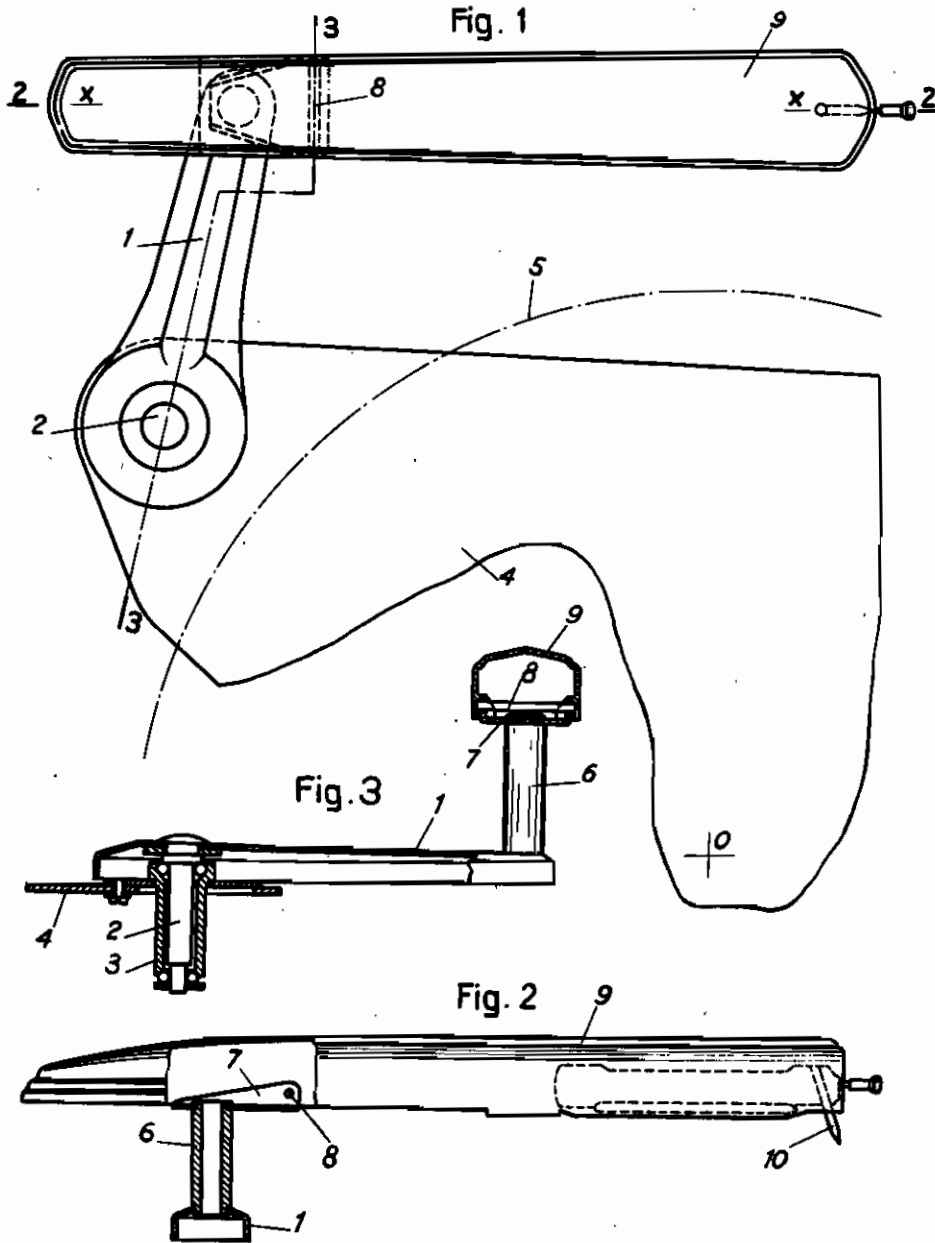


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M. MARZETTI
TONE ARMS
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Inventor:
M. Marzetti,
By E. F. Hendrich

ALIEN PROPERTY CUSTODIAN

TONE ARMS

Manlio Marzetti, Milan, Italy; vested in the
Allen Property Custodian

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It is known that in connection with tone arms of talking machines it is useful the angle included between the particular radius line of the record disk which extends through the contact point of the scanning needle with the disk record groove surface and the line being the orthogonal projection of the axis of the scanning needle on said record disk, is 90° or so close to 90° as possible, and further it is useful that during the scanning of a record said angle undergoes a so little variation as possible along the passage of the scanning disk from the outermost groove of the disk record to the innermost groove thereof.

Having in mind that due to practical requirements the tone arm must be pivoted at a point close to the record disk for its angular motion across the record disk in the period a record is scanned, the above defined angle necessarily undergoes a variation during the scanning motion of the tone arm; to minimize such an objectionable variation, tone arms have been suggested in which the orthogonal projection of the scanning needle axis on the record disk is inclined to a large angle with respect to the plane extending through the vertical axis the tone arm turns about during the record scanning operation and through the point where said scanning needle contacts with the record groove surface.

The conditions so arising cause the tone arm to be non-symmetrical and accordingly it is subject to unbalanced vibrations under the action of the needle oscillations, said vibrations including high-order harmonics which affect the tone arm performance.

This invention has for its object a tone arm for talking machines in which the orthogonal projection of the scanning needle on the record disk may extend at any desired angle with respect to the plane extending through the rotary axis of the tone arm and the contact point of the needle with the record groove surface, said tone arm being on the other hand made symmetrical with respect to the plane perpendicular to the record disk in which the needle axis lies, and further said first named plane is perpendicular to the horizontal axis about which said tone arm is mounted to oscillate for its vertical movements with respect to the record disk.

The tone arm of this invention still has the advantage that it requires a reduced space.

A tone arm according to this invention is shown on the annexed drawing and

Fig. 1 is a plan view thereof,

Fig. 2 is a fragmentary section on line 2—2 of Fig. 1, and

Fig. 3 is a section on line 3—3 of Fig. 1.

In the illustrated embodiment the tone arm 1, which includes pick-up means of any preferred and well known construction, includes a horizontal arm 1 mounted to rotate on the board plate 4 of a talking machine case not shown, by means of a spindle 2 fast with said arm 1 and a bearing 3 fast to said board plate 4 at a point adjacent to the periphery of the record carrying turn plate 5, this turn plate 5 being rotatable around its centre 0 and being driven by a motor not shown, as conventional.

An upright 6 is fast on the end of the arm 1 and a fork member 7 is fast on the top of said upright 6; the fork member 7 carries a horizontal pivot pin 8 whose axis lies in a direction substantially parallel with the arm 1. The tone arm 9 is mounted to oscillate on the pivot pin 8 and the longitudinal axis $x-x$ of the tone arm 9 extends substantially perpendicular to the axis of pivot 8; said tone arm 9 carries a scanning needle 10 at its free end and has a configuration which is entirely symmetrical with respect to a plane perpendicular to the turn plate 5 and extending through said longitudinal axis $x-x$ of the tone arm 9 and having the axis of the scanning needle 10 lying therein.

Owing to the described arrangement, the axes of the spindle 2 and pivot pin 8 have an invariable respective position and the distance intermediate the longitudinal axis of the arm 9 and the axis of spindle 2 is comparatively large.

The longitudinal axis $x-x$ of the tone arm 9 and the vertical axis of the spindle 2 may be said to be askew to each other in the meaning that said axes are not parallel with nor intersect each other.

During the scanning of a record located on and driven by the turn table 5, the tone arm 9 whose pivot pin 8 is fast with the arm 1, rotates around the vertical axis of the spindle 2 and the orthogonal projection of the scanning needle axis on the record disk and turn table (which coincides with axis $x-x$ in Fig. 1) is held at an angle which is substantially constant with respect to the record disk radius line which extends through the point of contact of the scanning needle with the record disk groove.

The above stated condition, combined with the condition that the tone arm 9 is symmetrical with respect to the plane in which the axis of the scanning needle lies and which is perpendicular to the record disk, and with the further condition that the vertical oscillations of said tone arm occur about the axis of the pivot pin 8 which is perpen-

pendicular to the plane of symmetry of the arm 8, secures the above suggested conditions of operation.

The arm 1 may be located below the plate board 4 of the talking machine case, said board 5 being in turn below the turn plate 5; for such a purpose the plate board 4 is provided with an arc-

shaped slot, having its centre on the axis of the spindle 2 to enable the upright 8 to extend through the base board 4 and to oscillate about the axis of the spindle 2, the pivotal means 2, 3 of course depending from the base board 4.

MANLIO MARZETTI.