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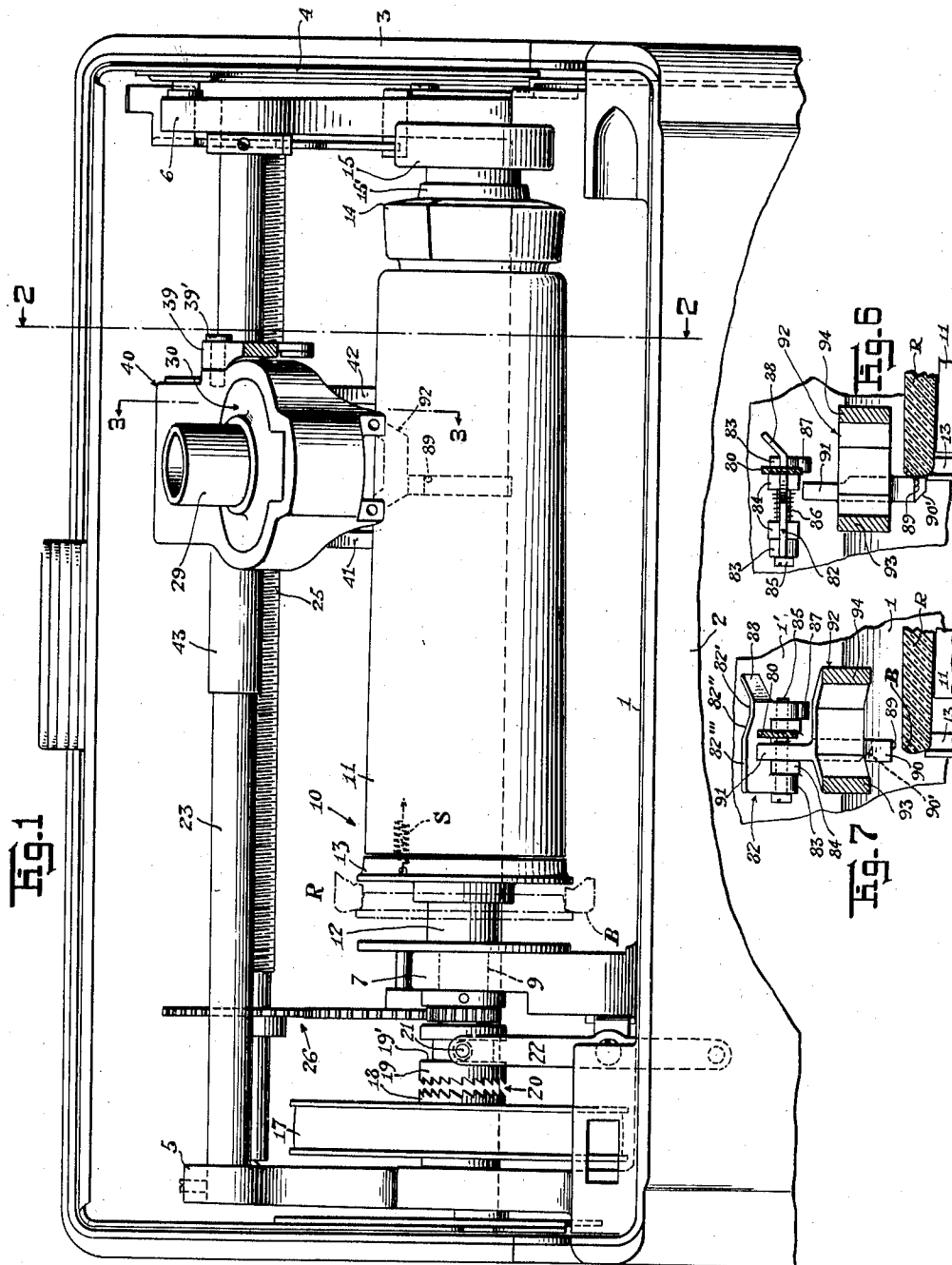
O. M. DUNNING ET AL

2,270,832

PHONOGRAPH

Filed Aug. 6, 1938

3 Sheets-Sheet 1



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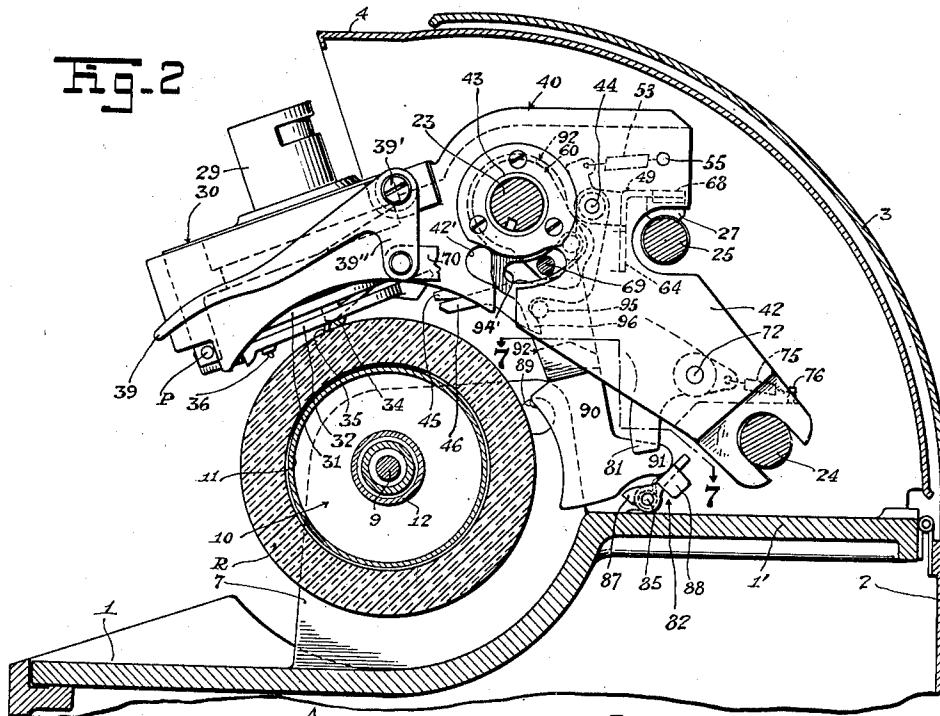
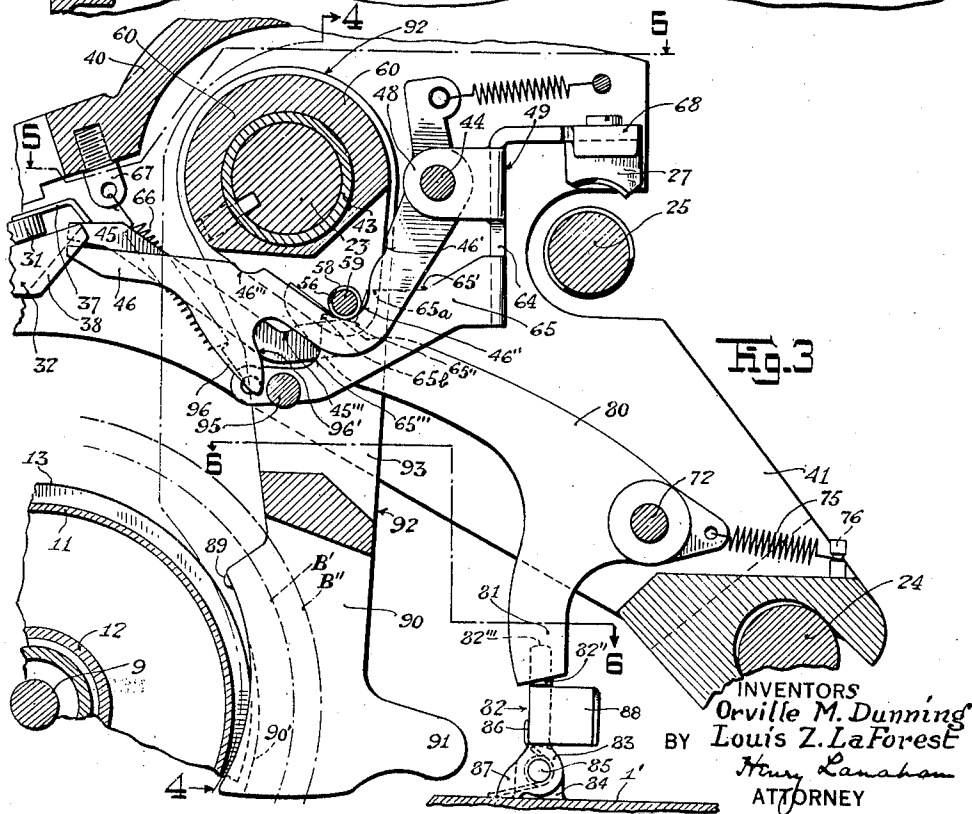
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PHONOGRAPH

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Fig. 2



Jan. 20, 1942.

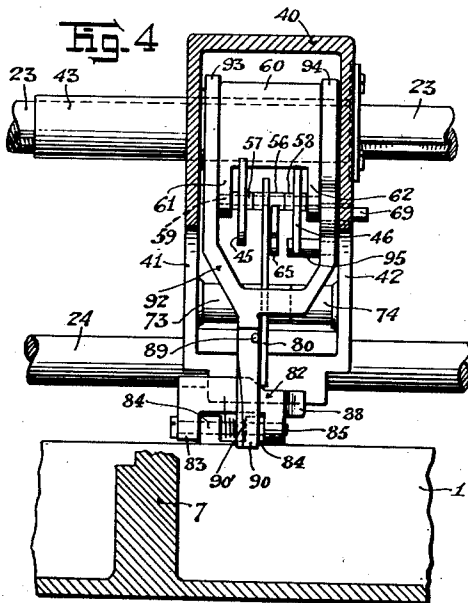
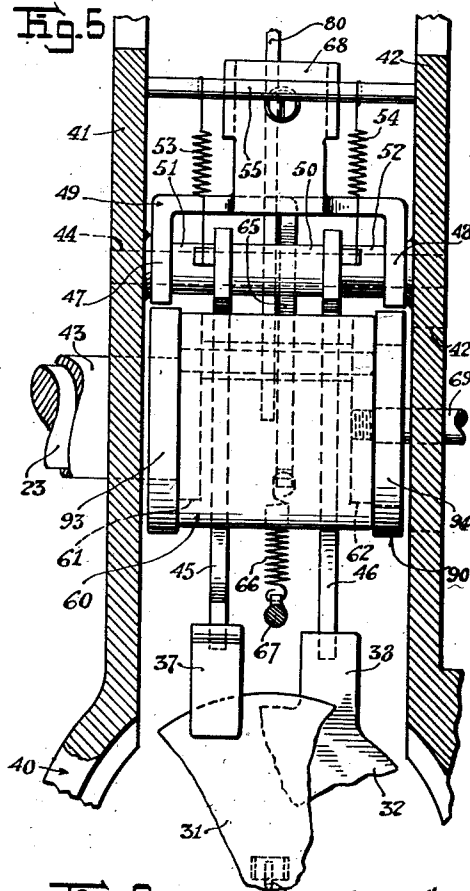
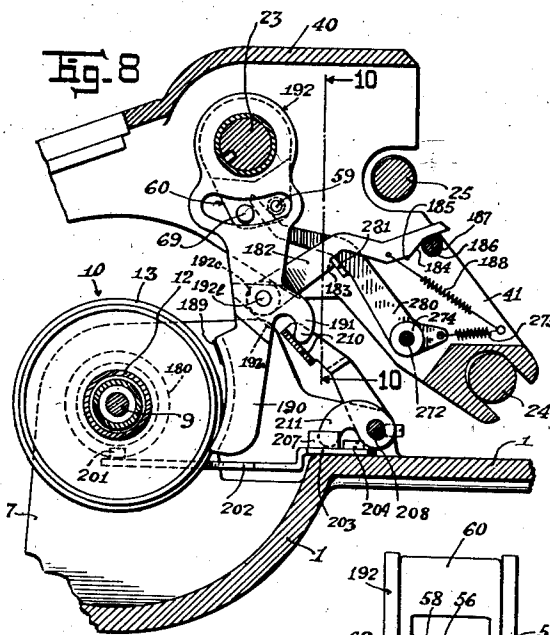
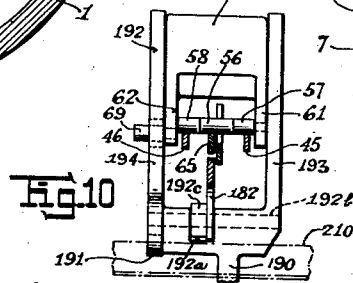
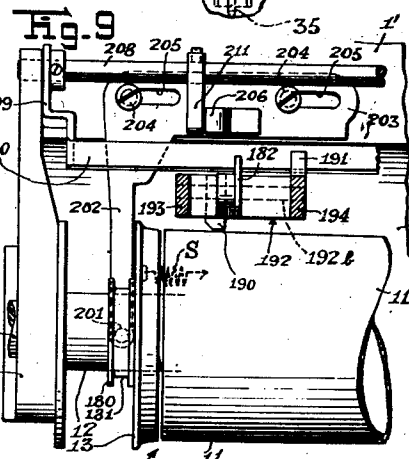
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PHONOGRAPH

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3 Sheets-Sheet 3



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PHONOGRAPH

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16 Claims. (Cl. 274—17)

This invention relates to phonographs, and more particularly to those of the type wherein there are employed a support on which a record may be mounted and a carriage, with a variously conditionable record-cooperating translating device, movable relative to the record. The invention has especial utility, and has been illustrated and described in connection with, a phonograph adapted for the recordation, or the selective recordation and reproduction, of sound such as dictation and the like.

It is an object of our invention to provide improved means for automatically placing the translating device in a preselected condition as an incident of one or more other manipulations necessary in the use of the phonograph.

It is another object of the invention to provide improved and simple means for automatically returning the carriage to an initial position as an incident of one or more other necessary manipulations.

It is another object to provide novel and effective combinations of the means for performing the two functions abovementioned.

It is a general object of the invention to provide improvements in, and improved, phonographs of the type described.

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

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

Figure 1 is a front elevational view of the principal portion of a phonograph in which our invention has been incorporated in a first embodiment;

Figure 2 is a vertical cross-sectional view taken substantially along the line 2—2 of Figure 1, and illustrating the components at the positions they occupy at the completion of the mounting of a record on the mandrel;

Figure 3 is an enlarged, partial vertical cross-sectional view through the carriage and mandrel, taken approximately along the line 3—3 of Figure 1, and illustrating the components in the positions they occupy prior to the mounting of a record on the mandrel;

Figure 4 is a partial vertical cross-sectional view taken substantially along the line 4—4 of Figure 3;

Figure 5 is a partial horizontal cross-sectional view taken substantially along the line 5—5 of Figure 3;

Figure 6 is a partial horizontal cross-sectional view taken substantially along the line 6—6 of

Figure 3, excepting that it illustrates the components in the positions they occupy slightly prior to the completion of record mounting on the mandrel;

Figure 7 is a partial horizontal cross-sectional view taken substantially along the line 7—7 of Figure 2;

Figure 8 is a partial vertical cross-sectional view of nature similar to that of Figure 3, but illustrating a modified or second embodiment of our invention, and simplified by the omission of certain components common to the phonographs of both embodiments;

Figure 9 is a partial plan view of the phonograph in which the second embodiment has been incorporated; and

Figure 10 is a partial vertical cross-sectional view taken substantially along the line 10—10 of Figure 8.

A feature of the invention is the provision of means operated by the mounting of a record on the record support—more specifically, responsive to the substantial completion of that mounting—for causing the translating device to assume a preselected condition. Such means in their broadest aspect are known. But the preferred forms of these means according to this invention are novel in that the movable member which operates them is embodied in the moving system of the phonograph—i. e., in the system which effects translational movement of the record and translating device. Further according to our invention, these means are preferably arranged to put upon the translating device a positive constraint to assume the preselected condition, which constraint is, however, automatically released as the constraining means completes its operation. Still further according to the invention, these means preferably operate concomitantly with the substantial completion of carriage return, and in one embodiment they operate in direct response to that substantial completion.

These last-mentioned actions are incidents of a further important feature of the invention—the return of the carriage by the mounting of a record on the support. As a preferred means of accomplishing this we employ an arm or interference piece carried by the carriage and extending therefrom into the path of a record being mounted on the support, this arm being automatically retracted from that path in response to the substantial completion of record mounting.

The first embodiment of our invention may be described with reference to Figures 1 through

7, Figures 1 and 2 illustrating the principal portions of a phonograph in which the invention has been incorporated. The phonograph may include a base plate 1, of different elevation in its forward and rearward portions; a stationary enclosure 2 below and supporting the base plate 1; a forwardly curving rear stationary enclosure 3 above the base plate; and a curved front cover 4 movable to just within the enclosure 3 to expose the phonograph for use. Extending upwardly from the base plate 1 are the lefthand and righthand standards 5 and 6, respectively, and the intermediate standard 7, these standards serving to support various elements of the phonograph next described.

Journalled in the standard 7 is a mandrel shaft 9 on which, to the right of that standard, is carried a record support in the form of a generally cylindrical mandrel 10; this may for example be of the form disclosed in U. S. Patent No. 2,010,717, issued August 6, 1935, on application of H. F. M. Gramann. For purposes of the instant description some of the elements of the mandrel, all rotationally secure with respect to the shaft 9, may be noted as comprising the main shell 11; a sleeve 12 within and extending leftwardly from shell 11 toward standard 7; the flanged ejecting head 13 at the left of shell 11, limitedly movable along sleeve 12 away from the shell, and rightwardly biased (as purely schematically indicated by the spring S); the expansible chuck members 14 at the right of the shell 11; and the righthand end knob 15. The mandrel is adapted to receive a cylindrical record R, purely typically of a wax composition, which may be slid leftwardly over the shell 11 until the lefthand end of the record impinges against the head 13; further leftward movement of the record moves the head 13 leftwardly against its bias, until a suitable mechanism (including the bevelled surface 15' at the leftward extremity of the knob 15) expands the chuck members 14 to internally grip the righthand end of the record. With the record so mounted, a slight leftward movement of the knob 15 collapses the chuck members 14 and permits the ejecting head 13 to obey its bias and to eject the record rightwardly. The position of the lefthand record extremity when the record is fully mounted, and the corresponding position of the ejecting head 13, are shown in dash-dot lines in Figure 1. The mandrel shaft 9 extends to the left of standard 7 axially toward a driving pulley 17, which latter may be rotated as by a motor and belt (not shown). Secured to the pulley 17, and splined on the end portion of the shaft 9, are the respective elements 18 and 19 of a clutch 20. The element 19 is provided with an annular groove 19', in which there is positioned a pin 21 secured in the upper extremity of a pivoted lever 22; and it will be understood that slight rightward and leftward rocking of the lower extremity of the lever 22, by means not herein necessary to show, will engage and disengage the clutch 20 and will thereby control the rotation of the mandrel 10.

Above and behind the mandrel 10 there extend, between the standards 5 and 6, the respective carriage rods 23 and 24, along which there is slidable a carriage 40. The carriage extends forwardly over the mandrel, and carries in its forward portion a translating device 30 arranged, in manner hereinafter more detailedly apparent, for cooperation with a record R on the mandrel. The carriage may be driven rightwardly along

the rods 23 and 24 by a feed screw 25 journalled between the standards 5 and 6 behind rod 23 and engageable by a feed nut 27 carried by the carriage. The feed screw 25 may be rotated by a train of gears 26 coupling it rotationally to the mandrel shaft 9.

It will be understood that the mandrel 10 and carriage 40 form a moving system for producing translational movement of a record R and the translating device 30—e. g., a movement which causes either of the translating device styli (hereinafter mentioned) to traverse a spiral path on the record, for the translating of oscillatory energy into a recording on the record or vice versa.

While the translating device 30 may in recording be actuated by, and may in reproduction produce, oscillatory energy of any of a variety of natures, we have shown it as provided with an upwardly extending neck 29, to which a sound-conveying tube (not shown) may be attached for the conveyance of sound energy to and from the translating device. Not all the details of the translating device are necessary to an understanding of the present invention; it may be pointed out, however, that the device may include two circular members pivoted (as at point P) at the front of the device and extending generally rearwardly, the upper of these members being designated as 31 and the lower one as 32. When both members are free of upward restraint, a smooth ball 34 attached to member 32 contacts the record surface, without effect on the latter, and a recording stylus 35 carried by the upper member 31 also contacts the record surface; the translating device is then conditioned for recording on the record—e. g., for the engraving in the record surface of a groove of depth undulating in accordance with sound energy supplied to the device through the neck 29. When the upper member 31 only is held upwardly (as by means hereinafter described) both the ball 34 and the recording stylus 35 are held away from the record, and a reproducing stylus 36, suitably carried by the member 32, is brought into contact with the record surface; the translating device is then conditioned for reproduction from the record—e. g., for the emission through the neck 29 of sound energy translated by the device from an undulating record groove being traversed by the reproducing stylus 36. When both members 31 and 32 are held upwardly (as by means hereinafter described) the ball 34 and both the styli 35 and 36 are held away from the record; the translating device is then in neutral condition. The translating device structure and conditioning as so described will be seen to be essentially those of the sound box of U. S. Patent No. 1,989,198, issued January 29, 1935, on application of Charles Heunlich, to which patent reference may if desired be had for further details.

The means for variously positioning the circular members 31 and 32, and thus for selectively conditioning the translating device, comprise two lugs 37 and 38 extending rearwardly from those members respectively; two arms 45 and 46 carried in the carriage and having their forward extremities underneath those lugs; a translating device control lever 39 pivoted on a horizontal stud 39' at the righthand side of the carriage and extending forwardly therefrom; and a mechanism rendering the arms 45 and 46 responsive to the angular position of the control lever 39 about the stud 39'. This mechanism

(as well as the lug 37 from the member 31) is best seen in Figures 3 through 5.

In its central portion the carriage 40 includes the vertical side members 41 and 42, and the sleeve 43 extending between those side members and to the left of 41 about the carriage rod 23 and acting as a long bearing for the carriage about that rod. Between the side members 41 and 42, behind the sleeve 43, is secured a cross rod 44. The forwardly extending ears 47 and 48 of a U-shaped member 49 are pivotally mounted on this rod 44 just inside 41 and 42. Rotatably surrounding the rod 44 between the ears 47 and 48 are a series of three collars 51, 50, 52; the arm 45 is secured to the righthand side of the lefthand collar 51, while the arm 46 is secured to the lefthand side of the righthand collar 52, so that the arms may rotate about the rod 44. The principal portion of each of the arms 45 and 46 extends downwardly and forwardly from rod 44; but each arm also extends a short distance upwardly from rod 44, to be engaged by the forward extremity of a respective tension spring 53 or 54. The rear extremities of the springs 53 and 54 are secured to a stationary cross rod 55 (at the back of the carriage) to bias upwardly the forward extremities of arms 45 and 46; this arm bias of course tends to cause the raising of both circular members 31 and 32, and hence a neutral condition of the translating device 30.

The arms 45 and 46 are moved against their biases, to variously condition the translating device, by respective small rollers 57 and 58 movable along specially formed intermediate top surfaces of the arms. To support these rollers there rotatably surrounds the sleeve 43, between the carriage side members 41 and 42 (but with a spacing from each of those members to accommodate an element hereinafter mentioned), a centrally apertured block 60; from this block there extend generally downwardly lefthand and righthand ears 61 and 62; and between those ears there extends a thin cross pin 59 on which the rollers 57 and 58 are positioned, with a third roller 56 therebetween. When the block 60 occupies the angular position about sleeve 43 in which it is illustrated in Figure 3, the aligned rollers 57 and 58 will respectively be in contact with top surface portions of the two arms, that portion for the arm 46 having been designated as 46''. The configurations of the top surfaces of the arms 45 and 46 are such that the forward arm extremities are then in a raised position, and the translating device 30 therefore in a neutral condition.

From the portions typified by 46'' toward the pivoting rod 44 the top surfaces of the arms 45 and 46 extend (similarly, and as indicated by the arm 46 in Figure 3) more nearly vertically than the rearward arcuate path traversed by the rollers 57 and 58 upon rotation (counter-clockwise as viewed in Figure 3) of the block 60. Accordingly upon such rotation (for example to bring the rollers into slight indentations indicated as 46' for the arm 46) the arms will be rocked about rod 44 to bring their forward extremities downwardly; this results in a lowering of both circular members 31 and 32 and therefore conditions the translating device 30 for recordation.

From the portions typified by 46'' the top arm surfaces extend forwardly with different elevational configurations. That of arm 45 extends a distance forwardly (for example to the slight

indentation 45'') approximately along the forward arcuate path traversed by the rollers 57 and 58 upon rotation (clockwise in the view of Figure 3) of block 60; while that of arm 46 extends (for example to the slight indentation 46'') materially more upwardly than that forward arcuate path. Accordingly upon such rotation (for example to bring the rollers into the indentations 45' and 46') the arm 45 will be left approximately in its Figure 3 position, while the arm 46 will be rocked to move its forward extremity downwardly; this results in a lowering of the circular member 32 but a maintenance of the member 31 raised, and therefore conditions the translating device 30 for reproduction.

A detent is provided to preclude the assumption by block 60 of angular positions intermediate those which respectively condition the translating device for recordation, in neutral, and for reproduction. To provide this detent the lefthand portion of the base of the U-shaped member 49 is provided with the downward extension 64; and from the lower portion of this extension there is folded, in a vertical plane, the forward extension 65 forming the detent. This detent is biased upwardly, to force its top surface against the central roller 56, by a strong spring 66 tensioned between its forward extremity and a lug 67 internally secured to the carriage thereabove. The top surface of the detent 65 is provided with two high points 65a and 65b sloping into low regions 65', 65'' and 65'''; these are behind 65a, between the points, and in front of 65b, respectively, and define positions of the rollers and block 60 for conditioning of the translating device for recordation, in neutral and for reproduction, respectively. It will be understood that upon rotation of block 60 from any one of its three positions, toward another one of those positions, sufficient only to carry the roller 56 up a side of and just over either high point, the spring 66 will force the roller to cam down the other side of that point to bring the block into that other position.

It is desirable that the feed nut 27 be disengaged from the feed screw 25 throughout a neutral condition, but engaged therewith throughout either translation condition (for recordation or reproduction), of the translating device 30. This is readily accomplished by mounting the feed nut 27 above the feed screw, on the bottom of a horizontal rearward extension 68 formed from the U-shaped member 49 (as shown particularly in Figure 3); and by making the region 65'' abovementioned a somewhat higher one than either 65' or 65'''. Then the angular position of the U-shaped member 49 about the rod 44 will be less clockwise (as viewed in Figure 3) when roller 56 is in the region 65'' than when the roller is in either 65' or 65'''; and the feed nut 27, engaged throughout either translation condition by virtue of appropriate angling of the extension 68, will be disengaged throughout neutral condition.

The angular position of block 60, and hence the condition of the translating device and the engagement of the feed nut, is made responsive to the angular position of the control lever 39, and vice versa. A pin 69 is extended rightwardly from the righthand block ear 62, through an arcuate aperture 42' in the righthand carriage side member 42 (the extremities of this aperture 42' serving as stops for the pin 69 and eliminating the necessity for outside limitations of the low regions 65' and 65'' abovementioned). A

link 70 is pivotally secured to this pin, and extends forwardly therefrom to have its forward extremity pivotally secured to the bottom of a short arm 39'' integral with and extending downwardly from the control lever 39. (In Figure 3 the rear portion of this link 70 has been broken away, better to illustrate the elements therebehind, pin 69 accordingly appearing therein in cross-section.) It will be obvious that a downward position of the control lever (as illustrated for example in Figure 2) will be accompanied by a conditioning of the translating device for recordation, an intermediate lever position by a neutral condition of the translating device, and an upward lever position by a conditioning of the device for reproduction.

There may now be described the means employed in the first embodiment of our invention for causing the translating device to assume a preselected condition—this preselected condition having been illustrated as the condition for recordation, although as to the broader aspects of the invention no unnecessary limitation thereto is intended. Between the carriage side members 41 and 42, a little above and forward of the rod 24, there is provided a cross rod 72, and rotatably surrounding this rod are two collars 73 and 74. Between these collars and secured to one of them (for example 74) for pivoting about rod 72, there is provided a flat member 80 which extends in a vertical plane both slightly rearwardly from rod 72, and a material distance diagonally forwardly and upwardly therefrom. From close to the rear extremity of the member 80 a spring 75 is tensioned rearwardly to a pin 76 secured at the rear of the carriage 40; the spring 75 is arranged in such a line as to tend to maintain the forward end portion of member 80 just below the roller 56 (for example immediately to the left of the detent 65 abovementioned), though not necessarily with any pressure against that roller when the translating device is in neutral condition. Somewhat forward of the rod 72 the member 80 is provided with a branch 81 extending downwardly toward the rear portion 1' of the base plate 1, and terminating diagonally forward of the rod 72. With the translating device in neutral condition (as illustrated in Figure 3) it will be understood that if the extremity of the branch 81 be rocked sufficiently upwardly and forwardly about the rod 72, the forward end portion of the member 80 will be rocked upwardly and rearwardly to move the roller 56 (therewith rotating the block 60) over the high point 65a of the detent 65 and thereby to constrain the translating device to assume its recordation condition. Such rocking of the extremity of the branch 81 is performed in response to the substantial completion of the leftward return of the carriage (during which return the translating device will be adjusted to neutral condition to render the feed nut 27 disengaged from the feed screw 25) by an actuating device 82 secured on the rear base plate portion 1' and normally extending into the end portion of the leftward path of that branch extremity.

This actuating device 82 is shown as a normally vertical cam plate. The righthand portion 82' of the top surface of this plate is at a level just low enough not to intercept the extremity of the branch 81 when the member 80 is in its normal position. The central portion 82'' of this surface, however, is inclined upwardly to lead into the relatively higher lefthand portion 82''' ; and as the carriage return is being completed the

inclined surface portion 82'' acts as a cam to force the extremity of branch 81 to rock in the manner abovementioned, placing the translating device in the preselected condition as above explained.

While in this embodiment this effect on the translating device occurs in direct response to the completion of carriage return, it nevertheless occurs in response to record mounting—since means are provided for returning the carriage leftwardly in response to that mounting. For effecting this carriage return we provide an interference piece or arm which is carried by the carriage and which, at least under conditions obtaining during record mounting, extends from the carriage into the path of a record being mounted on the mandrel 10; in this embodiment the arm tends to extend into the path of the record mounting whenever the translating device is in neutral condition. This arm appears in the drawings as 90. It extends downwardly behind the mandrel 10 from the base of a generally upright U-shaped member 92, a little to the left of the center of this member; this member 92 in turn hangs down from the portion of the sleeve 43 within the carriage, wherein the sides 93 and 94 of the member 92 straddle the block 60, fitting rotatably about sleeve 43 between that block and the respective carriage side members 41 and 42. The side 94 of the member 92 is provided with an arcuate aperture 94' through which the pin 69 abovementioned freely extends, to avoid interference between that pin and the member 92. The front edge of the arm 90 may be elevationally concave, having the form of an arc of about the outside radius of a record R; when the translating device is in neutral condition and no record is mounted on the mandrel, the lower portion of this edge may be maintained, as by gravity, in at least substantial contact with the mandrel 10 (as seen for example in Figure 3). Obviously therefore the arm 90 will be impinged on and moved leftwardly, moving with it the carriage, by a record being mounted on the mandrel.

When the carriage has been returned to its initial or leftward position it is necessary that the arm 90 be retracted rearwardly behind the record to permit the rightward driving of the carriage for translation onto or from the record. In this embodiment of our invention the arm is retracted in response to the placing of the translating device in the preselected (e. g., recordation) condition. This is accomplished by a camming finger 96 (best seen in Figure 3) extending diagonally downwardly and rearwardly from the arm 46 approximately below the indentation 46'''. This arm 46 has been seen to be moved downwardly whenever the translating device is conditioned for recordation or reproduction; and the rear surface 96' of the finger 96 then impinges against and moves rearwardly a pin 95 extending leftwardly from the side 94 of the U-shaped member 91, this pin being seen in elevation in Figure 4 and in cross-section in Figure 3, and being just free of the finger 96 when the translating device is in neutral condition with the arm 90 hanging into contact with the mandrel (as seen in Figure 3). The position to which this pin movement retracts the arm 90 is illustrated in Figure 2, wherein the arm will be seen to be wholly out of contact with a mounted record R.

A little before the full completion of the mounting of a record the lower portion of the front

edge of the arm 90 will have been brought into contact with the flanged ejecting head 13; the lefthand side of this lower edge portion may be bevelled, as indicated at 90' in the fragmentary cross-sectional Figure 6, so that the arm will be cammed slightly rearwardly as it passes by the head 13. Figure 6 illustrates the conditions obtaining just as the end of the record itself reaches the ejecting head, but before it has moved that head leftwardly; the branch 81 of the member 80 has just reached the inclined top surface portion 82'' of the actuating device 82. With further leftward movement of the record the branch 81 will be moved partially up on the surface portion 82'' and the roller will be moved by the member 80 to the high point 65a of the detent 65, as already described; the arm 46 and finger 96 will then have been moved sufficiently to effect a partial retraction of the arm 90, which slides rearwardly along, while being pushed by, the end of the record. The inner and outer portions of the lefthand end of the record are preferably oppositely bevelled, the outer bevel being indicated as B (and the elevational position of this bevel being indicated by the area between the two dash-dot arcs B' and B'' in Figure 3); and the partial retraction of arm 90 just mentioned will preferably be sufficient to bring all portions of the forward edge of the arm 90 at least as far back as the inner arc B'. The further or final leftward movement of the record will occasion no further leftward movement of the arm 90 or carriage; but in the very first portion of this final movement the roller 56 will pass over the high point 65a of the detent 65 and will be forced rearwardly by the detent into recordation position, further moving downwardly the arm 46 and finger 96 and completing the retraction of the arm 90, as well as fully establishing the recordation condition of the translating device. In view of the relative side-to-side positioning of the arm 90 and the recording stylus 35, that stylus will be lowered onto the record surface to the right of the bevel B; a minute terminal portion of the leftward record movement may occur after the lowering of the stylus, but this will affect only a minute unused marginal portion of the record surface.

When the translating device has been subjected to constraint to assume its preselected condition, it is desirable that this constraint be removed, to permit a reconditioning of the device under those occasional circumstances when the preselected condition is not the desired one. We remove the constraint as the constraining means completes its operation; and in this embodiment of the invention we remove the constraint by means of the arm 90, which we cause to effect a movement of the actuating device or cam plate 82 out of its normal vertical position. To permit this movement the cam plate 82 is pivotally secured to the base plate 1 for rearward rocking; as seen for example in Figure 6, it is formed with two hubs 83 at its bottom extremities, these hubs embracing two spaced-apart lugs 84 extending upwardly from the base plate. A pin 85 passes through these hubs and lugs; and a torsion spring 86, surrounding the pin between the lugs, biases the cam plate 82 to forward movement. This movement is limited, and the normal vertical position of the cam plate established, by an ear 87 extending forwardly from one of the hubs 83 (best seen in Figure 2) and adapted to impinge on the base plate 1. The arm 90 is formed with

a rearward extension 91 near its bottom; and as the retraction of the arm 90 is being completed, this extension 91 impinges against and rocks rearwardly the cam plate 82, for example to the position illustrated in Figures 2 and 7. This releases the branch 81 of the member 80 from its raised position, permitting the member 80 again to obey its bias and permitting the movement of the roller 56 attendant on any reconditioning of the translating device. With a reconditioning for reproduction the member 80 and branch 81 will be moved downwardly below their normal (Figure 3) positions; but the displacement of the cam plate 82 by the extension 91 is sufficient to render the extremity of the branch 81 still free of the cam plate. With a reconditioning to neutral, the arm 90 is of course released and permitted to execute a forward movement; but this movement is slight, in view of the impingement of the arm on and its subsequent contact with the now-mounted record, and the cam plate 82 will still be maintained rearwardly away from the branch 81.

It will be observed that with a record mounted on the mandrel the arm 90 is permitted to contact the record surface whenever the translating device is in neutral condition. This contact is rendered harmless, however, by the inclusion in the record-contacting portion of the arm (e. g., at the top of its forward edge) of a smooth ball 89 which rides along the record surface without damage to the latter.

It may at times be desired to return the carriage leftwardly while a record remains mounted on the mandrel (the disengagement of the feed nut from the feed screw being effected for example by adjusting the translating device to neutral condition). In order to permit the full return of the carriage, without the extension 91 of the arm 90 being blocked by the cam plate 82, that plate is provided in its righthand end portion with an extension 88 running diagonally rightwardly and rearwardly from the main portion of the plate. When the carriage is returned under the mentioned conditions the extension 91 will first contact this extension 88 and will then cam it, and with it the whole cam plate 82, to rock rearwardly to the displaced position already described.

In Figures 8, 9 and 10 we have illustrated an alternative or second embodiment of our invention, in a phonograph otherwise similar to that of earlier figures and whose description is therefore not repeated. In this embodiment we employ, for returning the carriage 40, an arm 190 extending downwardly from the base of a U-shaped member 192—this arm and member being generally similar and similarly disposed to the arm 90 and member 82 of the first embodiment. From arm 190 there is omitted, however, any rearward extension such as 91; and the member 192 may be formed with a slot 192a cut downwardly into its base, and may be provided with a pin 192b passing horizontally across the slot 192a to support an element hereinafter described. In spite of these differences it will be understood that a carriage-returning movement of the arm 190 is effected by a record being mounted on the mandrel, as was disclosed in connection with the arm 90 of the first embodiment.

In this second embodiment we provide a biased member 180 which, like the member 80 of the first embodiment, is included in the moving system for effecting translational movement of the record and translating device and is subjected to

movement against its bias by the substantial completion of the mounting of a record on the mandrel. We employ this movement of this member, which in this embodiment occurs concomitantly with (rather than directly in response to) the completion of carriage return, both to retract the arm 190 rearwardly and to subject the translating device to constraint to assume its pre-selected condition.

The member 180 is a collar surrounding the mandrel sleeve 12 at the left of the ejecting head 13, secured to that head, provided with an annular groove 181, and of course biased rightwardly by the head-biasing spring S. The groove 181 is engaged by a pin 201 extending upwardly from the forward extremity of an arm 202; the arm 202 is formed forwardly from a plate 203 secured, as by screws 204 passing through elongated slots 205 in that plate, for limited side-to-side sliding movement on top of the rear base plate portion 1'. At a forward intermediate position on top of the plate 203 there is secured a small block 207 whose lefthand end portion is an inclined cam surface 206. It will be understood that the plate 203, with block 207 and cam surface 206, will occupy a rightward position (as illustrated in Figure 9) when no record is on the mandrel, but will be slid to a leftward position by the leftward movement of the head 13 occasioned by the completion of the mounting of a record on the mandrel.

From side to side above the base plate portion 1', for example passing above the rear portion of the plate 203, there is mounted a rotatable but otherwise stationary horizontal rod 208; at its lefthand extremity this rod may for example be rotatably mounted in the standard 7. A side-to-side extending bail 210 is secured to the rod 208 in a position spaced diagonally above and forward of that rod, a means for this securing at the lefthand bail extremity being shown as the arm 209; a clockwise rocking of the rod 208 (as viewed in Figure 8) will be understood to cause a rearward and upward displacement of the bail 210. The rod 208 is so rocked by a finger 211 secured to and extending forwardly from the rod, this finger being just to the left of the cam surface 206 when no record is on the mandrel, but being cammed upwardly by that surface, to rest finally on top of block 207, as record mounting is completed. Thus the bail 210, maintained by gravity in a relatively forward position (as illustrated in Figure 8) when no record is on the mandrel, is displaced to a more rearward position when a record is fully mounted on the mandrel.

The bail 210, when displaced rearwardly, retracts the arm 190 by virtue of a finger 191 formed from the righthand side 194 of the member 192, and curving therefrom first rearwardly and then downwardly to a position just above and behind the bail. Since the bail will remain rearwardly displaced so long as the record remains mounted on the mandrel, the arm 190 will remain retracted, without dependence on the condition to which the translating device may be adjusted, so long as the record remains mounted.

In this embodiment the means for constraining the translating device to assume its pre-selected condition, again operating on the roller 56, is a flat member 280, secured to a collar 274 rotatably surrounding a cross rod 272 between the carriage side members 41 and 42 and thereby pivoted on that rod; these elements may in gen-

eral be similar and similarly disposed to the respective elements 80, 74 and 72 of the first embodiment, excepting that rod 272 is preferably a little more forwardly positioned than cross rod 72, and that the member 280 has no downward branch such as 81. Like member 80, the member 280 extends both slightly rearwardly, and a material distance forwardly and upwardly, from its pivoting; and it may be biased by spring 275 to maintain its forward end portion just below roller 56 when the translating device is in neutral condition. At an intermediate point in the member 280 a lug 281 may be folded rightwardly from its front edge.

The arm 190, in its rearward retraction by the bail 210, actuates the constraining means through the medium of an actuating device 182. The device 182 may be an arm whose forward extremity is secured to a collar 192c rotatably surrounding the pin 192b in the slot 192a above-mentioned, which extends diagonally rearwardly and upwardly just to the right of the member 280 and above the lug 281, and whose lower edge is provided with a shoulder 183 disposed just forward of the lug 281 when the translating device is in neutral condition and no record is on the mandrel (as illustrated in Figure 8). When the arm 190 is retracted rearwardly the actuating arm 182 is moved substantially longitudinally of itself, and the shoulder 183 will move the lug 281 rearwardly, rocking the member 280 clockwise (as viewed in Figure 8) to carry the roller 56 rearwardly toward its recordation position. In this embodiment this actuation may if desired carry the roller 56 substantially or fully into its recordation position, with little or no reliance on the action of the detent 65.

For releasing the constraint of the translating device when the member 280 has sufficiently moved the roller 56, the actuating arm 182 is then moved upwardly to disengage its shoulder 183 from the lug 281—i. e., to disengage the latch which that shoulder and that lug form.

The latch disengagement, or upward movement of the actuating arm 182, is effected by a cam surface 184 provided on the bottom of the arm 182 near its rear extremity, and a roller 187 carried on a pin 186 extending rightwardly from the lefthand carriage side member 41. The rear extremity of the cam surface 184 is adjacent the roller 187 when the translating device is in neutral condition and no record is mounted on the mandrel (as illustrated in Figure 8), the action of gravity in maintaining this condition being augmented if desired by a spring 188 tensioned between a rear portion of the arm 182 and a lower rear portion of the carriage. But as the arm 190 is retracted and the actuating arm 182 moved generally longitudinally, the cam surface 184 rides up on the roller 187, the degree of camming of surface 184 being apportioned to cause the disengagement of shoulder 183 from lug 281 at the appropriate time. This disengagement will occur before the record is fully mounted or the arm 190 fully retracted; and as these actions are completed the actuating arm 182 will move further rearwardly to bring its lower surface 185, forward of the cam surface 184, to rest on the roller 187. This renders the latch formed by shoulder 183 and lug 281 incapable of re-engagement so long as the record remains mounted.

Upon ejection of the record from the mandrel the bail 210 will of course be restored downwardly and forwardly by gravity, and the arm 190 will swing forwardly toward the mandrel;

the record, not ordinarily being fully removed from the mandrel by the ejection, may be then impinged on by that arm. To render this impingement harmless to the record the record-contacting portion of the arm may be a small pad 189 of felt or the like; this may for example occupy a position analogous to that of the ball 89 of the earlier embodiment—it being understood that, in view of the similarity of their purposes, either the pad 189 or the ball 89 may be employed in either embodiment.

As to the broader aspects of the invention it will be understood that the translating device need not be adjustable to more than two conditions, for example a predetermined translating condition and some other condition such as neutral; and that the condition in which it is automatically placed as above described may be preselected as any one of its conditions. Generally it will be understood that the broader aspects of the invention are not intended to be limited by details of the illustrated embodiments, which obviously may be widely varied without departure from the true spirit and scope of the invention. In many of the appended claims we undertake to express that scope broadly, subject however to such proper limitations as the state of the art may impose.

We claim:

1. In a phonograph having a record-supporting mandrel and a record-cooperating translating device: the combination of a carriage for said device drivable in the direction of record removal from said mandrel and returnable in the direction of record mounting on said mandrel; means, carried by the carriage and extending therefrom into the path of a record being mounted on the mandrel, for effecting a return movement of said carriage incident to record mounting; and means, rendered effective by the record when the mounting thereof is at least substantially completed, for retracting said last-recited means out of said path.

2. In a phonograph having a record-supporting mandrel: and a record-cooperating translating device: the combination of control means for selectively placing said device in at least one translating condition and a neutral condition; a carriage for said device drivable in the direction of record removal from said mandrel and returnable in the direction of record mounting on said mandrel when said translating device is in neutral condition; and an arm, carried by the carriage, and controlled by said control means to extend into the path of a record being mounted on said mandrel when said translating device is in neutral condition and to be retracted out of said path when said device is in said translating condition.

3. In a phonograph having a frame, a record-supporting mandrel and a record-cooperating translating device: the combination of a carriage for said device drivable in the direction of record removal from said mandrel and returnable in the direction of record mounting on said mandrel; means, carried by the carriage and extending therefrom into the path of a record being mounted on said mandrel, for effecting a return movement of said carriage incident to record mounting; means carried by the carriage and arranged for movement relative thereto to retract said last-recited means out of said path; and means, mounted on the frame and extending into the path traversed by said retracting means

when said carriage is returned, for effecting said movement of said retracting means.

4. In a phonograph having a record-supporting mandrel and a record-cooperating translating device: the combination of a carriage for said device drivable in the direction of record removal from said mandrel and returnable in the direction of record mounting on said mandrel; means, carried by the carriage and extending therefrom into the path of a record being mounted on the mandrel, for effecting a return movement of the carriage incident to record mounting; a biased ejecting head in said mandrel, subjected to movement against its bias by the mounting of a record on the mandrel; and means, operated by said head in said movement thereof, for retracting said movement-effecting means from said path.

5. In a phonograph having a record-supporting mandrel: the combination of a record-cooperating translating device selectively placeable in a predetermined translating condition and in at least one other condition; a carriage for said device drivable in the direction of record removal from said mandrel and returnable in the direction of record mounting on said mandrel; means, carried by the carriage and extending therefrom into the path of a record being mounted on the mandrel, for effecting a return movement of said carriage incident to record mounting; and means, rendered effective by the record when the mounting thereof is at least substantially completed, for retracting said last-recited means out of said path and placing said translating device in a preselected one of its conditions.

6. In a phonograph, the combination of a record-cooperating translating device selectively placeable in a predetermined translating condition and in at least one other condition; a moving system for effecting translational movement of said device and a record, comprising a rotatable record-supporting mandrel, a carriage for said device, and means for rotating said mandrel and driving said carriage therealong; a biased ejecting head in said mandrel, subjected to movement against its bias by the mounting of a record on the mandrel; and means, operatively interconnecting said head with said translating device, and rendered effective by said head in said movement thereof, for placing said translating device in a preselected condition.

7. In a phonograph having a record support and a carriage drivable adjacent thereto: the combination of a record-cooperating translating device carried by the carriage and selectively placeable in a predetermined translating condition and in at least one other condition; means, operated by a record in the mounting thereof on said support, for constraining said device to assume a preselected one of its conditions; a movable actuating device included in said constraining means and biased to render the same effective; and means, operated as said constraining means completes its operation, for moving said actuating device to render said constraining means ineffective.

8. In a phonograph having a record support and a carriage drivable adjacent thereto: the combination of a record-cooperating translating device carried by the carriage and selectively placeable in a predetermined translating condition and in at least one other condition; means, operated by a record in the mounting thereof on said support, for constraining said device to assume a preselected one of its conditions, said constraining means including an engageable

member for a latch biased to engage the same to render the constraining means effective; and means, operated as said constraining means completes its operation, for disengaging said latch from said member.

9. In a phonograph having a record support and a record-cooperating translating device: the combination of a carriage for said device drivable and returnable in a path adjacent said support; means, movably connected with the carriage and arranged to extend into a position to be operatively engaged by a record being mounted on said support, for effecting a return movement of the carriage incident to record mounting; and means, connected with said last-recited means and controlled by the carriage in accordance with its position in its path, for retracting said last-recited means out of said position.

10. In a phonograph conditionable for recodation, having a record support and a translating device operable to record on the supported record: the combination of a carriage for said device drivable and returnable in a path adjacent said support; means, movably connected with the carriage and arranged to extend into a position to be operatively engaged by a record being mounted on the support, for effecting a return movement of the carriage incident to record mounting; control means connected with the translating device and arranged for operation to place the phonograph in condition for recodation; and means, connected with said control means for operation concomitantly with said control means operation, for retracting said return-movement-effecting means out of said position.

11. In a phonograph having a record support, a record-cooperating translating device, and driving means: the combination of a carriage for said device drivable and returnable in a path adjacent said support; means, movably connected with the carriage and arranged to extend into a position to be operatively engaged by a record being mounted on said support, for effecting a return movement of the carriage incident to record mounting; control means arranged for operation to place said driving means in effective relationship to said carriage; and means, connected with said control means for operation concomitantly with said control means operation, for retracting said return-movement-effecting means out of said position.

12. In a phonograph having a record support and a record-cooperating translating device: the combination of a carriage for said device drivable and returnable in a path adjacent said support; means, movably connected with the carriage and arranged to extend into a position to be operatively engaged by a record being mounted on said support, for effecting a return movement of the carriage incident to record mounting; and means, rendered effective by the record when the mounting thereof is at least substantially completed, for retracting said last-recited means out of said position.

13. In a phonograph having a record support and a record-cooperating translating device: the combination of control means for selectively placing said device in at least one translating condition and a neutral condition; a carriage for said device drivable in a path adjacent said support and returnable in said path in the direction of record mounting on said support; and an arm, carried by the carriage, and controlled by said control means to extend into the path of a record being mounted on said support when said translating device is in neutral condition and to be retracted out of said record path when said device is in said translating condition.

14. In a phonograph having a record support, a record-cooperating translating device, and driving means: the combination of a carriage for said device engageable with said driving means to be driven in a path adjacent said support, and returnable in said path in the direction of record mounting on said support when disengaged from said driving means; control means for engaging and disengaging said carriage with and from said driving means; and an arm, carried by the carriage, and controlled by said control means to extend into the path of a record being mounted on said support when said carriage is disengaged from said driving means, and to be retracted out of said record path when said carriage is engaged with said driving means.

15. In a phonograph having a frame, a record support, and a record-cooperating translating device: the combination of a carriage for said device drivable and returnable in a path adjacent said support; means, movably connected with the carriage and arranged to extend into a position to be operatively engaged by a record being mounted on said support, for effecting a return movement of the carriage incident to record mounting; means carried by the carriage and arranged for movement relative thereto to retract said last-recited means out of said position; and means, mounted on the frame and extending into the path traversed by said retracting means when said carriage is returned, for effecting said movement of said retracting means.

16. In a phonograph having a record support: the combination of a record-cooperating translating device selectively placeable at least in one translating condition and in another condition; a carriage for said device drivable and returnable in a path adjacent said support; means, movably connected with the carriage and arranged to extend into a position to be operatively engaged by a record being mounted on said support, for effecting a return movement of said carriage incident to record mounting; and means, rendered effective by the record when the mounting thereof is at least substantially completed, for retracting said last-recited means out of said position and placing said translating device in said translating condition.

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