Dec. 13, 1932. J. P. STOCKTON 1,890,797

AUTOMATIC CONTROL FOR PHONOGRAPHS

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Fig. 2.

Fig. 1.

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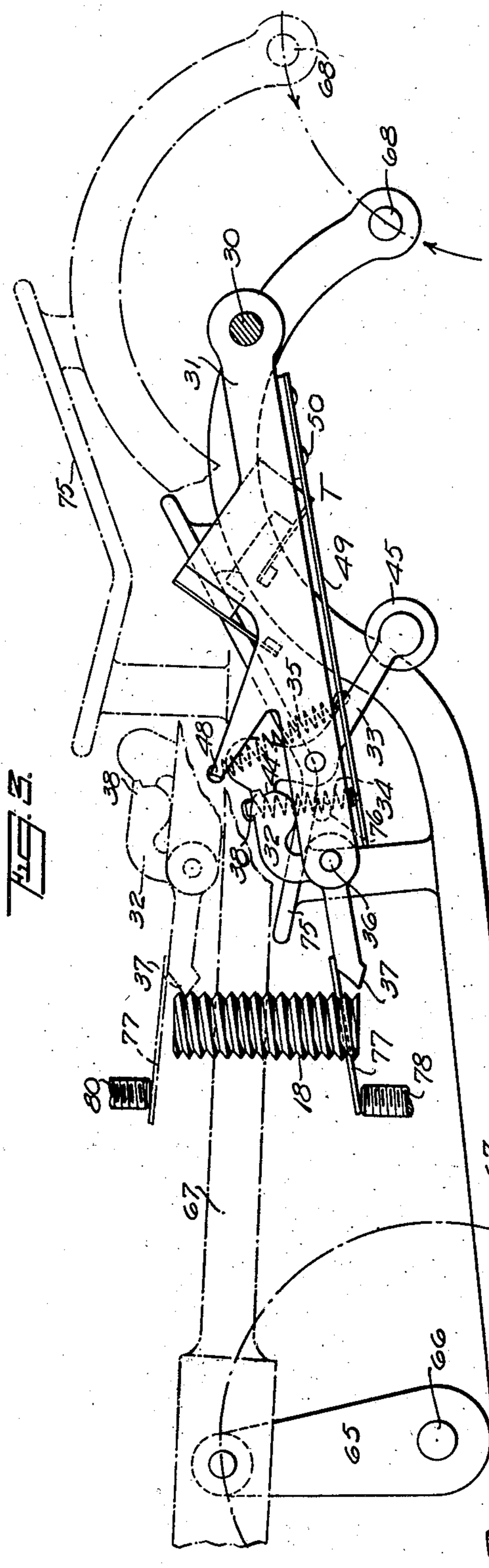

FIG. 2.

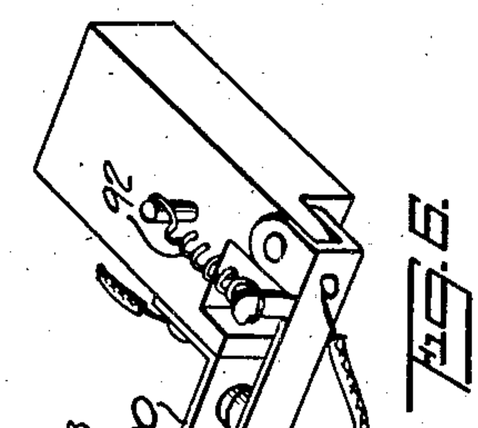

FIG. 6.

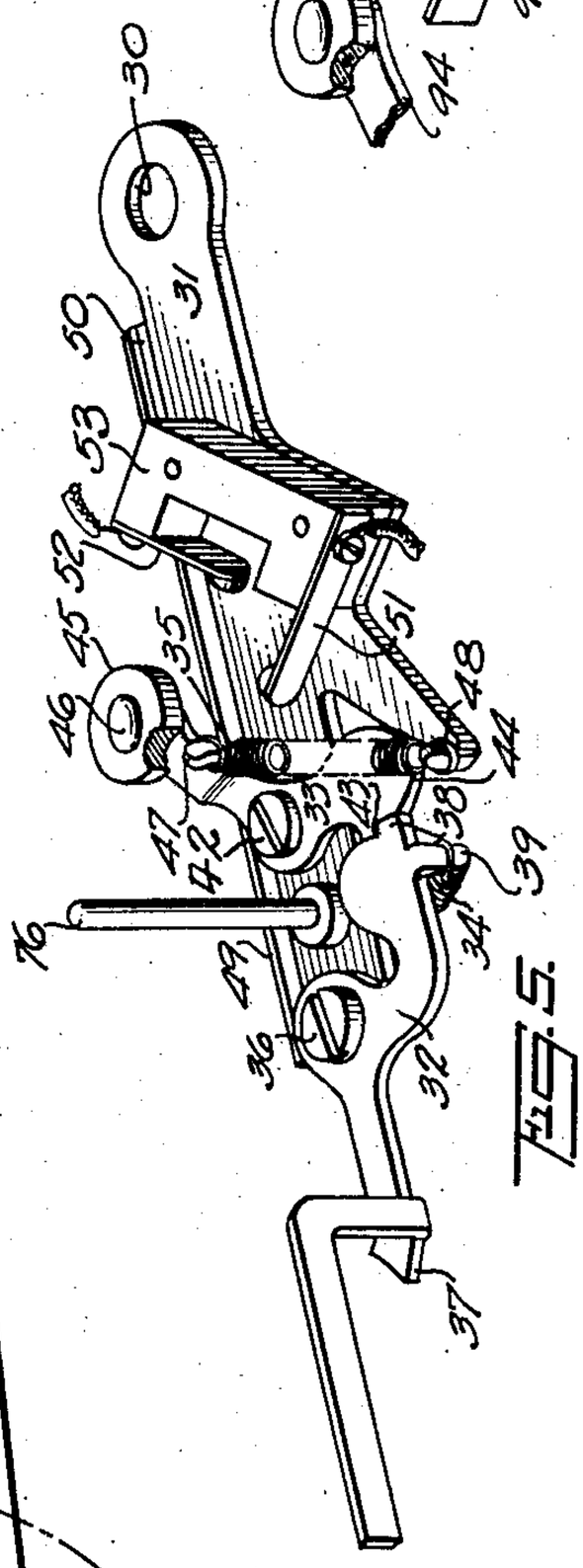

FIG. 5.

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AUTOMATIC CONTROL FOR PHONOGRAPHS

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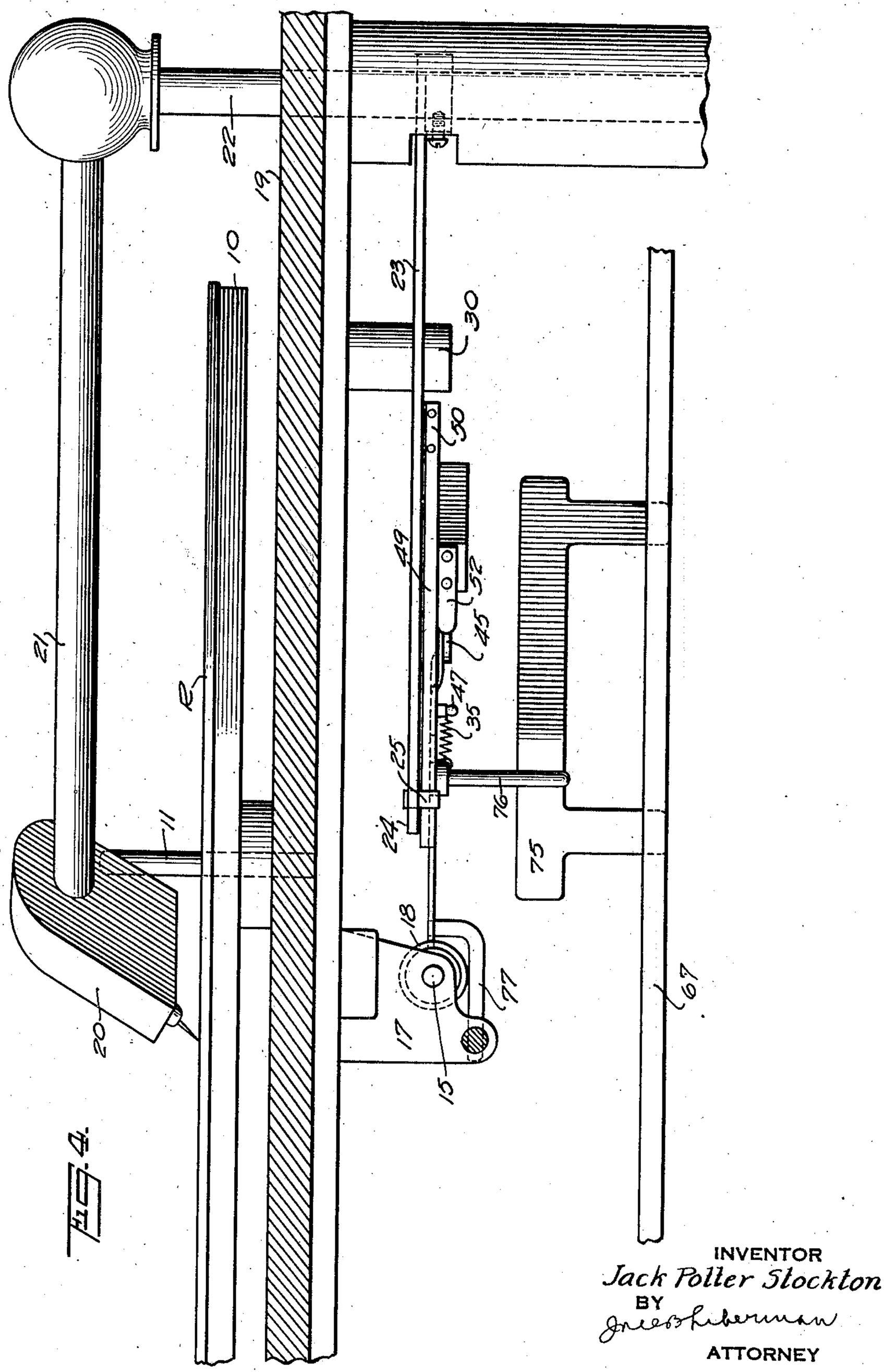

Fig. 4.

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Patented Dec. 13, 1932 1,890,797

UNITED STATES PATENT OFFICE

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AUTOMATIC CONTROL FOR PHONOGRAPHS

Application filed June 3, 1929. Serial No. 368,036.

The present invention relates to automatic controls for phonographs and more particularly directed toward phonograph controls for the purpose of controlling a circuit after the playing of a record has been completed. The control may be arranged either to close a circuit, such for example, as would be employed in operating an auxiliary motor or a clutch in a multiple record phonograph, or the circuit may be arranged to be opened by the automatic control so as to stop the platform motor.

Most disk type phonograph records now available are provided with sound grooves of uniform pitch spaced about one hundred to the inch, and also have additional grooves inside the playing surface which communicate with the sound grooves to receive the stylus on the reproducer. The stylus is thus carried from the last groove of the playing surface into these special grooves so that the reproducing means is moved accordingly. These grooves have not been standardized by the various manufacturers of phonograph records. They take various forms and sizes according to the fancy of the maker. Some of the manufacturers use grooves which are concentric with the center of the record, while other manufacturers use other grooves which are eccentric with respect to the record center. These concentric grooves are at various radii and the eccentric grooves are of various diameters and are placed at various off center distances from the center of the record.

Inasmuch as the sound grooves are in the form of a spiral about the center of rotation of the record, and are closely spaced to economize in space, it results that the stylus and its support may have a substantially uniform angular movement about the pivot of the support as the stylus is carried in toward the center of the record by the sound grooves. In all cases, the various eccentric or concentric grooves above referred to, are continuations of the sound groove, so that the stylus passes from the sound groove into the special groove. As these special grooves must be inside the playing surface, it is apparent that the angular movement of the reproducer and support about the pivot of the reproducer support will be accelerated as soon as the stylus enters any of these forms of special grooves. The acceleration will of course be dependent upon the pitch of the groove carrying the stylus in toward the center of the record, and the angular extent of the groove having the increased pitch.

The concentric form of special groove in the record has been utilized to actuate or control various automatic stop mechanisms and switch mechanisms for stopping the phonograph or for initiating the actuation of a repeat mechanism in an automatically repeating phonograph. Others have provided mechanisms for these purposes which operate in response to the outward movement of the stylus and reproducer support caused by the eccentric groove.

The present invention contemplates the provision of an improved mechanism which will function on any or all of these forms of records to actuate the automatic switch or repeat or record changing mechanism after the completion of the playing of a record. With the present mechanism one is able to use a much wider selection of records than is possible where the mechanical features of the phonograph restrict the records to those of a particular manufacturer; for, with the present device the automatic stop and automatic repeat or record change mechanism may function the same on any or all records wherein the stylus and reproducer arm are moved toward the center of the rotating record at a speed substantially greater than the ordinary inward movement caused by the spiral groove occupying the playing surface.

The records of the various manufacturers, provided, as they are, with these various grooves, normally carry the stylus in toward the center of the record. The point of greatest inward movement of the stylus is a considerable distance from the center pin, and the present invention contemplates that the automatic control device will function whenever the stylus is carried in closer than this position. In a few cases the records may have no special grooves, or the special groove may be poorly formed or worn so that the stylus refuses to follow it. The present invention

provides for such cases as this, and the automatic control functions upon the turn table making a predetermined number of revolutions after the stylus has been brought to a predetermined position. The number of such revolutions is greater than required for the completion of the playing of a record having the most closely placed special groove.

The accompanying drawings show, for the purposes of illustrating the present invention, a form of the invention arranged for closing the circuit of an auxiliary motor when the record is completed and for resetting the control by the auxiliary motor so as to be in a position for the next actuation, and indicate a modified form of construction for opening a motor circuit, it being understood that the drawings are for the purpose of illustration only and are not to be construed as a definition of the limits of the invention.

In these drawings:

Figure 1 is a top plan view of the automatic control showing the parts in the position assumed just before the completion of the playing of a record;

Figure 2 is a view similar to Figure 1 showing the automatic control just after it has been tripped;

Figure 3 is a top plan view showing the resetting of the automatic trip; this figure also showing in dotted lines the resetting arm for the trip in an intermediate position, and the trip switch engaging a permanent stop for actuating it in case a record is used having no special groove inside the playing surface;

Figure 4 is a side elevational view taken from the lower side of Figure 3;

Figure 5 is a perspective view of the automatic trip, the device being inverted; and

Figure 6 is a fragmentary view illustrating the modified arrangement for opening the circuit motor instead of closing it.

The playing platform of the phonograph is indicated in the drawings at 10. It has an upwardly extending pin 11 adapted to center the record or records played on the playing platform. This playing platform is preferably continuously driven by an electric motor M in a well known manner. The center of the playing platform is indicated at 12 in Figure 1. The driving mechanism for the playing platform operates a gear train indicated at 13 and 14 for driving a shaft 15 at a slow speed. This shaft is arranged underneath the stationary table and top of the phonograph and may conveniently be secured by mounting it in brackets fragmentarily indicated at 16 and 17. The platform motor, reduction gears and shaft 15 are preferably mounted in the multiple record phonograph as a complete unit. The shaft 15 carries a worm 18. It will be apparent that this worm revolves continuously at a rate of speed corresponding with the speed of the platform motor.

The reproducer is indicated at 20. This reproducer may be of the mechanical type associated with a tone arm or may be of the electric pick up type carried on a swinging arm. Such electric pick up arm is indicated at 21. It swings about on a center post 22. This arm, it will of course be understood, will be above the phonograph table 19 and also above the playing platform so as to cooperate with the record grooves r and lead-in grooves l of the record R on the playing platform. The center post 22 on which the reproducer is supported extends down through the phonograph table 19. An arm 23 is secured to the post 22 and swings back and forth about this vertical axis at the same rate as the reproducer. It is so connected with the reproducer that it is fed in by the reproducer as the record is played and is moved back when the reproducer is returned to the initial or playing position. The free end 24 of this arm 23 extends over so as to be near the worm 18 and may as here shown be provided with a downwardly extending finger or pusher 25.

The automatic trip switch is designated generally by the reference letter "T". It is pivotally supported on a bearing 30 in the form of a post carried on the under face of the chassis of the phonograph. This automatic trip, in the form here shown, has a flat swinging arm or bar 31 which may be stamped out of heavy gauge sheet metal. The bar 31 carries a toggle lever mechanism consisting of two levers 32 and 33 together with springs 34 and 35.

The lever 32 is pivoted on a pin or screw indicated at 36. It has a pointed tip 37 which when the toggle is in set position as indicated in Figures 1 and 3, is adapted to traverse the threads of the worm 18. The other end of this lever 32 is provided with a tooth indicated at 38 and with an upwardly pressed lug 39 to which is secured one end of the spring 34. The other end of the spring is secured to a lug 40 carried by the swinging arm 31. This spring acts to turn the lever 32 in clockwise direction when viewed from the top.

The lever 33 is pivoted at 42, and has at one end, a tooth 43 and a camming head 44. The other end of the lever 33 carries a metal ring 45 carried on an insulating support 46. The coiled spring 35 is connected at one end to a lug 47 bent downwardly from the lever 33 and is connected at the other end to a lug 48 bent downwardly from the flat swinging arm 31. This spring 35 acts to swing the lever 33 in a counterclockwise direction when viewed from the top.

When these two levers 32 and 33 are in the position shown in Figures 1 and 3, the toggle is set and the members 31, 32 and 33 together with the springs 34 and 35 swing bodily as a unit about the pivot 30 and when the detent

mechanism is released, the springs swing the levers to the position indicated in Figure 2.

The swinging arm 31 also carries a yieldable member in the form of a leaf spring 49 which is secured to it near the pivot 30 as indicated at 50. This leaf spring is spaced slightly from the swinging member 31 as will be clear from the drawings, and is, as shown in Figure 1, in the path of the pusher 25 carried by and moving with the reproducer support. When the reproducer is in the starting position on the record, this pusher is out of contact with the automatic trip, being in about the dotted line position of Figure 1. When the reproducer is in starting position and during most of the time the record is being played, the automatic trip is in the full line position indicated in Figure 3.

As one approaches the end of the playing surface on the record, the arm 24 is moved so as to bring the pusher against the leaf spring 49. This will cause the entire mechanism carried by the plate 31 to move in a clockwise direction about the pivot 30. This will move the tip 37 of the lever 32 from the full line position of Figure 3 over into the threads on the worm 18. As soon as the tip of this lever enters into the threads, the platform motor driving through the gearing and the worm will take up the drive of the mechanism turning this system of levers as a unit about the center 30. The worm is proportioned to drive these parts at the same speed which they would be moved by the reproducer being fed in along the sound groove and, hence, the spacing between the pusher 25 and the moving mechanism will be substantially constant. There will be slight movements back and forth on account of eccentricities in the sound grooves.

As soon, however, as the stylus on the reproducer enters into the high pitched groove inside the playing surface, the entire reproducer support and parts connected to it will be moved suddenly. In consequence, the pusher 25 will press the spring 49 over against the body of the lever 31 and will continue to push this lever in a clockwise direction. As the end 37 of the lever 32 is in the worm, this part of the system is comparatively stationary.

The continued motion of the lever 31 and parts carried thereby will cause the lever 32 to turn on its axis thereby moving the tooth 38 up away from the tooth 43 and permitting the spring 35 to swing the lever 33 in a counterclockwise direction. This will cause the camming head 44 of the lever 33 to come in under the end of the lever 32 as will be clear from Figure 2. This movement will cause the metal ring or bridging contact 45 carried on the lever 43 to swing from the position shown in Figures 1, 4 and 5 to the position shown in Figure 2 where it will bridge a pair of contacts indicated at 51 and 52. These contacts are carried on an insulating block 53 carried by and moving with the lever of arm 31, and are adapted to close the circuit for an auxiliary device such as a motor, indicated at 60 in Figure 1. Instead of starting a motor, it might, however, energize a solenoid coil or other translating device. Where an auxiliary motor is used, it may be adapted to operate record shifting mechanism and to control the resetting of the trip switch to open position. A multiple record phonograph having record shifting mechanism operated by an auxiliary motor is shown in my application, Serial No. 262,190, filed March 16, 1928.

As indicated in the drawings, the auxiliary motor 60 is connected to reduction gears 61 and 62 to drive a shaft 63. This shaft 63 is connected to gears 64 to operate crank arm 65 one revolution about a center indicated at 66. When the record is being played, the auxiliary motor is idle and the crank arm 65 is in the position indicated. This arm is connected to a connecting rod 67, the other end of which is connected as indicated at 68 to a ring (not shown). This ring is mounted to move about the center 22, which is the same center about which the reproducer swings. The one revolution shaft 63 carries a running switch indicated at 70 and this running switch has an insulating segment indicated at 71.

When the circuit is closed through the contacts 51 and 52, which occurs after the playing of the record, the auxiliary motor is started and, through the gearing, it starts the shaft 63 and crank 65 in motion. This will move the crank 65 and connecting rod 67 from the position indicated in Figure 1 toward the position indicated in dot and dash lines in Figure 3, and will carry the insulating segment 71 on the running switch beyond brushes 72 and 73 connected with the leads 74 and 75. Now the motor 60 can receive current both through the trip switch and through the running switch as will be obvious.

The connecting rod 67 carries a trip switch resetting cam indicated at 75. This cam moves from the position indicated in Figure 1 through the position indicated in dotted lines in Figure 3 until it comes over toward the position shown in full lines in Figure 3. The cam 75 engages a pin 76 secured to and carried by the swinging arm 31 and swings the trip mechanism in a clockwise direction about the pivot 30. This brings an extension 77 on the lever 32 against an adjustable reset stop indicated at 78. This reset stop arrests the finger or extension 77 and as the lever 32 is now compelled to turn in a clockwise direction, it cams the lever 33 in a clockwise direction against the tension of the spring 35. This action continues until the tooth 38 is brought against the tooth 43, these acting as cooperative detent parts to relock the three levers 31, 32 and 33 into a unit and the switch

in the open circuit position. Further movement of the connecting rod 67 toward the right will cause the resetting cam 75 to move away from the pin 76 and the parts driven from the connecting rod will move onto the initial position without otherwise affecting the automatic trip.

During this time the auxiliary motor will continue to operate by current fed through the running switch 70. When, however, the auxiliary motor has completed its cycle, the running switch will be moved to the position to open the circuit for the auxiliary motor and the auxiliary motor will stop. The device is then in position to repeat the operation.

In operating phonographs one occasionally desires to play a record which has no special groove inside the playing surface or wherein the special groove has been injured so that the stylus continues to travel around in the inner groove of the playing surface or in a broken or mutilated groove of the closely spaced spiral. In this event, the device herein shown will in a short time automatically trip as though the record had the special groove inside the playing surface. It will be understood that near the end of the playing of each record, the nose 37 of the lever 32 will be moved into the worm so as to travel with the worm. If, however, it is carried by the worm beyond the distance to which it is normally moved for playing of records, the parts will be carried on to the position indicated in dot and dash lines in Figure 3. The finger 77 will then be brought against the permanent stop indicated at 80, which will compel the relative motion between the levers 31 and 32 so as to break the toggle. The trip switch will then close and the auxiliary motor or other translating device go through its operations as though the switch had been tripped in the regular manner.

In the modified form of construction illustrated in Figure 6, the switch shown is a normally closed one. It has a fixed contact 90 and a movable spring pressed contact 91 normally in engagement with the fixed contact 90. The spring indicated at 92 may be provided to hold these parts together. This switch is adapted to control the platform motor for a phonograph wherein a single record is played and then the phonograph is stopped by stopping the platform motor. The opening of the circuit for the platform motor is effected by the engagement of the end 93 of the lever 94. This lever may correspond with the lever 33 of the trip switch heretofore described in detail. The parts are suitably insulated so that the circuit is not grounded when the trip is operated to open the switch for the platform motor.

It is obvious that the invention may be embodied in many forms and constructions, and I wish it to be understood that the particular forms shown are but a few of the many forms. Various modifications and changes being possible, I do not limit myself in any way with respect thereto.

I claim:

1. The combination with a talking machine having a rotatable record support, and sound reproducing means including a stylus cooperative with sound grooves on the sound record and moved thereby across said support, of a pivotally supported swingable arm carrying a member bodily moving therewith and normally having a fixed position relative thereto, the said member being actuated by the stylus at a speed proportional to the pitch of the record groove, a worm driven synchronously with the record support, a follower for the worm carried by the arm to actuate the arm at the same speed it is normally moved by the stylus actuated member, whereby the arm and member operate as a unit so long as the record groove is of uniform pitch and a differential movement is brought about by a variation in pitch of the record groove, and phonograph controlling trigger mechanism mounted on the first arm, said trigger mechanism being released by a sudden movement of the stylus.

2. A phonograph having a turntable, a reproducer support, a worm driven from the same power source as the turntable, a swinging arm carrying switch contacts and a pair of spring controlled levers capable of being interlocked in one position wherein the switch contacts assume one condition and capable, when the interlock is disengaged, of shifting to another position wherein the contacts assume the opposite condition, a yieldable spring secured to the swinging arm and engageable with a member movable with the reproducer support to swing the arm, one of the levers having a projection entering the worm when the reproducer support shifts the arm sufficiently toward the worm, the worm thereafter compelling the lever and arm to move at a speed controlled by the power source, the member moving with the reproducer support acting on a sudden inward movement of the reproducer support to disengage the interlock.

3. An automatic control for phonographs comprising a swinging arm, a pair of switch contacts carried by the arm, two spring controlled levers pivoted to the arm, one being near the end of the arm and carrying a projecting follower, the other being pivoted at an intermediate point, and carrying a circuit controlling part, the two levers being capable of being locked together to hold the current controlling part away from the contacts, the spring for the second lever acting, when the levers are disengaged, to swing the current controlling part against the fixed contacts.

4. The combination with a talking machine

having a rotatable record support, and sound reproducing means including a stylus cooperative with sound grooves on the sound record and moved thereby across said support, of a worm actuated at a speed proportional to the speed of the record support, a swinging arm, a yieldable spring secured to the swinging arm near the pivot thereof and normally having its free end spaced from the arm, the yieldable member being in the path of a member moving with the reproducer support so that the swinging arm may be actuated by the reproducer as the stylus is fed across the record, a follower for the worm carried by the arm and locked in fixed position there by a detent lever carried thereby, the follower entering the worm and moving the arm at a speed proportional to the speed of the record support, the reproducer operated member acting on sudden inward movement of the reproducer to actuate the swinging arm and unlock the detent, and a switch controlled by the unlocking of the detent.

5. In a phonograph control device, a swinging arm carrying a yieldable spring whose free end is normally spaced therefrom, the arm carrying a spring controlled lever system including detent means to latch the lever system in fixed position relative to the arm, a switch carried by the arm and opened and closed according to the condition of the lever system, and a worm into which one of the levers is brought by a reproducer actuated member engaging the yieldable spring, the worm moving the lever system and arm at a predetermined rate, the reproducer actuated member operating when moved at an increased rate, to release the detent whereupon the circuit condition is changed.

6. In a phonograph control, a flat sheet metal arm pivoted at one end, a pair of switch contacts fixedly carried thereby and movable therewith, a lever pivoted on the arm, a spring urging the arm toward the switch contacts to change the circuit conditions controlled thereby, a second lever pivoted at the end of the arm and having a spring pressing it toward the first lever, the two levers having detent means to interlock them in position, and a worm adjacent the end of the second lever, the end of the lever being engageable with the worm in certain positions of the arm whereby the worm may actuate the arm about its pivot.

7. In a phonograph control, a flat sheet metal arm pivoted at one end, a pair of switch contacts fixedly carried thereby and movable therewith, a lever pivoted on the arm, a spring urging the arm toward the switch contacts to change the circuit conditions controlled thereby, a second lever pivoted at the end of the arm and having a spring pressing it toward the first lever, the two levers having detent means to interlock them in position, a worm adjacent the end of the second lever, the end of the lever being engageable with the worm in certain positions of the arm whereby the worm may actuate the arm about its pivot, the second lever having an extension passing beyond the worm, and stops limiting the movement of the swinging arm, one stop acting to unlock the levers when the arm is swung too far one way, the other stop acting as an abutment to permit resetting of the levers in interlocked position.

8. In a phonograph control, a flat sheet metal arm pivoted at one end, a pair of switch contacts fixedly carried thereby and movable therewith, a lever pivoted on the arm, a spring urging the arm toward the switch contacts to change the circuit conditions controlled thereby, a second lever pivoted at the end of the arm and having a spring pressing it toward the first lever, the two levers having detent means to interlock them in position, a worm adjacent the end of the second lever, the end of the lever being engageable with the worm in certain positions of the arm whereby the worm may actuate the arm about its pivot, a spring secured to the swinging arm and having its free end slightly spaced from the arm.

9. A phonograph control device comprising a movably supported member carrying two levers, the free end of one lever having a switch operating device cooperative with contacts carried by the movably supported member, the free end of the other arm being adapted to follow a worm, the adjacent ends of the levers having cooperative detent means to interlock them in fixed position, a spring secured to each lever for holding the levers so interlocked, the interlock being opened upon movement of the supporting member relative to the worm whereupon the spring for the switch operating lever swings this lever to actuate the switch.

Signed at New York, in the county of New York, and State of New York, this 29th day of May, 1929.

JACK POTTER STOCKTON.