

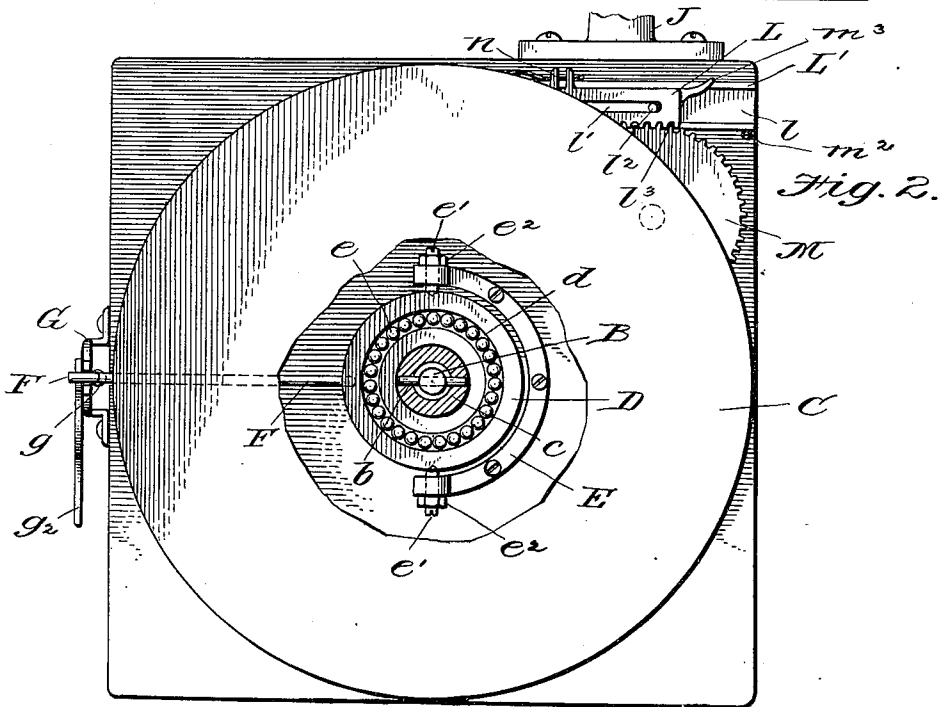
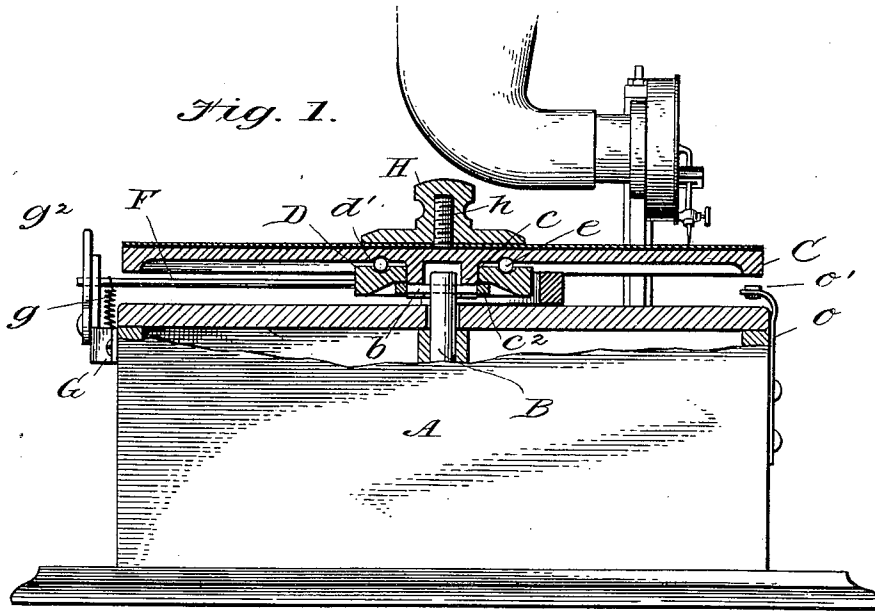
E. R. JOHNSON.

SOUND RECORDING AND REPRODUCING MACHINE.

(Application filed Mar. 4, 1899.)

(No Model.)

3 Sheets—Sheet 1.

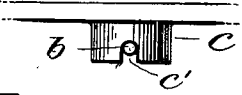


Witnesses.

Fig. 6.

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 by *Home Peltz,*  
 Attorney.

No. 650,843.

Patented June 5, 1900.

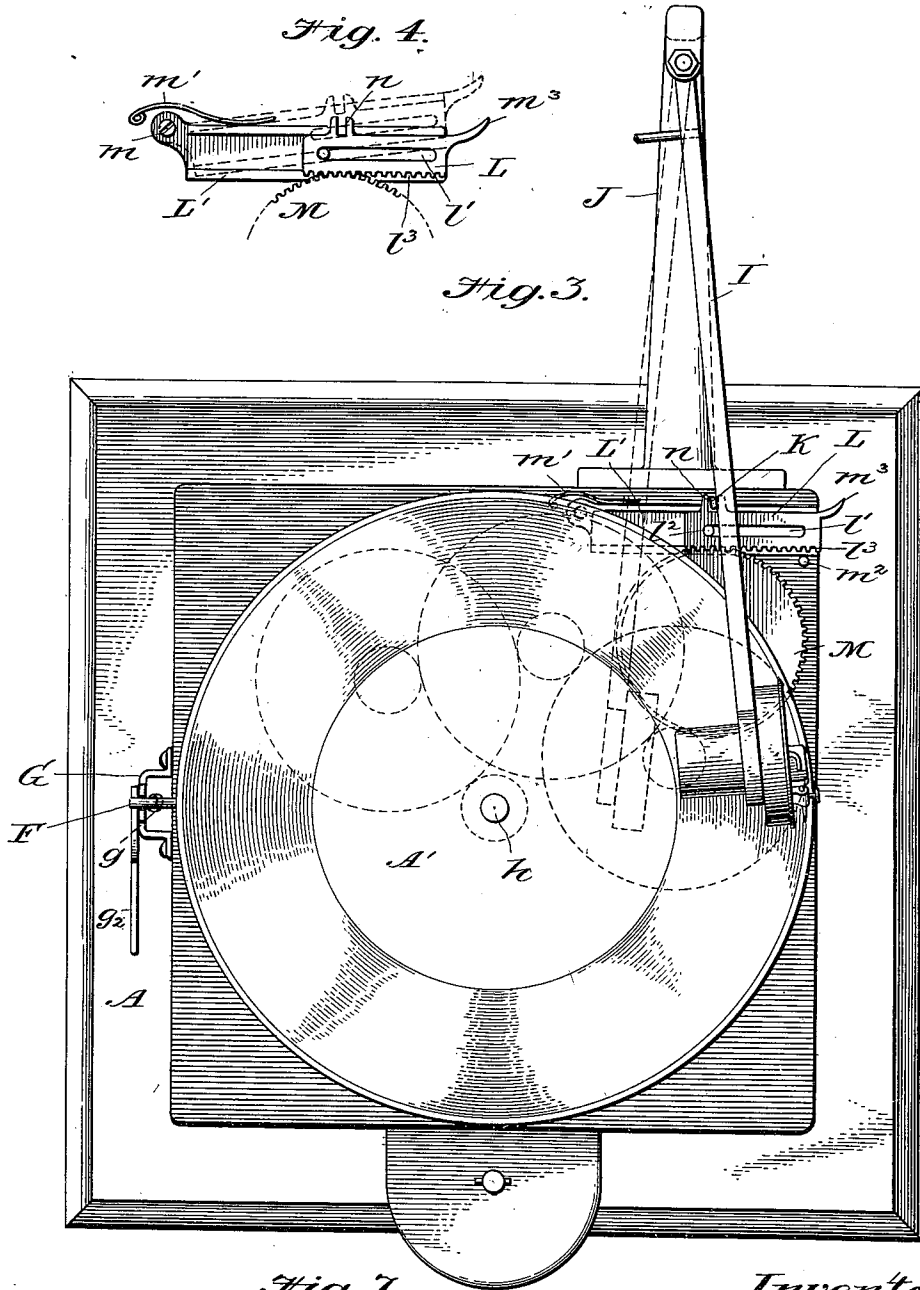
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 5.

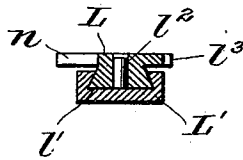


Fig. 8.

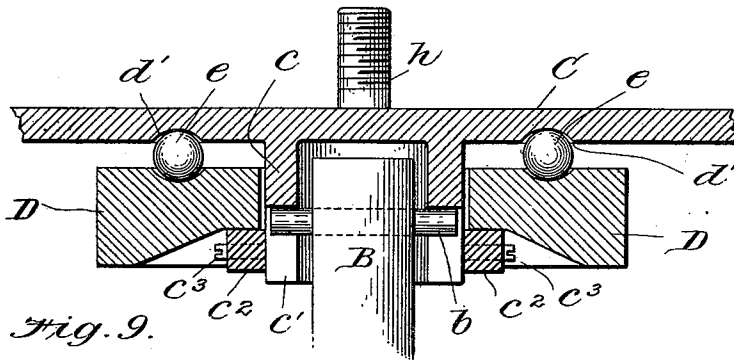


Fig. 9.

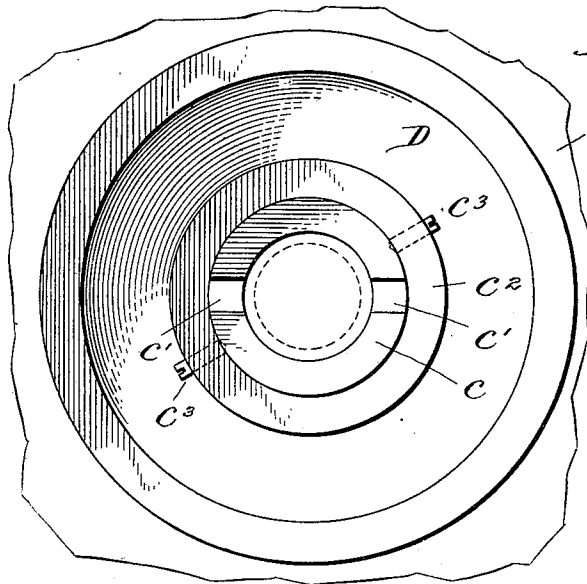
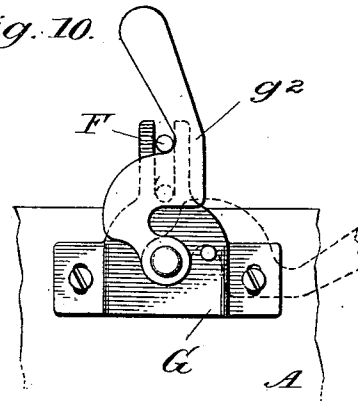


Fig. 10.



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# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA.

## SOUND RECORDING AND REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 650,843, dated June 5, 1900.

Application filed March 4, 1899. Serial No. 707,731. (No model.)

*To all whom it may concern:*

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention has relation to certain improvements in sound recording and reproducing machines, and particularly to the class known as "gramophones," although it might be adapted to any other machines of similar character which employ a flat record-disk.

The main object of this invention is to provide a simple and effective means for supporting the record-disk and its carrying-table in such a manner that it is capable of a yielding movement at its point of contact with the stylus of a vertically-rigid reproducer; also, to provide means for rendering the said record capable of a slight lateral movement and a very slight yielding movement in any direction, so as to accommodate any irregularities or unevenness that might occur in the record-disk.

A further object of this invention is to provide an improved means connected with the driving mechanism of the motor for positively feeding the pivoted arm carrying the reproducing mechanism in a lateral direction, so that the stylus-point of said reproducing mechanism will follow or accommodate itself to the spirally-arranged record-groove of the record-disk.

With these objects in view my invention consists in the construction, combination, and arrangement of parts, such as will be hereinafter fully described, and pointed out in the claims made hereto.

In the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation showing the record-carrying table in central section and having my improved construction applied thereto. Fig. 2 is a plan view of Fig. 1, showing the central portion of the turn-table broken away and the hub or boss on the under side of the turn-table illustrated in cross-section. Fig. 3 is a plan view illustrating the pivoted arm which carries

the reproducer and the mechanism for feeding the same laterally, the gearing connected with the driving-shaft of the motor being illustrated in dotted lines. Fig. 4 is a detail view of the rack and its supporting-plate which feeds or imparts lateral movement to the reproducer-supporting arm. Fig. 5 is a detail cross-sectional view through the slide and rack illustrated in Fig. 4. Fig. 6 is a detail view illustrating the boss on the under side of the turn-table, showing the slot adapted to engage the pin on the driving-shaft. Fig. 7 is an enlarged detail section through the groove or raceway for the balls of the turn-table. Fig. 8 is an enlarged detail section illustrating the disk supporting the ball-bearings of the turn-table and the means for adjusting same. Fig. 9 is a bottom plan view of the mechanism illustrated in Fig. 8. Fig. 10 is a side elevation of the cam mechanism used for tilting the record.

In the drawings I have illustrated an outer frame or casing A, adapted to inclose a spring-motor, such as is ordinarily used for propelling machines of this character, and in the center of which is the driven shaft or turn-table spindle B, which projects a short distance above the top of the casing A, as illustrated in Fig. 1 of the drawings.

C designates the turn-table, which is of the usual form and has provided on its under side a central boss or hub *c*, the inner bore of which is of a diameter somewhat larger than the upper end of the driving-spindle B, over which it is adapted to fit loosely, so as to have play in any direction. A pin *b*, passed transversely through the spindle B, projecting a short distance on each side thereof, is adapted to enter the seats formed by the slots *c'*, provided in the boss *c* of the turn-table, thus forming a support and coupling between the driving-spindle B and the said turn-table C. The slot *c'* above mentioned is formed slightly larger than the diameter of the pin *b*, so that the turn-table will rest loosely on said pin and have a slight play for the purpose hereinafter described.

D designates a disk provided with a central aperture which fits over the boss *c* of the turn-table and which is held on said boss by means of a ring or collar *c<sup>2</sup>*, which is fitted on the boss below the disk D. The under side

of the disk D is reamed out, as illustrated in Figs. 1, 8, and 9, so that the ring or collar  $c^2$  can fit within said reamed-out portion for economy of space. The upper surface of the disk D has formed therein an annular groove  $d$ , which forms a raceway for a series of balls  $e$ . The lower surface of the turn-table is also provided with an annular groove  $d'$ , drawn from a radius the same as the annular groove  $d$  and in which the upper surface of the balls bear. There is a slight space between the upper surface of the disk D and the turn-table, and the ball-bearing between these two surfaces can be adjusted by means of the collar  $c^2$ , which is adjustable on the boss  $c$  by means of suitable set-screws, as  $c^3$ . If the ball-bearings  $e$  should be either too loose or too tight, the set-screws  $c^3$ , which pass through the collar  $c^2$  and secure the same on the boss  $c$ , can be loosened up and the said collar adjusted either up or down on the boss, which raises or lowers the disk D, and thereby adjusts the bearings. The grooves  $d$  and  $d'$  are of a slightly-larger diameter than that of the balls  $e$ , thus allowing of a slight lateral movement by the turn-table and its record, so that the said record may accommodate itself to the irregularities which occur in the side walls of the grooves of the record when the stylus-point is in engagement with said grooves.

On the top of the casing A is secured, by means of screws or otherwise, a half-ring casting E, having threaded apertures in its ends which are on a diametrical line with the center of the turn-table spindle B. Into these apertures are inserted the pivot-screws  $e'$ , which are provided with pointed ends adapted to enter countersunk openings in the sides of the disk D and form pivots upon which the said disk rocks. Lock-nuts  $e^2$  are provided on the outer portions of the screws  $e'$  for locking the same after they are properly adjusted.

From the above description it will be readily understood that the turn-table C and its record A' are capable of a yielding or tilting movement at that point which is in contact with the stylus of the reproducer.

A radial rod F is secured at one end to the disk D, at right angles to the swinging axis of said disk, and extends out beyond the casing A, where it is supported and guided on a bracket G and has connected to it a coil-spring  $g$ , which tends to normally keep that end of it down and the opposite side of the record up or in constant contact with the stylus-point of the reproducer. A cam-lever  $g^2$  is provided for throwing the rod F upward and tilting the turn-table and record so as to remove the record from contact with the stylus. The construction and operation of this part of my device are substantially the same as that described and illustrated in my application for Letters Patent filed January 3, 1899, Serial No. 701,083, and is not to be claimed in this application except in combination with the record-support.

The upper surface of the turn-table has formed in its center a screw-threaded nipple  $h$ , adapted to receive the lock-nut H, by means of which the record-tablet is securely held upon the turn-table.

I designate the reproducer-supporting arm, (illustrated in plan in Fig. 3 of the drawings,) which is pivoted at its outer end to a bracket J. The construction of this arm and bracket is substantially the same as that illustrated in my application before mentioned, (Serial No. 701,083,) and the operation is substantially the same, with the exception that I have added means for positively feeding the said arm in a lateral direction, so that the stylus-point carried thereby may be held in and made to follow the spiral groove of the record as the said record revolves. In order to accomplish this, I provide a depending arm K, secured to the arm I (see Fig. 3 of the drawings) and extending downwardly so as to engage a slotted lug  $n$ , formed on the rack-bar L. This rack-bar L is mounted in a guide-plate L', carried by the casing A of the machine, which is located near one corner of the said casing, as illustrated. On the under side of the rack-bar is formed a dovetail, adapted to fit and slide in a dovetail groove  $l$ , formed in the guide-plate L', and through the center of the said rack-bar is a longitudinal slot  $l'$ , through which passes the pin  $l^2$  and by means of which the sliding movement of the rack is limited. On the projecting inner edge of the bar L are the teeth  $l^3$ , adapted to be engaged by the gear M, which is connected by suitable reducing-gearing (shown in dotted lines in Fig. 3) to the driving-shaft of the motor.

The guide-plate L' is pivoted at  $m$  to the casing A and is provided with a spring  $m'$ , which bears against its outer edge and keeps the rack-bar in engagement with the teeth of the gear M. A stop-pin  $m^2$  is provided near the inner outer end of the guide-plate to limit its movement in that direction. A projection  $m^3$  is formed on the outer end of the rack-bar L, by means of which it can be thrown out of engagement with the gear M, swinging on its pivot  $m'$ , the spring  $m^2$  serving to return it to normal position as soon as the same is released by the operator. On the rear edge of the rack-bar L is formed a slotted or bifurcated projection  $n$ , in which the depending arm K rests, as before described.

From the above description it will be evident that as the driving-shaft B operates motion will be transmitted through the medium of the connecting-gearing to the rack-bar L, the said connecting-gears being so arranged as to greatly reduce the speed of the rack, so that it will travel in the correct proportion to feed the arm I and its carrying mechanism so that the stylus-point will follow the grooves of the record as the said record is revolved. When the end of the record-groove has been reached, the rack-bar L will have traveled the distance of the length of the slot  $l'$ , the pin  $l^2$  serving as a stop and limiting the movement

of the said rack, which will stop the motor. The rack can then be disengaged from the gear M and the arm I returned back to its starting position.

5 On the casing A is a spring-arm *o*, having its upper free end bent so as to extend under the turn-table C, and in this free end is secured a teat *o'*, of leather or other suitable material, adapted to bear against the under  
10 side of the turn-table when the same is tilted away from contact with the stylus-point by the cam-lever *g*<sup>2</sup> and rod F, as heretofore described, thus serving as a brake for stopping the machine.

15 The construction of the boss *c* and the manner in which it is mounted on the spindle B admit of the turn-table being tilted slightly in any direction, the play in the bore of the boss *c* and also the play in the slot *c'* allowing  
20 it to be tilted or to yield slightly in any direction, as hereinbefore stated.

The sound-box and trumpet I have not considered necessary to describe or illustrate in detail, as they form no part of my invention  
25 and could be of any of the well-known constructions.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

30 1. In a sound recording and reproducing machine, the combination with the casing of a driving-spindle, a record-support loosely mounted thereon so as to revolve therewith, a disk pivotally mounted on the casing of the  
35 machine, means for securing the said disk to the record-support, and ball-bearings located between the said disk and the record-support, substantially as described.

40 2. In a sound recording and reproducing machine, the combination of a driving-spindle, a turn-table loosely mounted thereon so as to revolve therewith, a stationary pivoted bearing-block in which the turn-table is  
45 loosely mounted, ball-bearings between the upper face of the bearing-block and the bottom of the turn-table, and means for adjusting the said ball-bearings, substantially as described.

50 3. In a sound recording and reproducing machine, the combination of a driving-spindle, a turn-table adapted to support the record mounted to revolve with driving-spindle, a stationary bearing-block pivotally  
55 mounted to the casing of the machine and in which the turn-table is journaled, ball-bearings on the upper surface of the bearing-block and the bottom of the turn-table, and means for tilting the said bearing-block and holding it in its tilted position, substantially as described and for the purpose stated.

60 4. In a sound recording and reproducing machine, the combination with the driving-shaft, a turn-table having a depending boss adapted to fit over the end of the driving-shaft, the aperture of said boss being of larger diameter than the driving-shaft, slots located in the sides of the boss, a transverse pin se-

cured to said shaft adapted to rest in the said slots and partly support the turn-table, a bearing-plate pivotally mounted on the frame  
70 of the machine, a central opening in said bearing-plate into which the boss loosely fits, ball-bearings between the bearing-surface of the bearing-block and the turn-table and means for holding the said boss in the bearing-block,  
75 substantially as described.

5. The combination of the revolving turn-table spindle, a turn-table loosely mounted on said spindle and adapted to revolve there-  
80 with, a bearing-block secured to the frame of the machine on a pivotal axis having a central aperture adapted to receive the depending boss of the turn-table, annular grooves formed on the upper surface of the bearing-block and the lower surface of the turn-table  
85 forming a raceway, and a series of balls adapted to said raceway, substantially as described.

6. The combination of the revolving turn-table spindle, a turn-table provided with a boss having an opening of larger diameter than  
90 the spindle adapted to fit over the end of said spindle, a pin passing through the spindle and engaging slots in the turn-table boss, a bearing-block secured to the frame of the machine on a pivoted axis, a central aperture for said  
95 block into which the boss is loosely fitted, annular grooves formed on the upper surface of the block and the lower surface of the turn-table, said grooves being of a larger diameter than the balls, and a series of balls adapted  
100 to said grooves, substantially as described and for the purpose stated.

7. The combination of a revoluble turn-table spindle, of a turn-table having a boss,  
105 *c*, formed thereon adapted to loosely fit over the end of the spindle, slots, *c'*, formed in said boss, a transverse pin, *b*, carried by the revolving spindle adapted to fit loosely in the slots, *c'*, a bearing-block, D, mounted in pivotal bearings, *e'*, secured on the frame of the  
110 machine, grooves, *d*, provided in the bearing-surface of the block, D, and grooves, *d'*, provided on the bearing-surface of the turn-table, balls *e*, adapted to said grooves, and a collar, *c*<sup>2</sup>, adjustably secured on the boss, *c*, substantially  
115 as described.

8. In a sound recording and reproducing machine, the combination with a yieldingly-mounted record-disk, of a laterally-movable  
120 support carrying the reproducer, a movable rack supported on the frame of the machine, a connection between the said rack and the reproducer-support, and a system of gearing connecting the said rack with the driving mechanism of the motor, for laterally feeding  
125 the reproducer so that its stylus-point will positively follow the grooves of the record, substantially as described.

9. In a sound recording and reproducing machine, the combination of a yieldingly-  
130 mounted record-disk, a laterally-movable reproducer, a pivoted supporting-arm for said reproducer, a rack-bar adapted to slide in a guide-plate, a rigid connection between the

supporting-arm and the rack-bar, gearing connecting the rack-bar with the driving-shaft of the motor, and means for disengaging the said rack from its connecting gearing, substantially as described.

10. In a sound recording and reproducing machine, a yieldingly-mounted record-disk, a laterally -swinging reproducer, a pivoted supporting-arm for said reproducer, a rack-bar adapted to slide in a guide-plate, said guide-plate being pivoted at one end to the frame of the machine, a connection between the reproducer-support and the rack-bar, gearing connecting the said rack with the driving mechanism of the machine, and a spring for keeping the said rack in engagement with its intermeshing gear, substantially as described.

11. The combination of the yieldingly-mounted record, a laterally -movable reproducer, a pivoted supporting-arm for said reproducer, a rack-bar adapted to slide in the direction of the movable arm, a guide-plate pivoted at one end to the casing of the machine in which the rack-bar slides, means limiting the movement of the said rack, a

gear supported on the casing adapted to mesh with the rack-bar, and a system of reducing-gear connecting the above-mentioned gear with the driving mechanism of the motor, substantially as described.

12. The combination of a yieldingly-supported record-disk, a laterally-movable reproducer, a pivoted supporting-arm, for said reproducer, a plate, *L'*, pivoted at one end to the casing of the machine, a groove, *l*, provided in said plate adapted to receive a rack-bar, *L*, a slot, *l'*, located in said rack-bar, a pin, *l''*, carried by the plate, *L'*, adapted to said slot, a bifurcated projection, *n*, located on the smooth edge of the rack, a depending arm connected to the arm, *I*, engaging the bifurcation of the projection, *n*, and gearing connecting the rack, *L*, with the driving-shaft of the motor, substantially as described.

In witness whereof I have hereunto set my hand this 25th day of February, A. D. 1899.

ELDRIDGE R. JOHNSON.

Witnesses:

L. S. BOWERS,  
J. T. CROSS.