May 9, 1944. G. P. BRUBAKER 2,348,204

SOUND REPRODUCING SYSTEM

Filed Sept. 15, 1941 3 Sheets-Sheet 1

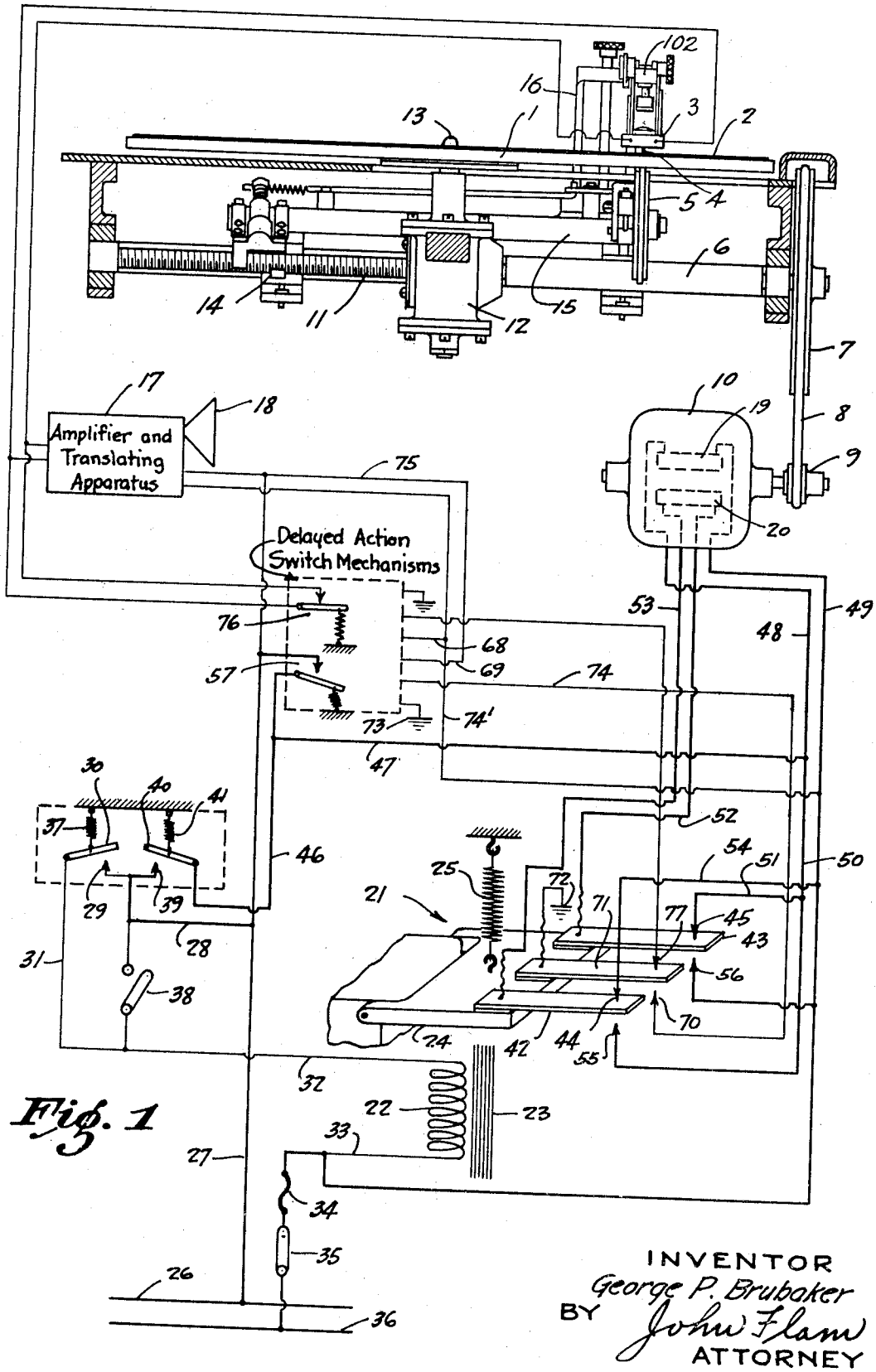


Fig. 1

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SOUND REPRODUCING SYSTEM

Filed Sept. 15, 1941 3 Sheets-Sheet 2

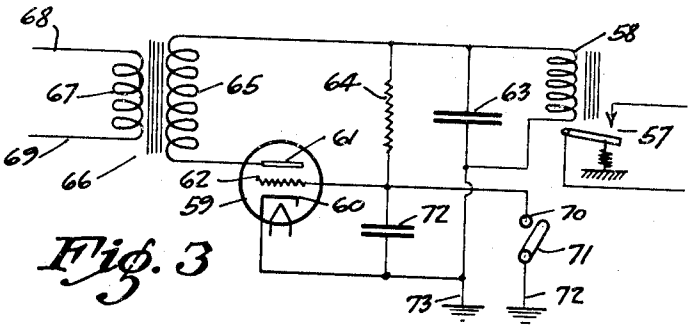


Fig. 3

Fig. 2

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SOUND REPRODUCING SYSTEM

Filed Sept. 15, 1941 3 Sheets-Sheet 3

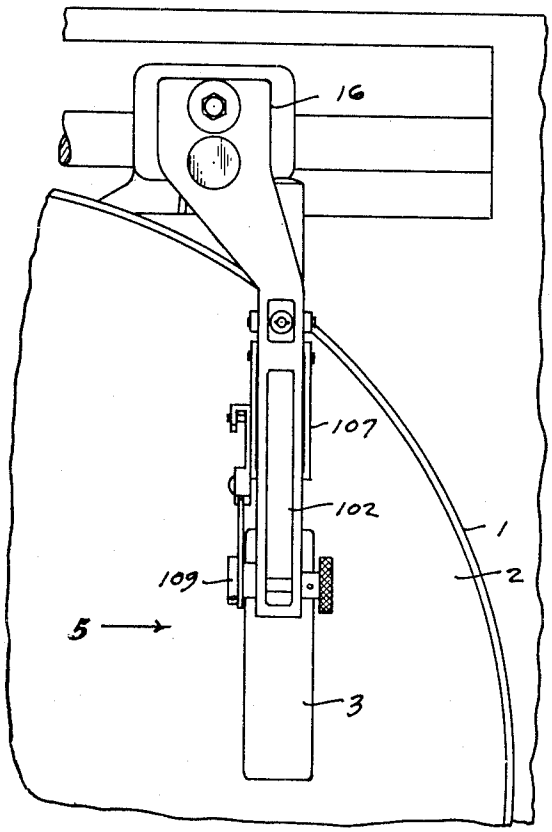


Fig. 4

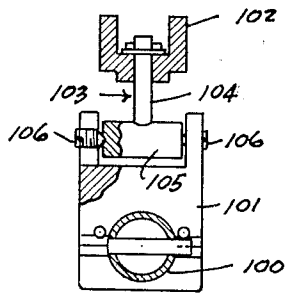


Fig. 6

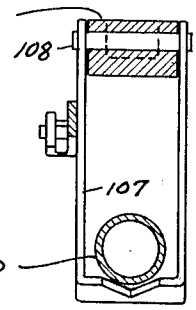


Fig. 7

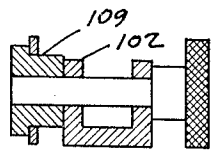


Fig. 8

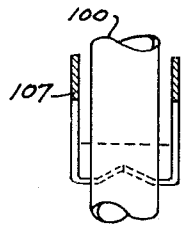
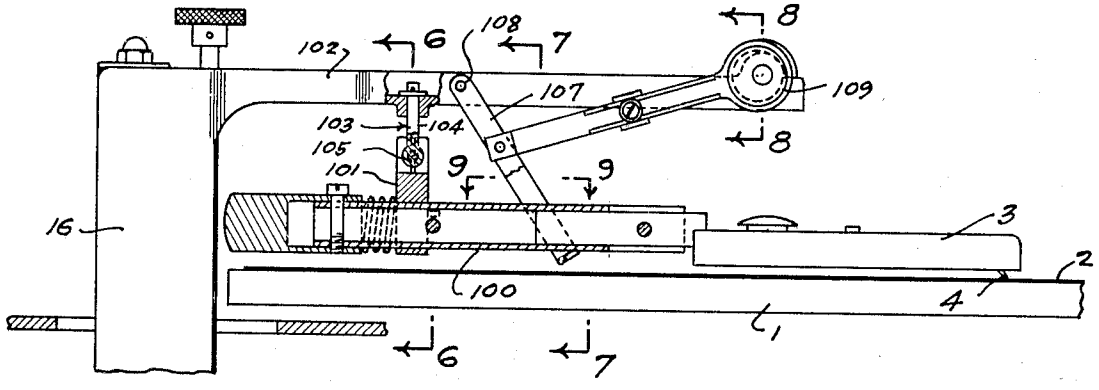


Fig. 9

Fig. 5



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UNITED STATES PATENT OFFICE

2,348,204

SOUND REPRODUCING SYSTEM

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Application September 15, 1941, Serial No. 410,884

17 Claims. (Cl. 179—100.4)

This invention relates to a system for reproducing sound, and more particularly to one utilizing a record member capable of reproduction either by aid of a stylus or by actinic or light radiations.

In such system the record member may be in the form of film or of a thin disc or a cylinder, and adapted to cooperate with a reproducer head. The reproducer head may carry a stylus to cooperate mechanically with the grooves of the record; or other means may be used if the record is in the nature of a photographic one. Often the record is in the nature of a "track" forming a continuous record, such for example, as a spiral groove of small pitch. The head cooperating with the record is moved in a direction transversely of the direction of the track while the record is moved past the head, and at a rate corresponding to the pitch of the groove. In this way, the stylus or equivalent device is kept in accurate alinement with the track.

When the reproducing system is used for transcribing, it is necessary to provide a back spacer, so that at the will of the transcriber, a portion of the record may be repeated. Invariably, where a stylus cooperates mechanically with a record groove, such back spacing has been accomplished by moving the stylus from one turn of the groove into a nearby turn of the groove, as by first lifting the stylus from the record, moving the stylus head backward, and then dropping the head again into operative engagement with the record.

Such backspacing may be satisfactorily utilized where care is taken to ensure that the backspacing movement causes the stylus to be accurately returned to the sound track. However, in the event that the linear velocity of the track past the stylus is low, such as six inches per second, and where disc records of considerable diameters are utilized, backspacing even from one turn of the groove to the adjacent turn causes far too much of the record to be repeated, since often only a few words or a sentence need be verified by the transcriber.

By the aid of this invention, it is possible to backspace along a record track to any desired extent, even less than that corresponding to one turn of the turntable. Furthermore, this backspacing effect is not limited to a system that utilizes a stylus, but may be used for example in connection with photographic or other light responsive records.

This backspacing is obtained by a reversal of the drive for the record, without lifting the reproducing head. Since the drive is synchronized with the transverse movement of the head, the head stays in full operative relation to the record during the entire period of the reverse motion. Although the stylus thus stays in engagement with the record, this reverse motion causes no injury either to the record or to the stylus; and this is true even where the axis of the stylus departs considerably from a direction normal to the record surface. This is primarily due to the fact that for reproduction the stylus pressure is light, and also that the end of the stylus invariably has a rounded surface, no matter how minute.

During the period when the backspacing movement occurs, it is advantageous to render the sound reproducer (such as a telephone receiver or loudspeaker) ineffective. It is accordingly another object of this invention to make it possible to effect this result automatically whenever back spacing is desired.

Transcription is often temporarily interrupted, for various reasons. Upon resumption of the transcription, it is almost invariably necessary to repeat a small portion of the last material that was transcribed. It is another object of this invention to make it possible automatically to back space the reproducer head whenever such an interruption occurs. Upon a resumption of the reproduction, the last part of the record is repeated without the necessity of any further conscious effort on the part of the operator.

This invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of several embodiments of the invention. For this purpose there are shown a few forms in the drawings accompanying and forming part of the present specification. These forms will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a diagrammatic representation, including the wiring, of a system embodying the invention;

Fig. 2 is a view similar to Fig. 1 of a modified form of the invention;

Fig. 3 is a detail diagram of a delayed action switch mechanism which may be utilized in connection with either of the systems illustrated in Figs. 1 and 2;

Fig. 4 is a plan view, on an enlarged scale, of the reproducer and mounting of Fig. 1;

Fig. 5 is an elevation partly in section, on a further enlarged scale, of the structure of Fig. 4, as viewed from the left; and

Figs. 6, 7, 8, and 9 are detail sections taken on the correspondingly numbered planes of Fig. 5.

The reproducing apparatus in this instance is shown as of the type illustrated in copending application filed in he name of Frank Rieber for Phonograph apparatus, having Serial No. 390,690, filed on April 28, 1941, now Patent 2,318,098, issued May 4, 1943; and assigned to the same assignee as the present application.

This reproducing apparatus includes a turntable 1 upon which is supported a record carrying member 2 in the form of a thin disk. Cooperating with the record carrying member 2 is a stylus head 3 having a stylus 4 shown in operative contact with the record member 2. The stylus 4 may be disposed at an angle slightly deviating from the normal to the active surface of the record member 2.

As disclosed in said copending application, the stylus 4 of the reproducer or pick-up head 3 rests at will upon record 2 by gravity. In this case, since no recorder is used, the reproducer is mounted on the threadedly advanced carriage. The reproducer 3 is suitably attached to one end of a mounting arm 100 (Figs. 4, 5, and 6), the other end of arm 100 being carried by a supporting block 101 mounted for universal movement by an overhanging extension 102 of a columnar structure 16 on the threadedly advanced carriage 15 (Fig. 1) by an inverted T-shaped hanger 103. The vertical leg 104 of this hanger is so supported in extension 102 that the hanger 103, as well as block 101, is freely rotatable in a horizontal plane. The horizontal part 105 of hanger 103 supports block 101 by means of adjustable pintles or bearing screws 106 carried by the block 101 and engaging the ends of part 105 (see Fig. 6), so that block 101 is freely rotatable also in a vertical plane. The block 101 and hangger 103 thus form a universal joint for supporting the reproducer arm 100 in such a manner as to permit the reproducer stylus 4 to follow minor vagaries of the second groove. A U-shaped link 107 (Figs. 5, 7, and 9), pivoted on extension 102 at 108 and arranged to be swung about its pivot by rotation of an eccentric 109 supported on extension 102, serves to swing the reproducer 3 upwardly about pivots 106, lifting stylus 4 out of contact with the record when desired.

The table 1 in this instance is shown as rotated by the aid of a roller 5 in driving contact with the lower surface of the table 1. This roller is in driving contact with a roller 6 driven as by the aid of a pulley 7 and belt 8 from a motor pulley 9. An electric motor 10 serves as a source of power for operating roller 6.

Since the particular mechanism whereby the turntable 1 is rotated is entirely similar to that disclosed in prior pending applications, it is not essential further to detail these features.

The arrangement is such that the stylus head 3 is caused to move in a radial direction with respect to the turntable 1 and in synchronism with the rotary movement of the turntable. For this purpose a lead screw 11 is utilized, driven, as through appropriate transmission mechanism located in a housing 12, so that its driven side is in connection with the spindle 13 of the turntable. The lead screw 11 is engaged by a mutilated nut device 14 carried by a carriage 15 which supports the roller 5. As the lead screw 11 is rotated the position of the roller 5 is also adjusted in a radial direction with respect to the axis of the spindle 13. In this way a constant linear groove speed is obtained. Furthermore, the stylus head 3 is also moved in conformity with the position of the roller 5. For this purpose the stylus head 3 is shown as supported upon a columnar structure 16 indicated as mounted on the carriage 15. The details of this mechanism are also fully described in the copending application and accordingly further description is unnecessary. It is merely sufficient to note that the source of power 10 operates to rotate the turntable 1, and therefore the record member 2, as well as to move the stylus head 3 in a direction transverse of the grooves of the record. These motions of the stylus head 3 and of the turntable 1 are thus maintained in synchronism, since the turntable is directly rotated by the motor 10; and the rotation of the turntable is transmitted by the aid of the spindle 13, to rotate the lead screw 11.

The stylus head 3 is electrically connected with an amplifying and translating apparatus 17. The head 3 serves to convert the mechanical vibrations of the stylus 4 into electrical vibrations, which then affect the input side of the amplifier and translating apparatus 17. The output side may be connected to any load device such as a loud speaker shown as provided with a speaker cone 18.

Control circuits are so arranged that the turntable 1 may be reversed to provide a back spacing effect as desired by the operator. Such back spacing may be desired when the operator utilizes the apparatus for transcribing previously recorded material. When the direction of motion of the turntable 1 is reversed, the radial direction of motion of the stylus head 3 is also reversed, since this stylus head motion is derived from the angular motion of the turntable 1.

Furthermore, it has been found that it is not necessary to lift the stylus head 3 and the stylus 4 off of the record carrying member 2 during this reverse motion. No injury results because the stylus 4 is provided with a rounded point, and even if this rounding is quite minute, the record carrying member 2 can slip past the end of the stylus 4. This manner of operation for backspacing is also rendered feasible by the fact that the pressure operating upon the head 3 is quite light.

For the purpose of making it possible optionally to rotate the table 1 in either forward or reverse direction, the electric motor 10 is reversible. Thus it has a running winding 19 (shown diagrammatically) as well as a starting winding 20, which upon reversal of its connections will cause the motor to operate in a reverse direction.

The operation of the motor 10 in forward or reverse direction is controlled by the aid of a relay mechanism illustrated generally by the reference character 21. This relay mechanism includes a solenoid coil 22 having a magnetic core 23 influencing a pivoted armature 24. This armature 24 is urged upwardly when the solenoid coil 22 is de-energized, as by the aid of a tension spring 25.

When the relay coil 22 is deenergized, connections are made that would condition the electric motor 10 to operate in a reverse direction. The control circuit for the coil 22 may be traced as follows: From the power main 26; connection 27, connection 28, contact point 29, switch arm

30, connections 31 and 32, coil 22, connection 33, a fuse 34, main switch 35, back to the other main 36. The switch arm 30 may be so mounted as to be capable of operation by a foot pedal. When the foot is released from the pedal the switch arm 30 may be urged to open position as by the aid of a tension spring 37.

If it is desired to run the table 1 continuously in a forward direction, even when the foot is removed from the pedal, an auxiliary switch 38 may be provided paralleling the switch 29—30. This auxiliary switch may be maintained closed for as long a period as desired.

The details of the connections causing the motor 10 to run in forward direction will be described hereinafter. To cause the motor 10 to run in a reverse direction for back spacing, a foot pedal switch may be provided, including contact point 39 and contact arm 40. This switch mechanism is in open position when the foot is removed from the pedal and is maintained in that position as by a tension spring 41.

Assuming that the foot is placed upon the pedal establishing contact between contacts 39 and 40 and that contacts between 29 and 30 are open, as well as the switch 38, the circuits of the motor 10 are established for back spacing. This is accomplished by the aid of a pair of spring contact fingers 42 and 43 mounted upon but insulated from the armature 24. These contact fingers establish electrical connection respectively with the contact points 44 and 45. Accordingly with the apparatus in the position illustrated in Fig. 1, but with the switch 39—40 closed, the circuits for the motor 10 may be traced as follows: from main 26, connections 27 and 28, contact point 39, arm 40, connections 46, 47 and 48, running winding 19, connections 49 and 33, fuse 34, switch 35, back to the opposite main 36.

The starting winding 20 is also energized in parallel with the running winding 19. The circuit for this starting winding 20 may be traced as follows: from main 26, connections 27 and 28, switch mechanism 39 and 40, connections 46 and 47, connections 50 and 51, contact point 45, contact arm 43, connection 52, starting winding 20, connection 53, arm 42, contact point 44, connection 54, connections 49 and 33, fuse 34, main switch 35, back to the other main 36. These connections are effective until the circuits are broken at switch 39—40.

When the back spacer pedal is released and the run pedal is depressed, contact is established between contact point 29 and arm 30. This causes energization of solenoid coil 22 and the armature 24 is pulled downwardly against the tension of spring 25. In this position the running winding 19 is still energized, but the starting winding 20 is energized to operate the motor in a forward direction instead of in the reverse direction as explained in connection with position of the apparatus illustrated in Figure 1. In this position contact arm 42 is caused to engage the stationary contact point 55 and contact arm 43 is caused to engage the stationary contact point 56. The contact points 44 and 45 are now disengaged from the contact arms 42 and 43 respectively.

In this position the running winding 19 is energized through the following circuit: from main 26, connection 27, a circuit controlling device 57, connections 47 and 48, winding 19, connections 49 and 33, fuse 34, switch 35, back to the opposite main 36. The circuit controlling device 57 is closed in the manner to be hereinafter described when the relay 21 is in energized position.

The starting winding 20 is also connected but in such direction as to cause the motor 10 to rotate in a forward direction. Energization of this starting winding is provided by a circuit paralleling the running winding 19, as follows: from main 26, connection 27, circuit controlling device 57, connections 47 and 50, contact point 55, contact arm 42, connection 53, starting winding 20, connection 52, contact arm 43, contact point 56, connections 49 and 33, fuse 34, switch 35, back to the opposite main 36.

The circuit controlling device 57 is of such a character that when the relay 21 is deenergized and returns to the position illustrated in Fig. 1, this circuit connection persists for a short period. Such a short period may be of the order of a second or less, after which the device 57 opens and the entire reproducing mechanism is inactive. Due to such an arrangement, upon releasing the running pedal controlling the switch 29—30, the turntable 1 is rotated for a short distance in a reverse direction. In this way when the transcriber or operator interrupts his transcription and then proceeds with it, the reproducer will reproduce the last few words or sentences of what had already been reproduced before, and accordingly it is unnecessary for him consciously to provide any back spacing at that time.

While any one of a number of delayed action switches 57 might be utilized, a simple form is illustrated in Fig. 3. Here the circuit controlling device 57 is shown as operated by the aid of a relay coil 58. This relay coil is shown as included in the output circuit of electronic emission device 59 having a cathode 60, an anode or plate 61 and a control grid 62. The coil 58 is placed directly in the circuit connecting the plate 61 and the anode 60. In parallel with the coil 58 is a large condenser 63. The output circuit also includes a source of electromotive force which may be the secondary coil 65 of a transformer 66. The primary coil 67 of this transformer may be connected as by leads 68 and 69 to a source of power. The complete circuit for this primary coil 67 is indicated on Fig. 1 and will be traced hereinafter.

When alternating current is fed to the transformer 66 the thermionic device 59 may cause pulses of current to flow through the relay coil 58 and of sufficient amount to keep the circuit controlling device 57 closed. This is due to the rectifier action of the thermionic device 59. In this condition the control electrode 62 is rendered inactive by being connected directly to the cathode 60. This is accomplished by the aid of a contact point 70 and a switch arm 71. However, when the arm 71 is out of contact with point 70, the control electrode 62 is caused to assume a blocking negative potential. This is accomplished by high resistance connection 64 between the control electrode 62 and one side of the transformer 65. A small condenser 72 is placed in parallel with switching device 70—71. When the switching device 70—71 is closed, the condenser 72 is inactive and the thermionic device 59 operates simply as a two-electrode rectifier. With the switching device 70—71 open, then during those periods that current can flow through the thermionic device 59, the control electrode 62 has impressed thereon a large negative potential which effectively blocks the flow of current through the thermionic device 59. However, since the large condenser 63 had been previously charged in parallel with the coil 58, even after the switching device 70—71 is opened, the dis-

charge current from the condenser 63 serves to keep coil 58 sufficiently energized to maintain the circuit controlling device 57 closed. As soon as this charging current attenuates, the circuit controlling device 57 opens. By appropriate choice of constants of the elements illustrated in Fig. 3, the delay action, after the switching device 70—71 is opened, may be made to conform with any desired value within limits.

The switching device 70—71 is illustrated in Fig. 1 as constituting an intermediate contact arm arranged between the contact arms 42 and 43 on the relay 21; and the contact point 70 is shown as disposed below the contact arm 71 so as to close the circuit whenever the relay 21 is energized. The control circuit for the thermionic device 59 thus includes arm 71, ground connection 72, ground connection 73 (shown adjacent the circuit controlling device 57), connection 74, contact point 70, back to the arm 71. Accordingly while the relay 21 is energized the circuit controller 57 is closed.

The supply of power to the primary 67 of the transformer 66 for the delay devices is also shown adjacent the circuit controlling device 57 in Fig. 1. The complete power circuit thus includes connections 27, 75 and 69 through the transformer 67 and then by way of connections 68, 74' and 33 to the fuse 34 and main switch 35.

As soon as the relay 21 is deenergized as by lifting the foot off the run pedal, the delay action circuit illustrated in Fig. 3 will function to maintain the circuits closed for a limited time, for the reverse operation of the turntable 1. In order to backspace by any desired amount, the back space pedal is depressed, causing the contact 39 to be engaged by the arm 40. This circuit control 39—40 is in direct parallel connection with the circuit controlling device 57 and accordingly the backspace connections are maintained even after the delay action switch opens.

During the process of backspacing or reverse rotation of the turntable 1, it is advantageous to render the amplifier and translating apparatus 17—18 also inactive so that the apparatus will be quiet during this period. For this purpose another delay action circuit controlling device 76 is provided arranged to short circuit the input side of the device 17—18. This circuit controlling device 76 is similar to the circuit controlling device 57 and operated in a similar manner. During the existence of reversing connections as illustrated in the position of Fig. 1, the circuit controlling device 76 is closed to short circuit the input. It is opened, however, promptly after forward operation, by separation of the arm 71 from the upper contact point 77 of the relay 21. The contact 77 is in engagement with the arm 71 in the deenergized position of the relay 21. The control circuit corresponding to the circuit shown in Fig. 3, for the circuit controlling device 76 thus includes the contact point 77 and arm 71, instead of contact point 70 and arm 71. While the circuit is closed by arm 71 and contact point 77 (corresponding to the back space position) the circuit controlling device 76 is likewise closed.

The power transformer corresponding to transformer 66 of Fig. 3 for the circuit controlling device 76 is placed in parallel to transformer 66 across the leads 68 and 69. Furthermore, the power supply for the amplifier system and translating apparatus 17—18 is also placed in parallel with the connections 68 and 69.

The description of the form of the invention illustrated in Fig. 1 is now complete. In the inactive position of Fig. 1, the delay switching device 57 is opened but otherwise the circuits are established for back spacing. If back spacing is desired, the back spacer pedal causes connections to be established between contact point 39 and arm 40 to energize both windings of the motor 10 in parallel and in reverse running position. If, however, it is desired to operate the reproducing system in forward direction, the run pedal causes connection to be established between the arm 30 and contact arm 29; relay 21 is then energized and the circuit controller 57 is closed due to contact of arm 71 with contact point 70. When the run pedal is released, the circuit controlling device 57 continues to be closed for a short interval and the turntable 1 is given a limited reverse motion.

In the form of the invention illustrated in Fig. 2, two motors are provided for rotation of the turntable 1 in forward and in reverse direction respectively. Thus the main motor 78 operates to drive the turntable 1 in forward direction. Another motor 79 is shown for cooperation with the edge of the turntable 1 to rotate it in the reverse direction. This motor 1 is shown as arranged normally to have its friction pulley 80 out of contact with the edge of the table 1. This is accomplished by the aid of a tension spring 81 operating upon the toggle link mechanism 82 to swing the motor 79 in a counterclockwise direction about a pivot support 83. However, when a solenoid 84 is energized the toggle mechanism 82 is straightened against the action of spring 81 and the motor 79 is swung in a clockwise direction into operative relation with the edge of the table 1.

The circuits for the motors are controlled by the relay 21. In the unenergized position of the relay 21 illustrated, back spacing connections are established except in the delay action circuit controlling device 57. The back space switch 39—40 may, however, be depressed and thus complete the circuit for the motor 79. This circuit may be traced as follows: from main 26, connections 85, 86 and 87, arm 43, connection 89, coil 84 and motor 79 in parallel, connections 90 and 91, switching device 40—39, connections 92 and 93, arm 42, connections 94 and 95, fuse 34, switch 35 to the main 36. The "forward" motor 78 in the deenergized position of relay 42 is deenergized. As before, if the relay 21 is energized for forward operation, contact point 70 on relay 21 cooperates with the arm 71 to cause the circuit controlling device 57 to be maintained in closed position. Upon subsequent deenergization of relay 21, the circuit controlling device 57 stays energized only for a limited period. In this form the controlling circuits for the circuit controlling device 57 includes a switch 96. This switch 96 is shown as joined to the switch 38 (that causes an indefinite forward operation of the device) and in such manner that when that switch 96 is closed the switch 38 is open. Accordingly when switch 38 is closed for maintaining the circuits for forward operation, the circuit control device 57 is inactive.

The circuit controlling device 76 operates similarly to the circuit controlling device 76 illustrated in Fig. 1. This circuit controlling device short circuits the amplifier and translating apparatus 17—18. Its control circuits include the contact point 77 and arm 71 as before. The power circuits for the devices 57, 76 and the amplifying translating apparatus 17 and 18, include connections 85, 86, 97, thence to devices 57—76

and 17—18 in parallel; thence by return connections 98 and 95, fuse 34, switch 35 to the opposite main 36.

When the forward running pedal is depressed to cause a connection to be established between contact point 29 and arm 30, the motor 79 is deenergized and the motor 78 is energized. The deenergization of the reverse direction motor 79 is effected by separation of arms 42 and 43 from the contact points 44 and 45. The connections for the motor 78 are established by contact of arms 42 and 43 with the contact points 55 and 56. The circuit for the motor 78 may then be traced as follows: main 26, connections 85, 86 and 87, arm 43, contact point 56, motor 78, connection 99, contact point 55, arm 42, connections 94 and 95, fuse 34, switch 35 to the other main 36. This forward operation continues only as long as contact is maintained between contact point 29 and arm 30. If desired, however, the switch 38 may be operated to maintain the system in forward running condition for an indefinite period.

The system of Fig. 2 operates in an entirely analogous manner to the system of Fig. 1, except that the motor 79 for backward rotation of the table 1 is provided instead of the use of a reversing motor. As before, upon opening of the relay circuit, the relay 21 attains the position illustrated in the drawings and the delay action circuit controlling device 57 stays active for a limited period. This causes the reverse drive motor 79 to be energized for a short period.

What is claimed is:

1. In apparatus of the character described, a reproducer head having a stylus adapted to contact with a record track, means for advancing the record track with respect to the stylus, means for reversing the direction of movement of the track for backspacing, and electrical means for rendering the reproducer head substantially ineffective during reversal of the record and while maintaining the stylus in contact with the track.

2. In apparatus of the character described, a reproducer head having a stylus adapted to contact with a record track, means for advancing the record track with respect to the stylus, means for reversing the direction of movement of the track for back-spacing the record, while maintaining the stylus in contact with the track, and means, operating in response to the initiation of said reverse movement, for rendering the reproducer head substantially ineffective.

3. In apparatus of the character described, a reproducer head having a stylus adapted to contact with a record track, means for advancing the record track with respect to the stylus, means for imparting positive movement to the head to keep the stylus in said track, means for reversing the directions of movement of the track and of the head for back-spacing the record, while maintaining the stylus in contact with the track, and means, operating in response to the initiation of said reverse movement, for rendering the reproducer head substantially ineffective.

4. In apparatus of the character described, a record carrier, a reproducer head, motor means for driving the carrier optionally in either direction, an electrically operable switch mechanism for controlling said motor means, and a circuit controller actuated by operation of said switch mechanism to reverse position, for rendering the reproducer head substantially ineffective.

5. In apparatus of the character described, a reproducer head having a stylus adapted to contact with a record track, and adapted to transmit electrical impulses in accordance with the record, means for advancing the record track with respect to the head, a device utilizing said impulses, means for reversing the direction of movement of the record while maintaining the head in contacting position with respect to the record, and electrical means for rendering said device ineffective during said reverse movement.

6. In apparatus of the character described, a reproducer head having a stylus adapted to contact with a record track, and adapted to transmit electrical impulses in accordance with the record, means for advancing the record track with respect to the head, means for moving the head while the record track is moved, for maintaining the head in proper relation to the track, a source of motion for operating both said means in synchronism, a device utilizing said impulses, means for reversing the direction of movement of the record while maintaining the head in contacting position with respect to the record, and means for rendering said device ineffective during said reverse movement.

7. In apparatus of the character described, a reproducer head having a stylus adapted to engage a record track, and adapted to transmit electrical impulses in accordance with the record, means for advancing the record track with respect to the stylus, a device utilizing said impulses, means for reversing the direction of movement of the track while maintaining the stylus in contact with the track, and means for rendering said device ineffective during said reverse movement.

8. In apparatus of the character described, a reproducer head having a stylus adapted to engage a record track, and adapted to transmit electrical impulses in accordance with the record, means for advancing the record track with respect to the stylus, means for moving the head while the record track is moved and in synchronism with the movement of the record track, a device utilizing said impulses, means for reversing the direction of the movement of the track and of the stylus while maintaining the stylus in contact with the track, and means for rendering said device ineffective during said reverse movement.

9. In apparatus of the character described, a record carrier, a reproducer head, means for driving the record carrier in forward direction with respect to the head, means for controlling the energization of said driving means, and means responsive to that operation of said control means which stops the forward motion of the carrier, for moving the carrier to a limited extent in a reverse direction.

10. In apparatus of the character described, a record carrier, a reproducer head adapted to convert the record into electrical impulses, a device utilizing said impulses, means for driving the record carrier in forward direction with respect to the head, means for controlling the energization of said driving means for forward motion, means responsive to the operation of said control means to stop the said forward motion, for moving the carrier to a limited extent in a reverse direction, and means responsive to the same operation of said control means for rendering said device ineffective for a limited time.

11. In apparatus of the character described, a record carrier, a reversible electric motor for driving the carrier, and an electric control circuit for the motor, comprising a switch mechanism optionally operable to energize the motor in either

forward or reverse direction, and a time delay control means in said circuit for deenergizing the motor when the switch mechanism is placed in reverse position.

12. In apparatus of the character described, a record carrier, a reversible electric motor for driving the carrier, and an electric control circuit for the motor, comprising a switch mechanism optionally operable to energize the motor in either forward or reverse direction, a time delay control means in said circuit for deenergizing the motor when the switch mechanism is placed in reverse position, and another switch mechanism paralleling said time delay control means for optionally maintaining the motor energized in reverse.

13. In apparatus of the character described, a record carrier, an electric motor for driving said record carrier in forward direction, an electric motor for driving said record carrier in reverse direction, and an electric control circuit for said motors, for optionally energizing either of said motors, including a time delay control means in said circuit for deenergizing said reverse direction motor when the control circuit is placed in reverse position.

14. In apparatus of the character described, a record carrier, an electric motor for driving said record carrier in forward direction, an electric motor for driving said record carrier in reverse direction, and an electric control circuit for said motors, for optionally energizing either of said motors, including a time delay control means in said circuit for deenergizing said reverse direction motor when the control circuit is placed in reverse position, and a switch mechanism paralleling said time delay control means for optionally maintaining the reversing motor energized.

15. In apparatus for reproducing sound, a reproducer head device having a stylus, a record carrying member having a continuous record groove with which the stylus contacts for vibrating said stylus in accordance with the record, said device also incorporating a mounting that permits the head to adjust itself to the groove, means for moving the record carrying member in a forward direction with respect to the stylus, for reproducing the record, the direction of the record groove being such as to require motion of the head laterally to the direction of motion of the record carrying member, for maintaining the stylus in operative relation with the groove, means, in addition to the groove, and synchronized with the motion of the record carrying member, for suitably imparting said required lateral motion to said head, and means for backspacing the record carrying member to any desired place of the record groove, without removing the stylus from the groove, comprising means for reversing the direction of motion of the record carrying member, and thereby, due to the said synchronized means, causing a reversal as well in the direction of lateral motion of said head.

16. In apparatus of the character described, a sound reproducer head device having a stylus adapted to contact a sound record groove and to be vibrated in accordance with the record, said device also incorporating a mounting that permits the head to adjust itself to the groove, means for advancing the groove with respect to the head, means for positively moving the head device while the record groove is moved, for maintaining the stylus in proper relation to the groove, a source of motion for operating both said means in synchronism, and means for backspacing the record to any desired place on the groove, comprising means for reversing the direction of motion of the record and of the head while maintaining the stylus in cooperative contacting position with respect to the groove.

17. In apparatus of the character described, a reproducer head device having a stylus adapted to contact a sound record groove and to be vibrated in accordance with the record, said device also incorporating a mounting that permits the head to adjust itself to the groove, means for advancing the record groove with respect to the stylus, and means for backspacing the record to any desired place on the groove, comprising means for reversing the direction of movement of the track while maintaining the stylus in cooperative contacting position with respect to the groove.

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