

June 30, 1931.

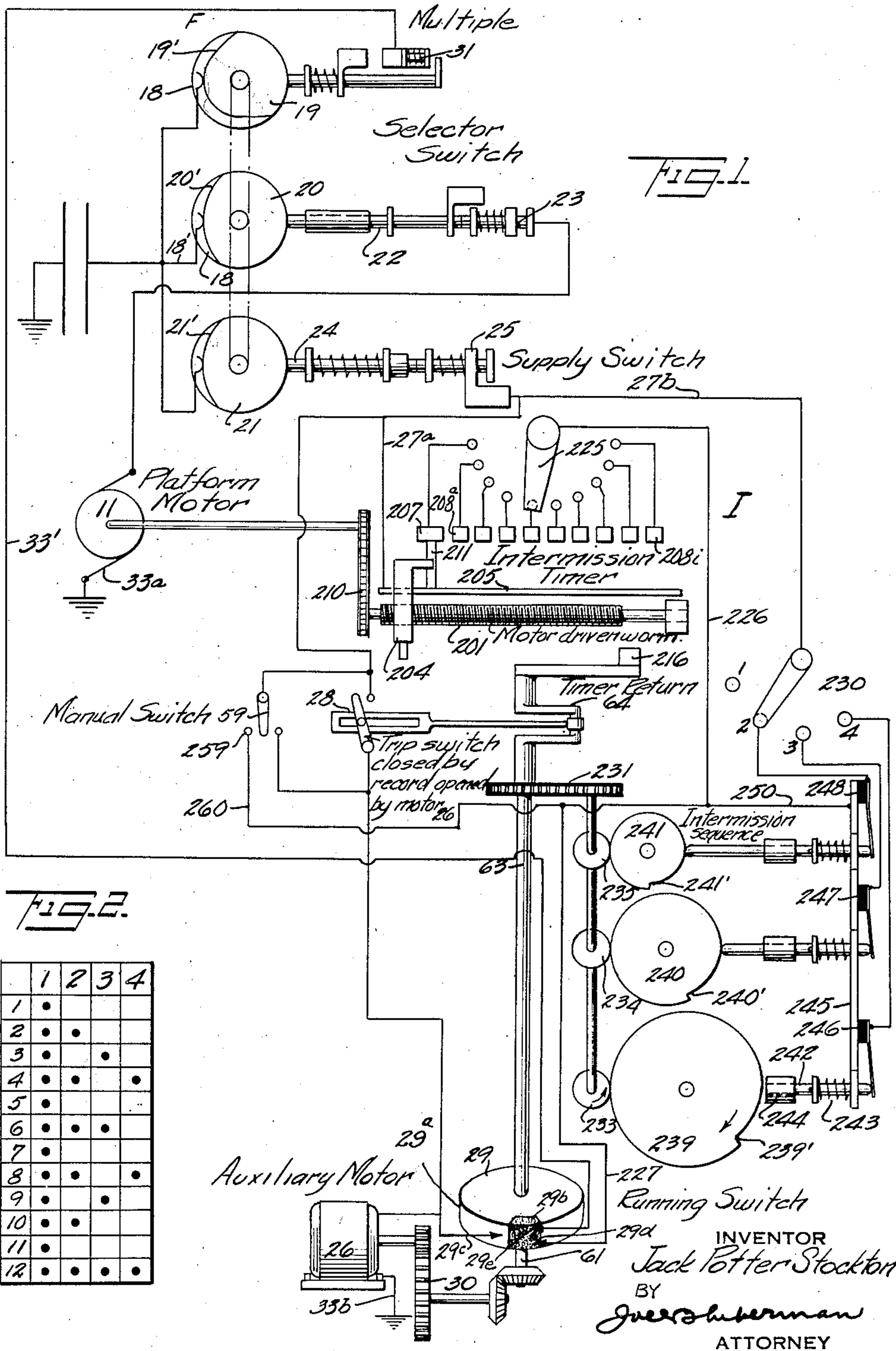
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PHONOGRAPH

Filed June 14, 1928

7 Sheets-Sheet 1



June 30, 1931.

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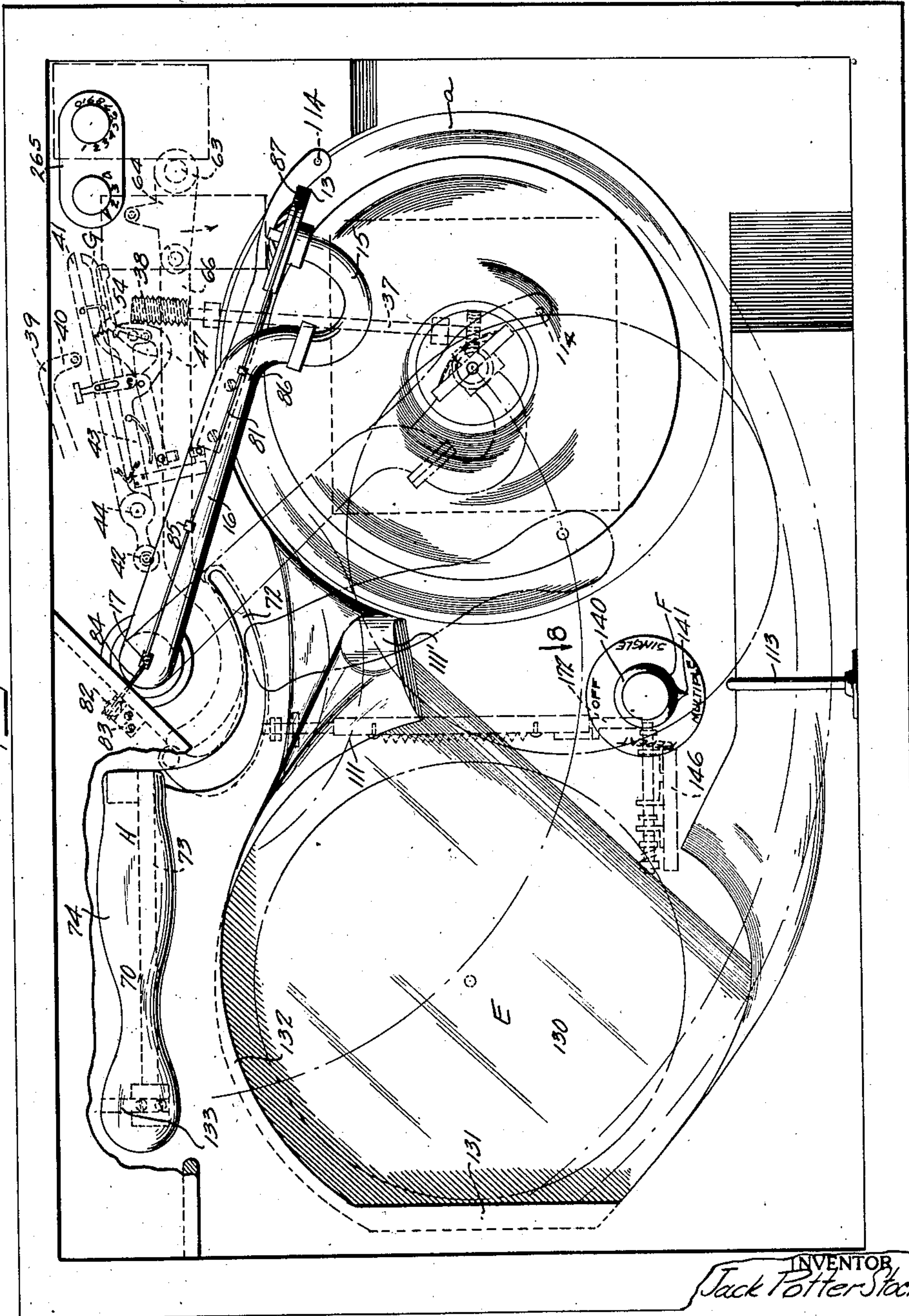
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PHONOGRAPH

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7 Sheets-Sheet 2

Fig. 3.



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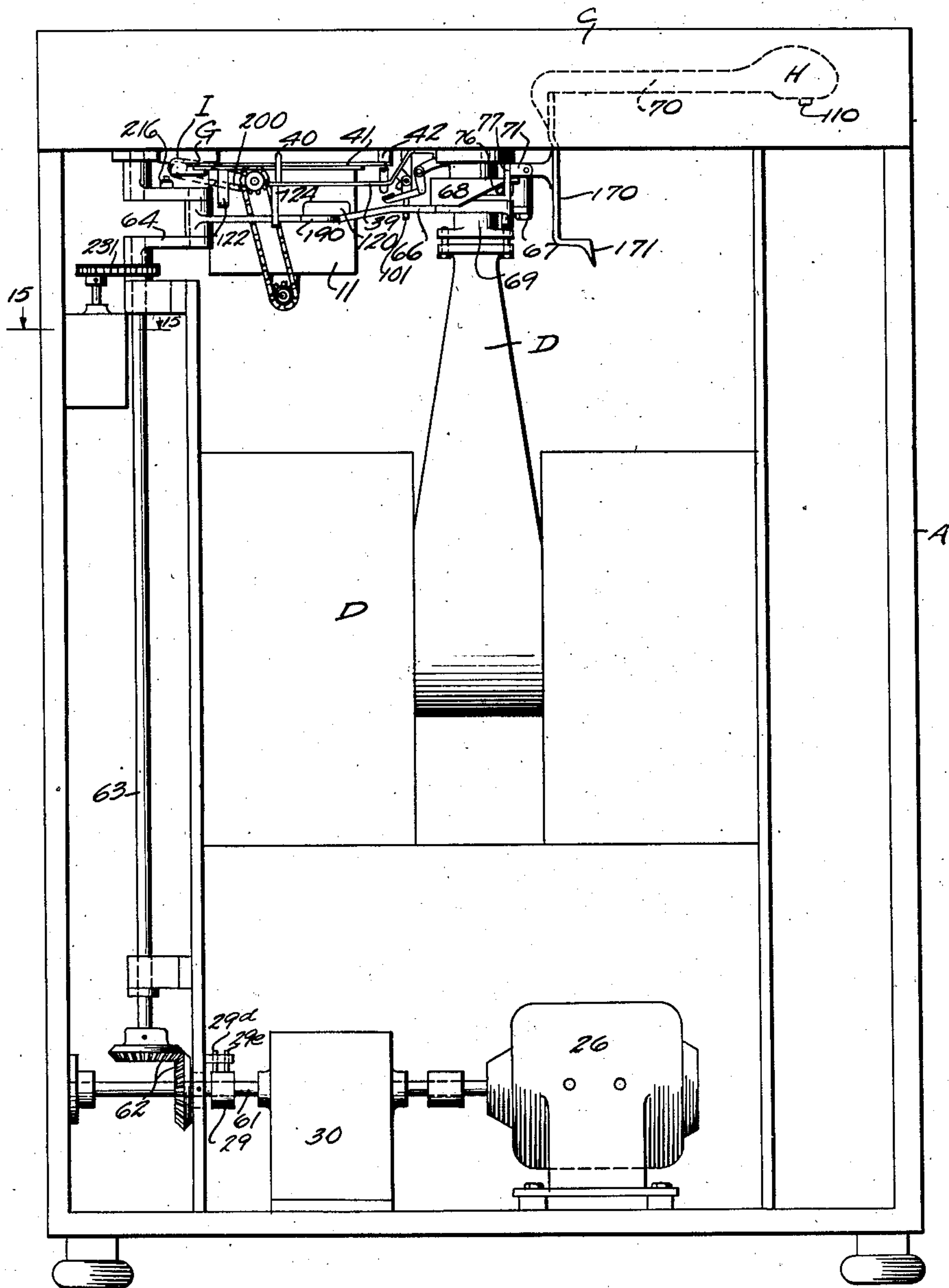
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PHONOGRAPH

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7 Sheets-Sheet 3

Fig. 4.



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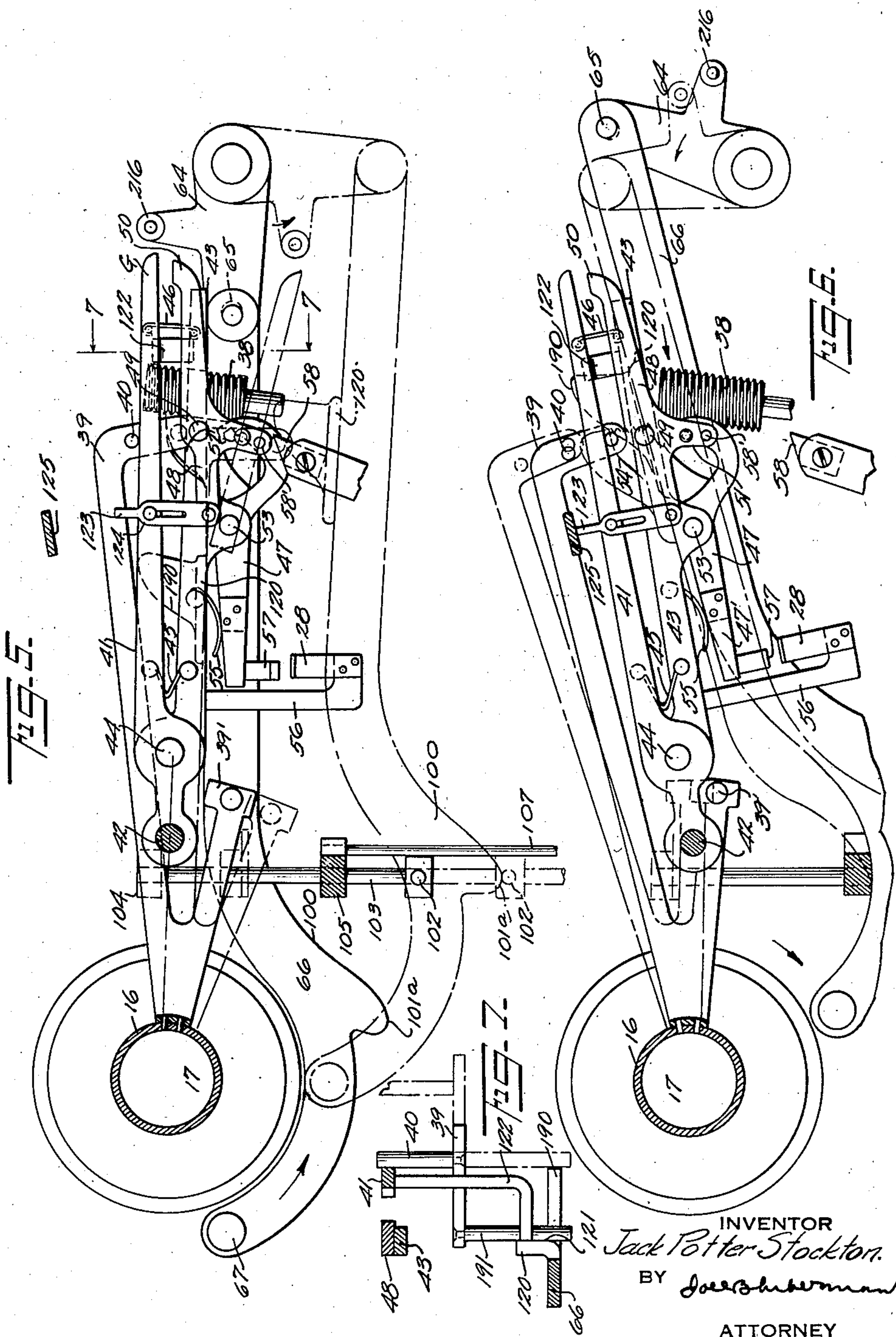
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PHONOGRAPH

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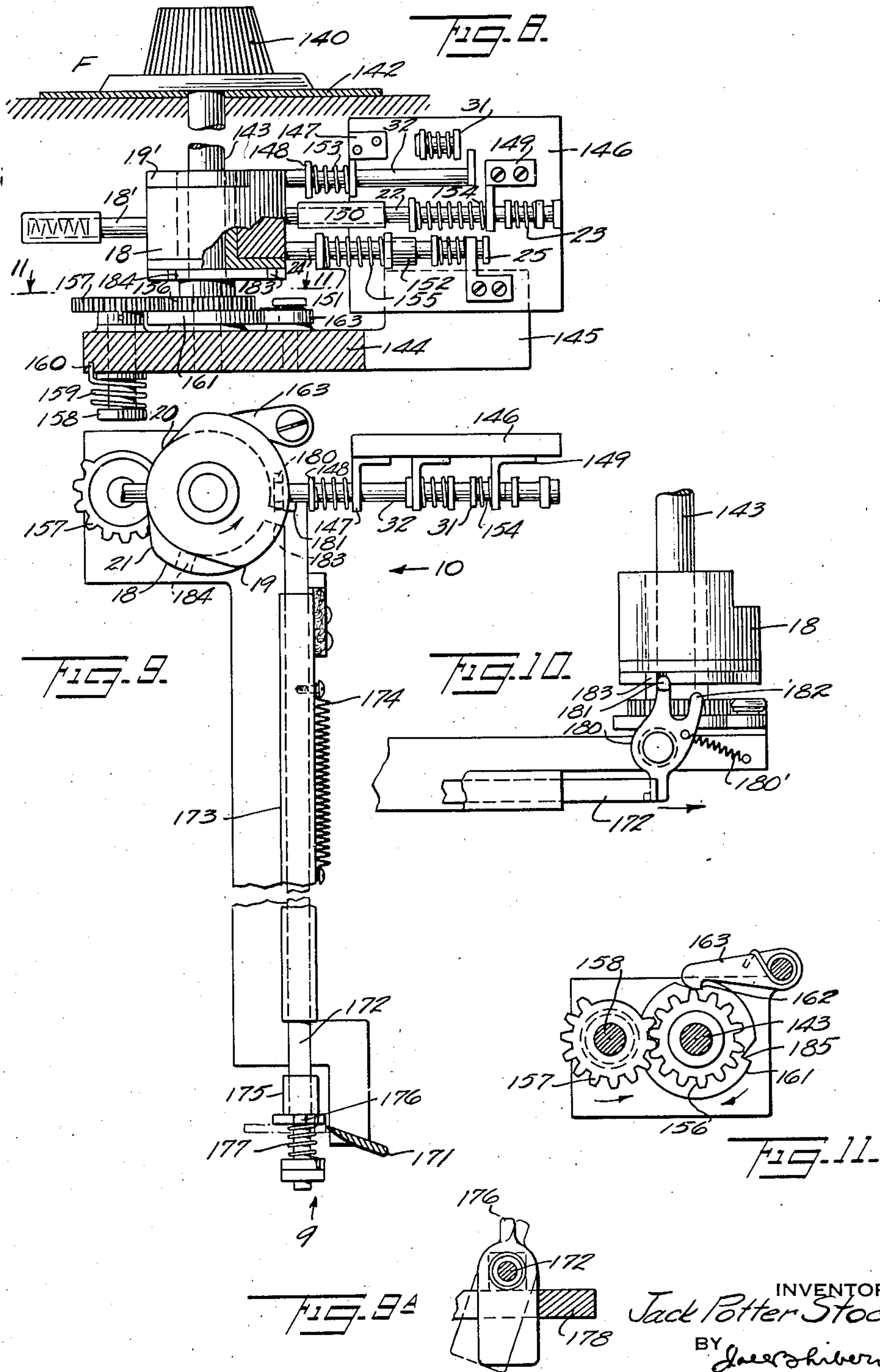
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PHONOGRAPH

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June 30, 1931.

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7 Sheets-Sheet 6

FIG. 12.

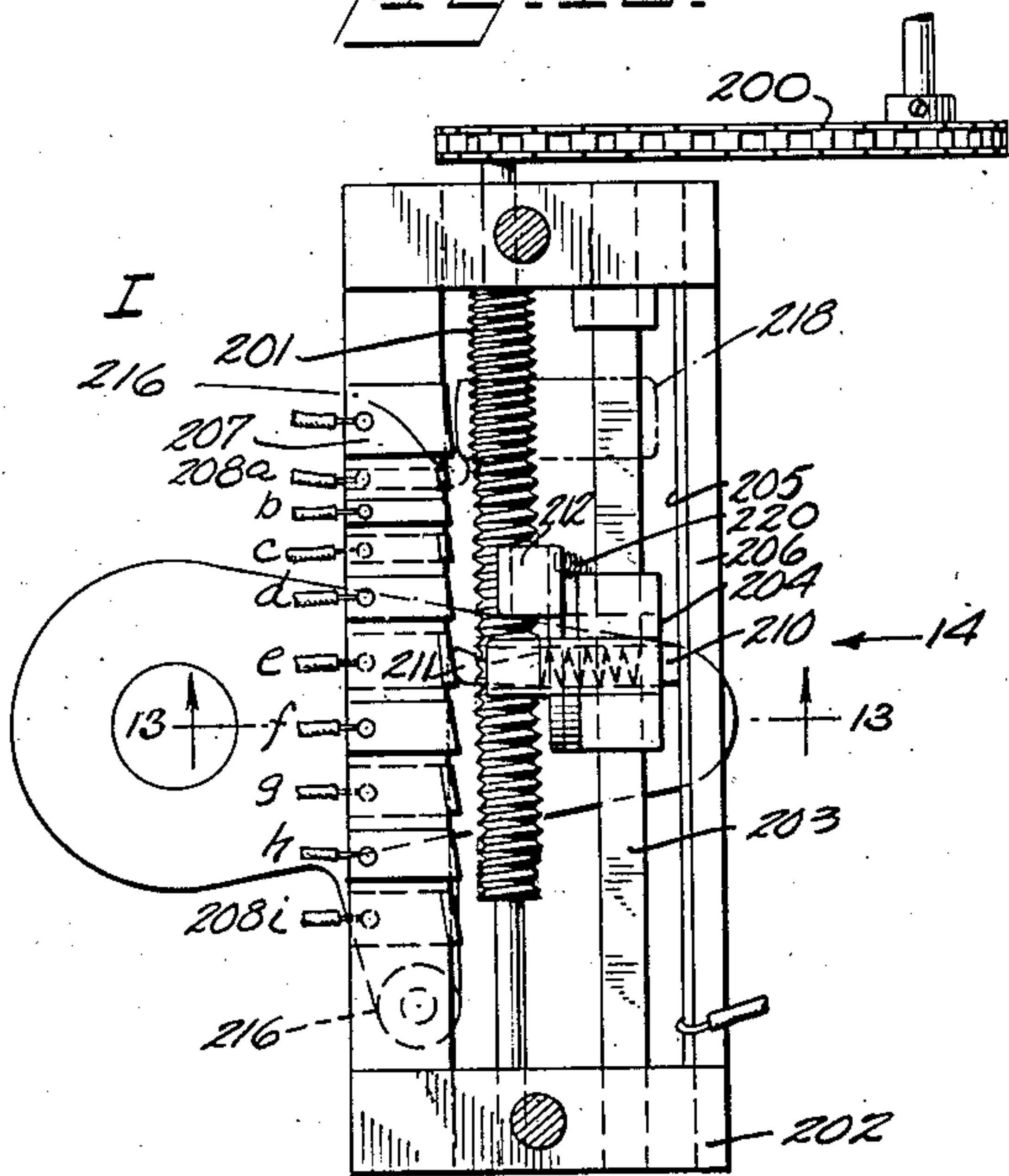


FIG. 13.

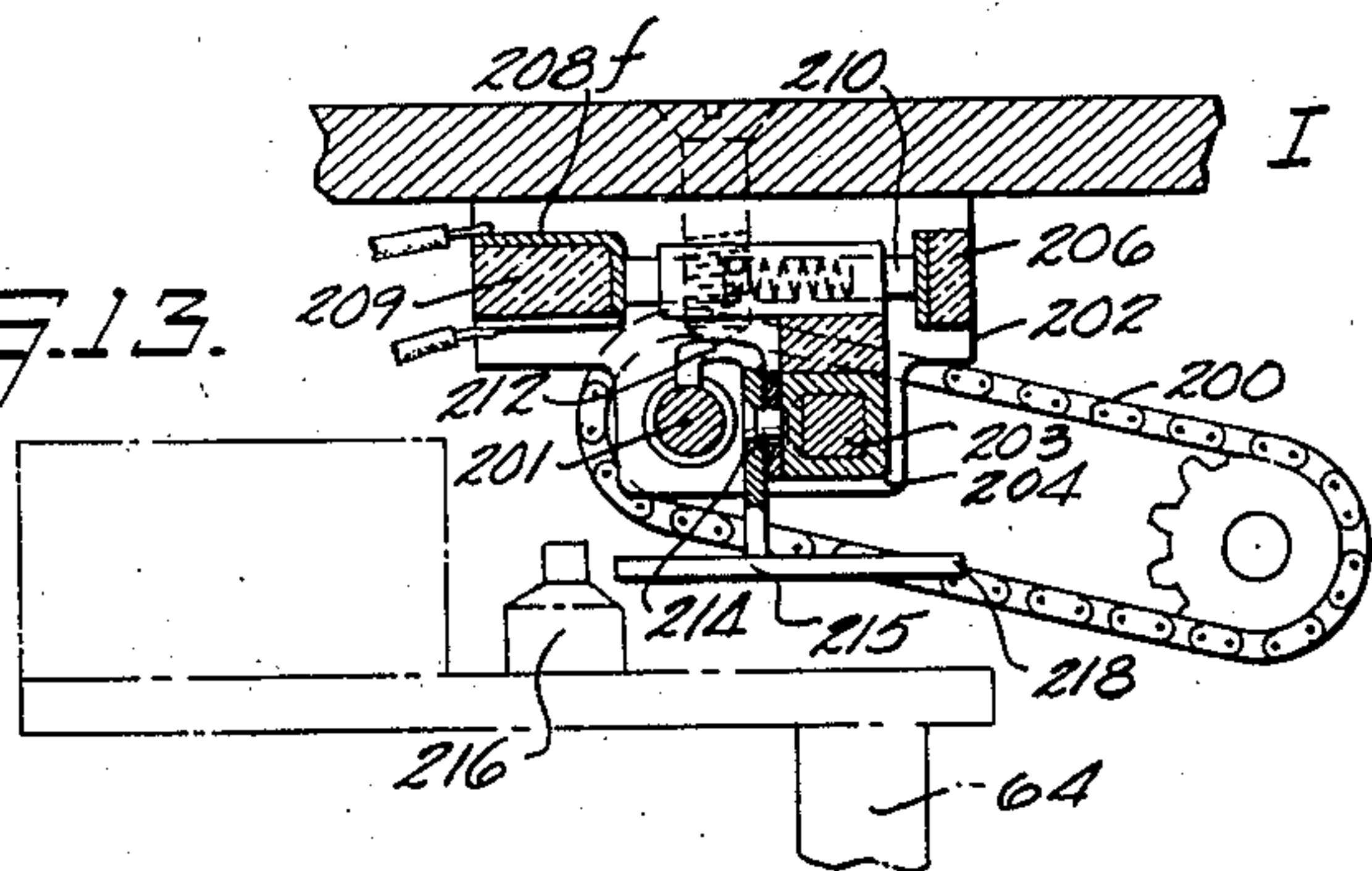


FIG. 14.

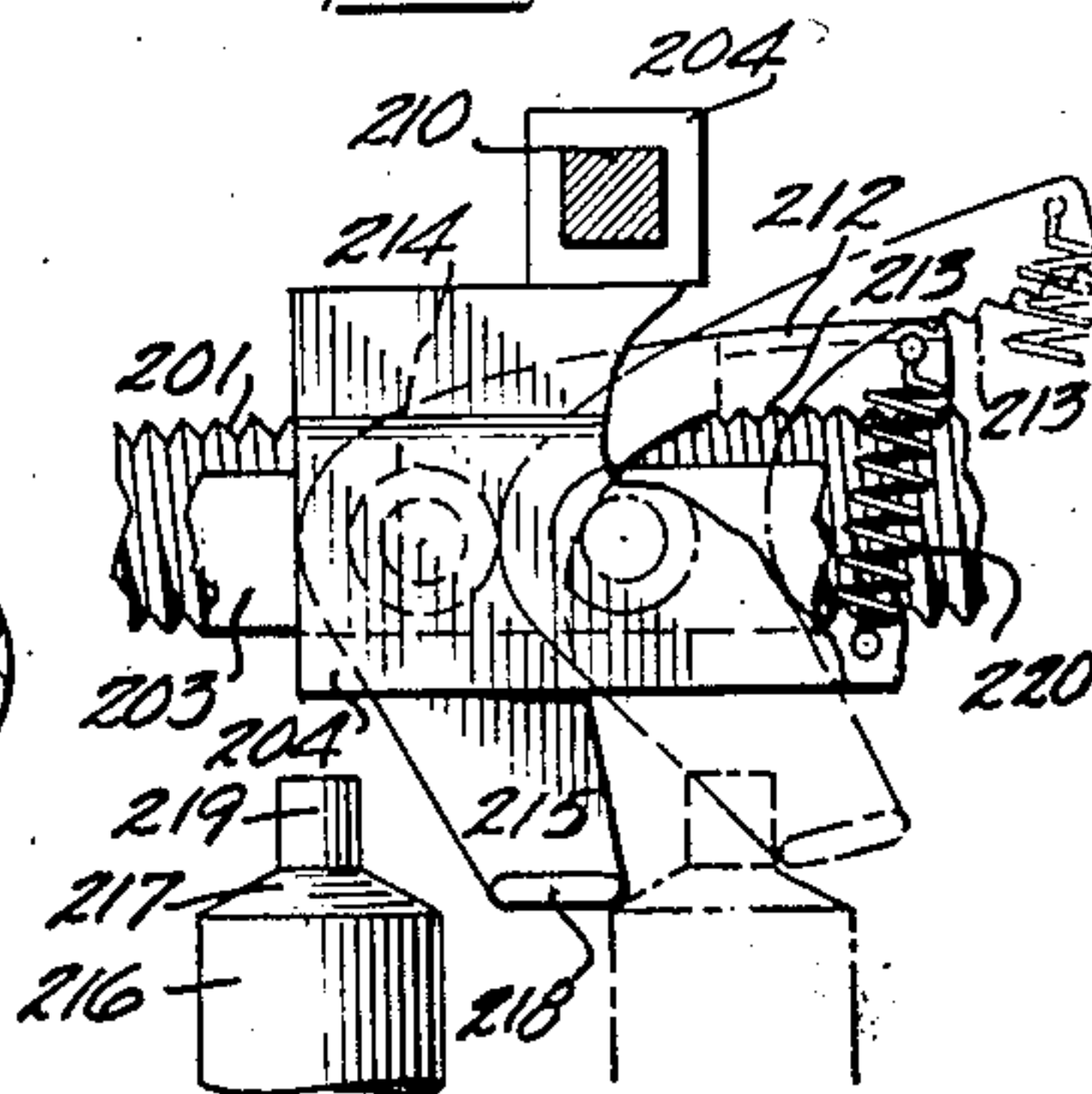
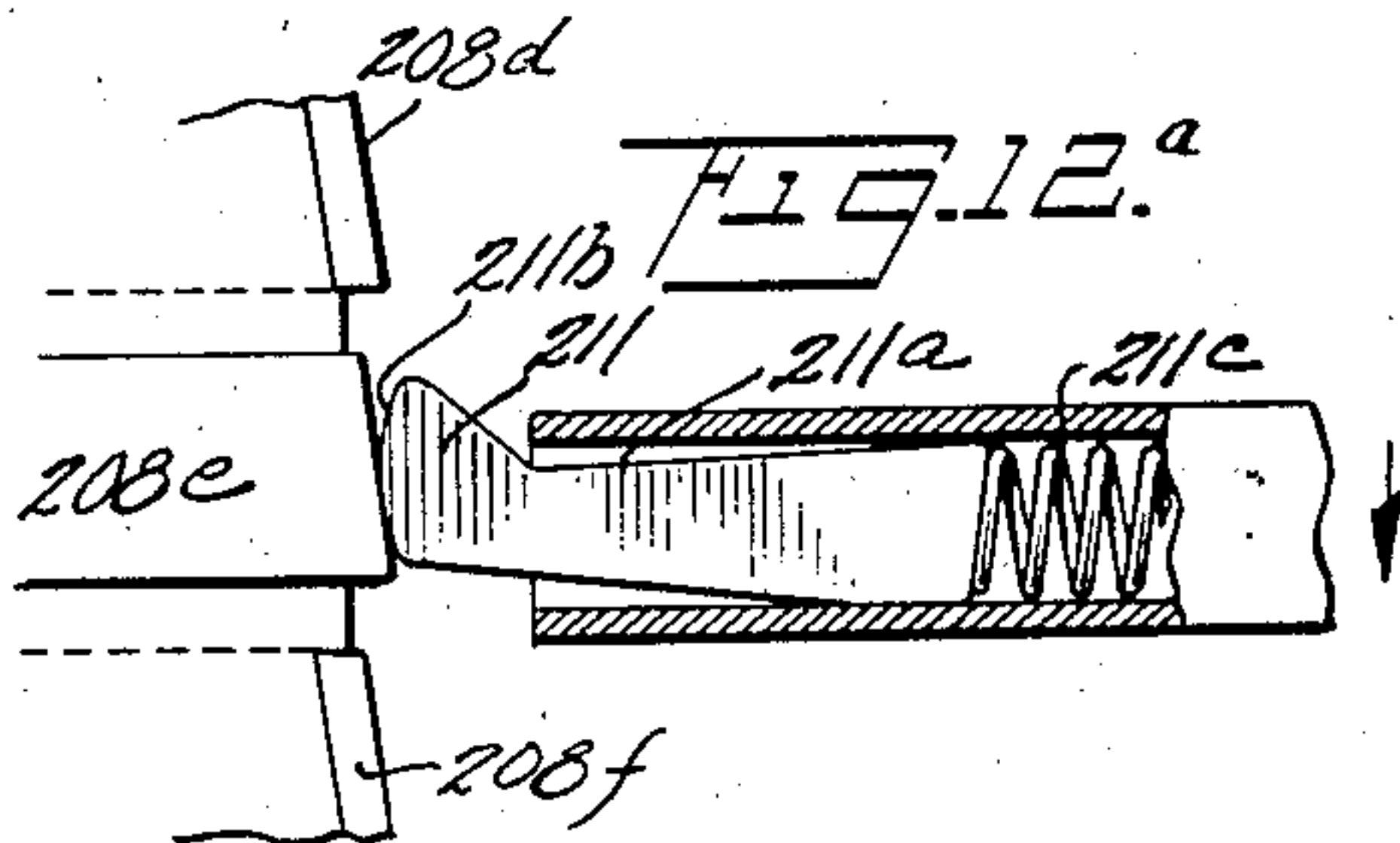


FIG. 12.^a



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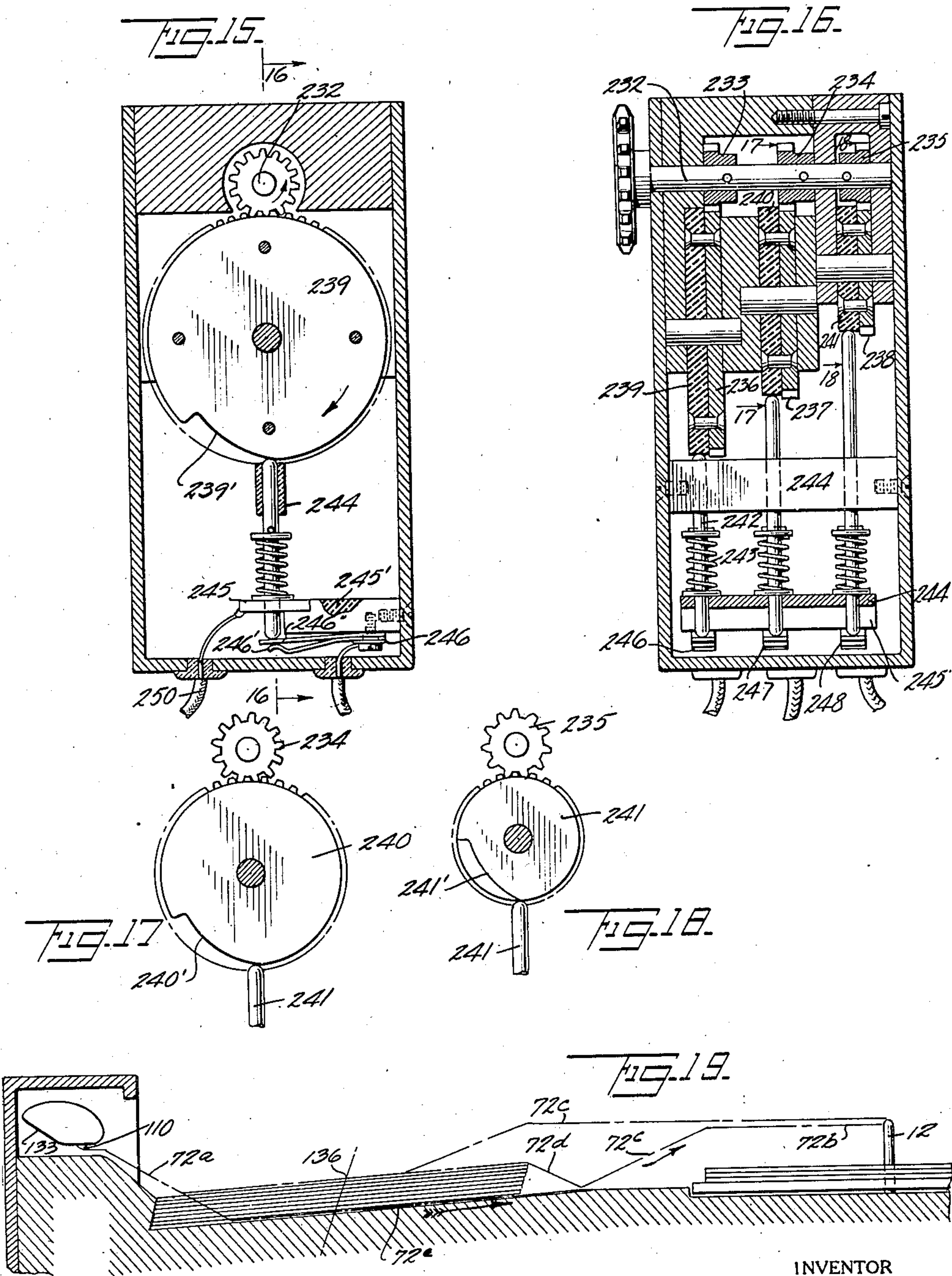
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PHONOGRAPH

Filed June 14, 1928

7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

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PHONOGRAPH

Application filed June 14, 1928. Serial No. 285,247.

The present invention relates to phonographs and is more particularly directed toward automatic multiple record phonographs wherein the records of a series are played successively. Multiple record phonographs have mechanical devices for effecting the change of records and restoration of the stylus to the playing area. These devices, depending on their nature and mode of operation, require a certain length of time to operate, which is the minimum time between the playing of the records.

This time may be too short for certain purposes and the present invention contemplates the provision of a multiple record phonograph wherein the intermission or time interval between the playing of successive records may be controlled to be a predetermined or set length of time greater than the minimum time inherent in the machine.

The invention also contemplates suitable arrangements by which one can obtain the longer intermission after each record, or after a predetermined group or sequence of records, such as after every other record, every third record, or every fourth record, as desired.

The invention is most conveniently embodied in phonographs operated by electric motors and wherein one electric motor, which runs continuously while the repertoire of records is being played, is employed to actuate the playing platform. The other or auxiliary motor operates intermittently and is employed for the purpose of raising and lowering the stylus and effecting the record transfer.

Multiple record phonographs heretofore available have generally had a fixed interval between the playing of successive records, this interval depending upon the time required for the carrying out of the record changing cycle.

The duration of this cycle may be from a minimum of about 10 or 15 seconds up to forty seconds or even a minute, depending upon the type of mechanism used in effecting the record transfer and restoration of the stylus. For many purposes, it has been found preferable to provide an intermission

between the playing of the records which is readily controlled so that one can obtain an intermission period longer than the minimum required by the record changing mechanism. Close playing of a number of unrelated classical records may become tedious or boring to the listener, while the continued playing of dance music becomes fatiguing for the dancers.

In its broad aspects, the present invention is adaptable to multiple record phonographs in which the records are transferred from the magazine to the playing position or are transferred out of the playing position after being played, or wherein the successive records are played on different record supports. It may also be employed in multiple record phonographs restricted to the playing of only one make of records, and capable of playing a repertoire wherein all of the records are of the same size, or may be employed in a phonograph restricted to neither of these conditions.

For convenience of description, the invention will be described as having been incorporated in a phonograph wherein the records are transferred from a storage magazine to the playing platform and allowed to pile up on the platform during the playing of the entire repertoire. Such a phonograph is disclosed in detail in my copending application 262,190, filed March 16, 1928. The phonograph shown in that application employs a platform motor and an auxiliary motor, also an auxiliary motor control whereby the auxiliary motor is started by a normally open trip switch as soon as the stylus on the reproducer passes from the record groove into the special groove inside the playing area after the record has been completed. It may also be tripped automatically in the absence of a special groove, or the motor may be started manually. A running switch for the auxiliary motor is then closed automatically after which the starting switch is reset to open position. The auxiliary motor continues to run and as soon as it has moved the record shifting mechanism and other phonograph controls through the complete cycle of movement, the running switch is

opened. According to the preferred wiring arrangement, a selector switch and appropriate circuits are provided for controlling both the platform motor circuit and the auxiliary motor circuit so that anyone of the following operations may be obtained:

a. Play a single record once after which the auxiliary motor goes through a complete cycle of operations (without shifting a record) whereupon the auxiliary motor and platform motor are stopped after the completion of the cycle.

b. Play records automatically in succession as long as there are records in the magazine to be played, whereupon, after the last record has been played once, the circuit arrangement is shifted for operation *a*, playing this last record, however from the 10 inch position.

c. Repeat a record placed on the platform, or the last record of a repertoire of records, until the phonograph is stopped manually.

The present invention contemplates the provision of suitable circuits and circuit controlling devices associated with the switches and motors above referred to so that (when playing records as described in paragraphs *b* and *c* above), the auxiliary motor may be stopped at some stage of its operating cycle and again started so that the entire time required for the cycle may be controlled. Inasmuch as the platform motor is operating continuously, this motor may be employed as a timing element to operate the intermission or time controlled switch. These circuit controlling devices are primarily intended to be set for the desired intermission, or to avoid an extended intermission, and remain set until manually reset. In this manner, the same intermission will be normally had after each record.

In playing certain types of music it is desirable to play two or more records in close sequence after which a longer intermission is available. According to the present invention, the circuit arrangement is such that the intermission controlling circuit may be rendered ineffective to stop the auxiliary motor during one or more of the record changing cycles after which the intermission circuit is again permitted to stop the auxiliary motor and bring about the intermission. In this manner the intermissions may be spaced according to a predetermined sequence, and, as herein shown, an intermission may be had after every record, every other record, every third record, or every fourth record. Other arrangements are possible.

Inasmuch as the intermission would ordinarily come after the last record has been played, there might be a long period during which the listener was not aware that the repertoire had been completely played. In order that there may be an automatic and an immediate notification that the last record

has been played, the phonograph is preferably so arranged that the functioning of the record change mechanism, in the absence of a record to be shifted, will operate the selector switch to a position which bypasses the intermission switch and intermission sequence spacing circuit so that the record is repeated without any delay. The operator may allow this record to be completed, after which the phonograph stops automatically, or may stop it by turning off the main switch.

The accompanying drawings show, for purposes of illustrating the present invention, one of the many possible embodiments in which it may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In these drawings:

Figure 1 is a wiring diagram, and diagrammatic illustration of certain of the parts, the main or selector switch being shown in the multiple position for playing a plurality of records in succession, all the other circuits and switches being shown in the normally idle position which maintains during the playing of a record;

Figure 2 is a tabulation showing the arrangement of intermissions possible by use of the intermission spacing circuit;

Figure 3 is a top plan view of a multiple record phonograph suitable for utilizing the present form of intermission control, the record shifting mechanism being in the position to which it is brought after the completion of an operation with the tone arm and associated parts in position to begin to play a twelve inch record, parts being broken away to show the record shifting arm at the left and the automatic trip switch at the right, the figure also showing the control knobs for the intermission mechanism, and in dot and dash lines showing one position of the record shifting parts while changing or shifting a ten inch record;

Figure 4 is a rear elevational view of the phonograph cabinet illustrating the arrangement of auxiliary motor, driving connections for the record shifting mechanism and for the intermission controls;

Figure 5 is a plan view taken in the direction of the arrow 5 of Figure 4 illustrating the automatic record controlled starting switch for the auxiliary motor, and the driving connections between this motor and the record shifting mechanism, the full lines showing the parts in playing position just prior to the completion of the playing of a record, the dot and dash lines showing the parts in the position assumed after the auxiliary motor has operated the record shifting mechanism to partially move the record from the magazine to the playing platform, and to bring the tone arm inwardly to the dot and dash line position of Figure 3 to meet this record;

Figure 6 is a view similar to Figure 5, parts shown in full lines being in the position assumed when the automatic starting switch has been reset to open the motor circuit, where they may remain while the intermission controlling circuits are open, the dot and dash lines showing the position assumed when the tone arm has been reset to ten inch playing position to play from that position;

Figure 7 is a section taken on the line 7—7 of Figure 5;

Figure 8 is a side elevational view of the selector switch for controlling the operation of the platform motor and the auxiliary motor, the selector switch being shown in the "multiple" position and taken in the direction of the arrow 8 of Figure 3;

Figure 9 is a top plan view of the selector switch and control mechanism for the same;

Figure 9a is a fragmentary elevational view taken in the direction of the arrow 9 of Figure 9;

Figure 10 is an elevational view taken in the direction of the arrow 10 of Figure 10, parts being omitted;

Figure 11 is a sectional view on the line 11—11 of Figure 8;

Figure 12 is a top plan view of the intermission or timing switch showing it in the position assumed after the playing platform has been operated for several minutes;

Figure 12a is an enlarged fragmentary view of the movable contact of this switch;

Figure 13 is a sectional view taken on the line 13—13 of Figure 12;

Figure 14 is a fragmentary side elevational view taken in the direction of the arrow 14 of Figure 12, the parts being shown in full lines in the position just prior to the reset of the timer switch, the dot and dash lines indicating the partial return of the contact carried mechanism;

Figure 15 is a sectional view through the intermission spacing device and taken substantially on the line 15—15 of Figures 4 and 16;

Figure 16 is a vertical sectional view taken on the line 16—16 of Figure 15;

Figures 17 and 18 are fragmentary views taken in the direction of the arrows 17 and 18 of Figure 16; and

Figure 19 is a diagrammatic view illustrating the vertical movement of the record shifting arm when transferring a record, and also in the absence of a record to be transferred.

The form of phonograph cabinet chosen for illustrating the invention is designated by the reference character A. It has a table B which extends across the upper part of the cabinet A spaced below the upper edges of the cabinet body in the ordinary position in which phonograph tables are placed in such cabinets. The top of the cabinet is closed by a cover C in the usual manner. The sta-

tionary sound amplifying apparatus, designated generally by the reference character D, is built into the cabinet underneath the phonograph table in the usual manner.

Instead of placing the rotating playing platform 10 in the center of the phonograph table as is customary in non-automatic phonographs, this table is, as indicated in Figure 1 of the drawings, placed to the right of the center. It is operated by the usual platform motor indicated at 11 and is adapted to receive a stack of records held in place by a centering pin 12. The reproducer and stylus for cooperation with the records on the playing platform are indicated at 13 and 14, respectively. They are carried on the usual goose neck 15 supported on the usual swinging tone arm 16 pivoted about a vertical axis 17. Where the invention is to be employed with an electric pick up device instead of a tone arm, the reproducer for the electric pick up may be carried on a movable reproducer support.

As indicated in the drawings, the center pivot, or axis about which the tone arm swings is placed in the center of the cabinet near the rear in the same position in which it is ordinarily located in phonographs wherein the playing platform is in the middle of the cabinet. The location of the playing platform on the right hand side of the cabinet provides room at the left for a record magazine or storage area designated generally by the reference character E and into which it is possible to place a repertoire of records which are to be played off in succession. In placing this stack of records in this record magazine, it is not necessary to accurately locate each and everyone of the records in the stack. The uppermost record of this selection is, however, preferably shifted as far toward the left rear corner of the cabinet as is possible.

The operation of the phonograph is under the control of a selector switch F capable of being manually preset to various positions conveniently designated as "Single", "Multiple", "Repeat" and "Off". This selector switch controls the flow of current to both the platform motor and the auxiliary motor. It is indicated diagrammatically in the wiring diagram in Figure 1 and shown in detail in Figures 8 to 11, inclusive.

The selector switch is associated with suitable operating mechanism whereby it may be manually preset in any of the desired positions to carry out the various cycles of operation above mentioned. It is capable of automatically shifting from the "multiple" position to the "single" position and from the "single" position to the "off" position when it is preset in those positions and the record shifting mechanism thereafter operates in the absence of a record to be shifted.

The selector switch F carries an insula-

tively supported metallic ring 18 having three camming sections indicated in Figure 8 at 19, 20 and 21, respectively. This metal ring is connected to one side of the power source through a brush 18'. The cam 19 is cut away to about one-half of the circumference as indicated at 19', while the cams 20 and 21 are cut away about one-quarter of the circumference, as indicated at 20' and 21'. Each of these cam portions of the ring are cooperative with followers so as to control circuits leading away from the ring. The cam 20 is associated with a follower 22 cooperative with a stationary contact 23 and adapted, when closed as indicated in Figure 8, to supply current to the platform motor 11. The follower 24 on the cam 21 is cooperative with a stationary contact 25 to connect into the circuit of the auxiliary motor 26.

In the drawings, various switches are shown as being interposed in the circuit for the auxiliary motor. The motor starting switch 28 is normally open and under the control of the swinging reproducer support. It is adapted to be closed after the completion of the playing of a record and to be thereafter reset to open position prior to the completion of the operation of the record shifting mechanism, and is in parallel with a normally open rotary or running switch 29.

The motor starting switch 28 may be any convenient form of switch which may be closed after the completion of the playing of a record. Such switch is designated generally by the letter "G". In order that the phonograph may be capable of playing the records made by various manufacturers I prefer to employ an automatic switch such as described and claimed in my Patent 1,715,873, granted June 4, 1928. This form of switch is one which acts in response to the sudden inward movement of the reproducer occasioned after the stylus moves from the low pitched groove in the playing surface toward a control groove placed inside the playing surface. This sudden inward movement of the reproducer is utilized to initiate the operation of the record changing mechanism. This motor starting switch is capable of being reset during the cycle of operations.

The rotary switch 29 is driven from the auxiliary motor 26 through a gear box diagrammatically indicated at 30. It has a metal contact 29a extending nearly around the circumference and interrupted by an insulating segment 29b. A brush 29c connected to one terminal of the auxiliary motor is adapted to ride on the metal segment 29a. A brush 29d is connected to a running circuit having two branches 27a and 27b each adapted to bypass the starting switch and a brush 29e is connected by a lead 33' to a yielding contact 31 cooperative with

the plunger 32 which is associated with the cam 19 on the ring of the selector switch. The platform motor 11 and auxiliary motor 26 are connected to the other side of the line through leads indicated at 33a and 33b.

Assuming that a record is on the platform and that the stylus has been placed in the record groove, and the switch F turned to the "multiple" position, as shown in Figure 8, the cycle of operations will be described in detail. The stylus will follow along in the grooves in the record *a* on this platform playing this record in the usual manner and carrying the reproducer and associated parts from the full position of Figure 3 to the end of the record groove, during which time the record plays as usual. The stylus enters into the special control groove indicated at 35, herein shown as a concentrically located groove commonly used by many record manufacturers. It, however, makes no difference in the operation of the device whether the concentric form of groove is used or an eccentric form of groove, for in either case there is a sudden inward movement of the swinging reproducer support occurring after the completion of the playing of the record.

While the contacts 28 of the switch G are in the auxiliary motor circuit, this switch is under the combined control of the swinging reproducer support 16 and the platform motor 11. The platform motor through a suitable speed reducing train 36 drives a shaft 37 carrying a worm 38 which is adapted to revolve at a speed proportional to the speed of the playing platform. The inner end of the reproducer support or tone arm 16 is fixedly connected with a swinging member or arm 39 adapted to swing underneath the table. This tone arm actuated member 39 is, as shown in Figures 4 to 7, inclusive, provided with an upwardly extending pin 40 engageable with a long thin flat arm 41 pivotally mounted at 42 underneath the phonograph table.

At the beginning of the playing of the record the pin 40 is spaced a considerable distance from the swinging member 41 as indicated in Figure 3 and in dot and dash lines as indicated in Figure 7, but is brought into engagement with this swinging arm 41 during the latter part of the playing of the record. The free end of the swinging arm 41 may be supported by a guide if desired. This swinging arm 41 carries a second movable member in the form of a long thin flat arm 43 pivoted at 44. An expansion spring 45 is interposed between these arms to hold them separated as shown in the full line position of Figure 5. The distance that these arms can separate, however, is limited by means of a cross strap 46 fastened to the arm 43 and hooked over a pin carried by the arm 41. This arrangement of parts permits the

arms 41 and 43 to swing bodily as a unit about the pivot 42 as soon as the pin 40, operating with the tone arm, is brought against the arm 41 and at a speed proportional to the feed of the stylus. There is, however, nothing to prevent moving the arm 41 toward the arm 43 when that arm is held stationary or compelled to move at a rate slower than the movement produced by the advance of the tone arm.

In order that the arm 43 of the automatic switch mechanism may be moved at a speed corresponding to the rate of advance of the arm 41 as determined by the inward feeding of the tone arm, means is provided by which arm 43 may be driven at the proper time by the worm 38 actuated by the platform motor. The arm 43 pivotally supports two members 47 and 48 cooperatively associated for the purposes above referred to. The member 48 acts as a trigger or detent and is pivoted on the arm 43 at 49. The member 48 carries a long arm 50 which is adjacent the outer end of the arm 41 and also is provided with a short arm 51 carrying a downwardly extending pin 52 to cooperate with a notch in the adjacent end of the member 47. This member 47 is pivoted at 53 and besides being provided with a notched end to cooperate with the pin 52, it also carries a downwardly extending serrated portion 54 adapted to cooperate with the worm 38 driven at constant speed by the platform motor. In order to hold the pin 52 in the notch, a spring 55 is provided between the member 43 and the member 47 pivoted thereon. The arm 43 is provided with a laterally extending contact carrier 56 conveniently made in the form of a strip of insulating material and provided with one of the contacts of the starting switch 28 for the auxiliary motor 26. The arm 47 has an insulated tip 47' which supports a conducting bridging member 57 cooperative with the contacts carried by the arm 56 for opening and closing the circuit through starting switch 28.

When the phonograph has operated long enough to bring the tone arm in near the end of the record, the pin 40 will have bodily moved the arms 41 and 43 in far enough to bring the serrated edge of the downwardly extending portion 54 of the member 47 into engagement with the worm 38. This worm is driven at a speed such that the arm 43 and parts carried thereby will be driven from the worm at the same rate that the arm 41 is driven from the tone arm. These parts are then in the position indicated in full lines in Figure 5.

As soon, however, as the stylus and reproducer pass from the playing surface into the high pitched groove, leading into the concentric or eccentric groove, there will be a sudden inward movement of the tone arm and all parts connected with it. The sudden

inward movement of the tone arm will swing the arm 41 in a clockwise direction bringing the free end of this arm against the free end 50 of the lever member 48. The pivot 49 for this lever, however, is held comparatively stationary on account of the interlocking connection with the arm 47 carrying the follower for the worm. The arm 48 will thereupon be moved slightly about the center 49 and will release the pin 52 from the notch in the member 47 thereby permitting the spring 55 to swing the member 47 in a counterclockwise direction releasing the worm feed and bringing the bridging member 57 into engagement with the contacts of the switch 28, thereby closing this switch and starting the auxiliary motor 26 into operation. The motor starting switch G is also adapted to be tripped by a permanent or fixed stop, here shown in the form of a cam 58 mounted in the path of the pin 58'.

It will also be understood that one can manually close the motor starting switch 28 so as to start the cycle of operations by merely lifting the stylus off the record and swinging the reproducer and stylus inwardly to bring the serrated portion 54 against the worm and continuing to move the tone arm inwardly at a more rapid rate than it would be fed in by the record. This will trip the switch and start the auxiliary motor into operation so that the cycle is carried out as though a record had been played. If desired, one may provide a circuit closer such as indicated at 59 in the wiring diagram to bypass the motor starting switch 28. This circuit closer is held closed long enough to permit the auxiliary motor to close the motor running switch 29.

The auxiliary motor 26 may conveniently be mounted in the lower rear part of the phonograph cabinet. As here shown this motor is connected through a reduction gear box 30 with a slow motion shaft 61. A belt or any other form of speed reduction mechanism may be used for obtaining a drive for such a slow motion shaft. The shaft 61 is connected through a pair of bevelled pinions 62 with a vertical shaft 63 which extends upwardly inside the rear part of the phonograph cabinet. The upper end of this shaft is connected with a crank 64 which is utilized in operating the record changing and repeat mechanism, the arrangement being such that the entire cycle of operation is carried out during one revolution of the shaft 61 and crank 64. This crank is connected through a lost motion connection (see Figure 5) with a link 66 the other end of which is connected at 67 to an oscillatory ring 68 whereby the ring may be oscillated back and forth once for each cycle of operations. This ring surrounds the fixed throat 69 beneath the central support for the tone arm.

In the form of multiple record phonograph

herein shown, the transfer of records from the magazine to the platform, the raising and lowering of the reproducer, the placing of the tone arm in initial position, and the releasing of the selector switch, are accomplished through this link or connecting rod 66 and parts operated thereby and associated therewith. The record shifting mechanism is designated generally by the reference character H. As shown in the drawings this mechanism includes an oscillatory record shifting arm 70 pivotally mounted on a bracket 71 carried by the oscillating ring 68. This record shifting arm is able to pivot a considerable extent about a horizontal axis. It extends upwardly through an opening 72 in the phonograph table B.

The construction and operation of the record shifting mechanism is clearly shown in Figure 3. The arm 70 may be conveniently made up of a metal strap having a long horizontal portion 73 adapted to sweep back and forth over the record magazine and part of the turn table. It carries a wooden cover 74 which conceals the mechanical parts, improves the appearance, and adds weight.

As here shown the reproducer lifting mechanism is operated by a cam 75 carried by the oscillating ring 68. This cam engages with a roller 76 carried by a plunger 77 guided for vertical movement. The upper end of the plunger is connected with a flexible member such as a chain or cord 81 which extends up over a guiding wheel 82 supported on bracket 83 in the rear of the pivotal mounting of the tone arm. The flexible cord 81 passes through an eye 84 directly over the pivotal axis 17 of the tone arm and then passes through the guides 85 and 86 and is connected at its farther end to the reproducer as indicated at 87. These parts are so arranged that when the oscillating ring 68 is shifted from the position shown in Figure 4 the plunger 77 is forced downwardly, thereby tensioning the flexible member and lifting the reproducer from the record. Preferably this position is some distance above the upper end of the center pin 12 of the turn table.

The tone arm carried member 39, Figure 5, disposed underneath the phonograph table and which has been described as actuating the automatic switch G, is also operatively associated with mechanism under the control of the connecting rod 66 and oscillating ring 68 for operating the tone arm in a predetermined manner. These mechanisms may include devices for offering slight resistance to the movement of the tone arm during record shifting operations for facilitating positioning of the tone arm in predetermined positions and moving the tone arm inward slightly to bring it into the lead in groove as shown and described in the application above referred to.

The link or connecting rod 66 is provided with an oblique cam surface 100 as indicated in Figure 5. During the initial movement of the connecting rod and parts carried thereby from the full line position of Figure 5 to the dot and dash line position, this cam surface 100 will be moved as indicated in this figure. During this movement the cam engages a roller 101 carried on a collar 102 fixed to a shaft 103. The shaft 103 is slidably and rotatably carried in bearing members 105 only one of which is shown. In order to prevent turning of the shaft 103 while the cam is moving the parts as described, the collar 102 carrying the roller 101 is arranged to slide along a fixed guide 107 carried underneath the phonograph table. The cam acts on the roller to shift the collar and shaft 103 from the full line position of Figure 5 to the dot and dash line position. The shaft 103 fixedly carries a tone arm push member 104 which is engageable with the arm 39' carried by the tone arm underneath the phonograph table.

The movement of the shaft 103 brought about by the cam 100 acting on the roller supported from the shaft, will bring the member 104 into engagement with the arm 39' and will thereby shift the tone arm inwardly bringing it near the center of the turn table where it will remain until acted upon by some other means either the record being transferred or record shifting mechanism to return the tone arm to a playing position.

It will of course be understood that this inward shifting movement of the tone arm is accomplished during the earlier part of the cycle and will always bring the tone arm and parts carried by it into a predetermined position no matter where they were when the motor starting switch was closed. This makes it certain that the reproducer support and associated parts are always moved in so as to be in position for subsequent operations in the cycle.

Assuming that the stack of records is placed in the record magazine with the upper record properly located and the circuit of the auxiliary motor has been closed by the switch 28, the operation of parts will be described. At first, the circuit through the running switch 29 is open, the brush 29d being on the insulating segment. As soon as the motor has turned the shaft part way around the brush 29d will ride onto the metal so that the later opening of this switch 28 will not stop the auxiliary motor.

Early in the shifting of the oscillatory ring 68, the plunger 77 is lowered to raise the stylus off the record. The swinging record shifting arm 70 starts away from the position shown in Figure 3, where it has been at rest, to bring it out toward the record magazine.

The arm 70 carries a record engaging or pick up pin 110 cooperative with the center

hole in the upper record in the storage magazine. The arc-shaped slot 72 through which the record shifting arm extends is provided with a camming surface which permits the arm 70 to lower as soon as it is moved forwardly from the position of Figure 3. The record engaging pin moves through the path indicated by dotted lines 72a in Figure 19 so that, as this record shifting arm 70 is brought out of the compartment to the rear of the record magazine it will be able to lower under the influence of gravity to rest on the upper record in the magazine as indicated in Figure 19. The cam is so shaped that the arm engages the record below the center hole and preferably inside the playing surface. The record shifting arm 70 then continues to move and brings the record engaging pin 110 by the center hole of the record, whereupon the pin drops into this hole and engages with the record to shift it laterally off the stack of records.

As soon as the record is moved away from the position of rest, the sides of the record engage with oppositely disposed guides 111 and 112, which are upwardly inclined so that the record is gradually brought to a higher elevation as the swinging arm continues its movement. This dragging up of the record facilitates separating the upper record from the one just below it. During this movement, the arm 70 is gradually raised while the record is carried up the slope.

The path of the edges of ten and twelve inch records is indicated in Figure 3 by dot and dash arcs. After the record has passed part way up along the inclined portions of the guides it passes underneath a stationary pin 113 as indicated in Figure 3. At the time that the swinging arm has carried the record up far enough to bring the center of the record beyond the inclined guiding surfaces the record lowers or flattens out into a horizontal position so as to slide along the top or horizontal portions 111' and 112' of the guides.

As the record is further moved toward the center of the playing platform, it slides along the upper part of the guides until the edge of the record passes above the center pin 12 of the playing platform. The advancing edge of the record is brought underneath a finger 114 fixedly carried by the tone arm and engages with a pin 115 carried by this finger whereupon the tone arm and all parts connected with it will be swung by the record to the right about the pivot 17.

The record then continues its movement until the pin 110 on the record shifting arm is brought over the center pin 12 on the turn table whereupon the record will drop away from the record shifting arm down onto the rotating playing platform and be brought to speed. This is the extreme right hand position of the record shifting arm and on

account of the lost motion pin and slot connection 65 between the crank 64 and the connecting rod 66, it will be apparent that the record shifting arm is stationary for an appreciable interval of time so that the record may be easily deposited on the platform. To facilitate the depositing of this record, the pin 12 may be slightly tapered and rounded at the top to receive the center hole in the record.

During the movement of the record shifting arm from the position of rest to place it over the center of the playing platform, the arm 70, as indicated in Figure 19, has rested on top of the upper record in the record magazine and on this record as it is being transferred to bring it over onto the center pin 12. The slot 72 through which the record shifting arm passes is shaped to permit the arm to rest under the influence of gravity on the record when in these positions but this slot is provided with a camming surface which limits the downward movement of the arm 70 about its horizontal pivot and prevents the arm from dropping down onto the record which has been deposited onto the turn table. The extent of this lowering of the record shifting arm is indicated at 72b in Figure 19. In this manner the record shifting arm is prevented from coming in contact with the rotating records on the playing platform.

During the right hand movement of the record shifting arm, the reproducer lifting cam 75 has kept the reproducer up above the record so that the record can pass underneath the reproducer and stylus to engage the tone arm shifting finger 114, and the nose 101a of the cam 100 has passed beyond the collar 102 so that there is nothing to interfere with swinging the tone arm outwardly. The extent of this outward swinging movement of the tone arm is determined by the diameter of the record.

At the same time the arm 39 connected to the tone arm will have been moved by the record being shifted to the position indicated in dot and dash lines in Figures 3 and 6.

The reset of the starting switch for the auxiliary motor is accomplished through the connecting rod 66. This connecting rod is provided with a pusher 120 having one face 121 engageable with a depending member 122 carried by the arm 41 of the automatic switch. This pusher member engages the depending projection 122 during a portion of the movement of the crank as indicated in Figure 6 and causes the arms 41 and 43 and parts carried thereby to swing bodily in a counter clockwise direction about the pivot 42. During this movement the tip 123 of the resetting link 124 engages with a permanent stop 125. The link 124 is pivotally mounted on an arm of the member 48 and will cause this member 48 to pivot in a counterclockwise di-

rection about its axis 49 thereby causing the pin 52 carried by the lever member 47 to swing this lever member in a clockwise direction against the tension of the spring 55 until such time as the detent mechanism including these two levers, the pin and notch, becomes reset. This resetting of the motor starting switch 28 to open position is accomplished after the record has been deposited on the playing platform. The resetting of the starting switch to open position is utilized according to the present invention for opening the circuit of the auxiliary motor to initiate the period during which the motor does not operate so that the desired intermission can be had.

The connecting rod 66 continues to turn the oscillating ring 68 backward and at the proper time brings the cam 75 past the roller 76 allowing the goose neck to lower the stylus and reproducer into cooperative relation with the record. Besides accomplishing the restoration of the stylus to the record and pushing the tone arm for initial playing position, the movement of the ring 68 and parts carried thereby operates on the uppermost record in the record magazine in a manner to be described.

According to the preferred arrangement of circuits, the resetting of the starting switch to open position is utilized for stopping the auxiliary motor whenever an extended intermission is to be had. The starting switch remains open until the next cycle of operations is to be initiated.

The intermission control switch is shown in Figures 1 and 12 to 14, inclusive, and is designated generally by the letter "I". It is connected to branch 27a and has contacts to be described in detail later, whereby this switch may be manually set to render it ineffective to control the motor. For convenience in discussing the record changing cycle, it will be assumed that the intermission has been so set whereby the circuit 27a leading to the running switch 29 is indefinitely closed. Under these circumstances the opening of the starting switch 28 has no effect as the motor 26 will continue to run and complete the cycle.

The record magazine E is adapted to receive a repertoire of records either ten inch or twelve inch stacked on top of one another in any order. It is not necessary to accurately center the records in the magazine except that the top or uppermost record in the stack should be placed in a predetermined position, self determined by the size of the record and the shape and configuration of the record magazine. The lower records may be placed in the magazine in indeterminate relation and are brought one at a time to the predetermined position dependent upon the size of the particular record being played. This record having been so placed, is the one which is removed during the next cycle of

operations. The record storage magazine may conveniently be constructed in the form of a receptacle or pocket forming part of the phonograph table B and may conveniently be disposed slightly below the level of the playing platform. As indicated in the drawings the storage magazine has a sloping bottom 130. The general shape of the bottom of this receptacle is circular and is made large enough to receive a twelve inch record. This bottom wall slopes downwardly to the left and toward the rear of the cabinet so that the records therein may be moved leftwardly and rearwardly against the lower side walls of the receptacle and so that the receptacle is free of obstructions on the right front side.

The storage magazine is provided with side walls 131 and 132 which extend upwardly from the bottom 130 of the record receptacle. These side walls 131 and 132 are as indicated in the drawings placed at an acute angle to the bottom 130 and slope inwardly in varying degrees, whereby either a ten inch or twelve inch record may be disposed in a predetermined position dependent upon its position in the stack. For instance, if all of the records in the stack are twelve inch records and they are brought against the side walls 131 and 132, the records will be brought to a predetermined position defined by the points of contact of the peripheries of the records with the side walls of the record magazine. These records, however, will not be directly on top of one another but are slightly offset or placed in echelon with their center holes in the path of the pick up pin 110. As this pick up pin, however, does not move in a vertical plane on account of its lowering about the horizontal pivot, the record centers are offset to receive the pivot pin at the various elevations and according to its position in the stack. The offsetting of record centers is indicated by the center line 136, Figure 19.

The side walls 131 and 132 are also so shaped as to receive ten inch records and to locate these records when their peripheries are brought against the portions of the side walls in such a manner that their center holes are offset relative to one another and in the path of the pick up pin 110 as it swings over the record magazine and is raised or lowered in accordance with the number of records in the stack.

In the previous description, the transfer of the uppermost record from the stack in the magazine to the playing platform has been described. It was assumed that the second and other records in the stack were placed in the storage area in indeterminate relation. Assuming that the second record of the stack was placed off center as indicated at B in Figure 3, the operation of placing this record in a predetermined position will now be briefly described.

After the arm 70 is carried beyond the edge of the turn table, the slot 72 permits it to lower as indicated by the line 72c (Figure 19) to bring it toward the phonograph table.

A camming shoe 133 carried by the arm 70 causes the arm to raise up onto the upper record as indicated at 72d after which it moves along the top of this record until it is lifted up as indicated at 72a. During this return movement, the top record is brought against the side walls 131 and 132 of the storage magazine, and this record is in position to be engaged the next time the record changing mechanism functions.

At the extreme position of the arm 70, the brush 29d of the switch 29 is brought onto the insulating segment 29b, opening the circuit for the auxiliary motor. The record shifting arm comes to this position at the same time that the lost motion pin and slot connection 65 between the crank 64 and the connecting rod 66 comes into play. This lost motion connection permits the record shifting arm and these parts to remain stationary during the over run of the motor after the switch 29 has been opened.

The operations which have been so far described will be carried out as long as there are records in the storage magazine to be played, and, so long as the intermission switch circuit is set to permanently bypass the starting switch, there will be no sustained or extended intermission. That is to say, the phonograph will play a record placed on the playing platform after which the record shifting arm will bring the next record of the repertoire to the playing platform and deposit it in position, the resetting of the tone arm to position and operation of switches being carried out in the proper sequence. Succeeding records will be brought to the proper position in the storage magazine and then transferred to the playing platform one at a time. Besides the playing of the record of the repertoire one after another in succession, the present construction provides for the setting of the selector switch to permit carrying out the various operations set forth above.

Assume that the selector switch F has been moved to the proper position indicated in Figures 1 and 8. This is the proper setting where one intends to play records automatically in succession as long as there are records in the magazine to be played, and after the last record has been played once, to play it again from the ten inch position, and then allow the machine to stop.

The selector switch F is placed underneath the table B and is provided with an operating knob 140 disposed above the table B and carried between the guides 111 and 112 so that the records being transferred will pass up over this switch knob without interference. The selector switch is also provided

with a pointer 141 adapted to be set manually to any of the four indications "Single", "Multiple", "Repeat" "Off". These indications are carried on an indicia plate 142.

The knob 140 is fastened to a shaft 143 which carries the conducting ring 18 so that its ring can be set to locate the camming portions thereof in the desired position. This shaft is carried in a supporting frame 144 suitably mounted underneath the phonograph table. This frame is provided with a bracket 145 to support an insulating slab 145 provided with guides 147 to 152, inclusive, for the plungers 32, 22 and 24. It also supports the contacts 23, 25 and 31. Springs 153, 154 and 155 are provided to push the plungers over against the ring 18. When the parts are in the position indicated in Figure 9, the contacts 22 and 23 and the contacts 24 and 25 are in engagement to connect the circuits as above described, while the contact 32 is separated from the contact 31.

The lower end of the shaft 143 is provided with a gear 156 in mesh with a mutilated gear 157 carried on a counter shaft 158. This counter shaft is connected to a spring 159 whose free end 160 is anchored in the support. The shaft 143 is also provided with a disk 161 having a notch 162 cooperative with the spring pressed pawl 163. This arrangement of parts permits turning the knob 140 around in a clockwise direction without overwinding the spring 159. The mutilated gear permits thus rotating the knob in the same direction, the teeth being so arranged that additional tension can not be placed on the spring 159 after the knob has been turned past the "repeat" position. The pawl 163 cooperates in stopping the switch in the "off" position when released by the escapement mechanism to be described.

The selector switch is provided with escapement mechanism under the control of the record shifting mechanism and so associated with it that the selector switch is automatically changed from the "multiple" position to the "single" position when the record shifting mechanism goes through its cycle of operations in the absence of a record to be shifted. This same escapement mechanism also permits the selector switch to automatically shift from the "single" position to the "off" position whenever the record shifting mechanism is again actuated without transferring a record.

In actuating the selector switch advantage is taken of the fact that, when no record is being transferred, the record shifting arm passes through a different path than when a record is being transferred. The difference in this path is most clearly indicated in Figure 19 where it appears that when a record is being transferred, the record shifting arm passes upwardly as the record travels up the inclined surfaces of the guides and moves

horizontally until the record is deposited. After the record has been deposited the record shifting arm comes back as indicated in the dotted lines to the position of rest. When, however, the record shifting arm is actuated in the absence of a record, the arm descends all the way to the bottom of the record magazine, is carried along the bottom of this magazine as indicated by the dotted line 72e until it is carried up along the line indicated at 72c to raise it up clear of the turn table. This portion of its path is indicated in Figure 19 by the feathered arrow. The selector switch is actuated during the portion of the movement of the record shifting arm wherein it is supported by the camming surface instead of by a record being shifted.

As more clearly shown in Figure 4, the record shifting arm 70 extends downwardly below the bracket 71. This downward extension is indicated at 170 and as shown in the drawings has an outwardly and downwardly extending tip 171. It will be apparent that this tip 171 will swing about the vertical axis with the record shifting arm and will also swing about the horizontal axis so as to travel through paths corresponding with those of the pick up pin 110, illustrated in Figure 19. This path would be the same shape as there indicated but the extent of movement would be much smaller. This finger 171 is utilized to actuate the escapement mechanism for the selector switch.

This escapement mechanism is under the control of a plunger 172 carried in a guide 173 and pressed rearwardly by a spring 174. The lower rear end of the plunger 172 carries a slidable rotatable finger 175 having an upwardly extending projection 176. This finger is under the control of a coiled spring 177 which presses it forwardly and which holds it against a stop 178. When the record shifting mechanism functions with a record, the finger 171 passes upwardly without engaging the finger 175 or any of the parts associated with it. During the return movement of the record shifting arm the finger 171 engages the upwardly projecting part 176 of the finger 175 and turns it on its axis as indicated in Figure 9a and cams it back compressing the spring as indicated in Figure 9 thereby permitting the record shifting mechanism to pass by the parts carried by the plunger 172 without actuating the plunger 172.

When, however, the record shifting mechanism operates in the absence of a record to shift, the finger 171, as it moves with the arm 70, is carried in behind the finger 176 engaging with this finger and pushing the finger and plunger 172 toward the front of the cabinet moving it in the direction of the arrow shown in the lower part of Figure 10, this motion of the plunger 172 being

accomplished by the record shifting mechanism before the camming surface 72b has raised the record shifting arm up above the turn table. The front end of the plunger 172 is connected with an escapement lever 180 mounted underneath the switch parts and held against the plunger by a light spring 180'. This escapement finger has a bifurcated end provided with two tips 181 and 182 which are cooperative with stops 183 and 184 carried by the selector switch shaft 143 and insulated from the contact portions of the selector switch.

When the plunger 172 is pushed forwardly by the record shifting mechanism in the absence of a record being shifted, the finger 181 is carried past the stop 183 permitting the spring 159 to operate through the gearing to rotate the selector switch shaft 143 backward. This brings the stop 183 against the side 182 of the escapement finger 180 temporarily arresting the selector switch. As soon, however, as the finger 171 on the record shifting mechanism has passed beyond the finger 175, spring 174 moves the plunger 172 rearwardly allowing the stop 183 to pass by the point 182 on the finger, whereupon the spring 159 will again act on the selector shaft to bring the next stop 184 on the selector switch against the tip 181 on the escapement mechanism.

During this operation the selector switch parts will have been shifted from the "multiple" position as shown in Figures 1, 3 and 8 to the "single" position. This will have changed the circuit arrangement in the selector switch. The follower 32 will have moved down along the cut-away portion 19' of the selector switch so as to bring this follower against the contact 31 thereby connecting the running switch to the power supply and by-passing the intermission control circuits 27a and 27b.

During this movement of the record shifting mechanism in the absence of a record, the reproducer support is shifted to the initial position for a ten inch record so that the last record on the stack of records will be played from the ten inch position as a signal to indicate that the repertoire of records has been completed, and as the switch 32 has by-passed the intermission control circuits 27a and 27b, this playing will take place immediately upon the restoration of the stylus to the record. The operation of the mechanism for effecting the setting of the reproducer to the ten inch position in the absence of a record being shifted is partially brought about by the engagement of the record shifting arm 70 with the reproducer support at some convenient point on either the tone arm or the goose neck so as to swing the reproducer support nearly to the ten inch position. This engagement is impossible when a record is being shifted because the

edge of the record reaches the pin 115 to set the reproducer according to the size of the record.

The accurate placing of the reproducer in this position, however, is accomplished by a cam 190 carried on the link or connecting rod 66. As shown in Figures 5, 6 and 7 this cam 190 is carried adjacent a downwardly extending lug or pin 191 carried by the member 39 connected to the tone arm. This lug will be moved into the path of the cam 190 when the tone arm has been brought out nearly to the ten inch position by the record shifting arm. At the proper time as indicated in Figure 6, the cam 190 will engage with the pin 191 and will move the arm 39 and tone arm to the 10 inch position. The record shifting mechanism goes through the remaining functions as though it had deposited a record and the record is played from the ten inch position. During the return movement, the record shifting mechanism has no effect on the selector switch.

After the completion of the playing of this record, the auxiliary motor is again energized in the usual manner, and the record shifting mechanism goes through its movements, again in the absence of a record. This time the escapement mechanism operates to release the lug 184 on the selector switch permitting the selector switch to turn another quarter of a revolution bringing the pointer to the "off" position, where it is stopped by the pawl 163. This will cause the plunger 22 to ride down into the cam surface 20' opening the circuit for the platform motor and permitting it to stop. It will also open the circuit between the contacts 24 and 25. The auxiliary motor, however will continue to be supplied by current through the circuit provided by the switch points 31 and 32, and will continue to run until the auxiliary motor has carried the record shifting mechanism through a complete cycle of operations so as to bring the brush 29e again onto the insulating segment 29b whereupon both the motors are disconnected from the circuit and the apparatus stops with the record shifting arm back in the compartment provided for it and with the stylus resting on the upper record on the platform. The records may then be removed from the platform in an obvious manner.

When it is desired to repeat a single record indefinitely, this record is placed on the playing platform, no records are placed in the magazine, and the selector switch is moved to the "repeat" position, being held thereby the pawl 163 which enters a notch 185 in the disk 161. In this position the selector switch is out of the range of action of the escapement mechanism and is held in this position until manually moved from it. The circuit arrangement is the same as indicated in Figure 15 in the drawings and the phono-

graph will repeat this record on the platform indefinitely, the time between various renditions of the record being controlled by the intermission controlling devices to be described.

Controls for intermission and intermission sequence

The intermission control circuits, as above referred to, have two branches 27a and 27b which lead from the supply terminal 25 of the selector switch F to the running switch contact 29d. When the auxiliary motor is stopped both these circuits are opened at the running switch. The circuit 27a is adapted to control the time or intermission between records, while the circuit 27b is controlled by the intermission sequence mechanism above referred to.

Assuming that the sequence control circuit 27b is in the position for allowing extended intermission after each record, the operation of the intermission or time mechanism will now be described. The intermission or time controller is shown in Figures 1 and 12 to 14, inclusive.

In addition to the worm 38 for operating the automatic trip, the platform motor is also drivingly connected through a chain 200 to a second worm 201 mounted in the sub-frame 202 carried underneath the phonograph table adjacent the upper end of the shaft 63. This frame 202 carries a straight guide bar 203 which supports movable contact carrier 204. The frame also carries a bus 205 supported on a strip of insulation 206 and a plurality of fixed contacts 207, 208a to 208i, inclusive. These contacts are carried on an insulating strip 209 so arranged that one contact is fastened to the upper side of the strip and bent downwardly, while the adjacent contact is fastened to the lower side of the strip and bent upwardly.

The movable contact carrier 204 carries a brush 210 cooperative with the bus 205 and a second contact 211 shown more in detail in Figure 12a. The contact carrier 204 also carries a lever 212 provided with a serrated edge 213 cooperative with the upper side of the worm 201. The lever 212 is pivoted at 214 and the lower arm 215 of this lever is in the path of a resetting pin 216 carried by the crank 64. Soon after the auxiliary motor 26 starts the cycle of record changing operations, it will have moved the timer reset pin 216 to the right as indicated in Figure 14 bringing the tapered surface 217 of this pin against the foot 218 of the lever 212. This tapered surface will turn the lever in a counterclockwise direction as indicated in dot and dash lines in Figure 14 until the smaller diameter part 219 of the resetting pin engages the foot of the lever, after which the entire carrier will be moved to the right or upwardly as shown in Figure 12. During this operation, the spring 220 has been ten-

sioned and as soon as the pin 216 passes by the end of the lever 212, the spring will bring the serrated edge of the lever down into the worm. At this time the movable contact 211 will have been moved back to the fixed contact 207.

As soon as the follower engages the worm, it will be apparent that the carrier will be advanced toward the rear of the cabinet. If at this time the knob 225 on the upper rear part of the cabinet has been turned away from the zero or continuous position to set it so that it is connected with any of the contacts 208a to 208i, inclusive, it will be apparent that the circuit 27a will have been opened by the return of the carrier 204. As soon as the trip switch 28 is opened by being reset, it will be apparent that the circuit for the auxiliary motor is open so that the motor will stop. In practice, it is found convenient to have this stopping take place shortly after the deposit of the record. The auxiliary motor and all the parts will remain stationary while the platform motor continues to revolve the platform and turn the worms.

As the worm 201 revolves, the carrier 204 will be moved carrying with it the contact 211. In order to reduce sparking at the contacts, the movable contact 211 is preferably cut back as indicated at 211a and is provided with a rounded contacting face 211b which rides across the stationary contact as the contact carrier moves. These contacts are arranged saw-tooth fashion so that as the contact 211 passes by the end of a stationary contact, the spring 211c in the contact carrier will snap the movable contact 211 over onto the next adjacent stationary contact. When this movable contact reaches the selected stationary contact, the circuit for the auxiliary motor is completed from this contact through the intermission setting knob or dial 225 and the wire leads indicated at 226 and 227 to the contact 29d of the running switch. This will permit the auxiliary motor to start and complete the cycle. The stationary contacts 208 are made long enough to permit the auxiliary motor to complete the cycle.

The phonograph may be provided with an arrangement of contacts by which any desired length of intermissions may be had. The worm 201 does not extend the entire length of the shaft which carries it, it being cut away at the rear end as indicated in Figure 12 so as to permit the carrier to pass off the worm in case the phonograph motor operates longer than the predetermined time.

When the knob 225 of the intermission control is set to the "continuous" position, it is connected to the terminal 207 against which the movable contact 211 is brought by the timer return mechanism. If the knob is set on "continuous" the auxiliary motor does not stop when the trip switch G opens. This permits obtaining a minimum time between

records and is a setting which will be used when no extended intermission is desired.

The intermission sequence circuit 27b is connected to a selector arm 230 also embodied in a knob or dial located in the upper rear part of the cabinet. This knob in the form here shown has four positions marked, "1", "2", "3" and "4". When it is placed on the position marked "1", the intermission sequence circuit is open at all times and the intermission will be had after every record as indicated in the column marked "1" in Figure 2.

A structural embodiment of an intermission sequence controller is shown in Figures 15 to 18, inclusive. This device is driven from the one-revolution shaft 63 by gears or chain drive 231. It includes a shaft 232 which carries three pinions 233, 234 and 235. The pinion 233 is in mesh with a gear 236 having four times the number of teeth while the gear 234 is in mesh with a gear 237 having three times its teeth, and the gear 235 is in mesh with the gear 238 having twice as many teeth. The gears 236, 237 and 238 carry insulating cam plates 239, 240 and 241. It will thus be apparent that the cam plate 241 turns once for every two revolutions of the one-revolution shaft 63, while the cam plate turns once for every three such revolutions, and the cam plate 239 turns once for every four such revolutions.

As here shown, each of these cam plates is provided with a follower 242 held against the cam plate by a spring 243. These followers may be metal and are guided in an insulating plate 244 and a metal guide plate 245 supported on an insulating bracket 245'. The bracket 245' carries three sets of spring contacts 246, 247 and 248 each of which may, if desired, have a steel spring 246' and a brass conducting spring 246''. These contacts are normally held against the end of the plungers 242 so that the circuit is completed when these plungers are pushed out as indicated in the drawings. The metal guide plate 245 is connected into the lead 226 by a wire 250 so that these plungers are connected to the contact 29d with the running switch. The contacts 246, 247 and 248 are connected to terminals numbered "4", "3" and "2" in the selector switch 230. Each of the cams 239, 240 and 241 has a single notch 239', 240' and 241' into which the corresponding plunger is pressed by the spring once during the revolution of the cam plate.

Assuming that the selector switch 230 is placed on the contact marked "2", it will be noted that the contact 248 is connected with a current supply circuit and as long as the cam 241 holds up its plunger the circuit 27b will be completed through to the running switch. In the same manner the circuit will be connected when the selector switch 230 is brought onto terminals "3" or "4". If the

phonograph is started with the parts in the relative position shown in Figure 1, the operation of the auxiliary motor in making the first record change will turn the cam 241 half way round, and during this entire operation of the auxiliary motor, the circuit will have been closed through the contact 248. No intermission will then be had. On the next operation of the auxiliary motor, however, the notch 241' of the cam plate 241 will permit the plunger to lower and open the circuit at the contact 248. Hence the intermission will be obtained according to the setting of the intermission switch, and the cycle of intermissions will be as indicated in column 2, Figure 2. If the switch 230 is connected to a terminal marked "3" the intermissions will come after every third record, as there indicated in column 3, and similarly after every fourth record when the switch is moved to position # "4".

The manual switch 59 which has been described as being suitable for bypassing the trip switch so as to start the auxiliary motor in rejecting a record is a normally open switch. As here shown, it is also provided with a second contact 259 connected by a lead 260 to the connection 227 leading to the running switch. One can operate this manual switch if desired just to start the auxiliary motor and then to throw the switch over to the other point 259 as soon as the auxiliary motor has brought the running switch into position. As this manual switch may be swung over at any time, one can bypass the time controlling circuits, allowing the running switch to stop the auxiliary motor as soon as the cycle is completed.

From the foregoing, it will be apparent that one can readily preset the parts to accomplish a wide variety of operations. In starting up the phonograph, it is merely necessary to place the first record on the playing platform, swing the selector switch F around to the multiple position, and place the stylus in the record groove in the usual manner. The remaining records of the selection may be placed in the record magazine, the uppermost record being pushed to the back of the magazine. The knob 225 may be then adjusted to give the desired intermission which will be indicated by appropriate indicia carried on indicia plate 265 adjacent the dial. The knob 230 may be adjusted to give the desired intermission sequence after every record, after every other record, etc. by turning the knob to the desired indication on the plate 265. The phonograph will then operate until the entire selection of records has been played with the desired intermission and intermission spacing, after which the last record will be repeated once from the ten inch position, without an intermission, whereupon the phonograph stops after the second playing of this record.

When it is desired to play a single record once after which the phonograph is stopped, the record is placed on the playing platform and the selector switch set in the single position. A series of records may be played with the selector switch in this position but the intermission controls will be ineffective. The phonograph will immediately stop after the last record is played.

While the invention is most conveniently embodied in a phonograph wherein two motors are employed, one to operate the record support and another to operate the record changing mechanism, it will of course be understood that in its broader aspect the invention is not limited to two motors for a single motor with appropriate clutches and other parts could be employed to carry out the functions of both motors.

I claim:

1. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated automatic record changing mechanism actuated through said mechanism including means to temporarily stop the mechanism, a predetermined cycle to effect the transfer of a record, and an intermission controlling device for variably controlling the interval after the record changing mechanism has been stopped until it is started again whereby the time required for the cycle may be changed.

2. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the motor stops, and an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed.

3. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the motor stops, an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, and a bypassing circuit for the intermission switch automatically closed after the playing of the last record of a series of records whereby the cycle is carried out without an intermission.

4. In a multiple record phonograph, a record support, a continuously operating motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxil-

5 iary motor after which the motor stops, and an intermission switch under the control of the first motor for variably controlling the time during which the circuit of the auxiliary motor is open whereby the time required for the cycle may be changed.

10 5. An automatic phonograph having a record support, a continuously operating motor for driving the record support, a movable reproducer and stylus cooperative with records on the support, an intermittently operated auxiliary motor, automatic record changing mechanism automatically set into operation upon the completion of the playing
15 of a record for effecting a record change and restoring the reproducer and stylus into position to commence playing another record, and means under the control of the first motor for interrupting the operation of said
20 mechanism whereby the time between successive renditions may be controlled.

25 6. An automatic phonograph having a record support, a driving motor therefor, a movable reproducer and stylus cooperative with records on the support, an auxiliary motor automatically set into operation upon the completion of the playing of a record, mechanism operated thereby for effecting a
30 record change and restoring the reproducer and stylus into position to commence playing another record after which the auxiliary motor is stopped, and means under the control of the driving motor for interrupting the cycle of operations of the auxiliary
35 motor to arrest the mechanism whereby the time between successive renditions may be controlled.

40 7. An automatic phonograph having a record support, a driving motor therefor, a movable reproducer and stylus cooperative with records on the support, an auxiliary motor automatically set into operation upon the completion of the playing of a record, mechanism operated thereby for effecting a
45 record change and restoring the reproducer and stylus into position to commence playing another record after which the auxiliary motor is stopped, means under the control of the driving motor for interrupting the cycle
50 of operations of the auxiliary motor to arrest the mechanism whereby the time between successive renditions may be controlled, and a bypassing circuit automatically closed after the playing of the last record for rendering the last mentioned means ineffective
55 whereby the auxiliary motor continues to operate until its cycle is completed.

60 8. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the auxiliary motor stops, and an intermission switch for variably controlling
65

the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, said switch including a movable contact actuated to a predetermined position by the auxiliary motor, a worm operated by the driving motor, means operated by the worm for moving the movable contact at a predetermined rate, a plurality of fixed contacts past which the moving contact is carried, and a selector arm connectible to any selected fixed contact.

9. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the auxiliary motor stops, said mechanism including a one-revolution shaft, and an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, said switch including a movable contact actuated to a predetermined position by the one-revolution shaft, a worm operated by the driving motor, means operated by the worm for moving the movable contact at a predetermined rate, a plurality of fixed contacts past which the moving contact is carried, and a selector arm connectible to any selected fixed contact.

10. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the auxiliary motor stops, and an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, said switch including, a worm operated by the driving motor, a movable contact normally moved by the worm at a predetermined rate, the movable contact being actuated to a predetermined position by the auxiliary motor during the early part of its cycle, a fixed contact on which the movable contact is then placed and along which it is moved by the worm, a plurality of other fixed contacts past which the moving contact is carried, and a selector arm connectible to any selected fixed contact, the first fixed contact being long enough to permit the auxiliary motor to complete the circuit before the movable contact is carried beyond it whereby the intermission switch may be rendered effective or ineffective at will.

11. An automatic multiple record phonograph comprising a continuously rotating record support, a driving motor therefor, a movable reproducer and stylus cooperative with records on the record support, mecha-

nism automatically set into operation upon the completion of the playing of a record for automatically changing records and restoring the reproducer and stylus to position to commence playing the next record, or for similarly restoring the reproducer and stylus to the record just played in the absence of a record change, and manually presettable means under the control of the motor for interrupting the operation of said mechanism to hold the stylus off the record whereby the intermission between the successive renditions may be controlled.

12. An automatic multiple record phonograph comprising a record support, a driving motor therefor, a movable reproducer and stylus cooperative with records on the record support, an auxiliary motor, mechanism automatically set into operation upon the completion of the playing of a record and actuated by the auxiliary motor for automatically changing records and restoring the reproducer and stylus to position to commence playing the next record, or for similarly restoring the reproducer and stylus to the record just played in the absence of a record change, and manually presettable means under the control of the driving motor for interrupting the operation of the auxiliary motor whereby the intermission between the successive renditions may be controlled.

13. An automatic multiple record phonograph comprising a record support, a driving motor therefor, a movable reproducer and stylus cooperative with records on the record support, mechanism automatically set into operation upon the completion of the playing of a record for automatically changing records and restoring the reproducer and stylus to position to commence playing the next record, or for similarly restoring the reproducer and stylus to the record just played in the absence of a record change, manually presettable means under the control of the motor for interrupting the operation of said mechanism whereby the intermission between the successive renditions may be controlled, and manually presettable means operated by the mechanism to render the first mentioned means ineffective during a predetermined sequence of records whereby the intermission for which the first means is set is available only after the playing of the sequence of records.

14. An intermission controller for multiple record phonographs comprising, a continuously operating playing platform driving motor, a worm driven by the motor, a follower for the worm, a movable contact carried by the follower, means to restore the follower to a predetermined position after the playing of each record, a plurality of fixed contacts cooperative with the movable contact, and a selector arm connectible to any of the fixed contacts whereby a circuit may be

completed after the movable contact has been carried to the selected fixed contact.

15. An intermission controller for multiple record phonographs comprising, a continuously operating playing platform driving motor, a worm driven by the motor, a follower for the worm, a movable contact carried by the follower, record change mechanism operated by an auxiliary motor, means operated by the auxiliary motor to restore the follower to a predetermined position after the playing of each record, a plurality of fixed contacts cooperative with the movable contact, and a selector arm connected to the auxiliary motor and connectible to any of the fixed contacts whereby the motor circuit may be completed after the movable contact has been carried to the selected fixed contact, each of said fixed contacts being long enough to maintain the circuit while the auxiliary motor is actuating the record change mechanism throughout the remainder of its cycle.

16. An intermission controller for multiple record phonographs comprising, a continuously operating playing platform driving motor, a worm driven by the motor, a follower for the worm, a movable contact carried by the follower, record change mechanism operated by an auxiliary motor, means operated by the auxiliary motor to restore the follower to a predetermined position after the playing of each record, a fixed contact engageable by the movable contact when in this position, a plurality of fixed contacts cooperative with the movable contact, and a selector arm connectible to any of the fixed contacts whereby a circuit may be completed after the movable contact has been carried to the selected fixed contact.

17. An intermission controller for multiple record phonographs comprising, a continuously operating playing platform driving motor, a worm driven by the motor, a follower for the worm, a movable contact carried by the follower, record change mechanism operated by an auxiliary motor, means operated by the auxiliary motor to restore the follower to a predetermined position after the playing of each record, a fixed contact engageable by the movable contact when in this position, a plurality of fixed contacts cooperative with the movable contact, and a selector arm connectible to any of the fixed contacts whereby a circuit may be completed after the movable contact has been carried to the selected fixed contact, each of said fixed contacts being long enough to maintain the circuit while the auxiliary motor is actuating the record change mechanism throughout the remainder of its cycle.

18. A multiple record phonograph having means for successively playing a repertoire of records, presettable means for varying the intermission between the successive

renditions, and presettable means for rendering the first mentioned means ineffective throughout a predetermined number of renditions whereby the intermission may be had according to a predetermined sequence.

19. A multiple record phonograph having a record support, means for successively presenting the records of a repertoire into playing position, an auxiliary motor for effecting the record change, presettable means for varying the intermission between the successive renditions, and presettable means for rendering the first mentioned means ineffective throughout a predetermined number of renditions whereby the intermissions may be had according to a predetermined sequence, both said presettable means including circuits and switches for controlling the auxiliary motor.

20. A multiple record phonograph having a record platform adapted to play records in succession, a platform motor, a power supply, a platform motor controlling switch, a movable reproducer and stylus cooperative with the grooves in a record on the platform and adapted to be moved thereby across the platform, an auxiliary motor, a main switch for connecting the auxiliary motor circuit to the power supply, a normally open starting switch for the auxiliary motor, record controlled switch closing means for closing the starting switch to start the auxiliary motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor connected in parallel with the starting switch, means operated by the auxiliary motor for closing the running switch, resetting the starting switch to open position and thereafter opening the running switch after a predetermined cycle has been carried out, and automatic record changing mechanism operated by the auxiliary motor during said cycle, the connections for the running switch including, a manually presettable switch for controlling the intermission between renditions, the intermission switch having a circuit controller set to a predetermined open circuit position by the auxiliary motor operated device and thereafter actuated at a predetermined rate by the platform motor to close the circuit after a predetermined time, the auxiliary motor being idle while the intermission controlling switch is open.

21. A multiple record phonograph having a record platform adapted to play records in succession, a platform motor, a power supply, a platform motor controlling switch, a movable reproducer and stylus cooperative with the grooves in a record on the platform and adapted to be moved thereby across the platform, an auxiliary motor, a main switch for connecting the auxiliary motor circuit to the power supply, a normally open starting switch for the auxiliary motor, record con-

trolled switch closing means for closing the starting switch to start the auxiliary motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor connected in parallel with the starting switch, means operated by the auxiliary motor for closing the running switch, resetting the starting switch to open position and thereafter opening the running switch after a predetermined cycle has been carried out, an automatic record changing mechanism operated by the auxiliary motor during said cycle and restoring the reproducer and stylus to the playing position, the connections for the running switch including, a manually presettable switch for controlling the intermission between renditions, the intermission switch having a circuit controller set to a predetermined open circuit position by the auxiliary motor operated device and thereafter actuated at a predetermined rate by the platform motor to close the circuit after a predetermined time, the auxiliary motor being idle while the intermission controlling switch is open, means whereby the platform motor controlling switch is automatically actuated toward open position by the operation of the record changing mechanism in the absence of a record to shift, this switch being capable of being preset to require two such movements to open the circuit whereby the last record played will be repeated once before the motor stops, and a sustaining switch closed when the platform motor control switch is moved the first time, the sustaining switch being connected to the running switch to keep the auxiliary motor in operation until the cycle is completed, and bypassing the intermission switch to render it ineffective to delay the repeat of the last record.

22. A multiple record phonograph having a record platform adapted to play records in succession, a platform motor, a power supply, a platform motor controlling switch, a movable reproducer and stylus cooperative with the grooves in a record on the platform and adapted to be moved thereby across the platform, an auxiliary motor, a main switch for connecting the auxiliary motor circuit to the power supply, a normally open starting switch for the auxiliary motor, record controlled switch closing means for closing the starting switch to start the auxiliary motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor connected in parallel with the starting switch, means operated by the auxiliary motor for closing the running switch, resetting the starting switch to open position and thereafter opening the running switch after a predetermined cycle has been carried out, an automatic record changing mechanism operated by the auxiliary motor during said cycle and restoring the repro-

ducer and stylus to the playing position, the connections for the running switch including, a manually presettable switch for controlling the intermission between renditions, the intermission switch having a circuit controller set to a predetermined open circuit position by the auxiliary motor operated device and thereafter actuated at a predetermined rate by the platform motor to close the circuit after a predetermined time, the auxiliary motor being idle while the intermission controlling switch is open, the connections for the running switch also including, an intermission spacing circuit in parallel with the intermission controlling switch, said last mentioned circuit including an intermission selector switch connected to contacts opened only after a predetermined number of cycles of operation of the auxiliary motor whereby the intermission may occur after the selected number of renditions.

23. A multiple record phonograph having a record platform adapted to play records in succession, a platform motor, a power supply, a platform motor controlling switch, a movable reproducer and stylus cooperative with the grooves in a record on the platform and adapted to be moved thereby across the platform, an auxiliary motor, a main switch for connecting the auxiliary motor circuit to the power supply, a normally open starting switch for the auxiliary motor, record controlled switch closing means for closing the starting switch to start the auxiliary motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor connected in parallel with the starting switch, means operated by the auxiliary motor for closing the running switch, resetting the starting switch to open position and thereafter opening the running switch after a predetermined cycle has been carried out, an automatic record changing mechanism operated by the auxiliary motor during said cycle and restoring the reproducer and stylus to the playing position, the connections for the running switch including a manually presettable switch for controlling the intermission between renditions, the intermission switch having a circuit controller set to a predetermined open circuit position by the auxiliary motor operated device and thereafter actuated at a predetermined rate by the platform motor to close the circuit after a predetermined time, the auxiliary motor being idle while the intermission controlling switch is open, the connections for the running switch also including, an intermission spacing circuit in parallel with the intermission controlling switch, said last mentioned circuit including an intermission selector switch connected to contacts opened only after a predetermined number of cycles of operation of the auxiliary motor whereby the intermission may occur after the selected

number of renditions, means whereby the platform motor controlling switch is automatically actuated toward open position by the operation of the record changing mechanism in the absence of a record to shift, this switch being capable of being preset to require two such movements to open the circuit whereby the last record played will be repeated once before the motor stops, and a sustaining switch closed when the platform motor control switch is moved the first time, the sustaining switch being connected to the running switch to keep the auxiliary motor in operation until the cycle is completed and bypassing the intermission switch to render it ineffective to delay the repeat of the last record.

24. A multiple record phonograph having a record platform adapted to play records in succession, a platform motor, a power supply, a platform motor controlling switch, a movable reproducer and stylus cooperative with the grooves in a record on the platform and adapted to be moved thereby across the platform, an auxiliary motor, a main switch for connecting the auxiliary motor circuit to the power supply, a normally open starting switch for the auxiliary motor, record controlled switch closing means for closing the starting switch to start the auxiliary motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor connected in parallel with the starting switch, means operated by the auxiliary motor for closing the running switch, resetting the starting switch to open position and thereafter opening the running switch after a predetermined cycle has been carried out, an automatic record changing mechanism operated by the auxiliary motor during said cycle and restoring the reproducer and stylus to the playing position, the connections for the running switch including, a manually presettable switch for controlling the intermission between renditions, the intermission switch having a circuit controller set to a predetermined open circuit position by the auxiliary motor operated device and thereafter actuated at a predetermined rate by the platform motor to close the circuit after a predetermined time, the auxiliary motor being idle while the intermission controlling switch is open, the connections for the running switch also including an intermission spacing circuit in parallel with the intermission controlling switch, said last mentioned circuit including an intermission selector switch connected to contacts opened only after a predetermined number of cycles of operation of the auxiliary motor whereby the intermission may occur after the selected number of renditions, the power supply connecting switches being capable of being preset in a position requiring manual opening, whereby a single record, or the last record of

a repertoire will be repeated indefinitely with the intermissions grouped according to the settings of the switches.

25. A multiple record phonograph having a record support, means for successively presenting the records of a repertoire into playing position, an auxiliary motor for effecting the record change within a predetermined minimum time, and means for opening and closing the motor circuit to stop the motor during the record changing operation so that a predetermined longer intermission may be had between successive renditions.

26. A multiple record phonograph having a record support, means for successively presenting the records of a repertoire into playing position, an auxiliary motor for effecting the record change within a predetermined minimum time, means for opening and closing the motor circuit to stop the motor during the record changing operation so that a predetermined longer intermission may be had between successive renditions, and means for rendering the motor stopping means ineffective throughout a predetermined number of renditions whereby the intermissions may be had according to a predetermined sequence.

27. A multiple record phonograph having a record support, means for successively presenting the records of a repertoire into playing position, an auxiliary motor for effecting the record change within a predetermined minimum time, means for opening and closing the motor circuit to stop the motor during the record changing operation so that a predetermined longer intermission may be had between successive renditions, and means for rendering the motor stopping means ineffective throughout a predetermined number of renditions whereby the intermissions may be had according to a predetermined sequence, said last mentioned means including a bypass circuit and motor operated means for opening the circuit only after the predetermined number of renditions.

28. A multiple record phonograph having a record support, means for successively presenting the records of a repertoire into playing position, an auxiliary motor for effecting the record change within a predetermined minimum time, means for opening and closing the motor circuit to stop the motor during the record changing operation so that a predetermined longer intermission may be had between successive renditions, and means for rendering the motor stopping means ineffective throughout a predetermined number of renditions whereby the intermissions may be had according to a predetermined sequence, said last mentioned means including a bypassing circuit having pairs of normally closed contacts, a selector switch connectible

to one of the contacts of any pair, and motor driven devices for opening the pairs of contacts according to the desired sequence.

29. A multiple record phonograph having a record support, means for successively presenting the records of a repertoire into playing position, an auxiliary motor for effecting the record change within a predetermined minimum time, means for opening and closing the motor circuit to stop the motor during the record changing operation so that a predetermined longer intermission may be had between successive renditions, and means for rendering the motor stopping means ineffective throughout a predetermined number of renditions whereby the intermissions may be had according to a predetermined sequence, said last mentioned means including a bypassing circuit having pairs of normally closed contacts, a selector switch connectible to one of the contacts of any pair, and a motor driven gear box having gears of two to one, three to one, and four to one ratio, each pair of gears being associated with a pair of contacts to open the same after every other rendition, every third rendition, or every fourth rendition.

30. In a multiple record phonograph, record shifting mechanism, an auxiliary motor for operating the record shifting mechanism, a shaft driven one revolution by the motor for each record change, a motor supply circuit having a pair of normally closed contacts, and motor driven means functioning after a predetermined number of revolutions of the shaft to separate the contacts during a portion of the next revolution and to close them during the remainder of said revolution.

31. In a multiple record phonograph, record shifting mechanism, an auxiliary motor for operating the record shifting mechanism, a shaft driven one revolution by the motor for each record change, a motor starting switch, a motor running switch which opens after the completion of the revolution of the shaft, a motor supply circuit connected to the running switch having a pair of normally closed contacts, and motor driven means functioning after a predetermined number of revolutions of the shaft to separate the contacts during a portion of the next revolution and to close them during the remainder of said revolution, the circuit being opened by the running switch to stop the motor.

32. In a multiple record phonograph, record shifting mechanism, an auxiliary motor for operating the record shifting mechanism, a shaft driven one revolution by the motor for each record change, a motor supply circuit having a plurality of pairs of normally closed contacts, a plurality of motor driven means each functioning after a different predetermined number of revolutions of the shaft to separate a corresponding pair of contacts during a portion of the next revolution and

to close them during the remainder of said revolution, and a selector switch in the supply circuit connectible to one of the contacts of each pair whereby the circuit opening may occur according to the desired sequence.

33. In a multiple record phonograph, record shifting mechanism, an auxiliary motor for operating the record shifting mechanism, a normally open starting switch for the auxiliary motor, record controlled switch closing means for closing the starting switch to start the auxiliary motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor connected in parallel with the starting switch, means operated by the auxiliary motor for closing the running switch, resetting the starting switch to open position and thereafter opening the running switch after a predetermined cycle has been carried out, a shaft driven one revolution by the motor for each record change, a second motor supply circuit connected ahead of the starting switch and to the running switch and having a pair of normally closed contacts, motor driven means functioning after a predetermined number of revolutions of the shaft to separate the contacts during a portion of the next revolution prior to the resetting of the starting switch and to close them during the remainder of said revolution, and a third motor supply circuit adapted to bypass the contacts in the second circuit.

34. In a multiple record phonograph, motor operated record changing mechanism, including a shaft operated through one complete revolution for each record change, a motor supply circuit and a shaft-operated circuit breaker and maker functioning during only one of a predetermined number of revolutions, and a bypassing circuit having a switch and time controlled means to close the switch after the circuit breaker is opened to permit the motor to complete the record change.

35. An intermission spacing mechanism for multiple record phonographs wherein records are changed, comprising a motor operated shaft turned a predetermined amount for each record change, a plurality of pairs of normally closed contacts, shaft operated means associated with each pair of contacts and functioning regularly after a predetermined number of such shaft movements for opening the corresponding pair of contacts during at least a portion of the succeeding shaft movement, and a selector switch connectible to any pair of contacts.

36. An intermission spacing mechanism for multiple record phonographs, comprising a motor operated shaft turned one complete revolution for each record change, a plurality of circuit controllers each actuated once during one of a predetermined number of

complete revolutions of the shaft, and a selector switch connectible to any one of the circuit controllers.

37. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the auxiliary motor stops, and an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, said switch including a movable contact actuated to a predetermined position by the auxiliary motor, a contact carried for the movable contact, driving motor operated means for driving the movable contact carrier at a uniform speed, a plurality of fixed contacts past which the moving contact is carried, and a selector arm connectible to any selected fixed contact.

38. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the auxiliary motor stops, said mechanism including a one-revolution shaft, and an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, said switch including a movable contact actuated to a predetermined position by the one-revolution shaft, a contact carrier for the movable contact, driving motor operated means for driving the movable contact carrier at a uniform speed, a plurality of fixed contacts past which the moving contact is carried, and a selector arm connectible to any selected fixed contact.

39. In a multiple record phonograph, a record support, a motor for driving the record support, an intermittently operated auxiliary motor, automatic record changing mechanism actuated through a predetermined cycle by the auxiliary motor after which the auxiliary motor stops, and an intermission switch for variably controlling the time during which the circuit of the auxiliary motor is opened whereby the time required for the cycle may be changed, said switch including, a movable contact normally driven by the driving motor at a uniform speed, the movable contact being actuated to a predetermined position by the auxiliary motor during the early part of its cycle, a fixed contact on which the movable contact is then placed and along which it is moved, a plurality of other fixed contacts past which the moving contact is carried, and a selector arm connectible to any selected fixed contact, the first fixed contact being long enough to

permit the auxiliary motor to complete the circuit before the movable contact is carried beyond it whereby the intermission switch may be rendered effective or ineffective at
5 will.

40. In a multiple record phonograph, the combination with a motor driven playing platform, an auxiliary motor, a normally open starting switch for the auxiliary motor,
10 record controlled switch closing means for starting the motor upon the completion of the playing of a record, a normally open running switch for the auxiliary motor, motor operated means for closing the running
15 switch and resetting the starting switch to open position and for thereafter opening the running switch after a predetermined cycle has been carried out, of intermission controlling mechanism to open the circuit for the
20 running switch prior to the opening of the starting switch whereby the auxiliary motor is stopped, and a timing switch driven by the platform motor for completing the circuit to the running switch after a predetermined
25 interval has elapsed.

Signed at New York, county of New York,
and State of New York, this 12th day of June,
1928.

JACK POTTER STOCKTON.

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