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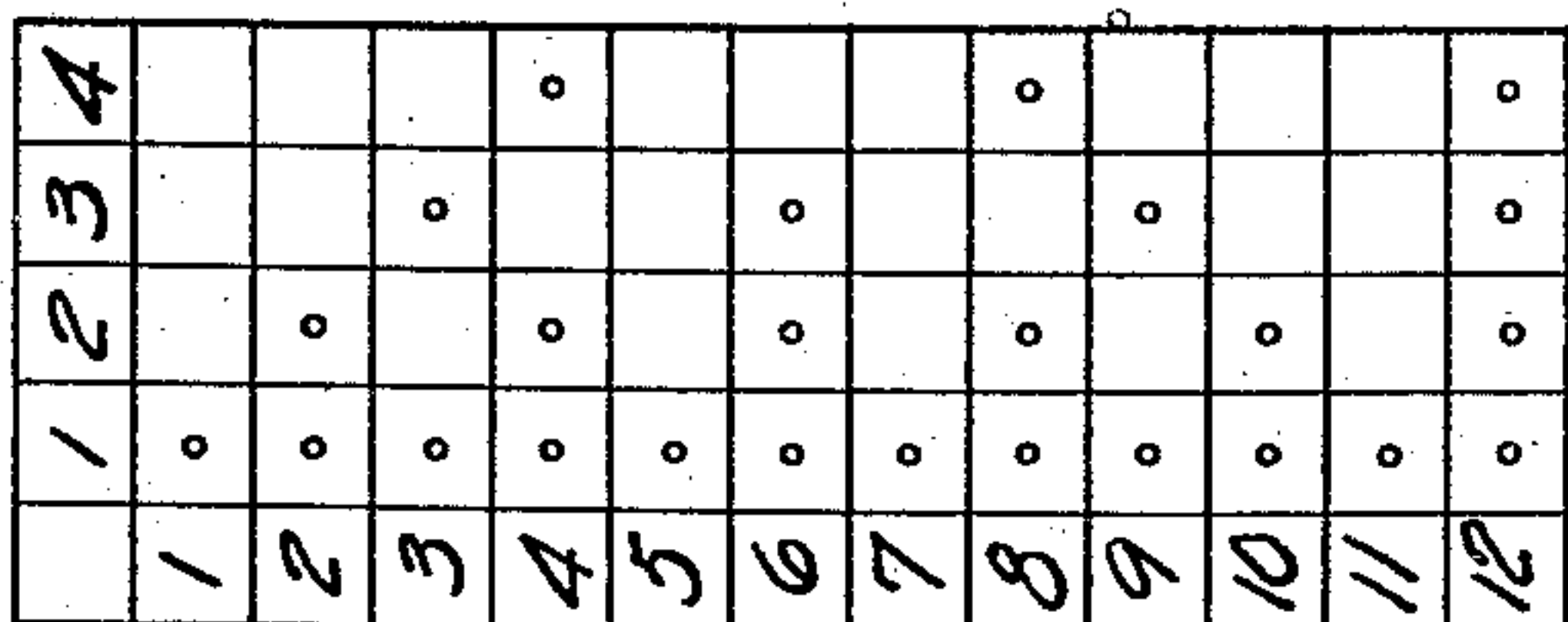
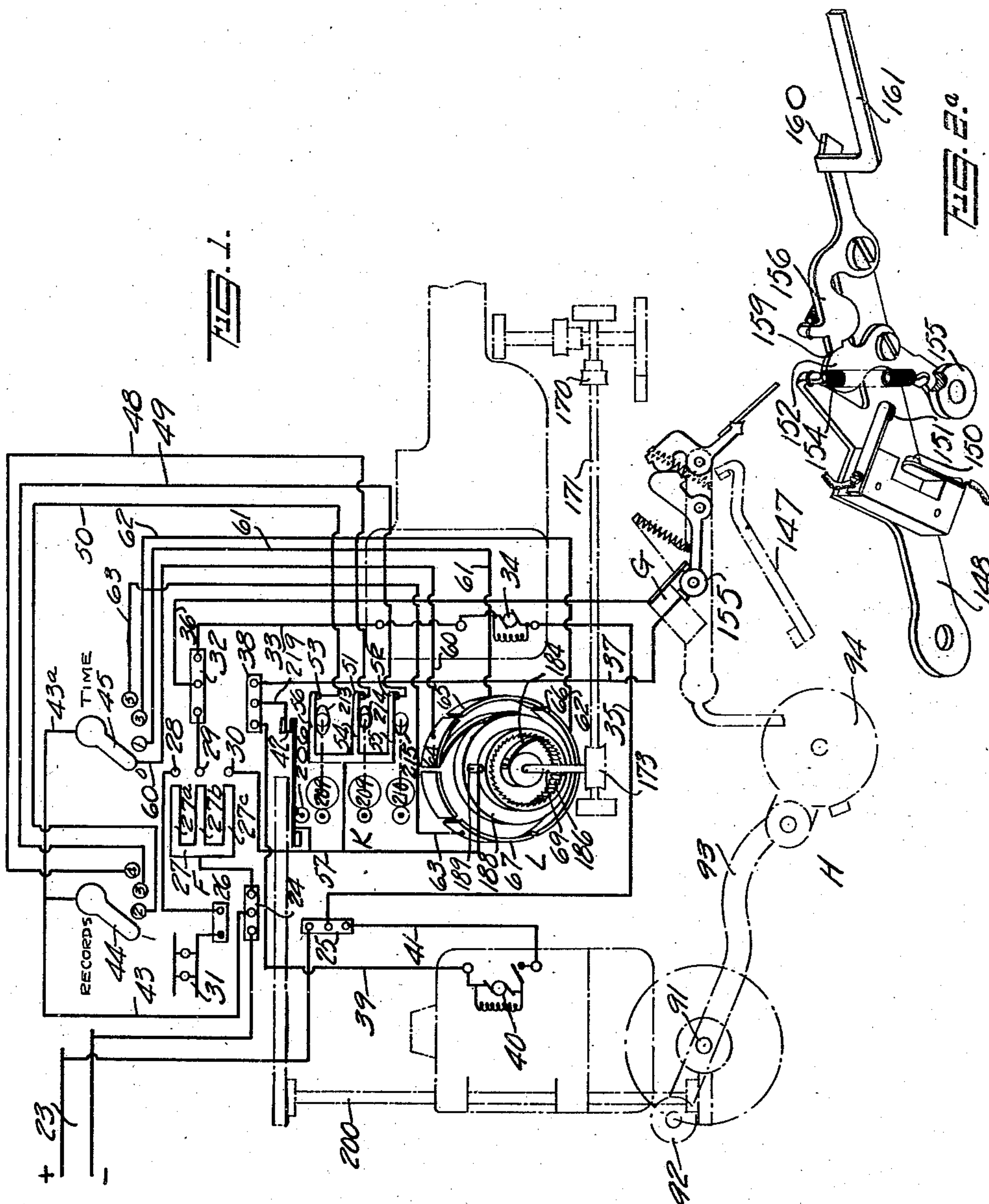
J. P. STOCKTON

1,992,334

PHONOGRAPH

Filed April 29, 1930

10 Sheets-Sheet 1



INVENTOR
Jack Potter Stockton
BY
Greco L. Herman
ATTORNEY

Feb. 26, 1935.

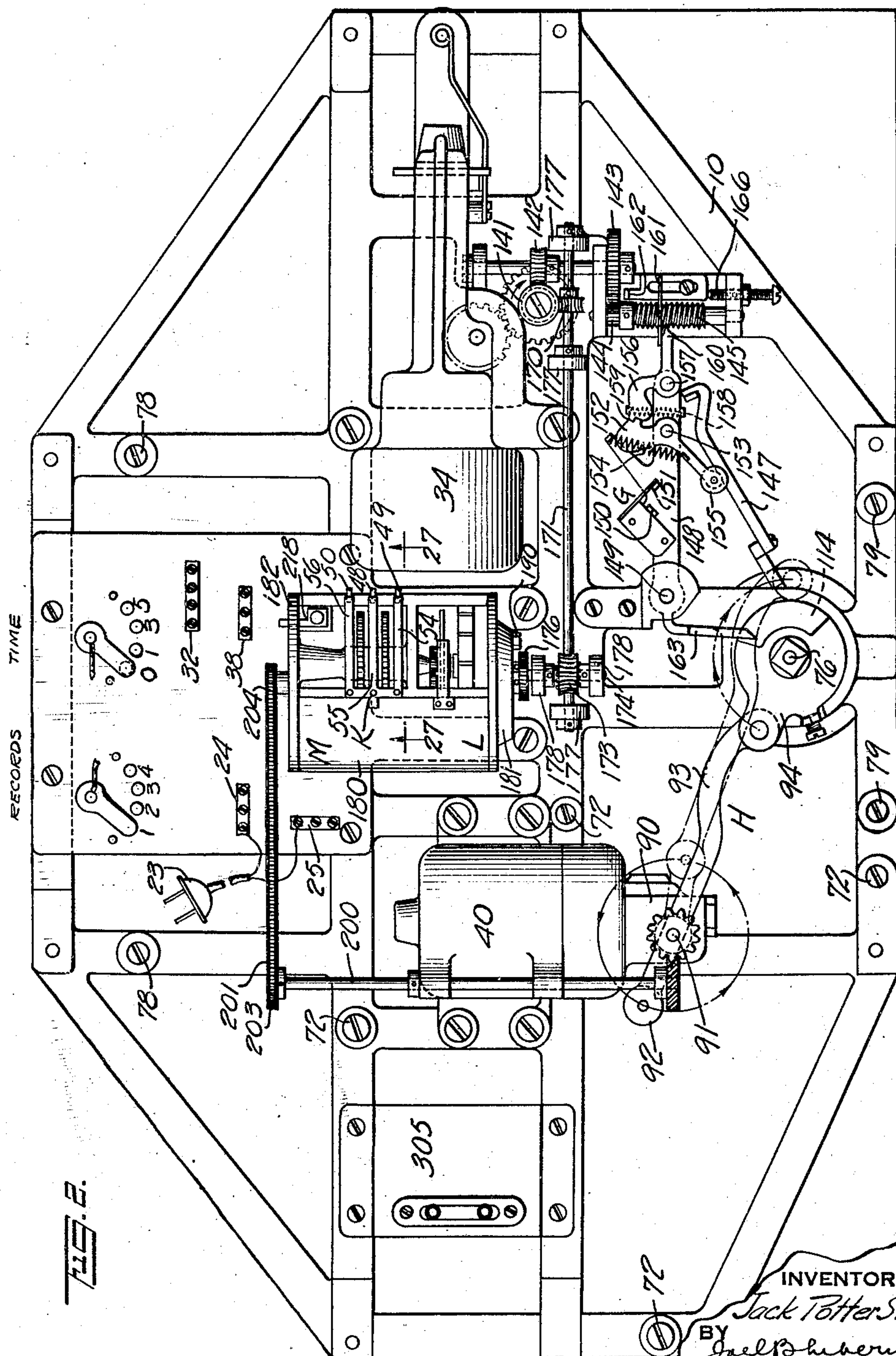
J. P. STOCKTON

1,992,334

PHONOGRAPH

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10 Sheets-Sheet 2



INVENTOR

Jack Potter Stockton

BY

Joel Shuberman

ATTORNEY

Feb. 26, 1935.

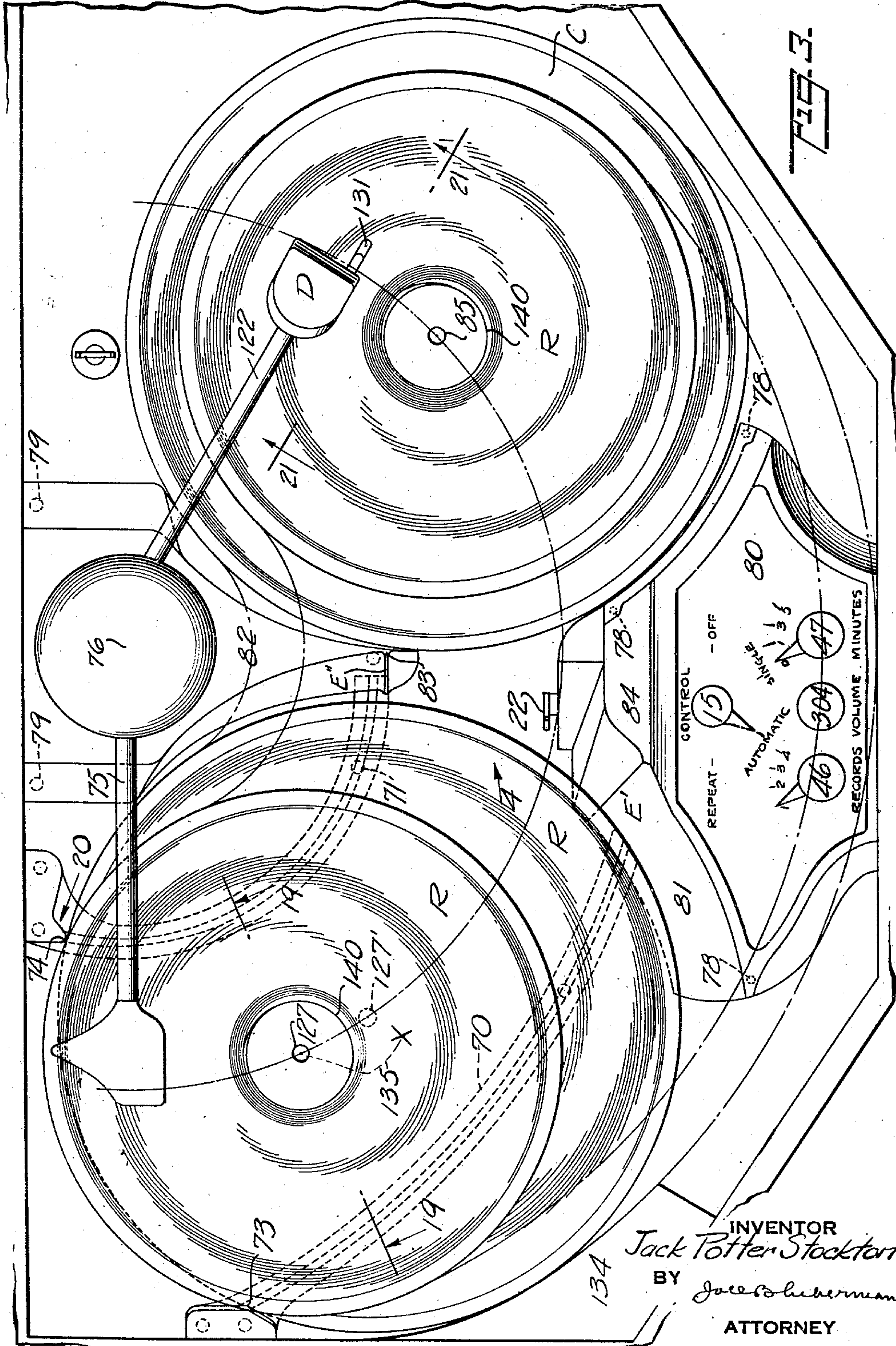
J. P. STOCKTON

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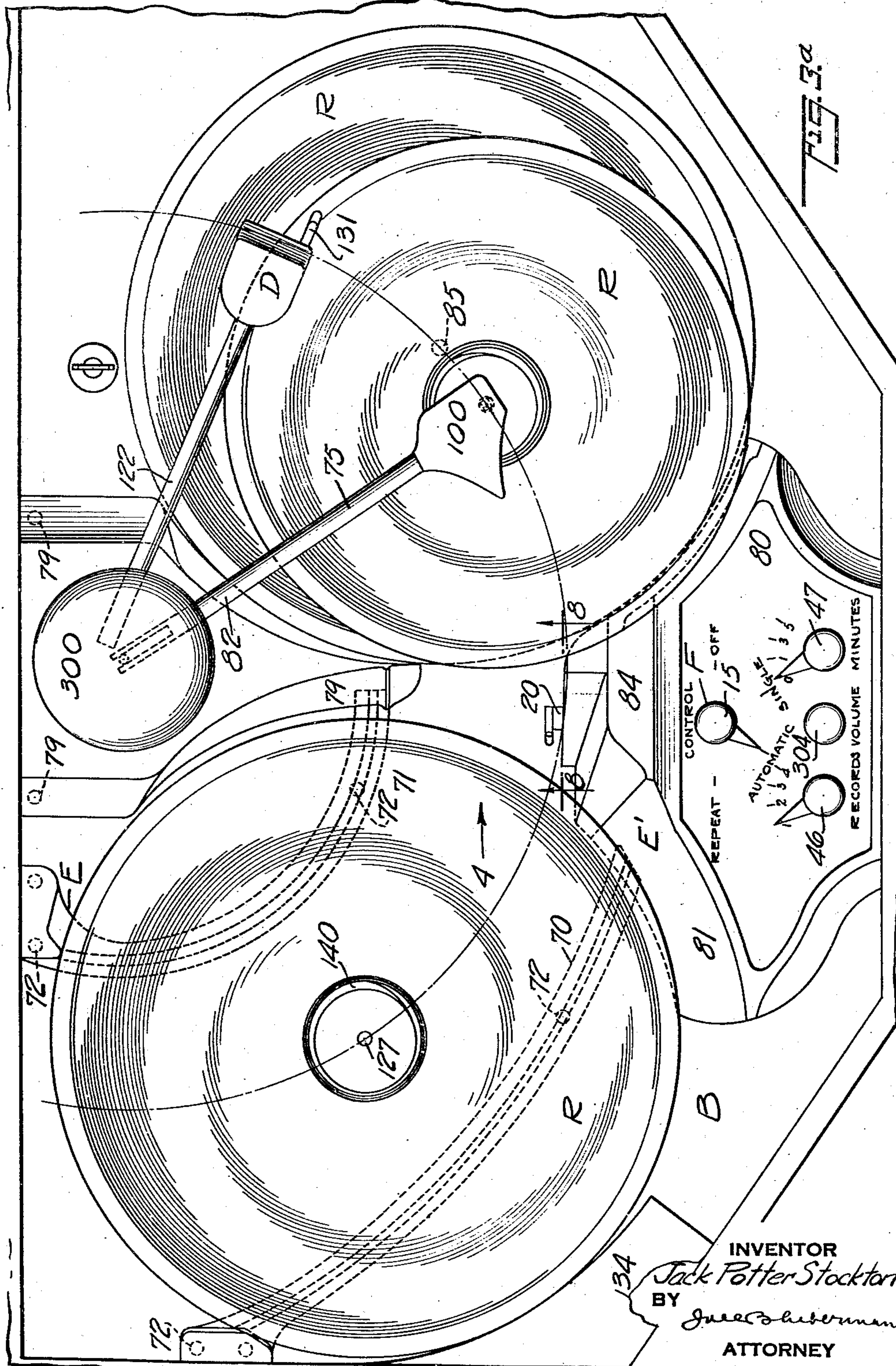
10 Sheets-Sheet 3



INVENTOR
Jack Potter Stockton
BY *Joel Scherman*
ATTORNEY

1,992,334

10 Sheets-Sheet 4



ATTORNEY

Feb. 26, 1935.

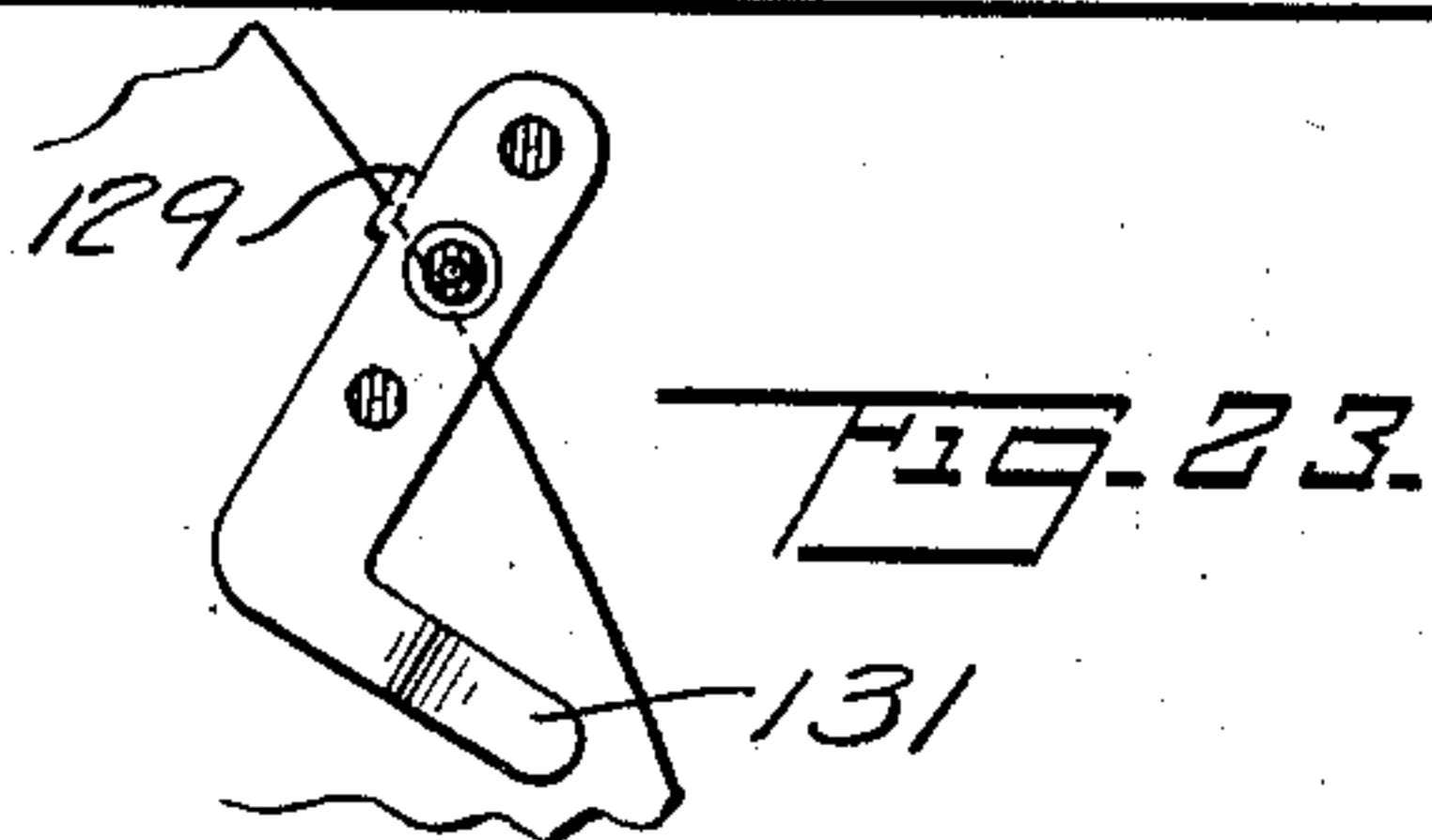
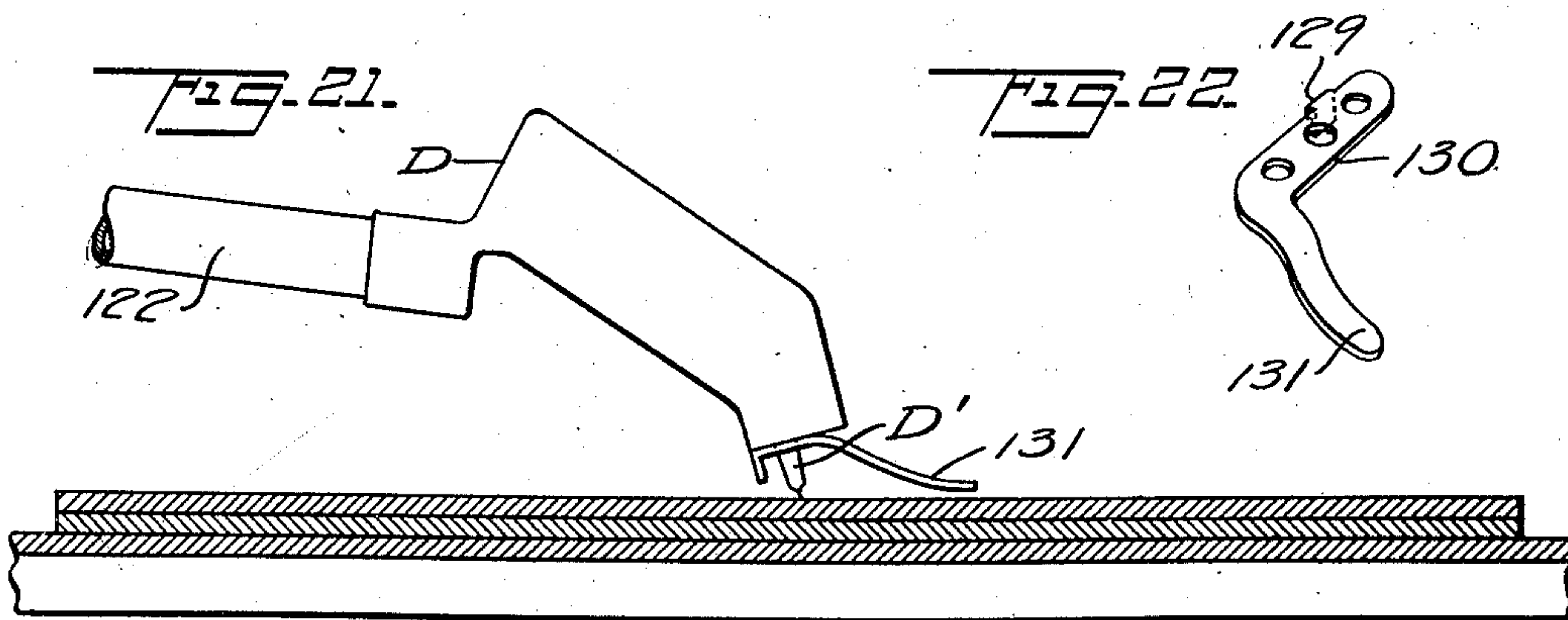
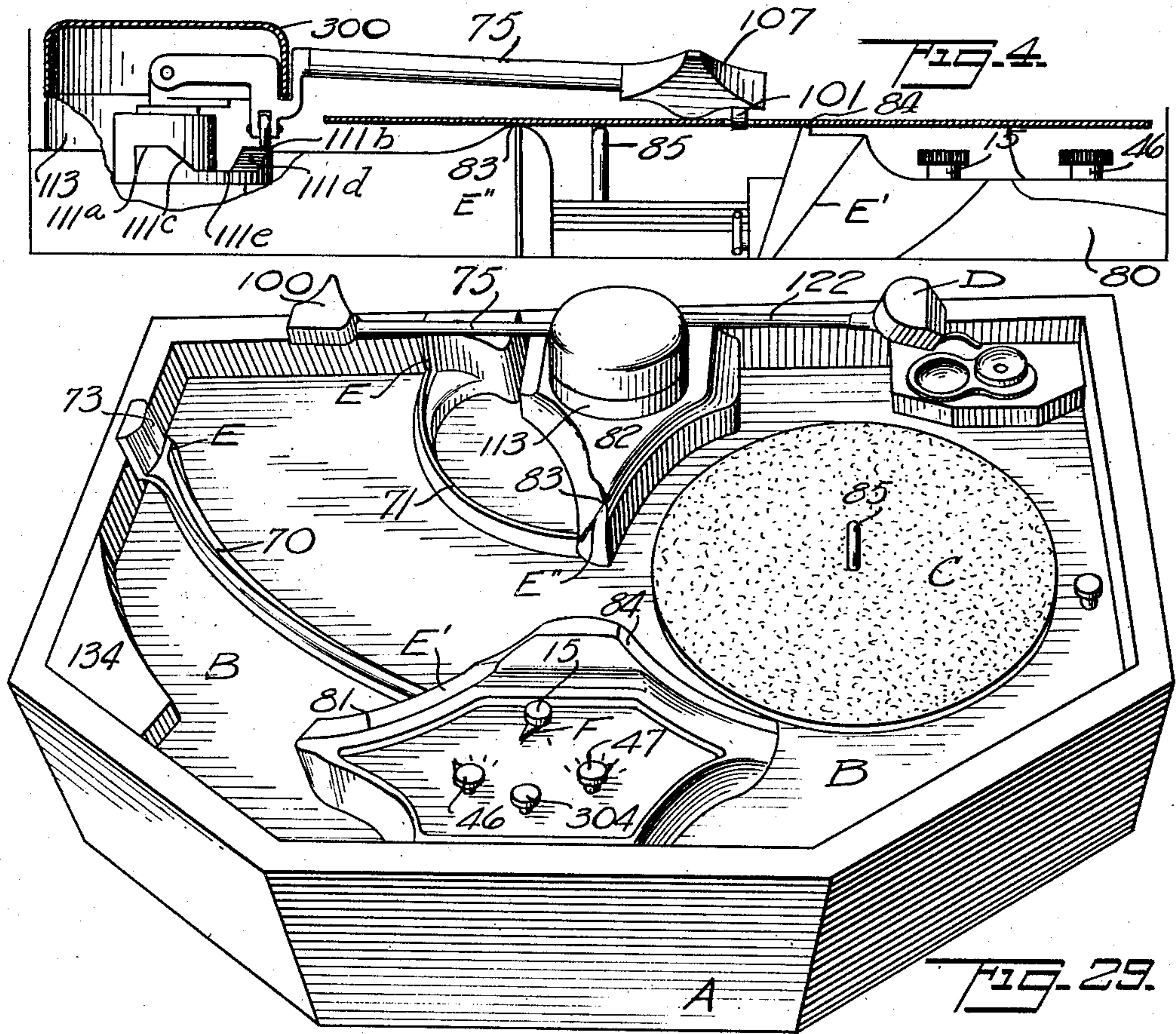
J. P. STOCKTON

1,992,334

PHONOGRAPH

Filed April 29, 1930

10 Sheets-Sheet 5



INVENTOR
Jack Potter Stockton
BY
Jesse Sherrman
ATTORNEY

Feb. 26, 1935.

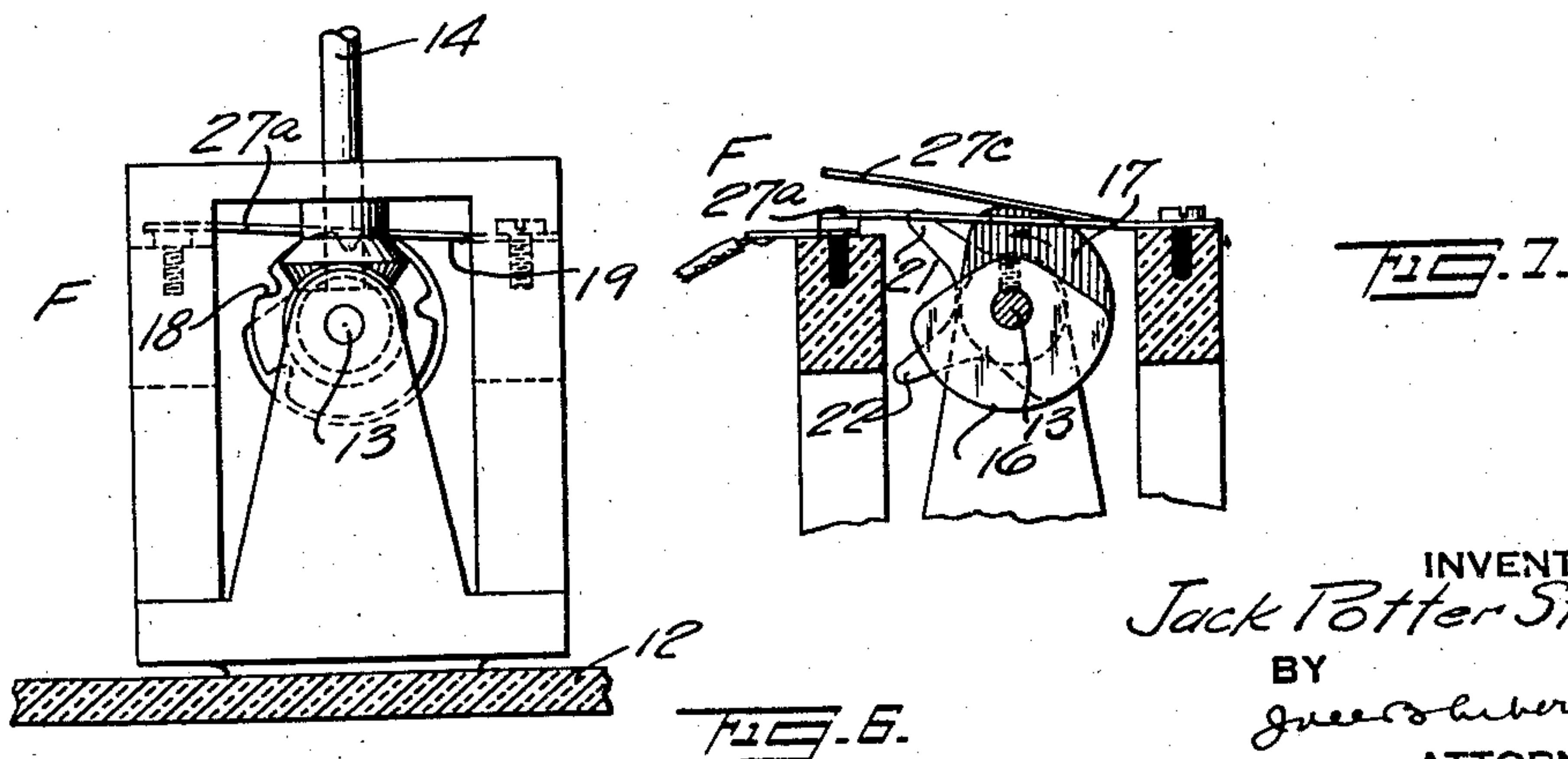
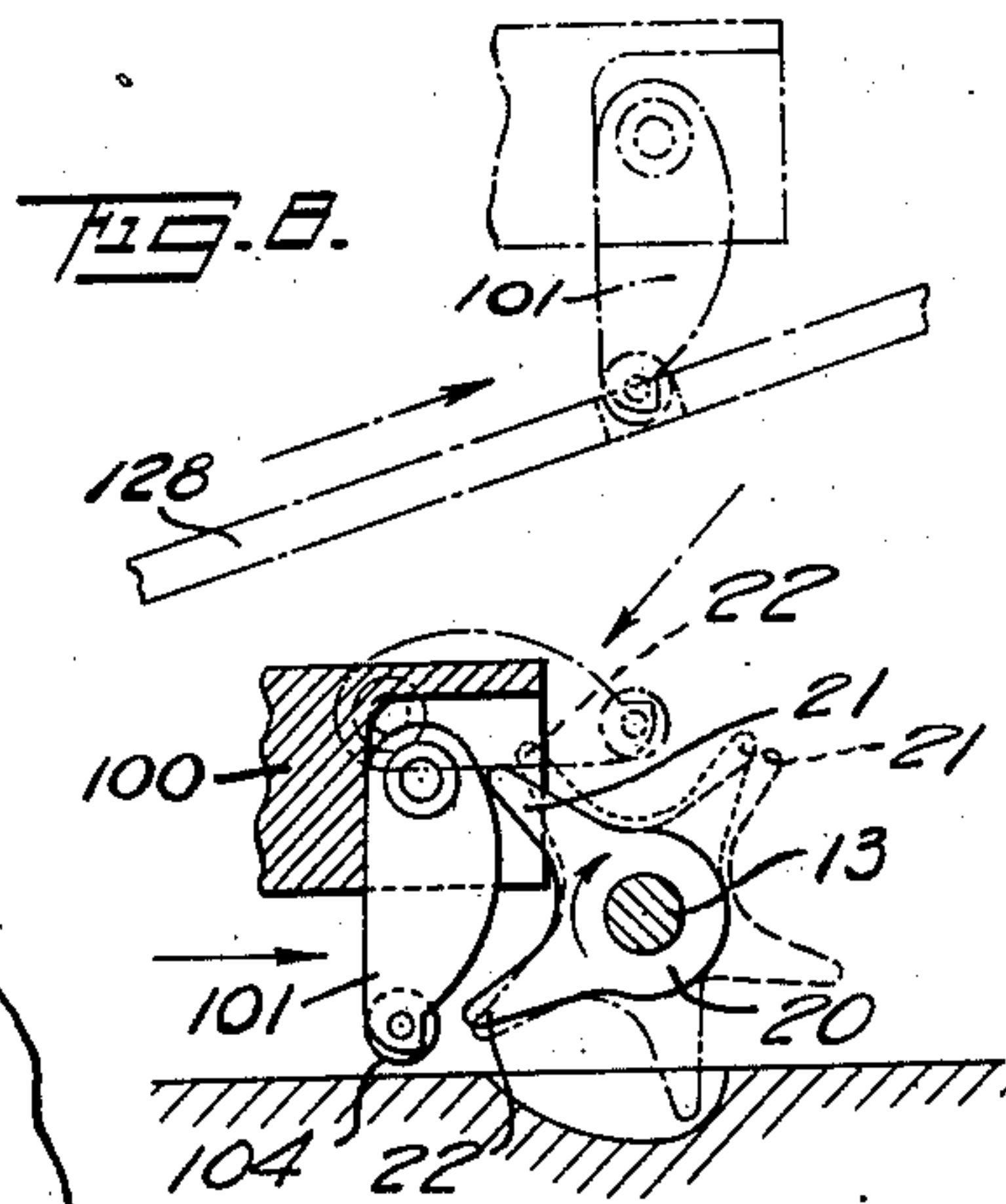
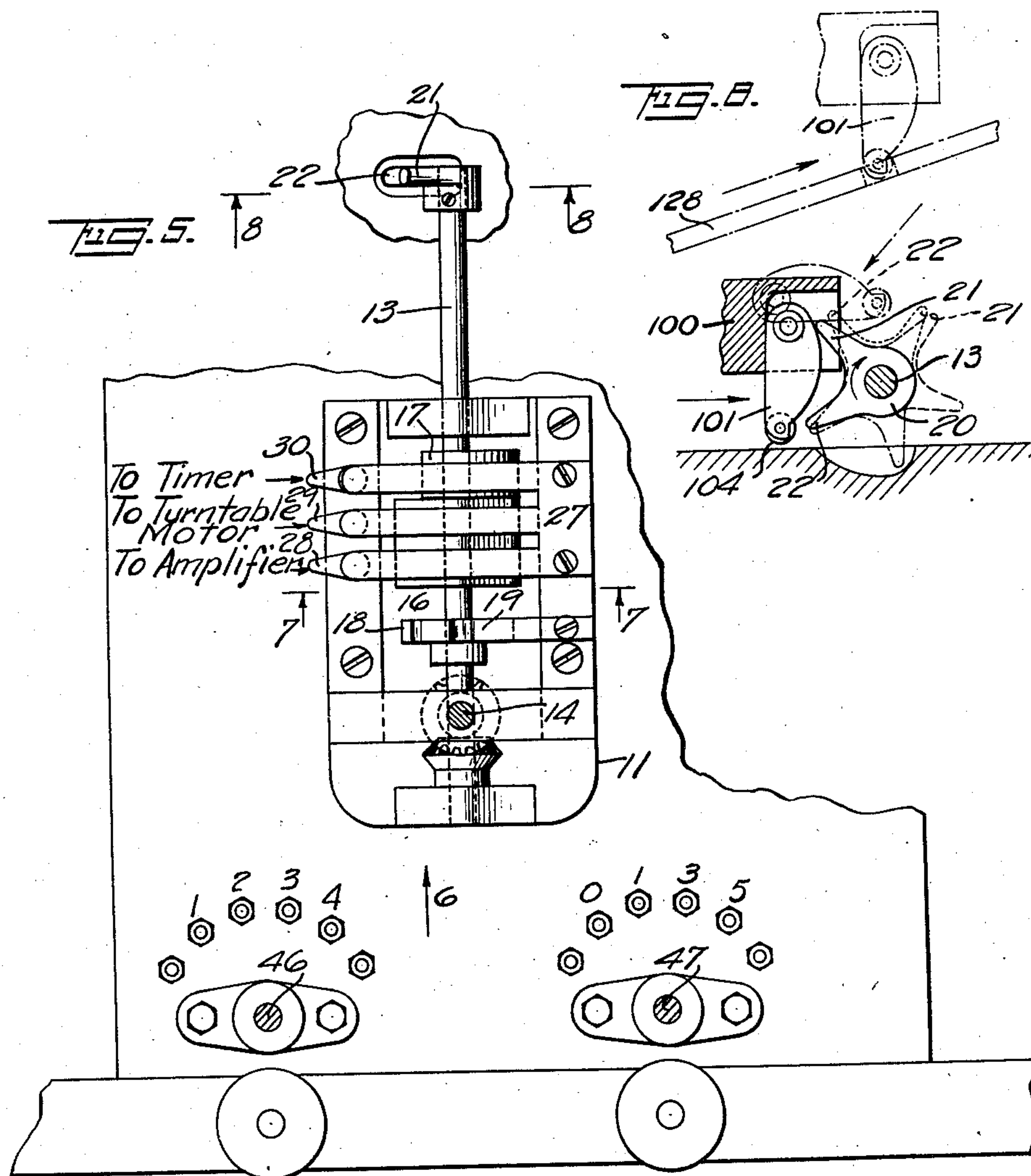
J. P. STOCKTON

1,992,334

PHONOGRAPH

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10 Sheets-Sheet 6



INVENTOR
Jack Potter Stockton
BY
Jesse S. Liberman
ATTORNEY

Feb. 26, 1935.

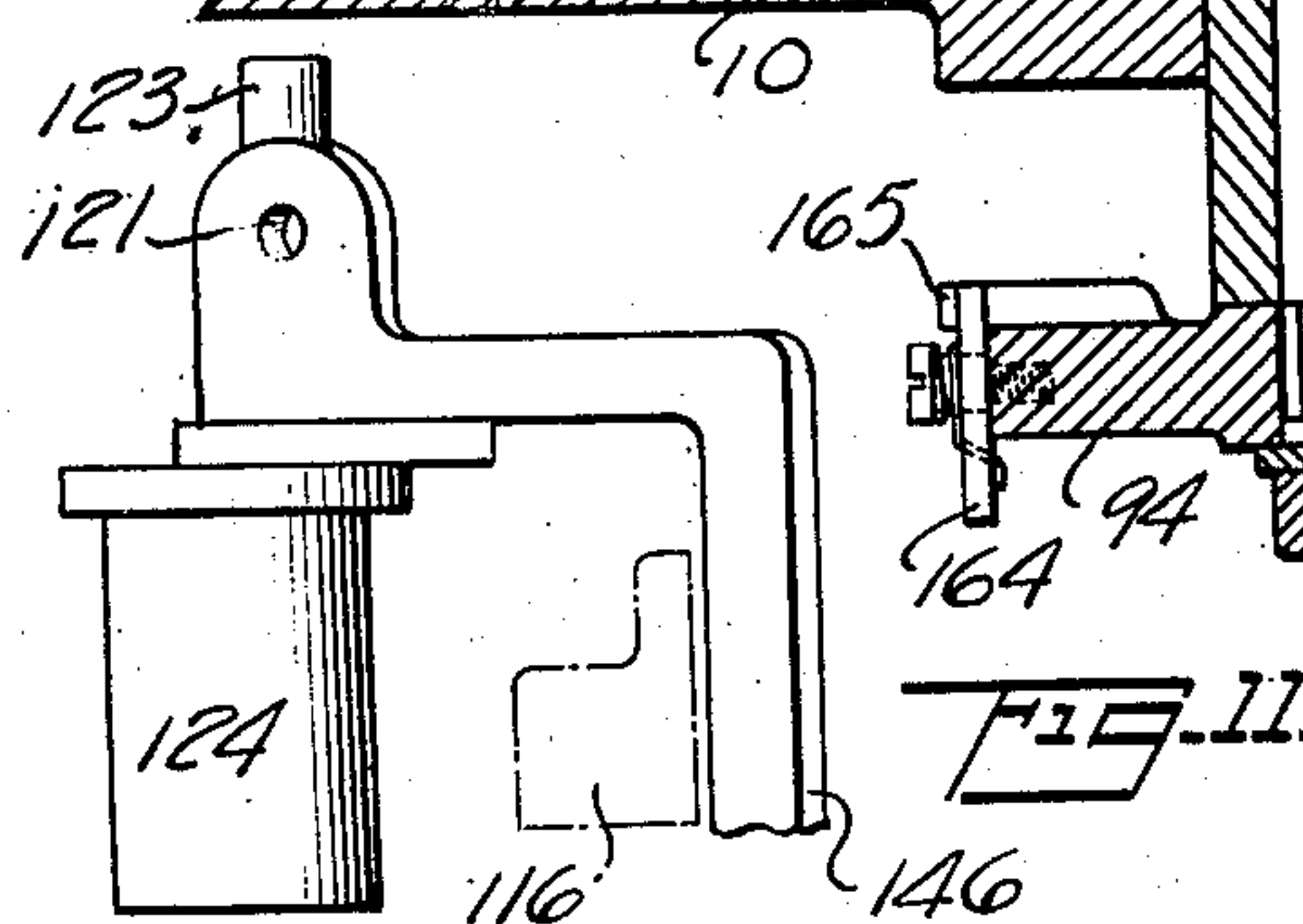
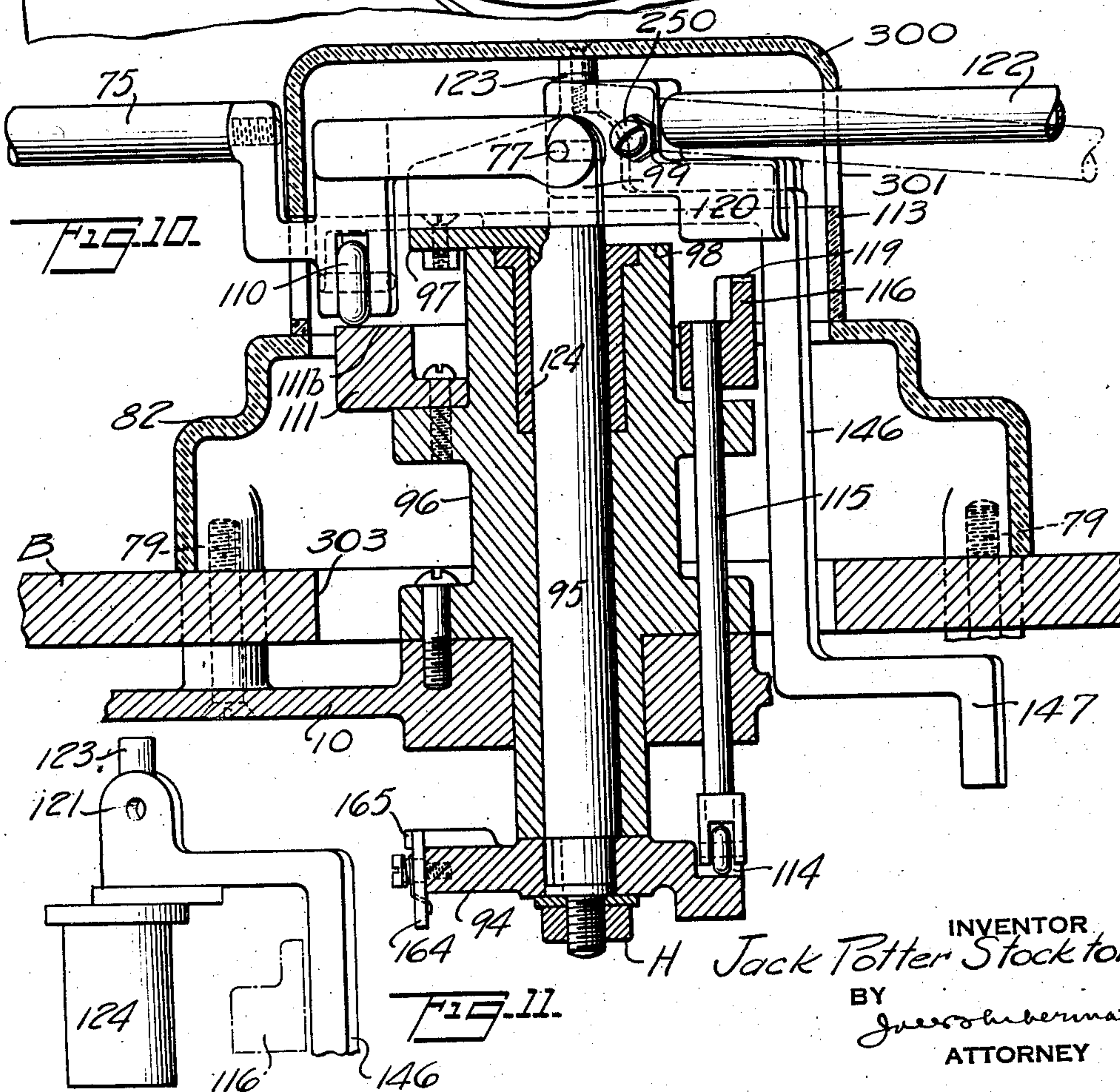
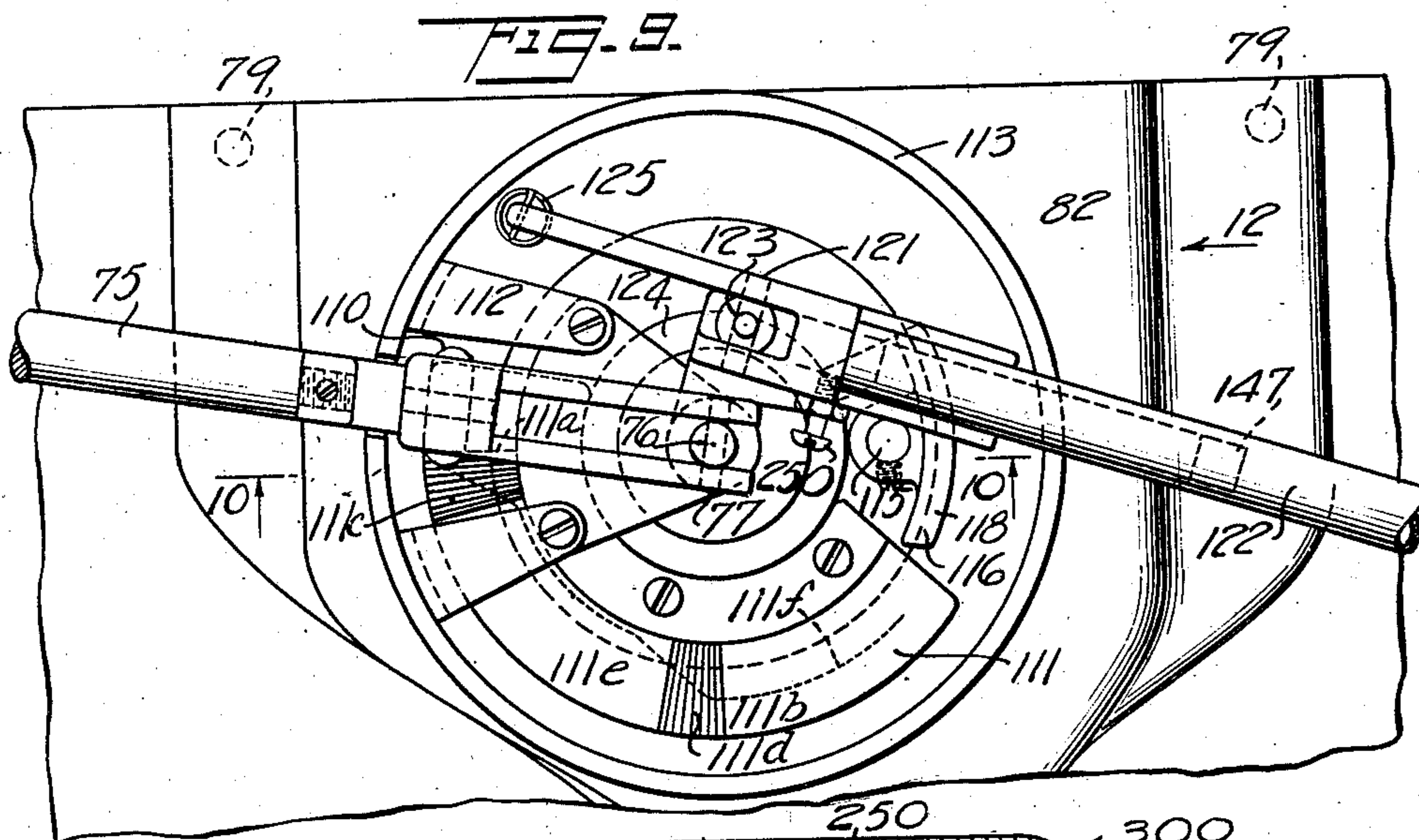
J. P. STOCKTON

1,992,334

PHONOGRAPH

Filed April 29, 1930

10 Sheets-Sheet 7



INVENTOR

H Jack Potter Stockton

BY

James H. Sherman

ATTORNEY

Feb. 26, 1935.

J. P. STOCKTON

1,992,334

PHONOGRAPH

Filed April 29, 1930

10 Sheets-Sheet 8

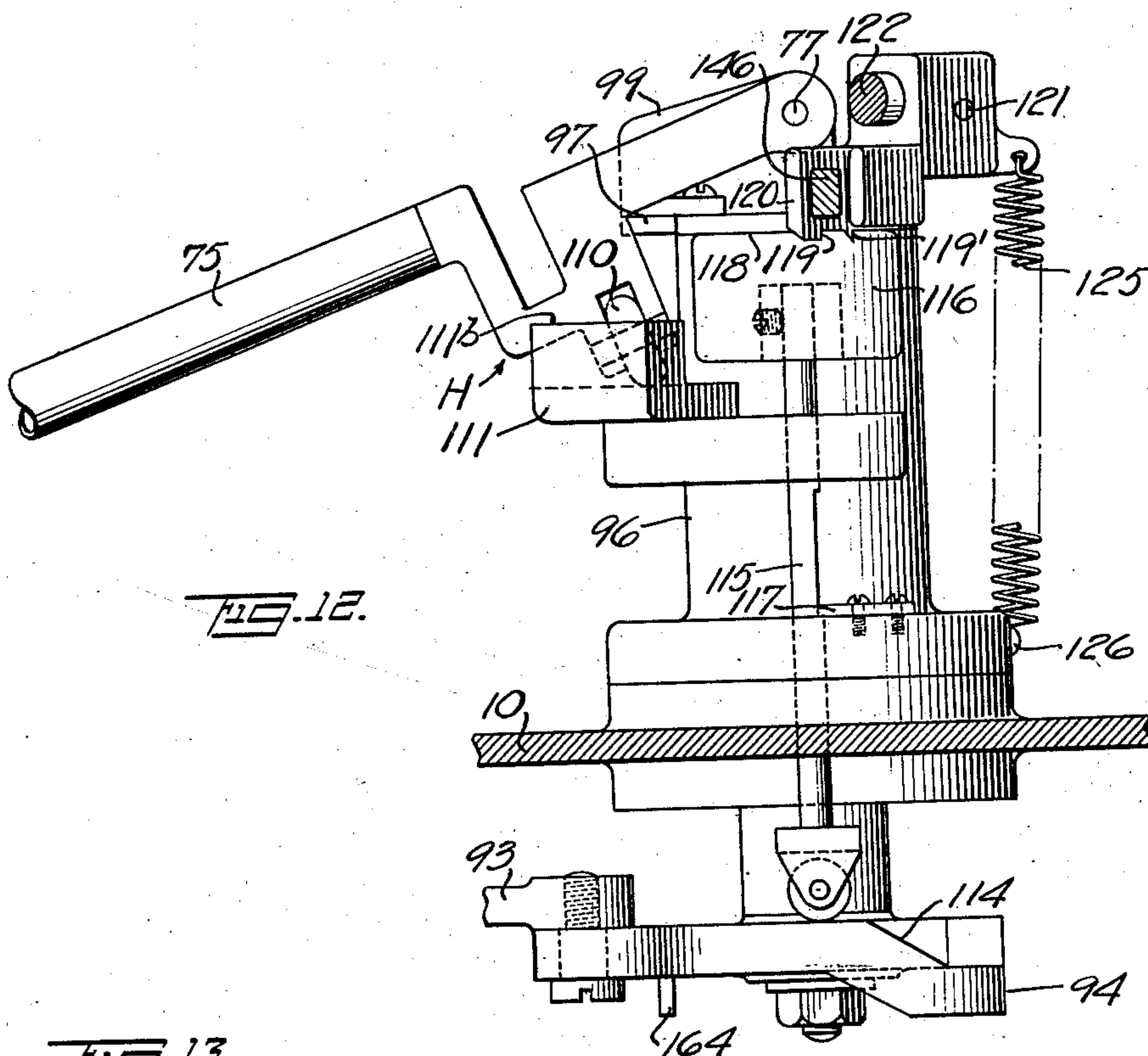


FIG. 13.

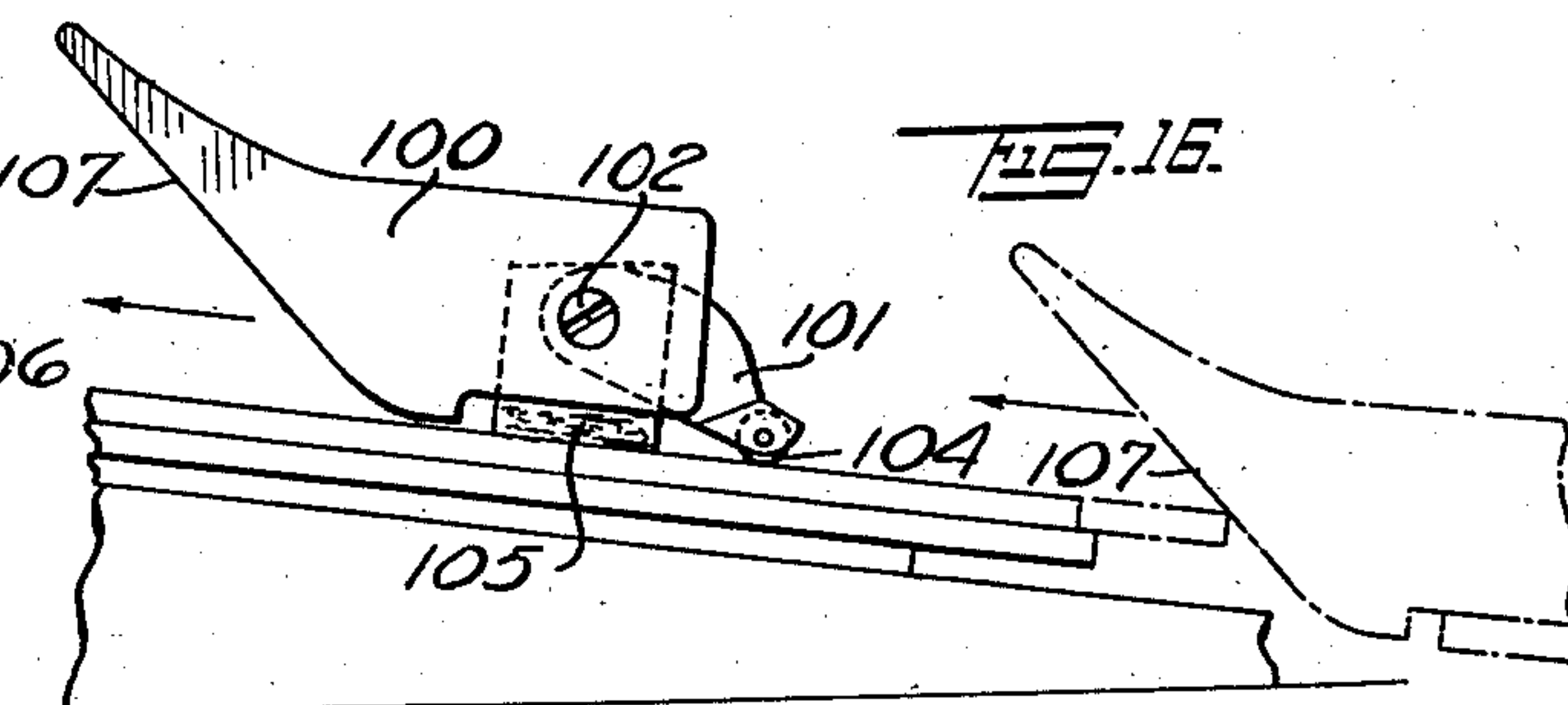
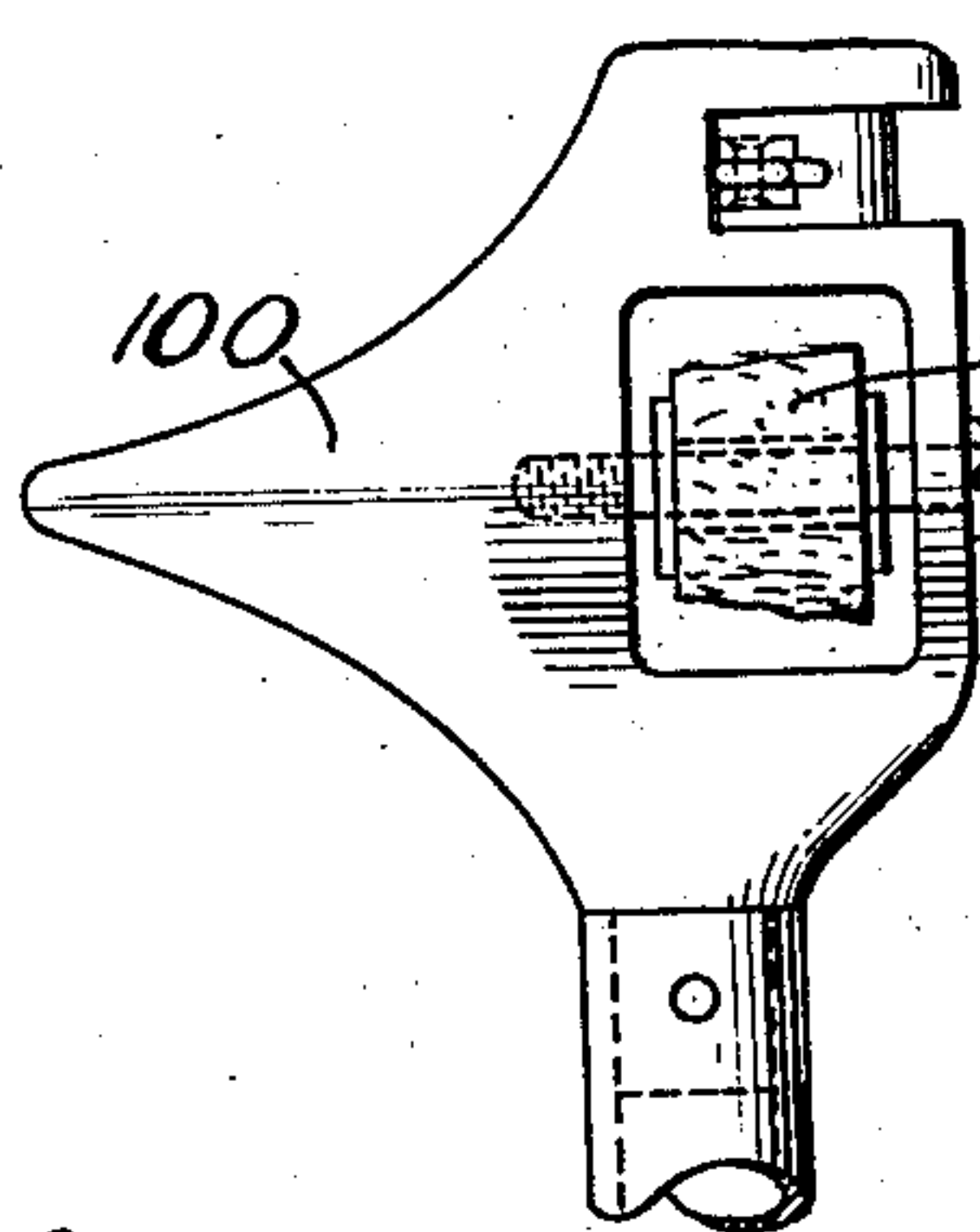


FIG. 15.

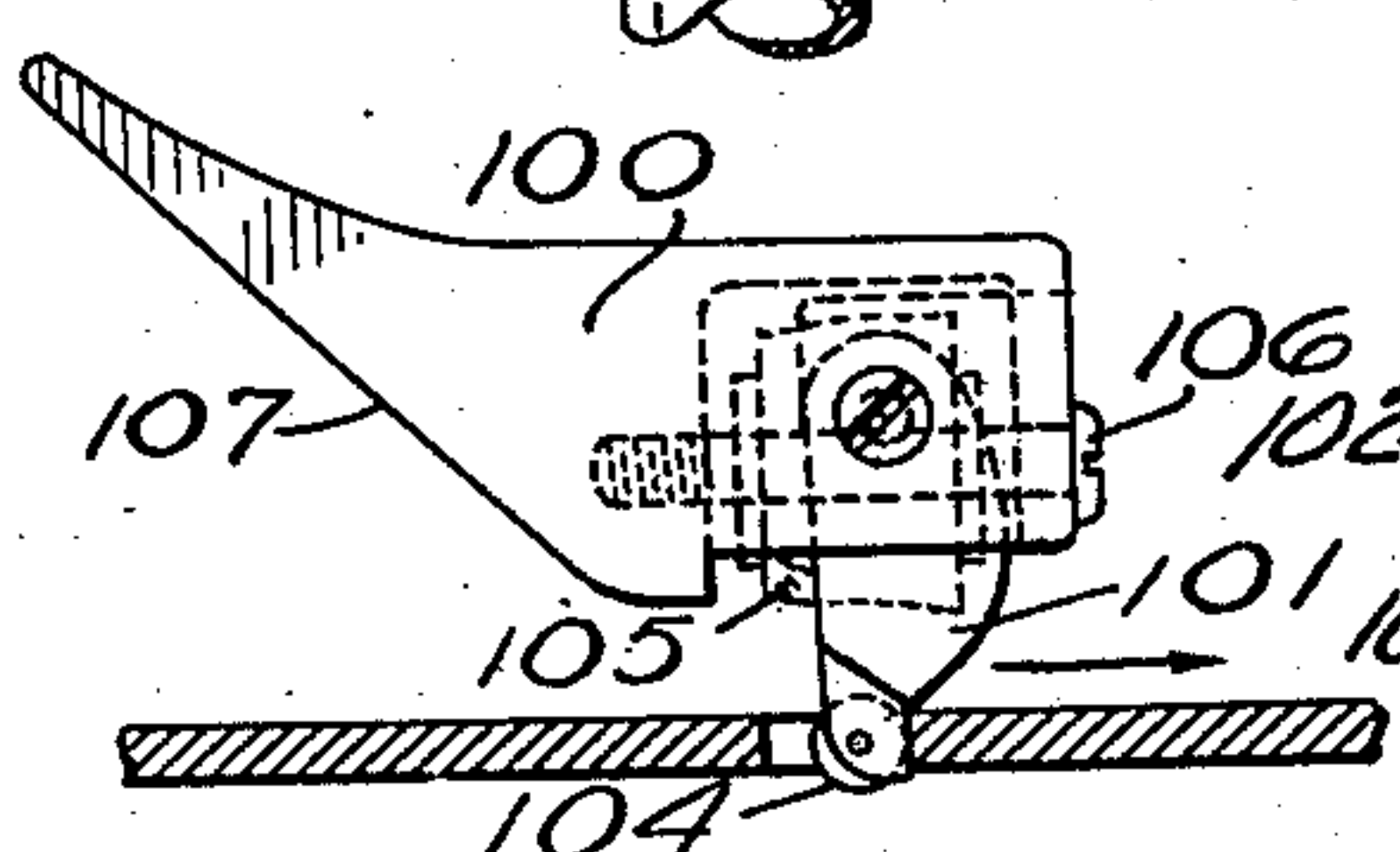


FIG. 14.

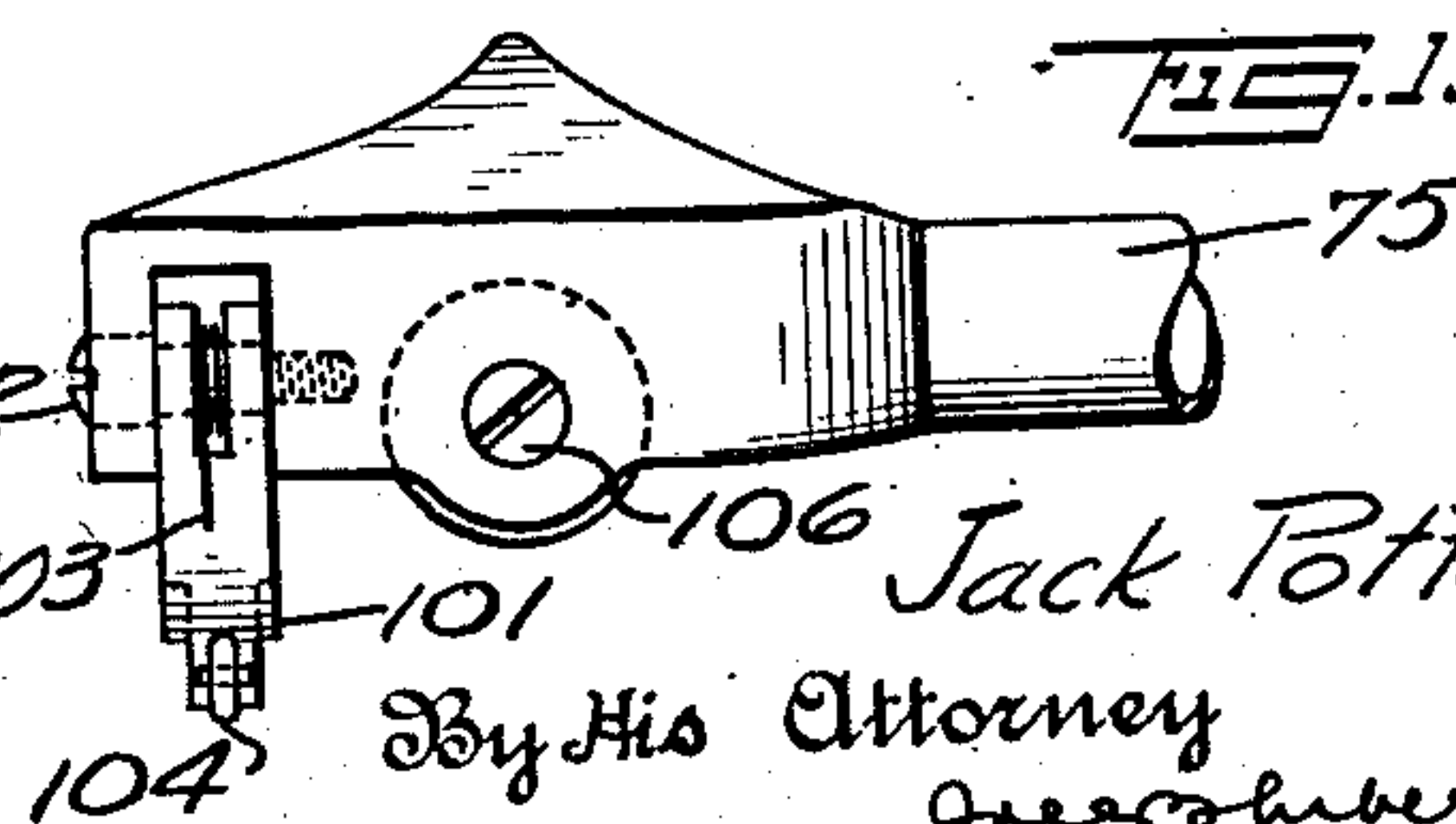


FIG. 15.

Inventor

Jack Potter Stockton

By His Attorney

Greenshieldman

Feb. 26, 1935.

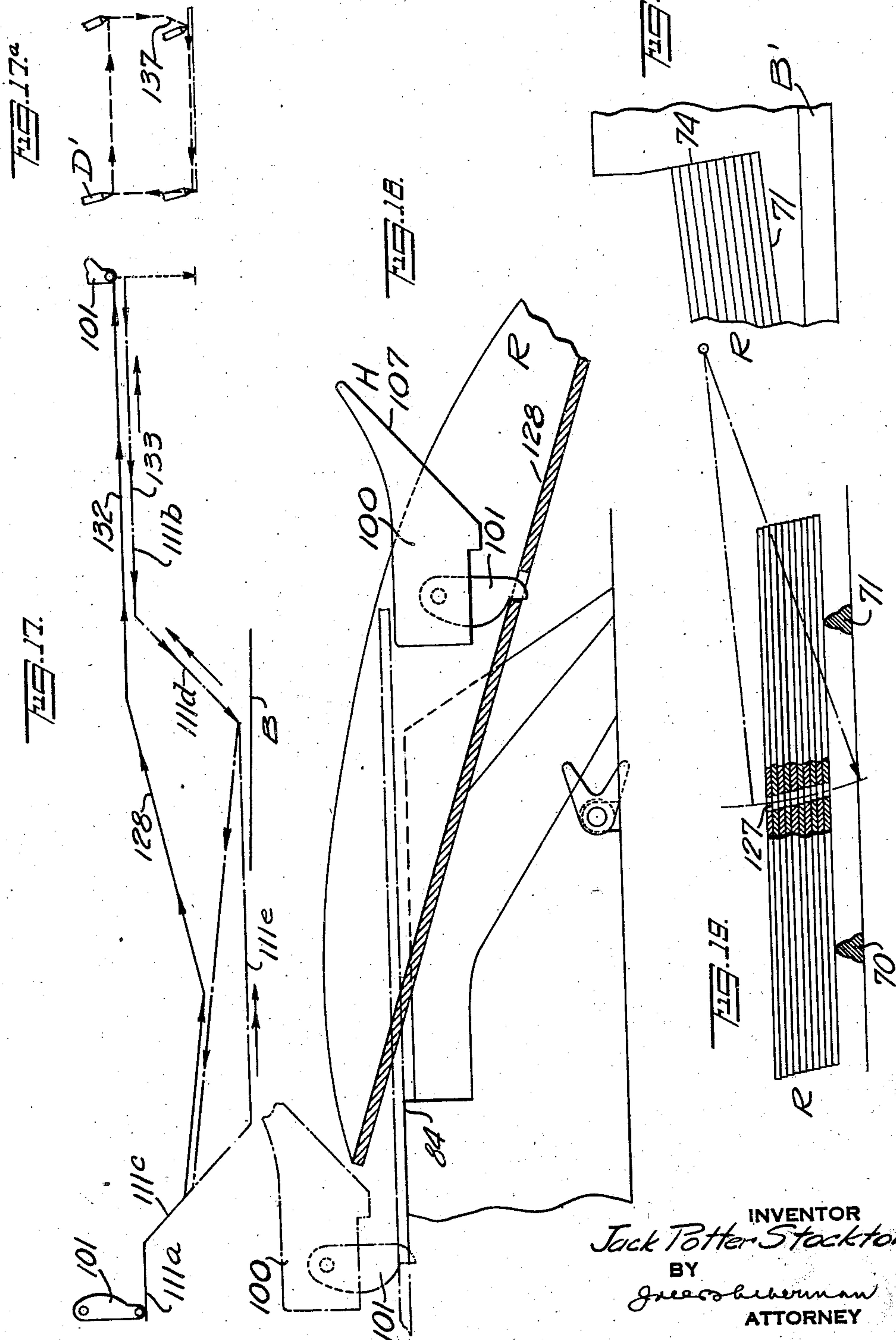
J. P. STOCKTON

1,992,334

PHONOGRAPH

Filed April 29, 1930

10 Sheets-Sheet 9



INVENTOR
Jack Potter Stockton
BY
Greenebaum
ATTORNEY

Feb. 26, 1935.

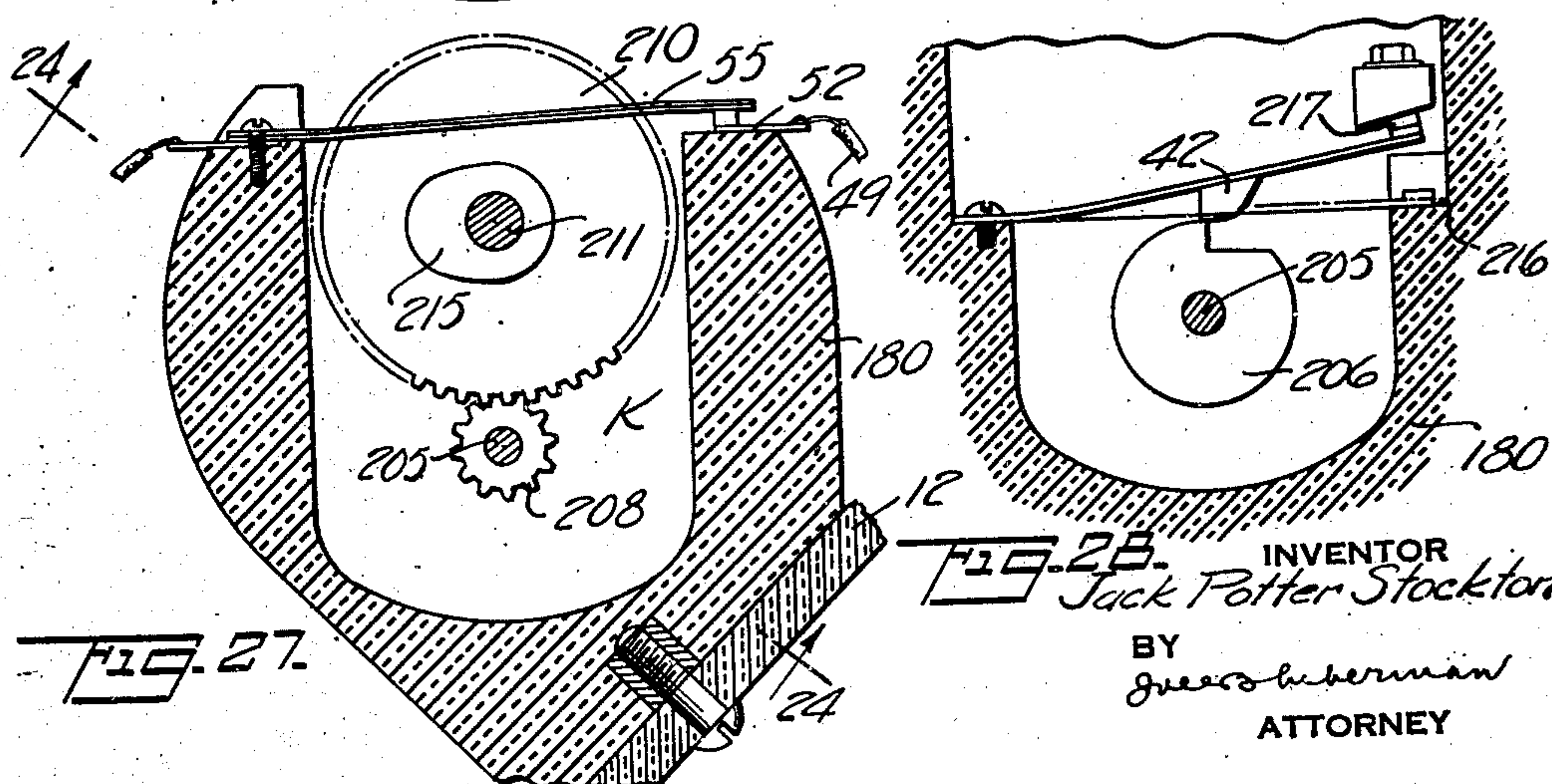
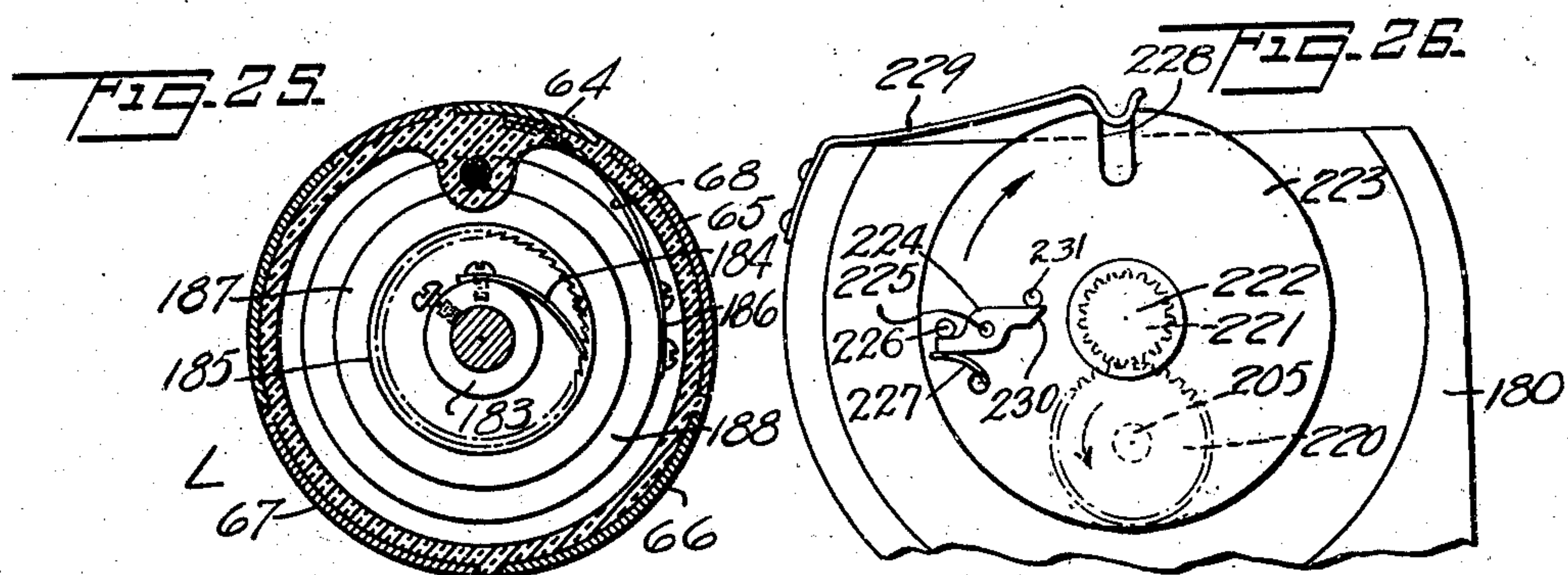
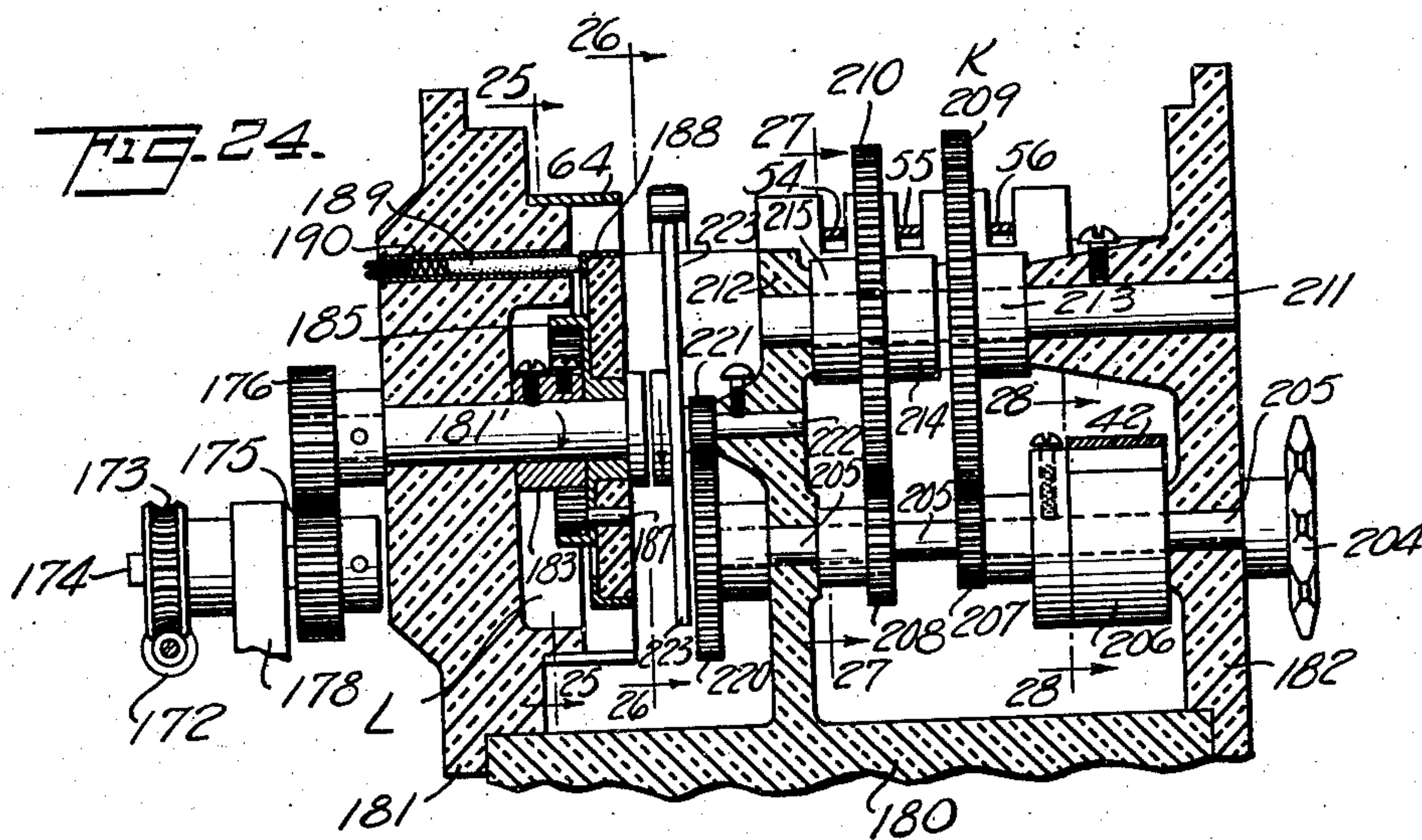
J. P. STOCKTON

1,992,334

PHONOGRAPH

Filed April 29, 1930

10 Sheets-Sheet 10



INVENTOR
Jack Potter Stockton
BY
Greene L. Herman
ATTORNEY

UNITED STATES PATENT OFFICE

1,992,334

PHONOGRAPH

Jack Potter Stockton, Spring Lake, N. J., assignor
to Stromberg-Carlson Telephone Manufactur-
ing Company, a corporation of New York

Application April 29, 1930, Serial No. 448,279

63 Claims. (Cl. 274—10)

The present invention relates to phonographs and is more particularly directed toward an automatic multiple record phonograph wherein a series of records may be played on a rotating record support, the succeeding record being automatically deposited on top of a record which has already been played, all the mechanism for accomplishing this shifting of the record being automatically set into operation upon the completion of the playing of said record. In this manner the records are brought onto the rotating record support and stacked on it one above the other.

The invention also contemplates an automatic multiple record phonograph wherein substantially all the operating parts are carried underneath the phonograph table so that these parts are invisible above the phonograph table. The few parts which are to be seen above the phonograph table are unobstrusive and so arranged as to present a pleasing appearance.

According to the present invention, the machine works entirely automatically so that the transferring of a record onto the playing platform automatically places the parts into position to play a record of that size. This resetting operation, according to record size, is carried out for each record so that one is at liberty to use either size of records or any arrangement of records of both sizes.

Furthermore, the invention contemplates an automatic record changing phonograph provided with a record storage device and record handling mechanism so arranged that careful placing of the records in the storage device is unnecessary for the satisfactory operation of the phonograph. The present invention contemplates the placing directly on the platform of the first record to be played, and the placing of the remaining records of the desired repertoire or selection of records in the storage device or magazine in the desired order and irrespective of the sizes of the records. The deposit of these records is made without care being taken to bring them to definite positions relative to one another except that the upper record is slid over the stack to a predetermined position. The remaining records in the stack are in indeterminate relation, merely resting on those underneath. After the upper record has been transferred to the playing platform, the record to be played next is automatically shifted to the desired position where it remains until the mechanism functions to shift it to the rotating record support.

According to the preferred wiring arrangement, suitable circuits and switches are pro-

vided for controlling the motors so that any one of the following operations may be obtained:

I. 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 turn table are stopped after the completion of the cycle.

II. 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 I, playing this last record, however, from the 10 inch position.

III. 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 more particularly relates to multiple record phonographs and controls for the same of the type shown in my applications, Serial Nos. 262,190 and Patent #1,812,454 issued June 30, 1931. These improvements include, among other things, the rearrangement of the parts for greater ease of manufacture and assembly as well as providing a more compact arrangement suitable for assembly as a unit in the upper part of the cabinet of a broadcast receiver. The more intricate parts are so designed that they may be made into preassembled units ready for securement to a supporting chassis, while the record supporting and guiding parts are made of molded insulating material of smooth graceful shape adapted to enhance the appearance of the top of the phonograph.

The accompanying drawings show, for purposes of illustrating the present invention, one of the many possible embodiments in which the invention 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, with the parts disposed substantially as in Figure 2;

Figure 1a is a tabulation showing the arrangement of intermissions possible by use of the intermission spacing circuit;

Figure 2 is an inverted plan view of the phonograph;

Figure 2a is a perspective view of the trip switch;

Figures 3 and 3a are top plan views showing, respectively, a record being played and a record being shifted;

Figure 4 is an elevational view in the direction of arrow 4 of Figures 3 and 3a;

Figures 5 and 6 are top plan and end views of

the selector switch in the "automatic" position;

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

Figure 8 is a section on the line 8—8 of Figures 3a and 5 and showing the relations between the selector switch and record shifting mechanism;

Figure 9 is a plan view of the reproducer support and record shifting mechanism;

Figure 10 is a sectional view on the line 10—10 of Figure 9;

Figure 11 is a fragmentary view of the reproducer support of Figure 10;

Figure 12 is an elevational view in the direction of the arrow 12 of Figure 9;

Figure 13 is an inverted plan view, and Figures 14 and 15 are plan, end and front views, respectively, of the end of the record shifting arm;

Figure 16 illustrates the action of the record shifting arm in moving the upper record in the magazine to a predetermined position;

Figures 17 and 17a are diagrammatic views illustrating the paths of the record shifting pin and stylus, respectively;

Figure 18 is a view illustrating the transfer of a record from the magazine toward the turn table;

Figure 19 is a section on the line 19—19 of Figure 3 illustrating the offsetting of the center holes of the records;

Figure 20 is a view taken in the direction of the arrow 20 of Figure 3 to illustrate the record positioning means of the magazine;

Figure 21 is a section on the line 21—21 of Figure 3;

Figure 22 is a perspective view of the record engageable reproducer positioning member;

Figure 23 is an enlarged plan view showing the relation of the edge of the record and the reproducer stylus during the presetting of the reproducer;

Figure 24 is a sectional view taken on the oblique plane 24—24 of Figure 27 and showing the time and intermission mechanism;

Figures 25 to 28 are sectional views on the correspondingly numbered lines of Figure 24, Figure 25 showing the drive for the timing mechanism, Figure 26 showing the interconnection between the timing mechanism and sequence mechanism, Figure 27 showing the gears of the sequence mechanism, and Figure 28 showing the one revolution stop switch for the auxiliary motor; and

Figure 29 is a perspective view of the phonograph.

The multiple record phonograph herein shown is designed more particularly for use with an electric pickup and electromagnetic sound amplification apparatus, the latter forming a part of a conventional broadcast receiver.

The phonograph is adapted for installation in the upper part of the radio cabinet, a fragment of which is indicated at A in Figure 29. The phonograph has a flat table B which extends across the top of the cabinet, and above the table are the turn table C, the electric pickup or reproducer D and stylus D', the record magazine E, and record guides E' and E''. The phonograph is under the control of a selector switch F located underneath the front guide E'. All the fixed and stationary parts of the device are secured to a metal chassis or frame plate 10, skeletonized to reduce weight. The table or board B merely conceals this frame and all the mechanism carried beneath.

Selector switch and wiring

The selector switch has a frame 11, fixed to an insulating plate 12 secured to the chassis plate 10, and carrying a horizontal shaft 13, geared to a vertical shaft 14, and accessible for operation by a control knob 15. The shaft 13 carries insulating cams 16 and 17 having the outlines shown in Figure 7, and a notched disk 18, cooperative with a stationary spring 19, to resiliently hold the shaft 13 in any one of four positions, designated in Figures 3 and 3a as "Repeat", "Automatic", "Single" and "Off". The shaft 13 extends rearwardly and carries a collar 20 having two arms 21 and 22, as shown in Figure 8. These arms may be set by the control knob 15, or may be employed to actuate the selector switch toward the off position.

The current supply cord 23 is connected to terminal plates 24 and 25. A wire 26 connects the plate 24 with a three-arm spring contact member 27, insulatively supported on the frame 11, and having arms 27a, 27b, and 27c extending across the frame and normally resting on stationary contacts 28, 29 and 30. These spring arms may be actuated to open or close the circuits according to the position of the cams 16 and 17 on the selector switch shaft 13.

When the selector switch is in the "automatic" position, as shown in Figures 5 to 8, (or in the "repeat" position) the springs 27a and 27b contact with the stationary contacts 28 and 29 and complete the circuits for the ordinary operation of the multiple record phonograph with intermission.

Referring now to Figure 1, it will be seen that the circuit from the spring contact 27a leads to the audio amplification circuits diagrammatically illustrated at 31. This audio amplifier connection may be omitted, if desired. The terminal 29, energized through the connection 27b, connects to a connection plate 32, which supplies current through a lead 33 to the turntable or platform motor 34. The return lead 35 extends to connection plate 25. A wire 36 runs from the connection plate 32 to a record control trip switch G, adapted to be closed on the completion of the playing of a record. The other lead 37 from this trip switch extends to a connection plate 38, permanently connected by a lead 39 with an auxiliary motor 40 having a return lead 41. The completion of the record, therefore, closes the circuit of the auxiliary motor and starts it in operation to carry the record shifting mechanism H through a predetermined cycle.

The auxiliary motor 40, besides actuating the record shifting mechanism H, drives a series of sequence controlling switches K. It also effects the closing of a running switch 42 associated with a one revolution shaft adapted to open it at the end of the record shifting cycle to stop the auxiliary motor. Where no intermission or sequence control is desired, the circuits so far described will suffice.

The circuits shown in Figure 1 include timing and intermission sequence controls. The current supply terminal 24 is connected by a lead 43—43a with a record selector 44 and a time selector 45. The record selector and timing selector are operated by knobs 46 and 47, shown in Figures 2, 3 and 4. The selector 46 for selecting the sequences has four positions, marked 1, 2, 3, 4. As shown in position 1, it is disconnected from the other circuits. The buttons for positions 2, 3 and 4 are indicated, and these buttons

are connected by wires 48, 49 and 50 with stationary contacts 51, 52 and 53, disposed adjacent the sequence control mechanism K. These stationary contacts 51, 52 and 53 are adapted to cooperate with movable spring contacts 54, 55 and 56, connected together, and by a wire 57 with the stationary contact 30 of the selector switch and with the movable contact 42 of the running switch. These contacts 54, 55 and 56 are operated by the sequence control mechanism K and act to open the circuit to the running switch, provided the selector 44 is connected to the contact which is opened during that particular record shifting operation.

The time selector 45 is shown as having four buttons, 0, 1, 3, and 5, designating the desired intermission between renditions. The point designated as 0 is intended for continuous operation, i. e., for the minimum time interval between records. Buttons 1, 3 and 5 are for intermissions of 1, 3 and 5 minutes, respectively. These buttons, 0, 1, 3, and 5, are connected by wires 60, 61, 62, and 63 with stationary arc shaped contacts 64, 65, 66, and 67, engageable by a wiper 68 driven forwardly by mechanism indicated at 69 and operated continuously by the turn table motor 34.

The sequence mechanism K is arranged to open the circuit between the contacts 51 and 54, after every other revolution, between the contacts 53 and 56, after every fourth revolution, and between the contacts 52 and 55, after every third revolution.

Figure 1a diagrammatically illustrates the sequence control available. When the record selector 44 is in position 1, and the time selector is in any position other than 0, one obtains the desired intermission period after every record, as indicated by the row of dots in the first column. When the switch 44 is in positions 2, 3 or 4, the desired intermission is had after the second, third or fourth record, as indicated by the dots in the second, third or fourth columns, thus making it possible to secure uniform intervals, or to group the renditions, particularly for dancing, where a long intermission may be desired after 2, 3 or 4 records have been played.

Record magazine and record guides

The phonograph table B may be a flat board, and the record magazine E may comprise two record supports, as indicated at 70 and 71, made of molded material and secured directly to the chassis 10 by screws 72. As here shown, these record supports slope upwardly toward the rear. They are provided with oblique record engaging side walls or stops 73 and 74, adapted to engage the edges of records of both ten and twelve inch size, as indicated in Figures 3 and 3a, and locate the record centers in predetermined position so that they may be engaged by an oscillatory record shifting arm 75, pivoted about a vertical axis 76 and having a horizontal pivot 77. This record shifting arm is provided with mechanism to be described, and is adapted to shift the records from the magazine up over the inclined guides E' and E'' to bring them to an elevation above the turn table C.

In starting the phonograph, the first record of the selection is placed on the turn table and the remaining records R of the selection are placed in the magazine. Only the uppermost record is pushed back to bring it into engagement with the walls 73 and 74 of the magazine. The lower

records are in indeterminate relation but are brought to determinate position, one at a time, as the mechanism operates.

The front record guide E' may conveniently be embodied in a molded piece of insulating material 80, shaped as indicated in the drawings. This piece of insulating material is adapted to cover the selector switch F and to bear the indicia for the selector switch, record selector, and the time controller of the intermission sequence mechanism. It also provides an inclined front wall 81 for the record magazine and tends to confine the records to the center part of the magazine. The rear records guide E'' may also be embodied in a piece of molded insulating material 82, which is placed on the upper rear part of the table and serves to separate the storage compartment from the turn table. These guides are secured directly to the chassis 10 by screws indicated at 78 and 79.

The summits of the record guides E' and E'' are indicated at 83 and 84 and they are arranged, as shown in Figure 4, to be at the same elevation as the top of the center pin 85 of the turn table. These three points are able to support a record in horizontal position.

Record shifting mechanism

This mechanism is actuated by an auxiliary motor 40 and is provided with a speed reducing gear box, indicated at 90 in Figure 2 and adapted to drive a vertical shaft 91 at a slow speed so that it makes one revolution during the minimum time for record change. The shaft 91 carries a crank arm 92 connected by a rod 93 with an oscillatory ring, or cam plate 94, so as to move it back and forth from the full line position to the dotted line position. The full line position corresponds with the position of rest, and the dotted line position with the point where the record is deposited on the turn table.

The oscillatory plate 94 is splined to a vertical shaft 95 forming a center post for the record shifting mechanism and for supporting the reproducer D. This shaft 95 is rotatably supported in a bearing member 96, secured to the chassis plate 10. The upper end of the shaft 95 has a lateral extension 97 which overlies the upper surface 98 of the bearing support 96. The center post shaft 95 also extends upwardly, as shown at 99, and carries the horizontal pivot pin 77 for the record shifting arm 75.

The extremity of the record shifting arm 75 is shown in Figures 4, 13, 14 and 15. It has a comparatively heavy head or terminal member 100 which carries a record engaging finger 101, pivoted on a stud 102, urged rearwardly by a light spring 103, and carrying a roller 104. The finger may extend into the center hole of the record, and the roller prevents scratching the record. The head 100 also carries a record pusher 105, preferably made of a conical piece of soft rubber and revolvably mounted on a stud 106. The rear edge of the head 100 is inclined, as indicated at 107, to cam it onto the records as indicated in Figure 16.

The inner end of the record shifting arm 75 carries a roller 110 cooperative with a stationary cam plate 111, secured to the bearing supporting post 96. The ends of this plate are high, as indicated at 111a and 111b. Inclined cams 111c and 111d lead to a low intermediate portion 111e. These cams act to hold the record shifting arm in elevated position at the ends of its movement

and to cause the raising and lowering of the arm when it is free of a record. The cam outline is amplified in Figure 17 and the same reference characters employed. The path of the roller 110 along the surface of the cam is indicated in Figure 9 by the dotted line 111f. The lateral plate 97, carried on the vertical shaft 95, carries arms 112 which support a ring 113, adapted to conceal this part of the mechanism.

The path of the stylus D' is indicated in Figure 17a. The reproducer support is raised away from the record by a cam 114 carried on the plate 94 and operating a plunger 115, guided in the bearing member 96. The plunger carries a friction plate 116 and is held against rotation by a plate 117. The upper surface 118 of the plate 116 is horizontal and is smooth, except for two notches 119 and 119'.

When the plunger 115 is raised, it acts on a bifurcated shoe 120, horizontally pivoted at 121 and supporting the reproducer supporting arm 122. The pivot 121 is carried by an eccentrically located post 123 extending upwardly from a bushing 124 which surrounds the shaft 95. The weight of the reproducer is balanced by a coiled spring 125, anchored to the bearing support at 126, and given a slight twist.

At the completion of the playing of a record, the reproducer and record shifting arm will be approximately in the positions shown in Figure 3. The trip switch G will have been actuated to close the circuit of the auxiliary motor, as shown in Figure 1. The auxiliary motor operates to shift the cam 94 in a counter clockwise direction, as viewed from above, carrying with it the record shifting arm 75. The lowering of the arm toward the records in the magazine is controlled by the cam 111c, as indicated by this reference character in Figure 17.

The arm is supported by the roller 104 as it moves on along the surface of the upper record, the pin 101 entering the center hole 127 of the uppermost record. The record is then shifted along the bottom of the magazine or over the record supporting it, until its edge is brought against the record guide E', which causes the record to climb to a higher elevation, raising the record shifting arm up away from the lower part of the cam 111e, as indicated in Figures 8, 17 and 18 at 128. Soon the edge of the record engages the guide E''. The record then travels on until it is supported entirely by the summits 83 and 84 of the record guides. The paths of the edges of 10 and 12 inch records are indicated in Figure 3.

It then moves over until it is also supported by the top of the shaft 85 and then passes underneath the reproducer D, so that its edge engages with the depending member 129, carried by the reproducer support and shown in Figures 22 and 23. This finger is part of a small stamping 130, secured to the reproducer and may have an outward extending finger 131 to extend over the surface of the record, but normally to be out of contact with the same. The movement of the reproducer is resisted by the friction between the plate 116 and shoe 120. Further movement of the record shifting arm 75 will move the reproducer D, as indicated in Figure 3a, and this movement will continue until the record is moved far enough to bring its center hole over the center post 85 of the turn table.

Up to the time the record is moved beyond the summits of the guides, it is supported by the guides and the center post. After it passes be-

yond the guides, it is supported solely from underneath by the center post, but does not tip over or upset because the weight of the reproducer on the side opposite the record shifting arm prevents such tilting. The horizontal movement is indicated at 132 in Figure 17.

When the center hole of the record is brought over the center pin of the turn table, the reproducer will have been moved to a position according to the diameter of the record, and the lower edge of the shoe 120 will have dropped into one or the other of the notches 119 or 119'. These notches act to hold the reproducer against accidental shifting of the reproducer out of the pre-set position.

On the return movement of the record shifting arm, the arm is held above the turn table by the cam 111b, as indicated at 133 in Figure 17. The cam 111d allows this arm to lower until it is brought against the upper surface of a record in the magazine, as illustrated in dotted lines in Figure 16. This figure indicates how the oblique surface 107 of the record shifting arm assists it in climbing up onto the uppermost record.

The record shifting arm moves rearwardly and the frictional surface 105 now engages with the record surface and tends to push the record rearwardly. It may bring it against a stop 134 or not, depending on the position it happened to have been placed in. The path of the center of a 10 inch record is indicated in Figure 3 by the dotted line 135, thus showing that a record whose center might have been at "X" would be pushed against the side walls of the record magazine to place its center in a predetermined position. During this movement the friction roller 105 turns on its axis. Had the record in the magazine been a 12 inch record, it would have been pushed back in the magazine, and its center placed as indicated at 127'. The record shifting arm will continue somewhat as indicated diagrammatically in Figure 17, until the cam 111a elevates it to a position of rest. The stops 73 and 74 offset the centers of the records, as illustrated in Figure 19.

At about the time that the record shifter is raised, the cam 114 allows the plunger 115 to lower and permits the stylus D' to be brought down toward the record. As commercial records are not provided with a lead in groove to the playing surface, and as the outside diameter of the playing surface is not standardized, it is necessary to provide means for imparting a rapid lateral movement to the stylus as it is deposited on the record. This is brought about by the energy stored in the twisted spring 125, which causes a slight but rapid lateral movement of the reproducer supporting arm as the needle is deposited on the record. This movement is indicated at 137 in Figure 17a.

Trip switch

The trip switch G, shown in Figures 2 and 2a, is designed to function when the stylus enters into a high pitched groove inside the playing surface and works irrespective of whether this groove is an eccentric one or a concentric one. Eccentric grooves are shown at 140 on the records of Figures 3 and 3a.

The turn table motor 34, besides operating the turn table, operates a gear train indicated at 141, 142, 143, and 144, whereby a worm 145 may turn at a uniform slow speed. The reproducer support 122 is connected to a downwardly extending arm 146. (See Figures 10 and 11.) Its

lower end 147 is adapted to sweep back and forth underneath the frame 10 and to partake of the back and forth movements of the reproducer.

The trip switch G includes a swinging plate 148, pivoted at 149 and carrying the contacts 150 and 151 of the switch mechanism. The arm 148 also carries a lever 152, pivoted at 153 and under the control of the spring 154. The end of the lever insulatively carries a conducting wheel 155, adapted to close the circuit between the contacts 150 and 151. The lever 152 may be held in the full line position of Figure 2 by a detent lever 156, pivoted at 157 and under the control of a spring 158. These two levers have interengaging teeth 159 and 159'. The lever 156 is in the shape of a bell crank and has a pointed tip or follower 160, adapted to traverse the worm 145.

The parts are arranged so that the reproducer actuated arm 147 will engage with the trip switch G near the end of a record and will move the nose or tip 160 into engagement with the worm. Thereafter, the worm will move the switch G at the same or substantially the same speed that it is being moved by the record. As soon, however, as the end of a record is reached, the special control groove suddenly moves the stylus inward, thereby suddenly moving the trip switch in a counter clockwise direction, as viewed in Figure 2. The follower 160 retards this movement, and the detents are separated so that the spring 154 closes the switch. The parts are then in the position indicated in Figure 1.

The switch will also be tripped in case there is no control groove in the record or the control groove is defective, for in this event the extension 161 on the lever 156 will be brought, by the continued rotation of the worm, against an adjustable permanent stop 162.

The trip switch G is reset to open position by the record shifting mechanism. To accomplish this the plate 148 is provided with a rearward extension 163, the free end of which is disposed just below the cam plate 94. A spring pressed pawl 164, carried by the plate 94, is urged against a stop 165. This pawl passes by the extension 163 during the record shifting movement of the cam plate 94, but during the return movement it engages with the extension 163 and bodily swings the trip switch mechanism in a clockwise direction, bringing the extension 161 against an adjustable stop 166, thereby resetting the detent so that the switch G is open. This switch opening operation is preferably timed to occur while the record shifting arm is above the turn table and supported by the cam 111b. The auxiliary motor will, however, continue to run by current supplied through the running switch, unless its circuit is opened by both the record sequence and time control mechanism.

It will also be understood that one can manually close the trip switch G 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 follower 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 to by-pass the motor starting switch G. This circuit closer is manually held closed long enough to permit the auxiliary motor to close the motor running switch 42.

Time and sequence control

The structural parts of the time and sequence control are embodied in a unit illustrated at M in Figure 2 and shown in detail in Figures 24 and 28, inclusive, and partially diagrammatically illustrated in Figure 1. The timing part L of this organization is driven from the turn table motor through the medium of a worm 170, shaft 171, worm 172, worm wheel 173, shaft 174, and gear pair 175—176. The shafts 171 and 174 are mounted in lugs 177 and 178 respectively, forming part of the chassis 10.

The casing of the unit M is made of insulating material and has a hollow chambered body 180 and two end walls 181 and 182, secured to it in any convenient manner. The end wall 181 carries the shaft 181' for the time drive gear 176. A collar 183 is secured to this shaft, and this collar carries a leaf spring 184, urged against a drum 185 having internal teeth, as indicated at 186. The drum 185 is loose on the shaft 182 but is adapted to be driven forwardly by the turn table motor. It carries an insulating disk 187 provided with a conducting rim 188, flanged on the side, as is clear from Figure 24. This rim contacts with a spring pressed brush 189, carried in a conducting tube 190, secured to the end member 181. The brush is connected with the wire 57. The end member 181 also carries the stationary cylindrical segments 64, 65, 66, 67, which are engageable by the wiper 68 carried by the conducting rim 188.

The sequence control mechanism K and the reset for the timer are operated from the auxiliary motor through a shaft 200 and chain 201, cooperative with equal sized sprocket gears, indicated at 203 and 204. The gear 204, therefore, makes one revolution for each cycle of the auxiliary motor 40. The gear 204 is connected to a shaft 205. This shaft carries an insulating cam 206 for actuating the running switch 42 which is in the form of a leaf spring. It also carries pinions 207 and 208 for actuating gears 209 and 210. The gear 209 is four times the diameter of the pinion 207, and the gear 210 is three times the size of the pinion 208. These gears are loosely carried on a shaft 211 secured to the end member 182 and to a partition wall 212 in a body 180. The gear 209 drives a double cam 213 and a single cam 214, while the gear 210 drives a single cam 215. These cams are adapted to operate the spring fingers 56, 54, and 55, respectively.

At the end of the cycle, the running switch 42 is in the dotted line position of Figure 28, resting against a shoulder 216 in the body 180, but soon after the motor starts, the cam 206 raises the running switch spring up against a stationary contact 217 which has a connecting post 218 extending through the wall 182 and connected by a wire 219 to terminal plate 38.

To reset the timer L to zero, the one revolution shaft 205 is provided with a mutilated gear 220, meshing with a pinion 221 carried on a shaft 222 in line with the shaft 181'. The shaft 222 carries a disk 223 on which is mounted a lever 224 pivoted at 225 and urged against a stop pin 226 by a spring 227. The plate 223 is notched at 228 to cooperate with a spring 229 carried by the insulating body 180. The lower end 230 of the lever 224 is engageable with a pin 231, carried by the insulating disk 187. The mutilated gear 220 is timed to mesh with the pinion 221, so that soon after the auxiliary motor starts it acts to drive the plate 223 in a clockwise direction, as shown in Figure 26, making a complete revolution, pref-

erably in less than one-half of a revolution of the shaft 205.

No matter to what position the pin 231 has been driven by the turn table motor, it will be picked up by the pawl 224 and will be carried around to a predetermined position, whereupon the gear 220 will pass free of the pinion 221 and leave the parts in this position, the spring 229 entering the notch 228 and holding the plate 223 against turning. This will turn forwardly the drum 185, the spring 184 passing by the teeth 186 and thereby placing the wiper 68 in a predetermined position on the segmental contact 64, connected to the zero position of the time selector.

As above pointed out, the trip switch G is reset to open position after the record has been deposited. If, at the time of the reset of this trip switch to open position, the time and record selectors are adjusted for an intermission of one minute after every record, the circuit for the auxiliary motor will be opened, once at the selector 44 and again at the segment 65, and the circuit will remain open until the motor 34 has driven the mechanism L far enough to bring the wiper 68 onto the segment 65; similarly, if the timer is on the three or five minute button, longer time will be required to close the circuit. If, however, the record selector is on the two, three or four button, the circuit for the auxiliary motor will be opened or closed, depending upon the position of the corresponding cams 213, 214 and 215, these cams being so timed relative to the remainder of the mechanism that they have opened the corresponding switches before the trip switch is reset to open position. Once the circuit for the auxiliary motor is completed through either the time or record selector circuit, the auxiliary motor continues to run until the running switch 42 operates the circuit and stops the motor.

In order that a long intermission will not occur after the last record has been played, the record shifting mechanism and selector switch are interconnected to cut out the timing circuits and mechanism after the last record has been played.

Referring now to Figures 5 to 8 inclusive, and Figure 17, it will be seen that the path of the record shifting arm during the shifting of a record differs from its path in the absence of a record to shift. In the latter case, it travels back and forth as determined by the cams 111a, 111b, 111c, 111d, 111e. The low part 111e of the cam keeps the pin 101 above this table B. This path indicated by the double arrows of Figure 17, and the elevation of the pin 101 is shown in full lines in Figure 8. This brings the record engaging finger 101 against the arm 21 of the selector switch (this switch being in the "automatic" position). This will shift the collar 20 and shaft 13 angularly, bringing it to the dotted line position of Figure 8 and thus shifting the cams 16 and 17 correspondingly. This moves the cam 17 beyond the contact 27c and allows it to engage the terminal 30. From the wiring diagram of Figure 1, it is seen that this connects the running switch 42 to one side of the line and renders the time and sequence mechanisms L and K ineffective to open the circuit for the auxiliary motor. The motor thus continues in operation as though it were shifting a record until it is stopped as before.

During this record shifting operation, in the absence of a record to shift, the reproducer is moved approximately to the 10 inch position by mechanism shown in Figures 9 and 10. The inner end of the reproducer supporting arm 122 carries a screw 250. Reasonably close adjust-

ment to the 10 inch position may be effected by the adjustment of this screw. The uppermost record on the platform is then played again from approximately the 10 inch position, and on the next operation of the trip switch the auxiliary motor again goes through the cycle. This time the record shifting pin engages with the arm 22 of the collar 20 and operates it another partial revolution, bringing it to the dash line position of Figure 8 and shifting the selector switch shaft 13 far enough to cause the cam 16 to raise the springs 27a and 27b, thereby opening the circuit for the turn table motor and the audio amplifying apparatus. The auxiliary motor continues to run through current fed through the running switch until this switch opens and brings the mechanism to a stop.

If one desires to repeat a record indefinitely, with or without the time and sequence control, the control knob 15 is set in the repeat position, which carries the arms 21 and 22 into the dot and dash line position of Figure 8, where they are out of the range of the pin 100'. If the selector switch is set in the "automatic" position and no records placed in the magazine, the record will be played twice. If the selector switch is set to the single position manually, the time and sequence position is automatically cut out of circuit, and the phonograph operates as though these circuits were not available and is automatically turned off after the last record is played.

Assembly

The mechanism which has been described is capable of very convenient assembly. The chassis 10 may be in the form of a single casting, and to this casting all the parts are secured. The turn table motor unit may be preassembled away from the frame or chassis. The auxiliary motor unit with reduction gear 90, arm 92 and shaft 220 constitute another unit capable of direct securement to the chassis. The center post and trip switch may also be assembled as units and secured direct to the chassis. The unit M is a preassembled unit. The electrical controls, including the selector switch F, the time and record selectors 44 and 45, and the timing and intermission sequence unit M may all be secured to the insulating plate 12.

After the table B has been secured to the upper side of the chassis, the magazine forming members 70 and 71 and the record guides E' and E'' may be secured directly to the chassis. The record shifting arm 75 and reproducer support 122 may be secured to the upper end of the turret, and a cover 300 secured to the top of the eccentric post 123. This cover is notched, as indicated at 301, to accommodate the record shifting arm 122 and moved with the reproducer supporting arm back and forth about the axis 76.

The wiring for the pickup may extend from the inner end of the arm 122 down through the opening 303 in the table B and be carried to a volume controller indicated at 304 in Figures 3, 3a and 29, and then to a transformer 305.

It is obvious that the invention may be embodied in many forms and constructions, and I wish it to be understood that the particular form shown is but one of the many forms. Various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

I claim:

1. In a multiple record phonograph, a chassis, 75

flat table above the chassis, a playing platform above the table, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, said magazine being placed to one side of the playing platform and comprising record supporting members disposed above said table and secured to the chassis and side walls at the more remote part of the magazine for limiting the movement of records rearwardly across the bottom, record shifting mechanism and record guiding members having upwardly inclined portions to receive the records when shifted from the receptacle toward the playing platform, said guiding members being independent of the table and secured to the chassis.

2. In a multiple record phonograph, a chassis, a flat table above the chassis, a playing platform above the table, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, said magazine being placed to one side of the playing platform and comprising two record supporting members disposed above the table and secured to the chassis, each having a side wall at the more remote part of the magazine for limiting the movement of records rearwardly across the bottom, record shifting mechanism and record guiding members having upwardly inclined portions to receive the records when shifted from the receptacle toward the playing platform, the record supporting members sloping downwardly toward the guides, said guiding members being independent of the table and secured to the chassis.

3. In a multiple record phonograph, a chassis, a flat table above the chassis, a playing platform above the table, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, said magazine being placed to one side of the playing platform and comprising record supporting members disposed above the table and secured to the chassis and side walls at the more remote part of the magazine for limiting the movement of records in one direction, record shifting mechanism, record guiding members having upwardly inclined portions to receive the records when shifted from the receptacle toward the playing platform, a control switch serving to disable said record shifting means and a control switch operating member underneath the front guiding member and having an operating device between the guiding members and engageable by the record shifting mechanism to actuate the switch toward open position when the mechanism functions without shifting a record.

4. In a multiple record phonograph, a chassis, a flat table above the chassis, a playing platform above the table, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, said magazine being placed to one side of the playing platform and comprising record supporting members disposed above the table and secured to the chassis and side walls at the more remote part of the magazine for limiting the movement of records rearwardly across the bottom, record shifting mechanism including an arm shiftable over the magazine, a cam for holding the mechanism out of contact with the table, and record guiding members having upwardly inclined portions to receive the records when shifted from the receptacle toward the playing platform, said guiding members being independent of the table and secured to the chassis.

5. In a multiple record phonograph, a chassis, a flat table above the chassis, a playing platform above the table, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, said magazine being placed to one side of the playing platform and comprising record supporting members disposed above the table and secured to the chassis and side walls at the more remote part of the magazine for limiting the movement of records rearwardly across the bottom, a horizontally jointed record shifting arm mounted on a vertical axis and adapted to swing over the magazine and playing platform, operating means for said shifting arm, a cam for supporting the arm during part of its movement, record guiding members having upwardly inclined portions to receive the records when shifted from the receptacle toward the playing platform, and a switch carried by the chassis underneath the front record guiding member and serving to disable said operating means, the switch having an operating device engageable by the record shifting arm for actuating the switch toward open position when the arm operates without shifting a record.

6. In a multiple record phonograph, a chassis, a flat table above the chassis, a playing platform above the table, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, said magazine being placed to one side of the playing platform and comprising record supporting members disposed above the table and secured to the chassis and side walls at the more remote part of the magazine for limiting the movement of records rearwardly across the bottom, record shifting mechanism including an arm supported by the chassis and swingable about a vertical axis to the rear of the table and between the magazine and the playing platform, and front and rear record guiding members having upwardly inclined portions to receive the records when shifted from the receptacle toward the playing platform, the rear guiding member housing the pivotal supports of the record shifting arm.

7. In a multiple record phonograph, a generally rectangular table, a playing platform above the table at one end, a magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, and disposed at the opposite end of the table, a record shifting arm pivoted on a vertical axis between the magazine and playing platform and to the rear thereof, and adapted to swing from the rear of the magazine to the axis of the playing platform, front and rear record guiding members between the magazine and playing platform and having inclined portions for guiding a record upwardly as it is shifted from the magazine to the playing platform, the record guiding portion of the rear member being very steep while the record guiding portion of the front member is more gradual, the rear member housing the support for the record shifting arm.

8. In a multiple record phonograph, a table, a playing platform above the table at one end thereof, a record magazine above the table at the other end thereof, oblique record guides between the magazine and playing platform for guiding a record to an elevation above the playing platform, the bottom of the magazine being in the form of forwardly and downwardly sloping members extending from adjacent the rear of the table to the record guides and having

at the rear oblique record edge engaging portions to offset the record centers.

9. In a multiple record phonograph, a table, a playing platform above the table at one end thereof, a record magazine above the table at the other end thereof, oblique record guides between the magazine and playing platform for guiding a record to an elevation above the playing platform, the bottom of the magazine being in the form of strips disposed above the surface of the table and extending from adjacent the rear corner of the table to the record guides, the rear of the strips having oblique record edge engaging portions to offset the record centers.

10. In a multiple record phonograph, a table, a record magazine having two record supporting bottom members above the table and two side wall forming members extending obliquely upward from the record supporting members.

11. In a multiple record phonograph, a table, record supports disposed above the table near the rear corner thereof and slanting downwardly away from the corner, and oblique side wall forming members at the rear to engage the edges of the records.

12. In a multiple record phonograph, a chassis, a table above the chassis, and magazine forming members carried above the table and secured to the chassis, said members being in the form of tapered strips to provide a sloping bottom for the magazine and having at the rear upward extensions with oblique record edge engaging portions.

13. In a multiple record phonograph, a front record guide and control board comprising a molded insulating body hollow from underneath to accommodate electrical controls and having a horizontal record supporting surface, an inclined record guiding surface at one end and a vertical wall at the other end to allow a record to drop when moved beyond the horizontal surface.

14. In a multiple record phonograph, a front record guide and control board comprising a molded insulating body hollow from underneath to accommodate electrical controls and having a horizontal record supporting surface, an inclined record guiding surface at one end and a vertical wall at the other end to allow a record to drop when moved beyond the horizontal surface, the insulating body having a lower front portion to accommodate a control knob.

15. In a multiple record phonograph, a phonograph table, a molded body hollow from underneath placed on top of the phonograph table, the body being wide at the rear and tapering toward the front, the front narrow part having a steep record guide at one side and a vertical wall at the other side to allow a record to drop when moved beyond the summit of the record guide, the rear of the body having a vertical opening to accommodate record shifting mechanism.

16. In a multiple record phonograph, a flat horizontal frame plate, a flat table above the plate, front and rear record guiding members above the table and secured to the plate, the guiding members having summits at the same elevation, a record shifting arm having operating mechanism concealed by the rear record guiding member, actuating means for said operating mechanism, and an electric switch for controlling said actuating means carried underneath the front record guiding member and having an operating member above the table and engageable by the record shifting arm to open the switch

when the arm acts to shift a record over the guides but in the absence of a record.

17. In a multiple record phonograph, a flat horizontal frame plate, a record magazine secured to the plate and comprising record supporting bottom members and record edge engaging members for supporting a repertoire of stacked records, each in predetermined position when brought against the record edge engaging members, and a table interposed between the magazine and frame plate to conceal the frame plate.

18. In a multiple record phonograph, a flat horizontal frame plate, a record magazine secured to the plate and comprising record supporting bottom members and record edge engaging members for supporting a repertoire of stacked records, each in predetermined position when brought against the record edge engaging members, a pair of record guiding members independent of the magazine, secured to the frame plate adjacent the magazine and having inclined record guides leading upwardly from the bottom of the magazine, and a table interposed between the magazine and guiding members and frame plate to conceal the frame plate.

19. In a multiple record phonograph, a horizontal chassis, a table above the chassis, a motor secured to the under side of the chassis and operating a slow speed shaft after one revolution of which it is stopped by a motor actuated running switch, a vertical shaft connected to the slow speed shaft by a crank, said vertical shaft being carried in a vertical bearing in the chassis and extending upwardly above the table; a record shifting arm having its inner end horizontally pivotally supported from the upper end of the vertical shaft to oscillate therewith and to permit vertical movement, and a cam carried by the bearing and disposed underneath the record shifting arm to support the arm as it is moved about.

20. In a multiple record phonograph, a horizontal chassis, a table above the chassis, a motor secured to the under side of the chassis and operating a slow speed shaft after one revolution of which it is stopped by a motor actuated switch, an oscillatory vertical shaft driven from the one-revolution shaft and carried in a vertical bearing in the chassis and extending upwardly above the table; a record shifting arm having its inner end horizontally pivoted about an axis intersecting the axis of the vertical shaft to oscillate with the vertical shaft and to permit vertical movement, and a cam carried by the bearing and disposed underneath the record shifting arm to support the arm as it is moved about.

21. In a multiple record phonograph, a horizontal chassis, a table above the chassis, a motor secured to the under side of the chassis and operating a slow speed shaft after one revolution of which it is stopped by a motor actuated switch, an oscillatory vertical shaft driven from the one-revolution shaft and carried in a vertical bearing in the chassis and extending upwardly above the table; a record shifting arm having its inner end horizontally pivotally supported from the upper end of the vertical shaft to oscillate therewith and to permit vertical movement, a cam carried by the bearing and disposed underneath the record shifting arm to support the arm as it is moved about, a reproducer support pivoted about the shaft and having a horizontal joint to permit it to raise and lower, and a cam movable

with the shaft for raising the reproducer support.

22. In a multiple record phonograph, a horizontal chassis, a table above the chassis, a motor secured to the under side of the chassis and operating a slow speed shaft after one revolution of which it is stopped by a motor actuated switch, an oscillatory vertical shaft driven from the one-revolution shaft and carried in a vertical bearing in the chassis and extending upwardly above the table; a record shifting arm having its inner end horizontally pivotally supported from the upper end of the vertical shaft to oscillate therewith and to permit vertical movement, a cam carried by the bearing and disposed underneath the record shifting arm to support the arm as it is moved about, a record controlled trip switch for starting the motor, and a pawl moving with the vertical shaft for resetting the trip switch to open position.

23. In a multiple record phonograph, a horizontal chassis, a table above the chassis, a motor secured to the under side of the chassis and operating a slow speed shaft after one revolution of which it is stopped by a motor actuated switch, an oscillatory vertical shaft driven from the one-revolution shaft and carried in a vertical bearing in the chassis and extending upwardly above the table; a record shifting arm having its inner end horizontally pivotally supported from the upper end of the vertical shaft to oscillate therewith and to permit vertical movement, a cam carried by the bearing and disposed underneath the record shifting arm to support the arm as it is moved about, and a cap supported from the shaft to conceal the cam and pivotal connection for the record supporting arm.

24. In a multiple record phonograph, an oscillatory record shifting arm having a pivoted record pickup pin pressed rearwardly by a spring and operable when the arm is moving in a forward direction over a record to enter the center hole of the record, and means including an electric switch for controlling said record shifting arm having an operator engageable by the pin during forward movement of the arm without a record, the pin having a shoulder to engage the upper surface of the record adjacent the hole and limit the extent the pin enters the hole, and a roller carried by the pin to roll over the surface of a record.

25. In a multiple record phonograph, a reciprocatory record shifting arm having a pivoted record pick-up pin pressed rearwardly by a spring and operable when the arm is moving in a forward direction over a record to enter the center hole of the record, and a friction pad carried by the record shifting arm and engageable with the surface of a record when the arm is moving in a rearward direction for sliding the record rearwardly, whereby, on forward movement of the arm, the pin holds the arm elevated to keep the pad off the record, and, on rearward movement of the arm, the pin may swing to permit the pad to engage the record.

26. In a multiple record phonograph, a reciprocatory record shifting arm having a pivoted record pickup pin pressed rearwardly by a spring and operable when the arm is moving in a forward direction over a record to enter the center hole of the record, and a friction roller carried by the record shifting arm and engageable with the surface of a record when the arm is moving in a rearward direction for sliding the record rearwardly, the roller turning on its axis when

the record has a rolling motion about its edge, whereby, on forward movement of the arm, the pin holds the arm elevated to keep the roller off the record, and on rearward movement of the arm the pin may swing to permit the roller to engage the record.

27. In a multiple record phonograph, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, and record shifting mechanism including a horizontally swingable record shifting arm jointed for vertical movement and carrying at its free end a record shifting head adapted to swing over the magazine and to rest on the uppermost record in the magazine during a portion of its swinging movement, the end of the arm having a pivoted record pickup pin adapted to enter the center hole of a record in the magazine and carrying a roller adapted to support the arm from the surface of the record until the pin enters the center hole.

28. In a multiple record phonograph, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, and record shifting mechanism including a horizontally swingable record shifting arm jointed for vertical movement and carrying at its free end a record shifting head adapted to swing back and forth over the magazine and to rest on the uppermost record in the magazine during a portion of its rearward swinging movement, the end of the arm having a friction roller engageable with the record to shift it rearwardly to bring its edge against one stop associated with the magazine and to roll the record about that stop to bring it against a second stop whereby the center hole of the record is located in a predetermined position.

29. In a multiple record phonograph, a record magazine for a stacked repertoire of records of different sizes to be played therefrom in succession, and record shifting mechanism including a horizontally swingable record shifting arm jointed for vertical movement and carrying at its free end a record shifting head adapted to swing over the magazine and to rest on the uppermost record in the magazine during a portion of its swinging movement, the end of the arm having a conical frictional roller mounted on an axis at substantially right angles to the horizontal axis of the arm and engageable with the record to shift it rearwardly to bring its edge against one stop associated with the magazine and to roll the record about that stop to bring it against a second stop whereby the center hole of the record is located in a predetermined position.

30. In a multiple record phonograph, record shifting mechanism including a vertical shaft mounted in a fixed bearing for oscillating about its axis, a record shifting arm pivotally supported from the upper end of the shaft and swingable by the shaft, a stationary cam carried by the bearing for supporting the arm, a loose sleeve surrounding the shaft and supported from underneath, a reproducer carried on the end of a reproducer supporting arm, the arm being pivotally secured to the sleeve to swing therewith and to raise and lower, and a shaft carried cam operating on a follower for raising and lowering the reproducer supporting arm.

31. In a multiple record phonograph, record shifting mechanism including a vertical shaft mounted in a fixed bearing for oscillating about its axis, a record shifting arm pivotally supported from the upper end of the shaft and swingable

by the shaft, a stationary cam carried by the bearing for supporting the arm, a loose sleeve surrounding the shaft and supported from underneath, a reproducer carried on the end of a reproducer supporting arm, the arm being pivotally secured to an eccentric post carried by the sleeve to swing therewith and to raise and lower, and a shaft carried cam operating on a follower for raising and lowering the reproducer supporting arm.

32. In a multiple record phonograph, an oscillatory shaft mounted in a vertical axis and carrying a horizontally swingable jointed record shifting arm, a sleeve about the shaft, the sleeve carrying an eccentrically located vertical post, and a reproducer supporting arm pivoted to the post to raise and lower about a horizontal axis and bodily swingable with the sleeve.

33. In a multiple record phonograph, an oscillatory shaft mounted in a vertical axis and carrying a horizontally swingable jointed record shifting arm, a sleeve about the shaft, the sleeve carrying an eccentrically located vertical post, and a reproducer supporting arm pivoted to the post to raise and lower about a horizontal axis and bodily swingable with the sleeve, there being a member movable with the reproducer and engageable by the record shifting arm for pushing the reproducer to a predetermined position, the shaft carrying a cam for operating a follower engageable with the reproducer supporting arm to raise the arm, the upper surface of said follower providing a friction drag to resist horizontal movement of the reproducer support when raised.

34. In a phonograph, a swingable reproducer support, means to raise the reproducer support to bring the stylus of the reproducer above a record and to move the reproducer and stylus to an initial playing position, the raising means having notches to locate the reproducer in predetermined positions corresponding with record sizes, and a counterbalance spring for counterbalancing the weight of the reproducer, the spring being twisted to tend to move the reproducer and stylus inwardly when the stylus is lowered onto a record.

35. In a multiple record phonograph, a turret carrying an oscillatory record shifting arm and an oscillatory reproducer supporting arm, a stationary ring about the lower part of the turret and a movable covering means carried by the upper part of the turret for covering and concealing the operating mechanism and supports for the arms, the covering means extending down to the stationary ring.

36. In a multiple record phonograph, a totally enclosed turret from which projects a record shifting arm and a reproducer supporting arm, both oscillatory in a horizontal plane and movable in a vertical plane, the upper part of the enclosing means partaking of the horizontal movement of one of the arms and the other part partaking of the horizontal movement of the other arm.

37. In a multiple record phonograph, a turret for record shifting mechanism and reproducer supporting, comprising, a fixed bearing housing having a vertical axis, a shaft mounted in the bearing and carrying at the lower end an oscillatory operating member, a horizontal cam movable with the shaft, a record shifting arm secured to the upper end of the shaft, a reproducer support loosely mounted about the shaft to swing independently of the record shifting arm, a reproducer pivotally carried by the re-

producer support to move horizontally therewith and to raise and lower, and a follower for the oscillatory cam for raising the reproducer.

38. In a multiple record phonograph, a turret for record shifting mechanism and reproducer supporting, comprising, a fixed bearing housing having a vertical axis, and carrying a fixed horizontal cam, a shaft mounted in the bearing and carrying at the lower end an oscillatory operating member, a horizontal cam movable with the shaft, a record shifting arm having an inner end secured to the upper end of the shaft by a horizontal pivotal mounting whereby it swings with the shaft and the free end may rise or lower, the arm resting on the stationary cam which determines the extent to which it may lower, a reproducer supporting arm pivotally mounted on an eccentric post carried by a sleeve loosely mounted about the shaft, the reproducer supporting arm being pivotally carried by the sleeve to move horizontally therewith and to rise and lower, and a follower for the oscillatory cam for raising the reproducer supporting arm.

39. In a multiple record phonograph, a turret for record shifting mechanism and reproducer supporting, comprising, a fixed bearing housing having a vertical axis, and carrying a fixed horizontal cam, a shaft mounted in the bearing and carrying at the lower end an oscillatory operating member, a record shifting arm having an inner end secured to the upper end of the shaft by a horizontal pivotal mounting whereby it swings with the shaft and the free end may rise or lower, the arm resting on the stationary cam which determines the extent to which it may lower, a reproducer support loosely mounted about the shaft to swing independently of the record shifting arm, a reproducer pivotally carried by the reproducer support to move horizontally therewith and to rise and lower, and shaft operated means for raising the reproducer.

40. In a multiple record phonograph, a turret for record shifting mechanism and reproducer supporting, comprising, a fixed bearing housing having a vertical axis, and carrying a fixed horizontal cam, a shaft mounted in the bearing and carrying at the lower end an oscillatory operating member, a record shifting arm having an inner end secured to the upper end of the shaft by a horizontal pivotal mounting whereby it swings with the shaft and the free end may rise or lower, the arm resting on the stationary cam which determines the extent to which it may lower, a reproducer support loosely mounted about the shaft to swing independently of the record shifting arm, a reproducer pivotally carried by the reproducer support to move horizontally therewith and to rise and lower, and a follower for the oscillatory cam for raising the reproducer.

41. In a multiple record phonograph, a turret for record shifting mechanism and reproducer supporting, comprising, a fixed bearing housing having a vertical axis, and carrying a fixed horizontal cam, a shaft mounted in the bearing and carrying at the lower end an oscillatory operating member, a horizontal cam movable with the shaft, a record shifting arm having an inner end secured to the upper end of the shaft by a horizontal pivotal mounting whereby it swings with the shaft and the free end may rise or lower, the arm resting on the stationary cam which determines the extent to which it may lower, a reproducer support loosely mounted about the shaft to swing independently of the record shift-

ing arm, a reproducer pivotally carried by the reproducer support to move horizontally therewith and to rise and lower, and a follower for the oscillatory cam for raising the reproducer, the follower for the cam having notches cooperative with the reproducer support for holding the latter in predetermined positions.

42. An intermission controller for phonographs comprising, a plurality of stationary contacts disposed concentrically about a continuously driven shaft, a contact carried by the shaft and wiping past the stationary contacts, a selector switch having connections to each of the stationary contacts and to an auxiliary motor for operating record shifting mechanism whereby the circuit for the motor may be closed when a selected stationary contact is reached, and a resetting mechanism for the movable contact comprising a member driven from the auxiliary motor for revolving the contact forwardly to a fixed position.

43. An intermission controller for phonographs comprising, a plurality of stationary contacts disposed concentrically about a continuously driven shaft, a contact support insulatedly carried by the shaft, a contact carried thereby and wiping past the stationary contacts, a selector switch having connections to each of the stationary contacts and to an auxiliary motor for operating record shifting mechanism whereby the circuit for the motor may be closed when a selected stationary contact is reached, and a revolvable member driven from the auxiliary motor and engageable with the support for the movable contact to move it faster than the shaft and bring it to a predetermined position.

44. An intermission controller for phonographs comprising, a plurality of stationary contacts disposed concentrically about a continuously driven shaft, a contact support insulatedly carried by the shaft, a contact carried thereby and wiping past the stationary contacts, a selector switch having connections to each of the stationary contacts and to an auxiliary motor for operating record shifting mechanism whereby the circuit for the motor may be closed when a selected stationary contact is reached, and a revolvable member driven from the auxiliary motor and including a pawl for moving the contact support faster than the shaft and bring it to a predetermined position, the pawl allowing the contact carrier to pass by when driven from the shaft.

45. In an intermission control for phonographs, a platform motor driven shaft, a conducting ring insulatedly supported from the shaft and having a one way driving connection therewith, a wiper carried by the ring, a stationary brush contacting with the ring, a plurality of stationary contacts engageable by the wiper, and a control switch for an auxiliary motor having wires connected to the various stationary contacts.

46. In an intermission control for phonographs, a platform motor driven shaft, a conducting ring insulatedly supported from the shaft and having a one way driving connection therewith, a wiper carried by the ring, a stationary brush contacting with the ring, a plurality of stationary contacts engageable by the wiper, an independently driven rotary member adapted to be turned one revolution and carrying a pawl engageable with a pin carried by the insulating support for the ring for turning the ring and associated parts to a predetermined

point, and a control switch for an auxiliary motor having wires connected to the various stationary contacts.

47. In an intermission control for phonographs, a fixed insulating base carrying a rotary shaft adapted to be driven continuously by a turn table motor, a conducting ring insulatedly supported from the shaft and having a one way driving connection therewith, a wiper carried by the ring and engageable with a plurality of stationary contacts carried by the insulating base, and a brush carried by the base and bearing on the conducting ring.

48. In an intermission control for phonographs, a fixed insulating base carrying a rotary shaft adapted to be driven continuously by a turn table motor, a conducting ring insulatedly supported from the shaft and having a one way driving connection therewith, a spring pressed wiper carried by the ring and engageable with a plurality of stationary contacts carried by the insulating base, and a brush carried by the base and bearing on the conducting ring, the stationary contacts being in the form of fragments of cylindrical surfaces and separated to allow the wiper to pass from one contact to the next.

49. In an intermission control for phonographs, comprising a plurality of fixed contacts, a rotary wiper having a one way driving connection with a platform motor shaft and engageable with the contacts for successively closing a plurality of circuits, of a resetting mechanism comprising a one revolution shaft having a mutilated gear driving connection with a shaft in line with the one revolution shaft and adapted to be driven one revolution and stopped at a predetermined point, and a device carried by the second shaft for engaging with the support for the wiper to bring it to a predetermined position.

50. A sequence controlling mechanism for phonographs comprising, a one revolution shaft carrying two pinions, a counter shaft carrying two gears in mesh with the pinions, one gear having four times as many teeth as the corresponding pinion while the other gear has three times as many teeth as the corresponding pinion, a single point cam carried by the smaller gear and a single point and a two point cam carried by the larger gear, and spring pressed contacts adapted to be raised by the cams according to the number of revolutions through which the one revolution shaft is passed.

51. A sequence controlling mechanism for phonographs comprising, a one revolution shaft carrying two pinions, a counter shaft carrying two gears in mesh with the pinions, one gear having four times as many teeth as the corresponding pinion while the other gear has three times as many teeth as the corresponding pinion, a single point cam carried by the smaller gear and a single point and a two point cam carried by the larger gear, and spring pressed contacts adapted to be raised by the cams according to the number of revolutions through which the one revolution shaft is passed, a mutilated gear carried by the first shaft and meshing with a pinion adapted to revolve once for each revolution of the one revolution shaft, but remain stationary during a part thereof.

52. A combined intermission and sequence controller for phonographs comprising, an insulating casing carrying a one revolution shaft adapted to be driven by an auxiliary motor, a timing

shaft adapted to be driven by the platform motor, a movable contact driven by the timing shaft and cooperative with stationary contacts carried by the casing, a plurality of independent fixed and movable contacts carried by the casing, and cam means driven from the one revolution shaft for opening and closing the latter mentioned contacts according to a predetermined sequence.

53. A combined intermission and sequence controller for phonographs comprising, an insulating casing carrying a one revolution shaft adapted to be driven by an auxiliary motor, a timing shaft adapted to be driven by the platform motor, a movable contact driven by the timing shaft and cooperative with stationary contacts carried by the casing, a plurality of independent fixed and movable contacts carried by the casing, cam means driven from the one revolution shaft for opening and closing the latter mentioned contacts according to a predetermined sequence, and resetting means for the first movable contact operable from the one revolution shaft.

54. In a multiple record phonograph, a vertical shaft mounted for oscillation about its axis, a record shifting arm mounted on a horizontal bearing carried by the upper end of the shaft, a record pickup pin carried by the end of the arm, a hill and valley cam carried below the arm for supporting the arm, and allowing it to lower during the mid portion of its travel.

55. In a multiple record phonograph, the combination with a turn table motor, and an auxiliary motor operated record shifting mechanism having one path of movement when functioning to shift a record and a different path of movement when functioning to shift a record but in the absence of a record to shift, of a selector switch having a shaft carrying a plurality of insulating cams and a bifurcated member, the shaft being manually presettable to various positions to control the circuit to the motor, and to place the bifurcated member in positions to either be actuated by the record shifting mechanism in the absence of a record to shift or to be inaccessible for such operation.

56. In a multiple record phonograph, the combination with a turn table motor, an auxiliary motor operated record shifting mechanism having one path of movement when functioning to shift a record and a different path of movement when functioning to shift a record but in the absence of a record to shift, a record controlled starting switch for the auxiliary motor, and a running switch for the auxiliary motor, both motors being permanently connected to one side of the circuit, of a selector switch having two pairs of fixed and movable contacts, one pair of which connects the turn table motor and the starting switch for the auxiliary motor, the other pair of which directly connects the running switch to the line, a shaft carrying a plurality of insulating cams for the contacts, the shaft being manually presettable to two positions in which the first pair of contacts only is closed and to a position in which the second pair of contacts is also closed and to an off position in which both pairs of contacts are open, the shaft carrying a bifurcated member adapted to be located in corresponding positions in which it may be actuated by the record shifting mechanism in the absence of a record to shift for changing the position of the cam shaft, or to a position in which it is inaccessible for such operation.

57. In a multiple record phonograph, the com-

bination with a turn table motor, and an auxiliary motor operated record shifting mechanism having one path of movement when functioning to shift a record, and a different path of movement when functioning to shift a record but in the absence of a record to shift and a turn table motor, of a selector switch operating shaft carrying a bifurcated member, the shaft being manually presettable to a position to place the bifurcated member out of range of the record shifting mechanism when actuated without a record to shift, or to positions in which it is engageable by the record shifting mechanism whereby the shaft is turned a partial revolution by the record shifting mechanism, and switches for controlling the motor circuits and actuated by the shaft to control the circuits to the motors, and to place the bifurcated member in position to either be actuated by the record shifting mechanism in the absence of a record to shift or to be inaccessible for such operation.

58. A multiple record phonograph comprising, a horizontal frame plate, a turn table driving unit secured to the under side of the plate and driving a turn table above the plate, a record magazine above the plate and to one side of the turn table, plate-supported record guides between the magazine and turn table, an auxiliary motor unit secured to the under side of the plate, a record shifting turret secured to the plate and carrying a record shifting arm above the plate, and driving connections interconnecting the turret and auxiliary motor.

59. A multiple record phonograph comprising, a horizontal frame plate, a turn table driving unit secured to the under side of the plate and driving a turn table above the plate, a record magazine above the plate and to one side of the turn table, plate-supported record guides between the magazine and turn table, an auxiliary motor unit secured to the under side of the plate, a record shifting turret secured to the plate and carrying a record shifting arm above the plate, driving connections interconnecting the turret and auxiliary motor, a combined intermission timing and record sequence unit secured to the lower side of the chassis and having timing mechanism driven from the turn table driving unit and sequence mechanism driven from the auxiliary motor, and circuits interconnecting the auxiliary motor and the timing and sequence mechanism.

60. A multiple record phonograph having a record magazine, record guides, a turn table carried above a horizontal chassis plate, a horizontally swingable, vertically movable record shifting arm for shifting a record from the magazine over the guides and onto the turn table, and a horizontally swingable, vertically movable reproducer support disposed above the plate and secured to a turret extending through the plate, the plate carrying and supporting a turn table motor and driving mechanism for the turn table, an auxiliary motor operatively connected to the turret for operating the record shifting arm to shift the records, a record controlled switch for starting the auxiliary motor, and an auxiliary motor controlled switch for stopping the auxiliary motor when the auxiliary motor completes its cycle, the lower part of the turret carrying mechanism for resetting the record controlled switch to open position.

61. A multiple record phonograph having an upwardly opening record magazine and record guides, secured to the upper side of a horizontal

chassis plate, a turn table above the plate, a horizontally swingable, vertically movable record shifting arm and a horizontally swingable, vertically movable reproducer support both secured to an oscillatory turret extending through the plate, a turn table motor and driving mechanism for the turn table, secured to the lower side of the plate, an auxiliary motor secured to the lower side of the plate and operatively connected to the turret for oscillating the same to cause the arm to shift a record, a normally open starting switch for the auxiliary motor, disposed below the frame and operatively connected to the reproducer support to be closed thereby, and auxiliary motor operated circuit controlling means opened by the motor at the end of the record shifting cycle.

62. A multiple record phonograph having an upwardly opening record magazine and record guides secured to the upper side of a horizontal chassis plate, a turn table above the plate, a cover board over the plate and below the magazine, the guides and the turn table, a horizontally swingable, vertically movable record shifting arm and a horizontally swingable, vertically movable reproducer support both secured to an oscillatory turret extending through the plate, a turn table motor and driving mechanism for the turn table, secured to the lower side of the plate, an auxiliary motor secured to the lower side of the plate and

operatively connected to the turret for oscillating the same to cause the arm to shift a record, a normally open starting switch for the auxiliary motor, disposed below the frame and operatively connected to the reproducer support to be closed thereby, and auxiliary motor operated circuit controlling means opened by the motor at the end of the record shifting cycle.

63. A multiple record phonograph having an upwardly opening record magazine and record guides secured to the upper side of a horizontal chassis plate, a turn table above the plate, a horizontally swingable, vertically movable record shifting arm and a horizontally swingable, vertically movable reproducer support both secured to an oscillatory turret extending through the plate, a turn table motor and driving mechanism for the turn table, secured to the lower side of the plate, an auxiliary motor secured to the lower side of the plate and operatively connected to the turret for oscillating the same to cause the arm to shift a record, a normally open starting switch for the auxiliary motor, disposed below the frame and operatively connected to the reproducer support to be closed thereby, starting switch opening means carried by the turret, and an auxiliary motor operated running switch opened at the end of the record shifting cycle.

JACK POTTER STOCKTON.