

Oct. 27, 1942.

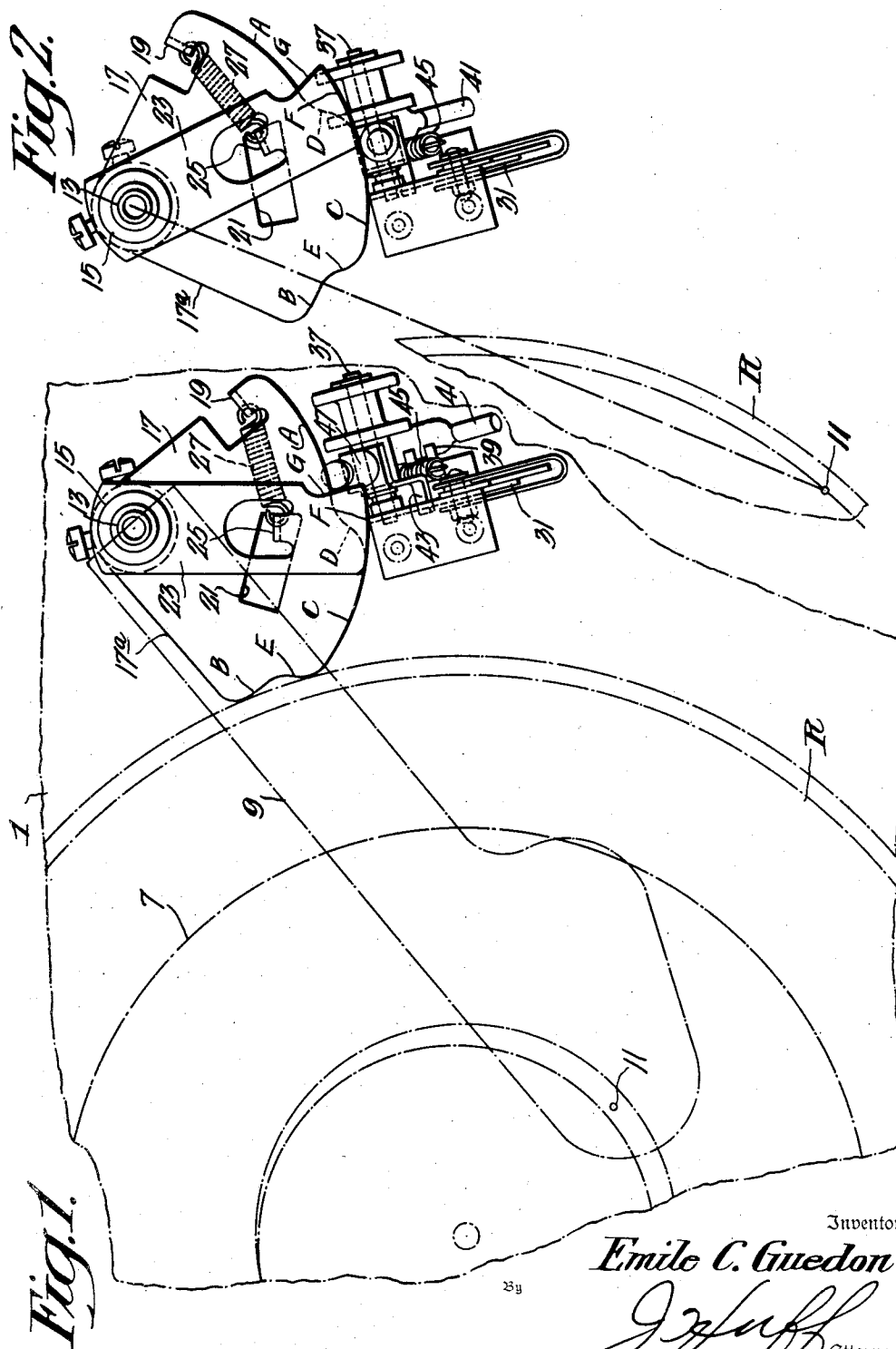
E. C. GUEDON

2,300,149

PHONOGRAPH

Filed Sept. 30, 1939

2 Sheets-Sheet 1



Oct. 27, 1942.

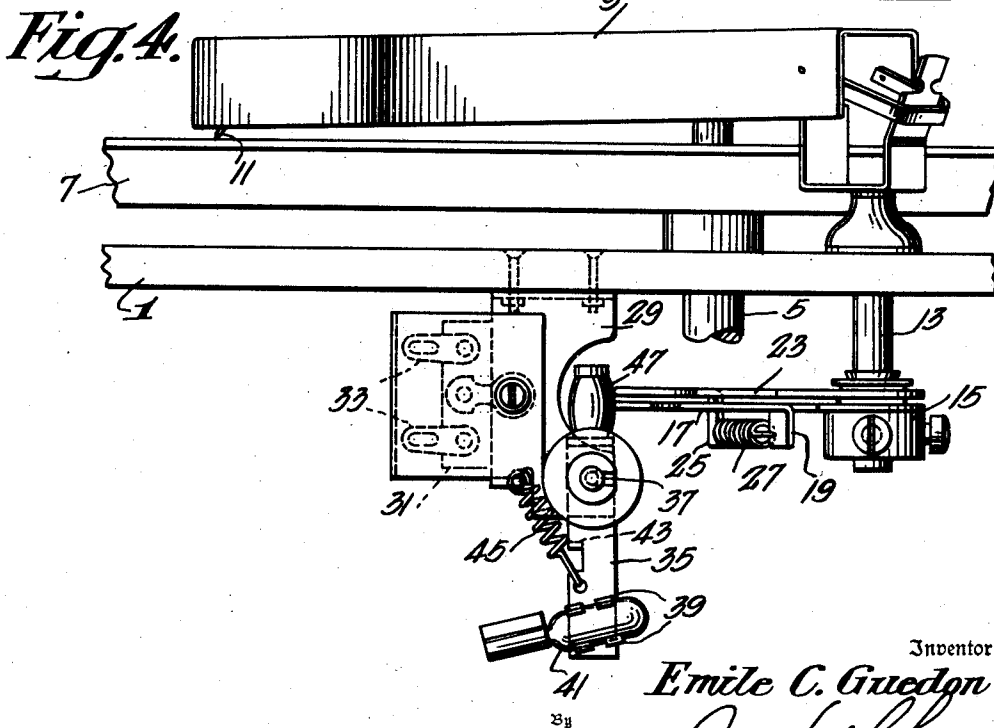
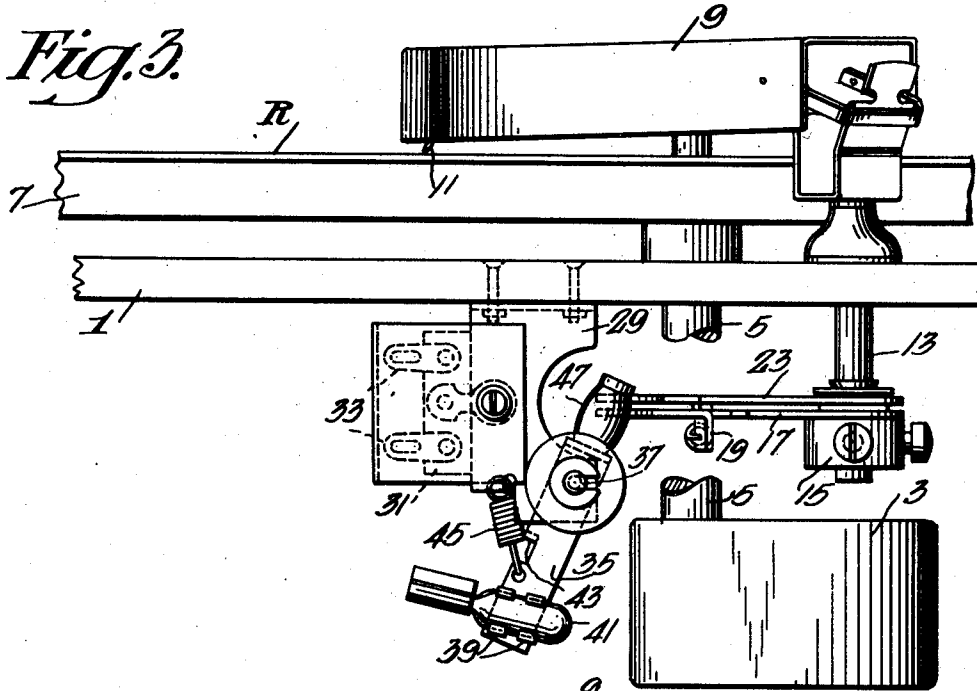
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PHONOGRAPH

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2 Sheets-Sheet 2



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[Signature]

UNITED STATES PATENT OFFICE

2,300,149

PHONOGRAPH

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13 Claims. (Cl. 200—52)

This invention relates to phonographs, and more particularly to the starting and stopping mechanism thereof, the primary object of my present invention being to provide improved mechanism of this type which will automatically start the phonograph motor when the pick-up arm is moved from its rest position to playing position and which will automatically stop the motor when the pick-up arm has reached a predetermined position at the end of playing of a record.

More particularly, it is an object of my present invention to provide improved mechanism of this sort which is extremely simple in construction and operation, and which is highly efficient in use.

Another object of my present invention is to provide an improved start and stop mechanism of the type set forth which will permit repeating any portion of the record without stopping the record before completion thereof and without the necessity of first returning the pick-up arm to its rest position before next placing it upon the record.

A further object of my present invention is to provide improved start and stop mechanism as aforesaid which, when once starting the motor, will permit it and the turntable driven thereby to come up to proper reproducing speed by the time the pick-up is placed upon the record.

Still another object of my invention is to provide an improved start and stop mechanism as aforesaid which will permit free movement of the needle in the terminal groove of the record after the motor has been shut off without turning the motor on again if the needle continues to ride awhile in the terminal groove.

It is also an object of my invention to provide an improved start and stop mechanism of the type set forth which will operate on standard records regardless of the type of terminal groove which they carry.

According to this invention, I provide a motor controlling switch on a pivotally mounted bracket adapted to be actuated by cam mechanism under control of the pick-up arm as it moves relative to the record. The cam mechanism comprises a pair of cooperating cams so shaped and arranged relative to each other that, when the pick-up arm is moved to a position clear of the record and also when it has been moved to a predetermined position near the center of the record, the switch will be thrown to "off" position, but it will be held in "on" position between both said "off" positions. The two cams are

pivotaly related to each other and one acts as a secondary or auxiliary cam to insure quick opening of the switch at the desired point following the end of playing of a record, the pivotal relation between the two cams permitting to and fro movement of the pick-up arm in a terminal groove of the eccentric type without forcing the needle to jump the groove.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of one embodiment thereof, when read in connection with the accompanying drawings, in which:

Figure 1 is a plan view of one form of my invention with the parts in position immediately after the turntable and its driving motor have stopped,

Figure 2 is a similar view showing the position of the parts at the beginning of reproduction of a record,

Figure 3 is a side elevation corresponding to Fig. 1, and

Figure 4 is a side elevation corresponding to Fig. 2.

Referring more particularly to the drawings, wherein similar reference characters designate corresponding parts throughout, I have shown a motorboard 1 below which is suitably supported an electric driving motor 2 the shaft or spindle 5 of which carries a turntable 7 adapted to support a record R during reproduction. Mounted on the motorboard 1 for swinging movement across the record R to reproduce the record is a pick-up arm 9 having a reproducing stylus 11 adapted to cooperate with the record R.

The pick-up arm 9 may be supported on the motorboard by a mounting such as that shown in my U. S. Patent No. 2,176,669 and including a post 13 which extends down through the motorboard 1. Fixed to the lower end of the post 13 is a collar 15 on a main cam 17 having a pair of low regions A and B and an intermediate high region C connected to the low regions A and B by gradual rises D and E, respectively. The main cam 17 is also provided with a downwardly extending lug 19 and an opening 21 for purposes to be presently set forth.

Superposed over the main cam 17 and loosely mounted on the post 13 for pivotal movement thereon relative to the cam 17 is a secondary or auxiliary cam 23 which is also provided with

a downwardly extending lug 25 extending down through the opening 21, a spring 27 connecting the lugs 19 and 25 and normally holding the cams 17 and 23 in the positions shown in Figs. 1 and 2. The auxiliary cam 23 is formed with a cam edge F having substantially the same radius as the cam edge C of the main cam 17 and constituting substantially an extension of the cam edge C to provide the balance of the high region of the cam assembly, as clearly shown in Figs. 1 and 2. The auxiliary cam 23 is also formed with a substantially radial cam edge G which constitutes a steep drop toward the low region A of the cam 17.

Fixed to the motorboard 1 is a bracket 29 which carries a terminal block 31 having suitable terminals 33 to which connections from the motor may be made. The bracket 29 also pivotally carries a second bracket or lever 35 on a shaft 37, the bracket 33 having a pair of spring clips 39 thereon in which is mounted a mercury switch 41 of well known construction, the switch 39 being in circuit with the motor 3 through the terminals 33. The bracket or lever 35 is provided with an offset lug 43 which is adapted to engage the lower end of the bracket 29 to limit clockwise movement of the bracket 35, as viewed in Figs. 3 and 4, in response to a spring 45, one end of which is secured to the bracket 29 and the other end of which is secured to the bracket 35.

Since the main cam 17 is fixed to the post 13 which carries the pick-up arm 9, and the auxiliary cam 23 is always constrained by the spring 27 to the position shown in Figs. 1 and 2, it will be obvious that the pick-up arm 9, the main cam 17, and the auxiliary cam 23 will move as a unit. These parts are so related that, when the pick-up arm is in its rest position to one side of the record (that is, to the right of the record R, as viewed in Fig. 1), the edge 17a of the main cam 17 will have passed beyond the upper end of the bracket 35 on which a roller 47 is mounted, and the spring 45 will have pulled the bracket 35 clockwise (as seen in Figs. 3 and 4) sufficiently to effect engagement of the lug 43 with the bracket 29, whereby the mercury switch 41 will be in the "off" position.

Upon moving the pick-up arm 9 manually toward the record, the edge or low region B of the cam 17 will eventually engage the roller 47 and move the bracket 35 slightly counterclockwise (as viewed in Figs. 3 and 4) but without substantially altering the position of the switch 41, so that the switch still remains in "off" position so long as the low region B rides on the roller 47. Upon continued movement of the pick-up arm toward the record, the rise E will eventually engage the roller 47 and force the bracket 35 counterclockwise until the high region C of the cam 17 has been brought into engagement with the roller 47, whereupon the bracket 35 assumes the position shown in Fig. 4 and the switch is thrown to its "on" position. The rise E is formed on the cam 17 at such a location that the switch 41 will be thrown to the "on" position before the pick-up arm has reached the beginning of the record, so that by the time the pick-up arm reaches the record and is placed thereon, the motor 3 and turntable 9 will have come up to proper reproducing speed. Thereafter, as the pick-up arm moves across the record, the high cam portion C rides along the roller 47 and retains the switch 41 in "on" position.

It will be noted that the high cam portion F of the auxiliary cam 23 overlaps the gradual rise

D of the main cam 17. Consequently, the cam portion D will have no effect upon the bracket 35 and the high cam region F will continue to hold the switch 41 in the "on" position after the high cam portion C has moved beyond the roller 47. Thus, the turntable continues to rotate until a predetermined radius on the record at the end of the sound groove has been reached, whereupon the steep cam drop G passes the roller 47 and permits the spring 45 to quickly rotate the bracket 35 clockwise until the roller 47 engages the low cam edge A of the main cam to thus bring the switch 41 back to its "off" position and break the circuit to the motor 3.

It is desirable to have a steep drop at the cam edge G in order to quickly shut off the motor at the desired point. Were this steep drop formed on the main cam 17, then it would not be possible to return the pick-up arm to its normal, or rest, position subsequent to the playing of a record. However, by providing the steep drop G on the auxiliary cam 17 and connecting the two cams by the spring 27, it is obvious that, as the pick-up arm is returned to its rest position clear of the record R, the cam portion G will, in time, engage the roller 47, and the latter will force the auxiliary cam 23 in a clockwise direction relative to the cam 17 (as viewed in Figs. 1 and 2), thus causing the gradual rise D of the cam 17 to become exposed and effective to force the bracket 35 counterclockwise again until the high cam region C rides behind the roller 47, at which time the spring 27 pulls the auxiliary cam 23 back to its normal position. The opening 21 in cooperation with the lug 25 will, of course, limit relative movement between the cams 17 and 23. When the low cam portion B is eventually behind the roller 47, it is obvious that the motor will again be shut off. The yielding connection between the cams 17 and 23 also permits the roller 47 to act against the cam edge G to move the auxiliary cam 23 slightly when the needle 11 is riding in a terminal groove of the eccentric type just before and shortly after the motor is shut off and while the turntable continues to rotate under the influence of its own inertia without causing the needle 11 to jump the groove.

From the foregoing description, it will be apparent to those skilled in the art that I have provided a very simple start and stop device for phonographs, and that my invention is equally well adapted for use with standard records having terminal grooves of either the eccentric or the concentric type. As noted heretofore, the switch 41 is thrown to the "on" position by merely moving the pick-up arm from its rest position toward the record edge and at a time when the pick-up arm has reached a predetermined distance from the center of the record as determined by the location of the rise E on the cam 17. The steep drop G then determines the point at which the motor circuit is broken when the pick-up arm has reached a predetermined radial position on the record in the vicinity of the center thereof. Between the rise E and the steep drop G, it is obvious that the combined high cam regions C and F will be effective to hold the switch 41 in the "on" position. Thus, it is possible to move the pick-up arm over the record to repeat any portions thereof that may be desired without stopping the motor in the meantime and without having to bring the pick-up arm way back to its rest position and then inwardly again to the record, as is necessary with certain start and stop devices now on the market.

Although I have shown and described but one embodiment of my invention, I am aware that many other modifications thereof and changes in the particular modification herein described are possible. For example, instead of making the cam assembly 17 and 23 movable with the tone arm and mounting the switch 41 on the bracket 35, the switch and its bracket may be mounted for movement with the pick-up arm 9, and the cam assembly 17-23 may be in a fixed location in the path of movement of the roller 47. Other changes will, no doubt, readily suggest themselves to those skilled in the art. I therefore desire that my invention shall not be limited except insofar as is made necessary by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. In a phonograph, the combination of a circuit controlling switch, a pivotally mounted member carrying said switch, said member being movable to and from positions to effect opening and closing of said switch, a pick-up arm movable across a record to be reproduced, and cam means movable with said arm for moving said member into the "on" position of said switch and holding said member in said "on" position during reproduction of the record.

2. In a phonograph, the combination of a circuit controlling switch, a pivotally mounted member carrying said switch, said member being movable to and from positions to effect opening and closing of said switch, means constantly biasing said member into the "off" position of said switch, a pick-up arm movable across a record to be reproduced, and cam means movable with said arm for moving said member into the "on" position of said switch and holding said member in said "on" position during reproduction of the record.

3. In a phonograph, the combination of a circuit controlling switch, a pivotally mounted member carrying said switch, said member being movable to and from positions to effect opening and closing of said switch, a pick-up arm movable across a record to be reproduced, and cam means comprising a plurality of cooperative cams movable with said pick-up arm for moving said member into the "on" position of said switch and holding said member in said "on" position during reproduction of the record, one of said cams being movable relative to the other of said cams.

4. In a phonograph, the combination of a circuit controlling switch, a pivotally mounted member carrying said switch, said member being movable to and from positions to effect opening and closing of said switch, a pick-up arm movable across a record to be reproduced, cam means movable with said pick-up arm and including relatively low regions and a relatively high region, and means constantly biasing said member against said cam means, said low regions being effective to permit said member to move into the "off" position of said switch and said high region being effective to move said member into the "on" position of said switch.

5. The invention set forth in claim 4 characterized in that said high region lies intermediate said low regions, and characterized further in that one of said low regions is effective when said pick-up arm is moved clear of the edge of the record and the other of said low regions is effective when said pick-up arm has reached a predetermined radius on said record.

6. The invention set forth in claim 4 characterized in that said high region lies intermediate

said low regions, characterized further in that one of said low regions is effective when said pick-up arm is moved to a predetermined radius beyond the record edge and the other of said low regions is effective when said pick-up arm has reached a predetermined second radius on said record, and characterized still further in that said high region is effective from a point in advance of the pick-up arm reaching the record as it is moved from its rest position clear of the record toward the starting groove thereof.

7. The invention set forth in claim 4, characterized in that said cam means comprises a pair of cooperative, superposed cams, one of said cams having said low regions and a portion of said high region, and the other of said cams providing the balance of said high region.

8. The invention set forth in claim 4, characterized in that said cam means comprises a pair of cooperative, superposed cams movable relative to each other, one of said cams having said low regions and a portion of said high region, and the other of said cams providing the balance of said high region when said latter cam is in a predetermined position relative to said first named cam.

9. The invention set forth in claim 4, characterized in that said cam means comprises a main cam and an auxiliary cam mounted for limited movement relative to said main cam, said main cam having said low regions and a portion of said high region, and said auxiliary cam providing the balance of said high region when in predetermined position relative to said main cam, and characterized further by the addition of means constantly tending to hold said auxiliary cam in said predetermined position relative to said main cam.

10. The invention set forth in claim 4 characterized in that said cam means comprises a main cam and an auxiliary cam mounted for limited movement relative to said main cam, said main cam having said low regions and a portion of said high region, said low regions being connected to said high region portion by gradual rises, and said auxiliary cam providing the balance of said high region when in predetermined position relative to said main cam and having a steep drop toward one of said low regions, and characterized further by the addition of means constantly tending to hold said auxiliary cam in said predetermined position relative to said main cam.

11. The invention set forth in claim 4, characterized in that said cam means comprises a main cam and an auxiliary cam mounted for limited movement relative to said main cam, said main cam having said low regions and a portion of said high region, said low regions being connected to said high region portion by gradual rises, and said auxiliary cam providing the balance of said high region when in predetermined position relative to said main cam and having a steep drop toward one of said low regions, characterized further by the addition of means constantly tending to hold said auxiliary cam in said predetermined position relative to said main cam, and characterized still further in that when said auxiliary cam is in said predetermined position, it overlies one of said gradual rises whereby its steep drop is free to engage said member.

12. In a phonograph, the combination of an electric motor, a record supporting turntable coupled to said motor and adapted to be rotated thereby, a pick-up arm movable across a record on said turntable, cam means movable with said

pick-up arm, a pivotally mounted bracket, a mercury switch in circuit with said motor and carried by said bracket, and a spring acting on said bracket to constantly hold one end thereof in position to be engaged by said cam means, said cam means including a pair of low regions against which said spring can urge said bracket to hold said switch in the "off" position and a high region against which said spring can urge said bracket to hold said switch in the "on" position. 10

13. The invention set forth in claim 12 characterized in that said cam means is constituted by a main cam having said low regions and a portion of said high region, and an auxiliary cam superposed over and mounted for limited movement relative to said main cam, said auxiliary cam providing the balance of said high region when in predetermined relation to said main cam.

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