

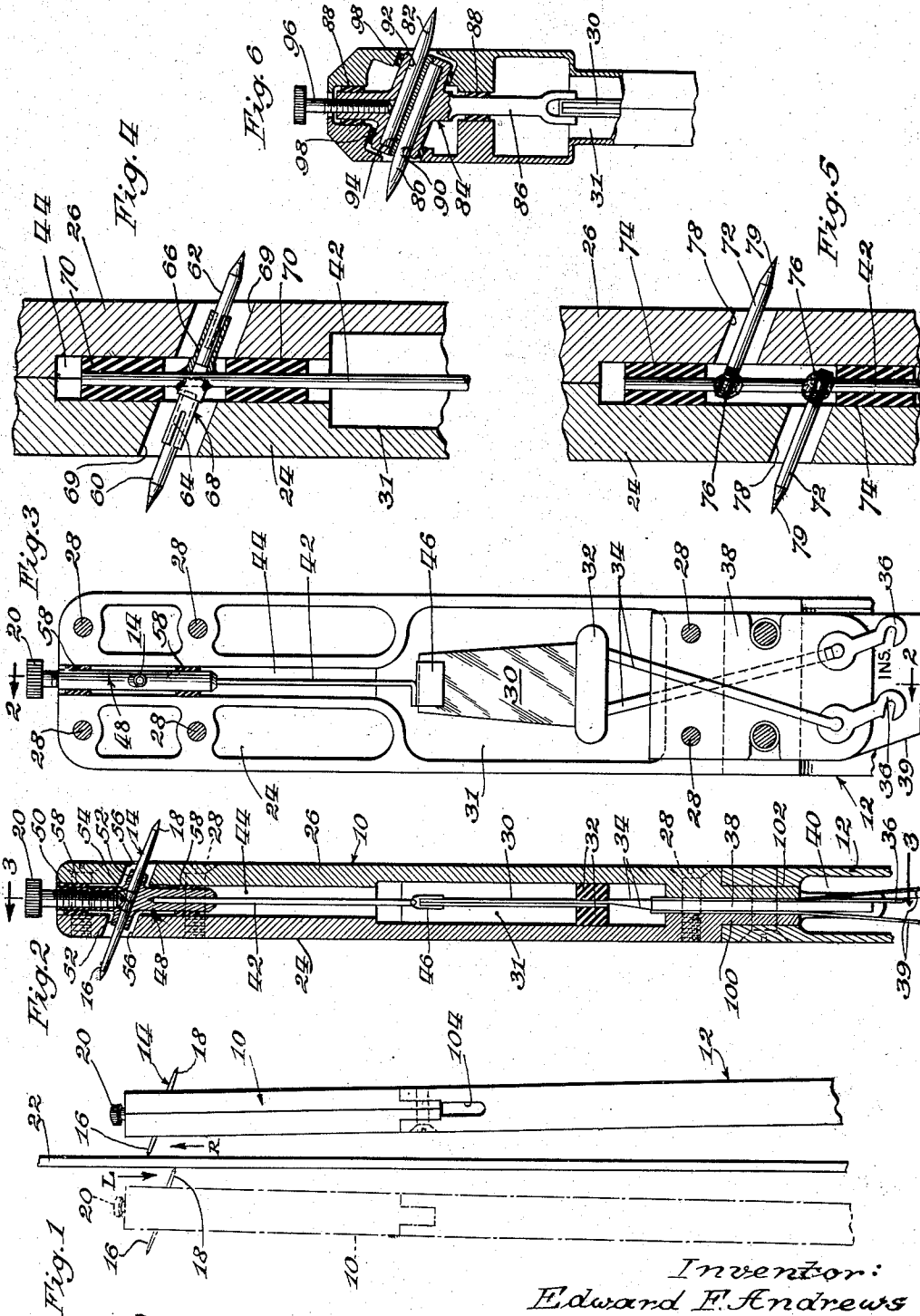
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PICKUP WITH TWO NEEDLES

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# UNITED STATES PATENT OFFICE

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## PICKUP WITH TWO NEEDLES

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7 Claims. (Cl. 274—36)

1

The present invention pertains to pickups and particularly to pickups for playing opposite sides of double faced disc records and this application is a continuation in part of my copending application, Serial No. 346,105, filed July 18, 1940, pat-

ented July 6, 1943, No. 2,323,365.

In my copending application, there is disclosed an automatic phonograph capable of selectively playing both sides of double faced disc records. To accomplish this, the pickup is bodily translated from one side of a record playing position to the other, its path of movement being along a line substantially parallel to the axis of rotation of the record so that when one side of a record is being played, one side of the pickup faces toward the record playing plane and when the other side is played, the other side of the pickup faces toward the other side of the plane.

The primary object of the present invention is the provision of a new and improved pickup having record engaging needle point defining portions extending in opposite directions from the pickup for engagement with opposite sides of records.

Another object of the present invention is the provision of a new and improved pickup having record engaging needle point defining portions extending in opposite directions from the pickup through openings in the pickup casing for engagement with opposite sides of records.

A further object of the invention is the provision of a new and improved pickup of the type mentioned wherein the point defining portions are constituted by a single double pointed needle, and, further, wherein the needle is located at a slant relative to the record surface.

Another object of the invention is the provision of a new and improved pickup wherein oppositely extending needles are detachably mounted in a single chuck by means of a single securing means.

A further object of the invention is the provision of a new and improved pickup comprising a needle holding chuck adapted removably to receive needles as by a press fit.

A further object of the invention is the provision of a new and improved pickup wherein the needle points lie in substantially the same plane transversely of the pickup and on opposite sides of the pickup, whereby the two points are located equidistant from the pivot point about which the pickup moves when a record is played. This arrangement provides a minimum needle tracking error for both sides of the record.

A further object of the invention is the provision of double needle point pickups having small

2

mass, thereby increasing the resonance frequency of the pickup and providing better reproduction of high-frequency vibrations.

A further object of the invention is to provide a new and improved tone arm and pickup assembly wherein the pickup constitutes an extension of the tone arm.

Further objects and advantages of the present invention will become apparent from the ensuing description in the course of which reference is had to the accompanying drawing, in which:

Fig. 1 shows a pickup and tone arm assembly constructed in accordance with the present invention; the solid line figures illustrating the assembly in playing position on one side of a record and the phantom lines illustrating the assembly in playing position on the other side of the record;

Fig. 2 is an enlarged central cross-sectional view of the assembly, the view being taken along the line 2—2 of Fig. 3;

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary cross-sectional view of a modified form of pickup wherein coaxially located needles are removably secured to a needle chuck by press fits;

Fig. 5 is a view similar to Fig. 4 of a further modification wherein the needles are secured directly to a coupling member connected to the transducer in such manner that the needle points are located at opposite sides of the pickup in substantially the same plane transverse of the pickup; and

Fig. 6 is a cross-sectional view of a further modification wherein oppositely extending needles are located in substantially side by side relationship and held in place by a single securing means.

Referring now to Figs. 1, 2, and 3, and more particularly to Fig. 1, it may be noted that the pickup and tone arm assembly comprises a pickup 12 secured to the outer end of the tone arm 10 in such a manner as to constitute an extension of the tone arm. A single double pointed needle 14, the opposite ends 16 and 18 of which project outside and beyond opposite sides of the pickup structure, is removably secured to the pickup by means of a single thumb screw 20.

In Fig. 1, the pickup and tone arm assembly is shown in solid lines in position to play the right side of a double faced disc record 22. At this time the needle point 16 is in engagement with the record grooves on the right side of the record. When the left side of a record is to be played,

3

the pickup and tone arm is shifted bodily to the left along a line parallel to the axis of rotation of the record so that the needle point 18 can be brought into engagement with the left side of a record. It should be noted that the needle 14 is located at a slant relative to the pickup and the record so that the needle points slant in the direction of rotation of the record (indicated by the arrows R and L) irrespective of the side of the record being played.

The construction of the pickup is illustrated more particularly in Figs. 2 and 3 to which reference will now be had. It comprises a supporting structure or casing made of two opposed parts 24 and 26, secured together by a plurality of suitably located flat-headed screws 28. A transducer including a mechanically actuated element, in this case a piezo-electric crystal 30, is mounted within the hollow central portion 31 of the casing between a pair of rubber pads 32. To the lower end of the crystal are secured relatively flat conductors 34 connected in turn to terminals 36 mounted on a block 38 of insulating material held in place between the casing parts 24 and 26. The conductors are insulated from the pickup casing by insulating strips 39. The terminals 36 are located within the hollow portion 40 of the tone arm 12.

The movement of the needle is transmitted to the piezo-electric crystal by means of a coupling member, in this case a torsion wire 42 of suitable characteristics and extending upwardly from the crystal into a hollow portion 44 defined by opposed relatively narrow channels in the casing parts 24 and 26. The coupling member is suitably secured to the upper end of the crystal by a channel-shaped member 46 encircling a portion of the upper end of the crystal. It should be understood that other forms of transducers may be utilized in place of the piezo-electric crystal.

The needle 14 is secured to a chuck indicated generally by reference character 48. The chuck is drilled or otherwise formed with an opening to receive the upper end of the torsion wire 42. The upper end 50 of the chuck is hollowed out in a suitable manner as by drilling and threaded internally to receive the thumb screw 20. The chuck is also provided with slanting bosses 52 which are drilled at a slant to receive the needle, the opening thus formed passing through the axis of rotation of the coupling member 42. The needle is preferably grooved centrally, as indicated by the reference character 54, so that the pointed end of the thumb screw may cooperate therewith to center the needle.

The two casing parts are also drilled at the same angle as the needle receiving opening in the chuck, as indicated by reference characters 56, so that the needle points may extend to points beyond and clear of the casing. The chuck is mounted in spaced apart rubber bearings 58 located near the opposite ends of the chuck in the hollow 44. An advantage resulting from the use of a single needle and a chuck such as that illustrated in Figs. 1 to 3 is that the overall length of the bosses 52 need not be any longer than if a single point needle was employed.

One of the features of the present invention is, as has already been indicated, the provision of a pickup and tone arm assembly wherein the pickup constitutes an extension of the tone arm. This construction may be readily noted from Figs. 1, 2, and 3 wherein the pickup is connected to the outer end of the tone arm by means of a tongue 100 formed at the inner end of the pickup

4

and a slot 102 formed at the outer end of the tone arm. The outer end of the tone arm may be slotted as indicated by the reference character 104 (see Fig. 1) in order to provide flexibility better to enable the pickup to be clamped to the tone arm.

In the modification of the invention illustrated in Fig. 4, two oppositely extending coaxially arranged needles 60 and 62 are employed and these are detachably secured as by a press fit in the oppositely extending slotted and apertured portions 64 and 66 of a chuck indicated generally by a reference character 68. The apertured portions 64 and 66 of the chuck and the needles 60 and 62 extend into and pass through slanting openings 69 in the pickup casing parts. The chuck in this modification is secured directly to the coupling member 42 which passes through a suitable opening in the chuck, which opening intersects the axis of the needles 60 and 62. The chuck is secured directly to the torsion wire as by welding or soldering. The upper end of the torsion wire is secured by spaced apart rubber bearings 70 mounted in the hollow 44.

A pickup constructed in accordance with this modification has a very small mass and requires but a relatively short extension of the coupling member for mounting the needles since the bearings 70 may be brought relatively close together.

In the modification of the invention illustrated in Fig. 5, the oppositely extending needles 72 are so mounted that the points lie in the same plane transverse of the axis of rotation of the torsion wire 42 and the axes of the needles are substantially parallel to each other and intersect the axis of the torsion wire 42. In the construction herein illustrated, the torsion member is extended as in the last described embodiment and supported by spaced apart rubber bearings 74. The inner ends of the needles are provided with drilled bosses 76 through which the coupling member extends and these bosses are secured to the coupling member in suitable manner as by welding or soldering. The casing is drilled as indicated by reference characters 78 to enable the needles to pass through the casing parts and to project beyond and clear of the pickup. An advantage of this construction is its light mass and a further advantage results from having the needle points in the same plane, so that distance from the pivotal point of the tone arm to the needle points is the same irrespective of the side of a record being played, which is of especial advantage when the major axis of the pickup and the transducer actuating member 42 is located at an angle to the axis of the tone arm 12 such that the needle end of the axis of the actuating member or element is nearer the center of the turntable than the opposite end when the pickup is in playing position, thereby to reduce the tracking error during the playing of records. In view of the permanent connection of the needles to the torsion wire, the needles should be provided with permanent points of sapphire or hard alloy or the like and as indicated by reference characters 79.

In the embodiment of the invention illustrated in Fig. 6, the oppositely projecting needles 80 and 82 are mounted side by side in a chuck, indicated generally by the reference character 84, having an integral portion 86 coupling the chuck to the transducer 30. The chuck is mounted near the outer end of the pickup in a pair of spaced apart rubber bearings 88. It comprises a central hollow portion located at a slant relative

to the longitudinal axis of the chuck and is provided with opposed openings 80 and 82 through which the needles 80 and 82, respectively, project outside the pickup, the axes of the needles intersecting the axis of the coupling portion 86 of the chuck. In the event round shank needles are utilized, it is preferable to utilize a spacer 94 located between the needles so that when the needle securing thumb screw 96 is tightened, the needles are securely held in place. In the event square shank needles are utilized, a spacer need not be utilized as the two needles will be securely held in place by the force applied through the outer needle to the inner needle. The central portion of the chuck, i. e., the needle holding portion is surrounded by rubber bearings 98 located therebetween and the adjoining portions of the casing.

Although the present invention has been disclosed in conjunction with specific details of preferred embodiments thereof, it should be understood that these detailed constructions are not intended to be limitative of the invention except in so far as set forth in the accompanying claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A pickup for playing opposite sides of double faced disc records, including in combination, a support, a transducer including a mechanically actuated element mounted on said support, an elongated coupling member for mechanically actuating said element, said coupling member being mounted on said support for limited rotation about an axis located lengthwise of the pickup and connected to said element, and means for imparting movement to said coupling member when either side of said pickup is brought into position to engage a record, said last-mentioned means including a pair of record engaging needles secured in spaced apart substantially parallel relation to said coupling member, said needles extending in opposite directions from said member along axes passing through the axis of rotation of said coupling member at substantially supplemental angles and to points beyond and clear of said support in a plane located at right angles to the length of the coupling member.

2. A pickup for playing opposite sides of double faced disc records, including in combination, a casing defining support, said casing being provided with an opening at each side thereof, a transducer including a mechanically actuated element mounted within said casing, a coupling member for mechanically actuating said element, said coupling member being mounted within said casing for limited rotation about an axis located lengthwise of the pickup and connected at one end to said element, and means for imparting movement to said coupling member when either side of said pickup is brought into position to engage a record, said last-mentioned means including a pair of record engaging needles secured in spaced apart substantially parallel relation to said coupling member, said needles extending in opposite directions from said member and through said openings along axes passing through the axis of rotation of said coupling member at substantially supplemental angles and to points beyond and clear of said support in a plane located at right angles to the length of the coupling member.

3. A tone arm assembly of the type pivotally movable about an axis during the playing of a record, including in combination, a tone arm, a

pickup including a casing, transducer means within said casing, and needle means for actuating said transducer means, said needle means including a pair of record engaging needles mounted in spaced apart substantially parallel relation and operatively connected to said transducer means, said needles extending in opposite directions from within said casing to points beyond and clear of said casing and substantially in a plane parallel to the pivotal axis and at right angles to the tone arm whereby the points of said needles are equally distant from said axis.

4. A tone arm assembly of the type pivotally movable about an axis during the playing of a record, including in combination, a tone arm, a pickup including a transducer means, and needle means for actuating said transducer means, said needle means including a pair of record engaging needles mounted in spaced apart substantially parallel relation and operatively connected to said transducer means, said needles extending in opposite directions from said transducer means to points beyond and clear of said means and substantially in a plane parallel to the pivotal axis and at right angles to the major axis of the tone arm whereby the points of said needles are substantially equally distant from said pivotal axis.

5. A tone arm assembly of the type pivotally movable about an axis during the playing of a record, including in combination, a tone arm, a pickup including transducer means and a single transducer actuating element having a major axis extending generally outwardly from the pivotal axis, and a pair of record engaging needles secured to said actuating element in spaced apart relation along said major axis, said needles extending in opposite directions from said element to points beyond and clear of said transducer means and element and the spacing between the needles and the slant thereof being such that their points are more nearly in a plane passing through the element at right angles to said major axis than the points at which they are secured to said element.

6. A pickup shiftable to opposite sides of a record for playing opposite sides of records, including in combination, transducer means, a longitudinal transducer actuating element, and a pair of record engaging needles secured in longitudinal spaced apart relation to said actuating element, said needles extending in opposite directions from said element to points beyond and clear of said transducer means and element and having their points in a plane located substantially at right angles to the longitudinal axis of said actuating element.

7. A pickup shiftable to opposite sides of a record and pivotally movable for playing opposite sides of records, including in combination, transducer means, a longitudinal transducer actuating element extending generally outwardly from the pivotal axis of the pickup, and a pair of record engaging needles secured in longitudinal spaced apart relation to said actuating element, said needles extending in opposite directions from said element to points beyond and clear of said transducer means and element and having their points nearer to each other longitudinally of said element than the distance between the points where the needles are secured to said element.

EDWARD F. ANDREWS.

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7

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