

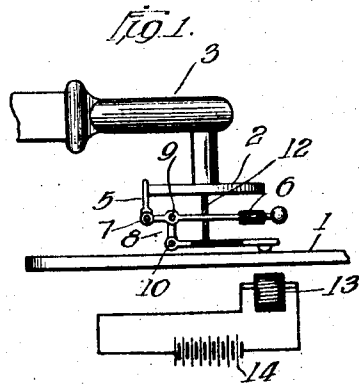
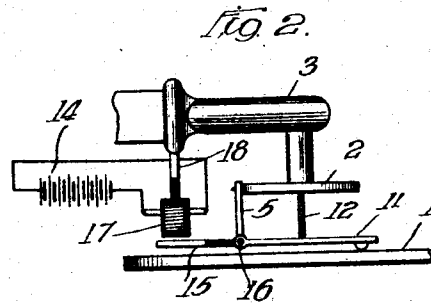
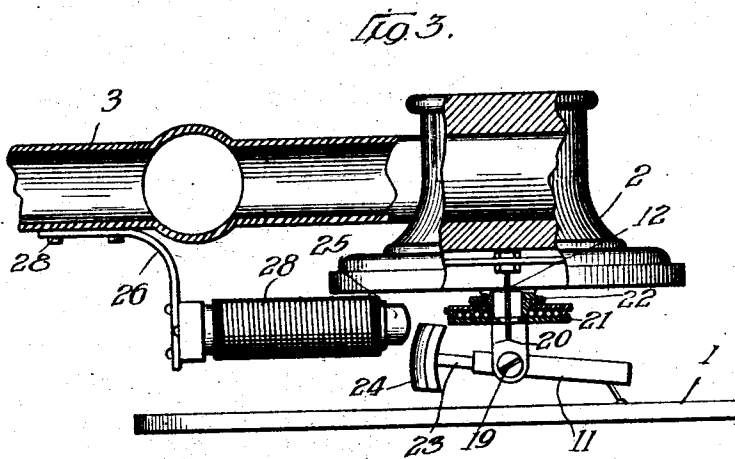
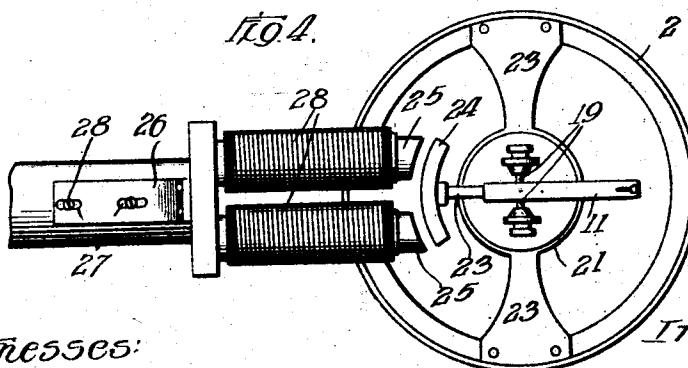
Jan. 5, 1926.

1,568,612

R. W. MORRISON
STYLUS OPERATING MEANS

Filed Nov. 1, 1920

4 Sheets-Sheet 1



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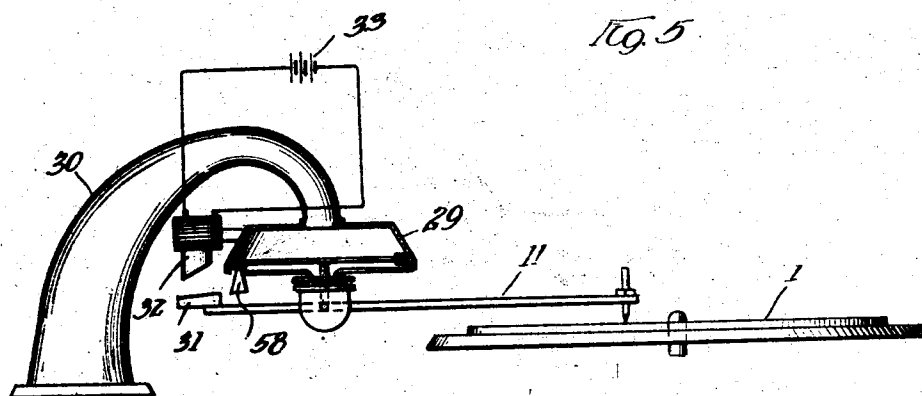
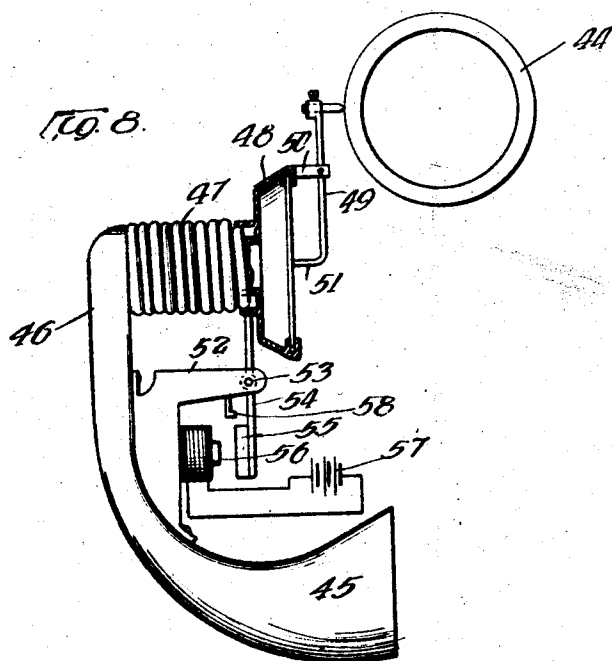
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STYLUS OPERATING MEANS

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4 Sheets-Sheet 2



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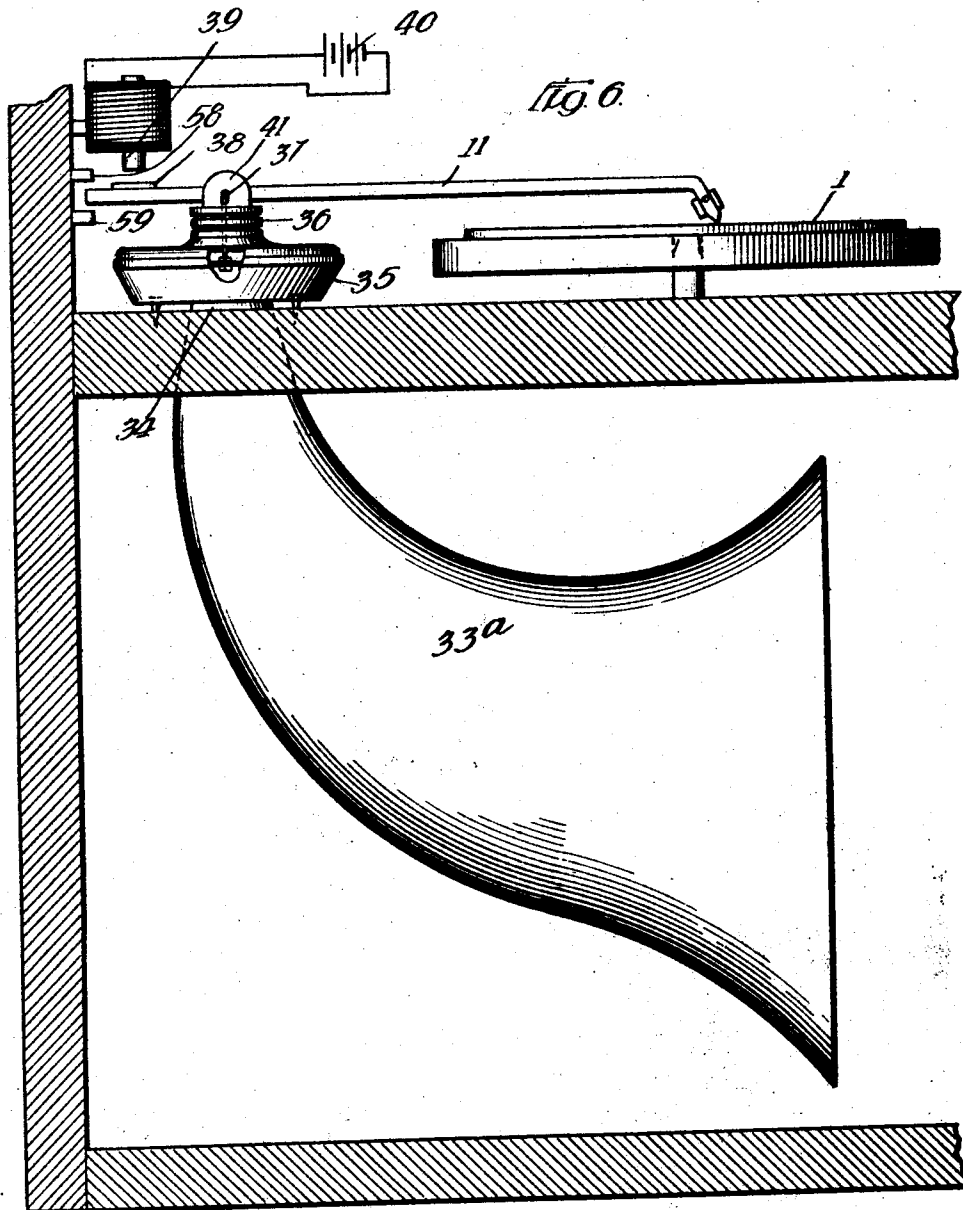
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R. W. MORRISON
STYLUS OPERATING MEANS

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4 Sheets-Sheet 3



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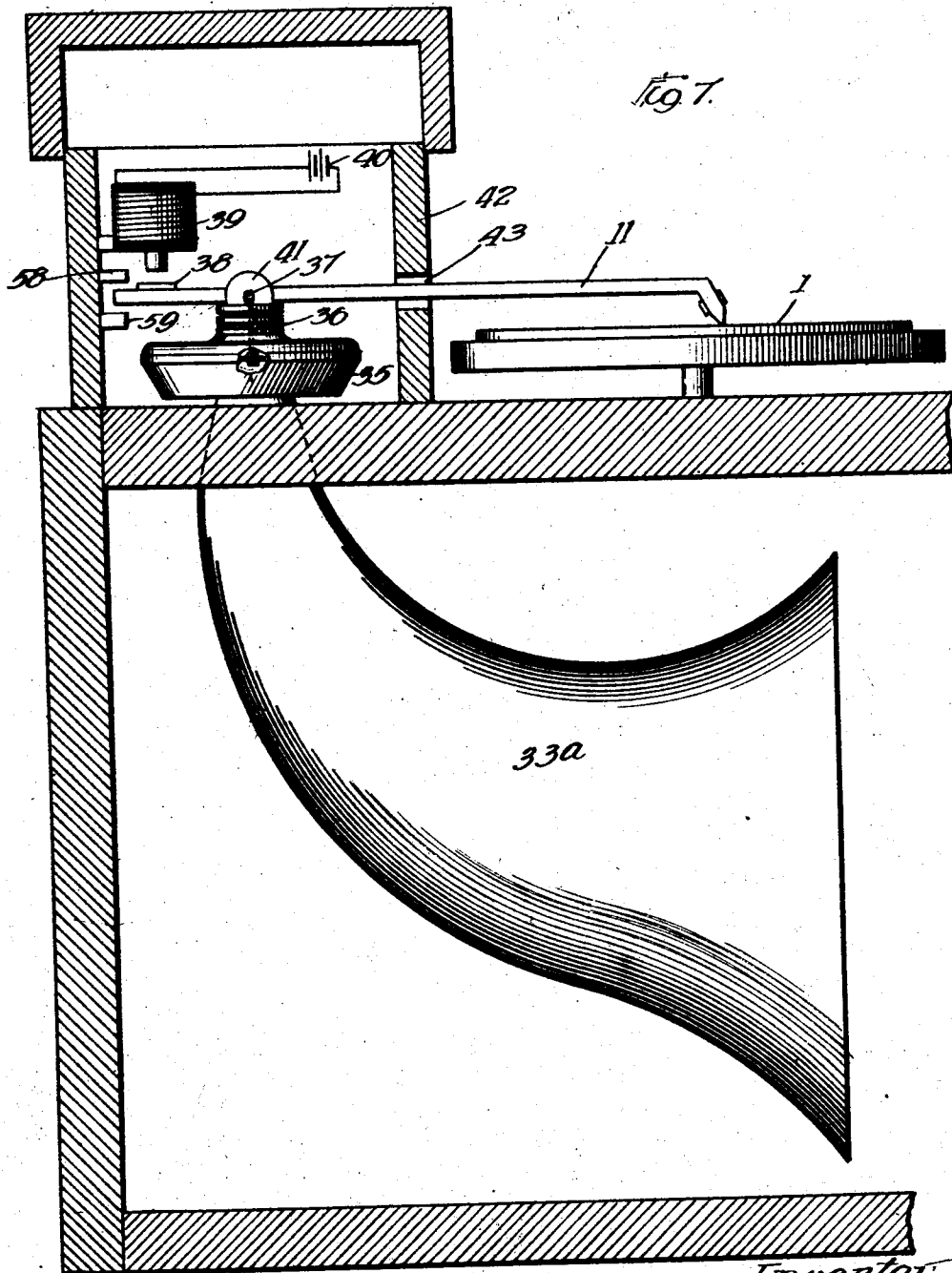
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1,568,612

R. W. MORRISON
STYLUS OPERATING MEANS

Filed Nov. 1, 1920

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

RALPH W. MORRISON, OF OMAHA, NEBRASKA.

STYLUS-OPERATING MEANS.

Application filed November 1, 1920. Serial No. 421,061.

To all whom it may concern:

Be it known that I, RALPH W. MORRISON, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Stylus-Operating Means, of which the following is a description.

This invention relates to an improved method of engaging the stylus of a phonograph with its cooperating record whereby a more perfect and reliable engagement of the stylus with every variation in the record is secured, even if the latter be not maintained in a perfectly level position, and without regard as to the manner in which the record may be produced. It also relates to an apparatus for carrying said method into effect.

One way in which my improved method may be carried into effect is illustrated in United States Letters Patent heretofore issued to me dated June 22, 1920, numbered 1,344,186.

The object of my invention is to provide a method to reliably and more perfectly engage a stylus with its cooperating record, than has heretofore been possible, and also to produce a device that will accomplish such result at a moderate cost, and which shall be durable in its operation.

To this end my invention consists in the novel method and apparatus herein described and set forth, and more particularly illustrated in the drawings herewith presented, wherein like reference characters indicate like or corresponding parts.

In the drawings,—

Fig. 1 is a side elevation of certain operating parts for phonographs illustrating one means of employing my improved method;

Fig. 2 is a similar view showing a modification;

Fig. 3 is a similar view partly in section, illustrating another modification;

Fig. 4 is a bottom plan view of the device shown in Fig. 3;

Fig. 5 is a side elevation partly in section, illustrating another modification;

Fig. 6 is a side elevation illustrating a form similar to that shown in Fig. 5, with the diaphragm directly upon the amplifying horn, eliminating the usual tone arm;

Fig. 7 is a similar view to that shown in Fig. 6, illustrating a modification of the form there shown; and

Fig. 8 is a side elevation partly in section, illustrating another manner of mounting the stylus-bar, and shown in connection with a cylindrical record.

In the drawings, 1, in Figs. 1 to 7 inclusive, indicates a substantially horizontally supported record. The record may be rotated in any usual or preferred manner (not shown). In the form shown in Fig. 1 a sound-box 2 of well known construction is supported upon the tone-arm 3. 5, in the form there illustrated, is a part supported upon the margin of the sound-box provided with a counterbalancing bar 6 pivotally connected to the part 5, as at 7. A vertical bar or link 8 is pivotally connected to the counterbalance bar 6, as at 9, and at its lower end, as at 10, pivotally supports the stylus-bar 11, which is provided with the usual or preferred cooperating needle adapted to the particular type of record employed. The stylus-bar is connected with the diaphragm by means of a preferably flexible and suitably tensioned member 12 which extends through the counterbalance 6 without touching it. In the form here shown, an electromagnet 13 is positioned beneath the record in substantial vertical alignment with the end of the stylus-bar 11 which acts as an armature in connection therewith, 14 indicating a source of electricity which may consist of a dry battery suitably positioned in the cabinet. As here shown the effect of the magnet is to cooperatively draw the needle carried by the stylus-bar armature into reliable engagement with the grooves of the record. It will also be seen that the stylus-bar 11 acts as a lever with the power applied at the needle end, the fulcrum at the engagement 10, and the weight on the connecting member 12, and the pull of the magnet may be very delicately regulated by adjusting the counterbalance bar 6.

In the form shown in Fig. 2, the stylus-bar 11 is shown pivotally connected between its ends upon the link 5 which as before is supported upon the margin of the sound-box. The end of the stylus-bar, as at 15, is extended beyond the pivotal support 16 and constitutes or carries the armature for the magnet 17 positioned above the armature. 14 indicates the electrical source as before. The magnet here is shown supported by a link or bar 18 depending from the tone-arm 3. As here shown the stylus-bar again constitutes a lever in which the power is applied at 15, the fulcrum at the point 16, and the resistance or weight at the needle end of the bar.

As shown in Figs. 3 and 4, the stylus-bar 11 is pivotally supported between its ends, as at 19 (in Fig. 3), upon a bar 20 carried by a member 21 which is rotatably engaged with a plate 22 carried by the arms 23 (Fig. 4). connected to the casing of the sound-box. Suitable anti-friction devices are interposed between the plates 21 and 22 in any preferred manner, or an equivalent construction may be employed which will permit the depending link 20 to freely rotate as the needle end of the stylus-bar changes its position upon the record. 12 here indicates the connecting member between the diaphragm and the stylus-bar, the said member extending through the supporting members 21 and 22, without touching them as shown. The rear end of the stylus-bar is extended, as at 23, in a manner somewhat similar to that shown in Fig. 2, and is provided with an armature 24 which in the form shown is illustrated as the segment of a circle. The magnet 25 has its cooperating ends formed to lie in a substantially parallel position to the outer plane of the armature 24. The magnet is supported, as illustrated, by a link or bar 26 which is suitably secured upon the tone-arm 3. In the preferred form the relative distance between the magnet and its armature may be increased or decreased in any preferred manner. As shown in Figs. 3 and 4, slotted openings 27 are formed in the support 26, screws or equivalent members 28 being positioned in said slots whereby the magnet may be adjusted back and forth in relation to its armature. In addition to the armature being formed in the segment of a circle, as shown in Fig. 4, it may also be formed in the same manner and with a transverse curvature upon its outer face, as indicated in Fig. 3, tending to equalize the magnetic pull upon the armature in every position of the needle end of the stylus-bar. As here shown, again the stylus-bar constitutes a lever in which the power is applied at the armature 24, the fulcrum at the point 19, and the weight or resistance at the needle end upon the record. The source of electricity is not shown in Figs. 3 or 4, but

electrical connections in various devices are well understood and require no further description.

As illustrated in Fig. 5, the same general form is shown as in Fig. 2, with the supporting means for the stylus-bar similar to that shown in Figs. 3 and 4. As here shown, the sound-box 29 is rigidly supported upon the tone-arm 30, the stylus-bar 11 being supported between its ends with the rear end extended and provided with an armature 31 cooperating with a magnet 32 and 33 indicates the source of electrical energy. The stylus-bar is permitted free movement upon its support, substantially as before described, the armature being of a length to permit the necessary movement of the needle end of the stylus-bar.

In Figs. 6 and 7, a construction is shown in which a radical improvement is embodied, not found in the previous figures.

Referring to Fig. 6, 33^a indicates the amplifier-horn encased within the cabinet and connected with the sound-box by a reduced portion 34, eliminating the tone-arm. 35 is the sound-box supported in a horizontal position with the working face of the diaphragm upward. The anti-friction support 36, substantially as shown in Figs. 3 and 4, is supported upon the upper marginal edge of the sound-box, substantially as shown in Fig. 4. 11 is the stylus-bar pivotally supported at 37. The rear end of the stylus-bar is extended and provided with an armature 38 coacting with a magnet 39 energized by a current from the source 40.

It will be noted that this arrangement is somewhat of a reversal of the forms shown in the other figures, in that the tone-arm is eliminated and the stylus-bar is supported upon the bar 41, above the sound-box 35. This arrangement produces a new and improved function in devices of this kind. In the previous figures the weight of the stylus-bar is continuously supported by the diaphragm. Operative engagement of the stylus-bar and the diaphragm is essential when the device is in operation, in order to transmit the complete and perfect vibrations transmitted by the record and generally no provision is made to relieve it. In some instances, at least, such continuous weight has a tendency to affect the resiliency of the diaphragm and its delicate and accurate operation.

In the form shown in Figs. 6 and 7, this is remedied in the following manner: There may be a slight play or movement allowed to the associated parts in the anti-friction support 36 or the pivotal connection at 37. In the preferred construction the part 41 is slightly slotted to receive the pivot 37, the upper wall of the slot being positioned to limit the upward movement of the pivot to secure the most perfect result, and relieve

the diaphragm from any undue strain by the pull of the magnet. The weight of the stylus-bar is sufficient to normally hold it down to its lower limit, thereby relieving the diaphragm from strain by reason of its engagement therewith, by the connecting member shown in dotted lines in Fig. 6. Upon energizing the magnet by throwing on a switch, not shown, in the ordinary manner, the armature 38 is drawn upward or toward the magnet, the opposite or needle end of the stylus-bar being supported on the record. This puts the necessary strain upon the connecting member and the diaphragm, continuing only during the operation of the device, and which is automatically released when the switch is reversed and the stylus-bar is permitted to drop back to its normal position.

As shown in Fig. 7, the function and operation last described are retained. A capped collar or enclosing member 42 enclosing the sound-box, magnet, armature, etc., and being formed with a horizontal slot 43, through which the stylus-bar 11 loosely extends, said slot being of a sufficient length to allow for the necessary movement of the needle end of the stylus-bar.

Fig. 8 illustrates another form of the device adapted to carry my method into effect. As here shown, a cylindrical record 44 is employed, being supported and rotated in a well known manner, not shown. 45 is the amplifier suitably supported in the case and provided with a tone-arm 46. Upon the upper end of the tone-arm and suitably supported thereon is a flexible and slightly extensible member 47 supporting the sound-box 48. The sound-box is provided with a stylus-lever 49 supported upon the diaphragm and a bar 50 carried upon the outer margin of the sound-box. The connection of the stylus-bar 49 with the bar 50 as shown, is not pivotal. The inner end 51 of the stylus-bar is connected to the center of the diaphragm in the well known manner. Upon a supported arm 52, is pivotally supported at 53, a lever 54, having the outer end extended and operatively engaged to control the pressure of the sound-box and its connected stylus upon the record, while the other end is extended beyond the pivot and is provided with an armature 55 cooperating with a magnet 56 energized by a source 57. As the magnet is energized the armature 55 is drawn toward it, serving as a source of power, the fulcrum being at 53 and the weight of resistance at the upper end of lever 54. The pressure is transmitted by reason of the flexible and extensible part 47 to the sound-box, and thence through the stylus-lever to the needle in engagement with the record.

In the form shown in Fig. 5, a stop 58 is used to limit the upward movement of the

armature and prevent it contacting with the magnet, which would cause it to lock and become inoperative for the time being.

In the form shown in Fig. 6 such stop is indicated at 58; a lower stop 59 being provided, if desired, to limit the downward movement of the end of the stylus-bar, although in the form shown I have not found it necessary to employ such a stop.

In the form shown in Fig. 7 a similar stop 58 is employed, as well as a similar stop 59, while in Fig. 8 a stop is indicated at 58.

It will be understood that by the term "magnet" I wish to include a magnet, whether permanent or energized by an electric current, although the latter is preferable, owing to the convenience by which it can be manipulated by a switch, as well as by suitable means for regulating the strength of the current. The strength of the current may also be regulated by providing means to adjust the relative distance between the magnet and its armature, as indicated in Figs. 3 and 4.

Having thus described my invention and various ways in which it may be operatively employed, it is obvious that other ways of employing it will occur to those skilled in the art; hence I do not wish to be understood as limiting myself in any way other than is indicated in the claims appended hereto.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a phonograph having a sound box supported in a horizontal position, provided with a diaphragm arranged working face upward, rotatable record-carrying means, and a magnet, of a stylus-bar supported above said diaphragm to freely oscillate both vertically and horizontally, one end of the stylus bar provided with record needle carrying means and the other end provided with an armature below said magnet, and a connecting member between said diaphragm and stylus-bar.

2. The combination with a phonograph having a sound box supported in a horizontal position, provided with a diaphragm arranged working face upward, rotatable record-carrying means, and a magnet, of a stylus bar support above said diaphragm to permit said bar to freely oscillate both vertically and horizontally and permitting a slight vertical movement bodily of the stylus bar thereon, one end of the stylus bar provided with record needle carrying means and the other end provided with an armature below said magnet, and a connecting member between said diaphragm and stylus-bar.

3. The combination with a phonograph having a sound box supported in a horizontal position, provided with a diaphragm arranged working face upward, rotatable record-carrying means, and a magnet, of a

stylus bar support above said diaphragm, a stylus bar arranged on said support to freely oscillate both horizontally and vertically, means to permit a slight vertical
5 movement bodily of the stylus bar on the support and to positively stop the same at the point of its working connection with the diaphragm, one end of the bar provided with record needle carrying means and the other end provided with an armature below said 10 magnet, and a connecting member between said diaphragm and stylus bar.

In testimony whereof, I have hereunto signed my name.

RALPH W. MORRISON.