Jan. 19, 1943. O. A. HOKANSON 2,308,880

AUTOMATIC PHONOGRAPH

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Fig. 1.

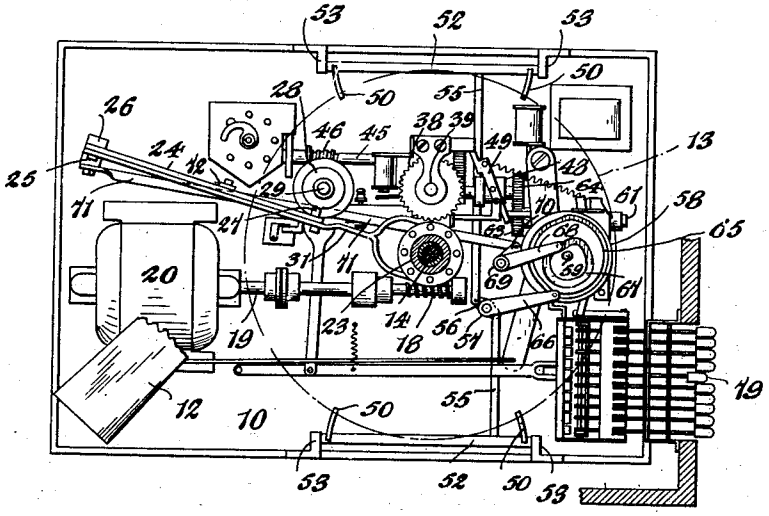


Fig. 2.

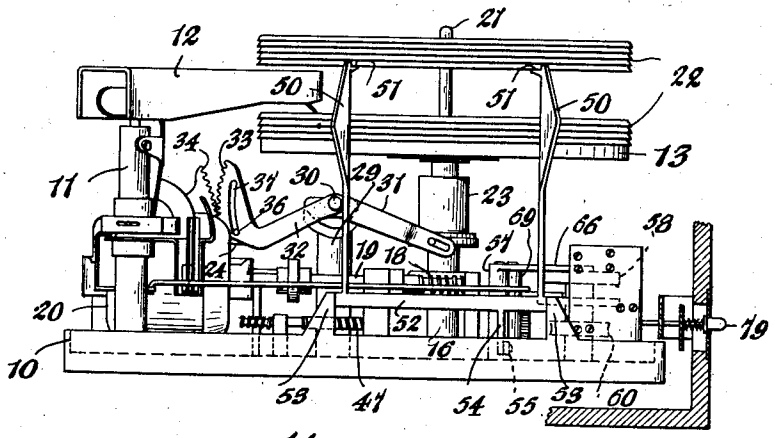
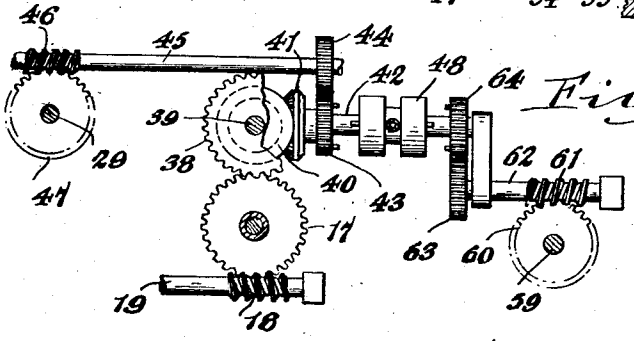


Fig. 7.



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AUTOMATIC PHONOGRAPH

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Fig. 3.

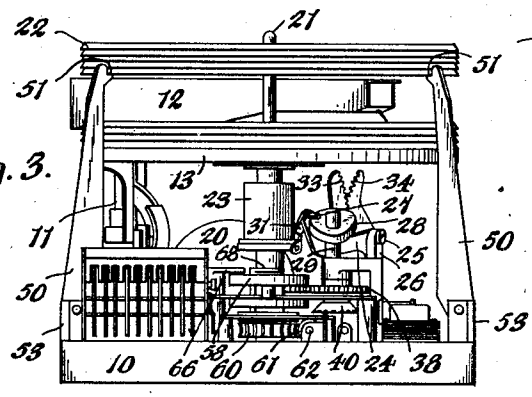


Fig. 8.

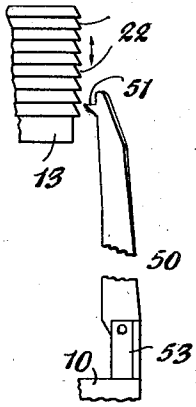
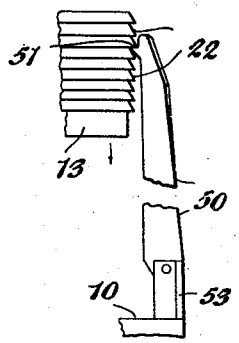


Fig. 4.



Fig. 9.



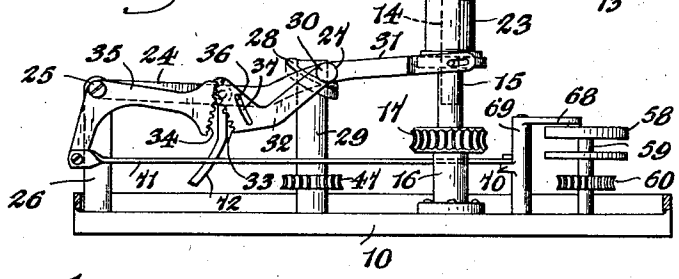


Fig. 6.

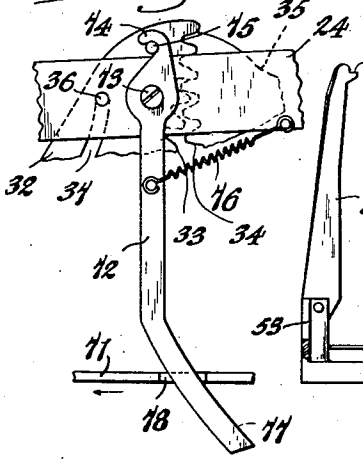


Fig. 5.

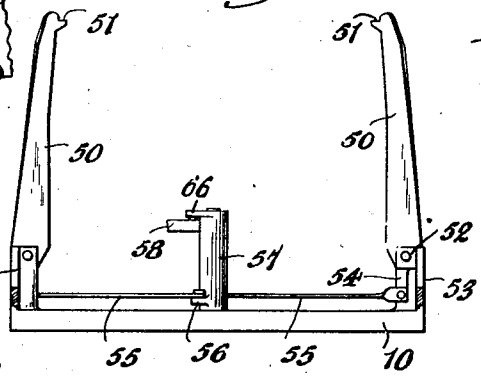
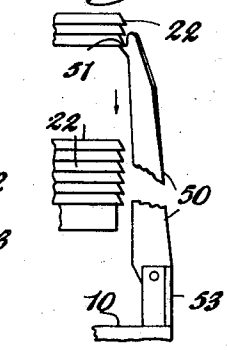


Fig. 10.



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UNITED STATES PATENT OFFICE

2,308,880

AUTOMATIC PHONOGRAPH

Otto A. Hokanson, Snyder, N. Y., assignor to The Rudolph Wurlitzer Company, North Tonawanda, N. Y., a corporation of Ohio

Application February 20, 1941, Serial No. 379,798

9 Claims. (Cl. 274—10)

This invention relates to certain new and useful improvements in automatic phonographs, and more particularly to improvements in the type of phonograph shown in my United States Patent No. 2,096,718, dated October 26, 1937, and wherein the records are arranged in stack-like fashion on the turntable for selective play.

One of the objects of this invention is to provide an automatic phonograph of this type which is composed of fewer parts to cheapen its manufacturing and assembling operations and to reduce to a minimum the number of moving parts and as well the power required to operate them.

Another object is to provide the phonograph with means for selectively controlling the playing of the records by imparting vertical movement to the turntable in such a way that the latter in its movements governs the selective positioning of the records for play as well as provides the necessary clearance space for permitting the operation of the tone arm in playing the records.

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 top plan view, partly in section, of the phonograph embodying my invention. Figure 2 is a side elevation of the same, partly in section, showing the parts in playing position. Figure 3 is a front elevation thereof. Figure 4 is a side elevation of the turntable and associated mechanism for governing its elevating movements. Figure 5 is a detail front view, partly in section, of the record-engaging supports for supporting the upper split portion of the record stack during the playing operation. Figure 6 is a side elevation showing the locking device associated with the turntable-elevating means. Figure 7 is a sectional plan view of the drive mechanism for controlling the turntable elevating cam. Figures 8, 9 and 10 are fragmentary elevational views showing the various positions of the turntable in selecting a record for play.

Referring now to the drawings, showing more particularly the chassis of the phonograph, 10 indicates a frame or platform on which the working parts of the phonograph are mounted, and which in practice is adapted to be arranged within a suitable cabinet. Rising from adjacent one corner of this platform is an upright post 11 on which the tone arm 12 is mounted for movement in a horizontal plane during the playing of a record and which is also adapted to swing vertically for movement into and out of playing engagement with a record. Any suitable means may be employed for controlling these movements of the tone arm to and from playing engagement with a record, such for example as disclosed in my aforesaid patent. The turntable 13 is mounted on an upright spindle whose lower portion 14 is keyed or feathered to a revolving sleeve 15 applied to an upright bearing member 16 secured to the platform 10 and having a driven gear 17 thereon meshing with a drive pinion 18 secured to the shaft 19 of an electric motor 20. The upper portion 21 of the spindle rises above the turntable and constitutes a guide post for the several records and their trays or carriers 22. As shown in Figures 2, 3 and 4, the records are disposed in superposed relation or in stack-like fashion on the turntable, the latter being capable of axial movement to a selective position to initially select a given record in the stack for play, and thereafter capable of further axial movement to split the record stack at the record selected to bring the selected record at an elevation for playing engagement with the tone arm and at the same time provide the necessary operating clearance between the split portions of the stack for the operation of the tone arm. By preference, the record trays at their peripheries slope upwardly and inwardly to provide resulting shoulders at the bottom edges of the trays for a purpose hereinafter described. Depending from the turntable about its spindle-portion 14 is a collar 23 with which a means is engageable for controlling the axial movements of the turntable during the selecting cycle.

The means for axially shifting the turntable and preferably governing the lowering movement of the turntable with its stack of records from a normally elevated position to one or another of a plurality of predetermined levels in accordance with a given record selected, consists of a vertically swinging actuating arm 24 pivoted at 25 to a bracket 26 rising from one side of the platform 10 and having at its free end a roller 27 which engages an oblique or elevating cam 28 applied to the upper end of an upright hollow shaft 29 which is adapted to be driven at predetermined times in the cycle of operations of the phonograph from the motor shaft 19, to either lower the turntable from the position shown in Figure 8 to a selective-governed elevation, shown in Figure 9, or raise the same to its initial position. Pivoted intermediate its ends at 30 to the free or roller-bearing end of the

arm 24 is a vertically swinging lever 31 whose inner arm is bifurcated and embraces the spindle-engaging collar 23, so that when this lever is vertically actuated about its pivot it causes the vertical displacement of the turntable to the split-stack position shown in Figure 10. The other or outer arm 32 of this lever terminates at its outer end in a gear segment 33 disposed about the pivot 30 which meshes with a companion segment 34 applied to one arm of a bell crank 35 pivoted at 25. The vertical swinging movement of the lever 31 is limited by a stop pin 36 applied to the arm 24 and engaging an arcuate slot 37 in the segment portion of the lever-arm 32.

Motion may be transmitted to the cam shaft 29 from the motor shaft 19 through the medium of a gear 38 meshing with the gear 17 and mounted on a stub shaft 39 having a bevel gear 40 thereon meshing with a like gear 41 fixed on a horizontal shaft 42 journaled in suitable bearings applied to the platform 10. Loosely mounted on this shaft is a clutch-controlled gear 43 meshing with a similar gear 44 fixed on one end of a countershaft 45 provided at its opposite end with a worm 46 meshing with a worm wheel 47 fixed on the cam-shaft 29. A sliding clutch collar 48 keyed to the shaft 42 and actuated by a clutch lever 49 serves at predetermined times to clutch the gear 43 to said shaft and accordingly transmit motion to the cam shaft 29. The mechanism for automatically shifting the clutch lever 49 to its applied and released positions to transmit motion to the turntable-elevating cam 28, and arrest it at the predetermined elevation corresponding to that at which the record is selected, may be as shown and described in my aforesaid Patent No. 2,096,718, but inasmuch as that mechanism forms no part of the present invention it has not been deemed necessary to go into the details thereof.

After the turntable with its full stack of records is lowered from its normally elevated position shown in Figure 8 to a lowered predetermined selective level, as shown in Figure 9, and as determined by the selective arresting of the cam 28, a means is provided for supporting any records of this stack which are above the record selected for play, so that upon the further lowering of the turntable to the playing position shown in Figures 2, 3 and 10, with its selected record exposed, the record stack is split with the upper portion of the stack supported at an elevation to provide a clearance for the movement of the tone arm 12 when playing the selected record. These means consist of pairs of upright supporting arms 50 disposed at diametrically opposite sides of the turntable and each provided adjacent its upper end with an inwardly-facing shouldered lug or projection 51 which is adapted to form a supporting seat for supporting engagement with the lower peripheral side of that record-tray immediately above the one selected. As shown in Figures 1, 2 and 5, the arms 50 of each pair are connected at their lower ends to a companion horizontally-disposed rock bar 52 fulcrumed at its ends in brackets 53 rising from the platform 10 and provided at its lower end with a depending actuating crank 54 to govern the inward and outward displacement of the arms relative to the record-stack. Extending from the cranks of the companion rock-bars 52 are opposite links 55 whose inner ends are pivotally connected to companion lugs 56 extending from diametrically opposite sides of an upright oscillating sleeve 57 suitably journaled on the platform 10 at one side of the turntable-spindle, as shown in Figure 1. By this construction, as the sleeve is turned in one direction or the other, the record-supporting arms 50 are correspondingly moved simultaneously into or out of supporting engagement with that record immediately above the one selected for play.

Means are provided for operating, at predetermined times in the selecting cycle, the levers 31 and 35 to control the elevating movements of the turntable and the rocking movements of the record-engaging arms 50 into and out of their record supporting position. For this purpose, I preferably employ a master cam 58, shown in Figure 1, mounted at the upper end of an upright shaft 59 suitably journaled on the platform 10 and having a worm gear 60 thereon meshing with a worm 61 fixed on a countershaft 62 having a gear 63 thereon meshing with a companion gear 64 loosely mounted on the shaft 42 in operative relation to the clutch collar 48. Thus, when the clutch collar is coupled with the gear 64, motion is transmitted to the cam shaft 59 to rotate its cam 58. The latter is provided in its top side with an outer cam-groove 65 with which a roller-fitted arm 66 radiating from the upper end of the sleeve 57 is adapted to engage and at predetermined times cause the oscillation of such sleeve to govern the inward and outward displacement of the record-engaging arms 50. Inwardly of the cam-groove 65 the cam 58 is provided with a cam-groove 67 with which a roller-fitted arm 68 applied to the upper end of an oscillating sleeve 69 is adapted to engage. Connected at one end to a crank arm 70 radiating from this sleeve is a link 71 whose other end is connected to the depending arm of the bell crank lever 35, as shown in Figure 4, whereby at predetermined times said arm 68 is oscillated in one direction or the other to accordingly actuate the bell crank lever 35 in directions to displace the lever 31, through the medium of the meshing gear segments 33 and 34, and cause the lowering of the turntable to split the stack of records selected at one time in the cycle of operations and at the other time to elevate the turntable to its selected elevation with the split stack portions reunited as a unit, as shown in Figure 9.

The shape or contour of the cam-grooves 65 and 67 is such that when motion is transmitted to the cam 58, which is subsequent to the initial lowering stroke of the turntable to a given preselected level by the oblique cam 28, the record-engaging arms 50 are swung inwardly by the action of the cam-groove 65 and companion arm 66 to support those records in the stack above the selected one, as shown in Figure 9, after which the companion cam-groove 67, through the medium of the arm 68 and link 71, actuates the gear segment levers 32 and 35 in a direction to further lower the turntable with its lower split portion of the record stack to the position shown in Figure 10, and thereby provide the necessary clearance space required for the movement of the tone arm over the selected record. The final down stroke of the turntable is limited by the pin and slot 36 and 37, respectively, and in this position the turntable is supported during the playing of the record and at which time the cam 58 is stopped. When the playing of the record is completed, the cam 58 is again set in motion and the first part of its revolution causes the turntable to be elevated to its previously selected level where its split portion of the stack rejoins that

portion of the stack supported by the arms 50, after which the latter, on the final stroke of the cam, are rocked outwardly and released from supporting engagement with the records. Thereupon the cam 28 is automatically set in motion and the turntable with its full stack of records is elevated to its normal position ready for the next selection on that turn of such cam to again lower the turntable to the level corresponding to the next record preselected for play.

During the down movement of the turntable to a preselected level as determined by the cam 28, as well as during the return of the turntable to its initial elevated position after the playing of a selected record, the actuating arm 24 is lowered or raised and the segment gear levers 31 and 35 move as a unit therewith about the common fulcrum 25. To insure such action and relieve the gear segments of the strain for so doing, I provide a latching device for coupling the segment gear levers to the actuating lever during the aforesaid movements of the turntable and for releasing such levers from the actuating arm for independent movement during the lowering and raising movements of the turntable to and from playing position. This latching device preferably consists of a vertically-swinging latching lever 72 pivoted intermediate its ends at 73 to one side of the actuating arm 24 adjacent the opposing ends of the gear segments 33 and 34 and terminating at its upper end in a hook 74 adapted to releasably engage a stud 75 projecting from the adjoining end of the lever arm 32. A spring 76 connected at one end to the arm 24 and its other end to the latching lever 72 below its pivot serves to constantly urge such lever to its latched position shown in Figure 6. The lower end of the latching lever terminates in an extension or tail 77 which is preferably arcuate in shape and described about the pivot 25 and which extends downwardly through a notch 78 formed in one of the side edges of the link 71. By this construction, the levers 31 and 35 are latched to the arm 24 during the selecting cycle, and when the arm 68 is actuated to impart a thrust to the link 71 to lower the turntable to playing position, the tail end of the latching lever is moved therewith to rock such lever in a direction to release its hook 74 from the stud 75 and thereby enable the levers 31 and 35 to perform their normal function of lowering the turntable from a selected level to a playing position and vice versa. When the levers 31 and 35 are actuated to elevate the turntable from its playing position to its previously selected level, the link 71 is thrust in the opposite direction and in so doing causes the latching lever to be restored to its latched position, in which position the parts remain during the final elevating stroke of the turntable to its normal elevation as well as during the initial lowering of the turntable from that position to a given selected position or level.

The means for governing the selection of the records and for controlling the movements of the turntable to its selecting levels may be of any appropriate construction and such mechanism may be the same as disclosed in my prior aforesaid patent. Also the means for governing the movement of the tone arm to and from playing position may be of any appropriate construction and as disclosed in my aforesaid patent.

Briefly stated, the operation of this phonograph mechanism is as follows:

When a patron depresses a given selector button 79, assuming the motor 26 to be running and the clutch collar 48 coupled with the gear 43, the turntable with its full stack of records is lowered from the position shown in Figure 8 to a corresponding preselected level by the cam 28, that is, to a level shown in Figure 9 wherein the shouldered seats 51 of the arms 50 will, when swung inwardly, engage beneath that record tray immediately above the one selected for play, and at which position the cam 28 is automatically stopped. Thereupon, when the clutch collar is shifted into engagement with the gear 64, the cam 58 will be automatically set in motion and through the medium of its cam-groove 65, links 55, and arm 66 the record-supporting arms will be rocked inwardly into supporting engagement with that record immediately above the one selected for play. The companion cam-groove 67 then comes into operation to actuate the arm 68 and link 71 to release the latching lever 72 from the stud 75 and impart an upward movement to the gear segments 33, 34 to cause the lever 31 to lower the turntable to its record-playing position with any records thereon spaced below that portion of the stack of records supported by the arms 50. At this time the cam 58 is stopped and thereupon the tone arm is swung into engagement with the selected record to play it. After the playing of this selected record the cam 58 is again set in motion to raise the turntable to its initial selected level where the records are rejoined into one complete unit stack, and the latching lever 72 during the tail end of this turntable movement is restored into latching engagement with the stud 75 to couple the levers 31 and 35 for subsequent joint movement with the actuating arm 24. The selector cam 28 is then set in motion to elevate the turntable and its stack of records to initial elevated position ready for the next selecting cycle.

I claim as my invention:

1. In a phonograph, a tone arm, a vertically adjustable turntable adapted to normally support a stack of records to be selectively played, means disposed at a fixed level alongside the path of travel of the turntable and its record-stack and projectable into intercepting, temporary supporting engagement with one or another of the records to effect the splitting of the stack at the record to be played, and means for actuating the turntable successively to a given selecting level relative to said record-supporting means and then in a like direction to a position displaced therefrom to split the stack at the record to be played and to provide an overhead clearance for the travel of the tone arm over such record, said turntable-actuating means including a system of levers and cams, one of the cams selectively controlling the displacement of the levers to position the turntable at its selecting level and the other cam controlling the displacement of the levers to move the turntable to and from its stack-splitting position.

2. In a phonograph, a tone arm, a vertically adjustable turntable adapted to support a stack of records, record-engaging means disposed at a substantially fixed level outwardly of the turntable and movable into and out of peripheral supporting engagement with any record or records above a record to be played, a selector-governing cam operatively connected to the turntable for actuating it to one or another of a plurality of elevations with a given record thereon disposed for supporting engagement with said record-engaging means, and a master cam in-

cluding connections to said turntable and said record-engaging means for actuating the latter into and out of supporting engagement with a given record and for actuating the turntable to and from a playing position spaced from the level of said record-engaging means.

3. In an automatic phonograph, a tone arm, a vertically adjustable turntable adapted to normally support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and in the same direction to a third elevation at which such record is played, leverage means operatively connected to the turntable for actuating it to its different positions of elevation, a cam operatively associated with said leverage means for controlling the movement of the turntable to and from its selective elevations, a second cam operatively associated with said leverage means for controlling the movement of the turntable to and from its playing elevation, and means disposed at a fixed level along the selective path of travel of the turntable for movement into and out of engagement with those records above a record to be played for temporarily supporting them at such selective elevation during the movement of the turntable to and from the elevation at which the record is played.

4. In an automatic phonograph, a tone arm, a vertically adjustable turntable adapted to normally support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and in the same direction to a third elevation at which such record is played, leverage means operatively connected to the turntable for actuating it to its different positions of elevations, a cam operatively associated with said leverage means for controlling the movement of the turntable to and from its selective elevations, a second cam operatively associated with said leverage means for controlling the movement of the turntable to and from its playing elevation, means disposed at a fixed level along the selective path of travel of the turntable for movement into and out of engagement with those records above a record to be played for temporarily supporting them at such selective elevation during the movement of the turntable to and from the elevation at which the record is played, and an operative connection between said second cam and said record-supporting means for actuating the latter at predetermined times into and out of engagement with the records.

5. In an automatic phonograph, a vertically adjustable turntable adapted to support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and to a third elevation at which such record is played, and means for actuating the turntable to such selective and playing elevations including a cam, a vertically-swinging actuating arm in operative engagement with said cam, a second cam, and a pair of opposing interconnected levers disposed in adjoining relation to said arm, one of said levers being co-pivoted with said arm and in operative engagement with said second cam, and the other being pivoted intermediate its ends to the free end of the actuating arm and operatively connected to said turntable, whereby when the first-named cam is rendered operative motion is transmitted to said actuating arm and levers as a unit to displace the turntable to and from a selective elevation and when said second cam is rendered operative motion is transmitted to said levers independently of the actuating arm to displace the turntable to and from its playing elevation.

6. In an automatic phonograph, a vertically adjustable turntable adapted to support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and to a third elevation at which such record is played, and means for actuating the turntable to such selective and playing elevations including a cam, a vertically-swinging actuating arm in operative engagement with said cam, a second cam, and a pair of opposing interconnected levers disposed in adjoining relation to said arm and having intermeshing gear segments at their opposing inner ends, one of said levers being co-pivoted with said arm and in operative engagement with the second cam, and the companion lever being pivoted intermediate its ends to the cam-engaging end of the actuating arm and operatively connected to said turntable.

7. In an automatic phonograph, a vertically adjustable turntable adapted to support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and to a third elevation at which such record is played, and means for actuating the turntable to such selective and playing elevations including a cam, a vertically-swinging actuating arm in operative engagement with said cam, a second cam, a pair of opposing interconnected levers disposed in adjoining relation to said arm and having intermeshing gear segments at their opposing inner ends, one of said levers being co-pivoted with said arm and in operative engagement with the second cam, and the companion lever being pivoted intermediate its ends to the cam-engaging end of the actuating arm and operatively connected to said turntable, and a stop means operatively associated with said levers for limiting their relative displacement in opposite directions.

8. In an automatic phonograph, a tone arm, a vertically adjustable turntable adapted to support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and to a third elevation at which such record is played, leverage means operatively connected to the turntable for actuating it to its different positions of elevation, a cam operatively associated with said leverage means for controlling the movement of the turntable to and from its selective elevations, means normally latching said leverage means to function as a unit during such selective elevating movements of the turntable, a second cam operatively associated with said leverage means for controlling the movement of the turntable to and from its playing elevation, and means governed by said second cam for releasing said latching means to permit other than a unitary functioning of said leverage means during the movements of the turntable to and from its playing elevation.

9. In an automatic phonograph, a vertically adjustable turntable adapted to support a stack of records and movable from an initial elevation to different selective elevations companion to a record to be played and to a third elevation at which such record is played, and means for actuating the turntable to such selective and playing elevations including a cam, a vertically-swinging actuating arm in operative engagement with said cam, a second cam, a pair of opposing interconnected levers disposed in adjoining relation to said

arm and having intermeshing gear segments at their opposing inner ends, one of said levers being co-pivoted with said arm and in operative engagement with the second cam, and the companion lever being pivoted intermediate its ends to the cam-engaging end of the actuating arm and operatively connected to said turntable, a latching member applied to said actuating arm and normally engageable with one of said segmental gear levers for coupling the same to swing as a unit with the actuating arm, and means governed by said second cam and operatively connected to said latching member for controlling its movements to and from latching position.

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