

A. J. SWING.  
TALKING MACHINE.  
APPLICATION FILED JULY 28, 1916.

1,304,404.

Patented May 20, 1919.

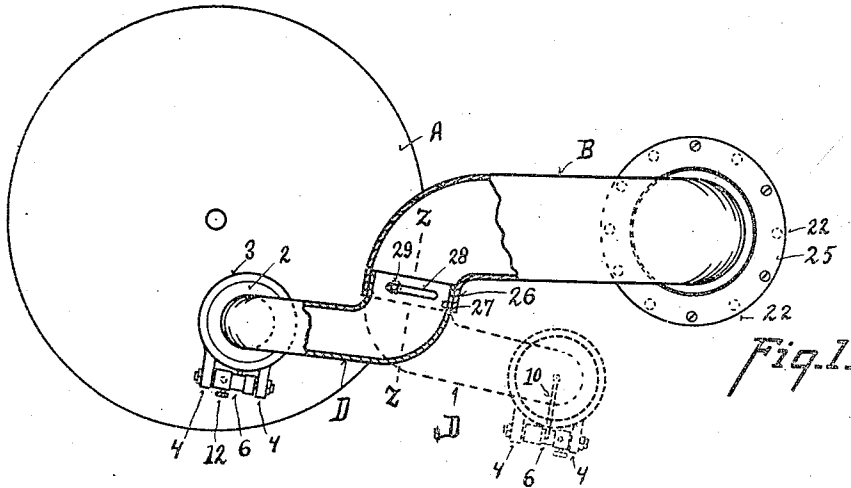


Fig. 2.

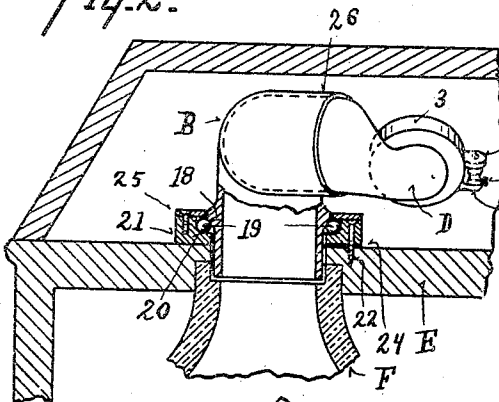
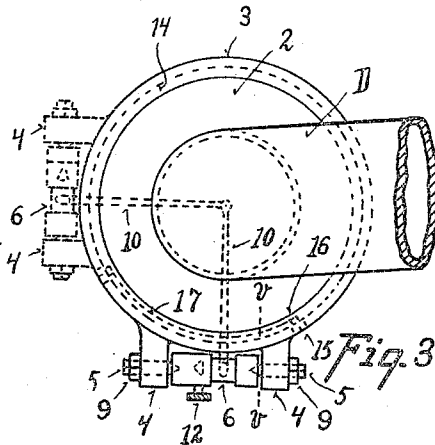


Fig. 3.

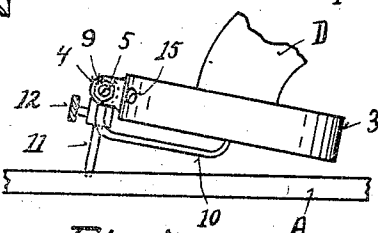


Fig. 4.

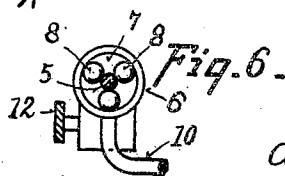


Fig. 5.

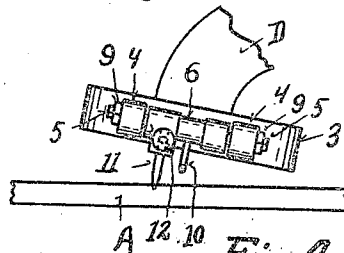


Fig. 6.

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## TALKING-MACHINE.

1,304,404

Specification of Letters Patent.

Patented May 20, 1919.

Application filed July 28, 1916. Serial No. 111,932.

*To all whom it may concern:*

Be it known that I, ALFRED J. SWING, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking machines. One of its objects is to provide improved tone arm and reproducing apparatus to adjust the reproducing apparatus into and out of operative relation with the record. Another object is to attain in an adjustable mechanism a more direct and nearly straight path for the sound vibrations from the reproducing mechanism to the megaphone. Another object is to provide for the protection of the reproducing mechanism in its inoperative position, and to enable a shallow lid or cover to be employed.

Another object is to attain improved angular positions of the stylus with reference to the record for either lateral or hill and dale types of record and for adjustments to both positions. Another object is to provide an improved pivotal mounting and adjustment for the tone arm to facilitate the travel of the reproducer across the face of the record. My invention also comprises certain details of form, combination and arrangement, all of which will be fully set forth in the description of the accompanying drawings in which:

Figure 1 is a plan view of a talking machine record and tone arm embodying my improvements, with the reproducer in operative position.

Fig. 2 is a side elevation partly in vertical section, illustrating the pivotal bearing for the tone arm in central vertical section and the reproducer in idle position with the casing lid closed.

Fig. 3 is an enlarged detail of the reproducer illustrating the adjustment of the stylus to engage records of different type.

Fig. 4 is a detail illustrating the angular position of the reproducer with reference to laterally cut records.

Fig. 5 is a view similar to Fig. 4 illustrating the position of the reproducer and stylus with reference to the hill and dale type of records.

Fig. 6 is an enlarged sectional detail on line *v v* of Fig. 3, illustrating the pivotal mounting for the stylus.

The accompanying drawings illustrate the preferred embodiment of my invention in which A represents the record. B represents the major section of the tone arm which is rotatably mounted upon a substantially vertical axis, and D is the minor tone arm section which is rotatably mounted upon and with reference to the tone arm section B so as to turn relative to the section B upon the axis indicated by the dotted line ZZ. At the free end of the tone arm section D is a face plate 2 to which the reproducer casing 3 is attached so as to be rotatably adjusted to a limited extent. The casing 3 is provided with the usual diaphragm and with outwardly projecting rigid ears 4 which are internally threaded to receive screws 5 having conical points or inner ends. A shaft 6 has cups or ball race-ways 7 at opposite ends, and balls 8, preferably three in number in each cup, travel in said race-ways and are centrally engaged by the conical ends of the screws 5 which thus provide journal bearings at opposite ends for the shaft 6, which bearings are capable of great accuracy and delicacy of adjustment to provide for rotative vibration of said shaft with a minimum of lost motion or lateral vibration. Lock nuts 9 serve to lock the screws 5 to their adjusted positions. The shaft 6 is provided with a lever 10 in contact at its outer end with the diaphragm and a stylus 11 is detachably secured in a socket in the shaft 6 by means of a set screw 12.

The face plate 2 is seated at its periphery in an annular channel 14 in the casing 3, and a screw 15 tapped into the casing 3 has a reduced point 16 which enters a groove 17 in the periphery of plate 2 to limit the movement of casing 3 rotatively relative to plate 2. The groove 17 extends about one fourth around the circumference of plate 2 and hence enables the casing 3 to be adjusted to bring the shaft 6 and stylus to either the full line position of Fig. 3 to engage laterally cut records, or to the dotted line position of Fig. 3 to engage the hill and dale type of records.

The tone arm section B has a conical face or raceway 18 to engage a series of balls 19 which travel in a raceway 20 in an annular plate 21. As illustrated the plate 21 is secured to the top of the casing E by means of a series of wood screws 22. By introducing a filling piece 24 under one edge of the plate 21 said plate is given a slightly inclined

position, and the section B being delicately journaled upon the balls 19 has more or less tendency to travel or swing toward the center of the record, depending upon the thickness of the filler piece 24. This adjustment of plate 21 together with the ball bearing support for section B enables practically all lateral strain upon the stylus incident to propelling the tone arm across the record to be relieved, since the inclination of plate 21 may be so adjusted as to practically overcome the inertia of the tone arm in the direction of its feed across the face of the record. A plate 25 screwed to plate 22 locks the balls 19 in place.

The sections B and D have each a short straight section 26 and 27 at their meeting ends and the section 27 telescopes closely in section 26. A slot 28 in the section 27 is engaged by the reduced end of a screw 29 threaded into section 26 to limit the rotative movement of section D with reference to section B. In Fig. 1 the operative position of section D is illustrated in full line and its idle or inoperative position is illustrated in dotted line. As illustrated in Fig. 2 it will be noted that when the section D is in inoperative position the casing 3 and stylus 11 occupy a position in a horizontal plane lower than the top of section B and alongside of section B which serves to protect them from accidental injury, and that the tone arm and transmitting apparatus occupy relatively less space vertically than where the transmitting apparatus rests upon the tone arm, thus permitting a lid K of less depth to be employed. The manner in which the section D is movably mounted relative to section B also provides for a relatively greater distance between the axis  $z-z$  and the casing 3, causing casing 3 to move through an arc of longer radius which provides for securing the desired angular position of casing 3 and its stylus with reference to the record, and provides for adjusting the stylus circumferentially about casing 3 without materially disturbing or departing from the desired angular position of the casing and stylus. The mounting of the section D upon section B also obviates any sharp or pronounced bend in the path to be traveled through said sections and provides for a nearly straight and direct and ample path for the sound vibra-

tions direct from the transmitter diaphragm along the sections D and B, to the megaphone section F, which results in a superior tone and greater volume of sound.

The apparatus herein illustrated and described is capable of considerable modification without departing from the principle of my invention.

Having described my invention, what I claim is:

1. In a talking machine a tone arm provided with a transmitting diaphragm and stylus at one end to engage a record and by traversing the record groove to guide the tone arm transversely across the face of the record, a journal to rotatably support said tone arm at its opposite end upon an axis at substantially right angles to the plane of movement of said stylus, and means to angularly adjust the axis of rotation of said tone arm to counterbalance the weight of the tone arm against its inertia to movement under the guiding influence of the stylus.

2. In a talking machine a tone arm rotatably mounted upon a substantially vertical axis at one end and provided at its opposite end with a stylus to engage a record and by traversing the record groove to guide said tone arm in a substantially horizontal direction across the face of the record, the axis of rotation of said tone arm being inclined from the vertical to substantially counterbalance the weight of the tone arm against its inertia to movement under the guidance by said stylus.

3. In a talking machine a tone arm rotatably mounted by means of a stationarily mounted race way a rotatably movable race way, and interposed rolling members upon a substantially vertical axis a stylus at the opposite end of said tone arm to engage a record and by traversing the record groove to guide said tone arm in a substantially horizontal direction across the face of the record, said stationarily mounted race way being inclined so as to predispose said tone arm to travel in the desired direction under the guidance of said stylus.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALFRED J. SWING.

Witnesses:

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