

May 9, 1961

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2,983,513

CHANGE CYCLE DELAY APPARATUS FOR PHONOGRAPHS

Filed Dec. 11, 1957

2 Sheets-Sheet 1

FIG. 1

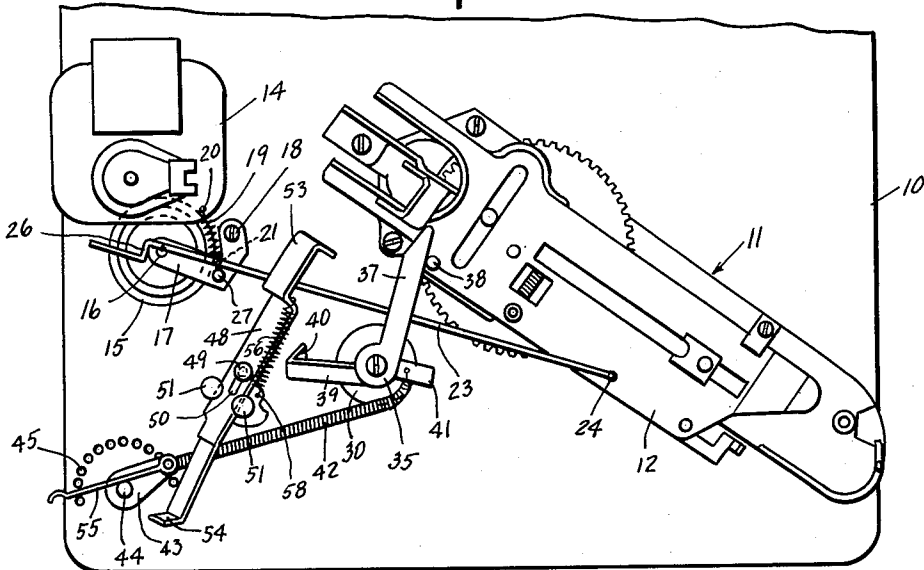
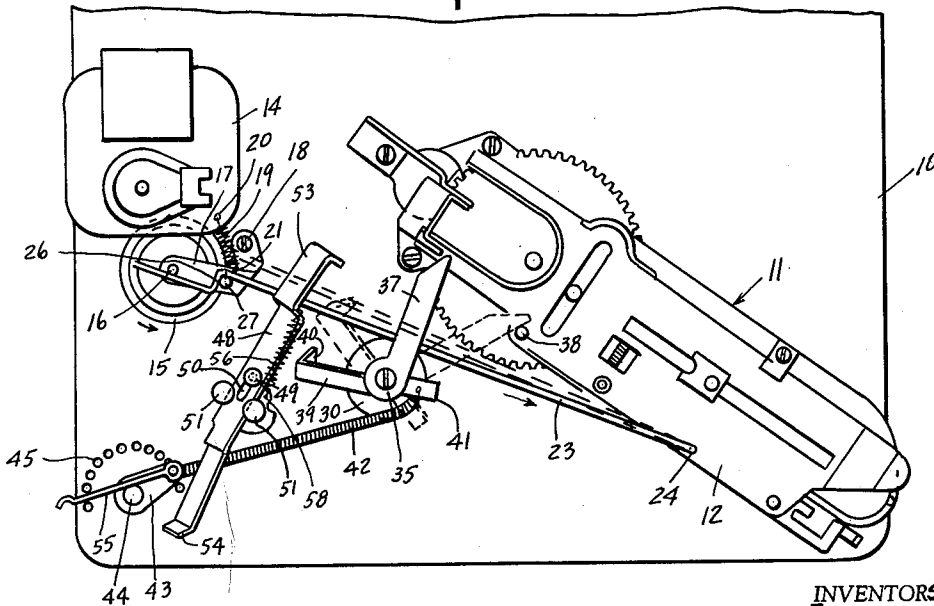


FIG. 2



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FIG. 3

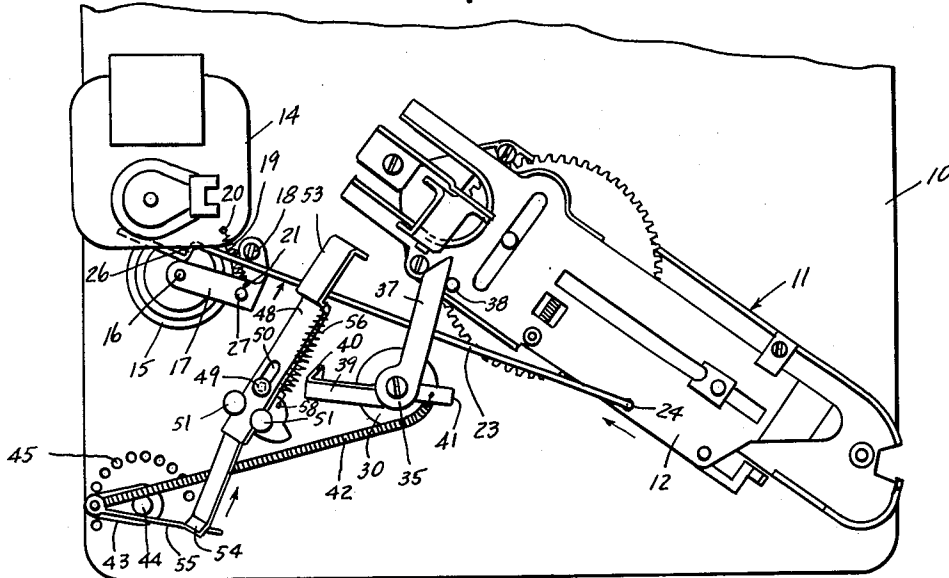
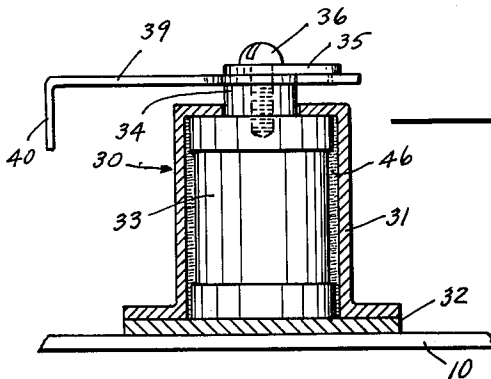


FIG. 4



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CHANGE CYCLE DELAY APPARATUS FOR PHONOGRAPHS

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Filed Dec. 11, 1957, Ser. No. 702,132

5 Claims. (Cl. 274—1)

This invention relates generally to automatic phonographs and more particularly to apparatus for introducing a delay in the change cycle to provide a pause between records.

The change cycle control mechanism in conventional automatic phonographs operates to elevate the tone arm, swing the tone arm outwardly beyond the edge of the turntable, release a record to the turntable, swing the tone arm inwardly and drop it into engagement with the initial playing groove of the record, all of these steps occurring in quick succession. The trend has been to design mechanisms which carry out this cycle in a minimum period of time.

It has now become desirable to provide a pause between the playing of successive records for the purpose of providing a more realistic presentation of music. For example, it is the usual thing that an orchestra pauses for a substantial period of time between the presentation of different selections. Therefore an appreciable pause between the playing of records on a phonograph more nearly simulates the actual presentation of musical selections by an orchestra.

The principal object of this invention is to provide in the change cycle control mechanism of an automatic phonograph apparatus adapted to introduce a pause in one phase of the record changing cycle thereby to lengthen the time interval between the reproduction of successively played records.

Another object of this invention is to provide in the change cycle control mechanism of an automatic phonograph a means of introducing a pause at one phase of the record changing cycle and which includes a control mechanism adapted to prevent such pause.

In accordance with this invention there is provided a pause control mechanism for automatic phonographs comprising a means controlled by the change cycle control mechanism of an automatic phonograph for stopping the phonograph and said change cycle control mechanism at one phase of its operation, a delay mechanism operable by said change cycle control mechanism into a cocked position, and selectively operable means for causing said delay mechanism to effect starting of said record changer after a predetermined pause in its operation, or for preventing effective operation of said delay mechanism.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a plan view of the preferred embodiment of this invention illustrating the mechanism in record playing position.

Fig. 2 is a view similar to Fig. 1 illustrating the apparatus in its pause position.

Fig. 3 is similar to Fig. 1 but illustrating the apparatus in the position wherein no pause occurs during the record changing cycle.

Fig. 4 is a vertical cross-section illustrating the structure of the delay mechanism shown in Figs. 1, 2 and 3.

The conventional automatic phonograph comprises the

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base plate 10 beneath which is mounted a change cycle control mechanism 11 which is adapted to be tripped when the tone arm of the record changer is moved into the tripping groove of a record after it is played. The mechanism then is driven through a record changing cycle wherein the tone arm is elevated and swung upwardly beyond the periphery of the turntable, the lowermost record is dropped into playing position on the turntable, and the tone arm is returned to a position over the initial playing groove of that record and lowered into engagement with said playing groove to commence the playing of said record. The change cycle control mechanism 11 as illustrated in Figs. 1, 2 and 3 includes a sliding plate 12 which is reciprocated during a record changing cycle between the two extreme positions illustrated in Figs. 1 and 2. During the movement of plate 12 from the position shown in Fig. 1 to the position shown in Fig. 2 and back to the position shown in Fig. 1, the movement of the tone arm and the dropping of a record is effected as described above. Since the mechanism 11 is conventional, no further detailed description is believed to be necessary.

For driving the turntable (not shown) and the change cycle control mechanism 11, there is provided a conventional motor 14 which includes an idler pulley 15 rotatably mounted at 16 on lever 17 pivoted at 18 to base plate 10. Idler pulley 15 is normally retained in engagement with an extension of the drive shaft (not shown) of motor 14 and with a portion of the turntable by means of spring 19 tensioned between a stud 20 on the frame of motor 14 and a hole 21 in the lever 17.

For disengaging the pulley 15 from the drive shaft of motor 14 during the record changing cycle, there is provided a spring wire 23, one end of which is welded or otherwise fixed at 24 to the plate 12 of the change cycle control mechanism. The opposite end of spring wire 23 includes a hooked portion 25 for latching with a pin 27 fixed to the lever 17. Spring wire 23 is attached to the plate 12 in such a manner that the wire is biased into constant sliding engagement with the pin 27.

In Fig. 2, plate 12 has been moved during the record changing cycle to its extreme position and spring wire 23 is so biased that the hooked portion 25 will have latched over pin 27 as plate 12 approaches its extreme position thereby to disengage pulley 15 from the drive shaft of motor 14 and stop the turntable and change cycle control mechanism in the Fig. 2 position.

For releasing the hooked portion 25 of spring wire 23 from the pin 27 after a pause there is provided a delay mechanism 30 which comprises a cylinder 31 (Figure 4) having a base portion 32 which may be attached to base plate 10 and a rotor 33. Rotor 33 may include a shaft 34 extending through the end of cylinder 31 for rotatably supporting rotor 33 within cylinder 31. A lever 35 may be mounted on shaft 34 by means of a screw 36 and may comprise an arm 37 extending into a position to be engaged by a pin 38 mounted on plate 12 of mechanism 11. Another arm 39 having a bent over portion 40 extends at right angles to arm 37 and is movable into the dotted line position shown in Fig. 2 for engaging spring wire 23 and moving hooked portion 25 thereof out of engagement with pin 27. The lever includes a third arm 41 to which may be anchored a tensioned spring 42 stretching between arm 41 and control arm 43 rotatably mounted on shaft 44 in base plate 10. The shaft 44 may be provided with a control knob mounted on the upper side of base plate 10 to provide manual rotation of arm 43. In order to control the rotation of the delay device 30, it is filled with a silicone oil as at 46 which has the characteristic that it offers extremely high resistance to rapid motion of rotor 33 and little or no resistance to relatively slow motion of rotor 33. Thus after the plate 12 reciprocates into the position

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shown in Fig. 2, lever 35 will be left in the full line position shown in Fig. 2. Spring 42 will cause lever 35 to rotate in a clockwise direction at a relatively slow rate whereby the idler pulley 15 will be out of engagement with the motor drive shaft for a short period of time, or until spring 42 rotates the rotor 33 and lever 35 into the dotted line position (Fig. 2) where the extension 40 of arm 39 engages spring wire 23 and moves the hooked portion 26 thereof out of engagement with pin 27. When this occurs, idler 15 moves into engagement with the drive shaft of motor 14 and the periphery of the turntable to start the record changer for completing its change cycle.

In order to adjust the rate at which the lever 35 rotates in a clockwise direction, the base plate 10 may be provided with an arcuate series of indexing apertures or raised projections 45 and the lever 43 may be provided with a cooperating member (not shown) for holding the lever 43 in an adjusted position. In this manner the tension on spring 42 may be adjusted thereby to determine the amount of force exerted on lever 35 and its rate of clockwise rotation. More or less tension on spring 42 provides a shorter or longer pause in the change cycle. The apertures or projections 45 may be calibrated to indicate the duration of the pause for any given setting of lever 43.

For preventing the operation of the spring wire 23 and eliminating any pause in the change cycle, there is provided a lever 48 slidably mounted on the base plate 10 by means of a stud 49 projecting through the slot 50 in lever 48. A pair of guide studs 51 may be fixed to the base plate 10 so that lever 48 will have a straight line reciprocating motion. Lever 48 includes at one end thereof a hook 53 embracing the spring wire 23 and at the other end thereof a hook 54 adapted to cooperate with an arm 55 fixed to the arm 43. A spring 56 is attached to the hook portion 53 of lever 48 and to the base plate as at 58 for holding lever 48 normally in the position shown in Fig. 1. When the arm 43 is rotated into the position shown in Fig. 3, lever 48 is moved by arm 55 in a direction toward spring wire 23 and into engagement therewith for flexing it out of alignment with pin 27 whereby reciprocative motion of the plate 12 will not cause spring wire 23 to pull the idler 15 out of its driving position. As a result, the record changing cycle will have no pause.

In operation, the change cycle control mechanism including the plate 12 moves into a position shown in Fig. 1 at the end of a record changing cycle, and during the movement of plate 12 into this position, the pin 38 mounted thereon moves lever 35 and its rotor 33 into the position shown in Fig. 1. When the next record changing cycle begins, the plate 12 moves from the position shown in Fig. 1 to the position shown in Fig. 2, causing the spring wire 23 to pull the idler pulley 15 out of its driving position. Due to the resistance of the fluid 46, the rotor 33 and lever 35 cannot move as fast as does plate 12. Therefore the idler pulley 15 remains disengaged until lever 35 moves its arm 40 into position in engagement with spring wire 23 for disengaging it from pin 27. This occurs within a time period determined by the setting of lever 43. The idler 15 then returns to its driving position and the record changing cycle is completed with the parts returning to the positions shown in Fig. 1.

Whenever it is desired to play records without a pause between them, the arm 43 may be rotated into the position shown in Fig. 3 wherein it engages the lever 48 moving its hooked portion 53 into engagement with the spring wire 23 thereby to flex it out of alignment with the pin 27. When this occurs, the plate 12 reciprocates back and forth between the position shown in Figs. 1 and 2 without disengaging the idler 15 and the complete reciprocative cycle of plate 12 is continuous without a pause.

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From the foregoing description it will be apparent that this invention provides a simple mechanism adapted to provide a pause during the record changing cycle in an automatic phonograph. The pause may be adjustable and the calibration of the adjusting mechanism will be accurate at all temperatures due to the viscosity-temperature characteristics of the silicone oil which is used in the delay device 30.

The invention claimed is:

1. A pause control mechanism for automatic phonographs comprising a phonograph driving motor having an idler pulley mounted for movement between a phonograph driving position and a non-driving position, a change-cycle control mechanism driven by said motor through said idler pulley and including a member mounted for reciprocation during a change-cycle, a rod operatively connected to said reciprocating member and said idler pulley for moving said idler pulley to its non-driving position during a change-cycle, and a delay mechanism operatively associated with said reciprocating member and said rod and comprising a cylinder, a rotor mounted within said cylinder for rotation, said cylinder containing a viscous fluid for resisting rapid movement of said rotor and permitting relatively slow movement of said rotor, a lever connected with said rotor for rotation therewith and having arms operatively associated with said reciprocating member and said rod and movable by said reciprocating member to a cocked position during a portion of a change-cycle, and spring means for moving said lever from said cocked position to a position where said lever engages said rod for disengaging said rod from said idler pulley and releasing said idler pulley to its driving position.

2. A pause control mechanism for automatic phonographs comprising a phonograph driving motor having a driving member mounted for movement between a phonograph driving position and a non-driving position, a change-cycle control mechanism driven by said motor through said driving member and including a member mounted for movement during a change-cycle, a rod operatively connected to said movable member and said driving member for moving said driving member to its non-driving position during a change-cycle, and a delay mechanism operatively associated with said movable member and said rod and comprising a cylinder, a rotor mounted within said cylinder for rotation, said cylinder containing a viscous fluid for resisting rapid movement of said rotor and permitting relatively slow movement of said rotor, a lever connected with said rotor for rotation therewith and having arms operatively associated with said movable member and said rod and movable by said movable member to a cocked position during a portion of a change-cycle, and means for moving said lever from said cocked position to a position where said lever engages said rod for disengaging said rod from said driving member and releasing said driving member to its driving position.

3. A pause control mechanism for automatic phonographs comprising a phonograph driving motor having an idler pulley mounted for movement between a phonograph driving position and a non-driving position, a change-cycle control mechanism driven by said motor through said idler pulley and including a member mounted for movement during a change-cycle, a rod operatively connected to said movable member and said idler pulley for moving said idler pulley to its non-driving position during a change-cycle, and a delay mechanism operatively associated with said movable member and said rod and comprising a rotatable means, means for resisting rapid movement of said rotatable means, a lever connected with said rotatable means for rotation therewith and having arms operatively associated with said movable member and said rod and movable by said movable member to a cocked position during a portion of a change-cycle, and means for moving said

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lever from said cocked position to a position where said lever engages said rod for disengaging said rod from said idler and releasing said idler to its driving position.

4. A pause control mechanism for automatic phonographs comprising a phonograph driving motor having a driving member mounted for movement between a phonograph driving position and a non-driving position, a change-cycle control mechanism driven by said motor mounted for movement during a change-cycle, a rod operatively connected to said movable member and said driving member for moving said idler pulley to its non-driving position during a change-cycle, and a delay mechanism operatively associated with said movable member and said rod and comprising a rotatable means, means for resisting rapid movement of said rotatable means and permitting relatively slow movement of said rotatable means, a lever connected with said rotatable means for rotation therewith and having arms operatively associated with said movable member and said rod and movable by said movable member to a cocked position during a portion of a change-cycle, and means for moving said lever from said cocked position to a position where said lever engages said rod for disengaging said rod from said driving member and releasing said driving member to its driving position.

5. A pause control mechanism for automatic phonographs comprising a phonograph driving member mounted

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for movement between a phonograph driving position and a non-driving position, a change-cycle control mechanism driven by said driving member, drive control means operatively connected to said control mechanism and said driving member for moving said driving member to its non-driving position during a change-cycle, and a delay mechanism operatively associated with said control mechanism and said drive control means and movable at a relatively slow rate, means operatively associated with said control mechanism, said drive control means and said delay mechanism, and movable by said control mechanism to a cocked position during the portion of a change-cycle, and means for moving said cocked means from said cocked position to a position where said cocked means releases said driving member to its driving position under the control of said delay mechanism.

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