

Aug. 26, 1941.

L. Z. LA FOREST

2,253,568

PHONOGRAPH

Filed Oct. 29, 1938

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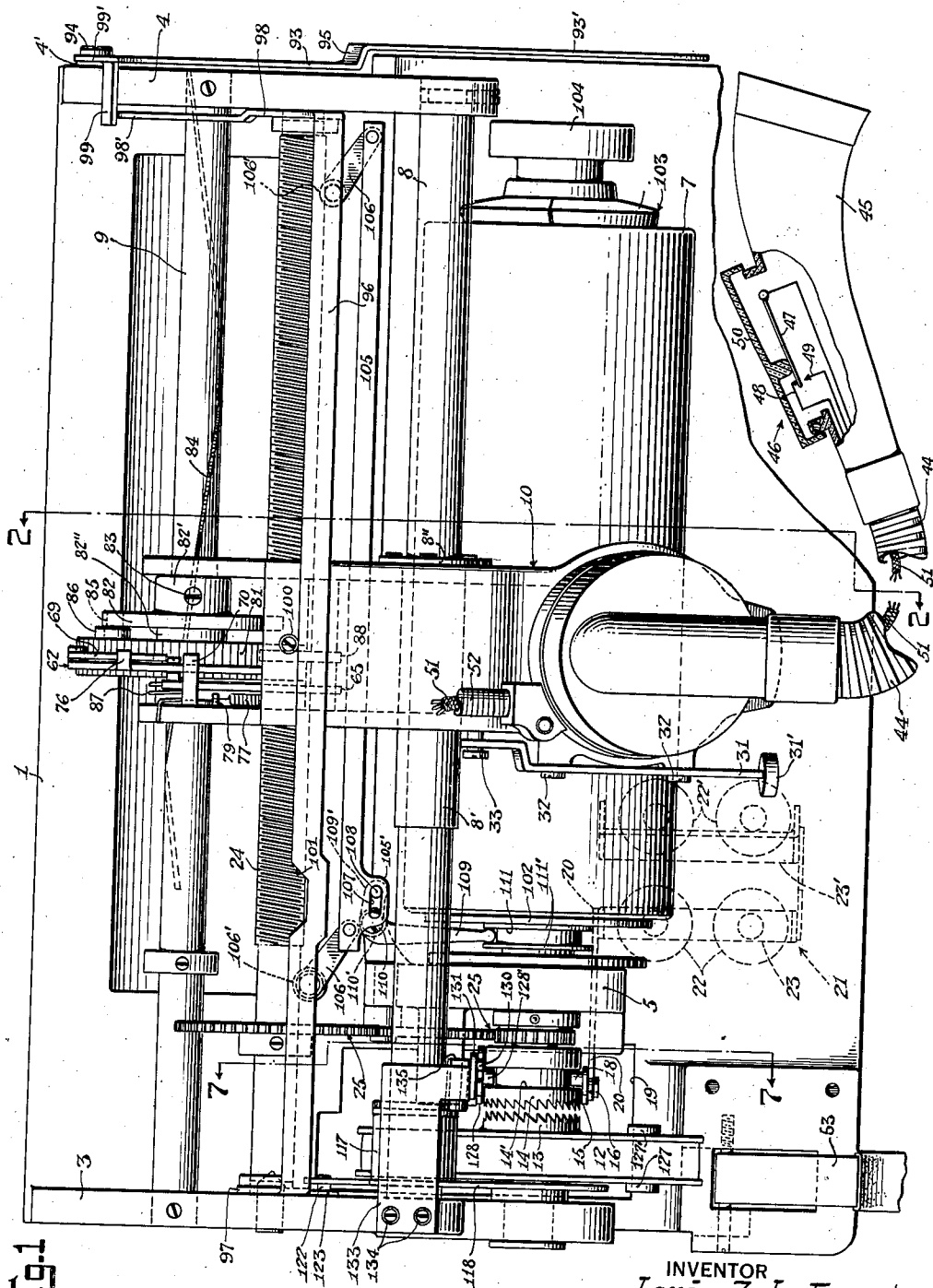


Fig. 1

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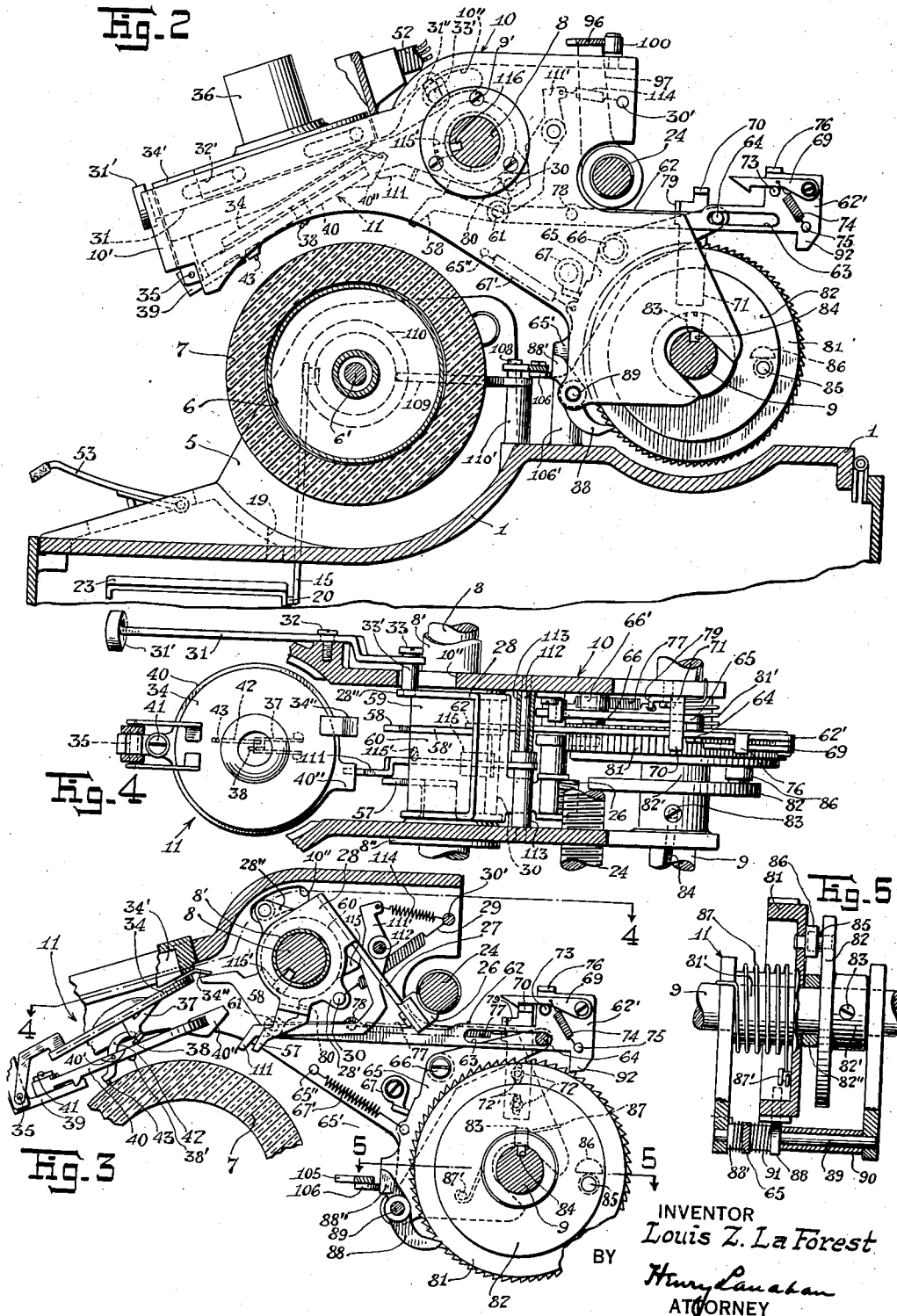
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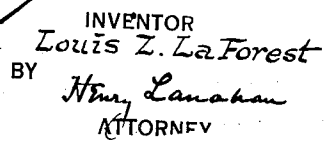
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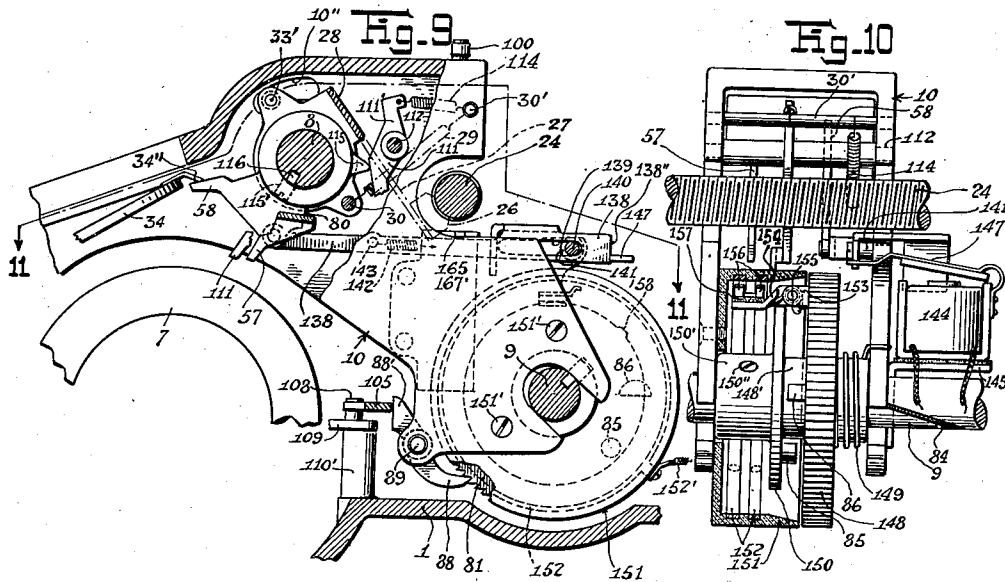
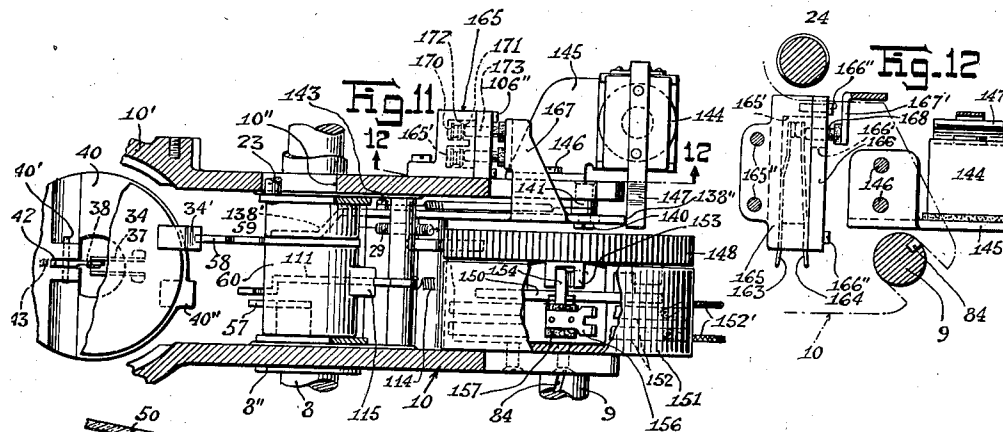
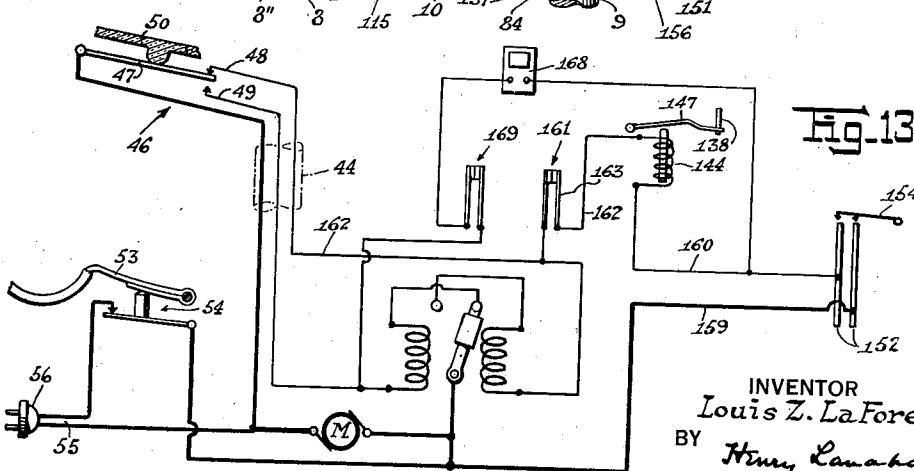
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PHONOGRAPH

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4 Sheets-Sheet 4



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2,253,568

PHONOGRAPH

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Application October 29, 1938, Serial No. 237,648

42 Claims. (Cl. 274—17)

This invention relates to phonographs and more particularly to commercial phonographs of the type intended for the recordation and reproduction of dictation. This invention is particularly concerned with novel and improved means for facilitating the operator to reproduce, or listen back on, previously recorded matter, as desired, during the operation of recording dictation.

Phonographs which are intended for both recording and reproducing dictation are commonly controlled by a hand switch for putting the phonograph into and out of operation, and by a control arm which is movable into a neutral position and into respective operative positions for conditioning a sound translating device for recording on and reproducing from a rotating record. During the uninterrupted use of the machine the sound translating device is moved steadily forwardly across the record for recording thereon or reproducing therefrom, as desired. However during the normal procedure of recording, the operator may at times desire to reproduce, or listen back on, portions of previously recorded matter, in which case there is normally performed a series of manipulations, to wit: first, to stop the phonograph; second, to manually move the control arm from recording position into neutral position; third, to backspace the translating device; fourth, to move the control arm into reproducing position; and fifth, to restart the phonograph. When the operator desires to resume recording, subsequent to such backspacing operation, he must then perform another series of manipulations in proper sequence, to wit: first, to stop the phonograph; second, to return the control arm to neutral position; third, to move the sound translating device into a position beyond the previous position of farthest advance; fourth, to condition the translating device for recording; and fifth, to restart the phonograph. These manipulations obviously tend to distract the operator's attention from the subject of the matter being dictated.

It is an object of my invention to provide, in a recording and reproducing phonograph, new and improved means by which the backspacing and conditioning of the sound translating device may be effected with a reduced tendency to distract the operator's attention.

It is another object of my invention to provide novel and improved means, operated incidental to the operation of backspacing the translating device, for conditioning the translating device to effect reproducing when the phono-

graph operation is resumed subsequent to such backspacing.

It is another object of my invention to provide improved means for automatically reconditioning the machine for recording after a backspaced area is traversed by the translating device.

Another object is to provide an improved form of advance device for distinguishing between a backspaced position of the carriage and the position of farthest advance reached by the carriage prior to its backspacing.

It is another object of my invention to provide an advance device which is adapted to define the position of farthest advance of the carriage supporting the translating device in terms of the angular displacement of a rotatable member.

It is another object of my invention to provide an advance device of novel and improved construction which is moved bodily with the forward and return movements of the carriage.

It is another object of my invention to provide novel and improved means for conditioning the advance device for re-operation.

It is another object of my invention to provide new and improved means, operated as an incident of removing a record from its support, for restoring the advance device to a fully unoperated position and for simultaneously conditioning the translating device so that it will effect recording upon resuming the operation of the machine.

It is another object of my invention to recondition the machine for recording as an incident of momentarily stopping the machine after a backspaced area is traversed by the translating device.

It is a still further object of my invention to provide signalling means for warning the operator when the recorded area has been traversed subsequent to a backspacing operation, the signalling means being rendered inoperative as an incident of momentarily stopping the phonograph.

Other and allied objects will more fully appear from the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawings, of which:

Figure 1 is a top plan view of a recording and reproducing phonograph embodying my invention, several parts being however broken away and shown in section;

Fig. 2 is a vertical cross-sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a side view of the carriage, partly in section and partly broken away, showing the advance device and means for conditioning the sound translating device;

Fig. 4 is a horizontal cross-sectional view taken substantially along the line 4—4 of Fig. 3;

Fig. 5 is a detail view, partly in section substantially along the line 5—5 of Fig. 3, of the pawl and ratchet of the advance marking means;

Fig. 6 is a partial side elevational view of the phonograph showing means controlled by the carriage for obstructing the mounting of a record on, or its removal from, the machine;

Fig. 7 is a vertical cross-sectional view, taken substantially along the line 7—7 of Fig. 1, showing a mechanism controlled by the clutch for rendering the translating device operative and inoperative;

Fig. 8 is a front elevational view of a portion of the mechanism shown in Fig. 7;

Fig. 9 is a side elevational view of a portion of a phonograph in which a second embodiment of my invention is incorporated;

Fig. 10 is a rear elevational view of the structure of Fig. 9;

Fig. 11 is a horizontal cross-sectional view taken substantially along the line 11—11 of Fig. 9;

Fig. 12 is a vertical cross-sectional view taken substantially along the line 12—12 of Fig. 11; and

Fig. 13 is a diagrammatic view of mechanism and circuits in accordance with the second embodiment of my invention.

Reference being had to the figures, particularly to Fig. 1, there will be seen a form of recording and reproducing phonograph to which my invention is especially well adapted. This phonograph comprises a base plate 1 suitably supported in a cabinet 2 (see Fig. 6) and having integrally formed left and right standards 3 and 4 and an intermediate standard 5. In the intermediate standard there is journaled a shaft 6' carrying a mandrel 6 on which there may be suitably mounted a cylindrical record 7. Supported by the standards 3 and 4 are the front and back longitudinal rods 8 and 9 on which a carriage 10 is slidably mounted for movement longitudinally of or across the record 7. The carriage is provided with a sleeve 8' embracing the rod 8 and integral with a disk 8'' which is secured to the carriage by the screws 9', as shown in Fig. 2. The carriage also has an arm 10' extending forwardly over the record 7, on which there is mounted a sound translating device 11 adjustable into an inoperative condition and respective operative conditions for recording and reproducing. The rearward portion of the carriage is of a shell form, and in it there is provided a mechanism for controlling the movement of the carriage and the conditioning of the sound translating device as is hereinafter described.

The record 7 may be rotated, and the carriage 10 advanced across the record, by means of an operating mechanism comprising a motor M, represented diagrammatically in Fig. 13, which may be coupled, as by a belt, to a pulley 12. The pulley 12 is rotatably supported by the standard 3 so that its axis is in line with the shaft of the mandrel 6. On the inner side of the pulley there is provided a toothed clutch member 13 adapted to be engaged by a toothed clutch member 14 which is splined to the shaft 6' of the mandrel 6, as by a key 14'' shown in Fig. 7, to form a suitable clutch mechanism for rotatably coupling the pulley 12 with the mandrel 6. The

clutch member 14 may be moved into engaging and disengaging positions, with respect to the member 13, by means of a vertically disposed lever 15 pivotally supported by a long shoulder screw 16 (see Fig. 7) threaded into a side extension 17 of the standard 5, and having a pin 18 at its upper end which engages an annular groove 14' of the clutch member 14. The lower end portion of the lever 15 extends downwardly through an opening 19 in the base plate 1 and is coupled by a link member 20 to a suitable actuating mechanism, which may very desirably be in the form of an electro-magnetic device 21 as described in a patent to S. G. Langley, No. 1,380,486, issued June 7, 1921, and entitled "Controlling device."

The aforementioned electromagnetic device or clutch actuating mechanism 21 comprises two sets of electromagnets or coils 22 and 22' having suitable cores for cooperation with the pivoted and coacting armatures 23 and 23' of which the armature 23 is pivotally connected to the link member 20. This device may be sufficiently described in the present instance by the following statements: When a circuit is established to cause current to flow through one set of coils, as for example the set of coils 22', both armatures are swung in the direction of that set to engage the clutch. When the armatures have substantially reached their terminal position, a suitable switch is operated to break the circuit of the set of coils through which current has been passing, and to prepare the circuit of the other set of coils for operation. At the same time a pair of cams cooperate to latch the armatures in their operated positions. When the other set of coils 22 is energized, the reverse operation takes place: the clutch being disengaged, the circuit through the last-mentioned set of coils being broken, and the circuit of the first set of coils being again prepared for operation.

In order that the carriage 10 may be advanced steadily across the record 7 coincidentally with the rotation of the record, there is provided a feed screw 24 rotatably supported by the standards 3 and 4 and coupled to the shaft of the mandrel 6 by a train of gears 25. This feed screw is adapted to be engaged by a feed nut 26 (see Fig. 3) mounted on a rearwardly extending arm 27 of a U-shaped member 28 which is pivotally mounted within the carriage on the carriage sleeve 8'. The member 28 is provided with suitable left and right ears, such as the ear 28' on the right side thereof, which support a cross rod 30; connected between the cross rod 30 and a cross rod 30' on the carriage is a tension spring 29 which acts to bias the member 28 in a counterclockwise direction, thereby urging the feed nut 26 against the feed screw 24. The feed nut 26 may be disengaged, however, from the feed screw 24 to render the carriage advancing means inoperative so that the carriage may be manually moved at will. Such disengagement is effected by imparting a rearward movement to a manual control member 31 which extends forwardly along the left side of the carriage, the control member being slidably mounted on the carriage by shoulder screws 32 which pass through the longitudinal slots 32' in the control member and thread into the carriage. At the rearward end of the control member 31 there is provided an elongated, transverse slot 31'' (see Fig. 2) through which passes a shoulder screw 33 threading into a stud 33'. This stud passes through an arcuate slot 10''

in the left wall of the carriage and is secured to an ear 28'' on the left side of the member 28. At the forward end of the control member 31 there is provided a finger piece 31' adapted to facilitate the manual operation of the control member.

The translating device 11 may be of a form as illustrated in Figs. 2, 3 and 4. It may comprise a suitable frame 34' in the form of an inverted cup, which is provided with an upwardly extending tubular element 36 to conduct sound to and from the translating device. Beneath the frame there is provided a sound box 34 pivoted for vertical movement about a cross pin 35 carried by the frame 34'. The sound box 34 carries a stirrup 37 mounted for vibration relative to the frame 34' and bearing a recorder stylus 38. Also pivoted about the cross pin 35 is an arm 39 connected by a shoulder screw 41 to a disk-shaped biasing weight 40 which is disposed directly beneath the sound box 34, the weight being thus mounted for both vertical and transverse movement with respect to the sound box. The weight 40 is apertured to permit the stirrup 37 to pass therethrough. In front of the recorder stylus 38 and slightly to the left thereof, as shown in Fig. 4, is a reproducer stylus 43 carried by a lever 42, pivoted to the biasing weight 40 by a cross pin 40'. The lever 42 has an upper end portion 42' which extends into the stirrup 37, and which is adapted to make contact with the stirrup to couple the stylus 43 to the sound box 34 as is hereinafter explained.

When the translating device 11 is conditioned for reproducing, the sound box 34 is maintained in an upward position, as shown in Fig. 3, and the weight 40 is permitted to move downwardly until it is supported by the stylus lever 42, the downward force of the weight serving to bias the reproducer stylus 43 against the record and to maintain the upper end 42' of the lever 42 in contact with the stirrup 37. In addition to the above, the weight 40 provides sufficient inertia so that vibrations imparted to the reproducer stylus, as it tracks a modulated groove of a rotating record, are almost wholly transmitted to the stirrup of the sound box 34 so as to create sound waves within the sound box 34 in accordance with the modulations of the groove being tracked.

When the translating device 11 is conditioned for recording, downward movement of both the sound box 34 and of the weight 40 is permitted. When this occurs the weight 40 moves downwardly until it is supported as by the contact of an advance ball 38' on the weight with the record 7, the weight, however, playing no part in recording. The sound box 34 moves downwardly until it also is supported by the record, by the contact of the recorder stylus 38 with the record. The translating device is then conditioned so that sound waves conducted into the sound box 34, by way of the tube 36, will vibrate the recorder stylus 38 to form on the record, as the record is rotated and the carriage 10 moved steadily therealong, a continuous groove having modulations in accordance with the sound waves.

With the above arrangement of sound translating device, it will be understood that when the weight 40 is maintained in an upward or raised position, as shown in Fig. 2, the sound box 34 is necessarily maintained also in an upward position free of the record. The translating device is then fully inoperative, but may be rendered operative by merely releasing the weight

40. When the weight 40 is released and the sound box 34 is maintained in its upward position the translating device is conditioned for reproducing; whereas when both the sound box 34 and weight 40 are released from their raised positions the translating device is conditioned for recording. Thus the translating device is rendered inoperative or operative by merely raising or lowering the weight 40, and when rendered operative it is adapted to be selectively conditioned for reproducing and recording by raising and lowering the sound box 34.

For conducting the sound to and away from the translating device 11 there may be provided a flexible tube 44 coupled to the tube 36 at one end and suitably carrying a handpiece 45 at the other end which is usable as a mouthpiece during recording and as an earpiece during reproducing. There is commonly mounted on the handpiece 45 a start and stop hand switch 46 operable to control the clutch actuating mechanism 21. The switch 46 is commonly of the single-pole two-way type comprising a pole member 47 and contact members 48 and 49. The switch 46 has a cover 50 pivoted to the handpiece 45 and biased outwardly as by the pole member 47, the pole member normally contacting the contact member 48. As the cover 50 is moved inwardly, as by the grasp of the hand, the pole member 47 breaks contact with the contact member 48 and thereafter makes contact with the contact member 49. The switch 46 is connected to the clutch actuating mechanism 21 by a three-wire cable 51 which extends within and along the tube 44 and then onwardly within a flexible protective casing 52, this connection being shown schematically in Fig. 13. When the cover 50 is operated inwardly into start position, the clutch is engaged for effecting mandrel rotation and carriage movement; when the cover 50 is released for outward movement into stop position, the clutch is disengaged for stopping the mandrel rotation and carriage movement.

During the non-use of the phonograph the handpiece 45 is normally supported by a forwardly extending and hook-shaped arm 53 adapted to fit the handpiece. The arm 53 is pivotally mounted on the base plate 1 in its front left-end portion and is normally resiliently maintained in an upwardly inclined position, shown in Fig. 13, as by a switch 54 biased into closed position. The weight of the handpiece 45 is, however, sufficient to move the arm 53 downwardly to open the switch 54. The switch 54 is serially connected in a power line 55 connected to a plug 56 adapted to make connection with a suitable power source, as schematically shown in Fig. 13. Thus the power supply to the phonograph is shut off, the motor M then being stopped, whenever the handpiece rests on the arm 53, the power supply being restored when the handpiece 45 is removed from the arm 53.

The above described structure and mechanism are common to phonographs of the dictating machine type as heretofore manufactured and used, and form a part of the present invention only in so far as they are related to or combined with other mechanism hereinafter described.

For the convenient operation of a phonograph of the recording and reproducing type, it is important that the operator, during the process of recording, be able to backspace the translating device and reproduce previously recorded matter, at will, with a high degree of facility. In

order to provide such improved facility of operation the shifting or adjusting of the translating device 11, in accordance with my invention, is largely automatically controlled. It will be seen that I provide no manually operable means, as is common in conventional machines, for adjusting the translating device into its various conditions. Instead the adjusting of the translating device is in part controlled by the hand switch 46 as an incident of starting and stopping the operation of the machine, in part, by the control member 31 as an incident of disengaging the feed nut 26 from the feed screw 24, and otherwise automatically controlled as an incident of performing other normal operations in the use of the machine.

The means for placing the sound translating device 11 into operative and inoperative conditions is controlled by the hand switch 46. Since the translating device has two operative conditions—a condition for recording and a condition for reproducing—there is provided a means for selectively determining which of these conditions is to be effected when the translating device is rendered operative. This latter means is in the form of a selector mechanism shiftable between a position for recording and a position for reproducing. The selector mechanism is biased into its recording position, is adapted to be releasably locked into its reproducing position, and is automatically released from reproducing position in ways to facilitate the use of the machine, as is hereinafter described.

The translating device 11 is controlled by the hand switch 46 in a manner to render the translating device operative and inoperative as the machine is started and stopped. The means by which this is done is shown in Figs. 2, 3 and 4, and comprises an angular lifting arm 111 pivoted on a cross rod 112 on the carriage 10 and suitably positioned thereon by the spacing collars 113. The lifting arm 111 is adapted to contact the lifting tab 40'' of the weight 40, and is biased upwardly by a tension spring 114 connected between an upward extension 111' of the arm and the cross rod 30'. On a collar 60 embracing the sleeve 8' there is a cam 115 which contacts the arm 111 so as to normally hold the lifting arm 111 in its downward position. The collar 60 is splined to the longitudinal rod 8 by a screw 115' threaded therein and passing through the carriage sleeve 8' to engage a longitudinal slot 116 in the rod 8. The rod 8 is pivotally mounted so that it may be rocked in counterclockwise and clockwise directions. By reason of the contact between the cam 115 and the lifting arm 111, this arm is moved downwardly and upwardly to lower and raise the weight 40 thereby rendering the translating device operative and inoperative.

The rod 8 may be rocked by any suitable means, but for illustrative purposes a means operated by the power means of the machine, as shown in Figs. 1, 7 and 8, is described. During the use of the phonograph, as when the hand-piece 45 is removed from the support 53, the motor M, and therefore also the pulley 12, are in continuous rotation, this rotation of the pulley 12 being in a clockwise direction. At the left end of the rod 8 there is a sleeve 117 having the left and right arms 118 and 119 suitably angularly spaced relative to each other, the sleeve 117 being splined to the rod 8 by a suitable screw 117' threaded therein and engaging the longitudinal slot 116. The left arm 118 is extended

rearwardly and provided with the upper and lower notches 120 and 121 which are adapted to coact with a pin 122 carried by a lever 123 pivoted on the standard 3 by a pivot screw 124 and biased in a counterclockwise direction to urge the pin into the notches 120 and 121 by a tension spring 125 which is connected between the lever and a pin 126 on the standard 3. As the rod 8 is rocked back and forth the pin 122 will engage the respective notches 120 and 121 to define the clockwise and counterclockwise positions of the rod 8.

On the rim of the pulley 12 there are secured, as by riveting, the left and right pins 127 and 127', which are adapted to engage the respective arms 118 and 119, as the pulley 12 rotates, to rock the rod 8 into its respective clockwise and counterclockwise positions. The length of the sleeve 117 is selected so that the arm 119 will suitably clear the right end of the pin 127' when the arm 118 is in radial alignment with the left pin 127, and vice versa. Thus the rod 8 is rocked back and forth by imparting a slight sliding movement to the sleeve 117 on the rod 8. In order that such suitable sliding movement may be imparted to the sleeve 117 as the machine is put into and out of operation, the sleeve is connected with the clutch actuating mechanism 21 by means of a lever 128 pivoted on the shoulder screw 16, and having a bail portion 129 suitably secured to the clutch lever 15, and carrying a pin 128' engaging the annular groove 14'. The upper end of the lever 128 is provided with a longitudinal slot 129 through which passes a pin 130 carried by a lever 131. This lever is pivoted by a pivot screw 132 to a bracket 133 which is secured to the standard 3 by the screws 134. The lever 131 is coupled to the sleeve 117 by means of a bracket 135 secured to the sleeve by the pins 135' and provided with a suitable elongated slot 136 through which passes a pin 137 carried by the lever 131. Thus the rod 8 is rocked back and forth between its counterclockwise and clockwise positions, so as to render the translating device 11 operative and inoperative, as the clutch is engaged and disengaged to start and stop the phonograph. Since by these means the translating device is automatically rendered free of the record as the machine is stopped, the phonograph is safeguarded from any accidental attempt of the operator to mount a record on, or remove a record from the mandrel 6 while the translating device is in an operative condition. Moreover, since the operator will normally stop the machine before he manually moves the carriage—as, for example, to effect a back-spacing operation—the styli of the translating device will be free of the record as the carriage is so moved, thereby avoiding possible scratching or marring of the record surface by the styli.

The selector mechanism for the sound translating device 11 may be best seen in Figs. 2, 3 and 4. This mechanism comprises a lifting arm 58 pivoted on the carriage sleeve 8' between a spacing collar 59 and the aforementioned collar 60, and arranged to contact a lifting tab 34'' on the sound box 34 for controlling the position of the sound box. The arm 58 is pivotally connected by a pivot screw 61 to a rearwardly extending bar 62. This bar is slidably connected to, and supported by, an angular lever 65 pivoted by a shoulder screw 66 to a boss 66' provided on the inner left wall of the carriage 10, the connection of the bar 62 to the lever 65 comprising a longitudinal slot 63 in the bar 62 through which passes

a headed pin 64 carried by the lever 65. The lever 65 is urged in a clockwise direction against an adjustable stop 67 by a tension spring 67' connected between a downwardly extending arm 65' of the lever 65 and a pin 65'' on the carriage. The rear end portion of the bar 62 is extended upwardly to form a substantially rectangular plate 62' on which there is pivotally mounted a forwardly extending latch 69 cooperating with a lug or catch 70 on a bracket 71. This bracket is secured to the carriage by the screws 72 which pass through suitable elongated slots 72' in the bracket 71 so that the bracket may be adjusted into a proper position relative to the latch 69. The latch 69 is biased downwardly against a lateral pin 73 on the plate 62' by means of a tension spring 74 connected between the latch and a pin 75 on the plate 62', the latch being restricted in upward movement by a turned over ear 76 on the plate 62'.

The selector mechanism is biased into its recording position by means of a tension spring 77 which urges the bar 62 rearwardly and therefore the lifting arm 58 downwardly, the spring 77 being connected between a pin 78 on the bar and a turned over lug 79 on the bracket 71. The rearward position of the bar 62 is defined by the impingement of a shoulder 80, on the lifting arm 58, with the cross rod 30 carried by the U-shaped member 28, as shown in Fig. 2. When the bar 62 is in such most rearward position the lifting arm 58 is out of the path of the lifting tab 34'' of the sound box 34. Upon rendering the translating device operative by releasing the weight 40 from its raised position, the translating device will then be conditioned for recording. As the control member 31 is moved rearwardly to disengage the feed nut 26 from the feed screw 24, the selector mechanism is shifted into its reproducing position, this shifting being effected by the cross rod 30 on the member 28 contacting the shoulder 80 on the lifting arm 58 and moving the arm 58 upwardly. When the arm 58 reaches its upward position the arm is releasably held there by the catching of the latch 69 on the lug 70, but the control member 31, as it is released, is returned into its forward position by the spring 29 to re-engage the feed nut with the feed screw. While the selector mechanism is in reproducing position the sound box 34 is maintained in an upward position by reason of the raised position of the lifting arm 58. Upon rendering the translating device operative while the selector mechanism is in its reproducing position, as by releasing the weight 40 from its raised position, the translating device will be conditioned for reproducing.

Thus, since the lowering and raising of the biasing weight 40 is effected as an incident of starting and stopping the operation of the machine, as hereinbefore described, the translating device is conditioned for recording as the machine is started while the selector mechanism is in recording position; however, since the disengaging of the feed nut from the feed screw causes the selector mechanism to be shifted into reproducing position, the restarting of the machine as after a backspacing of the translating device will cause the translating device to be conditioned for reproducing. It is thus seen that although the selector mechanism is automatically shifted into reproducing position in performing a backspacing operation, the translating device is not conditioned for reproducing until the operation of the machine is resumed.

When the translating device has reached its position of farthest advance subsequent to a backspacing thereof, the selector mechanism is automatically released from its reproducing position. The means which I provide for so releasing the selector mechanism comprises a new and improved form of advance device for distinguishing between, or responding differently to, a backspaced position of the translating device and a position of farthest advance reached by the translating device prior to its backspacing. This advance device is arranged to define the position of farthest advance of the carriage, or translating device, in terms of angular displacement, and is preferably moved bodily at all times with the carriage. It will be seen that with this arrangement there are obtained several distinctly important advantages over the well-known rectilinearly movable advance device; for example, by reason of the advance device moving bodily with the carriage, that device may be easily coupled with the selector mechanism to control the latter; moreover, by reason of the rotating nature of the advance device, there may be employed compact and simplified means for restoring it to an unoperated position, as is hereinafter described.

Reference being had to Figs. 1, 2, 3, 4 and 5, it will be seen that the advance device comprises an angularly reciprocable ratchet wheel 81, suitably in the form of a cup as shown in Fig. 5, which is provided with a hub 81' pivotally mounted on the back longitudinal rod 9 between the left and right walls of the carriage 10. The wheel 81 is turned proportionately with the advance of the carriage, but is normally restricted to unidirectional movement in that it is held substantially fixed in its turned position as the carriage is backspaced; this is done in order that its angular displacement will define the position of farthest advance reached by the carriage prior to a backspacing of the carriage. The means for so turning the ratchet wheel 81 comprises a disk-shaped drive wheel 82 having a hub 82' slidably mounted on the back rod 9 between the left and right walls of the carriage 10 adjacently of the ratchet wheel 81 but separated therefrom by a spacing collar 82''. Cut into the rod 9 in a counterclockwise direction and disposed along the rod throughout the length of travel of the carriage is a spiral groove 84 of substantially one revolution. In the hub 82' of the drive wheel 82 there is threaded a screw 83 which engages the spiral groove 84. By reason of this engagement of the screw 83 with the groove 84, the drive wheel 82 is turned through substantially one revolution in a counterclockwise direction as the carriage is advanced across the record, and is turned correspondingly in a reverse direction as the carriage is returned, the drive wheel thus moving both proportionately and coordinately with the advance and return or backspacing of the carriage, it of course being understood that the rod 9 is held stationary by the standards 3 and 4. When the carriage is advanced a lateral pin 85 on the drive wheel 82 contacts a pin 86 on the ratchet wheel 81 to move the ratchet wheel coordinately with the drive wheel in a counterclockwise direction, the pins 85 and 86 here constituting a one-way coupling between the ratchet wheel 81 and the drive wheel 82. During the advance of the carriage the pins 85 and 86 are normally in contact by reason of a torsional spring 87 which biases the ratchet wheel 81 in a reverse or clockwise direction, this spring being hooked at one end on the left wall of the carriage,

then coiled about the hub 81' and hooked at its other end on a pin 87' carried by the ratchet wheel 81. When the carriage is returned or backspaced from a position of farthest advance the ratchet wheel 81 is held substantially angularly stationary by a pawl 88 which normally prevents movement of the ratchet wheel 81 in its biased direction. The pawl 88 is secured to a collar 88' pivotally mounted on a cross rod 89 on the carriage, is retained in position on the rod by a spacing collar 90 and is biased into engagement with the ratchet wheel 81 by a torsional spring 91 which is disposed about the sleeve 88' and hooked at its ends on the carriage and pawl respectively. As the carriage is backspaced, the ratchet wheel 81 therefore remains substantially fixed in its turned position, the angular displacement between the pins 85 and 86 varying proportionately with the distance between the position of farthest advance of the carriage and its backspaced position. When the carriage has traversed the backspaced area the pins 85 and 86 will again have come into contact with each other so that, in the next further advance of the carriage, the ratchet wheel 81 will be turned proportionately onwardly in a counterclockwise direction.

Such further onward movement of the ratchet wheel 81 as is caused by an advance of the carriage through a predetermined distance beyond its previous position of farthest advance, automatically effects the release of the selector mechanism from reproducing position. For effecting this release the bar 62 is provided with a downward extension 92 which is adapted to contact the teeth of the ratchet wheel 81 when the selector mechanism is in reproducing position. By such contact a counterclockwise movement of the ratchet wheel 81, corresponding to further advancing movement of the carriage, will cause the rearward end of the bar 62 to be tilted upwardly to free the latch 69 from the lug 70. The spring 77 will then move the bar 62 into its rearward position and the lifting arm 53 in its downward position to effect the recording position of the selector mechanism.

By reason of the reproducer stylus 43 being positioned to the left of the recorder stylus 38, i. e., behind the recorder stylus in respect of the direction of carriage advance, the operator need not backspace the carriage in order to listen back over a recorded area of a width equivalent to the transverse distance between the reproducer and recorder styli, but need only to move the control member 31 rearwardly to shift the selector mechanism into reproducing position. Although such rearward movement of the control member 31 causes the feed nut to be disengaged from the feed screw to permit a backspacing (or other manual movement) of the carriage as desired, in the case where no backspacing of the carriage is to be effected the control member 31 serves only as a means for manually shifting the selector mechanism from recording to reproducing position. The next advance of the carriage after this shifting of the selector mechanism into reproducing position causes an immediate onward movement of the ratchet wheel 81. When the ratchet wheel is so moved through the aforementioned predetermined distance, the selector mechanism is automatically shifted into recording position. In order that this automatic shifting will not occur before the reproducer stylus 43 has advanced at least beyond the recorded area, the above-noted predetermined distance of the

ratchet wheel is selected so that it corresponds to a distance of carriage advance at least greater than the transverse distance between the recorder and reproducer styli. Thus the above-described selector mechanism is automatically released from reproducing position by a limited movement of the carriage beyond the point of farthest advance subsequent to a manual shifting of the mechanism. Since the translating device is conditioned for reproducing during such limited movement, there will arise a narrow vacant space on the record before the translating device is reconditioned for recording, thereby avoiding any possible overlapping of recorded areas. The selector mechanism as herein described is, however, of a flexible character, in that the length of the vacant space may be determined as desired by choice of the fineness of the teeth on the ratchet wheel 81 and by the positioning of the pawl 88 and of the extension 92 with respect to the teeth of the ratchet wheel.

Whenever the carriage is returned for the purpose of subsequently recording on the area so traversed by the return of the carriage, it is important that the advance device be released to move backwardly with the return of the carriage. The advance device will then be operative throughout the area to be recorded upon. Such release may be automatically effected when a record is removed and may be terminated when a record is remounted on the machine, thereby obviating the necessity for any manual release of the advance device in the normal use of the phonograph. The advance device herein illustrated, upon being released, will move backwardly only so far as the advance device is in advance of the carriage at the time of its release. In order for this release to be fully effective, it should be effected after the carriage is fully returned, or at least it should not be terminated before the carriage return is completed. Ordinarily a full return of the carriage is desired whenever the record is changed. I may therefore advantageously enforce the full return of the carriage before the removal of the record and the release of the advance device. The advance device will then be fully restored to a position corresponding to the "start" or initial position of the carriage at the completion of mounting a new record on the machine.

The means for insuring such full restoration of the advance device may comprise a suitable member 93 adapted to obstruct the free end of the mandrel 6 so that a record may be neither removed from nor mounted on the machine until the carriage is returned to its initial position. The member 93 is pivotally mounted on the standard 4 by a pivot screw 94 and is extended forwardly therefrom along the right side of the machine. The forward portion 93' of the member is suitably offset rightwardly along a line 95 so that the forward portion 93', which obstructs the open end of the mandrel, may comprise a movable wall section of the cabinet 2 of the phonograph. The member 93 is controlled in its movement by the position of the carriage. The operative connection between the carriage and member 93 comprises a cross bar 96 extending laterally of the phonograph slightly above the carriage 10 and having turned down left and right arms 97 and 98 pivoted on the respective left and right reduced-diameter end portions of the feed screw 24. The right arm 98 has an inclined downward extension 98' arranged to abut against a turned-over lug 99 of

a short arm 99' on the member 93. The member 93 is gravitationally biased in a downward or non-obstructing position and the cross bar 96 is thereby biased in a rearward direction. When the carriage is out of its initial position the cross bar 96 encounters an upright roller 100 on the carriage to maintain the member 93 in an obstructing position. However the bar 96 is provided with a notch 101 at a position in line with the initial position of the carriage so that the bar may move rearwardly, as by the gravitational force on the member 93, to permit the member 93 to move out of an obstructing position when the carriage is in its initial position.

Whenever the carriage is returned to initial position the selector mechanism is automatically shifted into reproducing position coincidentally with the disengagement of the feed nut from the feed screw. With the selector mechanism in reproducing position, the translating device will be rendered operative for reproducing when the machine is put into operation. In the usual operation of a dictating machine the operator will want to record, instead of to reproduce, as he conditions the machine for operation on a newly mounted record. In order to facilitate the operation of the machine, I not only automatically release the advance device so that it may be restored to a fully unoperated position but I also release the selector mechanism from its reproducing position, as an incident of changing a record on the machine, so that the phonograph will be immediately operable for recording at the completion of record changing. (It may be noted that should the operator desire to reproduce a recorded area on a replaced record, it would then be necessary that the carriage be first moved forwardly and be then returned so as to set the advance device into a position of farthest advance ahead of the area to be reproduced. The recorded area may then be reproduced with the translating device being maintained in a condition for reproducing until the set position of farthest advance is reached.)

The means which I provide for releasing both the advance device and the selector mechanism as an incident of record changing is preferably employed in connection with a record ejecting mechanism of the type disclosed in Gramann Patent No. 2,010,717, entitled "Phonograph" and issued on August 6, 1935. This record ejecting mechanism may be sufficiently described in the present instance by the following statements: The ejector is mounted on the mandrel 6 and comprises a disk-shaped member 102 biased rightwardly and arranged to abut against the left end of the record. At the open end of the mandrel there is provided an expansible and contractable chuck 103 which is rendered free to expand when the disk member 102 is moved leftwardly. The disk 102 (see Fig. 1) is so moved when a record is mounted on the mandrel; when the record reaches a fully mounted position, the expanded chuck 103 retains the record on the mandrel against the force of the rightwardly biased member 102. The record may, however, be ejected at will by means of a manual control 104 which is carried by the mandrel and movable inwardly to effect a contraction of the chuck 103. When the chuck is so contracted the record is no longer obstructed against ejection; the member 102 then moves rightwardly to eject the record from the mandrel and to releasably lock the chuck in its contracted position. When a

record is remounted on the mandrel the above sequence of operations is repeated.

In order that a record changing may automatically release the advance device, the disk member 102 is operatively connected to the pawl 88 so as to unlatch the pawl from the ratchet wheel 81 when a record is removed from the mandrel 6. When the advance device is so released the ratchet wheel 81 is returned by the spring 87 to a position corresponding to the position in which the carriage is then resting, this position of the carriage being its initial position since, as hereinbefore explained, a record can be changed only when the carriage is fully returned. In order that a record changing may also release the selector mechanism from reproducing position, the disk member 102 is further operatively connected with the lever 65 so that the lever will be moved in a counterclockwise direction as an incident of removing a record from the machine. Such movement of the lever 65 causes such upward tilting of the rearward portion of the bar 62 as to disengage the latch 69 from the lug 70. When this disengagement occurs the selector mechanism is shifted into its recording position by the spring 77.

To perform the functions mentioned in the preceding paragraph there is provided a parallel bar 105 (see Figs. 1, 2 and 3) having pivotally connected thereto a pair of similar links 106, which are in turn pivotally connected to suitable upright bosses 106' on the base plate 1 to form a pair of parallel motion supports for the bar 105. At the left end of the bar 105 there is a forward extension 105' bearing a longitudinal slot 107 through which slidably passes a pin 108 carried on a short rightwardly extending arm 109' of a lever 109 pivoted by a shoulder screw 110 on a post 110' (see Fig. 2) secured to the plate 1. The lever 109 extends forwardly to engage an annular groove 111 provided in a collar 111' which is secured to the disk member 102. When a record is in mounted position on the mandrel the disk member 102 is held in a leftward position and the parallel bar 105 is therefore held in a forward position free of the pawl 88 and lever 65; however, as a record is removed from the mandrel 6 the disk member 102 is moved rightwardly and the bar 105 is thereby moved rearwardly. As the bar 105 is so moved it contacts an arm 88' of the pawl 88 to disengage the pawl from the ratchet wheel 81; at the same time the bar 105 contacts the arm 65' of the lever 65 to tilt the bar 62 upwardly and to thereby disengage the latch 69 from the catch 70. As hereinbefore explained, when the pawl 88 is disengaged from the ratchet wheel 81 the advance device is restored, and when the latch 69 is disengaged from the catch 70 the selector mechanism is shifted into its recording position.

Whenever the carriage 10 is manually moved, for example, as during a backspacing of the carriage, the translating device will be normally in an inoperative condition since the operator will usually stop the machine before manually moving the carriage. The operator may however maintain the hand switch 46 in start position during such manual movement of the carriage, in which case the translating device would be in engagement with the record during the carriage movement. In order that the operator may be insured that the translating device 11 will be free of the record, when the carriage is manually moved across the record, there may be provided a means by which the translating de-

vice is rendered inoperative when the control member 31 is operated into its rearward position. For this purpose the U-shaped member 28 is provided with a forwardly extending lifting arm 57 which is adapted to contact the lifting tab 40'' on the weight 40 to move the weight and sound box 34 upwardly to inoperative position as the control member 31 is moved into its rearward position.

In Figs. 9, 10, 11, 12 and 13 there is shown another embodiment of my invention which is arranged to automatically recondition the translating device for recording as an incident of stopping and restarting the machine after the carriage, or translating device, has been advanced, subsequent to a backspacing thereof, to the position of farthest advance reached by the carriage prior to its backspacing, the operator being preferably warned when the carriage reaches this position of farthest advance by the provision of an automatically operated signalling means. Many elements, as well as combinations of elements, in this second embodiment are in all respects similar to corresponding elements of my first embodiment. When such similarity occurs between corresponding elements of the two embodiments, they are given the same reference characters; other new and slightly changed elements are given new reference characters.

This embodiment comprises the forwardly urged manual control member 31 connected to the U-shaped member 28 having the arm 27 carrying the feed nut 26, and the cross rod 30 adapted to coact with the shoulder 80 of the lifting arm 58. The selector mechanism of this embodiment comprises the lifting arm 58, which controls the sound box 34; pivotally connected to this arm is a rearwardly extending bar 138 slidably supported at its rearward end portion by a shoulder screw 140 passing through a longitudinal slot 139 in the bar and threading into a boss 141 on the carriage 10, the bar 138 being offset at 138' to clear other mechanism hereinafter described. The bar 138 is biased rearwardly by a tension spring 142 connected between a pin 143 on the bar and the boss 141, rearward movement of the bar being limited by the engagement of the shoulder screw 140 with the forward end of the slot 139. As the manual control 31 is moved rearwardly to disengage the feed nut 26 from the feed screw 24, the cross rod 30 contacts the shoulder 80 and thereby moves the lifting arm 58 upwardly to effect the reproducing position of the selector mechanism, the selector mechanism being releasably locked in its reproducing position as is hereinafter explained. Upon the release of the control 31, the feed nut 26 will be engaged with the feed screw 24 by the spring 29.

With this second embodiment there may be provided the lifting arm 57 for rendering the translating device inoperative as the control member 31 is moved rearwardly to disengage the feed nut from the feed screw. With this embodiment there may also be provided the automatic means of my first embodiment, for rendering the translating device operative and inoperative as the phonograph is put into and out of operation, such means being controlled by the hand switch 46 and comprising the coacting lifting arm 111 and cam 115 operated by suitable rocking movement of the rod 8, as hereinbefore described. It is, however, preferred that the reproducing stylus 43 be now located directly in front of the recording stylus 38, as is shown in Fig. 11, the translating device being otherwise unchanged.

The means for releasably locking the lifting arm 58 in an upward position to maintain the selector mechanism in its reproducing position comprises an electro-magnet 144 mounted on a bracket 145 secured to the carriage by the screws 146 and having an armature 147 spring-biased upwardly and suitably extended to coact with the rearward end portion 138'' of the bar 138. When the selector mechanism is in recording position, the lifting arm 58 is in a downward position out of the path of the sound box 34 and the bar 138 is in a rearward position overlying the armature 147, thereby maintaining the armature in a downward or operated position. As the lifting arm 58 is moved upwardly to place the selector mechanism in its reproducing position, the sound box 34 being moved upwardly into its normal position for reproducing, the bar 138 is moved forwardly. When the bar 138 reaches its most forward position, it rides off of the armature 147. The armature 147 will then spring upwardly behind the bar 138 into a bar-obstructing position to releasably lock the bar 138 against rearward movement, thereby maintaining the selector mechanism in reproducing position. Upon placing the machine in operation, the biasing weight 40 will be lowered, as hereinbefore described, to render the translating device operative, the device being operative for recording when the selector mechanism is in recording position and operative for reproducing when the selector mechanism is in reproducing position.

In accordance with my invention, when the carriage 10 is advanced, subsequent to a backspacing operation, into the previous position of farthest advance, the electromagnet 144 will be energized as an incident of stopping the machine. During the backspacing operation the selector mechanism is in reproducing position, but as the electromagnet 144 is energized the armature 147 is moved out of the aforementioned bar-obstructing position to effect the release of the selector mechanism from reproducing position. Upon such release the selector mechanism is moved into recording position by the spring 142. As the hand switch 46 is then operated to restart the machine the translating device will effect recording. Thus, when the carriage is advanced subsequent to a backspacing operation to the previous position of farthest advance, a momentary stopping of the operation of the machine causes the translating device to be shifted from a condition for reproducing to a condition for recording. Such momentary stopping of the machine is normally effected by the operator in order that he may gather his thoughts to resume recording.

The means for performing the functions mentioned in the preceding paragraph comprises an advance device in the form of a ratchet wheel 143 pivotally and slidably mounted on the back rod 9, biased in one direction by a torsional spring 149 similar to the spring 87 of my first embodiment, restricted against movement in its biased direction by the pawl 88, and adapted to be turned in its other direction against the force of the spring 149 by means of a disk shaped drive wheel 150. The hub 150' of the drive wheel 150 is slidably mounted on the rod 9 to the right of the ratchet wheel 143 and is spaced therefrom by a collar 148' mounted on the rod 9 between the drive wheel 150 and ratchet wheel 143. The drive wheel 150 is provided with a screw 150'' threaded into the hub 150' thereof and coacting with the spiral groove 84 in the

rod 9 so as to turn the drive wheel 150 substantially through one revolution in counterclockwise and clockwise directions as the carriage is respectively advanced and returned throughout the length of the record. The drive wheel 150 carries the lateral pin 85 adapted to engage the pin 86 carried by the ratchet wheel 148 so as to move the wheel 148 in a counterclockwise direction as the carriage 10 moves forwardly.

Surrounding the drive wheel 150 is a cylindrical shell 151 made of suitable insulating material and suitably secured to the right wall of the carriage by the screws 151'; in this shell there is embedded a pair of similar coaxial slip rings 152 having the soldering lugs 152' for making electrical connection thereto. On the side of the ratchet wheel 148, adjacent to the drive wheel 150, there is provided a bifurcated lug 153 pivotally supporting a short arm 154 slidably engaging the rim of the drive wheel 150 and biased thereagainst by a suitable torsional spring 155. The arm 154 carries a pair of electrically connected brushes 156 which are provided for the purpose of electrically connecting the slip rings 152 with each other, these brushes being insulated from the arm 154 by an insulation pad 157.

During recording the ratchet wheel 148 is driven in a counterclockwise direction by the drive wheel 150, the pins 85 and 86 then being engaged. When the pins 85 and 86 are so engaged the arm 154 is tilted upwardly by the engagement of a ridge 158 on the rim of the drive wheel 150 with the arm 154. By such upward tilting movement of the arm 154, the brushes 156 are brought into contact with the slip rings 152 to cause them to be electrically connected together. When the pins 85 and 86 are separated, as during a backspacing operation, the arm 154 is no longer in a tilted position by reason of it being free of the ridge 158 on the drive wheel 150. The brushes 156 are then free of the slip rings 152 so that the slip rings are disconnected. Thus the slip rings 152 and brushes 156 constitute a switch which, in connection with the ratchet wheel 148 and other related parts of the advance device, is differentially responsive to a moving of the carriage to a position of farthest advance and to a position backspaced therefrom, the switch being respectively closed and open when the carriage is in the former and latter positions. As shown in Fig. 13, one of the slip rings 152 is connected, as by the conductor 159, to the side of the power supply opposite to the side connected with the pole member 47 of the switch 46 and the other one of the slip rings 152 is connected, as by a conductor 160, to one side of the electromagnet 144, the other side of the electromagnet being connected, as by the conductors 162, through a switch 161 to the contact member 48 of the hand switch 46.

The switch 161 may comprise a pair of normally open front and back cantilever-mounted contact springs 163 and 164 arranged to be brought into contact with each other to close the switch. The springs 163 and 164 are preferably disposed within a recess 165' of a molded frame 165 made of suitable insulating material which is secured to the left wall of the carriage 10 by the screws 165''. The recess 165' is partially closed by a removable wall 166 having an opening 166', the wall 166 being secured to the frame 165 by the upper and lower screws 166''. On the

bar 138 there is provided a side arm 167, extending leftwardly of the bar and provided with a turned down lug 167'. The lug 167' carries a forwardly extending pin 168 suitably insulated therefrom. As the bar 138 moves forwardly the pin 168 passes through the opening 166' provided in the wall 166 of the frame 165, to contact the back spring 164 and move it forwardly so as to close the switch 161.

When the bar 138 is in its forward position the switch 161 is closed and the selector mechanism is in reproducing position. Whenever the operator listens back on a recorded area the translating device is in a backspaced position with respect to its previous position of farthest advance, the slip rings then being disconnected from each other. When the position of farthest advance is reached the slip rings are reconnected. Since the switch 161 is yet closed, by reason of the selector mechanism being yet in its reproducing position, the circuit of the electromagnet 144 will be closed with respect to the power supply upon the operation of the switch 46 to stop position. Thus as the operation of the machine is stopped by moving the switch 46 into stop position, the electromagnet 144 is energized to cause the armature 147 to be moved out of its bar-obstructing position, thereby permitting the bar 138 to move rearwardly so as to effect the recording position of the selector mechanism. The switch 161 is then open and the electromagnet 144 is therefore no longer energized, the armature 147 being, however, maintained in a downward position by the bar 138. Upon restarting the operation of the machine by moving the hand switch 46 into start position, the translating device is rendered operative for recording.

In listening back on a recorded area the operator will know by the termination of the reproduction when the carriage reaches its previous position of farthest advance. However, in order that the operator may be positively warned when the carriage reaches this position of farthest advance, I provide a signalling means preferably of a type comprising an electrical buzzer 168 which is jointly controlled by the advance device, the selector mechanism and the hand switch 46. Reference being had to Fig. 13 it will be seen that the power supply circuit for the buzzer 168 serially includes the slip rings 152 of the advance device, the pole member 47 and contact member 49 of the hand switch 46 and another switch 169. The switch 169 is to be respectively closed and open when the selector mechanism is in reproducing and recording positions, and may therefore be in all respects similar to the switch 161: comprising normally open front and back cantilever-mounted contact springs 170 and 171 disposed in a recess 172 provided in the frame 165 to the left of the recess 165' and a pin 173 insulatedly mounted on the side arm 167 and arranged to pass through the opening 166' provided in the wall 166, to contact the back spring 171 and move it forwardly to close the switch 169 as the bar 138 moves forwardly.

Thus in order to place the buzzer in operation the slip rings 152 must be shorted, the switch 169 closed and the pole member 47 in contact with the contact member 49. The switch 169 will be closed when the selector mechanism is in reproducing position and the pole member 47 will make contact with the contact member 49 as the hand switch 46 is moved to start position to place the machine in operation, but if the operator is lis-

tening back on a previously recorded area the slip rings 152 are open by reason of the carriage being backspaced from a position of farthest advance. This open condition of the slip rings 152 causes the buzzer 168 to be inoperative. When the position of farthest advance is reached, the slip rings 152 are closed and the buzzer is put into operation, but when the hand switch 46 is moved into stop position to stop the machine the power supply circuit to the buzzer is opened to restore the buzzer to inoperative condition, this moving of the hand switch to stop position causing contact to be broken between the pole member 47 and contact member 49 (whereby the power supply circuit to the buzzer is opened) and contact to be made between the pole member 47 and the contact member 48. The making of contact between the pole member 47 and contact member 48 causes the electromagnet 144 to be energized which in turn causes the selector mechanism to be shifted into recording position, as hereinbefore explained. The shifting of the selector mechanism into reproducing position opens the switch 169 and prevents any operation again of the buzzer as until the selector mechanism is shifted into reproducing position for another backspacing operation, at which time the above cycle of operations will be repeated.

It will be understood that in this second embodiment of my invention the advance device, comprising the ratchet wheel 148, may be restored to a fully unoperated position in the same manner as in my first embodiment, this restoration being properly effected by first returning the carriage 10 to its initial position and then removing the record from the mandrel. As the record is removed the parallel bar 105 is moved rearwardly to disengage the pawl 88 from the ratchet wheel 148. The ratchet wheel is then returned to unoperated position by the spring 149. It will also be understood that in order to freely reproduce a recorded area, the carriage 10 must first be moved forwardly to traverse the area to be reproduced so as to set the advance device to a position beyond such recorded area, as otherwise upon the operation of the hand switch 46 to stop position the translating device will be conditioned for recording while yet overlying the area to be reproduced.

It is to be understood that all matter herein set forth, or shown in the accompanying drawings, is to be interpreted in an illustrative but not limitative sense, as many possible embodiments may be made of my invention without departing from the scope thereof, which I undertake to express according to the following claims.

I claim:

1. In a phonograph having means for supporting a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record; and means effective to define all positions of farthest advance in the path of said device reached by the device prior to a backspacing thereof, comprising a turnable defining member, and a one-way action means coupling said defining member with said device throughout the range of movement of the device for causing said defining member to be turned by said device only in response to and in proportional relationship with the movement of the device into all positions of farthest advance.

2. In a phonograph having a record support: the combination of a record-cooperating translating device advanceable and backspaceable relative to said support; a pair of defining elements

movably mounted for movement independent from that of said device; means operatively coupling one of said defining elements with said device and causing said one element to move in opposite directions in response to the advancing and backspacing movements of the device; a one-way coupling between said elements for causing the other of the elements to be turned by said one element only in response to an advance movement of said device; and controllable means normally acting on said other element to limit the movement of the latter to the direction of its driven movement by said one element whereby to cause a relative defining movement between the defining elements upon a backspacing of the device from a position of farthest advance.

3. In a phonograph having means for supporting a record and a record-cooperating translating device: in combination, a carriage for said device capable of forward and return movements relative to the record; means effective throughout the range of movement of the carriage to define all positions of farthest advance reached by the carriage prior to a return thereof, said means being bodily carried with the carriage and mounted for movement relative thereto; operating means for said defining means actuated by said carriage in response to movement of the carriage throughout its path into positions of farthest advance; and means operative to hold said defining means substantially fixed in position relative to the carriage when the carriage is returned.

4. In a phonograph having means for supporting a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record; and means for defining the position of farthest advance reached by the device prior to a backspacing thereof, comprising a defining member bodily carried with said device and mounted for movement relative thereto, means biasing said defining member relative to said device, and means operatively connecting said defining member with said translating device and operated in response to the movement of said device into positions of farthest advance, for moving said defining member against its biasing.

5. In a phonograph having means for supporting a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record, and means for defining the position of farthest advance reached by said device prior to a backspacing thereof, comprising a position-defining member for said device mounted for movement in opposite directions, means biasing said defining member in one of said directions, means restricting movement of said member in said one direction, and means operatively connecting said defining member with said device and operated in response to the movement of said device into positions of farthest advance, for moving the defining member in the other of said directions.

6. In a phonograph having means for supporting a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record and conditionable for recording and reproducing; rotatable means rotated by said translating device in coordinate relation to the advancing and backspacing of the latter; an openable and closeable switch for controlling the condition of said translating device; a normally unidirectionally movable member coupled to said translating device

and moved proportionately with the movements of said translating device into positions of farthest advance and means, jointly operated by said rotatable means and said member, for causing said switch to be shifted between open and closed conditions in response to a movement of said translating device into and out of a position of farthest advance.

7. In a phonograph having means for supporting a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record; a pair of members mounted for relative angular movement and normally bearing a fixed angular relationship to each other; means operatively connecting said device with said members for causing the latter to be displaced from said normal angular relationship in response to a backspacing of said translating device from a position of farthest advance; a switch having open and closed conditions; and means operatively connecting said members with said switch and operated in response to a relative movement of said members into and out of said normal angular relationship, for moving the switch from one of its conditions to the other.

8. In a phonograph having a record support and a record-cooperating translating device advanceable and backspaceable relative to said support: the combination of a movable position-defining element for said device; and means for effecting a defining movement of said element comprising a stationary member extending along the path of said device and provided with a curved groove, a member coupled with said element and engaging said groove, and means for causing said member to be moved along said groove by the movement of said device.

9. In a phonograph having a record support and a record-cooperating translating device advanceable and backspaceable relative to said support: the combination of a rotatable defining element for said device; and means for effecting a defining movement of said element comprising a rod extending along the path of said device and provided with a helical groove, a member coupled with said element and engaging said groove, and means to cause said member to be moved along said groove in response to the movement of said device.

10. In a phonograph having a record-supporting device, a record-cooperating translating device, and means mounting one of said devices for advancing and backspacing travelling movement relative to the other: the combination of a movable element for defining relative positionings between said devices; means mounting said element for defining movement in a direction transverse to that of the travelling movement of the movable one of said devices; and means for effecting a defining movement of said element comprising a stationary member extending along the path of travelling movement of said one movable device and provided with a curved groove, a member coupled to said element and engaging said groove, and means causing said member to be moved along said groove by said one movable device in its travelling movement.

11. In a phonograph having a rotatable mandrel adapted to receive a record, and record ejecting means: the combination of a carriage movable along the record; a member movable into a position wherein it renders said ejecting means inaccessible for operation; and means, operatively connecting said carriage with said mem-

ber, for causing said member to be controlled by the movement of the carriage.

12. In a phonograph having a mandrel rotatably supported at one end and free at the other to receive a record: the combination of a carriage movable along the record; a cabinet for said phonograph; a member comprising a wall section of said cabinet movable into a position wherein it obstructs the mounting of a record on, and its removal from, said mandrel; and means, operatively connecting said carriage with said member, for controlling the movement of said member by the movement of said carriage.

13. In a phonograph having a rotatable mandrel adapted to receive a record, and record ejecting means: the combination of a carriage movable from an initial position into other positions along said mandrel; a cabinet for said phonograph; a member comprising a wall section of said cabinet movable into a position wherein it obstructs the operation of said record ejecting means; and means, operatively connecting said member with said carriage, for controlling the movement of said member by the movement of said carriage.

14. In a phonograph having a support for a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record and having respective operative conditions for recording and reproducing; means shiftable to effect the respective operative conditions of said translating device; a movable advance member operatively associated with said device for defining the position of farthest advance reached by the device prior to a backspacing thereof; and means, controlled by said advance member in response to a defining movement of the same through a predetermined distance beyond a prior farthest defining position for shifting said condition-effecting means.

15. In a phonograph having a support for a record: in combination, a record-cooperating translating device advanceable and backspaceable relative to the record and adjustable into operative and inoperative conditions, said operative conditions comprising respective conditions for recording and reproducing; means movable into recording and reproducing positions to effect said respective operative conditions; an advance member operatively associated with said device for defining the position of farthest advance reached by the device prior to a backspacing thereof; means for moving said condition-effecting means into reproducing position coincidentally with a backspacing of said device; and means, operated by said advance member in the defining movement of the same beyond a prior farthest defining position subsequent to said backspacing, for causing said condition-effecting means to be moved into recording position.

16. In a phonograph having means for supporting a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record and having an inoperative condition and respective operative conditions for recording and reproducing; a pair of members carried with said device and normally maintained in a fixed relative angular relationship; an operative connection between said translating device and said members for causing a relative angular displacement between said members in response to moving of said translating device in the portion of its path preceding a prior position of farthest advance;

and switch means controlled by said members in the movement of the same into said normal angular relationship, for shifting said device from one condition to another.

17. In a phonograph having means for supporting a record: the combination of a record-cooperating sound translating device advanceable and backspaceable with respect to the record and having an inoperative condition and respective operative conditions for recording and reproducing; and a mechanism bodily carried with said device for controlling the condition of the latter, comprising an openable and closable switch, and means associated with said switch and actuated by said device when the latter is moved with respect to the record for causing the switch to be differentially operated in response to a movement of the device into a position of farthest advance and into a position backspaced therefrom.

18. In a phonograph having a record support: the combination of a record-cooperating translating device advanceable and backspaceable relative to said support and comprising a recording stylus and a reproducing stylus spaced behind the recording stylus in respect of the direction of advance of the device; stylus-controlling means associated with said device and movable into recording and reproducing positions to place said styli respectively into engagement with the record; means manually operable to move said stylus-controlling means into reproducing position; an advance member moved by the advance of said device for defining the position of farthest advance reached by the device; and means, operated by said advance member in the movement of the same in response to an advance of said device at least through the distance of the said spacing between said styli, for causing a return of said stylus-controlling means to recording position.

19. In a phonograph: in combination, a support onto and from which a record may be mounted and removed; a record-cooperating sound translating device advanceable and backspaceable relative to the record; an advance device biased in one direction of its movement; means operatively connecting said advance device with said translating device for moving the former in the opposite direction in accordance with the advance of the latter into positions of farthest advance; means normally effective to restrain said advance device from movement in said one direction; a movable element biased in one direction and moved in the other by the record incidental to the placing of the record in mounted position on said support; and means, controlled by said element, for effecting the release of said advance device from said restraining means.

20. In a phonograph having a support for a record: in combination, record-ejecting means; a translating device capable of forward and return movements relative to the record and adjustable into operative and inoperative conditions, said operative conditions comprising respective conditions for recording and reproducing; means movable into recording and reproducing positions to effect said respective operative conditions; a movable advance device for defining the most forward position reached by said device prior to a return thereof; means causing said condition-effecting means to be moved into reproducing position upon a return of said device; and means, operated by said record-ejecting means, for moving said condition-effecting means into recording position and re-

storing said advance device into a position of neutral definition.

21. In a phonograph having a support onto and from which a record may be mounted and removed: the combination of a record-cooperating sound translating device advanceable and backspaceable relative to said support; means for defining the position of farthest advance reached by said translating device prior to a backspacing thereof; means operable to place said defining means in operative and inoperative conditions; a movable element moved in response to a placing of a record into mounted position relative to said support and to a removing of the record from said mounted position; and means operatively connecting said movable element with said operable means and respectively actuated during record mounting and record removal to place said defining means into operative and inoperative conditions.

22. In a phonograph having a support for a record: the combination of record-ejecting means; a translating device capable of forward and return movements relative to the record and adjustable into operative and inoperative conditions, said operative conditions comprising respective conditions for recording and reproducing; means movable into recording and reproducing positions to place said device into its respective operative conditions; restorable means for defining the most forward position reached by said device prior to a return thereof; and means, coupled with said record-ejecting means, for moving said placing means into recording position and concurrently restoring said defining means to a position of neutral definition.

23. In a phonograph having a support onto and from which a record may be mounted and removed: the combination of a record-cooperating translating device advanceable and backspaceable relative to said support; a defining means for indicating the position of farthest advance reached by said device prior to a backspacing thereof comprising a movable defining member, releasable means restricting said member in its movement to its defining direction, and means associating said member with said device for effecting a defining movement of said member in response to a movement of said device into positions of farthest advance; a movable element so positioned and arranged in relation to said support that a movement thereof is effected in response to record mounting and record removal; and means, operatively connected with and controlled by said movable element, for releasing said restricting means.

24. In a phonograph having a record support: the combination of a record-cooperating translating device advanceable and backspaceable relative to said support; position-defining means for said device comprising a movable defining member biased in the direction opposite to that of its defining movement, means for causing a defining movement of said member in response to a movement of said translating device into positions of farthest advance, and releasable means restricting the defining member in its movement to its defining direction; record-ejecting means; and an operative coupling between said record-ejecting means and said restricting means for causing the latter to be released as an incident of the operation of the former.

25. In a phonograph having a record support: the combination of a record-cooperating trans-

lating device advanceable and backspaceable relative to said support; position-defining means for said device comprising a movable defining member biased in one direction of its movement, means causing said member to be moved in its other direction in response to a movement of said device into positions of farthest advance, and releasable means restricting the member against movement in its biased direction whereby to cause the member to be held stationary in its path of defining movement while the translating device is in a backspaced position; a record-ejecting means; and means, operatively connecting said record-ejecting means with said restricting means and actuated in response to operation of the former, for causing a release of said restricting means.

26. In a phonograph: in combination, a record-supporting mandrel; a carriage advanceable from an initial position to other positions relative to the record; restorable means operatively associated with said carriage for defining the position of farthest advance reached by said carriage; a member movable into a position to obstruct the mounting and removal of a record with respect to said mandrel; means, operatively connecting said member with said carriage, for maintaining said member in said obstructing position except when said carriage is in said initial position; a movable element actuated in each removal of a record from said mandrel; and means, operatively connected with said element and controlled by the same as an incident of each record removal, for restoring said defining means to a position corresponding to the initial position of said carriage.

27. In a phonograph: in combination, record supporting means; record-ejecting means; a carriage advanceable from an initial position to other positions relative to the record; restorable means operatively associated with said carriage for defining the position of farthest advance reached by said carriage; a member movable into a position to obstruct the operation of said ejecting means; means, operatively connecting said member with said carriage, for maintaining said member in said obstructing position except when said carriage is in said initial position; and means, coupled with said record-ejecting means and actuated in response to the operation of the same, for restoring said defining means to a position corresponding to the initial position of said carriage.

28. In a phonograph having a record support and moving means therefor: in combination, a control means associated with said moving means manipulatable to render the same effective and ineffective whereby to place the phonograph into and out of operation; a sound translating device advanceable and backspaceable relative to the record and selectively conditionable for recording and reproducing; means differentially responsive to moving of said translating device to a position of farthest advance and to a position backspaced therefrom; and means, operatively connected with both said control means and said responsive means and actuated in response to the first interruption in the operation of the phonograph, by a manipulation of said control means, following a restoration of said translating device from a backspaced position to a position of farthest advance, for shifting said device between its said selective conditions.

29. In a phonograph having a record support and moving means therefor: the combination of

control means associated with said moving means and manipulatable to render the same effective and ineffective; a translating device advanceable and backspaceable relative to said support and selectively conditionable for recording and reproducing; means differentially responsive to moving said translating device to a position of farthest advance and to a position backspaced therefrom; means for shifting said translating device from reproducing to recording condition; means controlled by said responsive means for rendering said shifting means inoperable and operable as said translating device is moved into backspaced and farthest advanced positions respectively; and means, controlled by said control means in the first manipulation of the same following a restoration of said translating device from a backspaced to a farthest-advanced position, for operating said shifting means.

30. In a phonograph having a movable record support, a record-cooperating translating device advanceable and backspaceable relative to said support and placeable into recording and reproducing conditions, and driving means for effecting a relative movement between said device and said support: the combination of means associated with said device and movable into first position and into a constrained position to effect the recording and reproducing conditions of said device; means for retaining said condition-effecting means in said constrained position; means associated with said retaining means and operable to release the same; a control means operable to start and stop the said relative movement effected by said driving means; and means, operatively connected with said translating device and rendered operable in response to placing the device into a position of farthest advance, for operatively connecting said releasing means with said control means whereby to place the former under the control of the latter.

31. In a phonograph having a record support, a translating device advanceable and backspaceable relative to said support and comprising recording and reproducing record-engageable styli, and driving means for advancing said device: the combination of means for moving said styli into and out of engagement with the record; means operable to place said styli selectively under the influence of said stylus-moving means; means to control said driving means; means differentially responsive to moving said translating device into a position of farthest advance and into a position backspaced therefrom; means for moving said stylus-selecting means into reproducing position in response to backspacing said device; means, associating said control means with said stylus-moving means, for causing the stylus selected by said stylus-selecting means to be moved into and out of record engagement as said driving means is put into and out of operation; and means operatively connecting said control means with both said stylus-selecting and responsive means and operated at the first placing of said driving means into inoperative condition following a restoration of said device from a backspaced position to a position of farthest advance, for moving said stylus-selecting means into recording position.

32. In a phonograph having a support for a record: in combination, a translating device advanceable and backspaceable relative to the record; driving means for advancing said translating device; means differentially responsive to moving said translating device into a position

of farthest advance and into a position backspaced therefrom; control means operable to start and stop said driving means; signalling means; and means, jointly controlled by said control means and said responsive means and operated in response to a driven movement of said translating device from a backspaced position into its prior position of farthest advance, for rendering said signalling means operative.

33. The subject matter of claim 32 further including means associated with said last-mentioned means and operated at the initial stopping of said driving means following the restoration of said translating device to a position of farthest advance for rendering said signalling means inoperative.

34. In a phonograph having a support for a record: in combination, a translating device advanceable and backspaceable relative to the record; driving means for advancing said translating device; switch means differentially operated in response to moving of said translating device into a position of farthest advance and into a position backspaced therefrom; control means operable into start and stop positions to place said driving means into and out of operation; signalling means; and means, operatively connecting said signalling means with both said switch and control means and effective only when said translating device is in a position of farthest advance and said control means is in start position for rendering said signalling means operative.

35. In a phonograph having a support for a record: in combination, a translating device advanceable and backspaceable relative to the record and adjustable between operative and inoperative conditions, said operative conditions comprising respective conditions for recording and reproducing; means shiftable between recording and reproducing positions to select said operative conditions; driving means for effecting advancing movement of said translating device; means positively differentiated in response to a moving of said translating device into a position of farthest advance and into a position backspaced therefrom; means positively differentiated in response to shifting said selecting means; control means operable into start and stop positions to place said driving means into and out of operation; signalling means; and means, operatively connecting said signalling means with said two positively differentiated means and said control means and effective only when said selecting means is in reproducing position, said translating device is in a position of farthest advance and said control means is in start position, for rendering said signalling means operative.

36. In a phonograph having a record support and a record-cooperating translating device advanceable and backspaceable relative to said support and shiftable between recording and reproducing conditions: the combination of means associated with said device for shifting the condition of the same; signalling means; and a circuit system operatively connected with said signalling and shifting means and differentially controllable to cause respective operations of said two means, comprising a first switch operable to place said signalling means into operation, means to cause operation of said switch in response to a movement of said translating device from a backspaced position to a position of prior farthest advance, and another switch rendered effective in said system by the said operation of

said first switch for controlling both the stopping of said signalling means and the operation of said shifting means.

37. In a phonograph having a record support and a record-cooperating translating device advanceable and backspaceable relative to said support and shiftable between recording and reproducing conditions: the combination of means associated with said translating device for shifting the same from reproducing to recording condition; signalling means; and a circuit system differentially energizable to operate said shifting means and signalling means respectively, comprising a first switch means in the circuit of said signalling means and closed by said translating device in the movement of the same from a backspaced position to a position of prior farthest advance for rendering the signalling means operative, and a second switch means in said system effective when said first switch means is in closed condition to render said shifting means operative and to concurrently stop said signalling means.

38. In a phonograph having a record support, a translating device placeable into recording and reproducing conditions, and driving means operable to advance said device relative to said support: the combination of a signal; means to shift said device from reproducing to recording conditions; a first switch operable into start and stop positions to render said driving means effective and ineffective; a second switch actuated in response to advance of said device from a backspaced position to a prior position of farthest advance; and a circuit system operatively connecting both said switches with said signal and shifting means and operative to cause operation of the signal in response to the said actuation of said second switch while said first switch is in start position, and to cause the signal operation to be stopped and the shifting means to be operated in response to a return of said first switch to stop position while said second switch is in its actuated position.

39. The subject matter as claimed in claim 37, further including switch means, controlled by said translating device in respect of its conditioning, for rendering said circuit system inoperative to control said signal and shifting means while said translating device is in recording condition.

40. In a phonograph having a support for a record: in combination, a record-cooperating sound translating device advanceable and backspaceable relative to the record and having respective operative conditions for recording and reproducing; means for effecting said operative conditions, biased into a recording position; releasable means for holding said effecting means in reproducing position; electromagnetic means for operating said releasing means; moving means for said translating device; manipulatable control means associated with said moving means and operable to place the same into operative and inoperative conditions; means for operatively connecting said control means with said electromagnetic means; and means included in said connecting means controlled by said condition-effecting means and said translating device to cause said electromagnetic means to be under the influence of said control means only when said effecting means is in reproducing position and said translating device is in a position of farthest advance.

41. In a phonograph having a record support

and driving means therefor: in combination, control means movable into start and stop positions to render said driving means effective and ineffective; a sound translating device advanceable and backspaceable relative to the record and adjustable into operative and inoperative conditions, said operative conditions comprising respective conditions for recording and reproducing; means movable into recording and reproducing positions to place said device into its respective operative conditions; means for moving said movable means into reproducing position as an incident of backspacing said translating device; and means, operatively connected with said control means and operable when said translating device is advanced into the position of farthest advance reached by the device prior to said backspacing, for causing said movable means to be moved into recording position by the movement of said control means into stop position.

42. In a phonograph having a record support and moving means therefor: in combination,

control means movable into start and stop positions to render said moving means effective and ineffective; a translating device advanceable and backspaceable relative to the record and adjustable into operative and inoperative conditions, said operative conditions comprising respective conditions for recording and reproducing; means shiftable between recording and reproducing positions to place said device into its respective operative conditions; means differentially responsive to moving said translating device to a position of farthest advance and to a position backspaced therefrom; means differentially responsive to the positioning of said shiftable means; means for moving said shiftable means into reproducing position as an incident of backspacing said translating device; and means, jointly controlled by said two responsive means and said control means, for controlling the return of said shiftable means to recording position.

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