

No. 685,712.

Patented Oct. 29, 1901.

G. K. CHENEY.
SOUND REPRODUCING APPARATUS.

(Application filed Dec. 15, 1899.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2

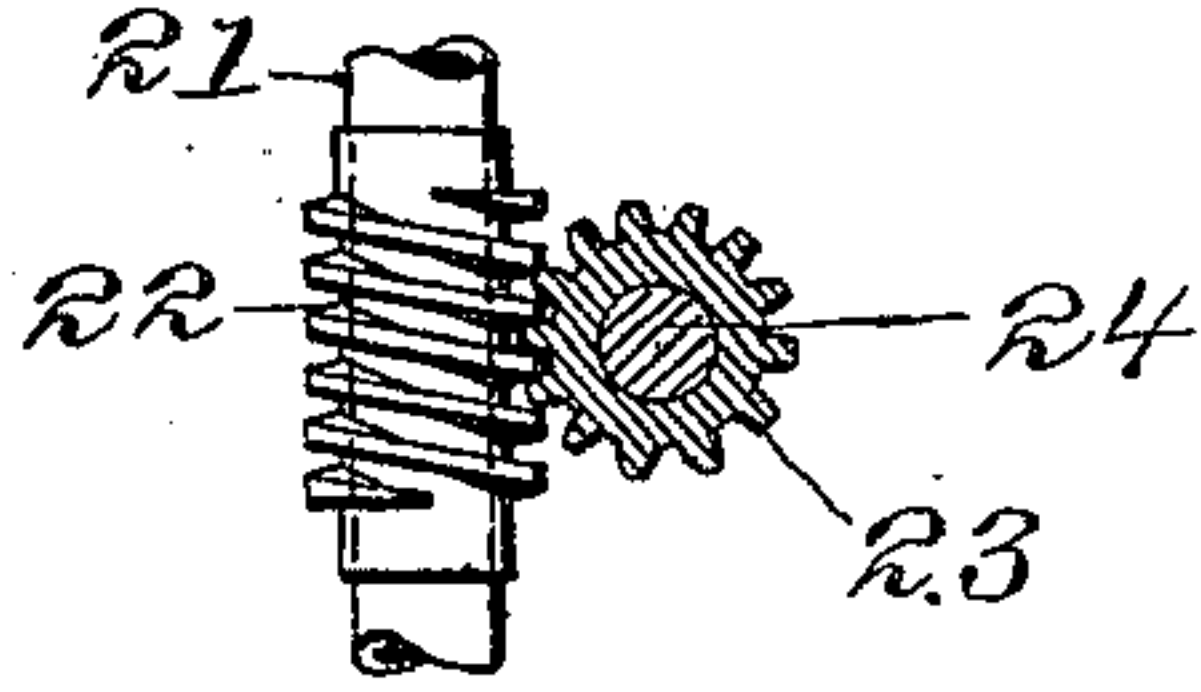


Fig. 3.

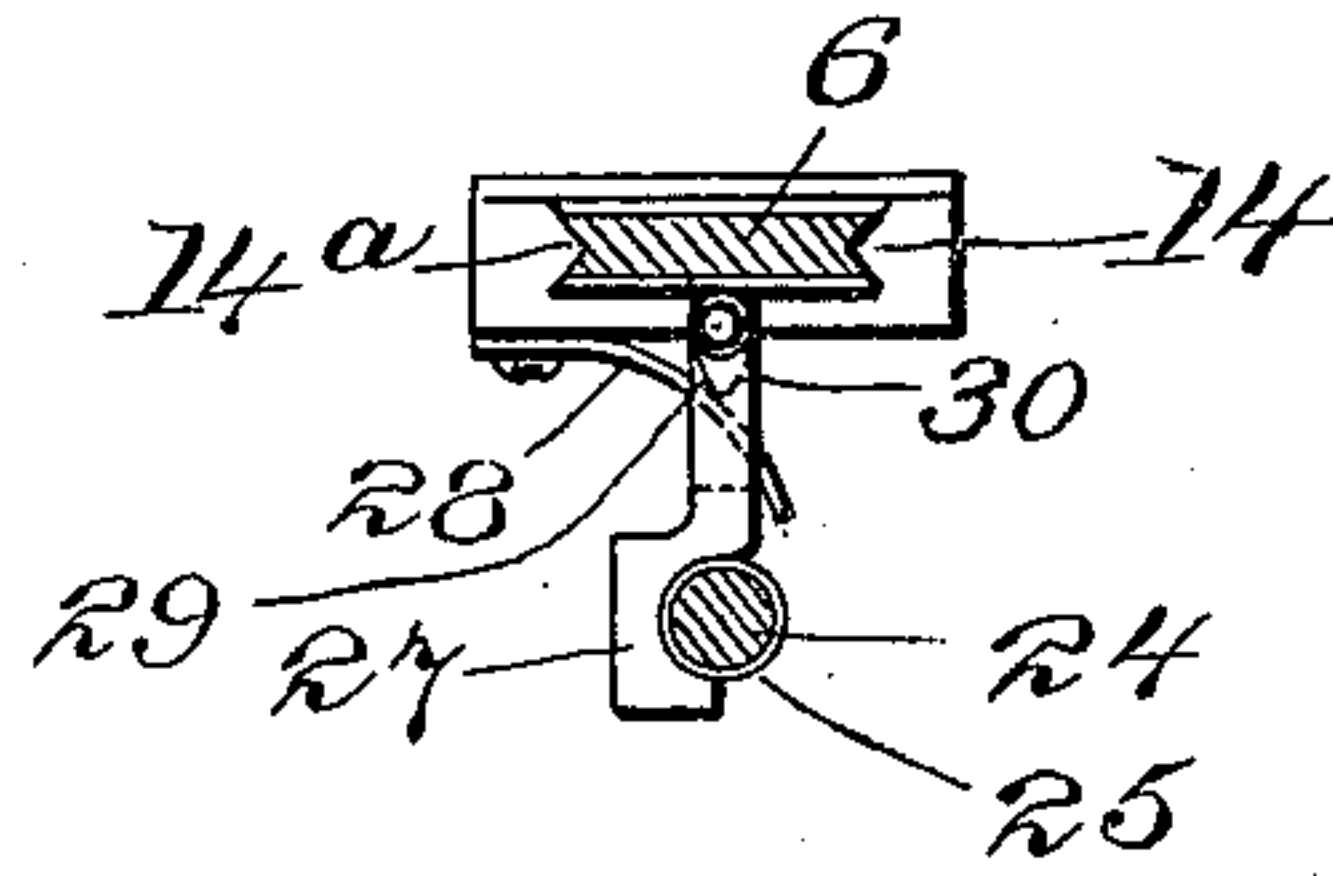
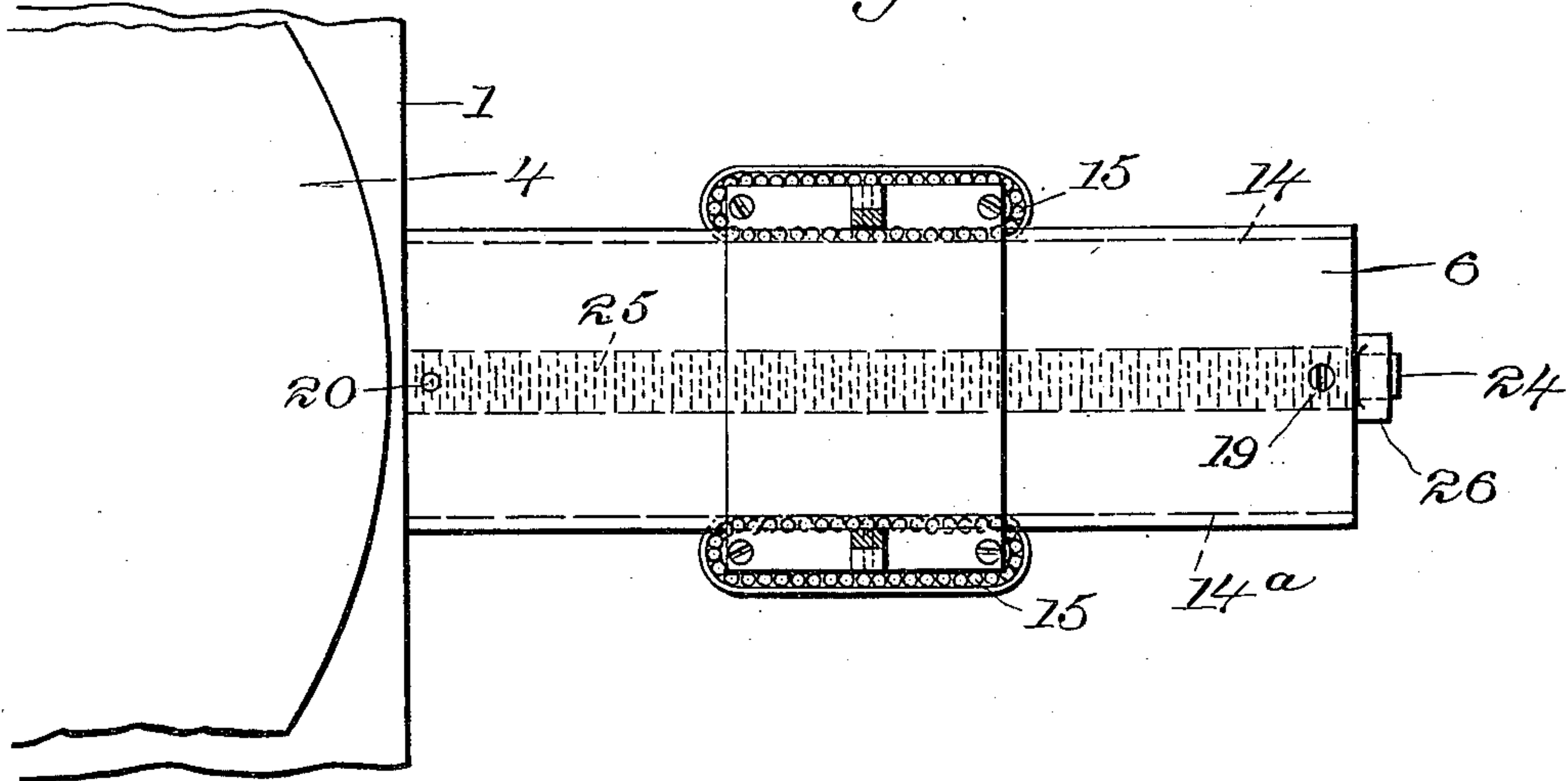


Fig. 4.



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SOUND-REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 685,712, dated October 29, 1901.

Original application filed February 23, 1899, Serial No. 706,448. Divided and this application filed December 15, 1899.
Serial No. 740,405. (No model.)

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of New York, county of New York,
5 State of New York, have invented certain new and useful Improvements in Sound-Reproducing Apparatus, of which the following is a specification.

My invention relates to talking-machines,
10 and comprises an improved reproducing apparatus designed to use a horn and to form a more compact and handy structure than has heretofore been usual where horns have been employed.

15 The present application is a division of my application Serial No. 706,448, filed February 23, 1899.

A special advantage of my invention resides in the fact that it may be manufactured
20 largely out of stock materials and applied to the ordinary gramophone as at present built for the market, the long projecting swinging arm-support, however, being done away with.

The preferred form of apparatus embodying my invention is disclosed in the accompanying two sheets of drawings, in which—

Figure 1 is a side elevation and partial section of a gramophone with my invention attached thereto. Fig. 2 is a detail showing the
30 manner in which the feed-screw is geared to the main shaft. Fig. 3 is a detail showing the manner in which the reproducer-carriage is geared to the feed-screw. Fig. 4 is a detail of a modification, showing ball-bearings provided for the reproducer-carriage. Fig. 5 is
35 a detail cross-sectional view taken on the line S⁵ S⁵ of Fig. 1.

Throughout the drawings like reference-figures refer to like parts.

40 The apparatus consists of the box 1, containing the ordinary gramophone driving-gear driven by clockwork located in the extension-casing 2. There is the usual rotating table 3, carrying the disk-shaped record 4,
45 which is held in place by a thumb-screw 5. A rectilinear guide-plate 6 has a right-angled lug 7, by which it can be screwed to the side of the motor-casing, as shown. On this guide-plate is mounted the sliding carriage 8, which
50 has uprights on which is journaled a swinging link 9. At the lower end of this swing-

ing link is pivoted a projection 10 from the horn 11. At the small end of the horn are an ordinary sound-box 12 and reproducer-stylus 13. The guide-plate 6 preferably has grooves 55 14 14^a in its edges, along which grooves the reproducer-carriage slides. Stops 19 and 20 for limiting the motion of the carriage are located at the extremities of the rectilinear guide 6, and one of these stops 19 is so located 60 that when the carriage strikes against it the projection 10 on the horn and the swinging link 9 will when extended be just long enough to permit the horn to swing up into an approximately vertical position before its side 65 strikes against the end of the guide-plate.

The worm 22 is formed on the rotating sleeve 21, which drives the turn-table, and this worm meshes with a worm-wheel 23 on a horizontally-extending shaft 24. The outer 70 portion of this shaft has a feed-screw 25 cut thereon, and its outer extremity is journaled in a bearing 26, extending down from the outer end of the guide-plate 6. A projection from the sliding carriage 8 meshes with this 75 screw, and consequently as the table and record rotate the carriage is positively fed to the right, (looking at Fig. 1.) The preferred form of gear with said feed-screw is illustrated in detail in Fig. 3, and consists of a 80 swinging half-nut 27, held in or out of engagement with the feed-screw by a yielding pressure device, such as the plate-spring 28, bearing on one of the beveled surfaces 29 and 30, formed on the swinging arm which sup- 85 ports the half-nut. When the half-nut is swung to the left, (looking at Fig. 3,) the plate-spring will bear on the right-hand beveled surface 30 and hold the nut out of engagement with the feed-screw, so that the car- 90 riage can be run back.

In the modification shown in Fig. 4 ball-bearings 15 run between the grooves 14 14^a in the edges of the plate and corresponding grooves on the overhanging portions of the 95 sliding carriage 8. The balls are guided around the exterior of said overhanging portions of the carriage 8 by the guides 16, so that there is a closed circuit or loop-shaped channel for the balls to run around in, as in any 100 ordinary ball-bearing, except that in this case the channel is in the form of a flattened loop

instead of being circular, as in the ordinary bicycle-bearing.

The method of operation of my invention is as follows: The reproducer being in the position shown in full lines in Fig. 1 and the table 3 being set rotating, carrying with it the disk-shaped sound-record, the hinged joint will allow the reproducer-stylus to run lightly in the groove of the sound-record. The reproducer, however, not being mounted on a universal joint, is incapable of motion sidewise and will not be moved by the rotation of the table except as it moves slightly up and down to accommodate any irregularities produced by warping of the disk-shaped record. This feature of my invention, however, is not herein claimed, as the same is described and claimed in my pending application, Serial No. 706,448, above referred to. As the mechanism rotates it also rotates the feed-screw 25, which meshes with the half-nut 27 and positively feeds the reproducer along a line radial to the disk-shaped record. The flexible mounting for the reproducer formed by the swinging link 9 coöperates with this positive feed motion to compensate for any slight irregularities between the motion given to the carriage by the feed mechanism at any one instant and the rate of motion transmitted to the reproducer by the record-groove at the same instant. As the ratio of the number of threads to the inch on the feed-screw to its number of revolutions per minute will be of course made equal to the ratio existing between the number of grooves to the inch on the sound-record and the number of revolutions per minute of such sound-record, there will be no substantial difference between the distance traveled by the reproducer-needle and the sliding carriage during the reproduction of an entire record; but temporary inequalities may arise on account of imperfections in the feed mechanism or in the record, and the special object of the flexible mounting above described is to allow for this and to prevent the record being ruined or the mechanism jammed, so that the clockwork might not have sufficient power to drive it further. Moreover, when a new needle is to be put in the sound-box or a new record is to be put in place on the revolving table the swinging link connection allows the horn and sound-box to be tipped up into the position shown in dotted lines in Fig. 1, thus leaving the other parts of the instrument exposed for the removal and replacement of the record and placing the sound-box in a convenient position for the insertion of a new needle. When the reproduction of the record is completed, the hinged half-nut 27 is pulled out of engagement with the feed-screw 25 and held out of engagement by the plate-spring 28 while the carriage is slid back to the initial position. The advantages of my invention are evident in its compact form and reduction of the

number of parts. Moreover, the horn and stylus and sound-box are little liable to injury when being lifted off the record, because they are supported in the position shown in dotted lines, whereas with the present form of machine the reproducer is liable to be dropped on the record or on the table at the side of the machine while it is being swung to one side. Moreover, my arrangement permits of more nearly balancing the reproducer on its hinge, so that the stylus will not be forced down into the bottom of the groove with the whole weight of the apparatus, thus producing a scratching sound, resulting from the dragging of the stylus along the bottom of the groove.

The essential parts of my invention can be sold as an attachment for the present style of gramophone, the guide-plate 6 being simply fastened to the motor-casing of the present gramophone by means of the lug 7 and the worm 22 being slipped over the rotating sleeve 21.

Another advantage is that my construction permits the horn to extend straight out from the sound-box and at right angles to the diaphragm, whereas other constructions have compelled the sound to be carried around the corner created by the right-angled bend in the horn. The positive feeding mechanism prevents the carriage sticking and the needle cutting across the record, thereby ruining the same.

A further advantage of the modification shown in Fig. 4 lies in the reduction of friction to the lowest point. This is important, inasmuch as the addition of a positive feed mechanism throws additional work upon the motor, and unless care is taken to reduce friction at every point to the lowest degree possible a more powerful driving-spring is required, and this adds to the cost of the machine and also to the difficulty of winding it up.

It is evident, of course, that various changes could be made in the details of construction of the apparatus. The guide-plate might be otherwise attached to the machine. Other forms of sliding carriage might be employed. Other means of hinging the reproducer to the carriage might be substituted. A different arrangement of feed-screw might be employed, which should be geared to the driving mechanism by other forms of mechanism. Other means might be substituted for conveying the motion from the feed-screw to the reproducer-carriage. All these modifications, however, I should still consider within the spirit and scope of my invention.

Having, therefore, described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. The combination of the rotating sound-record, the reproducer, the sliding carriage, the hanging link journaled on the carriage and hinged at its lower extremity to the re-

producer together with the rectilinear guide for the sliding carriage at right angles to the axis of the hinge.

2. The combination of the rotating sound-
5 record, the reproducer, the sliding carriage, the hanging link journaled on the carriage and hinged at its lower extremity to the reproducer together with the rectilinear guide for the sliding carriage at right angles to the
10 axis of the hinge, and the positive feed mechanism for said carriage.

3. A flexible mounting for a reproducer for a talking-machine comprising the combination of a guide, a carriage sliding thereon and
15 nearly to the end thereof, a swinging link hinged to said carriage at right angles to the line of motion thereof, a reproducer hinged to the lower ends of said swinging link, the length of the link and connections being such
20 that when the reproducer is at the end of the guide, the reproducer may be swung down over the end thereof into an approximately vertical position by swinging the link up into an approximately horizontal position.

25 4. The combination of the rotating sound-

record, the reproducer, the sliding carriage to which the reproducer is hinged, the rectilinear guide for said carriage extending horizontally and at right angles to the axis of the hinge, the feed-screw for said carriage, the worm-gear-
30 ing by which said feed-screw is driven from the record-rotating mechanism, the hinged half-nut carried by the carriage and meshing with the feed-screw, and a spring and cam which hold the half-nut in or out of engage-
35 ment with said feed-screw.

5. The combination of the rotating sound-record, the sliding carriage, the reproducer movable in a horizontal plane above the rec-
40 ord and finding support adjacent to its extremities through its stylus engaging the record and a connection between its trumpet and the sliding carriage and a guide for the carriage.

Signed by me at New York this 13th day of
December, 1899.

GEORGE K. CHENEY.

Witnesses:

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W. H. PUMPHREY.