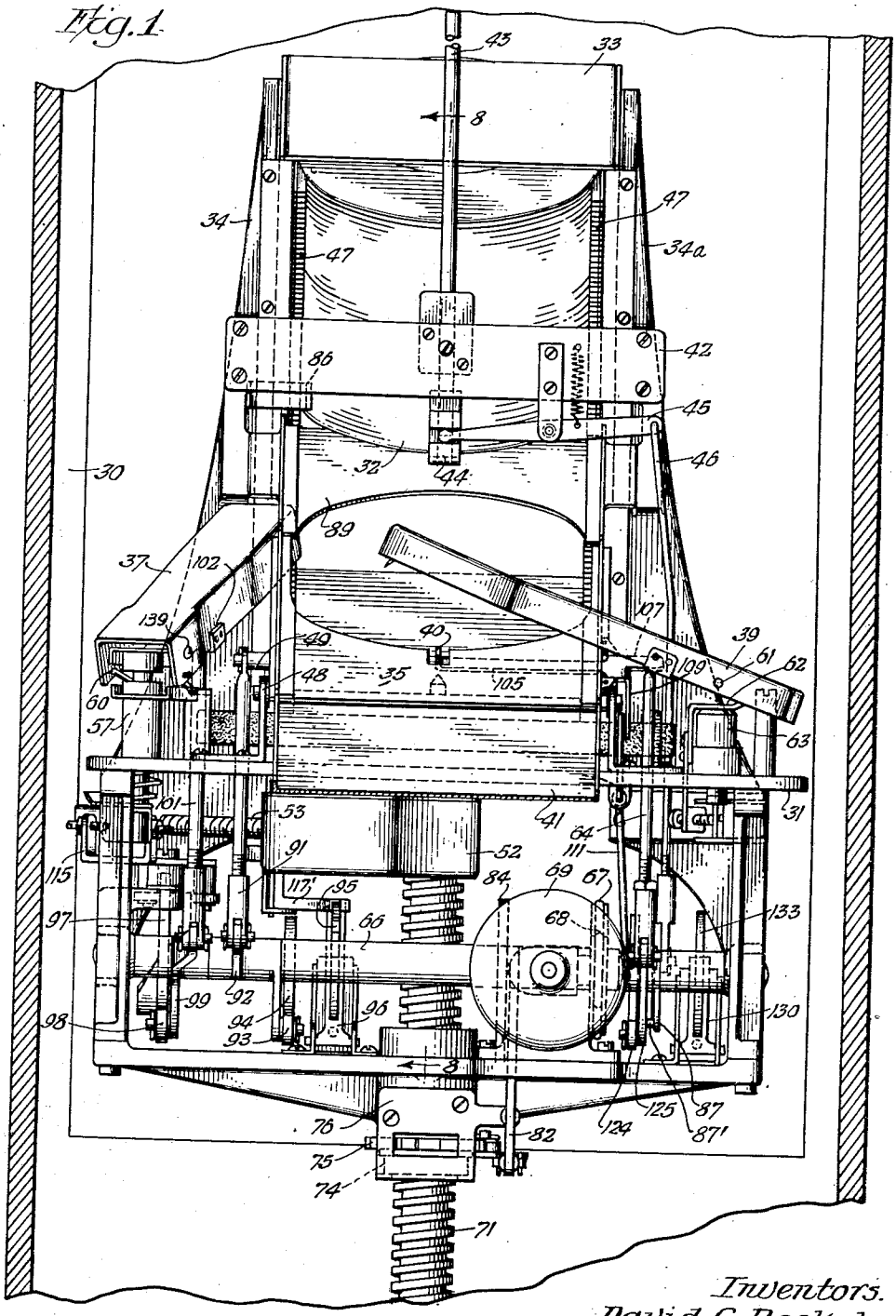
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PHONOGRAPHIC APPARATUS

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Fig. 1.



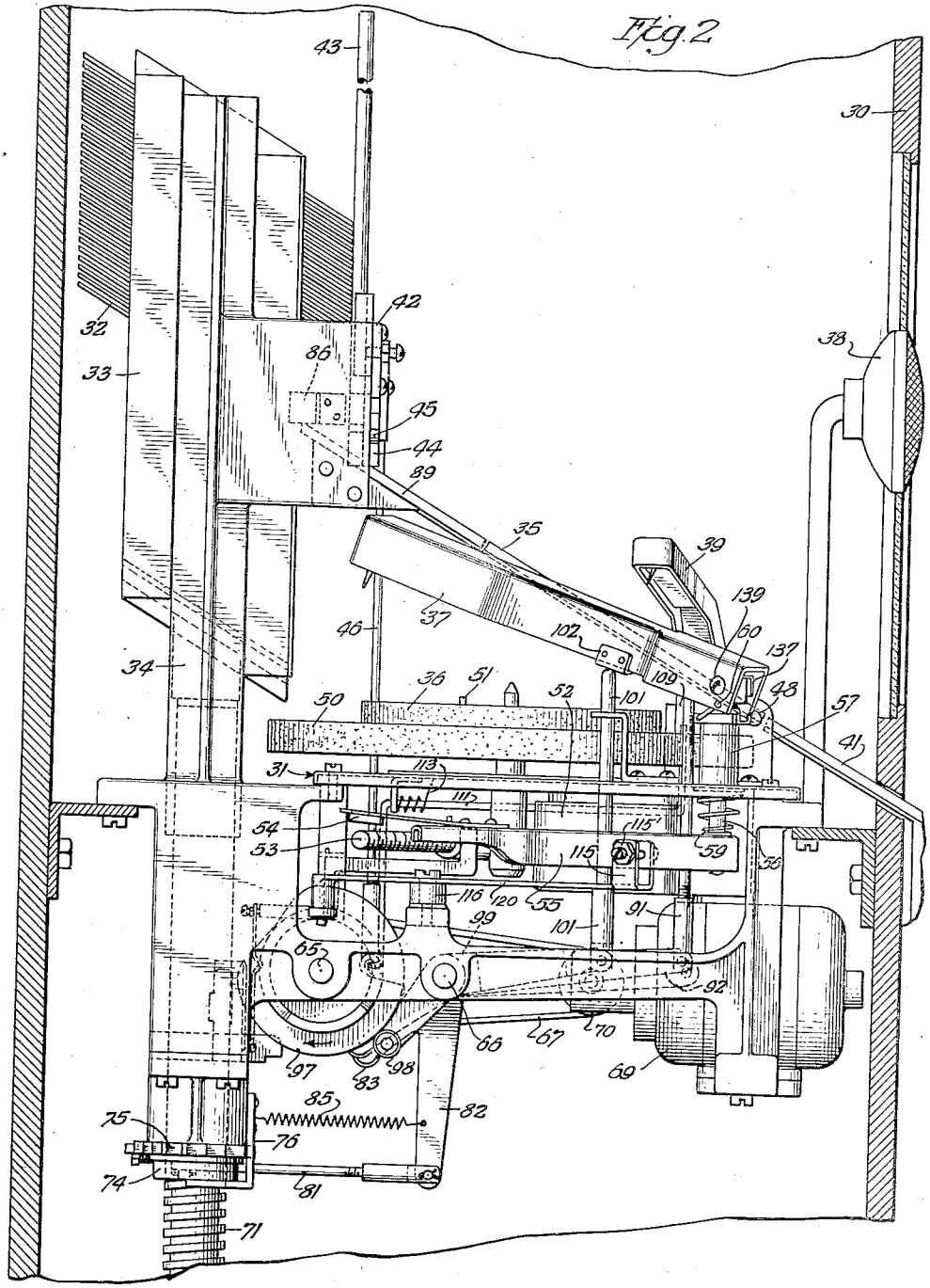
Inventors.
David C. Rockola
Irving Gil
By: Sheridan, Davis & Cargill.
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 2



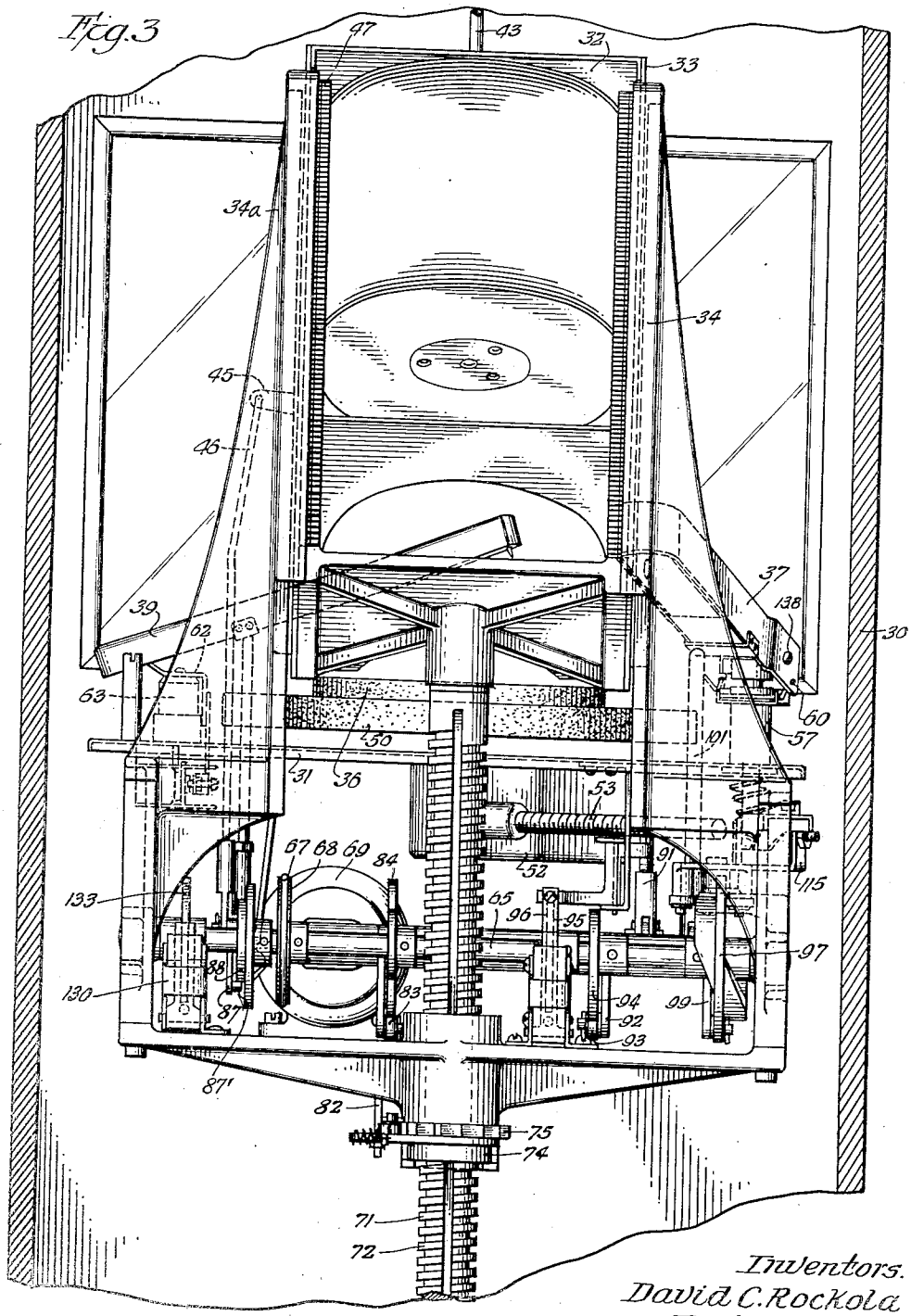
Inventors
David C. Rockola
Irving Gil
By
Sheridan, Davis & Cagill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 3



Inventors.
David C. Rockola
Irving Gil
By:
Sheridan, Ross & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 4

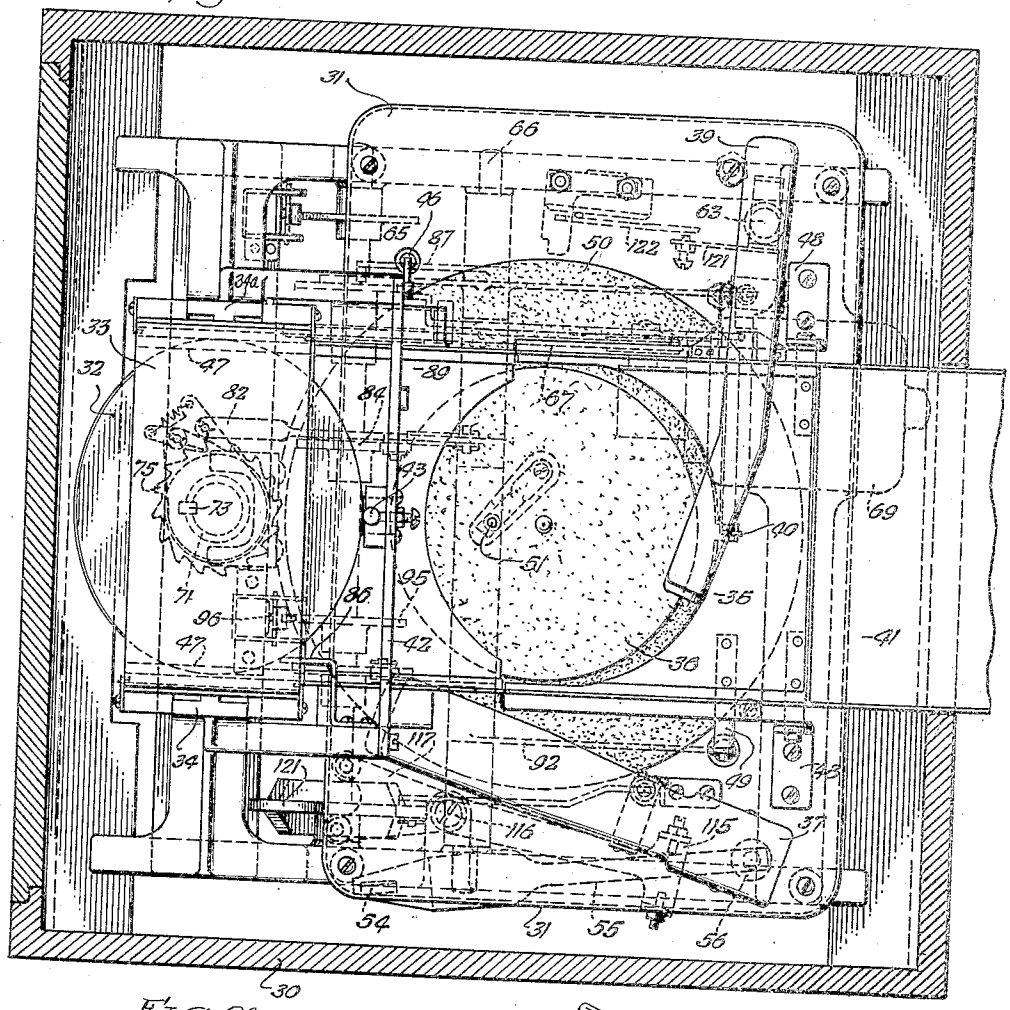
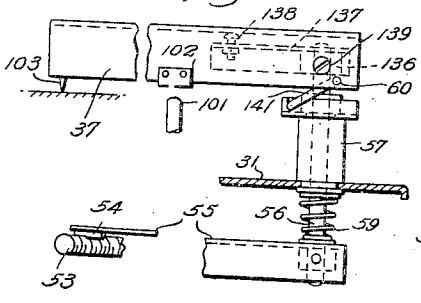


Fig. 24



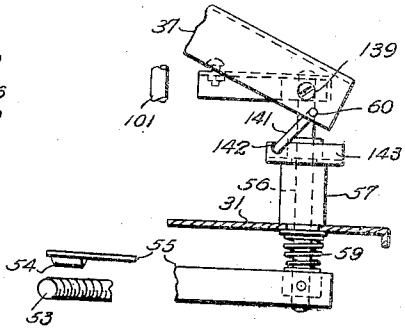


Fig. 25

Inventors.
David C. Rockola
Irving Gil
By: Sheridan, Davis & Cargill
Attys.

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Fig. 5

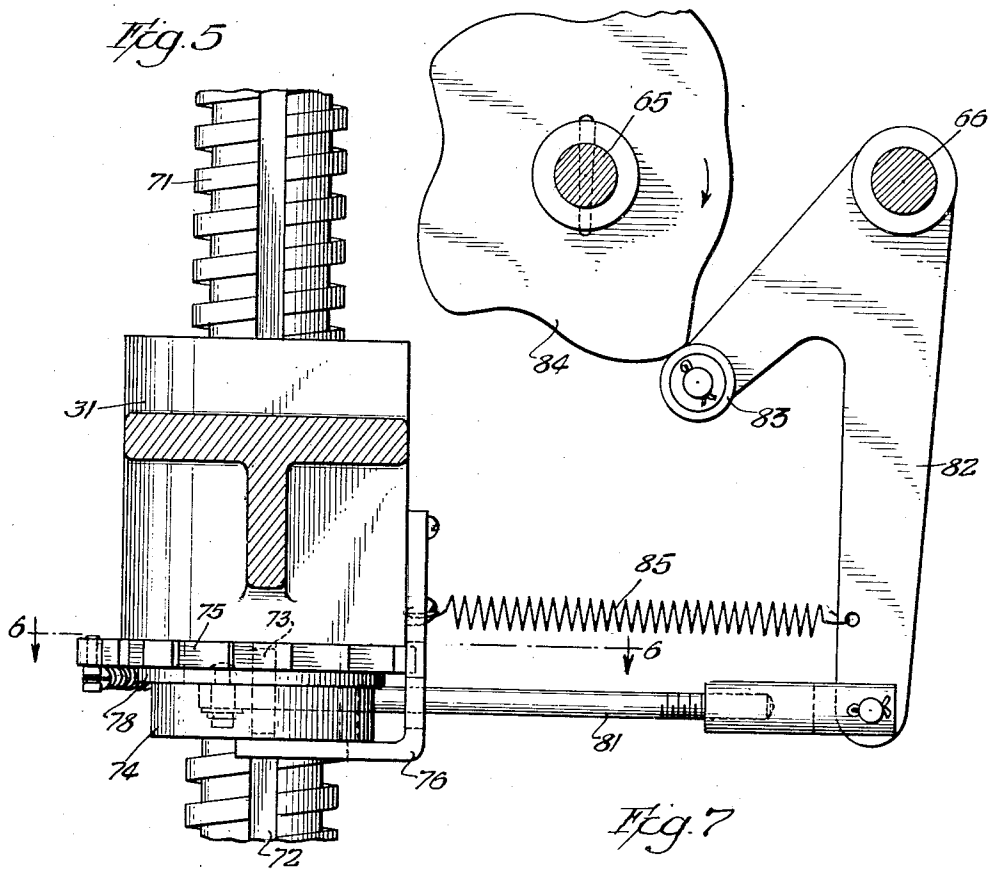


Fig. 7

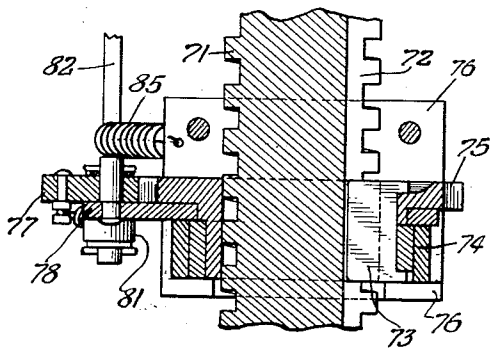
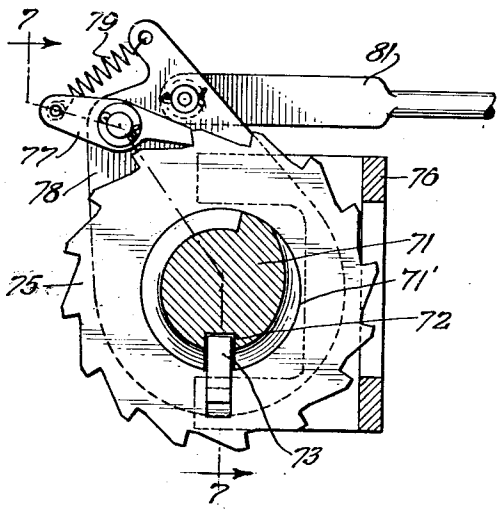


Fig. 6



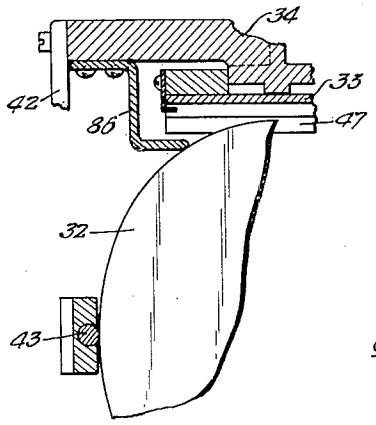
Inventors.
David C. Rockola
Irving Gil
By Sheridan, Davis & Cargill
Attys.

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Fig. 9



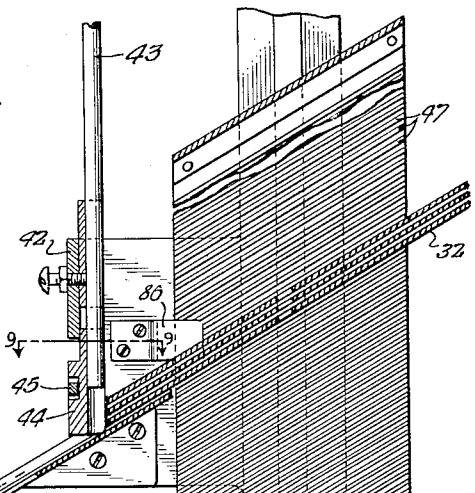
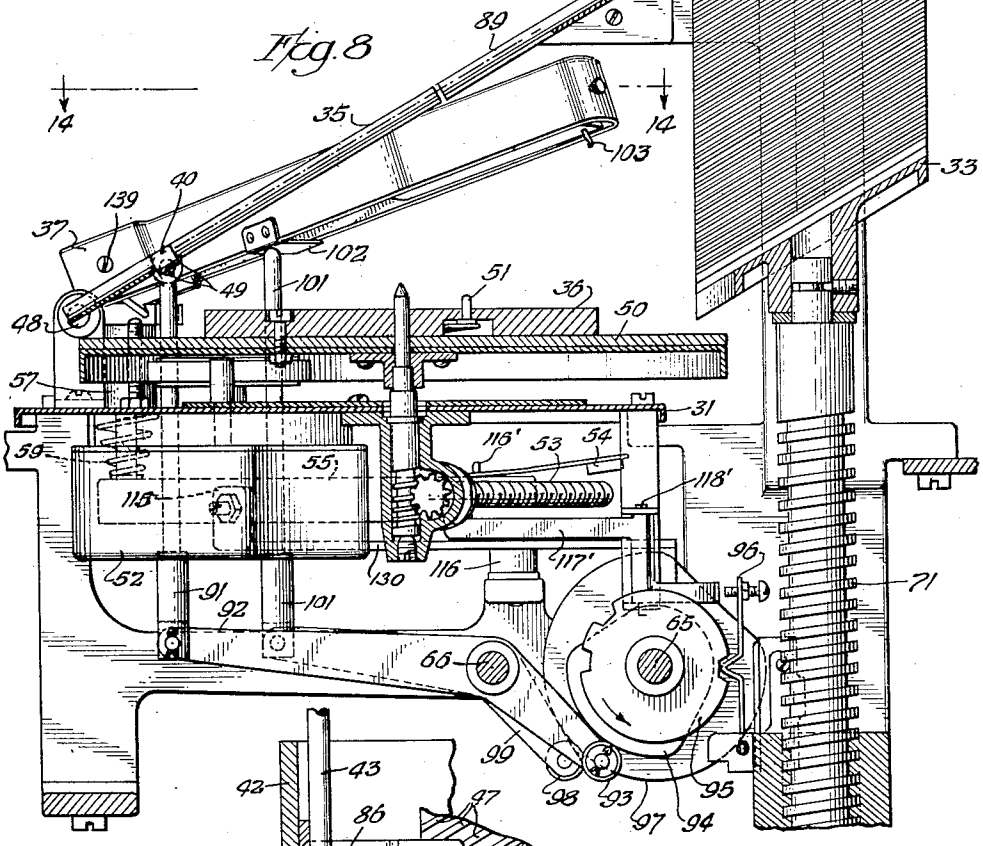


Fig. 8



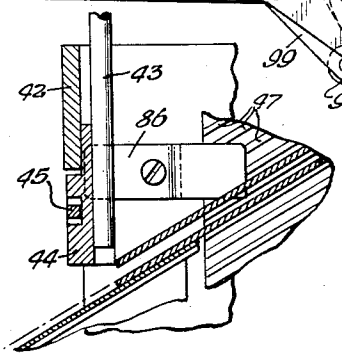


Fig. 10

Inventors.
David C. Rockola
Irving Gil
By:
Sheridan, Ross & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 11

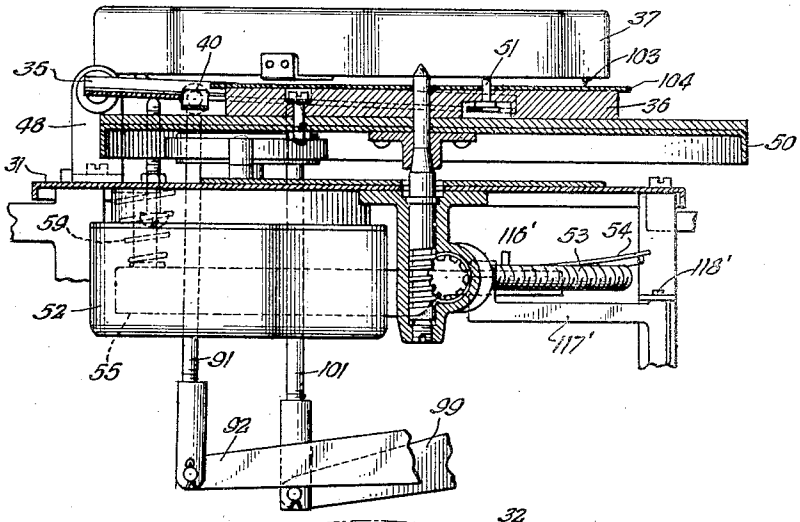


Fig. 12

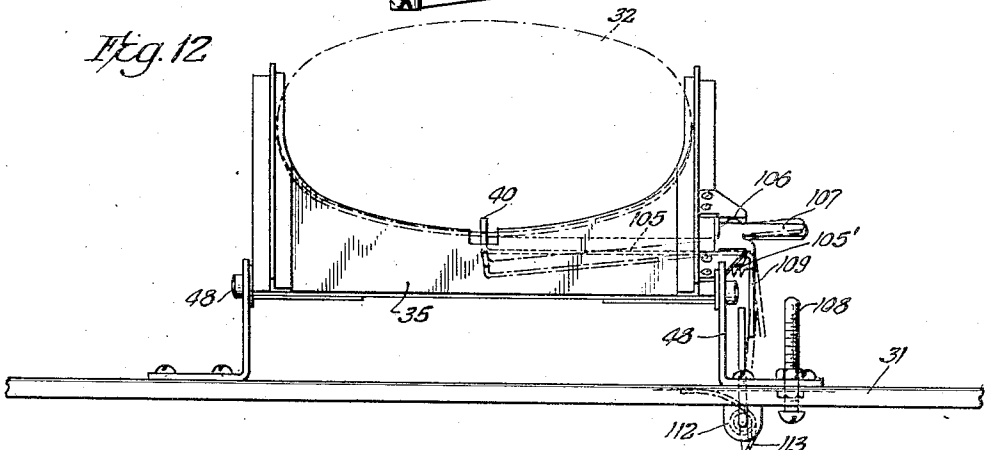
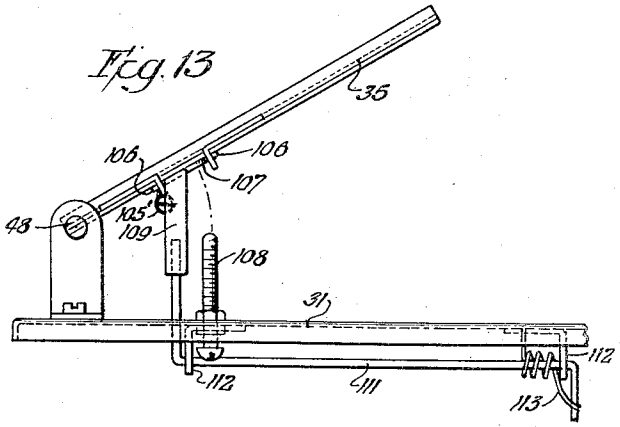
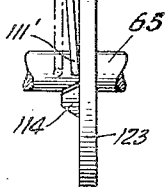


Fig. 13





Inventors.
David C. Rockola
Irving Gil
By Sheridan, Davis & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 14

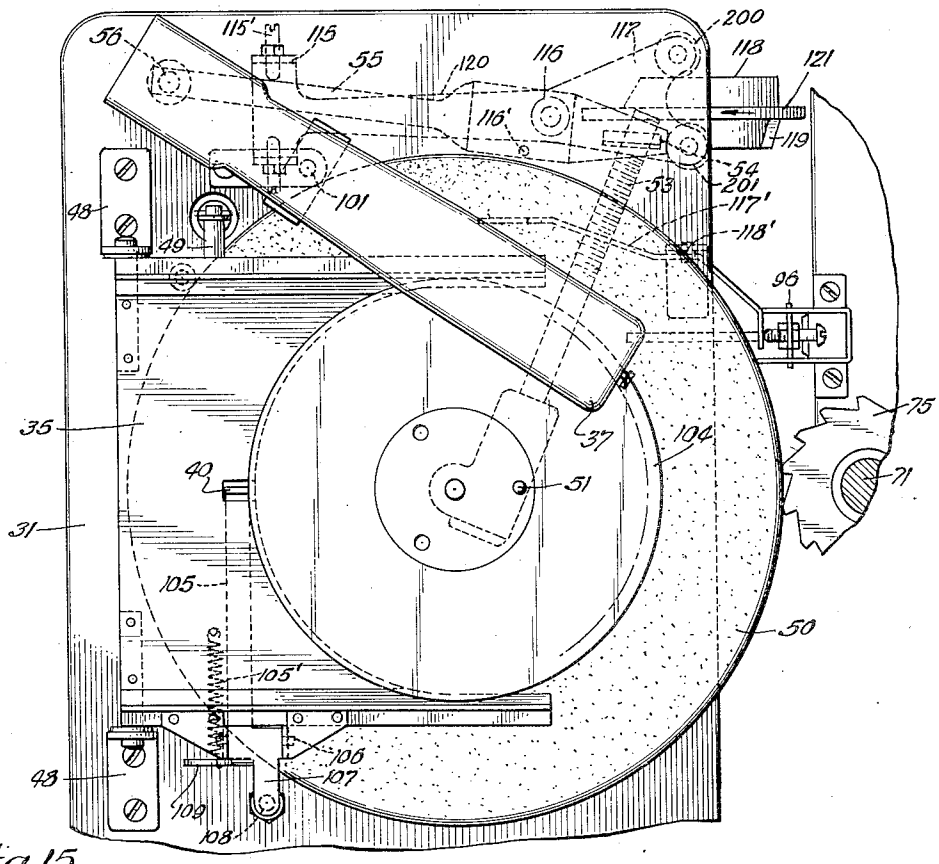
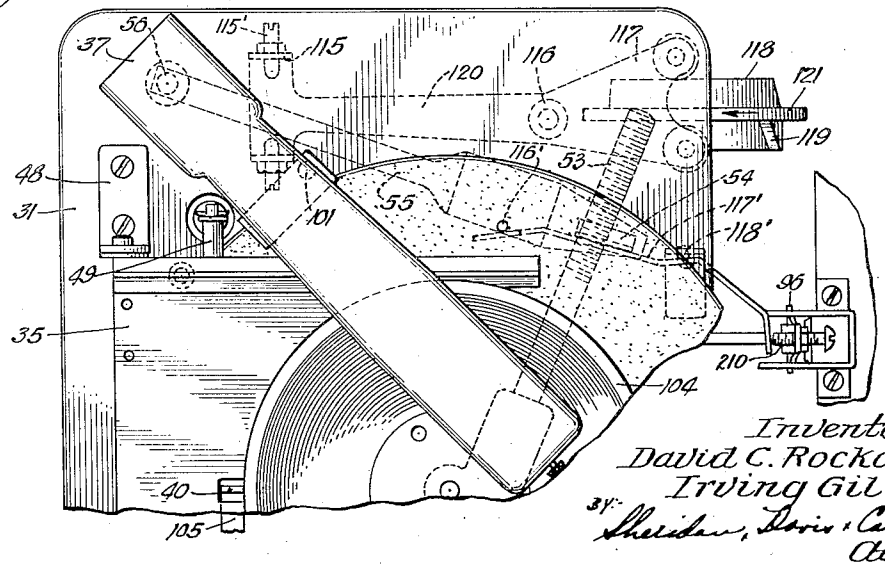


Fig. 15



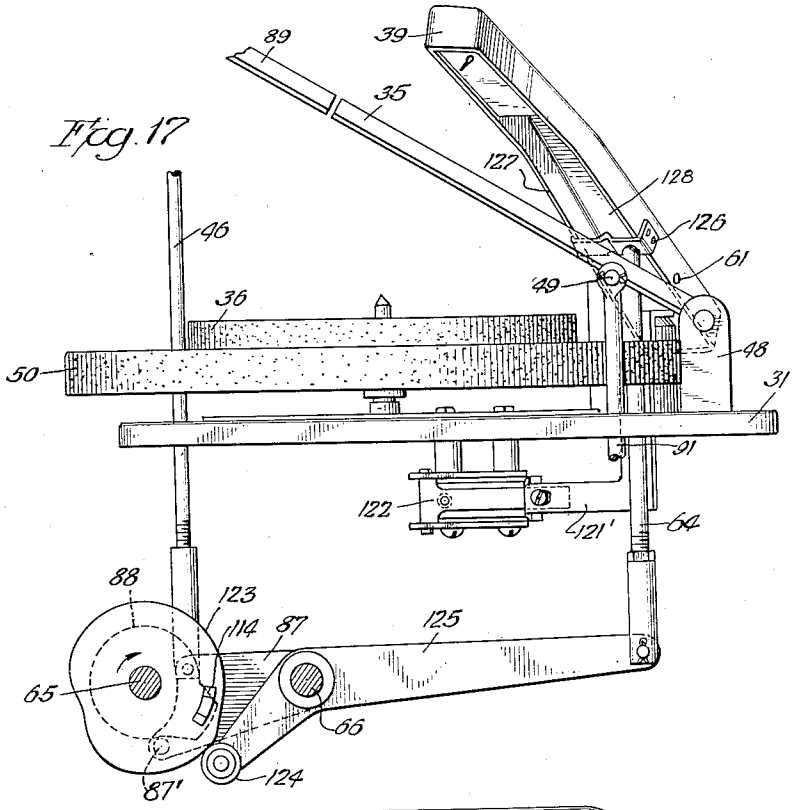
Inventors.
David C. Rockola
Irving Gil
By: Sheridan, Ross & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 17



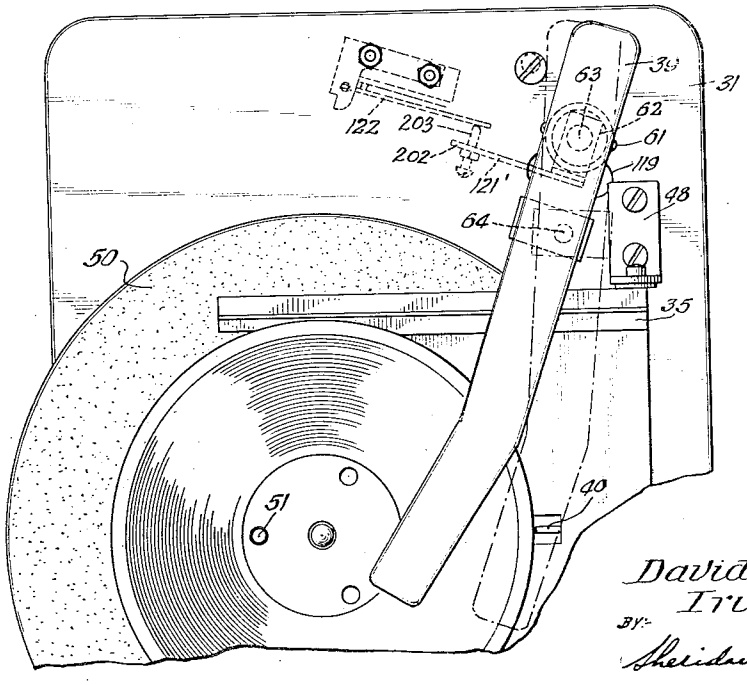


Fig. 16

Inventors.
David C. Rockola
Irving Gil
By: Sheridan, Davis & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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Fig. 18

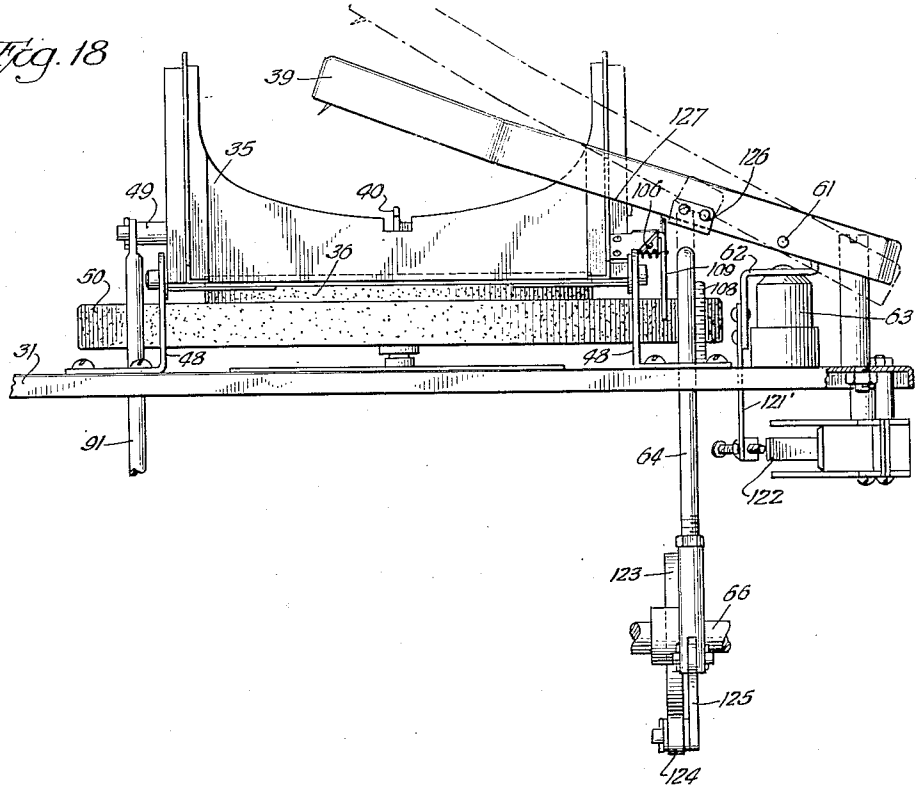


Fig. 19

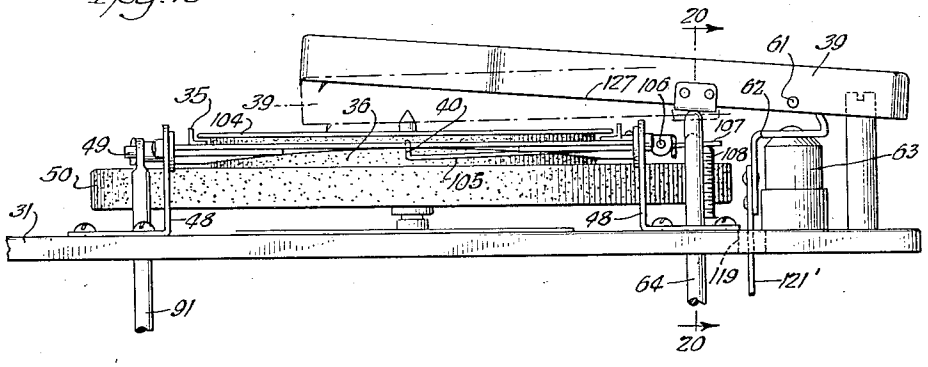
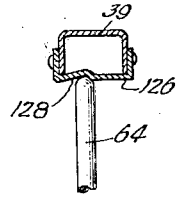


Fig. 20



Inventors.
David C. Rockola
Irving Gil
By:-
Sheridan, Davis & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL. 2,437,557

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Fig. 22

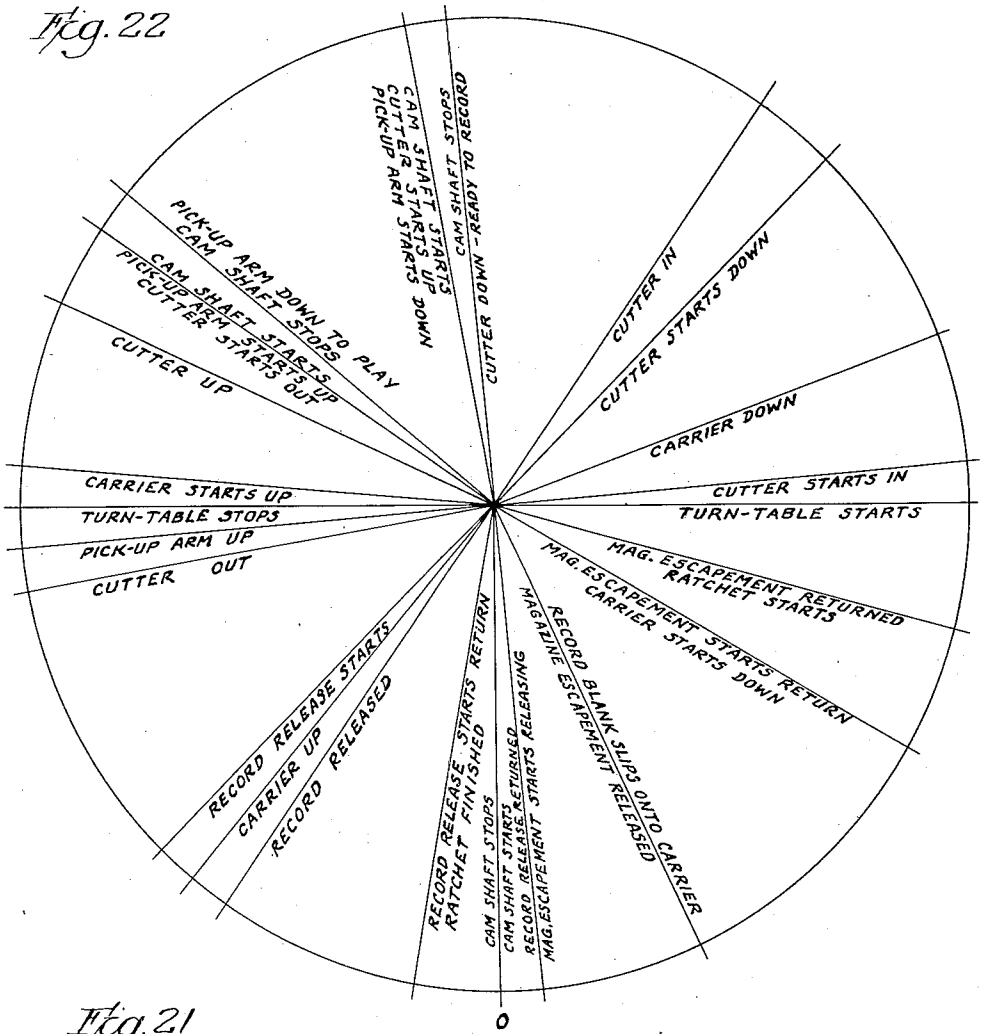
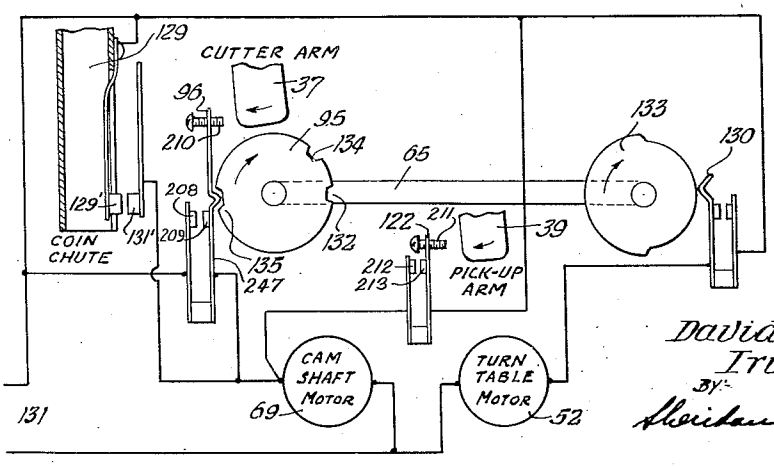


Fig. 21



Inventors.
David C. Rockola
Irving Gil
By:
Sheridan, Ross & Cargill
Attys.

March 9, 1948. D. C. ROCKOLA ET AL 2,437,557

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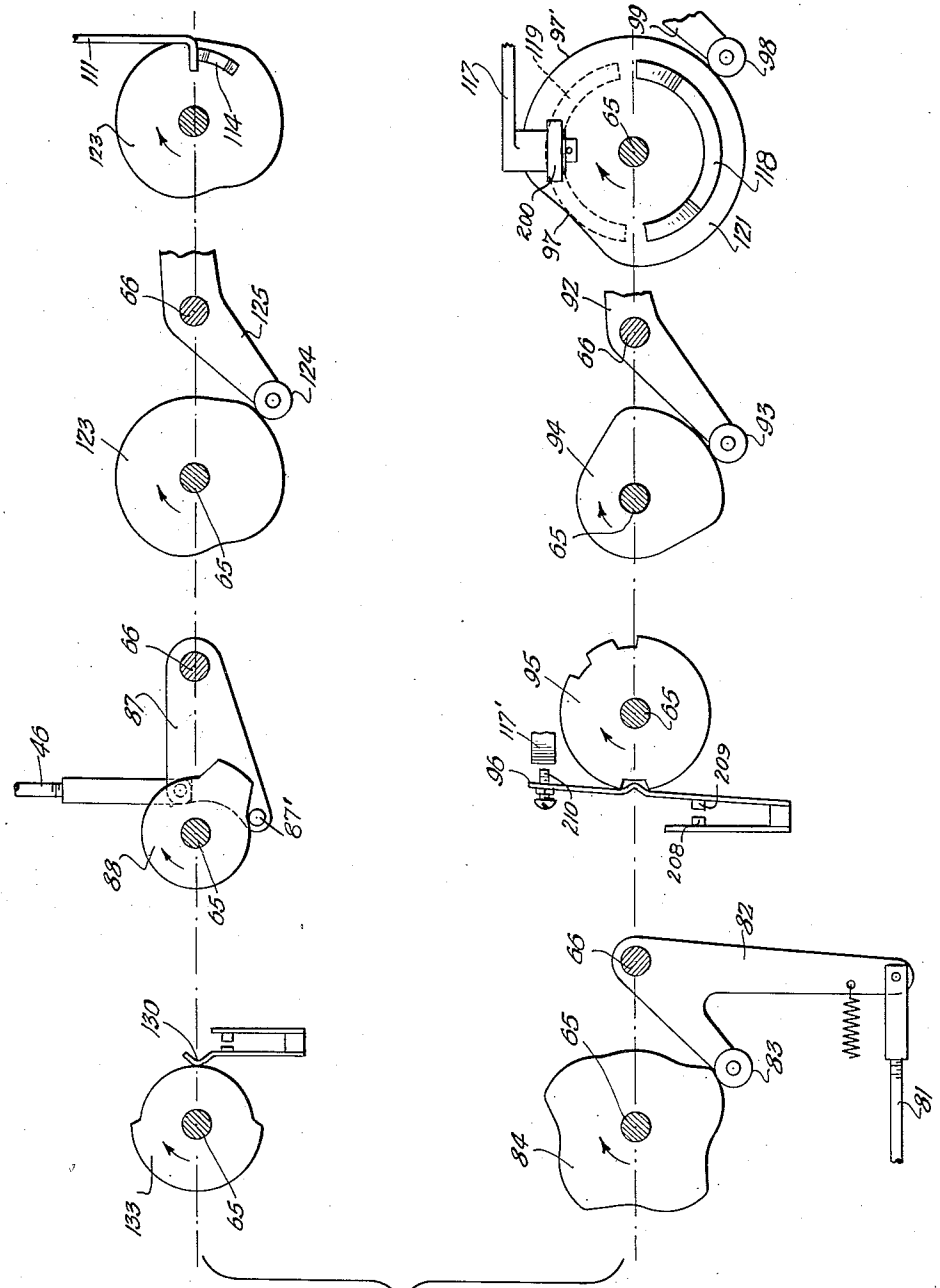


Fig. 23

Inventors.
David C. Rockola
Irving Gil
BY:-
Sheridan, Ross & Cargill
Attys.

Patented Mar. 9, 1948 2,437,557

UNITED STATES PATENT OFFICE

2,437,557

PHONOGRAPHIC APPARATUS

David C. Rockola and Irving Gil, Chicago, Ill., assignors, by mesne assignments, to Rock-Ola Manufacturing Corporation, Chicago, Ill., a corporation of Delaware

Application June 25, 1941, Serial No. 399,590

8 Claims. (Cl. 274—10)

1

Our invention relates to coin-controlled sound recording and reproducing devices, and more particularly to a coin-controlled phonograph device which records sound upon a record blank, reproduces the sound record, and vends the sound record.

It has frequently been indicated that it would be desirable to provide a coin-controlled device whereby for a nominal sum it would be possible to make a record of a message or greeting on a phonograph record which could be mailed or sent to a person, thereby providing a more personal and intimate touch to the message or greeting. With the advancement in the art of electrical recording and the production of inexpensive record blanks, it is now more commercially feasible than heretofore to provide a mechanism or device which will make this possible. However, previous attempts at making such a mechanism have been burdened with certain disadvantages which resulted from both economical and technical difficulties. In accordance with our invention, it is possible to build economically a device for this purpose. Furthermore, in accordance with our invention, it is possible to avoid many of the hitherto technical difficulties. Accordingly, we provide a coin-controlled automatic device which will supply a record blank, record sound thereon, reproduce the recorded sound, and deliver the sound record to the vendee.

It is therefore an object of our invention to provide a new and improved coin-controlled device which will supply a record blank, record sound thereon, reproduce the recorded sound, and deliver the record.

It is a further object of our invention to provide an improved automatic mechanism for recording and reproducing sound which has a sequence operation controlling mechanism which is readily synchronized to the various operations to be performed.

A still further object of our invention is to provide an improved automatic sound recording and reproducing device which does not introduce extraneous sound or vibrations into the record while sound is being recorded or reproduced.

Still another object of our invention is to provide an improved automatic sound recording and reproducing device which has a sequence operation controlling mechanism which remains stationary during the sound recording and reproducing periods.

Another object of our invention is to provide an improved record selecting and dispensing mechanism for phonographs.

Other and further objects of our invention are set forth in particularity in the appended claims. Our invention itself, however, may be understood

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best by reference to the following description and to the accompanying drawings, in which:

Fig. 1 is a front view of a mechanism embodying our invention shown in a non-operating position;

Figs. 2, 3 and 4 are left side, rear and top views respectively of the mechanism shown in Fig. 1;

Figs. 5, 6 and 7 show details of the record magazine advancing or lowering mechanism, Fig. 6 being viewed from the line 6—6 in Fig. 5 and Fig. 7 being viewed from the line 7—7 in Fig. 6;

Fig. 8 is a cross section taken substantially along the line 8—8 in Fig. 1;

Fig. 9 is a fragmentary sectional view taken on the line 9—9 of Fig. 8;

Fig. 10 is an enlarged fragmentary view of the mechanism shown in Figure 8, but on a larger scale to illustrate certain details of the record release mechanism;

Fig. 11 is a partial cross sectional side view similar to Fig. 8, but showing a portion of the mechanism of Fig. 8 in the recording position;

Figs. 12 and 13 are front and side views respectively of the record carrier and release mechanism;

Fig. 14 is a top view of the turntable and recording mechanism as viewed from the line 14—14 in Fig. 8, but showing the recording or record-cutting arm and record carrier at the beginning of the recording period;

Fig. 15 is a partial view similar to Fig. 14, showing the operation of the recording mechanism at the end of the recording period;

Fig. 16 is a top view explanatory of the operation of the phonograph pick-up during the reproducing period;

Fig. 17 is a side view explanatory of the operation of the return of the phonograph pick-up at the end of the reproducing period;

Fig. 18 is a front view further illustrating the same operation shown in Fig. 17;

Fig. 19 further illustrates the operation at the end of the reproducing period;

Fig. 20 is a cross-sectional view of position retaining means on the pick-up arm along the line 20—20 of Fig. 19;

Fig. 21 is a schematic diagram showing certain electrical connections controlling the operation of the device;

Fig. 22 is a diagram illustrating the sequence of operations;

Fig. 23 shows the relation of the sequence operation cams producing the operations diagrammatically shown in Fig. 22;

Figs. 24 and 25 are fragmentary elevational views, partly in section, showing details of the mounting of the record-cutting arm, which also is shown fragmentarily, Fig. 24 showing the arm in record-cutting position and Fig. 25 showing the record-cutting arm in raised position.

Reference may now be had to Fig. 4 and more particularly to Fig. 1, wherein there is shown for the purposes of illustrating our invention, a coin-controlled mechanism for supplying a record blank, making a sound record, reproducing the sound record, and delivering the sound record to the vendee. This device may be contained in a suitable housing 30 in which is supported a multipart frame 31, which supports the various elements of the mechanism. A supply of phonograph record blanks 32 is contained in a record blank magazine 33 supported between suitable magazine guides 34, 34a which preferably are integral extended portions of the frame 31. The record magazine 33 supplies a single record at a time to a record carrier 35 which slidingly receives the record blank, and lowers the record blank onto a turntable 36. Upon positioning the record blank upon the turntable 36 a sound recording arm 37 is lowered into position. A suitable microphone 38 (Fig. 2) conveniently mounted on the cabinet 30 receives the sound which when amplified actuates the stylus of the recording arm 37 to produce on the record blank a record of the sound. When a record is completed the record cutting arm 37 is removed from the record and a sound reproducing arm or phonograph pick-up 39 is lowered upon the record until the recorded sound thereon has been played back. Upon completion of the reproduction of the sound record, the pick-up arm 39 is removed from the record and the record carrier 35 removes the record from the turntable by raising the carrier to its former position. At this point, a record retaining member 40 is retracted so as to permit the record to slide toward the front of the machine onto a chute 41 which extends to the exterior of the cabinet or case 30.

The record magazine guide members 34, 34a have mounted thereon a cross-member 42 which supports a record retaining rod member 43. At the lower extremity of the rod 43 is provided a record release or discharging means 44 controlled by a lever 45 and a connecting pitman 46, the operation of which will subsequently be described in greater detail. Each of the phonograph record blanks 32 is supported by the record magazine 33 by means of a plurality of spaced shelf members 47 located on opposite sides of the magazine. These shelf members 47 are located at an angle to the horizontal thereby to support the records at an angle so that they bear against the record retaining rod 43 and are slidingly discharged by gravity when released by the record discharging means 44 to the record carrier 35. The record carrier 35 is pivotally mounted at one edge thereof by suitable pivot supporting means 48 mounted on the frame 31. The record carrier 35 is normally positioned at an angle corresponding to the angle of the phonograph record blanks. This is accomplished by a crank member 49 attached along one side of the record carrier. The frame 31 supports the phonograph turntable 36 which in the present invention is slightly smaller than the diameter of the records carried by the record magazine 33. This turntable 36 in the embodiment shown is superimposed upon a phonograph turntable 50 which is part of a conventional phonograph turntable mechanism of the rim-drive type commonly in use for making sound records or recording sound. As will be apparent to those skilled in the art, rim-drive turntables of this type have certain advantages and the use of such a device in the present embodiment is expedient both from economic and technical considerations. This arrangement further has the advantage that if at any time it is desired to vend records of a different diameter, it would only be necessary to change the smaller turntable 36 and no changes would be necessary in the turntable actuating mechanism. The turntable 36 is provided with a spring actuated record engaging stop 51 which shortly after a record blank has been placed on the turntable engages one of a plurality of holes located near the center of the record blank. Thus, the record blank is positively anchored to a turntable 36 thus insuring even and faithful recording of the sound. The rim of the turntable 50 as may be seen in Figs. 8 and 11 is driven by a motor 52. A cutter arm feed screw 53 is driven by the turntable 50 through a suitable gear arrangement such as shown in Figs. 8 and 11. The cutter arm feed screw 53 is selectively engaged by a follower member 54 which is attached to an arm 55 secured to a pivot shaft 56 attached to one end of the cutter arm 37. The pivot shaft 56 is journalled in a bearing post member 57 mounted upon the frame 31. The arm 55 is biased into position by a spiral spring 59. The spring 59 surrounds that portion of the pivot shaft 56 which is located between the end of the arm 55 and the frame 31.

By referring particularly to Figures 24 and 25, as well as Figures 1, 2, 3 and 8, it will be seen that the upper extremity of the shaft 56 is provided with a block or member 136 which supports an arm 137 having adjacent one end thereof an adjustable stop or set screw 138. The record cutting arm 37 is pivotally mounted on the member 136 by a suitable pivotal bearing 139. A U-shaped wire member 141 is pivotally connected to the cutter arm 37 adjacent the under side thereof at 60 between the pivotal support 139 and the bearing support 57. The U-shaped wire-like member 141 is retained within a suitable groove or passageway 142 in the top of the collar-like portion 143 of the bearing member 57 which is fixedly mounted on the supporting plate or frame 31.

The sequence operation shaft 65 will cause actuation of the cam follower 98 which in turn will move the rod 101 in an upward direction thereby engaging the bearing plate 102 on the bottom side of the cutter arm 37. When the rod 101 moves upwardly against the plate 102, the cutter arm 37 will pivot about the pivotal bearing 139 thus moving the pivotal connection 60 of the U-shaped member 141 upwardly so that the member 141 will produce a thrust against the collar 143 in the groove 142. This in turn will cause the pivot 139 to be moved upwardly with the result that the shaft 56 is moved upwardly thus compressing the spring 59 and moving the arm 55 a sufficient distance to cause the screw feed following member 54 to become disengaged from the feed screw 53.

The phonograph pick-up or reproducing arm 39 is pivotally supported at 61 on a member 62 which in turn is pivotally supported on a post 63 mounted upon the frame 31. The member 62 extends through an opening 119 in the frame 31 and carries an arm 121' which is utilized to start a driving motor for the sequence operation controlling mechanism at the end of the reproduction of a phonograph record. The pick-up arm 39 is supported by and lowered into playing position by a rod 64 which is operated from the sequence mechanism. The frame 31 is provided

with the shaft 65, best illustrated in Figs. 2 and 3, upon which a plurality of sequence operation controlling cams 84, 88, 94, 95, 121, 123, and 133 are mounted. These cams in one complete revolution of the shaft 65 control a complete sequence of operations beginning at the time when one of the records 32 is released from the record magazine 33 onto the record carrier 35 until the record has been cut, reproduced, and discharged from the record carrier 35 into the chute 41. Another shaft 66 is also supported from the frame 31 and this shaft is provided with a plurality of cranks or levers 82, 87, 92, 99, and 125 each having at one extremity thereof a cam follower cooperating with a particular one of the sequence cams mounted upon the shaft 65. The other extremities of the levers mounted upon the shaft 66 are generally connected to rods or pitmans which control the operation of and the position of such members as the record carrier 35, the record cutter 37, the pick-up arm 39 and the record retaining member 40. The shaft 65 is driven by means of a belt 67 engaging a pulley 68 (Fig. 3) which is suitably fixed on the shaft 65. The belt 67 is driven by a pulley 70 connected through gearing (not shown) to an electric motor 69, the energization of which is controlled (Fig. 21) by a coin or check chute, by a cam on the shaft 65 and by switches, hereinafter further referred to, operated in response to the movements of the ends of the recorder cutting arm and the pick-up arm when these arms reach the end of the record. This particular cooperation of these various members will subsequently become apparent.

By referring to Figures 5, 6 and 7, the mechanism for advancing the record magazine will be readily understood. The magazine 33 which is mounted between the guides 34, 34a in the frame 31 is supported from a lower cross member of the frame 31 by means of a jack screw arrangement. This jack screw comprises a threaded member 71 passing through a threaded opening 71' in the frame 31 shown in Fig. 8 and being rotated by means of a keyway 72 and a cooperating key 73. The threads of the jack screw member 71 are surrounded by a collar member 74 which is provided with ratchet teeth 75. The collar member 74 is supported from the frame 31 by means of a forked collar 76. A pawl 77 is supported by a member 78 mounted within an annular recess on the collar member 74. The pawl 77 is biased into position by a spring 79. The pawl 77 and the member 78 constitute a ratchet mechanism which is actuated by a pitman 81. The pitman 81 is pivotally connected to one end of a lever or crank 82 supported by the shaft 66. The other end of the lever 82 is provided with a cam follower 83 which engages a four-lobed sequence controlling cam 84 which is fixed to the cam shaft 65. The lever 82 is spring biased by a suitable spring means such as 85. In the particular arrangement shown the record magazine 33 is advanced to the next position during the sequence cycle by an amount sufficient to prepare the next record for discharge onto the record carrier 35. In this particular instance the distances between the records, the pitch of the jack screw 71, and the number of ratchet teeth 75 bear such a relation to each other that the four-lobed cam 84 causes the cam follower 83 to actuate the arm 82 four times during a sequence cycle period. It will be noticed that the cam is of unequal configuration so that during a portion of the revolution of the cam 84 no ratchet action takes place. It is to be understood, however, as will be readily apparent to those skilled in the art, that with different distances between the records, a different pitch for the threads of the jack screw, and a different number of ratchet teeth, the configuration of the cam and the operation of the ratchet mechanism would be modified accordingly so as to advance or lower the record blank magazine 33 a distance sufficient to provide for the release, in the next sequence cycle, of the next record blank in the magazine.

The operation which releases a record blank 32 from the magazine 33 will be better understood by reference to Fig. 8 which is a cross-sectional view along the line 8—8 of Fig. 1. The magazine 33 in Fig. 8 is shown in a position intermediate the limits of travel of the magazine so that only the upper portion of the magazine now contains phonograph record blanks 32. As has been stated in connection with Figs. 1 to 4, the record blanks are supported from shelf-like members 47 arranged at an angle to the horizontal so that the front edge of each of the records engages the record retaining member or rod 43. This rod 43, however, does not extend down so far as to contact all of the records, but to permit a few of the records to be free of the end of the rod 43. When the leading edges of the lowermost records remaining in the record magazine 33 have passed the lower extremity of the rod 43, the sides or one side of these lower records is engaged by a record stop bracket 86 mounted at one side of the magazine guide 34. By referring to Figs. 9 and 10, which are enlarged views of this portion of Fig. 8, it will readily become apparent how the lowermost records are retained in position by this member 86. The bottom record is retained in the magazine by the record release member 44 which is actuated by one extremity of the lever 45 supported at an intermediate point thereon from the cross member 42. This particular relation of elements may best be observed by reference to Fig. 1. In Figs. 1 and 2 it will furthermore become apparent that one extremity of the lever 45 which actuates the record release member 44 is controlled by the pitman 46. This pitman 46 is connected to one end of a crank member 87 which is mounted upon the shaft 66. This member 87 is provided with a cam follower 87' which engages the cam 88 of one of the sequence cams mounted upon the shaft 65. As soon as the sequence operation motor 69 is energized by the introduction of a check or coin in the coin chute, the cam 88 begins to move and it is in such position as to actuate the rod 46 thereby causing the member 44 to be raised, thus releasing the lowermost record in the magazine 33 onto an apron 89 from which the record slides onto the record carrier 35. The record carrier 35 slidingly receives the record blank and is subsequently lowered in position over and alongside the turntable 36 thereby placing the record blank in position for further operation of the mechanism. The record carrier 35 which is pivoted on the pivot-supporting means 48 is actuated by a pitman 91 connected to a crank 92 which is mounted upon the shaft 66. The other extremity of the crank 92 is provided with a cam follower 93 which engages a sequence operation cam 94 mounted upon the cam shaft 65. As the record carrier 35 is lowered into position, the cam shaft 65 is rotated thus rotating a cam 95 which engages one arm 96 of an electric switch which controls the energization of the phonograph turntable motor 52. As the cam shaft 65 rotates, a cam 97

brings about actuation of a cam follower 98 of a lever 99 which is connected to a rod 101. The rod 101 engages a bearing plate 102 attached to the under side of the record cutting arm 37. At the proper time in the sequence operation, the rod 101 is lowered so as to permit the stylus 103 of the cutting arm 37 to engage the phonograph record blank which has been placed upon the turntable 36. Substantially concomitantly with this engagement of the stylus 103 with the blank the record engaging stop 51 finds one of the holes near the center of the record blank, thereby securely fastening the record to the turntable 36, so that the record blank moves in synchronism with the turntable.

The operation just concluded is shown in Fig. 11 wherein the stylus 103 now engages the particular record blank 32 shown as 104 in Fig. 11. It will be seen that the record-engaging stop 51 now extends through a hole near the center of the record 104. By referring to Fig. 11, it will be seen that the arm 55 secured to the pivot shaft 56 upon which the cutting arm 37 is mounted has been lowered so that the feed screw 53 is engaged by the screw follower 54 carried by the arm 55.

The record retaining member 40 of the record carrier operates to stop and position the record blank which is slidingly received thereon from the magazine 33 by means of the apron 89. The record retaining member 40 therefore prevents the record blank from sliding down any further on the record carrier 35. This member 40 engages one edge of the record blank 104, and it is desired to withdraw or retract this member 40 so that it no longer engages the edge of the record 104 as shown in Fig. 11. The member 40 is an upturned portion of an arm 105, normally biased by a spring 105', which is pivoted at 106 shown in Fig. 13 along one side of the record carrier 35. The arm 105 is provided with a projecting portion 107 which is arranged to engage a release stop 108 mounted upon the base or frame 31 alongside the record carrier 35 and the turntable. When the extremity 107 is engaged by the stop member 108, the record retaining member comprising the elements 40, 105, and 107 assume the position shown in the dotted line in Fig. 12. The record retaining member is further provided with another portion 109 which extends at right angles to the portion 107. This portion 109 is arranged to be engaged by a trip lever 111 which is pivoted at 112 adjacent the frame 31 and which is suitably biased by a spring such as 113. The other extremity of the trip lever 111 is provided with a cam follower portion 111' which engages an operating cam abutment 114 therefor which projects laterally from the surface of the sequence operating cam 123 that is mounted on shaft 65. When the sound has been recorded upon the record blank, and the sound reproduced, and the arms have been raised from the record, the record carrier 35 is again raised to its normal position which is at an angle to the horizontal. In order to release the record from the record carrier, the cam 114 engages the cam follower portion of the trip lever 111, moving it to the dotted line position of Fig. 12 thereby retracting the record retaining member 40 to permit the record to be slidingly discharged into the chute 41 which extends to the exterior of the cabinet of the mechanism. Fig. 13 is a side view of Fig. 12 and serves to illustrate still further the location of the various components of the record retaining member and the cooperating parts such as the stop 108 and the trip arm 111.

Figs. 14 and 15 illustrate the operation of the mechanism during the period when sound is being recorded upon a phonograph record blank. The position of the various elements of the magazine shown in Fig. 14 is the position assumed at the beginning of the recording period. The cutting arm 37 which is pivotally supported by the shaft 56 is moved into the initial position by the lowering of the rod 101, also shown in Fig. 8. The shaft 56 is connected to the arm 55 which is engageable by a U-shaped member 115 supported at one end of a lever 120 pivoted at 116. The other end of the lever 120 is provided with a bifurcated portion 117, each portion of which is provided with suitable cam followers 200 and 201, respectively, which engage cam surfaces 118 and 119 of a sequence operation cam 121 mounted upon the shaft 65. The action of the sequence operation cam 121 upon the cam followers at the extremities of the bifurcated portion 117 of the lever 120 is such that adjustable stops 115' located adjacent the outer extremity of the lever 120 engage a portion of the arm 55 thus causing the free end of the cutter arm 37 to be moved inwardly toward the center of the turntable at the same time that the arm is being lowered into position. The arm 37 in normal non-operating position is located along one side of the record carrier 35 and must be moved into the proximity of the outer edge of the record blank 104 at the time that the recording period is about to begin.

The position of the sequence cam 121 and the corresponding positions of the lever 120 and the free end of the cutting arm 37 are shown in Fig. 15. From examination of this figure it will further be seen that a projecting member 116' mounted on the free end of the arm 55 is now in engagement with a toggle arm or lever arrangement 117' which is pivotally mounted at 118' so that one extremity of the lever 117' is in engagement with the end of the electric switch arm 96. This engagement of the arm 55 which operates in accordance with the position of the cutter arm 37 is such as to close the circuit of the electric switch 96 thereby causing the cam shaft motor 69 to be energized thus starting the sequence operation mechanism which will cause the cutter arm 37 to be raised from the record and the sequence operation cam 121 will move the free end of the cutter arm 37 towards the outside away from the center of the turntable so that at a subsequent time the record carrier 35 may be raised to a normal position.

Fig. 16 illustrates the operation occurring during the period when the sound recorded upon the record blank is being reproduced. The solid line position of the pick-up arm 39 shows that the reproduction period has just been ended whereas the dotted line position of the arm shows the position at the beginning of the reproducing period. The pick-up arm 39 is pivotally supported at the points 61 which are a portion of the member 62 supported by the pivot post 63 mounted upon the frame 31. As stated previously, a portion of the member 62 extends through the base 31 through an opening 62' therein. Extending through the opening 62' is the member 62 to which is attached an arm 121' as shown in this figure and in Figs. 17 and 18. The extremity 202 of the arm 121', which may be provided with an adjustable stop 203, engages a contact arm of an electrical switch 122 which is connected to energize the cam shaft motor or sequence operation motor 69 at the end of the reproducing period. In connection with the positioning and the re-

turn of the cutter arm 37 it will be recalled that the sequence operating cam 121 was not simple since it had a plurality of surfaces, and the operation of returning the cutter arm 37 to non-operating position required several operating elements. In order to simplify such structure, thus gaining an economic advantage, the arrangement for returning the pick-up arm to its normal non-operating position was devised which is shown in Figs. 17, 18, and 19. Referring more particularly to Fig. 17, it will be seen that the cam shaft 65 is shown with a sequence operation member having a cam surface 114 and a cam surface 88. Interposed between these cam surfaces is a cam surface 123 which is engaged by a cam follower 124 connected to a crank 125, one extremity of which is connected to the rod 64. The rod 64 upon actuation raises the pick-up arm 39 off the record by engaging a bearing surface 126 which is positioned on the underside of the arm 39. After the arm 39 has been raised off the record, the record carrier 35 is also raised, thus removing the record from the turntable 36. The record carrier 35 is so related relative to the arm 39 that a portion thereof engages one of the undersides or edges of the pick-up arm as, for example, the edge 127. As the carrier 35 continues to rise, the contact of the edge 127 with one edge of the carrier 35 causes the arm 39 to be moved toward the front of the mechanism until the end of the rod 64 engages a detent 128 formed in the bearing surface member 126 as shown in Fig. 20. The relation occurring during this operation is further illustrated in Fig. 18 which shows how the arm 39 is engaged by the extremity of the rod 64 to raise it from the record and how one edge 127 of the pick-up arm is engaged by the right hand edge of the record carrier 35.

By dotted lines in Fig. 19 the pick-up arm 39 is shown to be at the end of the record. By solid lines the arm 39 is shown in its position just shortly after the reproducing period and just prior to the time that one edge of the record carrier 35 is about to engage one edge 127 of the pick-up arm 39. A sectional view along the lines 20—20 of this figure, as shown in Fig. 20, illustrates how the end of the rod 64 engages the detent 128 in the bearing member 126 so as to tend to retain the arm 39 in its normally non-operating position at the end of the action of the record carrier 35 upon the edge 127 of the arm 39.

The operation of the automatic sound recording and reproducing mechanism is initiated by the insertion of a coin in a coin chute 129 diagrammatically represented in Fig. 21, and conveniently located with respect to the apparatus, but not specifically shown therein, is provided with a contact arm 129' connected in an electrical circuit energized from a suitable source of energy 131 which supplies energy to the cam shaft motor 69 and the turntable motor 52. The coin passing through the chute 129 closes the circuit from one side of the source of energy 131 through a pair of contacts 129', 131', and through the cam shaft motor 69, to the other side of the circuit 131. As the cam shaft or sequence operation motor 69 begins to rotate, the sequence operation cam shaft 65 is rotated thereby causing the sequence operation cam 95 mounted thereon to close the circuit of electric switch 96. Through suitable means, not shown but generally well known to those skilled in the art, the coin in the coin chute is released and the contacts thereof are opened. The circuit through the motor, however, is now closed by means of the contacts 205, 206, of the switch arm 96. The cam shaft motor 69 continues to operate until the record cutting arm 37 has been moved into position at which time the indentation 132 on the cam 95 reaches the contact portion 247 of the switch arm 96 thereby opening the contacts 208, 209 of this switch. While the cam shaft 65 has been rotating through approximately 180 degrees, the turntable motor 52 has been energized at a point about 90 degrees of this rotation by means of a sequence operation cam 133 which controls the operation of an electric switch 130, the contacts of which control the energization of the turntable motor 52. The turntable motor now being energized feeds the cutter arm across the record until the arm reaches the inner edge of the record whereupon the toggle lever 117' connected to the cutter arm 37 engages the adjustable abutment screw 240 of the switch arm 96 thereby again energizing the cam shaft motor 69. This causes rotation of the sequence operation shaft 65 which raises the cutter arm 37 off the record and disengages the contacting toggle lever 117' connected to this arm from the outer extremity of the electric switch 96. The pick-up arm 39 is now lowered into position on the phonograph record and this operation is completed by the time that the indentation 134 on the sequence operation cam 95 has reached the contact portion of the switch arm 96 thereby deenergizing the sequence operation motor 69. The turntable motor 52 is still energized, thus permitting the phonograph pick-up arm 39 to reproduce the record until it has reached the end of the record, at which time an arm 121' attached to the pick-up arm 39 engages the abutment screw 211 of switch arm 122 to close contacts 212 and 213 thereof which again energizes the sequence operation motor 69, thus causing the sequence operation cam shaft 65 again to be rotated. This rotation, of course, again closes the contacts 208, 209 of the electric switch 96 which remain closed until the indentation 135 on the sequence operation cam 95 reaches the contact portion of the switch arm thereby deenergizing the sequence operation motor 69.

The operation of the apparatus heretofore described may be better understood by reference to Figs. 22 and 23 which serve to illustrate the sequence of operation performed in a complete cycle. Fig. 22 gives a diagrammatic indication of the sequence of operations occurring during a complete 360 degree rotation of the sequence operation cam shaft 65. The relation of the various sequence operation cams to each other is believed to become more apparent by the representation as shown in Fig. 23 wherein the sequence operation cam members have been arranged along a center line representing the cam shaft 65. The positions of these cams as shown in the figure is the position assumed at the beginning of a cycle of the sequence operation. In the diagram shown in Fig. 22 the sequence of operations may be followed by reading at the various points indicated in a clockwise direction. During the previous cycle of operations the record release mechanism comprising the record retaining member 40, the lever 111, and the cam surface 114, as may be viewed from Fig. 12, are just about completing the operation. At the time that a coin is inserted in the coin chute of the mechanism which coin chute 129, diagrammatically represented in Fig. 21, may be located at any convenient point on the cabinet or case 30 housing the mechanism, the sequence operation motor 69 shown in Figs. 1, 2, 3, is energized,

thereby causing the sequence operation cam shaft 65, Fig. 2, to be rotated. The initial portion of the rotation of the cam shaft causes the sequence operation cam member 95 to close the electric switch 96, as is apparent from Figs. 8, 21 and 23. At the same time the sequence operation cam 88 is engaged by the cam follower 87 which actuates the rod 46 attached to one end of the lever 45, the other end of which controls the position of the record release member 44, as may be seen from Figs. 1 and 3. The member 44, having been raised, permits a phonograph record blank 32 to be slidingly discharged across the apron 89 onto the record carrier 35 and this operation is completed during a rotation of 25 degrees of the cam shaft 65. During the next 35 degrees rotation of the cam shaft 65, the record release member 44 is being returned to its former position and also the record carrier 35 is being lowered down, over and alongside of the turntable 36. At the end of another 15 degrees of rotation of the cam shaft 65 the record discharging member 44 has completed its return to its former position and at the same time a cycle of operations is initiated to move the record magazine 33 into position so as to be ready to discharge another record blank at the beginning of the next cycle of operation. This advancement of the magazine 33 by the mechanism shown in Figs. 5, 6 and 7 continues through the next 100 degrees of rotation of the shaft 65, is discontinued through the 5 degree dwell and again continued for a 40 degree period, then discontinued for a 5 degree dwell, and again continued for 115 degrees of rotation of the cam shaft 65.

The record carrier 35 is now being lowered to a position alongside of the turntable 36, but before the record is placed in contact with the turntable, the turntable is energized after a 15 degree rotation of the cam shaft 65. After 5 degrees more rotation, the cutter arm 37 begins to move in toward the record since the carrier 35 has been lowered sufficiently to be a considerable distance past the end of the cutter arm 37. This operation of the cutter moving in toward the outer edge of the record blank such as 104 is illustrated in Fig. 14 wherefrom it will be seen that the cutter arm 37 is fastened to the pivot post 56 which has attached thereto a lever 55. The lever 55 is actuated by the contact portion 111 on a lever arm pivoted at 116 and having bifurcated extremities 117, each of which is provided with a cam follower for engaging the cam surfaces 118 and 119 which are mounted on either side of the sequence operation cam member 121. The movement of the cutter arm 37 from a position such as shown in Fig. 4 to the position shown in Fig. 14 requires 40 degrees rotation of the cam shaft 65. During the first 15 degrees of this 40 degrees period of rotation, the record carrier 35 has been lowered alongside of the turntable 36 thereby positioning a record blank such as 104 upon the turntable. The record cutter 37 now moves down so that the stylus 103 may contact the surface of the phonograph record blank. By referring to Fig. 8, it will be seen that the under side of the record cutting arm 37 is provided with a contact surface 102 which is engaged by a shaft or rod 101, which is attached at the other extremity thereof to a crank 99. The crank 99 which is mounted upon the shaft 66 is provided with a cam follower 98 which engages the sequence operation cam 97 which is mounted upon the shaft 65. If the phonograph record blank 104 has not yet been securely anchored to the turntable 36 by the pin 51, the pressure of the stylus 103 of the record cutter 37 will exert sufficient pressure so as to slow down the rotation of the phonograph record blank sufficiently to permit the pin 51 to seek one of the holes in the record blank and to project through such hole thereby anchoring the record upon the turntable. In order to provide for this operation and to permit the stylus 103 to start to cut a groove in the phonograph record blank, a 40 degree rotation of the cam shaft 65 is permitted.

Fig. 21 only shows so much of an electrical circuit as is deemed necessary to understand the operation of the mechanism herein disclosed and to that extent there has been shown a circuit including the cam shaft motor 69 and the turn table motor 52 together with the associated control switches. The circuit, therefore, does not show the conventional electrical equipment required for the operation of the microphone 38, the record cutter 37 and the record reproducing arm 39 since such arrangements are well-known by those skilled in the art. Obviously, of course, when the switch controlled by the coin chute 129 is first actuated, an electrical circuit would also be complete for such electrical equipment to warm up the speech amplifier and to produce a signal to the vendee of the machine when the machine is in condition for receiving sound and for recording the sound upon the record blank which has been positioned upon the turn table 36.

The cam shaft remains stationary during the recording operation. At the end of the recording operation the sequence operation motor 69 is again energized by the closing of the electric switch 96. This switch 96 is closed in response to the travel of the phonograph cutting arm 37 to the end of the record as is shown in Fig. 15. The lever arm 55 attached to the pivot shaft 56 is provided with a projection at one extremity thereof which engages a lever 117' pivoted at 118' so that the lever 117' engages the outer extremity of the electric switch arm 96 thereby energizing the cam shaft motor 69. During the next 5 degrees the sequence operation cams are so designed as to permit a 5 degree dwell. After the 5 degree rotation the cutter arm 37 is raised from the record by the action of the sequence operation cam 97 against the cam follower 98 which is located at one extremity of the crank 99. The crank 99 raises the rod 101 thereby engaging the surface 102 which is located on the under side of the record cutting arm 37.

At the time that the cutting arm 37 is being raised from the record, the pick-up arm 39 is being lowered as will be apparent in Fig. 17. The pick-up arm 39 is normally positioned so that the stylus thereof is above the outer edge of a phonograph record as will be apparent from Fig. 4. While Fig. 17 shows the operation occurring during the return of the phonograph pick-up arm 39 to its normal position, reference may be made thereto in order to readily see the parts involved in the operation of lowering the phonograph pick-up arm 39 onto the phonograph record. The sequence operation cam 123 bearing against the cam follower 124 which is mounted on the arm 125 serves to actuate the rod 64 bearing against the contact surface 126 mounted on the under side of the pick-up arm 39. As the rod 64 is retracted the end of the arm 39 is lowered onto the record. At the end of 40 degrees this pick-up arm is in position and the cam shaft 65 is stopped. The shaft remains stopped during the repro-

ducing period. When the pick-up arm 39 reaches the end of the record, as is shown in Fig. 16, the lever 121' actuated by the pick-up 39 operates to close the electric switch 122 thereby energizing the sequence operation motor 69, as is apparent from Fig. 21. When the cam shaft 65 is again rotated, the pick-up arm 39 is again raised from the record by means of the rod 64 and at the same time the record cutter 37 is moved from its raised position, corresponding to the position in Fig. 15, to a position corresponding to the position shown in Fig. 4. This is brought about by the operation of certain elements best seen in Fig. 15. The lever 55 attached to the record cutter 37 by means of the pivot shaft 56 is now engaged by one of the contact members 115 which is mounted upon the lever 120, which as has been pointed out above, is pivoted at 116 and has the bifurcated extremities 117 provided with contact followers which engage the cam surfaces 118 and 119. The cam surfaces cause the arm pivoted at 116 to be moved so as to move the lever 55 attached to the record cutter 37 toward the outer edge of the frame 31 thereby returning the cutter arm 37 to a position corresponding to that shown in Fig. 4.

While this latter operation is being completed, the carrier 35 begins to move upwardly after a 20 degree interval. This operation can best be followed by referring to Fig. 8 wherein it will be seen that the sequence operation cam 94 mounted upon the shaft 65 engages the cam follower 93 mounted at one end of the lever 92 which in turn actuates the pitman 91. The pitman 91 is pivotally connected at 139 at one side of the record carrier 35. The period during which the carrier is raised from alongside of the turntable 36 to the position shown in Fig. 8 requires a 55 degree period. Shortly after the record carrier 35 starts to raise, a 5 degree period, the turntable 36 is stopped by the operation of the cam surface 133 which permits the contacts of electric switch 130, shown in Fig. 21, to be opened. After a 5 degree interval the phonograph pick-up arm starts to move up off the record and 5 degrees later the cutter is beginning to move out.

While the record carrier is on its way up, a short time before it has reached its maximum position, a 5 degree interval, the record retaining member 41 is being actuated. This will be apparent from Fig. 12 wherein it will be seen that the lever 111 is engaging a portion of the sequence operation cam surface 114 thereby actuating the member 109 which causes the record retainer 40 to be withdrawn. The complete withdrawal of the record retainer member 40 is completed within a 10 degree period or a 5 degree period after the record carrier has reached its uppermost position. The phonograph record thereupon slides off the carrier 35 onto the chute 41 which extends to the outside of the cabinet or case 30 as is apparent from Fig. 2. The sequence operation motor 69 continues to be energized and during the next 25 degree period the record release member 40 is permitted to return to its normal position; and also during this same period the latter portion of the sequence operation of the record magazine positioning means, shown in Figs. 5, 6 and 7, is being completed so as to prepare for the release in the next sequence cycle the next blank in the record magazine. During the following 10 degree period the record release of the record retaining member 40 has completed its operation and the cam shaft 65 is rotated sufficiently to permit the indentation 135 on the sequence operation cam 95 to reach the contact member of the electric switch arm 96 thereby deenergizing the sequence operation motor 69 and completing the cycle of operation.

It is to be understood, however, as will be readily apparent to those skilled in the art, that while we, for the purpose of readily and conveniently illustrating our invention, have shown the invention embodied in but one particular mechanism, that our invention is not to be limited thereby, since it will be apparent that other and further modifications may be made therein and that other instrumentalities may be employed in performing the operations as is commensurate with the true spirit and scope of the appended claims.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a sound recording and reproducing device, the combination which comprises a housing, a supporting frame mounted in the housing, a turntable mounted on the supporting frame, means for operating the turntable, a record-cutting arm mounted on the frame adjacent to the turntable, a record pick-up arm also mounted on the frame adjacent to the turntable, a sequence operation controlling mechanism operatively connected to the cutting arm and to the pick-up arm, means operated by the said mechanism for stopping the said mechanism whenever one of the said arms is moved to an initial operating position relative to the turntable, and means connected to said arms and operable responsively to the movement of the said arms to the ends of their respective operating positions to start the said sequence operation controlling mechanism.

2. In a sound-recording and reproducing device, the combination which comprises a housing, a record blank magazine in the housing, means in the record blank magazine for supporting a plurality of record blanks at an angle to the horizontal, a record carrier positioned adjacent to the said magazine at an angle corresponding to the angle of the record blanks, a turntable adjacent to the record carrier, means for rotating the turntable, means for supplying successive record blanks from the magazine to the turntable, a record-cutting arm located adjacent to the said turntable and adapted to operate on a record blank on the turntable to cut a sound track therein, a record pick-up arm adjacent to the said turntable adapted to operate in the said sound track for reproducing the sound recorded in the sound track, a sequence operation controlling mechanism operatively connected to the cutting arm and the pick-up arm, mechanism operated by the sequence controlling mechanism for positioning the cutting arm and the pick-up arm relative to the said turntable, instrumentalities connected to and operated by the sequence operating controlling mechanism for stopping said latter mechanism whenever one of the said arms is moved to an initial operating position relative to the said turntable, and means connected to the said arms and operative responsively to the movement of the said arms to the ends of these respective operating positions to start the said sequence controlling mechanism.

3. In a sound-recording and reproducing device, the combination which comprises a housing, a supporting frame in the housing, a turntable mounted on the supporting frame, a record-cutting arm mounted on the supporting frame adjacent to the turntable, a record pick-

up arm mounted on the frame adjacent to the turntable, a sequence operation controlling mechanism connected to the cutting arm and to the pick-up arm, a motor for driving the said sequence operation controlling mechanism, instrumentalities connecting the said sequence operation controlling mechanism with the cutting arm and with the pick-up arm, the said instrumentalities being operated by the said sequence operation controlling mechanism, an electric circuit for the said motor, a switch in the said circuit operated by the said sequence operation controlling mechanism for stopping the motor whenever one of the arms is moved to an initial operating position relative to the turntable, means connected to and operable responsively to the movement of the record-cutting arm to the end of its operating travel for closing the switch to start the motor, and means connected to and operative responsively to the movement of the record pick-up arm to the end of its operating travel to close the motor circuit.

4. In a sound-recording and reproducing device, the combination of a housing, a supporting frame in the housing, a turntable mounted on the supporting frame, a record-cutting arm mounted on the frame adjacent to the turntable, a record pick-up arm mounted on the frame and positioned adjacent to the turntable, means for operating the turntable, a record blank magazine mounted on the supporting frame and adapted to hold a series of record blanks from a bottom record blank to a top record blank, a guide frame carried by the supporting frame for receiving record blanks in succession from the magazine, means supported by the guide frame for retaining in position a majority of the record blanks, means supported by the supporting frame adjacent to the guide frame for engaging the edges of a plurality of blanks adjacent to the bottom blank in the said magazine, sequence operation controlling mechanism carried by the supporting frame and operatively connected to the said record-cutting arm and pick-up arm, record releasing means engaging the bottom record blank in the magazine, instrumentalities connected to and operated by the said sequence operation controlling mechanism for actuating the said record releasing means to release the bottom record blank in the magazine, mechanism connected to the magazine guide frame for subsequently lowering the latter a distance sufficient to enable the said bottom record blank to be placed on the turntable and to bring the succeeding blank in the magazine to released position, record carrier means for positioning the record blank from the guide frame onto the turntable, a motor in the housing for driving the sequence operation controlling mechanism, means for starting the motor, and mechanism operated by the sequence operation controlling mechanism for starting the turntable, for operating the record blank positioning means, for positioning the record blank on the turntable, for positioning the recording-cutting arm on the record blank, and for stopping the sequence operation controlling mechanism, means carried by the supporting frame connected to the cutting arm and operable responsively to the movement of the said cutting arm to the end of its travel across the record blank for starting the motor for operating the sequence operation controlling mechanism, means connected to and operated by the said sequence operation controlling mechanism for positioning the record pick-up arm and for stopping the said motor for the sequence operation controlling mechanism, means carried by the supporting frame connected to the pick-up arm and operable responsively to the movement of the said pick-up arm at the end of travel of the pick-up arm for starting the motor for the sequence operation controlling mechanism, and instrumentalities thereupon operated by the said sequence operation controlling mechanism for stopping the turntable, for raising the pick-up arm from the record, for causing the record carrier to remove the record from the turntable and to discharge the record from the housing and for stopping the motor for the sequence operation controlling mechanism.

5. Mechanism for making and dispensing phonograph records which comprises, in combination a housing, a supporting frame mounted in the housing, a record blank magazine mounted on the supporting frame, a record carrier mounted on the supporting frame adjacent to the magazine, means for discharging a record blank from the magazine on the carrier, a turntable mounted on the supporting frame adapted to receive in series record blanks from the carrier, operating mechanism for the turntable, a record-cutting arm also mounted on the supporting frame adjacent to the turntable, a sequence operation controlling mechanism operatively connected to the record-cutting arm, a motor for driving the said sequence operation controlling mechanism, means for starting the said motor, instrumentalities connected to and operated by the sequence operation controlling mechanism for operating the record blank discharging means, mechanism also operated by the said sequence operation controlling mechanism for causing the record carrier to lower a record blank onto the turntable, for starting the said turntable, for positioning the record-cutting arm, and for stopping the sequence operation controlling mechanism, means operable responsively to movement of the cutting arm to the end of its travel across the record blank for starting the motor for the sequence operation controlling mechanism, instrumentalities thereupon operated by the sequence operation controlling mechanism for positioning the record pick-up arm and for stopping the sequence operation controlling mechanism, means operable responsively to movement of the pick-up arm at the end of the record for starting the sequence operation controlling mechanism, and means thereupon operated by the said sequence operation controlling mechanism for stopping the turntable, for raising said pick-up arm from the record, for causing the record carrier to remove the record from the turntable and to discharge the record from the housing, and for stopping the sequence operation controlling mechanism.

6. Mechanism for making and dispensing phonograph records, comprising, in combination, a housing, a supporting frame mounted in the housing, a record blank magazine mounted on the supporting frame, a record carrier also mounted on the supporting frame adjacent to the record blank magazine, mechanism for discharging a record blank from the magazine onto the carrier, a turntable mounted on the supporting frame adapted to receive in series record blanks from the record carrier, operating mechanism for the turntable, a record-cutting arm mounted on the supporting frame adjacent to the turntable, a record pick-up arm also

mounted on the supporting frame adjacent to the turntable, sequence operation controlling mechanism for the cutting arm and operatively connected to the pick-up arm, check-controlled means for starting the sequence operation controlling mechanism to operate the record discharging means, mechanism operatively connected to and actuated by the sequence operation controlling mechanism for causing the record carrier to lower a record blank onto the turntable, means for starting the turntable, mechanism connected to and operable responsively to operation of the sequence operation controlling mechanism for positioning the record-cutting arm on the record blank, means for starting the turntable, mechanism for stopping the sequence operation controlling mechanism operatively connected to the sequence operation controlling mechanism and to the record-cutting arm responsively to the positioning of the record-cutting arm on the record blank, mechanism connected to the cutting arm and operable responsively to the movement of the cutting arm at the end of its travel across the record blank for starting the said sequence operation controlling mechanism, instrumentalities operatively connected to the sequence operation controlling mechanism and to the cutting arm for removing the cutting arm from the record blank at the end of its travel across the record blank, mechanism operatively connected to the sequence operation controlling mechanism and to the record pick-up arm for positioning the record pick-up arm on the resulting record and for stopping the sequence operation controlling mechanism, means operatively connected to the sequence operation controlling mechanism and to the pick-up arm and operable responsively to movement of the pick-up arm to the end of the record for starting the sequence operation controlling mechanism, means connected to the sequence operation controlling mechanism and to the turntable and operated by the said sequence operation controlling mechanism for stopping the turntable, instrumentalities operatively connected to the pick-up arm for raising the pick-up arm from the record, mechanism operatively connected to the sequence operation controlling mechanism and to the pick-up arm for stopping the said sequence operation controlling mechanism responsively to the raising of the pick-up arm, mechanism operative responsively to the raising of the pick-up arm for causing the record carrier to remove the record from the turntable and to discharge the record from the housing, and magazine-advancing means operatively connected to the record magazine and to the sequence operation controlling mechanism operated by the sequence mechanism during a sequence cycle for advancing the magazine sufficiently to prepare for the release in the next sequence cycle of the next blank in the magazine.

7. Mechanism for making, playing, and dispensing phonograph records, which comprises, in combination, a housing, a supporting frame in the housing, a turntable mounted on the supporting frame, a record blank magazine mounted on the supporting frame, mechanism for supplying a record blank from the magazine to the turntable, an electric motor for operating the turntable, a record-cutting arm mounted on the supporting frame adjacent to the turntable, a record reproducing arm also mounted on the supporting frame adjacent to the turntable, means for dispensing a record from the turntable and out of the housing, a coin controlled switch, a sequence operation controlling mechanism operatively connected to the record-cutting arm and to the record-reproducing arm and adapted to be energized by the coin controlled switch, mechanism operatively connected to the sequence operation controlling mechanism and to the record blank supplying means and operated by the sequence operation controlling mechanism for actuating the record blank supplying means and for operatively positioning the said arms to an initial operating position relative to the turntable for stopping the said sequence operation controlling mechanism, means connected to the said arms and to the sequence operation controlling mechanism and operable responsively to the movement of each of the said arms to the ends of their respective operating positions to start the sequence operation mechanism, and instrumentalities operatively connected to the sequence operation controlling mechanism and to the record dispensing means for enabling the sequence operation mechanism to operate the said means for dispensing the record responsively to the second starting of the sequence operation controlling mechanism, and thereupon stopping the sequence operation controlling mechanism.

8. A sound recording and reproducing device, which comprises, in combination a housing, a supporting frame mounted in the housing, a vertically movable record blank magazine mounted on the supporting frame, means in the magazine for supporting at opposite sides thereof a plurality of record blanks at opposite edges of the blanks and at an angle to the horizontal, a vertical guide frame for the magazine, vertical means supported by the guide frame to engage the forward edges of all of the record blanks in the magazine except a plurality of blanks adjacent to the bottom record blank, thereby to retain the blanks in position in the magazine, means supported adjacent to the side of the guide frame for engaging the edges of a plurality of blanks adjacent to the bottom blank in the magazine, movable means engaging the forward edge of the bottom blank, a sequence operation controlling mechanism operatively connected to the record magazine, means interconnecting the movable means with a sequence operation controlling mechanism for releasing the bottom blank, means for subsequently lowering the magazine a distance sufficient to position for release in the next sequence cycle the next blank in the magazine, a turntable mounted on the supporting frame for receiving the record blank from the magazine, a record-cutting arm mounted on the supporting frame adjacent to the turntable, instrumentalities actuated by the sequence operation controlling mechanism to position the cutting arm on the record blank and for stopping the sequence operation controlling mechanism, mechanism operable at the end of travel of the record-cutting arm across the blank for starting the sequence operation controlling mechanism, a record pick-up arm mounted on the supporting frame adjacent to the turntable, means actuated by the sequence operation controlling mechanism for applying the pick-up arm to the record on the turntable, and for stopping the sequence operation controlling mechanism, and instrumentalities operable at the end of travel on the pick-up arm across the record for starting the operation of the sequence operation controlling mechanism, for raising the pick-up

arm from the record, for removing the record from the turntable, and for discharging the record from the housing.

DAVID C. ROCKOLA.
IRVING GIL.

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