

H. H. MURRAY.
TONE ARM MOUNTING FOR TALKING MACHINES.
APPLICATION FILED APR. 26, 1916.

1,285,320.

Patented Nov. 19, 1918.

Fig. 1.

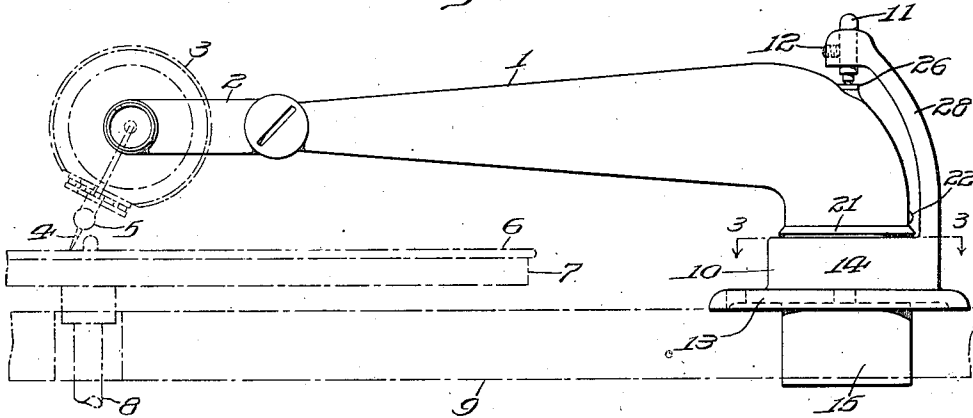


Fig. 2.

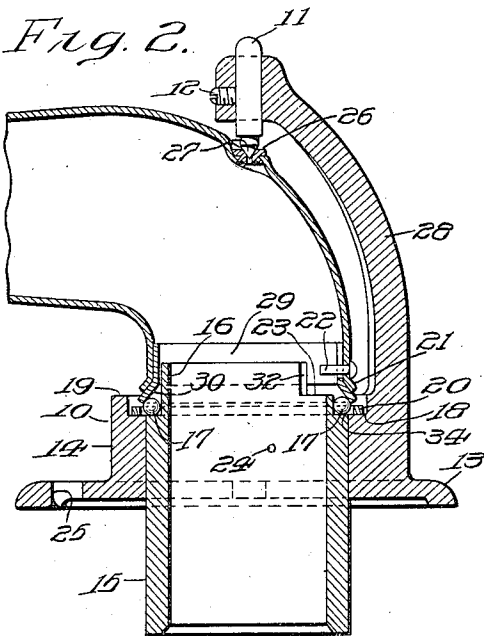
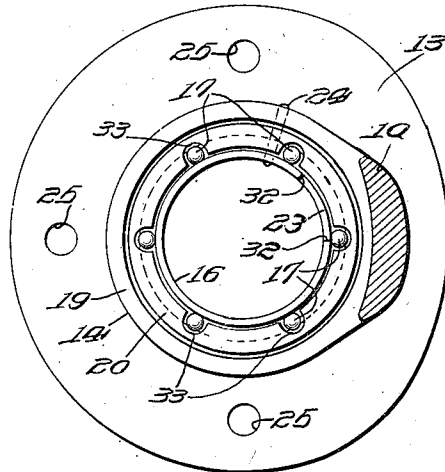


Fig. 3.



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UNITED STATES PATENT OFFICE.

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1. TONE-ARM MOUNTING FOR TALKING-MACHINES.

1,285,320.

Specification of Letters Patent. Patented Nov. 19, 1918.

Application filed April 26, 1916. Serial No. 93,623.

To all whom it may concern:

Be it known that I, HENRY H. MURRAY, a citizen of the United States, and a resident of Riverton, county of Burlington, and State of New Jersey, have invented certain new and useful Improvements in Tone-Arm Mountings for Talking-Machines, of which the following is a specification.

The invention described herein has to do with a form of combined mounting and bracket for a sound conduit forming a part of well known talking machine apparatus. In particular, the device is used on talking machine apparatus wherein the tone arm is positioned upon a horizontal part of the cabinet and joins a sound amplifier therebelow, the amplifier and tone arm being placed with regard to each other so that an unobstructed sound conduit from the free end of the tone arm to the amplifier is provided.

In the apparatus to which I have applied my invention the tone arm is maintained to freely move without substantial friction about a vertical axis in a fixed horizontal plane and therefore embodies coacting parts which provide for said movement and at the same time restrain the moving parts from any displacement whatever vertically or horizontally.

The movement upon the vertical axis of those parts and that of those disposed to move in the horizontal plane are accommodated without requiring any introduction of parts within the interior of the tone arm. At the same time all parts are rigidly maintained in position while in motion and as well while not in action.

An object of my invention is to provide an antifriction bearing between the tone arm and its support, and to prevent any other movement of the tone arm on its bearing other than that about a vertical axis. As the tone arm carries at one end a sound box and is not supported except at its pivoted end, a considerable eccentric thrust is imposed on a mounting of this sort, the bad effect of which is off-set in a complete way by the form of bearing herein described.

It is apparent that it is desirable that the mounting must be so formed and as-

sembled as to permit the tone arm to move from one side to another of its path with the least amount of resistance, and it has been an object of my improvements to provide means of supplying and maintaining delicate adjustment as shown hereafter. Should any material resistance be present in this sort of a mounting it will seriously disarrange the action of the sound box upon the end of the tone arm. It is well known that such sound boxes, through the needle attached thereto, are moved across a record by reason of contact with a very delicate groove containing therein the recorded sound. Any substantial resistance in the mounting will necessarily tend to seriously interfere with the delicate action of the sound box and produce an undesirable result in the reproduction and another object of my invention is to provide a uniformly smooth uninterrupted motion of the tone arm.

A further object of my invention is to mount the tone arm firmly so that no exterior vibrations can reproduce themselves in the parts of the mounting and thus impair the quality of the reproduced sound.

In the drawings accompanying this specification, and relating thereto, Figure 1 shows a tone arm in place in the mounting. At the other end of the tone arm, a sound box is represented by dotted lines in contact with a record upon a turntable in position upon a motor board or other part of a talking machine cabinet. Fig. 2 shows an enlarged detail section for the most part of the large end of the tone arm in place in the mounting. Fig. 3 is a section upon line 3—3 of Fig. 1 with the tone arm removed.

The dotted portion 9 shows in outline the position and relation of the mounting to the motor board through which projects a spindle 8 from a motor attached to the board 9 and upon the upper end of the spindle 8 is fastened the turntable 7 bearing a record 6. The sound box 3 upon the gooseneck 2 of the tone arm 1, has a well known form of needle 4 held in position therein by the thumb screw 5, the point of the needle co-acting with the sound record grooves to re-

produce the sound recorded thereon. As the needle is placed at the outer edge of the record and moves toward the center of the record, the sound box is thus moved and in turn moves the tone arm from one side to the other in playing the record. For convenience this movement is enlarged so that the tone arm may move to a line intercepting the center of the turntable at the inner limit of its movement and at the outer limit may extend to beyond the outer diameter of the sound record.

Referring to Fig. 2 a casting 10 is formed and proportioned to form the exterior of the mounting proper. At the lower portion of the mounting 14, a flanged portion 13 is provided with apertures 25 so that the flange may be firmly attached to the cabinet 9 at a suitable place. Rising from the flange 13 is the vertical portion for the most part cylindrical except as it is modified by the joint of the upright bracket member 28 thereto. The portion 28 extends upwardly and arches over the curved elbow formation of the tone arm and bears at its upper part a stud 11 with a tapered end 27 formed and finished to co-act with a bearing 26 in the outer wall of the tone arm 1. A set screw 12 maintains the stud 11 in the desired position in which it may be adjusted to nicely contact with the bearing member 26. Fitting neatly within the mounting 14 there is introduced the sleeve 15 which is fastened to the mounting 14 by means of the pin 24 driven so as to pass through both members in the hole drilled therefor. By means of the pin 24, the sleeve 15 is maintained so that the recess 23 in the upper part thereof is located to control by its vertical walls 32 and the stud 22 the above described motion of the tone arm from a point without the outer circumference of the sound record to the other end of its travel at about a line intercepting the center of the sound record and the axis of the tone arm. The sleeve at its upper end is turned down and thereby reduced so that a thin or reduced portion 16 of the sleeve extends beyond the shoulder 34 formed by the turning down of sleeve 15.

In the mounting 14, a recess is formed concentric with the aperture which receives the sleeve 15 so that a shoulder 18 is formed at the bottom of the recess and thus between the upper edge of the recess and the outer edge of the sleeve 14 a rim 19 is formed. The bottom of the recess 18 forms with the shoulder 34 formed upon the sleeve 15, a bearing aperture of sufficient extent to receive the hardened steel balls 17 and a keeper 20 therefor, the steel balls and keeper resting upon the lower surface formed by the shoulders 18 and 34.

The keeper 20 is formed at its inner edge with a plurality of notches at the inside

of which is formed a circular contacting edge; by reason of these notches and the formation thereof steel balls are maintained by the keeper against the sleeve 16 and in contact with the shoulder 34. As the keeper 20 is shaped and proportioned there is provided a certain amount of play for the steel balls within their respective notches and as well a chance for the keeper to move away from the thin portion of the sleeve 15 indicated by 16 and as well around said thin sleeve portion 16, and this motion around the thin sleeve portion 16 may continue so that the steel balls and keeper may continue to move and complete a circular path about 16.

The tone arm 1 at the lower edge of the elbow portion has inserted within it a wear resisting sleeve 29. In order to provide firm contact between the tone arm 1 at this place and the sleeve 29, the tone arm is flared as at 21 and correspondingly the sleeve 29 is enlarged to form a taper corresponding to that of the tone arm 21. Thus, the inner surface of the sleeve and the outer surface of the sleeve both in their cylindrical and flared or conical portions are firmly contacted and by sweating or similar process over the sleeve 29, the tone arm 1 is securely fastened and holds within it the wear resisting sleeve 29.

I have above referred to the cut portion of the sleeve 16 indicated by the numeral 23 and that the limits of its extent were shown by the walls 32, the cut out portion being made by cutting along an element of the cylindrical sleeve to the desired depth and then removing the portion of the sleeve between the two wall portions 32.

Extending through the tone arm in Fig. 2, there is the stud 22 with an enlarged head on the outside with the pin portion extending within the tone arm and the wear resisting sleeve. The stud 22 is placed so that it is below the upper edge of the sleeve 16 and thus as the tone arm moves from side to side it limits the amount of the motion, the pin 22 contacting with the walls 32 of the cut out portion 23.

As the steel balls 17 are maintained in a horizontal plane and as the stud 11 in the bracket 28 is positioned over the center of the sleeve 15, these parts co-act with the conical flange 30 and serve to position the tone arm and cause it to center upon the axis passing from the center of the stud 11 to a point in the axis of the sleeve 16. Having once located the position for the bearing 26, it is a simple matter to position the stud 11 therein and fasten the stud in its place by means of the set screw 11. Having thus positioned the stud 11 and placed it at its proper vertical position, the tone arm 1 is necessarily brought into proper position so

as to turn upon the vertical axis through the stud 11 and the center of the annular ball bearing. Thus the mounting and the tone arm are readily assembled without delicate adjustments and quickly made ready for use upon the talking machine cabinet.

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

1. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end communicating with said opening, an annular ball bearing between said end and said support, a restraining rim on said tone arm inclosing said ball bearing and restraining movement of the parts thereof away from the axis, and a pivot carried by said support and operatively engaging said tone arm at a point removed from but coaxial with said annular bearing and cooperating with said bearing whereby the tone arm has a free swinging movement about said axis formed by the annular ball bearing and the pivot and is restrained from any other movement.

2. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end communicating with said opening, an annular bearing between said end and said support, and pivotal means on the exterior of said tone arm engaging said arm at a point removed from but coaxial with said bearing and cooperating with said bearing whereby the tone arm has a free swinging movement about said axis formed by the annular ball bearing and the pivot and is restrained from any other movement, said annular bearing including a substantially conical bearing surface the apex of which is located at a point in the said axis on the same side of a transverse plane through said bearing as the tone arm.

3. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end communicating with said opening, an annular bearing between said end and said support, pivotal means on the exterior of said tone arm engaging said arm at a point removed from but coaxial with said bearing and cooperating with said bearing whereby the tone arm has a free swinging movement about said common axis and is restrained from any other movement, said annular bearing including a substantially conical bearing surface the apex of which is located at a point in the said axis on the same side of a transverse plane through said bearing as the tone arm, and means comprising adjustable parts for fixing the said pivotal means in different axially adjusted positions.

4. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end communicating with said opening, an annular bearing between said end and said support, pivotal means on the exterior of said tone arm engaging said arm at a point removed from but coaxial with said bearing and cooperating with said bearing whereby the tone arm has free swinging movement about said axis formed by the annular ball bearing and the pivot and is restrained from any other movement, said annular bearing including antifriction balls, and a substantially conical bearing surface engaging said balls and having its apex located at a point in the said axis on the same side of a transverse plane through said bearing as the tone arm.

5. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end communicating with said opening, an annular bearing between said end and said support, pivotal means on the exterior of said tone arm engaging said arm at a point removed from but coaxial with said bearing and cooperating with said bearing whereby the tone arm has a free swinging movement about said axis formed by the annular ball bearing and the pivot and is restrained from any other movement, said annular bearing including antifriction balls, a substantially conical bearing surface engaging said balls and having its apex located at a point in the said axis on the same side of a transverse plane through said bearing as the tone arm, and means comprising adjustable parts for fixing said pivotal means in different axially adjusted positions.

6. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end communicating with said opening, an annular bearing between said end and said support, and pivotal means engaging said arm at a point removed from but coaxial with said bearing, said annular bearing comprising coacting bearing elements one of which is formed with an annular shoulder facing the other element and with a cylindrical portion and projecting longitudinally beyond said shoulder, and the other bearing element having a substantially conical surface the apex of which is located at a point in said common axis on the same side of a transverse plane through said bearing as said tone arm, and antifriction balls interposed between said elements and held by said conical surface against said cylindrical portion and said shoulder.

7. The combination of a support having an opening therethrough, a tone arm having an angularly disposed open end com-

municating with said opening, an annular bearing between said end and said support, and pivotal means engaging said arm at a point removed from but coaxial with said
5 bearing and cooperating with said bearing whereby the tone arm has free swinging movement about said common axis and is

restrained from any other movement, said annular bearing including a bearing surface flaring away from said pivot. 10

In witness whereof, I have hereunto set my hand this twenty-fifth day of April, 1916.

HENRY H. MURRAY.