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1,569,062

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RECORD MANIPULATING MECHANISM FOR PHONOGRAPHS

Filed Jan. 26, 1924

4 Sheets-Sheet 1

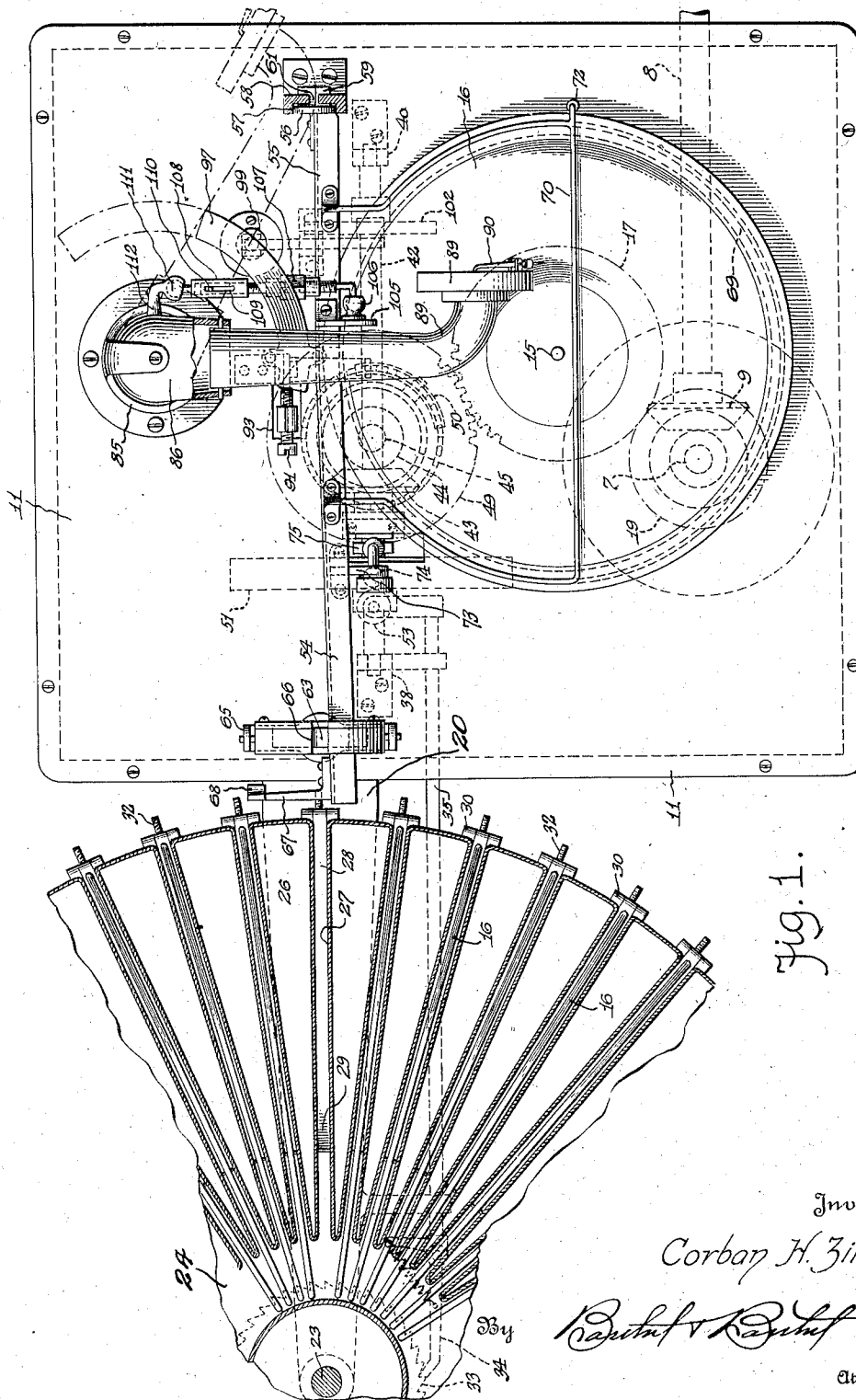


Fig. 1.

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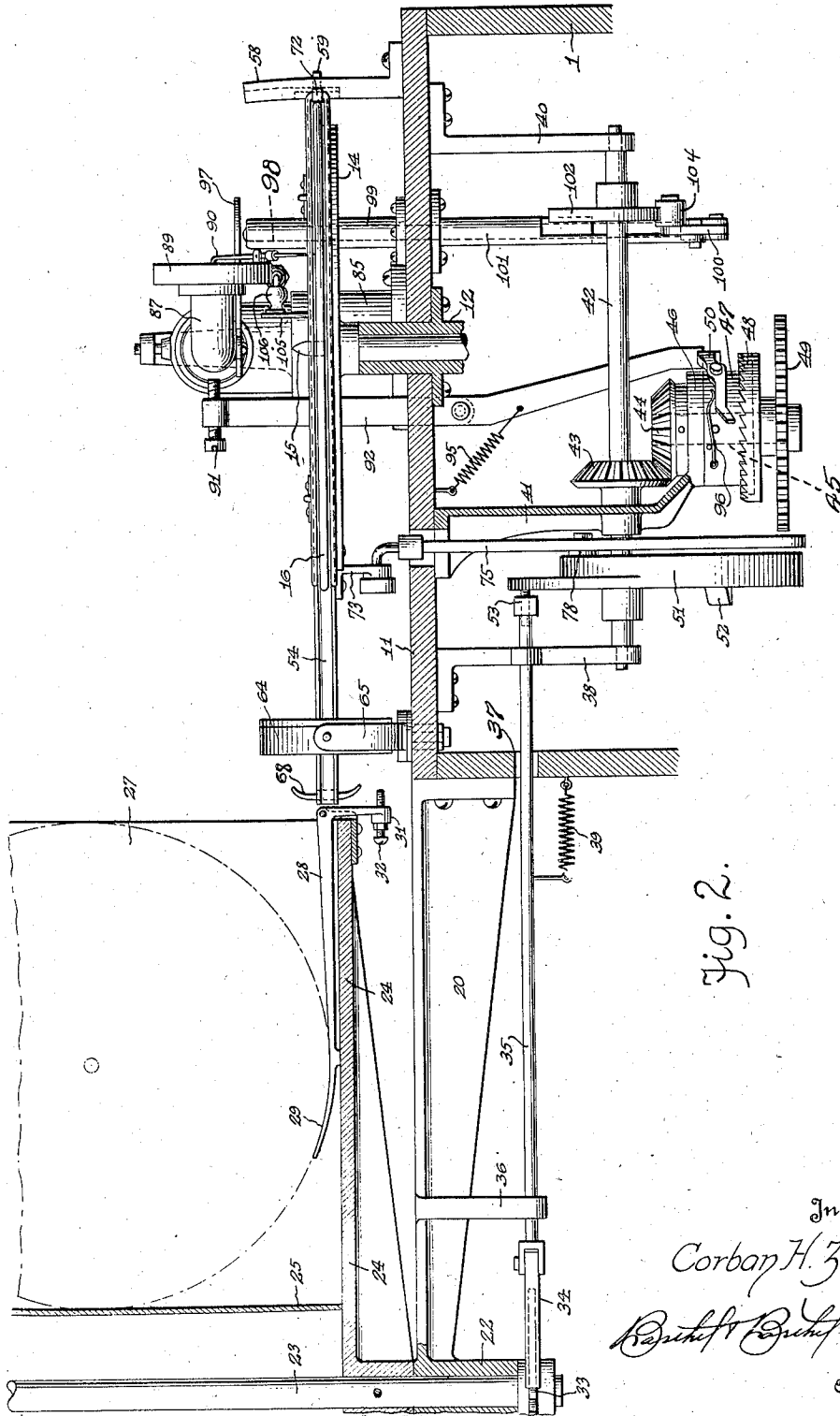
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4 Sheets-Sheet 2



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Fig. 3.

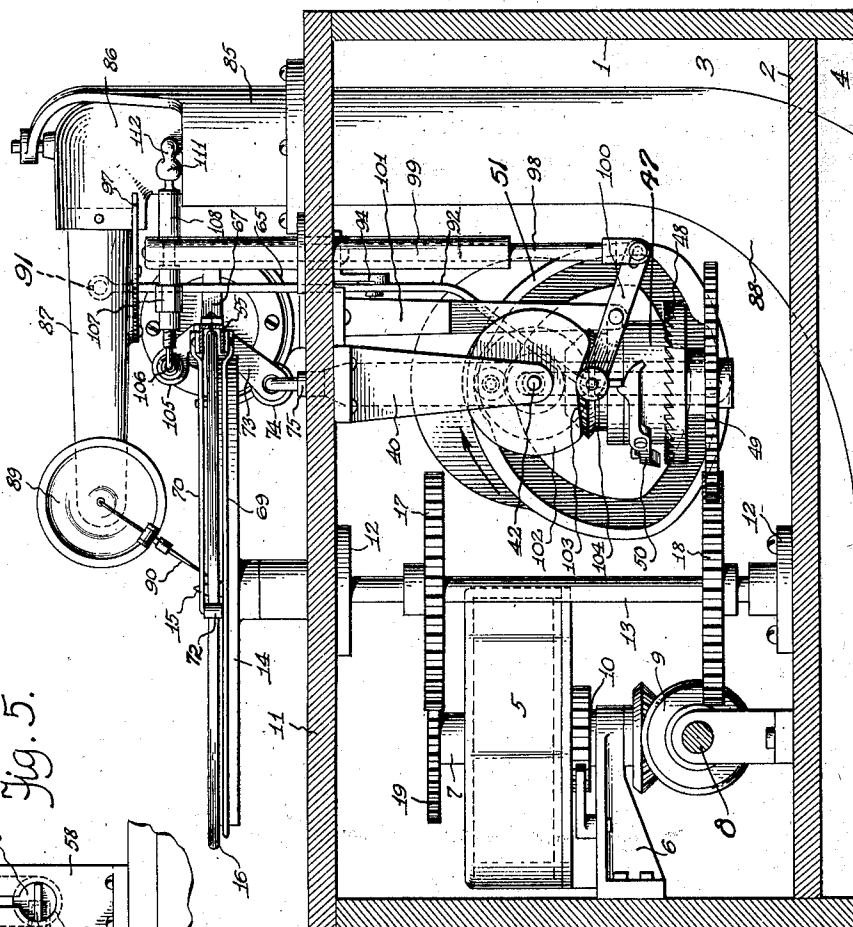


Fig. 5.

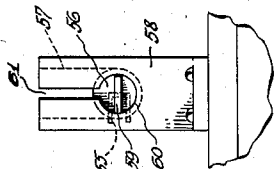
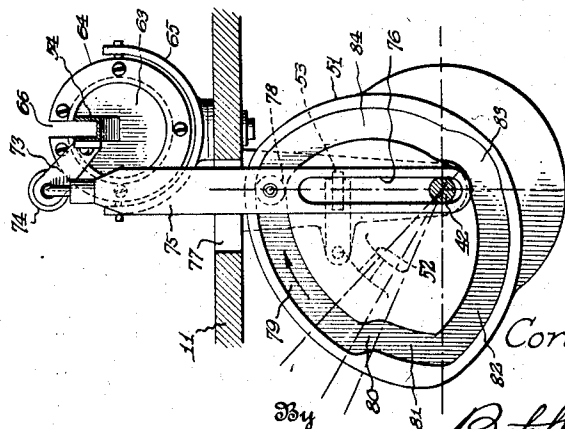


Fig. 4.



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4 Sheets-Sheet 4

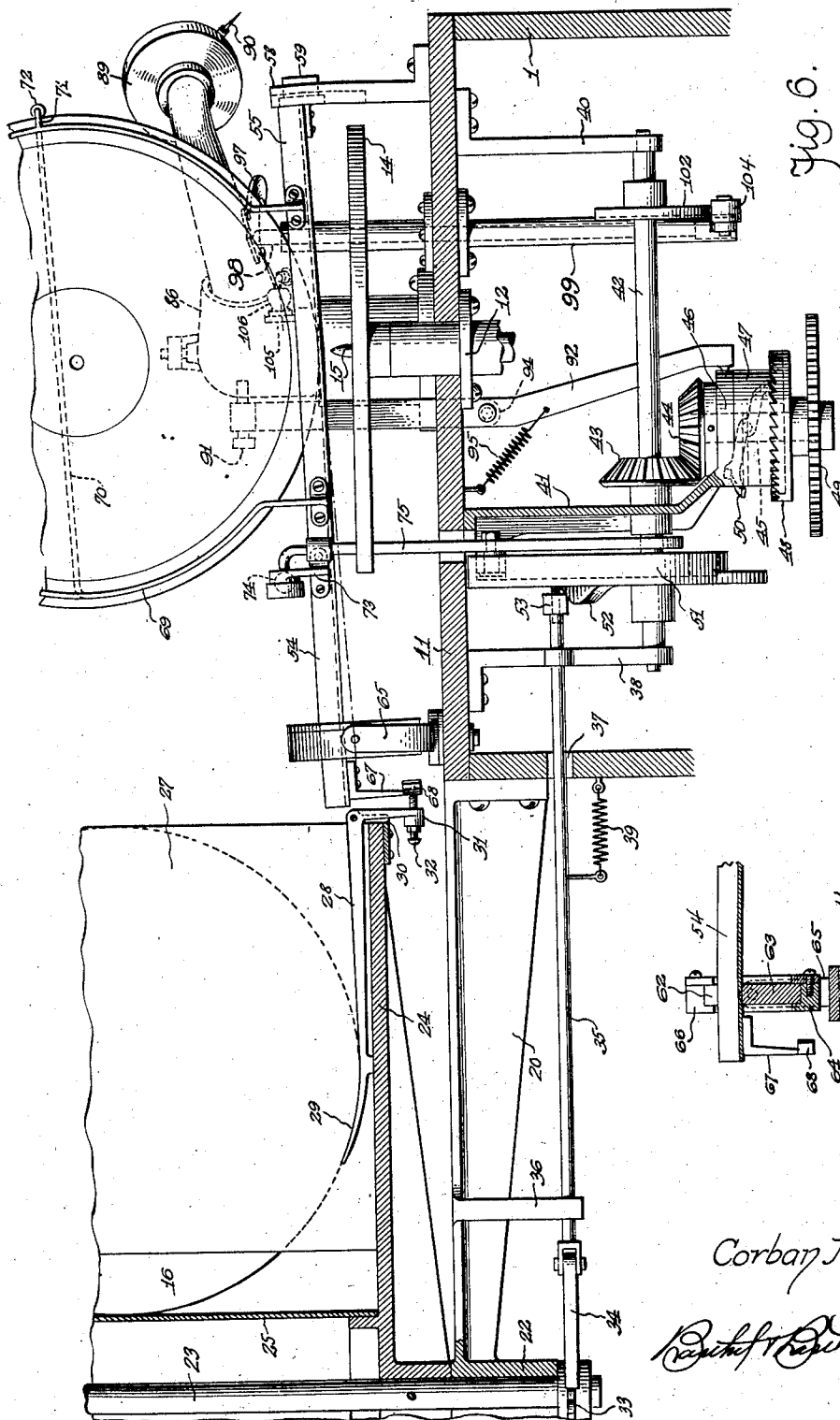


Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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RECORD-MANIPULATING MECHANISM FOR PHONOGRAPHS.

Application filed January 26, 1924. Serial No. 688,692.

To all whom it may concern:

Be it known that I, CORBAN H. ZILER, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Record-Manipulating Mechanism for Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to record manipulating mechanism for phonographs, and such sound reproducing instruments in connection with which flat disk records are used and placed on a revolvable member or table, with a needle engaging the record for transmitting sound through a tone arm to a horn or sound amplifier. Such instruments are driven by various types of motors and are ordinarily manually started and automatically stopped.

My invention aims to provide a phonograph of the above type with a record magazine and automatic mechanism for intermittently moving the magazine, removing a record from the magazine and properly positioning it on the phonograph, adjusting the tone arm for a rendition of the record, and after the record is played causing its removal to the magazine. The mechanism is of such construction and arrangement that records may be successively played as long as the phonograph is operated.

My invention further aims to provide a rotary record magazine for a phonograph and from the magazine may be removed records to be automatically placed in a playing position on the phonograph. After the record has been played it is automatically returned to the magazine and the magazine shifted so that another record may be removed therefrom and used on the phonograph.

My invention is further characterized by a record transferring device that is positive in its action and highly efficient for safely manipulating a fragile disk record relative to a rotatable table by which the record is revolved relative to a tone arm. The novel construction of the record transferring device precludes any danger of the device interfering with the proper position of the record on its rotating table and the operation of the transferring device is timed

relative to the intermediate movement of the magazine so that there will be proper alinement of the device and magazine for the transfer of a record from the phonograph proper to the magazine.

My invention further includes novel means by which a tone arm and its needle are automatically transferred from a finished position to a record clearance position, and from such record clearance position to a starting position. The movements of the tone arm are in timed relation to the operations of other parts of the phonograph and in attaining these results the only additional space required is that for the rotary magazine, which is placed at one side of the phonograph and practically on a level with the top thereof in contradistinction to the storage compartment ordinarily in the lower part of a phonograph cabinet. Without necessarily discarding a phonograph already in use my record manipulating mechanism may be installed with a few slight additions or changes in the usual operating mechanism of the phonograph.

My invention will be hereinafter considered under such captions as phonograph and its main operating mechanism; rotary record magazine; record transferring device, and tone arm shifting mechanism together with a review of the general operation of the phonograph.

Reference will now be had to the drawings, wherein—

Figure 1 is a plan of a phonograph provided with my improvements, showing the rotary magazine partly broken away and partly in horizontal section and a record in position on the phonograph;

Fig. 2 is a vertical longitudinal sectional view of the same;

Fig. 3 is a vertical cross sectional view of the phonograph;

Fig. 4 is a detail view of parts of the mechanism associated with the record transferring device, showing one of the universal supports for the device;

Fig. 5 is a detail elevation of another universal support for the record transferring device;

Fig. 6 is a view similar to Fig. 2, showing a record removed from the phonograph and about to be returned to the magazine, and

Fig. 7 is a vertical longitudinal sectional view of a portion of the record transferring device showing in detail the universal support illustrated in Fig. 4.

5 Phonograph and its main operating mechanism.

In the drawings, the reference numeral 1 denotes the upper portion of a cabinet or housing which has a horizontal partition 2 dividing the cabinet into an operating compartment 3 and a horn or amplifying compartment 4 (Fig. 3). In the operating compartment 3 is the main operating mechanism of the phonograph, a motor 5 supported by a bracket 6 in which is journaled the drive shaft 7 of the motor. As set forth in the beginning, the motor may be of an electric or spring operated type and if of the latter type there is a winding arbor or shaft 8 protruding from the compartment 3 and having a beveled gear drive 9 between the winding arbor 8 and a spring winding connection 10 which will permit of a spring in the motor being wound up for operating the phonograph a predetermined period of time. If the motor is of the electrical type the usual connections are provided whereby such motor may be operated from an electric lighting circuit.

The partition 2 and the top wall 11 of the cabinet 1 have vertically alining bearings 12 for a shaft 13 which extends above the top wall 11 and is provided with a fixed record holder or table 14 having a center pin 15 by which a disk record 16 may be properly centered on the upper disk supporting surface of the holder 14.

On the shaft 13, within the compartment 3, are two horizontally disposed gear wheels 17 and 18, the former meshing with a gear wheel 19 mounted on the motor shaft 7, so that when said motor is placed in operation the table or record holder 14 will be revolved with the record 16 thereon, so that if the needle of a tone arm is in operative relation to said record it may be played.

Rotary record magazine.

Extending outwardly from a side wall of the cabinet 1 is a bracket 20 (Fig. 2) having its outer end provided with a bearing 22 in which is journaled a vertical magazine shaft 23. Fixed to the shaft, at the bearing 22 is a circular platform 24 and mounted on said platform, about the magazine shaft 23 is a sleeve or annular inner wall 25 which may serve as an abutment for the records 16 which are rolled into the magazine, on edge. Mounted on the rotary platform 24 are hollow partition members 26 providing radially disposed stalls or compartments 27 in which the records 16 are placed and the partition members 26 may cooperate with other walls in providing a drum or cylinder-like

magazine which will afford an inclosure for records placed in the radially disposed stalls of the magazine.

In the bottom of each of the stalls or compartments 27 is a tiltable record support 28 on to which a record may be rolled, said support having an inner curved end 29 adapted to limit the inward movement of the record and prevent sudden contact of the edge of the record with the sleeve or inner wall 25 of the magazine. The record supports 28 have the outer ends thereof pivotally mounted between bearings 30 (Fig. 1) provided therefor on the peripheral edge of the platform 24 and said supports have depending ends 31 provided with set screws 32 which are adapted to be engaged to cause the support 28 to be tilted whereby the record 16 on the actuated support will roll out of its stall or compartment 27.

On the lower end of the magazine shaft 23 is a horizontally disposed ratchet wheel 33 and normally engaging said ratchet wheel to intermittently rotate the same is a pivoted spring restrained pawl 34 carried by a rod 35 slidable in a hanger 36, (Fig. 2) carried by the bracket 20. The rod 35 extends through an opening 37 in the cabinet side wall into the compartment 3 where the inner end of said rod is slidable in a hanger 38, carried by the lower face of the top wall 11 of the cabinet 1. A coiled retractile spring 39 connecting the rod 35 and the cabinet 1 retains the rod 35 normally retracted and restores it to such position for each actuation and intermittent movement of the rotary magazine. The ratchet mechanism is designed so that the magazine will be rotated in a clockwise direction with each movement bringing a stall or compartment 27 of the magazine into position for automatic removal of a record therefrom. By reference to Fig. 2, it will be noted that the upper surface of the record support 28 is at a slight inward inclination to the horizontal so that said support will serve somewhat as a cradle for the record 16, and even though the outer ends of the stalls or compartments 27 are normally open, there is no danger of the records accidentally rolling out of the stalls. It is obvious that records may be manually removed and others placed in the stalls.

Transversely alining with the hanger 38 in the operating compartment 3 are other hangers 40 and 41 and journaled in these hangers is a transversely disposed shaft 42 provided with a beveled gear wheel 43 meshing with a horizontally disposed beveled gear wheel 44 mounted on a shaft 45, journaled in a bearing 46, carried by the lower end of the hanger 41. Fixed to the lower end of the shaft 45 is a pawl supporting member 47 and loose on the lower end of said shaft is a horizontal crown ratchet wheel 48 having

its hub portion provided with a horizontal gear wheel 49 normally meshing with the horizontal gear wheel 18 (Fig. 3) of the record holder shaft 13, which is adapted to be driven from the motor 5.

On the pawl supporting member 47 is a pivoted spring pressed pawl 50 adapted to engage the ratchet wheel 48 and establish a driving relation between the loosely mounted gear wheel 49 and the shaft 45. When such driving relation is established the shaft 42 is driven and on said shaft is a cam member 51 having one face thereof provided with a cam 52 adapted to engage an adjustable end member 53 (Fig. 2.) of the rod 35 and cause said rod to be pushed outwardly whereby movement is imparted to the rotary magazine to shift a record stall out of the road and bring another record stall into position for manipulation of the record in the stall. The retractile force of the spring 39 holds the end member 53 of the rod 35 normally against the cam member 51 so that once during each rotation of the cam member 51 the cam 52 thereof will impinge against the end member 53 and actuate the ratchet mechanism of the rotary magazine.

Record transferring device.

Extending transversely of the phonograph, in proximity to what may be considered the rear edge of the record table or holder 14 is a tiltable, rockable and universally supported channel shaped record transferring trough 54 which has one end thereof contiguous to the peripheral edge of the rotary magazine so that said trough may receive a record from the magazine and discharge a record into the magazine. By close inspection of Fig. 6, it will be noted that the trough 54 has its outer end 55 at a very slight angle to the inner end of the trough and the purpose of this angularity is to have the inner end of the trough substantially horizontal to receive a record from the magazine and at the outer end of the trough provide an incline which will tend to retard the rolling on movement of a record until the record is positioned on the outer end of the trough, as shown in Fig. 6. When the trough is tilted in a vertical plane the outer end is brought approximately to the horizontal with the inner end of the trough at an inclination to the horizontal and this will tend to prevent the record from accidentally rolling out of the trough.

The outer end 55 of the trough 54 has a circular head 56 (Fig. 1) loosely mounted in a slot 57 of a support 58 mounted on the top wall 11 of the cabinet. The head 56 is rotatable in the slot 57 and on said head is a fin 59 extending into a circular opening 60 of the support 58, said fin not interfering with rotation of the head 56 brought about by rocking the trough 54 from a vertical

position, shown in Fig. 6 to a horizontal position shown in Figs. 1, 2 and 3. The fin 59, which is best shown in Figs. 1 and 5, is adapted to enter a vertical slot 61 in the support 58 when the trough 54 has been rocked to a vertical plane, thereby permitting the head 56 to slide upwardly in the slot 57, said fin preventing a rocking movement of the trough 54, except when the head 56 is in the lower end of the slot 57.

The inner end of the trough 54 extends through a slot 62 (Fig. 7) of a head 63 rotatable in a ring 64 trunnioned in a yoke 65 rotatably mounted on the top wall 11 of the cabinet, the head, ring and yoke constituting a universal support for the inner end of said trough. The ring 64 is slotted, as at 66, to permit of a record rolling in the trough 54.

On the inner end of the trough 54 is a depending bracket 67 (Fig. 6) supporting a cam member 68 and this cam member is positioned so that the screws 32 of the tiltable record supports 28 will impinge against the cam member and cause a record support in alinement with the trough 54 to be tilted whereby a record on the tilted support will roll out of its stall on to the trough 54.

Attached to the side walls of the trough 54 is a cage composed of a circular member 69 and a semi-circular member 70, said members being disposed in parallel and joined by a connection 71 provided with a periphery 72 which limits the rolling-in movement of a record entering the cage when the cage is in a vertical position as shown in Fig. 6. The members 69 and 70 are comparatively rigid with the circular member 69 of such diameter that it may be swung downwardly over the record table or holder 14, as shown in Fig. 3, and the semi-circular member 70 will not interfere with the swinging movement of a tone arm above the record 16.

To rock the trough 54 and swing the record cage downwardly to deposit a record on the table or holder 14 and to remove the record therefrom after rendition of the same, the front side wall of the trough 54 is provided with a rigid arm 73. Connected to said arm by a conventional form of universal joint 74 is the upper end of a slotted pitman 75 which has a longitudinal slot 76 (Fig. 4) providing clearance for the shaft 42, said pitman extending through a slot 77 in the top wall 11 of the cabinet. On one side of the pitman 75 is an anti-frictional roller 78 extending into a cam groove in the cam member 51 and said cam groove is of such configuration as to govern movement of the tiltable and rockable trough 54 when operated by the shaft 42. That portion of the cam groove designated 84 serves to lift the pitman 75, this action first rocking the trough 54 to a vertical plane where the pin 59 (Fig. 5) registers with the slot 130

61 thereby permitting the trough end 55 to be lifted. Continued upward movement of the pitman 75 (Figs. 4 and 6) tilts the trough on the support 65, the end 55 being raised sufficiently to cause the record 16 to roll from the trough into its stall of the rotary magazine. The trough is held at rest during the transfer to the magazine by a portion of the cam groove designated 79. Just before this rest period expires and after the record is in the magazine the cam 52 is brought into action to impart movement to the rotary magazine, whereby there is a new record placed in alinement with the trough 54 to roll out of the magazine on to the trough. As the actuated magazine comes to rest the end 55 of the trough is lowered to incline the trough away from the magazine, and the cam 68 actuates the record support 28, causing the record to roll from the magazine into the trough. Tilting of the trough is accomplished by that portion of the cam groove designated 80 and while the record is rolling along the trough into the cage thereof there is another rest period in the cam groove, designated 81. Following this rest period is that portion of the groove designated 82 which causes the trough to be rocked downwardly on an axis provided by the universal supports at the ends of the trough. Rocking the trough 54 swings the cage downwardly and places the record in the cage on the table or holder 14, as shown in Fig. 3. Following the portion 82 of the cam groove is what may be considered a short rest period 83 and it is during this period that the tone arm is manipulated, partially lowered, as will hereinafter appear. Following the groove portion 83 is another portion designated 84, which causes the trough to again be rocked upwardly to swing the record off of the holder 14 to a vertical position when it may roll down the trough into the magazine.

Tone arm shifting mechanism.

Rearwardly of the table or record holder 14 and on the top wall 11 of the cabinet is a support 85 (Figs. 2 and 3) for a swingable connection 86 establishing communication between a pivoted tone arm 87 and a horn or amplifying device 88. The outer end of the tone arm 87 has the usual diaphragm holder 89 and record engaging needle 90. As the tone arm is carried inwardly towards the center of the record 16 by its natural drift incurred by the needle 90 engaging in the spiral groove of the record, the tone arm impinges against an adjustable screw 91 carried by the upper end of a lever 92 extending through an opening 93 in the top wall 11 and pivotally connected to a bearing 94 depending from the lower face of the top wall. The lever extends downwardly and is normally held against the bearing

46 of the hanger 41 by the retractile force of a spring 95 connecting said lever to the wall 11 of the cabinet. See Figs. 6 and 2.

The lower end of the lever 92 is angular and is engaged, at times with the pawl 50 to hold the pawl out of engagement with the crown ratchet wheel 48 and against a stressed spring 96 carried by the pawl supporting member 47. When the lever 92 is actuated by the tone arm 87 it is moved out of the path of the pawl 50, releases said pawl and permits it to engage the crown ratchet wheel 48, thereby establishing a driving relation between the motor 5 and the shaft 45. This is accomplished as the end of a record is reached and it is obvious that the tone arm must be shifted out of the road in order that the record may be removed from the holder 14 and swung to a vertical position. The mechanism for shifting the tone arm is as follows.

Suitably attached to the tone arm 87 is a curved cam member 97 and adapted to engage the lower face of this cam member is a plunger 98 slidable in a tubular guide 99 carried by the top wall 11 of the cabinet. The lower end of the plunger 98 is loosely connected to a cross head 100 pivotally supported on the lower end of a hanger 101 attached to the top wall 11 of the cabinet, said hanger being cut away or off-set to provide clearance for a cam 102 mounted on the shaft 42. The cam 102 has a cam surface 103 normally engaged by an anti-frictional roller 104 on the end of the cross head 100. The cam surface 103 affords a retracted and lowered condition of the plunger 98, otherwise the cam 102 retains the plunger 98 elevated so that the cam member 97 may ride on the upper end of the plunger. Initial elevation of the plunger 98 causes the tone arm 87 to remove the needle 90 from the record and when so elevated, the tone arm is ready to be swung to the right or in a counterclockwise direction to provide clearance over the record holder 14. The swinging of the tone arm is accomplished by virtue of the rockable record transferring device and the following connection is established between the outer end of the trough 55 and the tone arm.

Considering Fig. 1, it will be noted that the rear side wall of the trough 54 has a fixed bracket 105 and connected to said bracket by a conventional form of universal joint 106 is an extensible rod or turn-buckle 107 which extends into a sleeve 108 provided with a longitudinal slot 109 to receive a pin 110 carried by the end of the rod 107. The sleeve 108 is carried by part of a universal joint 111 which has its fixed part or bracket 112 attached to the swiveled connection 86 of the tone arm. On account of the short radius between the bracket 112 and the vertical axis of the connection 86,

and the long radius of the bracket 106 relative to the same axis of the connection 86, rocking of the trough 54 on its axis, from a horizontal to a vertical position, causes the trough 54 to swing the tone arm 87 to one side with the cam member 97 riding on the upper end of the plunger 98. The tone arm will be swung to the dot and dash position shown in Fig. 1 where it remains during the removal of the record 16 to the magazine and the loading of another record on to the trough and into the cage of said trough. As the trough is rocked from a vertical to a horizontal position it pulls on the rod 107 and shifts the tone arm from the dot and dash position shown in Fig. 1 to a position at the edge of the record 16, at which time the cam surface 103 of the cam 102 permits the plunger 98 to assume a retracted or lowered position, thus bringing the needle 90 into the outer groove of the record 16. From this position the tone arm is gradually swung inwardly during the rendition of the record, and such movement of the tone arm is permissible because of the pin and slot sleeve connection forming part of the rod 107.

From the foregoing it will be observed that the tiltable and rockable trough is a very important feature of my invention for the reason that it not only cares for the loading and unloading of the table or holder 14, but serves as means for swinging the tone arm to an inactive position and then bringing the tone arm to an active position, all of which is accomplished in timed relation to the operations of other parts of the phonograph. The manipulation of the records is entirely automatic, and as long as power is applied to the phonograph the records in the magazine may be repeatedly played in the order in which they are arranged in the rotary intermittently actuated magazine. The record holder 14 is not stopped during the manipulation of a record, as the cage affords ample freedom for the record holder and an instant release or pick-up of the record relative to the driven holder.

It is thought that the operation and utility of my invention will be apparent without further description, and while in the drawings there is illustrated a preferred embodiment of my invention, it is to be understood that the structural elements are susceptible to such variations and modifications as fall within the scope of the appended claims.

What I claim is:

1. The combination with a motor operated phonograph having a driven record holder and an adjustable tone arm, of a record transferring cage rockable and tiltable at the side of said record holder adapted to receive a record on edge and by a tilting

movement place the record at the side of the holder and by a rocking movement place the record on said holder, a universal connection between said record transferring cage and said tone arm so that said tone arm may be adjusted by the rocking movement of said transferring cage, and means in said phonograph adapted to actuate said record transferring cage in timed relation to the operation of said phonograph.

2. The combination set forth in claim 1, wherein the connection between said record transferring cage and said tone arm permits of said cage shifting said tone arm to an inactive position and said tone arm operating relative to a record while said record transferring cage remains dormant.

3. The combination with a motor operated phonograph having a driven record holder and an adjustable tone arm, of a cage at the side of the record holder adapted to receive and deliver a record on edge, means adapted for swinging said cage to place a record held thereby on the holder and remove the record from the holder, and a slidable connection between said tone arm and cage which connection has a sliding movement during the movement of the tone arm incident to the playing of a record.

4. The combination set forth in claim 3, wherein said cage is tiltable and adapted to be automatically inclined to receive and deliver a record.

5. The combination set forth in claim 3, wherein said cage includes a circular record holding member adapted to be swung to a plane below the upper surface of said record holder to permit of a record in said cage resting on said holder to be driven thereby.

6. The combination set forth in claim 3, wherein the means for swinging said cage includes a cam mechanism within said phonograph actuated in timed relation to the operation of said phonograph.

7. The combination with a motor operated phonograph having a driven record holder, and a tone arm, of an adjustable record magazine adjacent said phonograph, said magazine comprising a series of stalls, a tiltable record support in each stall, a record transferring device on said phonograph adapted to actuate the record support in a stall, receive a record, and place it on said record holder and return it to said magazine, and a ratchet mechanism below said magazine operatable from within said phonograph adapted to impart movement to said record magazine.

8. The combination set forth in claim 7, wherein said record transferring device is tiltable to receive and discharge a record and rockable to place a record on said record holder and remove it therefrom.

9. The combination with a phonograph

having a motor driven record holder, of a rotary intermittently actuated record magazine supported from the side of said phonograph, said magazine having stalls adapted to receive records on edge, a tiltable and rockable trough on said phonograph adapted to receive a record in a vertical on edge position from said magazine, place the record in a horizontal position on said record holder, and remove it from said holder and return it to said magazine, and means actuated in timed relation to said record holder and said trough for intermittently actuating said magazine.

10 10. The combination with a motor operated phonograph having a driven record holder, of a rotary intermittently actuated magazine at one side of said phonograph, a ratchet mechanism below said magazine and

20 operated from within said phonograph adapted to rotate said magazine, said magazine having stalls supporting records on edge, means on said phonograph adapted to

receive a record and place it on said driven record holder and remove the record therefrom and deliver it to said magazine, and bell crank supports extending into each stall of said magazine, adapted to be actuated by the first mentioned means and rotation of said magazine to cause a record to be delivered from said magazine.

11. Means for manipulating a record relative to a phonograph having a record holder and an adjustable tone arm, said means comprising a tiltable and rockable trough adapted to receive a record on edge and lay said record on said holder, means connecting said trough to said tone arm so that said tone arm may be adjusted in timed relation to the manipulation of the record, and means in said phonograph adapted for tilting and rocking said trough in timed relation to the operation of said phonograph.

In testimony whereof I affix my signature.

CORBAN H. ZILER.