July 4, 1944. W. C. EDDY 2,352,778

CONTROL MECHANISM FOR SOUND REPRODUCING APPARATUS

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Fig. 1

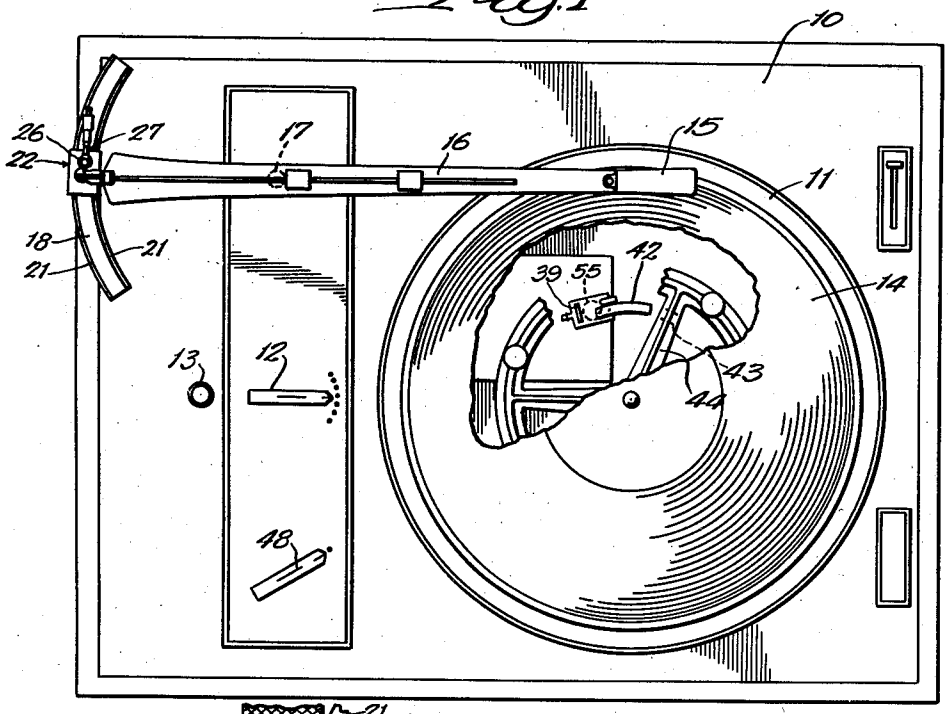


Fig. 2

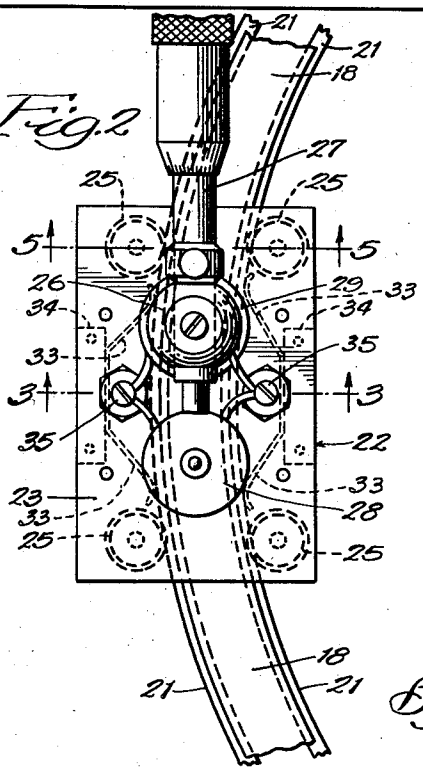
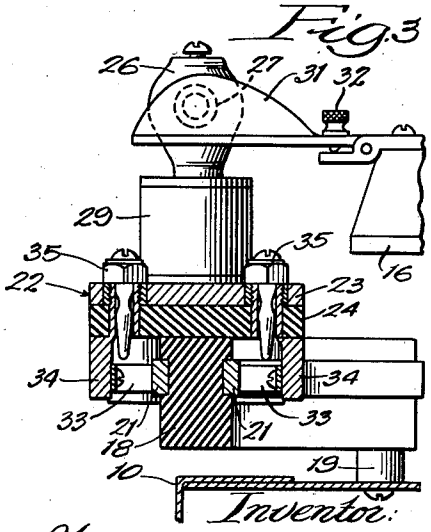


Fig. 3



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Fig. 4

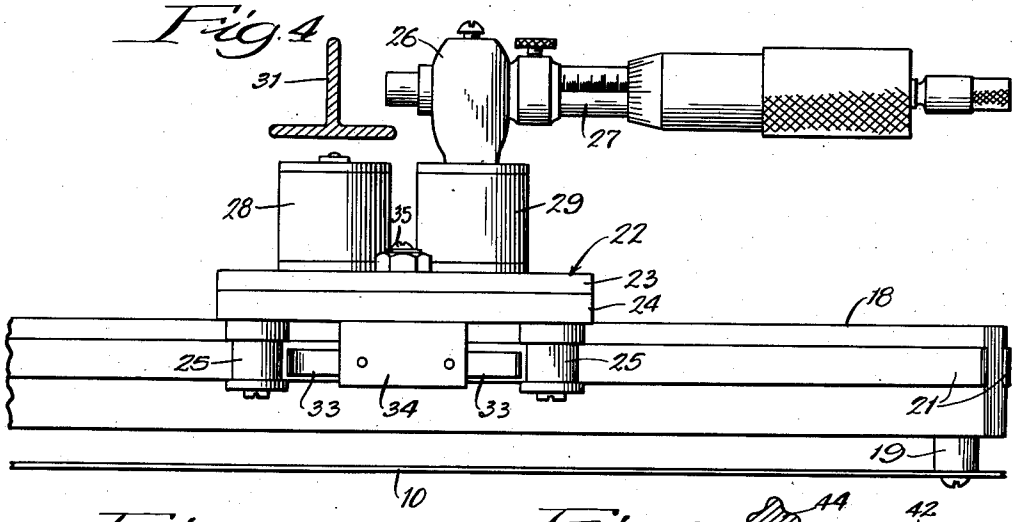


Fig. 5

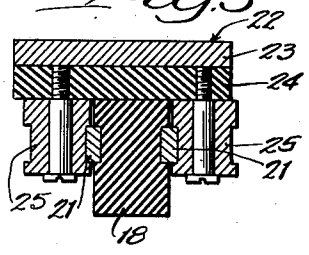


Fig. 6

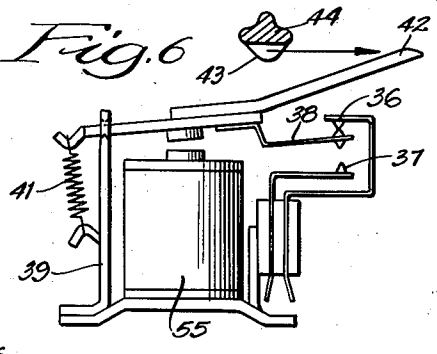
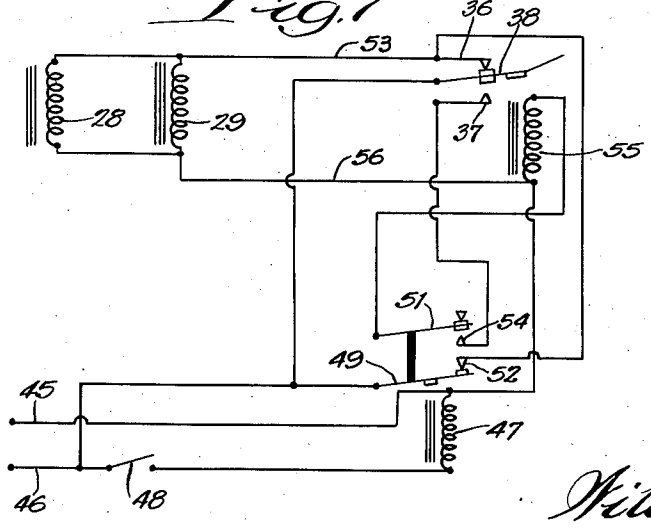


Fig. 7



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UNITED STATES PATENT OFFICE

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CONTROL MECHANISM FOR SOUND REPRODUCING APPARATUS

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Application May 6, 1942, Serial No. 441,912

7 Claims. (Cl. 274—1)

This invention relates to control mechanism for sound reproducing apparatus and more particularly for mechanism for accurately controlling the position of a pickup relative to a sound record so that any selected portion of the record may be reproduced.

One of the objects of the invention is to provide a control mechanism which may be used with records playing in either direction. For example, the control mechanism may be utilized with disc records playing from the center out or from the periphery in.

Another object of the invention is to provide control mechanism having a wide range of adjustment. According to one feature, a block may be provided movable bodily for course adjustments and carrying a micrometer stop for precise adjustment.

Another object of the invention is to provide control mechanism operable electrically to control the position and movement of a pickup into engagement with a record in which electrical contact with the control mechanism is maintained over a wide range of adjustment and in either direction of operation.

Still another object of the invention is to provide control mechanism including a trip switch operating positively and quietly to release the pickup at a predetermined rotary position of the sound record.

The above and other objects, advantages and novel features of the invention will be apparent from the following description when read in connection with the accompanying drawings, in which—

Figure 1 is a plan view with parts broken away of a sound reproducing apparatus embodying the invention;

Figure 2 is an enlarged partial plan view of the block and stop mechanism;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a side elevation of the stop mechanism;

Figure 5 is a section on the line 5—5 of Figure 2;

Figure 6 is an enlarged side elevation of the trip switch; and

Figure 7 is a circuit diagram.

The apparatus illustrated in Figure 1 includes a casing 10 adapted to contain amplifying and loud speaker devices and rotatably supporting a turntable 11 driven by a motor in the casing. The motor and amplifying mechanism may be controlled by a combined shut-off and volume control lever 12, a pilot light 13 being provided to indicate when the mechanism is in operating condition.

The turntable 11 is adapted to support a disc record 14 having a spiral sound track thereon. It will be understood that some records of this type have a sound track playing from the center out to the periphery while others have a sound track playing from the periphery in towards the center. The illustrated record is of the former type, although the invention may be used equally well with either type of record.

The record is adapted to be engaged by a pickup 15 carried by one end of an arm 16 pivotally mounted on a post 17 for swinging movement of the pickup across the record. The arm 16 is also mounted on a horizontal pivot so that the pickup may be raised from the record when desired.

The present invention provides a means for enabling the pickup to be moved into engagement with any desired part of the sound track so that any selected portion of the record may be played starting at any desired intermediate part of the sound track. For this purpose an adjustable stop is provided engaging the end of the arm 16 opposite the pickup and positioning the pickup at the desired point in the sound track.

As shown, the stop mechanism comprises a curved track member 18 supported on posts 19 on the upper surface of the casing 10 adjacent the free end of the arm 16. Preferably, the track member is curved about the center 17 so that the free end of the arm 16 will always register therewith in the same manner regardless of its position. Metal tracks 21 are carried by the sides of the track member 18 and project therefrom to support a block indicated generally at 22 on the track. The block comprises an upper plate 23 of metal or other like material supported on an insulating block 24 which carries a plurality of rollers 25 cut away in their intermediate portions to receive the tracks 21.

In this way, the block is slidably supported on the track member and is firmly held thereon against tilting movement. As best seen in Figure 2, the rollers 25 are symmetrically arranged about the longitudinal center of the block so that the block may be placed on the track in either of two reversed positions. This enables the mechanism to control a record playing in either direction.

The block carries a stop mechanism shown as

comprising a post 26 extending above the surface of the block and carrying an adjustable micrometer 27. By sliding the block along the track member a course adjustment of the position may be obtained while the micrometer mechanism produces a means for obtaining a very precise adjustment.

The pickup arm is adapted to be tilted to move the pickup out of engagement with the record and to swing its end against the stop by means of electro-magnets 28 and 29 mounted on the block. As shown, the magnet 29 surrounds the post 26 to magnetize the micrometer mechanism and the magnet 28 lies adjacent and below the end of the micrometer. A plate 31 of magnetic material is pivotally connected to the end of the arm 16 as best seen in Figure 3, and has a vertical flange thereon adapted to register with the end of the micrometer. Screw 32 carried by the plate 31 engages an extension of the arm 16 so that the relative angular positions of the plate and arm may be adjusted to vary the amount the pickup will be raised. When the magnets 28 and 29 are energized the magnet 28 will draw the armature plate 31 down to raise the pickup and the magnet 29 acting through the micrometer will draw the plate toward it until the flange on the plate abuts the end of the micrometer. Contact with the magnets 28 and 29 is maintained by means of spring wipers 33 carried by plates 34 on the sides of the block and engaging the tracks 21. The spring wipers may be connected to contacts 35 on the upper surface of the block, the contacts in turn being connected to the magnet coils 28 and 29. With this construction, contact with the magnet coils may be maintained regardless of the position of the block on the track or of the direction in which the block is facing.

The magnets 28 and 29 are adapted to be simultaneously de-energized under the control of a trip switch including a pair of spaced contacts 36 and 37 adapted to be alternately engaged by a contact arm 38. The arm 38 is pivotally supported on a plate 39 and is urged by a spring 41 in a direction to engage the contact 36. An operating finger 42 on the contact arm is adapted to underlie the turntable to be engaged by a projection 43 carried by an arm 44 forming a portion of the supporting structure of the turntable. Preferably, the finger 42 will be made of a relatively soft plastic material and the projection 43 will be of a sound deadening material such as felt or rubber so that the trip switch mechanism will operate quietly and at the same time efficiently.

The operating circuit is illustrated in Figure 7 in which power lines 45 and 46 supply the power for the circuit and are connected to a relay coil 47 through a manual control switch 48. The switch 48 is preferably operable from the top of the cabinet 10 and is normally open except when the pickup is to be moved into engagement with the record. The power line 46 is connected to one arm 49 of a double-pole switch, the other arm of which is shown at 51. The arm 49 is adapted to engage a fixed contact 52 connected to a lead 53 which may connect through the spring contact 33 and track 21 with one side of the coils 28 and 29. The switch contact 36 is also connected to the lead 53 as shown.

The switch arm 51 is adapted to engage a fixed contact 54 which is connected to the contact 37 of the trip switch. The trip switch is adapted to be held in its down position by a coil 55 one side of which is connected directly to the power line 45 and by a lead 56 with the opposite side of the coils 28 and 29. The other side of the coil 55 is connected to the switch arm 51. In operation of the system with the power leads 45 and 46 energized and the manual switch 48 open, as shown in Figure 7, the switch blades 49 and 51 will occupy the illustrated position and the switch blade 38 will be in its raised position to engage the contact 36. At this time, a circuit will be completed through the coils 28 and 29 from lead 45 through lead 56 and the coils, lead 53 switch 36—38 and back to the opposite line 46. When the switch 48 is closed, the coil 47 will be energized to move the blades 49 and 51 down thereby breaking contact between blade 49 and point 52 and establishing contact between blade 51 and point 54. At this time, the circuit through the coils 28 and 29 is maintained through the same circuit described above.

As soon as the turntable passes the position where the projection 43 engages the finger 42, the switch arm 38 will be moved down away from the contact 36 and into engagement with the contact 37. This interrupts the circuit through the coils 28 and 29 and establishes a holding circuit through a coil 55 from lead 45, through the coil 55 to the switch blade 51, contact 54 through switch 37—38 and back to the line 46. This condition will be maintained as long as the switch 48 is closed.

As soon as the circuit above described is established to de-energize the coils 28 and 29, the armature plate 31 will be released so that the pickup may move down onto the record at the point across the record determined by the setting of the micrometer stop and at the rotary position in the record determined by the relationship of the record with the projection 43 of the turntable. It will thus be seen that by properly adjusting the micrometer stop and positioning the record properly on the turntable, any preselected point in the sound track may be engaged by the pickup within very accurate limits

When it is desired to again raise the pickup from the record, the switch 48 is opened to interrupt the circuit through the coil 47. As soon as this is done, the blades 49—51 move upwardly de-energizing the coil 55 and allowing the switch blade 38 to raise into engagement with the contact 36. At the same time, the circuit through the coils 28 and 29 will be re-established so that coil 28 will attract the armature plate 31 to raise the pickup from the record and coil 21 will act through the micrometer to draw the armature plate 31 against the end of the micrometer. This returns the parts to their original starting position so that, if desired, the selected portion of the record may be repeated.

In playing a record whose sound track runs from the periphery toward the center, the position of the block 22 on the track is reversed so that the micrometer stop will engage the opposite side of the armature plate. Otherwise operation of the system is identical and will not be described in detail.

While one embodiment of the invention has been shown and described in detail, it will be understood that this embodiment is illustrative only and is not intended as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. In a sound reproducing apparatus having a rotatable carrier for a record formed with a sound track, control mechanism comprising an

arm swingably mounted adjacent the carrier, a pickup carried by one end of the arm for cooperation with the sound track, a block, means on the block engageable with the arm to form a stop therefore, means on the block cooperating with the arm to urge the arm into engagement with the stop means, mounting means for the block adjacent the arm, and cooperating means on the block and the mounting means symmetrical about the longitudinal center line of the block to support the block in either of two reversed positions so that the stop can engage the arm to limit its swinging movement in either of two directions.

2. In a sound reproducing apparatus having a rotatable carrier for a record formed with a sound track, control mechanism comprising an arm swingably mounted adjacent the carrier, a pickup carried by one end of the arm for cooperation with the sound track, a block, an adjustable stop on the block to engage the arm and limit swinging thereof, electrical means on the block to urge the arm against the stop and to tilt the arm to move the pick up away from the record, mounting means for the block, cooperating means on the block and the mounting means symmetrical about the longitudinal center line of the block to support the block in either of two reversed positions, and disengageable electric connections on the block and the mounting means symmetrical about the longitudinal center line of the block to provide electric connections to the electrical means in either position of the block.

3. In a sound reproducing apparatus having a rotatable carrier for a record formed with a sound track, control mechanism comprising an arm swingably mounted adjacent the carrier, a pickup carried by one end of the arm for cooperation with the sound track, a block, adjustable stop means on the block engageable with the arm to limit swinging movement thereof, mounting means slidably supporting the block for movement bodily in an arcuate path concentric with the swinging axis of the arm and magnetic means on the block cooperating with the arm to urge the arm into engagement with the stop means.

4. In a sound reproducing apparatus having a rotatable carrier for a record formed with a sound track, control mechanism comprising an arm swingably mounted adjacent the carrier, a pickup carried by one end of the arm for cooperation with the sound track, a block, adjustable stop means on the block engageable with the arm to limit swinging movement thereof, electrical means on the block to urge the arm into engagement with the stop and to tilt the arm to move the pickup out of engagement with the record, mounting means slidably supporting the block for movement bodily in an arcuate path concentric with the swinging axis of the arm, and relatively slidable contacts on the mounting means and the block to provide electric connections to the electrical means in any position of the block on the mounting means.

5. In a sound reproducing apparatus having a rotatable carrier for a record formed with a sound track, control mechanism comprising an arm swingably mounted adjacent the carrier, a pickup carried by one end of the arm for cooperation with the sound track, a curved track member adjacent the arm, a block having symmetrical mounting means on opposite sides of its center for slidably supporting it on the track in either of two reversed positions and an adjustable stop member carried by the block and engageable with the arm to limit swinging movement thereof in one direction or the other depending on the position of the block, electrical means on the block to urge the arm against the stop and to tilt the arm to move the pickup away from the record, and relatively sliding contacts on the block and the track member to provide connections to the electrical means in any position of the block on the track member.

6. Control mechanism for a sound reproducing apparatus having a swingable pickup arm comprising an arcuate support concentric with the swinging axis of the arm, a pair of curved tracks on the opposite sides of the support, a block adapted to be slidably mounted on the support, spaced rollers carried by the block and cut away to receive the tracks slidably to support the block, and an adjustable stop carried by the block and engageable with the arm to limit swinging thereof, the rollers being symmetrically arranged on the block so that the block can be mounted on the support in either of two reversed positions.

7. Control mechanism for sound reproducing apparatus having a swingable pickup arm comprising an arcuate support concentric with the swinging axis of the arm, a pair of curved tracks on the opposite sides of the support, a block adapted to be slidably mounted on the support, spaced rollers carried by the block and cut away to receive the tracks slidably to support the block, an adjustable stop carried by the block and engageable with the arm to limit swinging thereof, the rollers being symmetrically arranged on the block so that the block can be mounted on the support in either of two reversed positions, electrical means on the block to urge the arm into engagement with the stop and to tilt the arm to move the pickup out of engagement with a record, an electric control circuit for the electrical means connected to the tracks, and flexible contacts on the block engaging the tracks.

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