

April 13, 1943.

J. G. KURZEN, JR

2,316,174

SOUND REPRODUCING DEVICE

Filed June 25, 1940

2 Sheets-Sheet 1

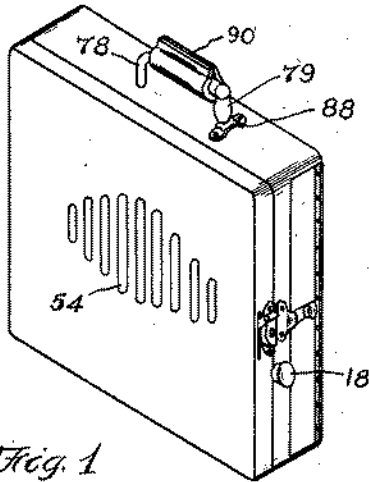


Fig. 1

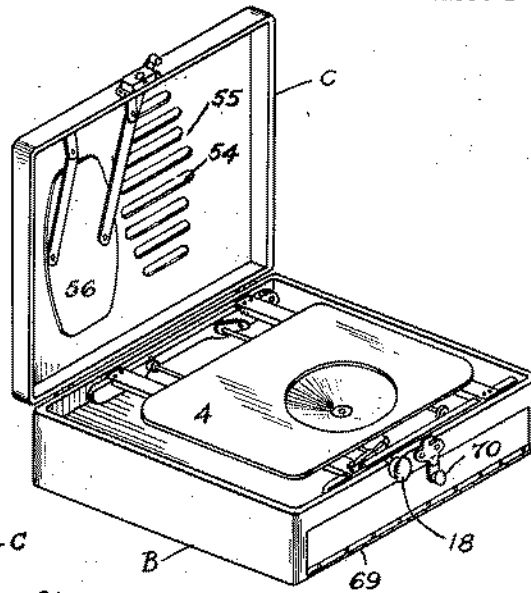


Fig. 2

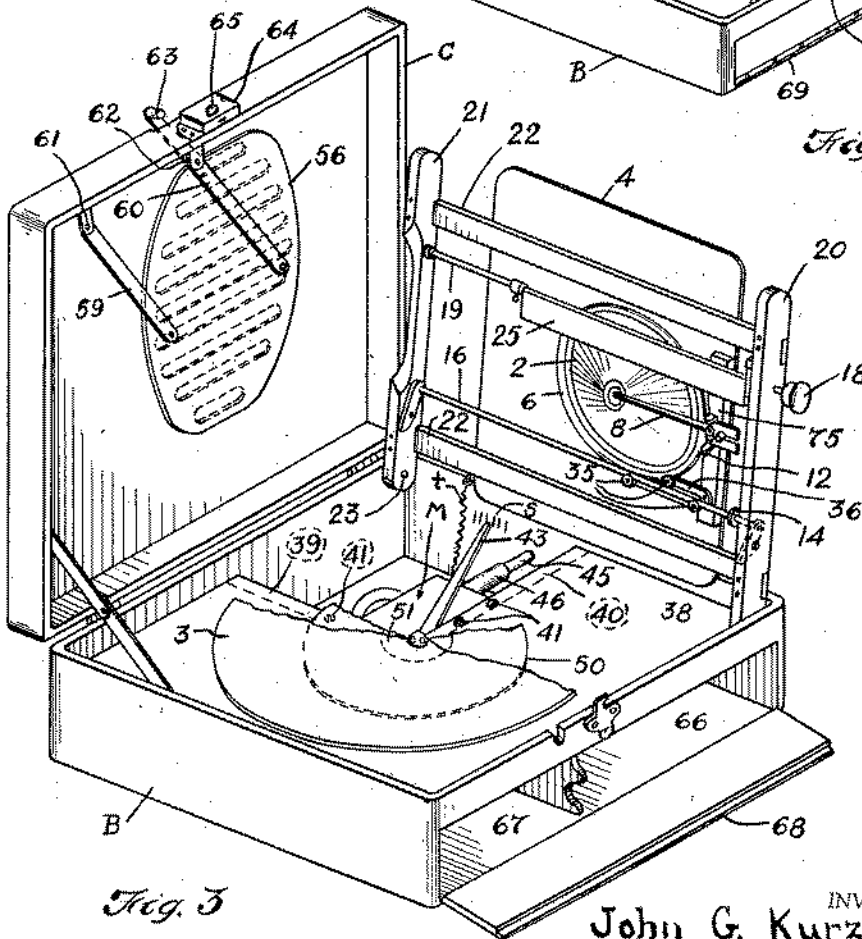


Fig. 3

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2 Sheets-Sheet 2

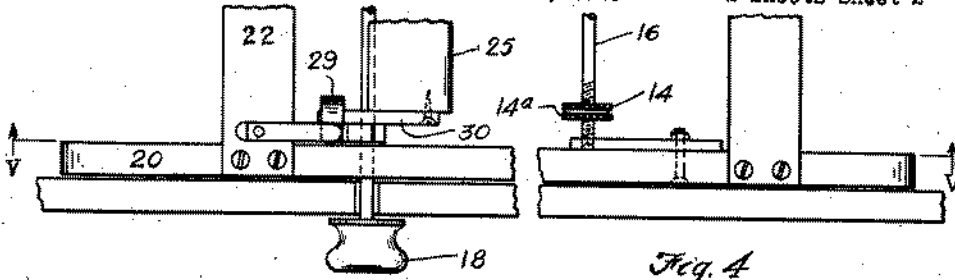


Fig. 4

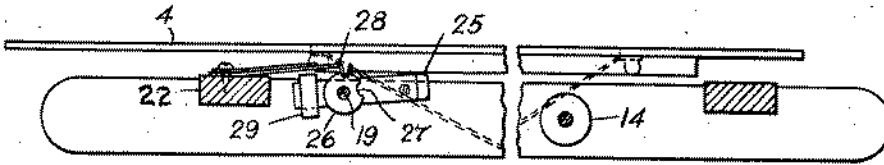


Fig. 5

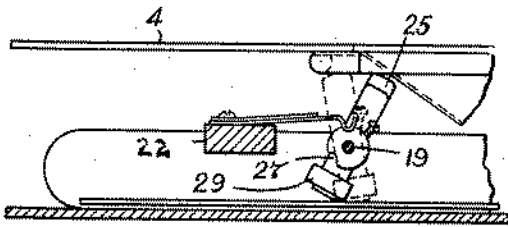


Fig. 6

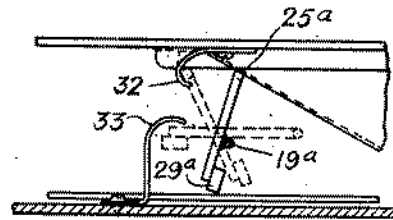


Fig. 7

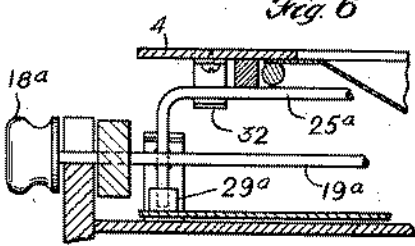


Fig. 7a

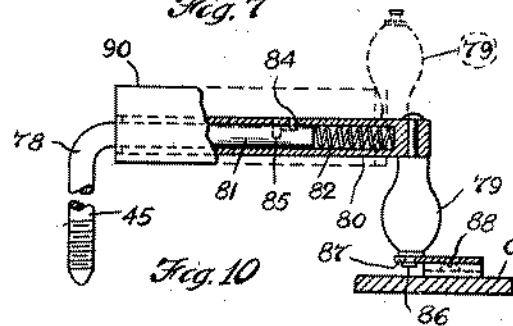


Fig. 10

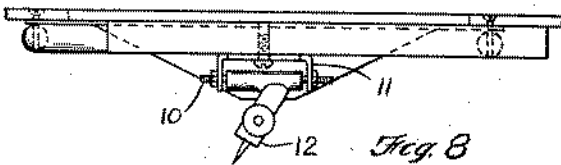


Fig. 8

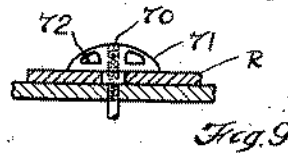


Fig. 9

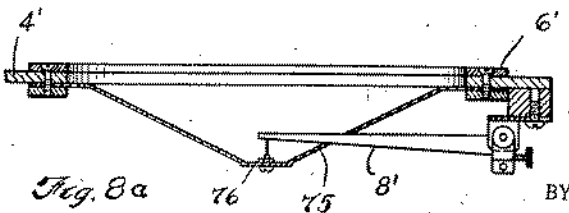


Fig. 8a

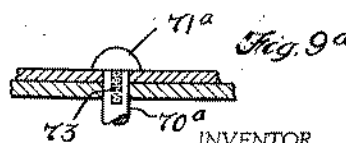


Fig. 9a

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# UNITED STATES PATENT OFFICE

2,316,174

## SOUND REPRODUCING DEVICE

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Application June 25, 1940, Serial No. 342,235

20 Claims. (Cl. 274—1)

The practice in phonograph mechanism construction has conventionally followed the original commercial forms. Diaphragms of metallic character and of small diameter in proportion to the length of the needle arm have prevailed. The mounting has been such as to carry the needle across the record disk in a generally curved or arcuate path thereby introducing a varying angle of presentation of the needle in the sound track in different zones of the record. During playing, disks have had to be in carefully maintained horizontal position. Regardless of care exercised, the placement of the needle in the sound track in starting the record has involved more or less guess-work and chance which has been quite annoying to many users. After playing a record, to return the reproducer head to starting point has required the operator to take the trouble to grasp the tone arm and re-swing it to initial position. In the present invention such disadvantages may be eliminated and construction features may be had permitting realization of some of the finer tone and timbre values that are customarily lost with a mechanical reproducer head. Again, the needle can be accurately and uniformly started on a record without strained effort on the part of the operator and even without opening the cabinet; and a record can also be played in vertical position as well as horizontal, if desired.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

Fig. 1 is a perspective view of one illustrative embodiment of the invention, with the cabinet or container closed; Fig. 2 is a perspective view of the same with the cabinet or case open; Fig. 3 is the perspective view, on a larger scale, with the reproducer head raised up away from the sound record to give access thereto; Fig. 4 is an enlarged fragmentary plan view of the end of the movable frame which carries the reproducer head or diaphragm board; Fig. 5 is a section thereof taken on a plane substantially indicated by line V—V, Fig. 4; Fig. 6 is a similar view of the structure in the left-hand portion of Fig. 5, showing different positions of the diaphragm board; Fig. 7 is a similar view showing the detail of modified means for holding the diaphragm board against

misplacement in event of moving the container; Fig. 7a is similarly a fragmentary section taken on a plane at right angles to Fig. 7; Fig. 8 is a side elevational view showing a detail of the diaphragm and mounting of the needle lever; Fig. 8a is a sectional detail showing a modified diaphragm construction; Fig. 9 is a fragmentary section of the head of the motor spindle and the adjacent portion of the turntable; Fig. 9a is a similar view of a modification; and Fig. 10 is a fragmentary elevation, partly in section, showing the detail of the combined winding crank and carrying handle.

In one general aspect, the invention involves improvements in sound reproducing heads. The diaphragm 2 for mechanical generation of air waves at sonic frequencies from the sound track in a sound record 3 may be of large diameter, in contrast to the customary small diaphragms. It should be very materially in excess of three inches, and desirably at least four inches, or five inches. And it may be more where the size of the mounting and container permits. Viewed in terms of relation of diaphragm diameter  $d$  to length of needle arm lever  $L$  from fulcrum to needle point, the ratio  $d/L$  should be well in excess of 3 and desirably 5 or 6, or more in large size equipment. Preferably, the diaphragm is coned or concaved; it being found that the result is increased efficiency or a better directive action on the air waves as generated, and this is a matter to be particularly appreciated where a good output is desired on available small driving force. It is preferable also that the diaphragm be non-metallic, for example of fiber or cellulosic material, it being found that there is a considerable difference in the moment of inertia effective in the vibrating system, and favoring naturalness of reproduction in frequencies otherwise prone to be lost. The diaphragm 2 thus may be mounted on a support or a board which may also contribute baffle effect, and the whole is movable across a sound record by suitable mounting permitting positioning of the needle in the sound track or the raising of the needle or reproducer head away from the record, as described more in detail hereinafter. The diaphragm preferably is provided with a surrounding inertia element, desirably for instance in the form of a heavy metal ring 6, Figs. 3-8, which can also combine a clamping function to mount and hold the diaphragm. Extending from a connection at the apex or center of the diaphragm is a diaphragm lever arm 8, Fig. 3, which is part of a bell-crank system fulcrumed on the support pin 10, Fig. 8, which may be car-

ried in a bracket 11 just outside of the diaphragm mounting. A peculiarity of this lever system furthermore is the angularity or obliquity of the needle arm 12, Figs. 3 and 8, with respect to the diaphragm 2. Desirably, this angle may be on the order of about 20 degrees, plus or minus 2, thus providing the needle chuck or stylus holder oblique to the plane of the pivot. It will be noticed that the diaphragm when in playing position is in a plane parallel to the plane of the sound record 3.

The variability and guess work which is usual in the placement of the stylus or needle of a sound reproducing head in the start of the sound groove for beginning to play a record may be eliminated by the present invention by the incorporation of a starting gage 14, Figs. 3 and 4, against which the sound reproducer head or diaphragm carriage is brought to start the playing of a record. This gage has a position in relation with the beginning of the sound track of the records and it may be adjusted over a range requisite for different dimension records. Thus for instance, one convenient form is a screw-threaded adjustable abutment of two nuts and a washer 14a, Fig. 4, between the two nuts, one acting as a set nut, and being carried on a threaded rod 16, Figs. 3 and 4. The reproducer head or diaphragm carriage 4, etc., may thus be brought each time into exactly the right position to start the playing of record. And as a further refinement, the return of the reproducer head or diaphragm carriage may be accomplished by gravity. With the needle lifted out of the sound track by suitable means, such as described more in detail hereinafter, the reproducer head or diaphragm carriage 4, etc., may be run back to starting position against the starting abutment 14 by simply inclining or tilting the container or cabinet so as to allow the carriage to run down in the direction of the abutment. Then by appropriate manipulation the reproducing needle may be set down into the sound track and start playing. For the lowering and raising movements of the reproducing head or diaphragm carriage, as required for placing the needle in the sound track or removing it, it is of particular convenience to have a single control. For instance, by means of a turning knob 18, Figs. 2, 3, 4, the diaphragm carriage 4, etc., may be raised or lowered from or to sound record 3 by turning the knob in one direction or the other, and this may be accomplished even if the cover of lid C of the container is closed. The knob 18 is fastened to an oscillable shaft 19 which is mounted in the frame elements 20, 21, which with tie pieces 22 constitute the general support upon which the reproducer head is carried. For convenient access to the sound record this frame may be pivoted to the container, as at 23, and may be swung up into a position shown in Fig. 3, or may be swung down into general operating position as shown in Fig. 2, a toggling spring *t* holding it in either. In the latter position of the frame then, the diaphragm carriage 4, etc., may be limitedly raised or lowered sufficient to remove the needle from the sound track or to engage it therein, as desired, the movement for this being provided by the knob 18 and rock-shaft 19 which carries an off-setting bar 25, Figs. 3, 4, 5, 6, whereby on turning the knob and the rock-shaft 19 into the position shown in Fig. 5 the eccentric element 25 is turned down or lowered and permits the diaphragm carriage 4 to seat the needle down in the sound track of the record. On the other hand, by

turning the knob and the rock-shaft 19 to the position shown in Fig. 6, the eccentric element or lifter 25 raises the diaphragm carriage 4, etc., and lifts the needle away from the sound record. To hold the eccentric lifter 25 in desired position safely against displacement, the rock-shaft 19 desirably may carry a detent, such as a cam 26 with recesses 27 in which a spring-urged dog 28 may engage. As a further convenience, a brake may be provided to be operated by the same control means. Thus, a brake shoe 29, Figs. 4, 5, 6, may be provided on the other end of the bracket 30 which secures the eccentric lifter 25, and when the knob 18 and rock-shaft 19 are turned into the position shown in dotted lines in Fig. 6, the brake shoe (of rubber or other suitable friction material), is swung into engagement with the edge of the record disk to hold it. In a slightly modified construction Figs. 7, 7a, the eccentric lifter element 25a may take the form of a bale or suitably heavy metal rod secured by welding or otherwise to the rock-shaft 19a whereby similarly the eccentric lifter may raise or lower the diaphragm carriage 4a, etc., according to the direction of turning the knob 18a. A catch 32 serves to limit and also hold the eccentric 25a against misplacement when in the dotted line position shown in Fig. 7, and correspondingly even if the container be moved around and be turned upside down, misplacement of the diaphragm carriage is prevented. Again a brake shoe 29a may be carried on the extension of the element 25a, and similarly engage the edge of the record disk for retarding and holding it against movement. A stop or catch 33, Fig. 7, prevents turning the element 25a excessively when the sound reproducer head is in down or playing position.

As already indicated, the reproducer head is mounted to travel in a straight line, radially of the sound record. A desirable mounting may involve a track-way utilizing the rod 16, upon which flanged anti-friction wheels 35 may travel, these being mounted in arms 36 secured to the diaphragm board 4. As thus seen, the diaphragm board 4 carrying the diaphragm 2 and needle chuck 12 may travel back and forth on the track provided, and the carriage and needle may be raised from the sound record or lowered into engagement with it, at will, by the turning knob 18.

In a device of this kind, and particularly in small sizes, such as for portable use, the mounting of the motor is prone to occasion trouble. A particularly solid and vibration-free mounting may be had however, by including in the container or cabinet a system of partitioning at angles, and which may involve a horizontal partition 33 and angular partitions 33, 40, Fig. 3. The motor M is then mounted by arrangement of screws 41 in L-contour, these being generally in the contour relation of the partitioning. The speed-control lever 43 of the motor may then extend toward the outer wall of the container and scale *s* in position to be accessible when required. It will be understood that the motor may be of spring-wound type, and the shaft of the winding crank 45 may extend through a hole for that purpose in the side wall into a receiving socket 46. By having the end of the shaft 45 and the socket 46 screw-threaded in appropriate direction the winding crank may thus be inserted and turned up for winding the motor, or reversely may be turned back and out for removal if desired.

Customarily, heretofore, the turn tables of such

devices have been made of iron or steel. As a further refinement in the present invention, the turn table 50 is preferably of a very light metal, such as magnesium. A hub or reinforce center 51 may be of ferrous metal, since particular lightness, with strength, is thus had, which is of advantage in sizes intended for portable use.

For instruments of portable character, a feature of the invention involves a very compact and light container or case B in which the cover of lid C may include a grille or sound outlet means 54, Figs. 1, 2, 3, and conveniently this may involve a series of openings, over which a grille cloth 55 may be pasted on the inside, and it will be noticed that the diaphragm is directly underneath when the lid is closed down. With this there is possible a volume control which is particularly convenient and effective. By mounting a shutter 56 to be suitably swung over or away from the grille 54 to the extent desired, the grille may be correspondingly uncovered for emission of the sound. The shutter may be mounted on one or more swing arms, for instance, arms 59, 60, pivoted to brackets in the lid, as at 61, 62. By extending the arm 60 to a point without the case, and providing an operating handle 63, the shutter may be controlled from without, while the case is closed. A suitable spring latch 64 serves to lock the lid in closed position and can be released by pressure on the button 65 for opening. The partitioning arrangement aforementioned permits also the additional convenience of compartments 66, 67, Fig. 3, within which papers or accessories or other articles desired may be conveniently carried, and the closure 68 may be hinged as at 69, Fig. 2, and be provided with a thumb latch 70 for convenient opening and closing.

With construction as set forth, it is to be noticed that a sound record can be played with the cabinet or container closed, and in either horizontal or vertical position, movement of the reproducer head or diaphragm carriage being safe-guarded under all conditions. Furthermore, the needle pressure on the sound record is uniform in horizontal or vertical position of the diaphragm, and a feature of the invention is the provision of weight means, as a metal element 75, Fig. 3, which is secured to the diaphragm board 4 and extends along the diaphragm to a point beyond the anti-friction carriage rollers 35. The weight is thus effective on both sides of the pivot line as represented by the roller mounting on the rail 16. The spindle of the motor may be provided with means for locking or holding record disks on the turn-table. Conveniently, this may involve a screw-threaded fastening and may involve screw-threading of the exterior of the spindle 70, Fig. 9, and a nut to engage therewith, preferably in the form of a mushroom-like member 71 which may screw into position on the spindle 70 against a record R. Desirably, the nut 71 may have finger-holds 72, either recessed or upstanding, as preferred, or, if desired, the nut may be in a form of a smaller cap-screw 71a, Fig. 9a, which may take into a threaded bore 73 in the end of the spindle 70a. Depending upon the length of the screw-thread engagement one, two or more records may be thus held on the turn-table, and are securely maintained irrespective of the position of the machine.

In some instances, a relatively deep cone diaphragm may be desired, and the diaphragm arm 8', Fig. 8a, may be passed through a suitable opening 75 in the diaphragm, to connect at 75

with the apex. Again, the diaphragm may be provided with inertia weight means 6', and conveniently this may also serve to clamp the diaphragm in place on a support plate or board 4'. Diaphragms of radio loud speaker type may thus be employed, with particular enhancement of tone values.

For small portable units, the invention provides a convenience in the form of a combined winding crank and carrying handle. As illustrated in Figs. 1 and 10, this may involve a winding crank element 78, with screw-threaded end 45 to engage in the receiving sleeve of the motor; and a turning handle 79, as in dotted line position in Fig. 10, serves for the turning and winding. This turning handle is secured to a hollow sleeve 80 which is mounted for limited sliding and turning motion on the end 81 of the crank 78, and by means of a coil spring 82 the sleeve is pressed thereagainst when the handle 79 in the dotted line position shown in Fig. 10, this position being locked by a pin 84 which may engage for that purpose in offset notch 85, and otherwise permit disengagement therewith when the sleeve 80 and handle 79 are sufficiently rotated to clear, whereupon the handle 75 may be turned downwardly as shown in full lines in Fig. 10, and be extended by the spring 82 to the limit of its position allowed by the pin 84 in its longitudinal slot travel, and at the same time engage the head 86 of the handle 79 in a recess 87 in the end of a bracket 88 on the container B. To enclose the slightly slidable sleeve 80 and also present an easier handle surface there may be provided a cover 90 of tubular form made of leather or other desired material.

In use, as will be readily understood, the frame carrying the sound head or diaphragm equipment may be turned up as illustrated in Fig. 3, and a sound record 3 may then be placed on the turn-table 50, and the retaining nut be set into locking position. Then, the frame 20, 21 is turned down with the diaphragm over the record, as in Fig. 2, being still elevated above playing position, as indicated in Fig. 6. To start playing then, the sound head or diaphragm plate 4, etc., having been slid over to position against the starting gage or abutment, the sound head may then be lowered by turning the knob 18, and bringing the needle into engagement with the beginning of the sound track. With this turning of the knob 18, simultaneously the brake shoe 29, Fig. 5, is released, and the motor having been wound up, playing ensues. If desired, the lid C may be closed down before, or after the beginning of the playing, and by manipulation of the handle 63, the volume of sound may be controlled by the shutter 56. The sound-outlet means or grille 54 etc. is inconspicuous and may be apparently a normal part of the wall surface. As already seen, the box B may be in horizontal or vertical position, as desired during the playing. On completion of the record, or whenever it is desired to stop, by manipulation of the knob 18 the reproducer mechanism is lifted away from the record, and the brake applied.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and claim as my invention:

1. In a mechanical sound reproducing device, a container, a sound head therewithin, a support

board on which said head is carried to travel over a sound record, an eccentric element at the back of said support board for raising the same and said head, a restraining catch for said eccentric raising and lowering element, and an operating handle externally of the container for controlling the raising and lowering.

2. In a mechanical sound reproducing device having means for turning a sound record, a container having a sound-emitting grill, volume control means including a shutter adjustable on the grill, a radio-type diaphragm facing said grill, a support for said diaphragm including a carriage and a guideway, a frame pivoted to said container and carrying said guideway and carriage, a diaphragm-operating lever pivoted on the diaphragm support and connected at one end to said diaphragm and having at its other end a needle-carrying arm, weight means for holding the diaphragm and needle-carrying arm in operating relation with the sound record, and means for changing the elevation of said diaphragm for playing and off positions, including a lifting element on said frame and an operating means therefor externally of the container.

3. In a mechanical sound reproducing device having means for turning a sound record, a container having a sound-emitting grill, volume control means including a shutter adjustable on the grill, a radio-type diaphragm facing said grill, a support for said diaphragm including a carriage, a guideway and anti-friction means between the carriage and guideway, a frame pivoted to said container and carrying said guideway and carriage, a diaphragm-operating lever pivoted on the diaphragm support and connected at one end to said diaphragm and having at its other end a needle-carrying arm, means for changing the elevation of said needle-carrying arm for playing and off positions, including a lifting element on said frame, and an operating means therefor externally of the container.

4. A mechanical sound reproducing device operable with a sound record disk in horizontal or vertical positions, comprising a container having a lid, a sound-emitting grill, a diaphragm within opposite said grill, said diaphragm being disposed in substantially parallel relation to the record disk when in playing position, a support for said diaphragm including mounting permitting movement over the sound record disk, a diaphragm-operating lever connected at one end to said diaphragm and having at its other end a needle-carrying arm, a turn table for carrying a sound record disk in relation with the needle-carrying arm, means for holding record disks on said turn table, and weight means for compensating needle pressure on the sound record in vertical and horizontal positions.

5. A mechanical sound reproducing device, comprising a hand-portable container having a lid; and means for operation with the lid closed, including a sound-emitting grill, a diaphragm within opposite said grill, said diaphragm being disposed in substantially parallel relation to the record disk when in playing position, a support for said diaphragm including mounting permitting movement over a sound record disk, a diaphragm-operating lever connected at one end to said diaphragm and having at its other end a needle-carrying arm, and control means for said diaphragm externally of the container.

6. A mechanical sound reproducing device, comprising a hand-portable container having a lid; and means for operation with the lid closed,

including a sound-emitting grill, a diaphragm within opposite said grill, a support for said diaphragm including mounting permitting movement over a sound record disk, said support being disposed in substantial parallel relation to the disk when in playing position, a diaphragm-operating lever connected at one end to said diaphragm and having at its other end a needle-carrying arm, a turn table for carrying a sound record disk in relation with the needle-carrying arm, a lifting element for raising or lowering the needle-carrying arm to off or playing position, and a control means therefor externally of the container.

7. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting grill in said container, a sound diaphragm substantially parallel to the turn table and facing said grill, a volume-control shutter slidable on said grill, a plate having an opening in which said diaphragm is mounted, an inertia weight about said diaphragm, an operating lever connected at one end to said diaphragm and having a needle-holding chuck at an angle to the fulcrum axis of the lever, a carriage mounting for said diaphragm plate to carry the diaphragm in relation to the record in vertical or horizontal positions thereof, a brake, a control means for changing the elevation of the diaphragm for playing and for off positions and for applying said brake, and a gauge in the path of the carriage for the return of the diaphragm to starting position on a record.

8. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting grill in said container, a sound diaphragm substantially parallel to the turn table and facing said grill, a volume-control shutter slidable on said grill, a plate having an opening in which said diaphragm is mounted, an operating lever connected at one end to said diaphragm and having a needle-holding chuck at an angle to the fulcrum axis of the lever, a carriage mounting for said diaphragm plate to carry the diaphragm in relation to the sound record in vertical and horizontal positions thereof, a brake, a control means for changing the elevation of the diaphragm for playing and for off positions and for applying said brake, and a gauge in the path of the diaphragm for the return of the diaphragm to starting position on a record.

9. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting grill in said container, a sound diaphragm substantially parallel to the turn table and facing said grill, a volume-control shutter slidable on said grill, a plate having an opening in which said diaphragm is mounted, an operating lever connected at one end to said diaphragm and having a needle-holding chuck at an angle to the fulcrum axis of the lever, a carriage mounting for said diaphragm plate to carry the diaphragm in relation to the sound record in vertical and horizontal positions thereof, a brake, and control means for changing the elevation of the diaphragm for playing and for off positions and for applying said brake.

10. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting grill in said container, a sound diaphragm substantially parallel to the turn table and facing said grill, a volume-control shutter slidable on said grill, a plate having an opening in which said diaphragm



is mounted, an operating lever connected at one end to said diaphragm and having a needle-holding chuck in relation to the record, an eccentrically mounted guide for directing the diaphragm over the record in vertical and in horizontal positions thereof, a brake, control means for turning said guide to change the elevation of the diaphragm relative to the record for playing and for off positions and for applying said brake, and a gauge in the path of the diaphragm for the return of the diaphragm to starting position on a record.

11. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting opening in said container, a sound diaphragm substantially parallel to the turn table and facing said opening, a volume-control shutter slidable on said opening, a plate having an opening in which said diaphragm is mounted, a lever for operating the diaphragm from a sound record, a guide for directing the diaphragm over the record in vertical and horizontal positions thereof, the ends of said guide being offset from the intermediate portion and journaled in bearings in the container walls, a control means on an extended end of said guide outside the container for turning the guide to change the elevation of the diaphragm relative to the sound record for playing and for off positions, and a brake also operated by and associated with said control means.

12. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting opening in said container, a sound diaphragm substantially parallel to the turn table and facing said opening, a volume-control shutter slidable on said opening, a plate having an opening in which said diaphragm is mounted, a lever for operating the diaphragm from a sound record, a guide for directing the diaphragm over the record in vertical and horizontal positions thereof, the ends of said guide being offset from the intermediate portion and journaled in bearings in the container walls, and a control means on an extended end of said guide outside the container for turning the guide to change the elevation of the diaphragm relative to the sound record for playing and for off positions.

13. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound-emitting opening in said container, a sound diaphragm substantially parallel to the turn table and facing said opening, a combined support and baffle plate having an opening in which said diaphragm is mounted, an inertia weight on said baffle plate about said diaphragm for checking undesirable vibration, a carriage with anti-friction mounting for carrying said diaphragm plate over a sound record in vertical and horizontal positions of the record, compensating weight means alongside the diaphragm on said plate for controlling the needle pressure in both positions, a guide rod for said carriage having offset ends journaled in bearings in the walls of the container, and control means on an extended end of said guide outside the container for turning the guide to change the elevation of the diaphragm relative to the sound record for playing and for off positions.

14. In sound reproducing apparatus having a container and a sound record operating motor and turn table within, a sound diaphragm in the

container substantially parallel to the turn table, a guideway for directing said diaphragm over a record and movably mounted to change elevation relative to the record on the table, and hand-control means operable externally of the container for raising and lowering said guideway and diaphragm relative to the sound record for off and playing positions.

15. In a portable sound reproducing apparatus having a carrying case and carrying handle and containing a sound record turn table and a sound reproducing head movable over a sound record, means for maintaining the sound reproducing head in operating relation with the sound record in vertical or horizontal position, and means including a control handle externally of the carrying case for lowering said head to the sound record, raising same from the sound record, and applying a brake, with the sound record in vertical or horizontal position.

16. In a portable sound reproducing apparatus having a carrying case and carrying handle and containing a sound record turn table and a sound reproducing head movable over a sound record, means for maintaining the sound reproducing head in operating relation with the sound record in vertical or horizontal position, and means including a control handle externally of the carrying case for lowering and raising said head to and from the sound record, with the sound record in vertical position.

17. In a portable sound reproducing device having a carrying case and carrying handle, a sound diaphragm, a baffle board on which said sound diaphragm is secured, means for supporting said diaphragm and baffle board in playing position in substantially parallel relation to a sound record, a diaphragm-operating lever and a record-engaging needle in association with said diaphragm, and compensating means alongside the diaphragm on the baffle board to maintain needle pressure on the record with the latter in either horizontal or vertical position.

18. In a portable sound reproducing device having a carrying case and carrying handle, a sound diaphragm, a baffle board on which said sound diaphragm is secured, a guide on which said baffle board and diaphragm travels over a sound record in substantially parallel relation thereto, a diaphragm-operating lever and a record-engaging needle in association with said diaphragm, and a weight alongside the diaphragm on the baffle board to maintain the diaphragm in relation with a sound record in either horizontal or vertical position.

19. In a portable sound reproducing device having a carrying case and lid and a carrying handle and containing a turn-table for sound records, a sound record actuated sound diaphragm directed toward the lid, said lid having a sound-outlet opening over the diaphragm, and means guarding the diaphragm including a shutter slidable on the opening.

20. In a portable sound reproducing device having a carrying case and lid and containing a turn-table for sound records, a sound record actuated sound diaphragm between the turn-table and lid, said lid having a sound outlet opening, a baffle board to which said diaphragm is secured, and means for guiding said baffle board and diaphragm over a sound record operating in vertical position.

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