June 16, 1931. E. R. TAYLOR 1,810,062

SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

Filed Jan. 7, 1928 6 Sheets-Sheet 1

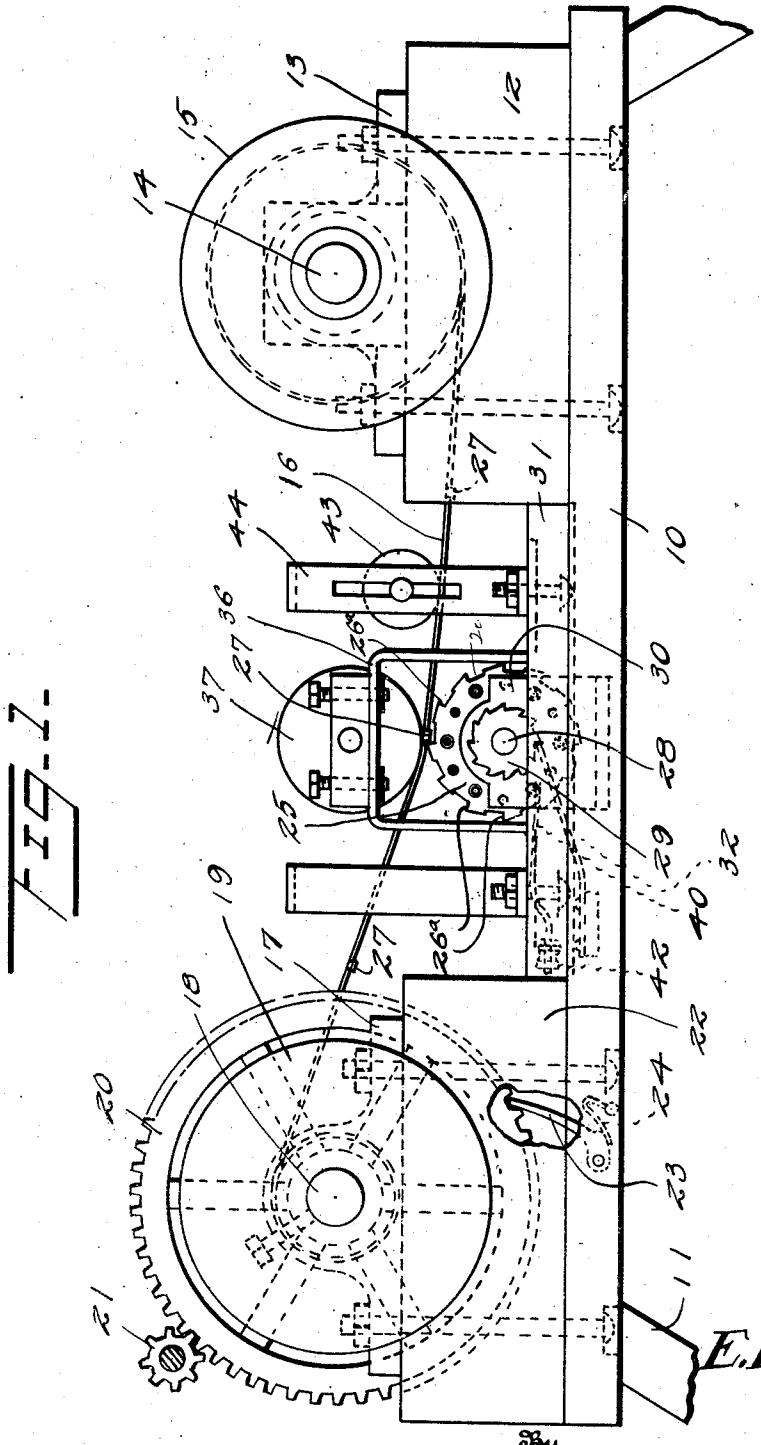


Fig. 1.

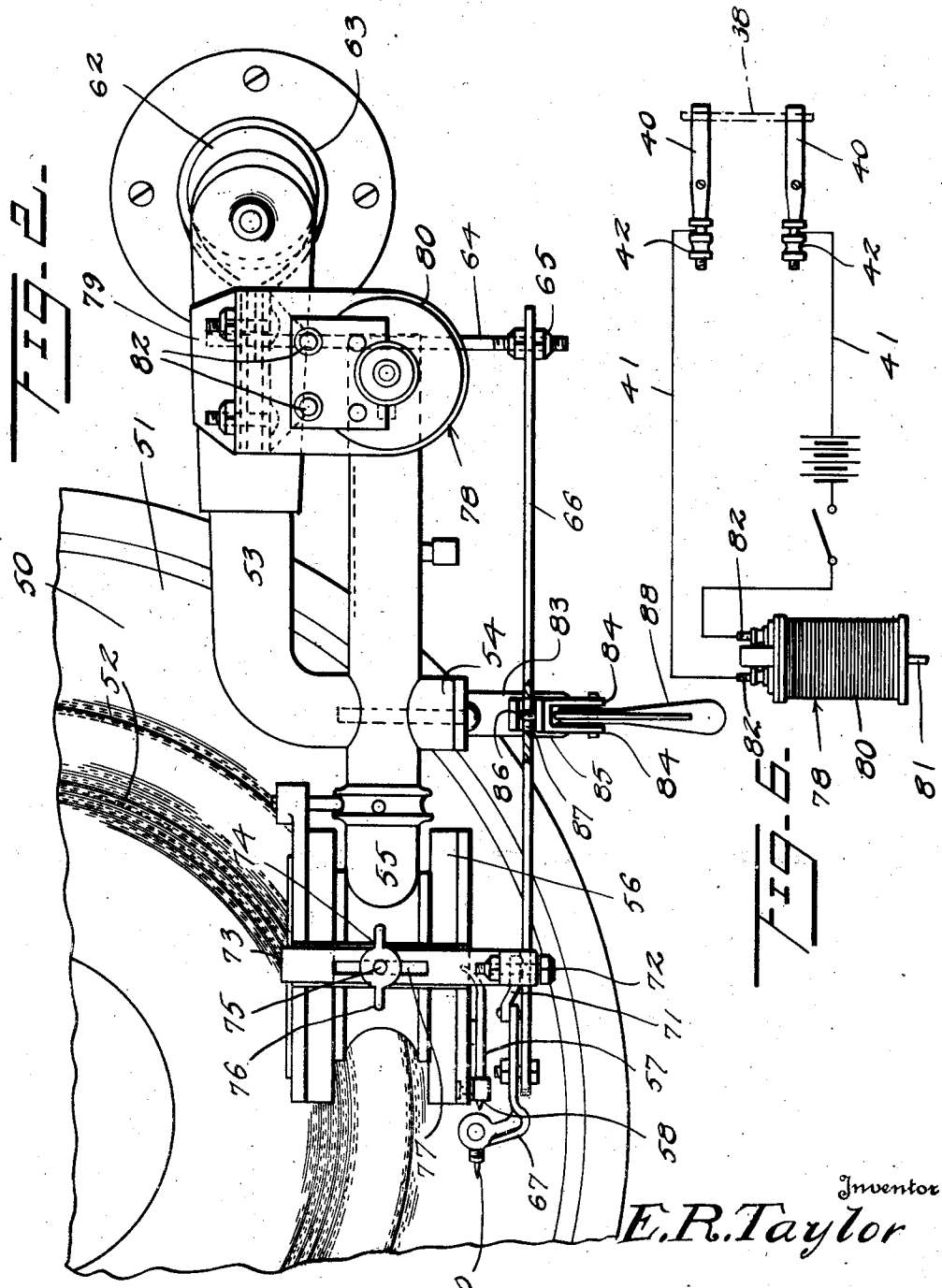
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SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

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SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

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FIG. 3.

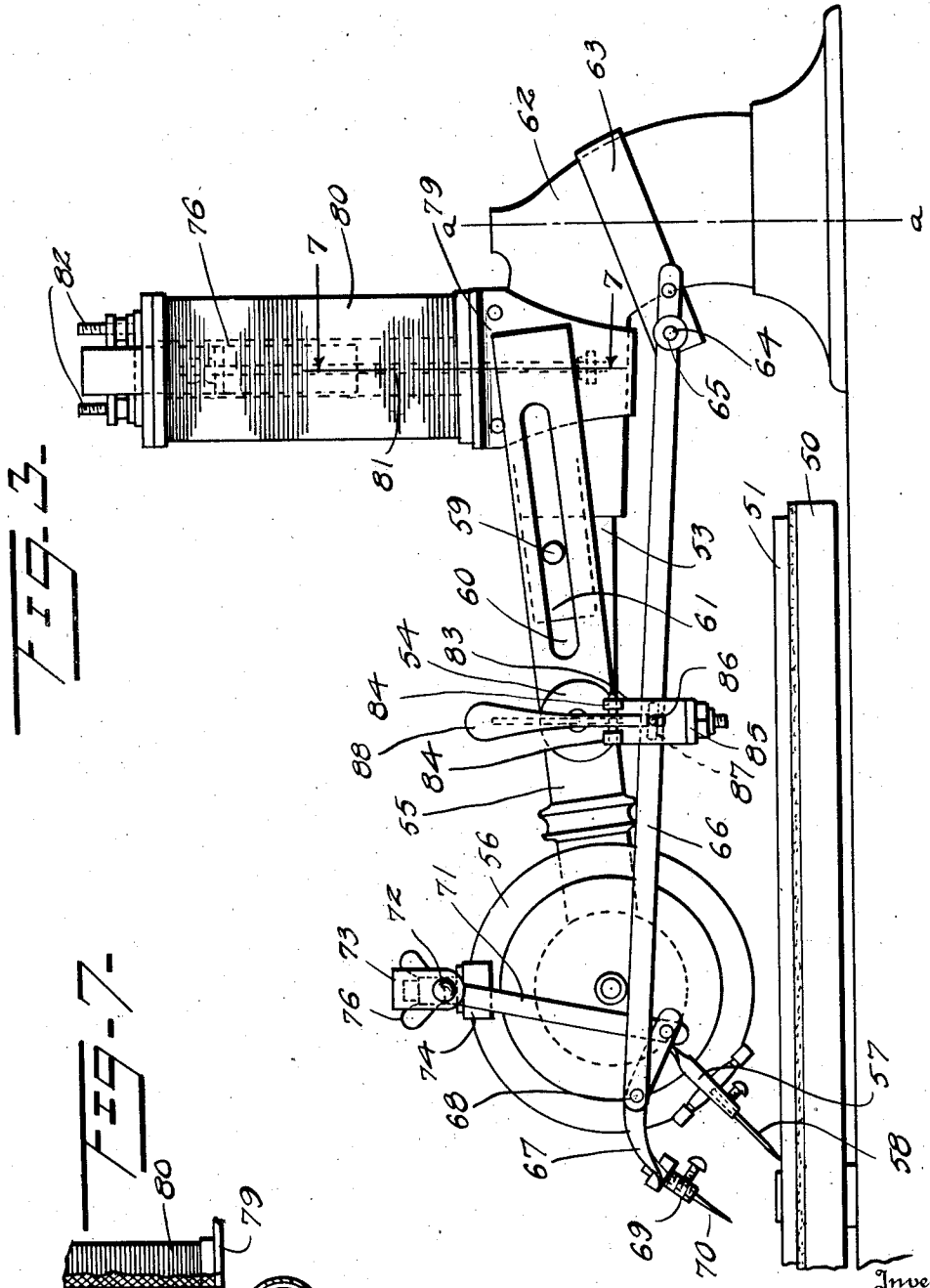
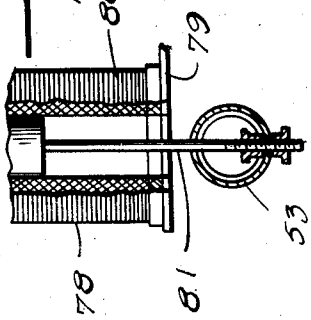


FIG. 7.



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SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

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Fig. 4.

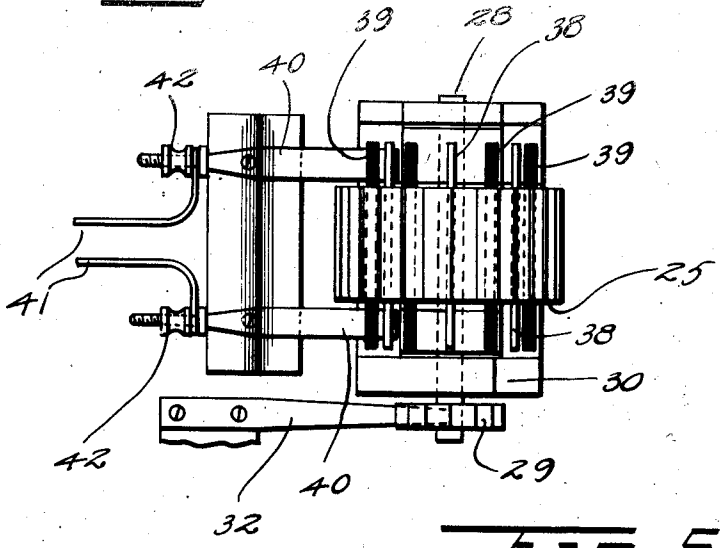
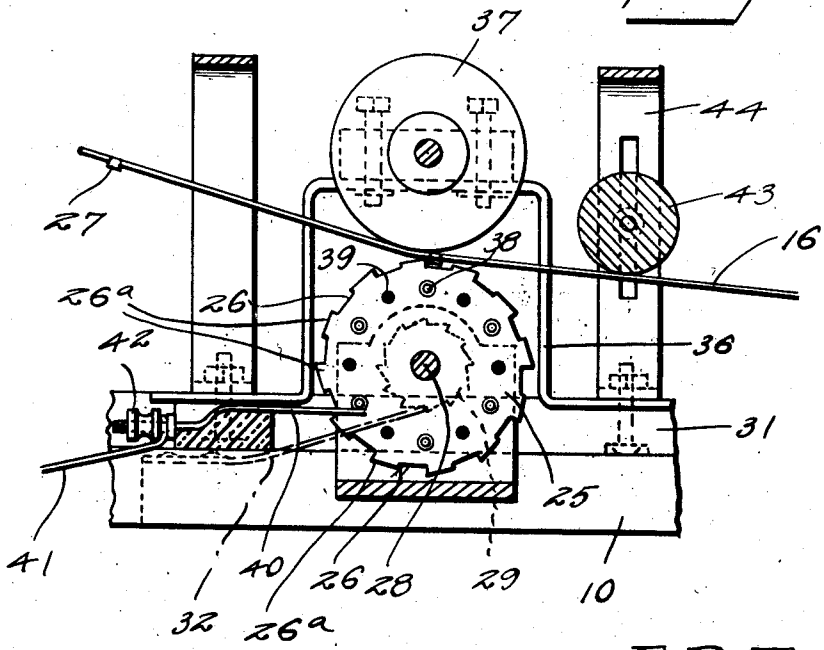


Fig. 5.



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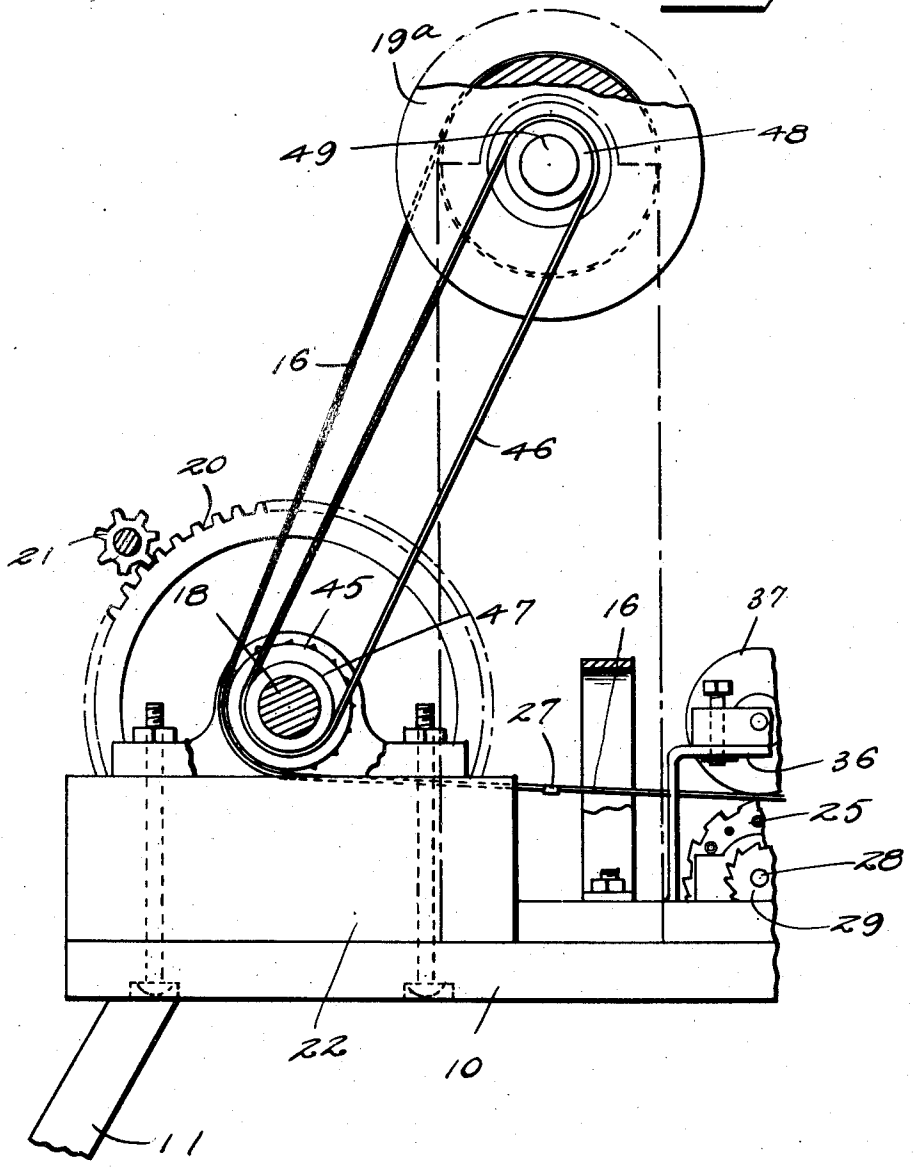
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SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

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Fig. 5.



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SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

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Fig. 9.

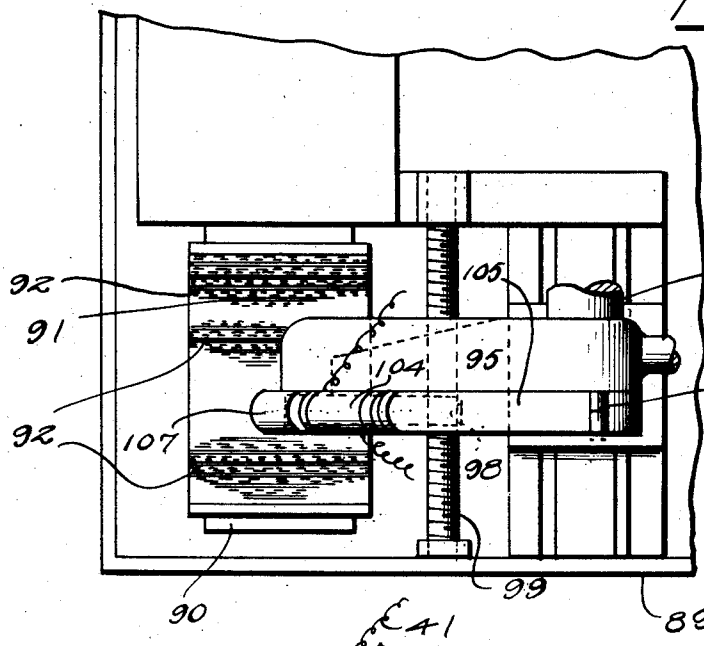
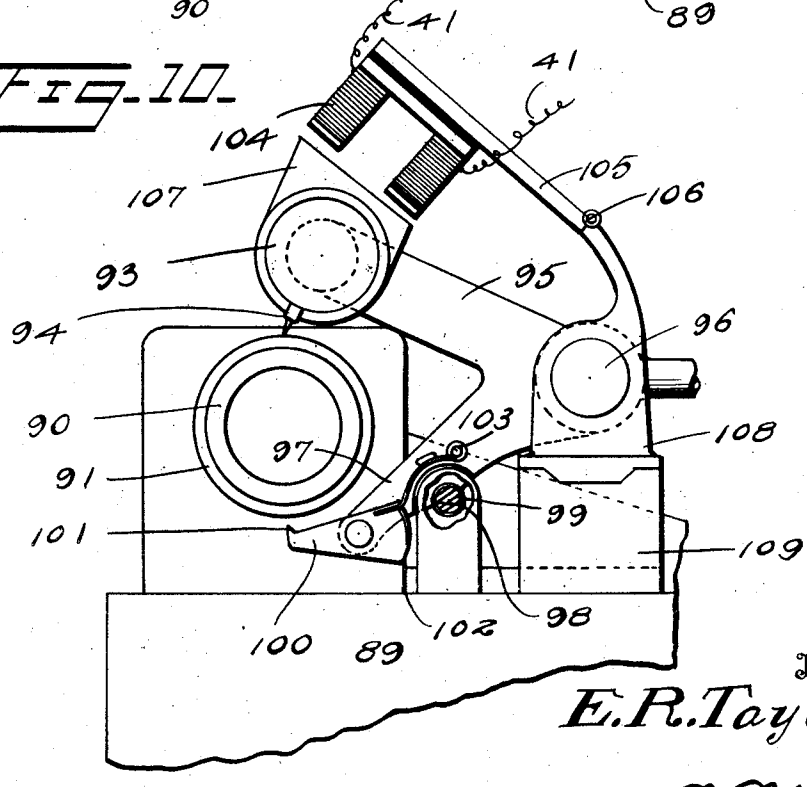


Fig. 10.



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UNITED STATES PATENT OFFICE

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SYNCHRONIZING MECHANISM FOR COMBINED TALKING AND MOVING PICTURE MACHINES

Application filed January 7, 1928. Serial No. 245,194.

This invention relates to devices for synchronizing a phonograph with moving picture projection, and particularly to devices of this character wherein ordinary phonographic records are used in connection with the usual moving picture projecting machines.

The general object of the present invention is to provide means whereby a phonograph may be started and stopped in synchronism with the pictures displayed upon the screen.

A further object of this invention is to provide a mechanism of this character wherein electro-magnetic means is used for lifting a phonographic sound box and stylus out of coactive relation to a record or lowering it into coaction with the record. The electro-magnetic means being energized or de-energized in synchronism with the moving picture film, and provide for this purpose a strip preferably separate from the film but having a length the same as the film and operating at the same speed, this strip having thereon studs which act to break a circuit or make a circuit between the source of energy and the electro-magnetic means.

A still further object is to provide means for holding the sound box and its associated parts in proper position with relation to the phonographic record so that as soon as the stylus and the sound box are lifted from the record, means will be provided for holding the sound box and stylus in the same approximate relation to the sound record that they were when they were lifted so that when the sound box and stylus are depressed, the stylus will start sound transmission approximately at the point where it left off.

Another object is to provide devices for this purpose which will permit the records to be readily changed at any time.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of a phonograph controlling mechanism;

Figure 2 is a fragmentary top plan view of a phonograph and record and showing the means for raising the tone arm and sound box;

Figure 3 is a side elevation of the structure shown in Figure 2;

Figure 4 is a top plan view of the controlling roller and its contacts;

Figure 5 is a sectional view through the roller and adjacent parts;

Figure 6 is a diagrammatic view of the circuit for controlling the phonograph;

Figure 7 is a fragmentary section of the solenoid and a portion of the tone arm;

Figure 8 is a view partly in section through a modified form of the controlling means shown in Figure 1;

Figure 9 is a top plan view of a cylinder record phonograph;

Figure 10 is a side elevation partly in section showing the means for raising or lowering the tone arm of a cylinder record phonograph.

Referring to Figure 1, which illustrates the part of the mechanism which is used in connection with the moving picture projector, 10 designates a supporting base which is supported on adjustable legs 11 and which carries upon it the supports 12 for the bearing 13, which in turn supports the shaft 14 of a reel 15. Upon this reel a tape 16 is wound, as will appear more fully hereinafter.

Disposed in the bearings 17 is a shaft 18 which carries upon it the take-up reel 19 over which the tape 16 is wound. This shaft 18 carries upon it the gear wheel 20, which in turn is driven by a pinion 21 which is carried on any shaft of the projecting machine, which shaft has a constant rotation as the picture is being projected. The bearing 17 is mounted upon the supporting block 22, which in turn is bolted or otherwise attached to the table or base 10. A pawl 23 bears against the teeth of the gear wheel 20 and acts to prevent reverse movement of this gear wheel, this pawl being urged by a spring 24 into engagement with the gear wheel.

Disposed between the two reels 15 and 19 is a roller 25 (see Figures 4 and 5) having a width equal to the width of the tape 16 and this roller upon its face has the alternate indentations and projections, the indentations

or recesses being designated 26, and over the face of this roller the tape 16 passes. This tape 16 carries upon it at intervals the studs 27 and when one of these studs in the course of its travel reaches the roller 25 it will engage against a tooth 26*a* and will rotate the roller 25 a predetermined distance as, for instance, one-twelfth of the circumference of the roller. The projection or stud then escapes from its engagement with the toothed face of roller 25 and the roller does not move again until another stud 27 comes in contact with the toothed faces and rotates the roller through another one-twelfth of a revolution. This roller 25 is mounted upon a shaft or axis 28 which carrier upon it the ratchet wheel 29. This shaft is mounted in bearings 30, in turn carried by a supporting block or frame 31 attached to the base 10 in any suitable manner.

Coacting with the ratchet wheel 29 is the spring pawl 32 which prevents any return movement of the roller 25. Mounted upon supporting brackets 36 is a roller 37 which bears upon the tape 16 and holds this tape down into contact with the roller 25. Extending transversely through the roller 25 are alternate conducting and non-conducting rods, designated 38 and 39, the rods 38 being conducting rods and the rods 39 being non-conducting rods. These project out laterally beyond the roller 25, as shown in Figure 4, and projecting into the path of movement of the rods are the resilient contact members 40 which are connected by the wires 41 to the electro-magnetic means for controlling the sound box of the phonograph, as will hereafter more fully appear.

Each of these terminals 40 is in the form of a light leaf spring and carries upon it the binding post 42 whereby the wires may be connected. It will thus be seen that when a conducting rod 39 comes against these springs or terminals that the two terminals will be electrically connected to each other and the circuit closed through the wires 41 at this point, whereas when a non-conducting rod comes against these terminals the circuit will be broken or interrupted at this point.

In addition to the roller 37, I preferably provide a roller 43 mounted in guides 44 for the purpose of holding the tape 16 down into proper engagement with the roller 25. If desired, another roller 43 of the same character mounted in a frame 44 may be disposed in advance of the roller 37 to guide the tape onto the reel 19.

It will be seen that with this mechanism, as the take-up reel 19 is operated in consonance with the operation of a moving picture machine, the tape 16 will be wound up upon the reel 19 at the same speed as the film of the moving picture and that when a stud 27 comes in contact with the roller 25 it will shift this roller one step and if, for instance, the electrical connection has heretofore been made across the terminals 29, the shifting of the roller one step will break this electrical connection and, on the other hand, the next stud 27 to come in contact with the roller will shift the roller so as to close the electrical connection across the terminals 29. Thus the circuit formed by wires 41 will be alternately opened and closed by the studs 27. Thus after a speech has been made or other sound produced which relates to the action on the screen, then this sound will be cut off if, for instance, the scene changes or no words or other sound are desired to be reproduced, but just as soon as another stud engages the roller the phonograph or other talking machine will be again started. Thus it will be seen that the talking machine or other phonograph is alternately stopped and started in conformity with the requirements of the moving picture film.

In Figure 1, I have illustrated the reel as being mounted upon the shaft 18, but under some circumstances it is not desirable to mount the reel in this manner, and in Figure 8 I have illustrated the reel 19*a* as being disposed at a height above the gear wheel 20 and I have shown the shaft 18 as carrying upon it the toothed wheel 45 over which the tape 16 passes, this tape passing over this toothed wheel and then up and around the winding reel 19*a*. This winding reel is driven by a belt 46 which passes around a belt wheel 47 on the shaft 18 and a belt wheel 48 on the shaft 49 of reel 19*a*. The tape 16 may be wound, therefore, either upon a reel mounted upon the shaft 18 or upon a reel mounted upon the shaft 49. The reel 19 mounted upon the shaft 18 turns at the same rate as the gear wheel 20, but owing to the increasing radius as the tape is wound on and owing to the irregular outline caused by the studs 27, the tape will not always move at the same rate proportionately to that of the picture film but the rate of winding will increase more or less constantly. If it is deemed desirable or necessary to have the rates of the film and the tape exactly proportional at all times, the tape can be run over the sprocket wheel 45 and then wound up on the reel 19*a* which, being turned by the smooth belt 46, is always exerting a tension on but never positively pulling tape 16.

I will now describe the connections to the sound reproducing mechanism which is controlled by the mechanism shown in Figures 1 to 8 and which has just been described. It will be understood that any desired phonographic mechanism may be used and that by the term "phonograph" I refer to any sound reproducing machine. In Figure 2, I have illustrated the use of a flat rotatable turntable, and in Figure 10 I have illustrated the use of a record cylinder.

Referring now to Figure 2, 50 designates the turntable of an ordinary disk phonograph and 51 the record thereon. This record is formed with a plurality of concentric grooves 52 disposed in spaced relation to each other and separating each speech, as it may be termed, or each selection of music from the next succeeding speech or selection. Coacting with the turntable and record and forming part of the phonograph is the tone arm 53. This tone arm rotates on an axis *a—a* (see Figure 3) and in practically all respects is the same as the ordinary tone arm, except that it is laterally extended, as at 54, and passes through a tubular arm 55. This tubular arm carries upon it the sound box 56, which is of an ordinary character, this sound box having the usual stylus arm 57 and the usual stylus 58. The tubular arm 55 into which the tone arm opens is pivoted or oscillatably mounted on the lateral extension 54 of the tone arm 53 and is extended rearward beyond its junction with the tone arm. The tubular arm 55 is balanced by an adjustable counter-weight 61 mounted upon a pin 59 and operating within a slot 60.

Mounted upon the base 62 of the tone arm is a clamp 63 and this clamp carries upon it the transversely extending pin or bolt 64 which at its end is screw-threaded for engagement by the two nuts 65. Mounted upon this bolt 64 as upon a pivot is a lever 66 which extends across the face of the sound box above the lower portion of the stylus-carrying arm. The extremity of this lever 66 carries upon it the short lever 67 pivoted upon the lever 66 at 68. One arm of the lever 67 is downwardly and forwardly turned and carries upon it the screw-threaded member 69, which in turn carries upon it the stylus 70 held in place by a set screw or other suitable means. The opposite end of this lever 67 is pivotally connected to a link 71. This link at its upper end is pivotally connected by a bolt 72 to a slidable bar 73 mounted upon a supporting bar 74. This supporting bar is clamped or otherwise engaged with the sound box 56 and the slide 73 is held in adjusted position upon the supporting bar 74 by means of the adjusting bolt 75 and the wing nut 76, the bolt passing through a slot 77 in the slide. Any suitable clamping means may be provided for holding this fixed support for the link 71 upon the sound box.

The rear end of the arm 55 is raised or depressed by means of an electro-magnet. I have shown for this purpose a solenoid coil 78 mounted upon a base 79 which is clamped upon the tone arm and projects out laterally therefrom so that the axis of the coil 78 is immediately above the center line of the arm 55. The core of the solenoid is designated 80 and a supporting rod 81 extends vertically through this core and at its lower end is operatively connected to the arm 55. The upper end of the supporting rod 81 has a universal joint connection with the upper end of the core. The upper end of the coil 80 has the binding screws 82 with which the wires 41 are designed to be engaged. One of these wires is connected to a battery or any other suitable source of current and preferably a switch is also disposed in the circuit whereby the circuit may be manually opened or closed.

Adapted to operatively connect the arm 55 to the lever 66 is a link 83 pivotally engaged with ears 84 on an L 85 which is attached to the arm 55. The link 83 is provided with a latch pin 86 which extends through a slot 87, this latch pin being urged inward by a spring and having a thumb piece 88 whereby the latch may be withdrawn.

The support for rod 66 is the bolt 64, and it will be obvious that when the solenoid coil 80 is energized the core 78 will be drawn downward, thus pressing down on the rear end of the tubular pivoted arm 55 and lifting up on the sound box to carry the stylus thereof out of engagement with the record grooves on the record 51. As the pivoted portion 55 of the tone arm, the sound box lifts up through the link 71 upon the lever 67, depressing the positioning stylus 70 into the last record groove of a series, whereupon it will immediately run off into the next adjacent groove 52 and, so long as the sound box is raised and out of operation, this needle 70 will traverse the groove 52 and the sound box will thus remain, while it is raised, always in the same relative position to the central axis of the turntable but with the sound reproducing stylus 58 disposed immediately above the first sound record track or groove of the next adjacent band or series of grooves, this being for the reason that, as illustrated in Figure 2, the positioning stylus 70 and the sound reproducing stylus 58 are disposed slightly out of alinement or offset with relation to each other. When the coil 80 is de-energized, the weight of the sound box and of the outer end 55 of the tone arm will cause the descent of the sound box and this, through the link 71, will depress the rear end of the lever 67, causing the stylus 70 to lift from the groove 52, while the stylus 58 will enter the first record groove of the next series of sound record grooves and continue therein in the usual manner.

Thus it will be seen that whenever the circuit through the solenoid coil is broken across the contacts 40, the solenoid will be de-energized and the sound box will descend and the phonograph will produce sound. Whenever, however, the contacts 40 are connected by one of the conducting bars 38, the core of the solenoid will be forced downward, thus raising the outer end of the tone arm and the sound box and causing the stylus 70 to move into one of the grooves 52. The latch

86 may be readily disengaged from the rod 66 by pressing inward on the thumb piece 88 and then the records may be readily changed, as this allows tone arm section 55 of the sound box and the rod 66 to be raised carrying with it the reproducing needle 58 without causing the corresponding lowering of the position needle 70. Adjustments to bring the two needles or styluses 58 and 70 into proper relationship may be made by means of the wing nut 76 and by shifting the bar 66 into any one of a plurality of positions of engagement with the supporting bolt 64.

In Figures 2 and 3, I illustrate a structure particularly adapted to disk records, but in Figures 9 and 10 I illustrate a structure whereby the same principle may be applied to the control of cylindrical records. In these figures, 89 designates generally the base of a cylinder phonograph and 90 the mandrel upon which the cylindrical record 91 is mounted. This cylindrical record is formed with a plurality of grooves 92 which are exactly the same as the grooves 52 in Figure 2 and act as position grooves, and between these grooves 92 the record 91 is provided with the usual phonogram extending spirally around the record.

Coacting with the record is a sound box, designated generally 93, having a stylus 94 engageable with the record grooves, and this sound box is mounted upon a tone arm 95 extending rearward and operatively connected to a longitudinally extending tube 96 forming the axis of the tone arm which leads to a sound chamber (not shown). Illustrated as formed in one piece with the arm 95 is a controlling arm 97. This extends downward and forward and is formed on its under side with interrupted screw-threads 98 adapted to engage, when the tone arm is lowered to bring the stylus into engagement with the record, with a feed screw 99 extending parallel to the axis of the record and acting in the usual manner to carry the tone arm longitudinally along the record. This screw is operated by any suitable mechanism not forming part of the present invention and well known to all those skilled in the art.

Pivotally mounted upon the controlling arm 97 is a lever 100 which carries the position stylus 101 adapted to engage in any one of the grooves 92. This lever 100 is forced downward, that is has its butt end shifted in a direction to carry the stylus 101 into engagement with the record by means of the spring 102 which is supported by means of the pin 103. It will be seen that so long as the tone arm 95 is dropped, this phonograph will act in the usual manner, and when the tone arm 95 is raised, the stylus 94 will be carried out of engagement with the record and the stylus 101 will be carried into engagement with the grooves 92.

For the purpose of raising the tone arm 95 to thus stop, in this sense, the operation of the talking machine, I provide the electromagnet 104 which is mounted upon an arm 105 preferably hinged, as at 106, so that it may be moved out of the way, this magnet coacting with an armature 107 mounted upon the tone arm or upon the sound box. In this instance it is shown as mounted upon the sound box. This magnet 104 has its windings connected to the wires 41, and thus when a circuit is completed across the contacts 40 in the manner heretofore described, the magnet will be energized and will draw the armature 107 up and lift the reproducing stylus from the record. Simultaneously the controlling or positioning stylus 101 will be lowered and eventually as later and more particularly described will enter a groove 92, thus holding the arm from further movement. The lifting of the tone arm 95 by means of the magnet 104 lifts the arm 97 out of engagement with the screw 98 so that the tone arm is no longer fed along the record. As soon as the circuit through the wires 41 is broken in the manner heretofore described, the tone arm will drop and its stylus will come into engagement with the record groove, while the positioning stylus will pass out of engagement with the positioning groove 92.

The arm 105 which supports the magnet is preferably hinged so that it may be turned backward to permit ready changing of the record. As illustrated, the tone arm is mounted upon a supporting member or base 108 slidably mounted upon a base 109. It is obvious that these details of construction might be modified in many ways without departing from the spirit of the invention.

It will be seen that I have provided means whereby a cylinder record may be used or means whereby a disk record may be used, the playing of both of these records being controlled by a tape which is actuated or moves coincidently with the moving picture film. Preferably I use a tape in place of a film, but it is understood that a film might be used under some circumstances and the buttons or studs be placed along this film. The tape may be made of steel, cloth, fiber or other material. The studs will be attached to this tape at irregular distances, depending, of course, upon when the sound reproducing mechanism is to be used or when it is to be stopped. The positioning grooves in the disk or cylinder record will also be disposed at irregular distances. Thus, for instance, if the sentences are short, the positioning grooves will be very close together. If the sentences are long or if there is a long speech or piece of music, the positioning grooves will be relatively wide apart. The advantage of using tape instead of film to operate the contact rollers is that ordinary film can then be used in any projector which will

handle such films without any danger of the film being torn, worn or otherwise injured. There will be no humps or projections to cause breakage and delay. Inasmuch as the tape runs at a rate proportional to the film, the timing is as exact as if the studs were on the film itself. Since the tape is run at a proportional rate only, there need be only a small fraction as much tape as film used.

It is to be understood that the position needle or stylus 70 in Figure 3 or 101 in Figure 10 when lowered to the record does not drop directly into the position crease or groove 52 in Figure 2 or 92 in Figure 9 but initially engages the sound reproducing groove or phonautogram which merges into the positioning groove and by so doing carries the reproducer with its stylus past the position crease and into such position that it will engage the record groove when the sound box is again lowered. The use of the positioning grooves upon the record I deem as very important, as this holds the stylus at the point where the sound reproduction ceases for the time being and keeps the stylus at this point so that when the stylus is again lowered the sound reproduction will be picked up at exactly the place it left off at the other side of the positioning groove.

While I have illustrated certain details of construction and arrangement of parts, it is to be understood that the broad principle of my invention may be embodied in many different forms without departing from the spirit of this invention as defined in the appended claims and that many minor modifications might be made without such departure.

I claim:—

1. A mechanism for operating phonographs in synchronized relation to moving picture films including electro-magnetic means for raising the sound box of a phonograph from the sound record thereof and holding it raised while energized and disposed in a circuit with the source of energy, and a tape moving in correspondence with the movement of the film but distinct therefrom and having means thereon for causing the intermittent opening or closing of said circuit of said electro-magnetic means.

2. The combination with a moving picture projector using a moving picture film, of a reel operated by the projector, a tape distinct and separate from a moving picture film and adapted to be wound upon said reel and moving proportionately to the movement of the film, a phonograph including a sound box and a coacting stylus, means for alternately raising or lowering the stylus from the phonographic record, and means carried by said tape at predetermined intervals actuating said controlling means.

3. In mechanism of the character described, a moving picture projector using a picture film, a reel operated by the moving picture projector, a phonograph including a sound box, a stylus and a phonographic record, electro-magnetic means adapted when energized to lift the stylus from the record and when deenergized to permit the descent of stylus onto the record, and a tape wound up upon said reel and moving proportionately to the movement of the motion picture film, said tape having disposed at intervals thereon means for alternately closing or opening a circuit through the electro-magnetic means.

4. Mechanism of the character described including a moving picture projector using a motion picture film, a phonograph having a tone arm, a sound box and a stylus and having a rotatable record with which the stylus normally engages, an electro-magnet associated with the tone arm and adapted when energized to lift the sound box and its stylus away from the record and when de-energized to permit the sound box and stylus to descend onto the record, said electro-magnet including a coil in circuit with a source of current and two spaced terminals, a reel operated by the projector, a tape mounted upon the reel and moving thereby in proportion to the movement of the film, the tape having studs disposed at intervals thereon, and a circuit controller adapted to be shifted step by step in one direction by said studs to alternately close a circuit through said terminals and the magnet or open the circuit therethrough.

5. A mechanism of the character described including a moving picture projector using a motion picture film, a phonograph having a tone arm, a sound box and a stylus and having a rotatable record with which the stylus normally engages, an electro-magnet associated with the tone arm and adapted when energized to lift the sound box and its stylus away from the record and when de-energized to permit the sound box and stylus to descend onto the record, said electro-magnet including a coil in circuit with a source of current and two spaced terminals, a reel operated by the projector, a tape mounted upon the reel and moving thereby in proportion to the movement of the film, the tape having studs disposed at intervals thereon, and a circuit controller adapted to be shifted step by step in one direction by said studs to alternately close a circuit through said terminals and the magnet or open the circuit therethrough, said controller comprising a roller carrying transversely extending rods, the rods being alternately of conductive and non-conductive material and the terminals being resilient and being disposed in the path of movement of said rods whereby to alternately electrically connect or disconnect said terminals, the roller having a toothed member with which said studs on the tape are adapted to engage.

6. A mechanism of the character described including a moving picture projector using a picture film, a phonograph including a ro-

tatable record and vertically movable tone arm section, a sound box carried by the tone arm section and a stylus for the sound box engaging the record, the tone arm section being movable toward or from the record, means for continuously driving the record, a reel operated by the projector, a tape adapted to be wound upon said reel, means associated with the tone arm section and sound box and adapted to raise the tone arm and raise the stylus from the record or lower the tone arm bringing the stylus into engagement with the record, and means disposed at intervals upon the tape adapted to intermittently actuate said tone arm raising or lowering means alternately.

7. A mechanism of the character described including a moving pictures projector, a phonograph including a rotatable record, a tone arm, a sound box and a playing stylus carried by the sound box and normally engaging the record, electro-magnetic means acting when energized to lift the playing stylus away from the record and when de-energized to permit the descent of the sound box and the playing stylus onto the record, a positioning stylus operatively mounted upon the sound box and slightly out of alinement with the playing stylus, means as the playing stylus is lowered acting to raise the positioning stylus out of engagement with the record and when the playing stylus is raised acting to depress the positioning stylus into engagement with the record, said record having concentric grooves at intervals with which the positioning stylus is adapted to be engaged when depressed to thereby hold the sound box and its stylus in fixed relative relation until the playing stylus is again lowered into contact with the record.

8. In a mechanism of the character described, a phonograph including a rotatable record, a sound reproducing mechanism adapted to be raised from the record or lowered into engagement therewith, means for driving the record constantly, means controlled in accordance with a moving picture film for intermittently and alternately raising or lowering the sound reproducing mechanism into or out of operative engagement with the record, and means for holding the sound reproducing mechanism positively in the same position relative to the sound record whenever it is raised and until it is again lowered.

9. In a mechanism of the character described, a phonograph including a rotatable record, a sound reproducing mechanism adapted to be raised from the record or lowered into engagement therewith, means for driving the record constantly, means controlled in accordance with a moving picture film for intermittently and alternately raising or lowering the sound reproducing mechanism into or out of operative engagement with the record, means for holding the sound reproducing mechanism positively in the same position relative to the sound record whenever it is raised and until it is again lowered including a plurality of concentric grooves on the record, and a member carried by the sound reproducing mechanism automatically engaging one of said grooves when the sound reproducing mechanism is raised from the record and disengaging from the groove when the sound reproducing mechanism is lowered onto the record.

10. In mechanism of the character described, a moving picture projector, a film operating thereover, a reel, a shaft driven by the projector, a band affording driving connection between said shaft and the reel, a second reel, a tape passing from the second named reel to the first named reel, said tape having studs at intervals, a roller over which said tape moves and having teeth with which the studs are adapted to engage, the studs being arranged at irregular distances and acting to move the roller one step at each engagement of a stud with a tooth, a plurality of electrically conductive and non-conductive elements mounted upon the roller and alternating with each other, a roller disposed above the first named roller and holding the film into contact therewith, a phonograph having a rotatable record, a sound reproducing mechanism including a stylus, electro-magnetic means for intermittently raising and lowering the stylus connected in circuit with a source of current, and means actuated by said conductive and non-conductive elements acting to alternately close and open the circuit through said electro-magnetic means.

11. In combination with a moving picture projector employing a picture film, and a phonograph operating in consonance therewith, said phonograph including a sound box and a vertically movable playing stylus, a record associated with the phonograph and having bands of sound phonograms disposed concentric to the axis of the record and separated from each other by concentric grooves, a controlling element for the phonograph movable by the projector and proportionately to the moving picture film thereof and acting to alternately raise the playing stylus from the phonographic record or to lower it into contact with the phonographic record, a positioning stylus carried by the sound box and disposed in offset relation to the playing stylus, and means acting to depress the positioning stylus into position where it may engage with one of said grooves whenever the playing stylus is raised to thereby hold the playing stylus and record in the same relation, said positioning stylus being automatically raised out of said groove when the playing stylus is depressed into contact with a record phonogram.

12. A mechanism for operating phonographs in synchronized relation to a moving picture film including electro-magnetically operated means for raising the stylus of a phonograph sound box from a sound record and holding it raised while the electro-magnetically operated means is energized, and means operating in correspondence with and controlled by the film operating mechanism acting to intermittently open and close the circuit of said means.

13. In mechanism of the character described, a sound record having bands of sound record phonograms of discontinuous matter, the matter of one band being separated from the next adjacent band by a concentric groove, a sound reproducing mechanism including two relatively offset styli, one stylus being operatively connected to the sound reproducing mechanism and the other constituting a positioning styplus, and means actuated automatically and in correspondence with a moving picture film alternately and intermittently shifting the positioning stylus into position for engagement with one of said grooves and simultaneously raising the sound reproducing stylus or depressing the sound reproducing stylus into engagement with the phonograms of a sound record, and simultaneously raising the positioning stylus.

14. In a mechanism of the character described, a sound record having a phonographic track thereon and a sound reproducing mechanism associated therewith, the record being constantly driven, and means controlled in accordance with a moving picture film acting automatically to alternately raise the reproducing mechanism out of operative engagement with the phonographic track or lower the reproducing mechanism into operative engagement with the phonographic track and means acting automatically when the reproducing mechanism is raised to prevent any movement of the reproducing mechanism relative to the track and when the reproducing mechanism is lowered, permit the reproducing mechanism to feed transversely across said record.

In testimony whereof I hereunto affix my signature.

ELMER R. TAYLOR.