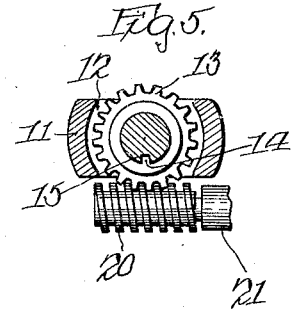
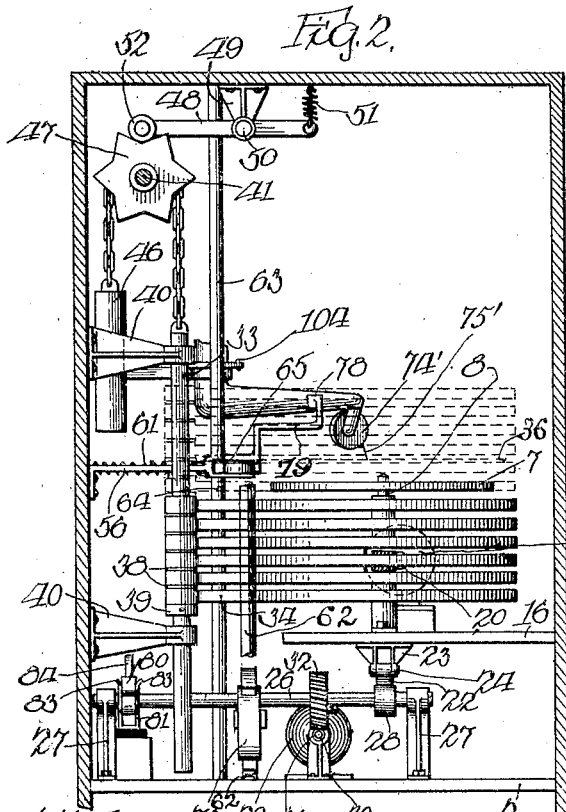
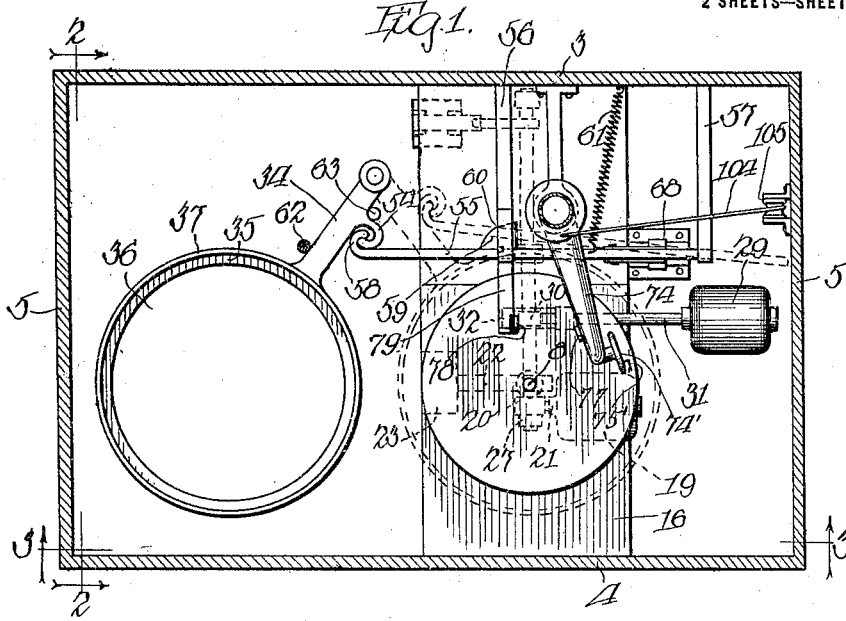


R. E. UTLEY.
 PHONOGRAPH.
 APPLICATION FILED JUNE 8, 1917.

1,362,972.

Patented Dec. 21, 1920.

2 SHEETS—SHEET 1.

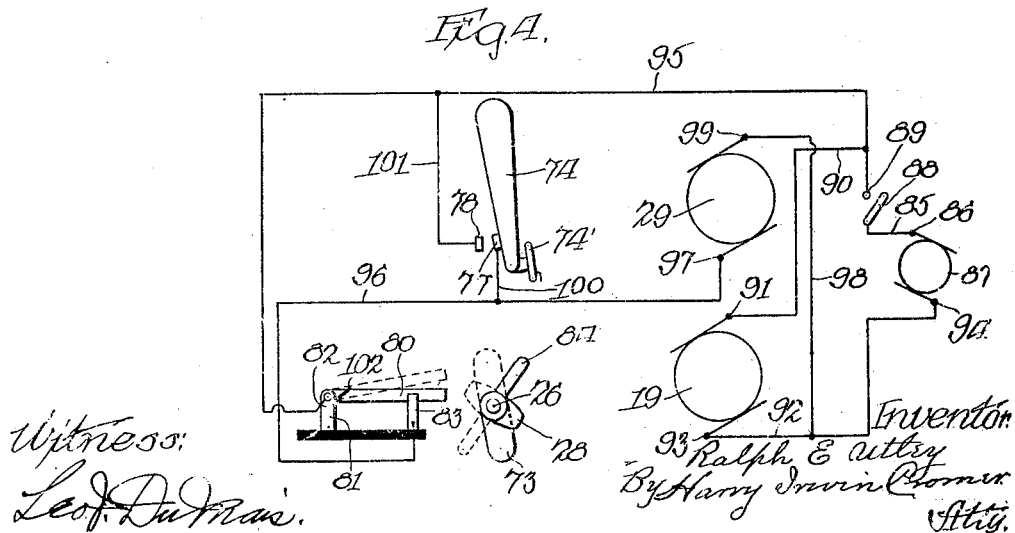
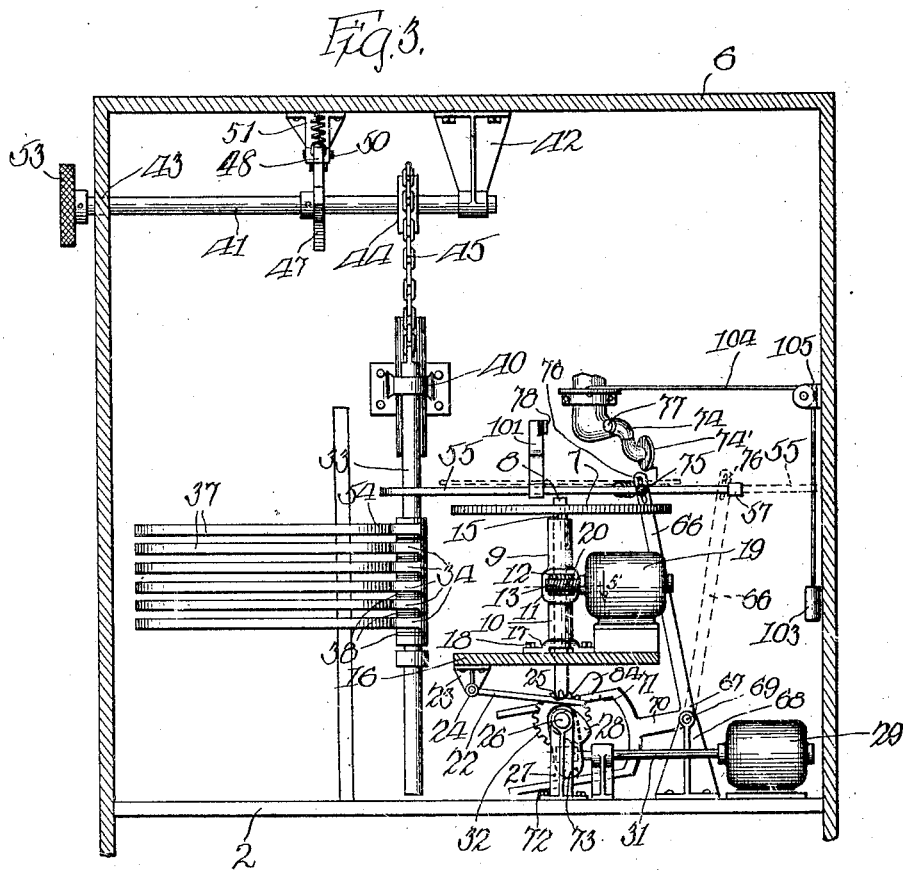


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1,362,972.

Patented Dec. 21, 1920.
 2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

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PHONOGRAPH.

1,362,972.

Specification of Letters Patent.

Patented Dec. 21, 1920.

Application filed June 8, 1917. Serial No. 173,536.

To all whom it may concern:

Be it known that I, RALPH E. UTLEY, a citizen of the United States, residing in Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to that class of phonographs or sound reproducing machines which are adapted to play a plurality of records successively and selectively, or in any desired order.

The principal object of the invention is to provide a simple, economical and efficient phonograph or machine for reproducing sounds, adapted to enable a plurality of records to be played in successive order, or selectively.

A further object of the invention is to provide in a phonograph or a machine for reproducing sounds, a simple, and efficient means for automatically placing a plurality of records upon a turntable or rotative record support in successive order, and removing them from the turntable successively, in such a manner as to enable any desired one or more of a plurality of records to be successively played and returned to position to be readily accessible for further and repeated use.

Other and further objects of the invention will appear from the following description and claims, and from an inspection of the drawings which are made a part hereof.

The invention consists in the features, combinations, parts, and details of construction herein described and claimed.

In the accompanying drawings, Figure 1 is a plan view of a machine constructed in accordance with my invention and improvements;

Fig. 2, a view in vertical section, taken on line 2 of Fig. 1, looking in the direction of the arrow;

Fig. 3, a view in vertical section, taken on line 3 of Fig. 1, looking in the direction of the arrow;

Fig. 4, a diagrammatic view showing the connections between the motors and the source of electrical supply, and means for connecting the electrically actuated parts, and the means for automatically making and breaking the electric circuit; and

Fig. 5, an enlarged detail sectional view, taken on line 5 of Fig. 3, looking in the

direction of the arrow and showing the manner of connecting and supporting the turntable supporting spindle and the means for rotating the same.

In constructing a phonograph or machine for reproducing sounds, in accordance with my invention and improvements, I provide a box or frame 1, which may be of any desired suitable or well known form. The frame or box, shown in the drawings, comprises a base 2, a rear wall 3, a front wall 4 and end walls 5, 5, and having a top wall or cover 6. It is obvious that any desired one or more of the front or end walls may be removably secured in position by means of hinges or similar means adapted to permit convenient access to the interior of the frame.

A turntable 7 is rotatively mounted upon a vertical spindle 8, to which the turntable is secured, by preference, in such a manner as to permit the turntable and spindle to rotate together, and to be raised and lowered. The spindle is rotatively mounted in suitable bearings which may be in the form of an upper sleeve 9 and a lower sleeve 10, which are, by preference, connected by means of a connecting portion 11 in such a manner as to provide a space 12 between the connected sleeve portions in which is mounted a worm-wheel 13 which encircles the spindle 8. The worm-wheel is provided with a spline or feather 14 which extends into and in sliding engagement with a longitudinal peripheral groove 15 in the spindle or stem 8, so that the worm-wheel and spindle will rotate together and the spindle is adapted to be moved vertically, or upward and downward with respect to the worm-wheel. The lower sleeve or spindle supporting member 10 is secured to a suitable stationary support, which may be in the form of a bracket or platform 16, by means of a base or flange 17 on the lower extremity of the sleeve, and screws 18, or similar securing means.

A motor 19, which is by preference in the form of an electric motor, is mounted upon a suitable support, such, for instance, as the bracket 16, and is operatively connected with the turntable or spindle, by means of a worm 20, which is fixed to the motor shaft 21 and in toothed engagement with the worm 13, which encircles the spindle 15 and is operatively connected with said spindle, in the manner above described.

The spindle 15 is, by preference, supported upon an upwardly and downwardly movable bearing member 22, which may be in the form of a metallic arm or bearing member pivoted to a suitable support, such as a bracket 23, by means of a pivot 24. The bearing member has a recess 25, which is adapted to admit and rotatively support the bottom end of the spindle 15, when the latter is in raised or operative position.

A shaft 26 is rotatively supported in brackets or bearings 27, 27, and is provided with a cam or eccentric 28, mounted in position to engage the spindle bearing 22, so as to raise and lower the latter and thereby the spindle and turntable. It is obvious that the cam 28 is adapted to cause the raising and lowering of the spindle and turntable when the shaft 26 is rotated, without the interposed bearing 22 between the spindle and cam. The use of a bearing between the spindle and cam serves to prevent the wearing away of the cam by direct contact with the rotating spindle and is therefore desirable. The shaft 26 is connected with a suitable source of power, such as an electric motor 29, by means of a worm 30 fixed to the motor shaft 31, and a worm wheel 32 fixed to the shaft 26 on which the cam or eccentric 28 is mounted, as already described.

Mounted upon an upwardly and downwardly movable supporting member, which is, by preference, in the form of a vertical rod or pivot 33, is a series of pivoted record-carrier arms 34, each of which is provided with a record engaging portion 35, which is, by preference, in the form of a ring or flange adapted to engage the periphery of a record 36 and hold the same in position upon the carrier arm during the operation of carrying the record toward and from the turntable. A peripheral guard or flange portion 37 upon or made in one integral piece with the record engaging member 35 is provided for each carrier arm, and is adapted to hold a record in position upon the annular member or flange 35, during the movement of the carrier arm, and to permit the record to be raised out of engagement with the carrier arm by the turntable 7, when the latter is raised, and the record is in position directly over the turntable.

The vertical rod or pivot 33 is provided with a series of collars 38, each encircling said pivot and in supporting engagement with a carrier arm 34, and a supporting collar 39 is fixed to the shaft or pivot and in supporting engagement with the lowermost one of the set or series of superposed carrier arms 34. Brackets 40 are fixed to a suitable support, such, for instance, as the wall 6 of the box in which the mechanism is inclosed, and are provided with suitable sockets or bearing portions through which the vertical pivot 33 extends. The vertical shaft or

pivot 33 is thus slidably supported in parallel relation to the spindle 8 upon which the turntable 7 is supported, and the record carrier arms are thus pivotally supported in superposed relation to each other, adjacent to the turntable, and in position to enable the records to be carried successively, and in any desired order into and out of position to be engaged and supported by the turntable. In order to provide means for enabling the record supporting rod or pivot 33, with the record-carrier arms and records carried thereby to be raised and lowered with facility, a shaft 41 is rotatively mounted in suitable supporting bearings or brackets 42 and 43, and provided with a pulley 44 fixed to said shaft and upon which is mounted a chain or flexible element 45, which is secured to and forms a support for the vertically movable shaft or pivot 33, to the upper end of which the chain is attached. The opposite end of the chain is provided with a counterweight 46, which is adapted to counterbalance the weight of the pivot 33 and the arms and records carried thereon. A toothed wheel or ratchet 47 is fixed to the shaft 41, and a pawl or escapement lever arm 48 is pivotally mounted in a support 49 by means of a pivot 50, and provided with a spring 51, by means of which a detent or anti-friction roller 52 is yieldingly held in engagement with the peripherally toothed portion of the ratchet wheel 47. An operating handle 53, which may be in the form of a thumb-nut, is fixed to the outwardly projecting end of the shaft 41, and is adapted to enable the shaft to be rotated in either direction, for raising or lowering the vertically movable pivot 33, with the record-carrier arms and phonographic records carried thereby, as desired.

Each of the record carrier arms 34 is provided with a boss or hook 54, and a reciprocating plunger or carrier arm operating member 55 is mounted adjacent to the turntable 7 in suitable supports 56 and 57, and provided with a carrier arm engaging portion or hook 58, which is adapted to engage and operate any desired carrier arm 34, when the series of carrier arms are raised or lowered to a position to bring a desired carrier arm to a position just above the level of the turntable when the latter is in its lowered position, as shown in full lines in Fig. 3. (See Figs. 1, 2 and 3.)

A tapered boss 59 is provided upon the reciprocating plunger or bar 55, and is adapted to extend into a similarly tapered recess 60, in the supporting bracket 56, having an inclined wall located in position to be engaged by the inclined face of the boss 59, so as to cause the hooked end portion 58 of the plunger to be moved out of tight engagement with the hook 54, when the plunger is in the position in which it is

shown in Fig. 1. The record-carrier arms 34 are thus permitted to be freely moved upward and downward with respect to the plunger, so as to present any desired carrier arm in position to be engaged and operated by the plunger. A spring 61 is operatively connected with the plunger, and with a suitable support, in such a manner that the tension of the spring tends to hold the plunger in engagement with the hooked portion 54 of any carrier arm to be operated by the plunger and its actuating means. A guard 62 is arranged in position to limit the movement of the carrier arms 34 in one direction; and upper and lower guards 63 and 64, having a space 65 therebetween, are adapted to limit the movement of the carrier arms in an opposite direction. The space between the guards 63 and 64 is located in a plane slightly above the level of the turntable when the latter is in its lowered position, and is adapted to permit the movement of a carrier arm 34 to and from the position to deposit a record upon the turntable.

The plunger 55 is operatively connected with the upwardly extending arm 66, of a reciprocating lever 67 which is pivotally supported upon a suitable bracket or supporting member 68 by means of a pivot 69; this lever has an arm 70 which is provided with arm portions 71 and 72, by preference, in the form of forked arms which are spaced apart so as to provide a space in which is mounted a cam or eccentric 73 fixed to the shaft 26 and located between and in engagement with the forked arms 71 and 72. A tone arm 74 is pivotally mounted in position to swing over the turntable, when the latter is in its raised or operative position and in supporting engagement with a phonographic record held in position to be engaged by a stylus supported by the tone arm, which is of course provided with a reproducer of which said stylus forms a part, and which reproducer may be of any desired, suitable or well known form. The tone arm and reproducer are mounted in position to permit the movement of a record and the record engaging portions of a record carrier between the reproducer and the turntable when the latter is in its lowered position. The stylus is thus supported in position to engage a phonographic record supported by the turntable, when the turntable is in its raised position, and with the record carrier in position to engage and hold the record when the turntable is lowered immediately following the completion of the operation of playing a record, and without interfering with the operation of the turntable, the tone arm, or the record during the operation of playing a record.

The lever arm 66 is, by preference, connected with the plunger 55 in such a manner

as to permit the movement of the plunger in a horizontal plane from the position in which it is shown in full lines in Figs. 1 and 3 to the position in which it is indicated in broken lines in Fig. 3. This connection may be made by means of one or more pivots or laterally projecting studs 75 on the plunger arranged in position to extend into an aperture 76 in the adjacent upper portion of the lever arm which may be forked and provided with an elongated slot 76 in each forked arm, as indicated in Figs. 1 and 3.

In providing means for automatically starting the motors, and for electrically connecting the electrically actuated parts, an electrical contact 77 is arranged upon or in position to be operated by the tone arm 74 and an electrical contact member 78 is arranged upon a suitable stationary support 79, in position to be engaged by the contact member 77 when the tone arm reaches the limit of its movement upon the completion of the operation of playing a record. A switch 80, which is, by preference, in the form of a knife switch, is pivotally mounted upon a suitable support 81 in position to be moved into and out of engagement with contacts 83, 83; and a tripping finger 84 is fixed to the rotative shaft 26 in position to engage and raise the switch member 80 out of contact with the contact members 83, 83 when passing said switch member located in the position in which it is shown in full lines in Fig. 4.

A wire 85 leads from one of the poles 86 of a dynamo 87, or other similar source of electric supply, and is connected with a movable switch member 88, which is movable into and out of engagement with a contact member 89. A wire 90 leads from the contact member 89 of the switch to one of the poles 91 of the motor 19, already described, and a wire 92 leads from the opposite pole 93 of said motor to the pole 94 of the dynamo 87, or source of electric supply.

An electric wire 95 leads from the contact member 89 of the switch 88, and is electrically connected with the movable member or contact arm of the switch 80, by means of a connecting member 82, which may be of any suitable well known form. A wire 96 leads from the contact member 83 of the switch 80 to one of the poles 97 of the motor 29 which operates the shaft 26, already described, and a wire 98 leads from the opposite pole 99 of the motor 29 to the wire 92 and is thereby connected with the pole 94 of the dynamo 87, or source of electric supply. It should be noted that the tripping finger 84 is fixed to the shaft 26 which is operated by the motor 29, and that during the rotation of said tripping finger from the position in which it is shown in broken lines in Fig. 4 to the position in

which it is shown in full lines in said figure, it will pass into and out of engagement with and raise the movable contact member of the switch 80 out of contact with the contact member 83, or to circuit breaking position. It is obvious that with the movable switch member of the knife switch 80 in circuit breaking position as indicated in broken lines in Fig. 4, the motor 29, which operates the shaft 26, will stop or remain stationary until the circuit which energizes the motor is closed either by means of the switch 80, or some other circuit closing means. In order to enable the switch 80 to be automatically closed upon the completion of the operation of playing a record, the contact member 77, which is upon or adapted to be operated by the tone arm 74 is connected with the wire 96 which leads from the contact member 83 of switch 80 to the motor 29, by means of a wire 100, and the contact member 78, adjacent to the contact member 77 on the tone arm, is connected by means of a wire 101, with the wire 95 which leads from contact member 89 of switch 88 to the movable contact member of the knife switch 80. The knife switch 80 is provided with a spring 102 for pressing the movable contact member of said switch into engagement with the contact member 83 when the tripping finger 84 is moved out of engagement with the switch 80, so as to release and permit the closing of said switch. Suitable means is provided, for returning the tone arm to initial position automatically immediately following the lowering of the turntable upon the completion of the operation of playing a record. This may be accomplished by means of a weight 103 operatively connected with the tone arm by means of a cord or flexible element 104 supported by a pulley or idler 105, or by similar or equivalent means adapted to permit the movement of the tone arm and the reproducer 74' with the stylus 75' in contact with a record during the operation of playing a record, and adapted to cause the tone arm to be returned to initial position upon the completion of the playing of a record.

In operation, a suitable number of records are placed in position upon the record-carrier arms. The series of carrier arms, with the records thereon, is then moved upward or downward into position to present the desired carrier arm in position to be engaged and operated by the reciprocating horizontally movable plunger or record-carrier operating mechanism, already described. The switch 88 is closed, and the knife switch 80 being in initial or circuit closing position, both motors will be energized and set in motion, causing the shaft 26, and also the turntable in its lowered position to be rotated.

In Figs. 1, 2 and 3 the mechanism is shown with the parts in the position which they would occupy upon the completion of the operation of returning a record-carrier arm with the record supported thereby to initial position. With the parts in the position indicated in said figures the knife switch 80 would be in circuit closing position, and the cam 73 which operates the lever 66 and thereby the carrier-operating plunger 55 would be in the position indicated in Fig. 3 and in full lines in Fig. 4. At the same time the cam or eccentric 28, which is also fixed to the shaft 26 which operates the cam 73 and switch tripping finger 84, would be in the position indicated in full lines in Fig. 4; and the tripping finger 84, which is also fixed to the shaft 26, would be in the position indicated in full lines in Fig. 4. The switch 80, being closed, as already suggested, the motor 29 which drives the shaft 26 for operating the record-carrier arms and for raising and lowering the turntable would be energized and set in operation—the motor 19 for rotating the turntable, being already in operation,—the further rotation of the shaft 26 would cause the cam 73 to engage the upper forked arm 71 thereby raising the lever arm 70 and moving the lever arm 66 and carrier-operating plunger 55 from the position in which said parts are shown in full lines in Fig. 3 to the position in which they are shown in broken lines in said figure, thereby swinging the record-carrier arm 34 from the position shown in full lines in Fig. 1 to the position in which it is shown in broken lines in said figure, and in position to support a record directly over the turntable. Upon the completion of the operation of moving the carrier arm into position directly over the turntable the cam 73 would be in the position in which it is shown in broken lines in Fig. 4, and cam 28 would be in the position in which it is indicated in broken lines in Fig. 4 at the moment of coming into engagement with the bearing member 22 and the beginning of the operation of raising said bearing member, and thereby the turntable spindle and turntable so as to bring the turntable into supporting engagement with a record located directly over the turntable. The further rotation of the shaft 26 would obviously bring the tripping finger 84 into position to engage the switch 80 and raise the movable switch member of said switch to open or circuit breaking position, in which it is shown in broken lines in Fig. 4. The opening of the switch would, of course, cause the motor 29, which operates the record carriers, to stop, thus permitting the record-carrier arm to remain stationary during the rotation of the turntable in the operation of playing a record thus carried into position over the turntable by the record-carrier arm.

The tone arm, upon the completion of the playing of such record, would be brought into position to close the electric circuit for energizing the motor 29, which operates the record-carrier arms, by causing the contact member 77 to engage contact member 78, thus closing the circuit and causing the shaft 26 to be rotated to a sufficient extent to carry the tripping finger 84 out of engagement with the movable member of the knife switch 80, thus releasing and permitting the closing of the switch 80, and enabling the rotation of the shaft 26 to be continued without the contact members 77 and 78, which are actuated by the tone arm, being in contact. The further rotation of the shaft 26 from the position last indicated, would cause the cam 28 to move downward and away from the turntable spindle bearing member 22, thus permitting the turn-table to move downward and away from the record supported thereby, and releasing and permitting the record to be supported by the record-carrier arm which is already in position to engage the margin of the record encircled by the ring portion 37 of such record-carrier arm. The knife switch 80 being still in circuit closing position, the further rotation of the shaft 26 with the cam 73 operated thereby will cause the carrier arm located over the turntable, with the record supported upon such carrier arm, to be returned to initial position, with the mechanism in the position indicated in Figs. 1, 2 and 3, in full lines. With the parts in the position last indicated, the rotation of the shaft 26 will again cause the cam 73 to be moved from the position in which it is shown in full lines in Figs. 3 and 4, to the position in which it is indicated in broken lines in Fig. 4. During this movement, and before the cam 73 engages the upper forked arm 71, the shaft 26 will be in rotation without operating the plunger 55 or any record carrier, and an opportunity or space of time is thus afforded for permitting the raising or lowering of the vertically movable record-carrier support 33 with the entire series of record-carriers into position to present any desired record-carrier with its record in position to be engaged and operated by the plunger 55, or record-carrier operating mechanism. This is done by rotating the shaft 41, which is adapted to be rotated in one direction automatically, by suitable operating means, such, for instance, as the weight 46, upon releasing and permitting the rotation of the ratchet wheel 47 fixed to said shaft, or by any desired suitable or well known operating means. The pawl or lever 48 is adapted to be readily moved to releasing position against the tension of the spring 51, either manually or by any suitable operating means.

It is obvious that the machine, constructed

as above described, is adapted to be actuated or set in operation by means of a coin-controlled actuating mechanism or nickel in the slot device or attachment of any suitable ordinary and well known form. Such devices being familiar to those skilled in the art, it is not deemed necessary or desirable that the same should be described herein.

I claim:

1. In a mechanism of the class described, the combination of a turntable, a series of superposed record carrier arms each pivotally mounted and provided with a record engaging portion adapted to engage the peripheral margin of a record to be supported thereby, means for raising and lowering said carrier arms, a reciprocating plunger adapted to engage said carrier arms successively for moving the same into and out of position to support a record over the turntable, a plunger-operating shaft rotatively mounted and operatively connected with said plunger, means connected with and adapted to be actuated by said plunger operating shaft and operatively connected with the turntable for raising and lowering the turntable into and out of engagement with a record located over the turntable, and means for rotating the turntable.

2. In a mechanism of the class described, the combination of a turntable, a series of superposed pivoted record carriers each adapted to support a phonographic record, a rotative shaft, reciprocating carrier-operating mechanism adapted to be connected with said carriers successively for moving the same into and out of position to support a record over the turntable, means for operatively connecting said shaft with the reciprocating carrier-operating mechanism, means in engagement with and adapted to be actuated by said shaft and operatively connected with the turntable for raising and lowering the turntable into and out of operative engagement with a record, and means for rotating said shaft and turntable respectively.

3. In a mechanism of the class described, the combination of a turntable, a rotative spindle upon which the turntable is mounted, a series of pivoted record carriers, a rotative shaft, reciprocating carrier-operating mechanism operatively connected with said shaft and adapted to be connected with a pivoted carrier for moving the same into and out of position to support a record over the turntable, spindle-supporting mechanism operatively connected with and adapted to be actuated by said shaft and in supporting engagement with the spindle for raising and lowering the spindle and turntable, means for rotating the spindle, and means for rotating said shaft.

4. In a mechanism of the class described, the combination of a turntable, a rotative

spindle upon which the turntable is mounted, a series of movable record carriers each adapted to support a record, means for rotating the spindle, a rotative shaft, means for rotating said shaft, reciprocating carrier-operating mechanism operatively connected with said shaft and adapted to be connected with said movable record carriers successively for moving the same into and out of position to support a record over the turntable, and an eccentric fixed to said shaft and in supporting engagement with the spindle, for raising and lowering the spindle and turntable with respect to a record to be operated upon.

5. In a mechanism of the class described, the combination of a turntable, a rotative spindle upon which the turntable is mounted, means for rotating the spindle, a series of movable record carriers each adapted to support a record, a rotative shaft, carrier-operating mechanism operatively connected with said shaft and adapted to be connected with said movable record carriers successively for moving the same into and out of position to support a record over the turntable, an upwardly and downwardly movable spindle-supporting bearing, an eccen-

tric fixed to said shaft and in supporting engagement with said spindle bearing, and means for rotating the shaft.

6. In a mechanism of the class described, the combination of a turntable, a rotative spindle upon which the turntable is mounted, means for rotating the spindle, a series of pivoted record carriers, an upwardly and downwardly movable support upon which said record carriers are pivotally mounted, means for raising and lowering said support, a rotative shaft, reciprocating carrier-operating mechanism operatively connected with said shaft and adapted to be connected with said pivoted record carriers successively for moving the same into and out of position to support a record over the turntable, spindle-supporting mechanism operatively connected with and adapted to be actuated by said shaft and in supporting engagement with the spindle and acting to raise and lower the spindle and turntable, and means for rotating said shaft.

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