trip member having connections between it and said latch bar for compelling a joint pivotal movement of such parts into and out of latching position and permitting an independent, adjustable linear movement of the trip member relative to the latch bar in seeking a tripping position, means applied to the tone arm assembly and operatively connected with said trip member for advancing it to a predetermined tripping position in response to the tone arm movements on its entering the extension groove of the record, means for yieldingly urging the latch bar and trip member jointly to a latching position and said trip member in a direction opposite to its tripseeking position, escapement means cooperating with said trip member for releasably retaining the latter in advancing positions of linear adjustment, and tappet means connected with the tone arm assembly to move therewith into tripping engagement with said trip member on an in-movement of the tone arm in the record-extension-groove.

6. A tone arm trip assembly for initiating the movement of a phonograph mechanism to starting position after playing records having extension grooves of either the spiral-lead-in or eccentric type, comprising a pivoted latch bar adapted for releasably latching an actuatable part of the phonograph mechanism in a normal position, a coaxially pivoted trip member having connections between it and said latch bar for compelling a joint pivotal movement of such

parts into and out of latching position and permitting an adjustable linear movement of the trip member relative to the latch-bar in seeking a tripping position, and means adapted for movement with the tone arm and operatively engageable with said trip member to adjust it to a position to effect its tripping and to cause the pivoting of the latch bar to unlatched position on an in-movement of the tone arm in the record-extension groove.

7. A tone arm trip assembly for initiating the movement of a phonograph mechanism to starting position after playing records having extension grooves of either the spiral-lead-in or eccentric type, comprising a pivoted latch bar adapted for releasably latching an actuatable part of the phonograph mechanism in a normal position, a coaxially pivoted trip member having connections between it and said latch bar for compelling a joint pivotal movement of such parts into and out of latching position and permitting an adjustable linear movement of the trip member relative to the latch-bar in seeking a tripping position, a spring connected to said trip member for yieldingly resisting movement of it and the latch bar out of a normal latched position and for yieldingly resisting linear movement of the trip member to trip-seeking position, and means adapted for movement with the tone arm and operatively engageable with said trip member to adjust it to a position to effect its tripping and to cause the pivoting of the latch bar to unlatched position on an in-movement of the tone arm in the record-extension groove.

8. A tone arm trip assembly for initiating the movement of a phonograph mechanism to starting position after playing records having extension grooves of either the spiral-lead-in or eccentric type, comprising a pivoted latch bar adapted for releasably latching an actuatable part of the phonograph mechanism in a normal position, a coaxially pivoted, trip member having ratchet teeth thereon disposed alongside said latch bar and having connections therebetween for compelling a joint pivotal movement of such parts into and out of latching position and permitting a linear movement of the trip member relative to the latch bar in seeking a tripping position, a pawl adapted for attachment to the tone arm and engageable with the ratchet teeth of the trip member for advancing it to a trip seeking position during an out-movement of the tone arm when encountering an eccentric type of eccentric groove, and a tappet adapted for attachment with the tone arm and engageable with said trip member for rocking it and the latch bar to an unlatched position on an in-movement of the tone arm when encountering either type of extension groove.

9. A tone arm trip assembly for initiating the movement of a phonograph mechanism to starting position after playing records having extension grooves of either the spiral-lead-in or eccentric type, comprising a pivoted latch bar adapted for releasably latching an actuatable part of the phonograph mechanism in a normal position, a coaxially pivoted, trip member having ratchet teeth thereon disposed alongside said latch bar and having connections therebetween for compelling a joint pivotal movement of such parts into and out of latching position and permitting a linear movement of the trip member relative to the latch bar in seeking a tripping position, a pawl adapted for attachment to the tone arm and engageable with the ratchet teeth of the trip member for advancing it to a trip seeking position during an out-movement of the tone arm when encountering an eccentric type of eccentric groove, a tappet adapted for attachment with the tone arm and engageable with said trip member for rocking it and the latch bar to an unlatched position on an in-movement of the tone arm when encountering either type of extension groove, and yieldable means connected to said trip member for restoring it to its initial ratcheting position and both the trip member and latch bar to latch-assuming position after the tripping operation.

10. A tone arm trip mechanism for phonographs, comprising adjoining, pivoted latching and trip members having connections therebetween for compelling a joint pivotal movement of such members into and out of latching position and permitting a linear movement of the trip member relative to the latching member, said trip member having ratchet teeth thereon, and means adapted for movement with the tone arm and including a pawl engageable with the ratchet teeth of the trip member for advancing it to a trip-seeking position relative to the latching member and a tappet engageable with said trip member on an in-movement of the tone arm in the center extension groove of the record for pivoting said members to an unlatched position.

11. A tone arm trip mechanism for phonographs, comprising adjoining, pivoted latching and trip members having connections therebetween for compelling a joint pivotal movement of such members into and out of latching position and permitting a linear movement of the trip member relative to the latching member, said trip member having two rows of ratchet teeth thereon, means adapted for movement with the tone arm and including a feed pawl engageable with one of said rows of ratchet teeth for advancing the trip member to a trip-seeking position relative to the latching member and a tappet engageable with said trip member on an in-movement of the tone arm in the center extension groove of the record for pivoting said members to unlatched position, an escapement pawl engageable with the other row of trip member ratchet teeth, and means connected to one of said members for yieldingly resisting their relative linear and joint pivotal movement to trip-seeking and unlatching positions, respectively.

12. A tone arm trip mechanism for phonographs, comprising adjoining, pivoted latching and trip members having connections therebetween for compelling a joint pivotal movement of such members into and out of latching position and permitting a linear movement of the trip member relative to the latching member, said trip member having ratchet teeth thereon, means adapted for movement with the tone arm and including a pawl engageable with the ratchet teeth of the trip member for advancing it to a trip-seeking position relative to the latching member and a tappet engageable with said trip member on an in-movement of the tone arm in the center extension groove of the record for pivoting said members to an unlatched position, and a stationary tappet disposed in the trip-seeking path of travel of the trip member for engagement therewith to pivot said members to unlatched position upon a manual outward swing of the tone arm.

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