Nov. 10, 1931. S. McCLATCHIE 1,830,800

ELECTROMAGNETIC PICK-UP

Filed Dec. 7, 1929 2 Sheets-Sheet 1

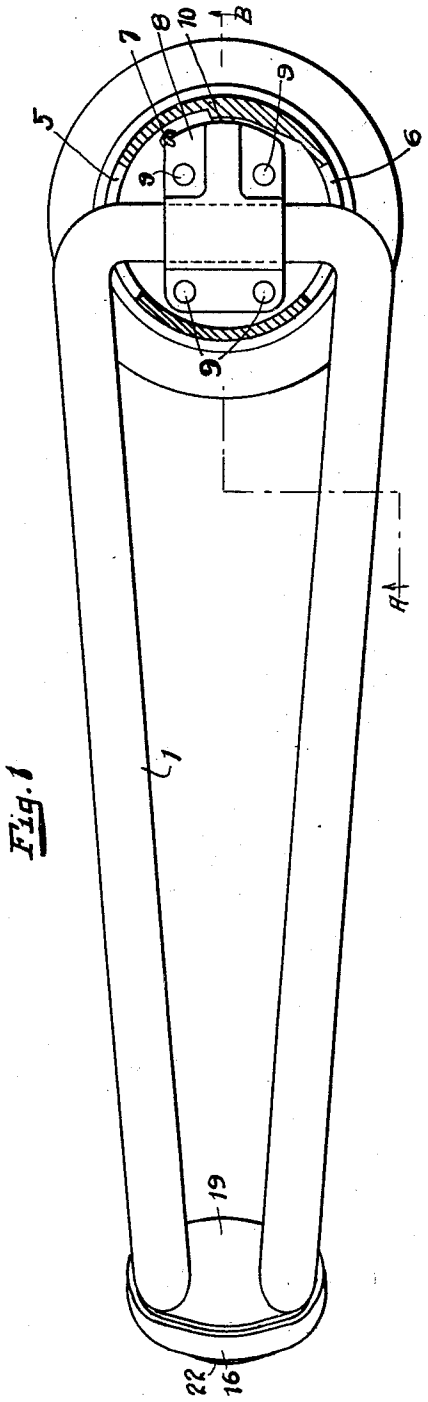


Fig. 1

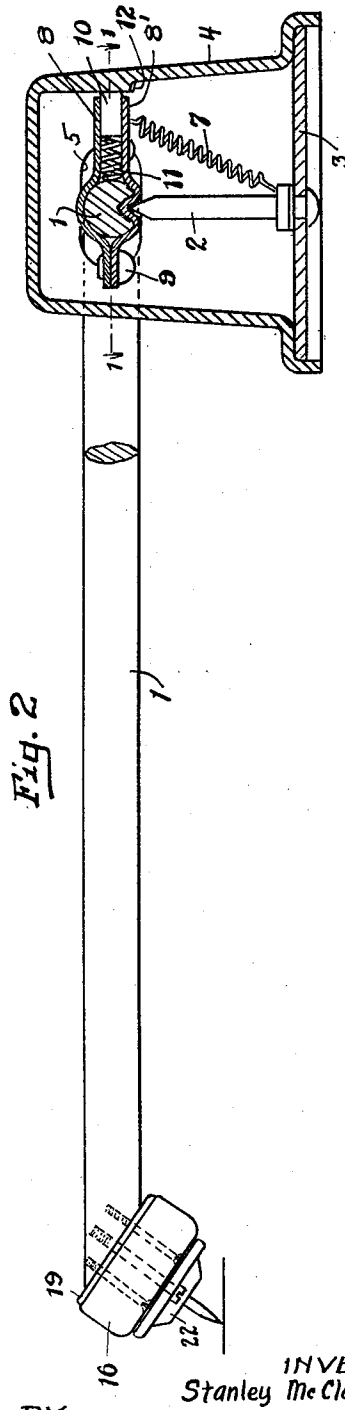


Fig. 2

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Filed Dec. 7, 1929 2 Sheets-Sheet 2

Fig. 4

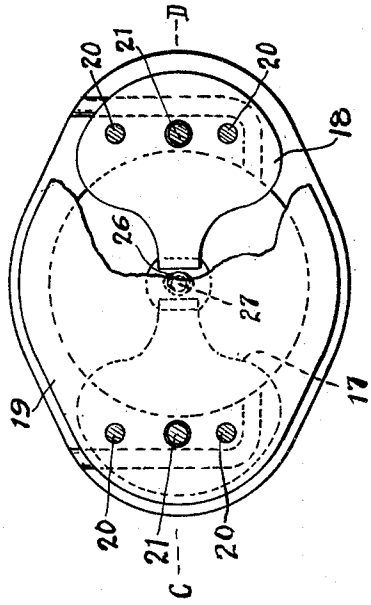


Fig. 5

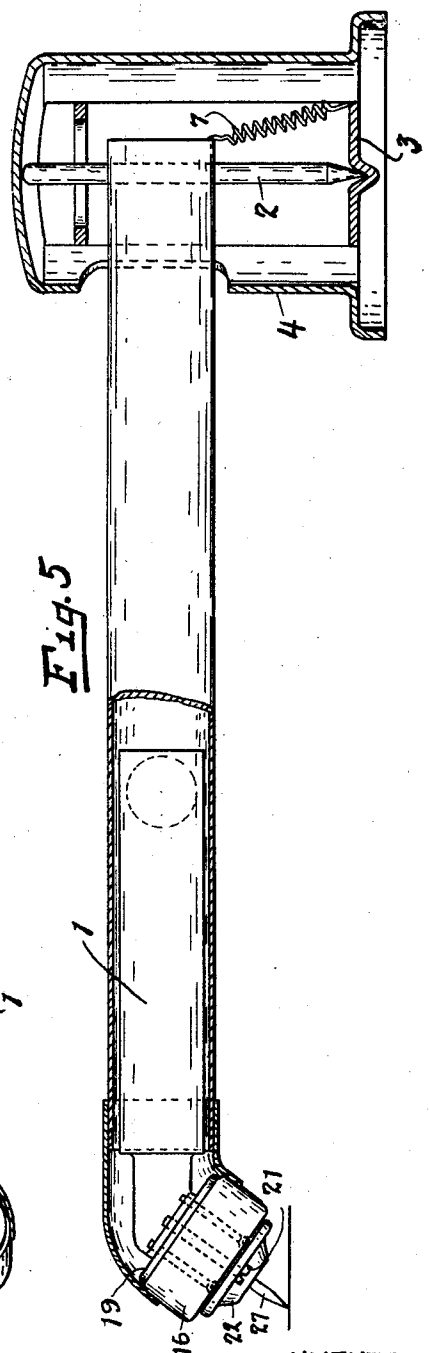


Fig. 3

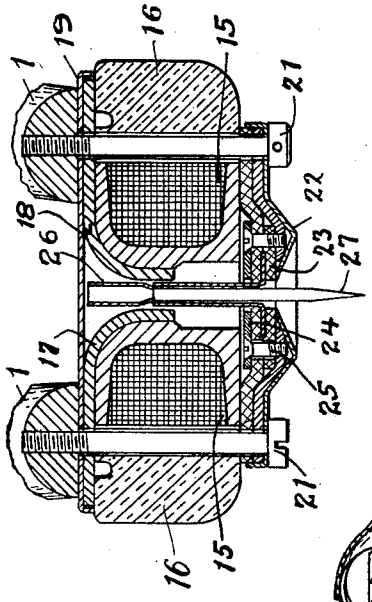
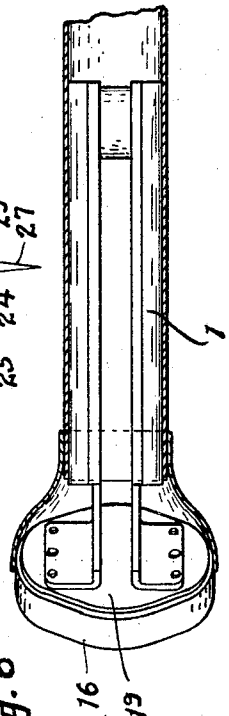


Fig. 6



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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC PICK-UP

Application filed December 7, 1929. Serial No. 412,489.

This invention concerns electro-magnetic pick-ups and has for its main object to provide an improved form of permanent magnet in combination with the pick-up tone arm. Other objects will become apparent from the description.

As is generally known, it is of advantage to have the magnetic field in electro-magnetic pick-ups as intense as possible, without having to keep the air gap between the armature and the pole pieces within too small limits in order to secure a satisfactory signal. With magnets of the size and type at present in general use, it has been found necessary to hold this air gap to from five to eight thousandths of an inch. This extremely small spacing involves delicate adjustment which is never secure, as the armature is labile and liable to change its position, due to ageing of the rubber cushions which are used to position it. It is therefore, in general, desirable to increase the size of the permanent magnets used to set up the magnetic field in phonograph pick-ups. The size of the magnet is, however, determined by practical considerations.

It has heretofore been the universal custom to include the magnet within the pick-up head. Any considerable increase in the size of the magnet would make this head unwieldy and much too heavy. This factor has heretofore limited the size of the permanent magnets used in pick-ups to very moderate proportions.

The present invention proposes, however, to include the magnet not within the casing of the pick-up head, but within the tone arm supporting the head, or indeed, to make the magnet the tone arm itself. In this way, the main weight of the magnet is carried backward towards the tone arm support and the use of clumsy pick-up heads is obviated.

Referring to the drawings, Figure 1 shows a top view of a proposed embodiment of my invention; Figure 2, a cross-section on the line AB of Figure 1; Figure 3 shows a section on the line CD and Figure 4, a top view of the spool with its associated holder. Figure 5 illustrates an alternative arrangement embodying my invention. Fig. 6 is a fragmental top view of the pick-up arrangement shown in Fig. 5.

In the preferred form shown in Figure 1, 1 is a U-shaped magnet extending from the pick-up head to the tone arm support, this magnet constituting in itself the tone arm. The arm is pivoted on the pin 2, which is held in the bottom 3 of the casing 4. This casing is provided with slots 5 and 6 for the passage of the tone arm. A spring 7, engaging extension 8 of the tone arm, serves to hold the arm against the pivot and at the same time, to draw the portion of the tone arm passing through the slot 5 against the upper edge of said slot, so that the arm as a whole is firmly guided and prevented from oscillating with the phonograph needle. As is well known, it is important that the supporting structure for pick-ups should be rigid against needle oscillations, in order to prevent the distortion of lower frequencies which would result from movement of the pick-up as a whole.

The above mentioned tone arm extension consists of two halves 8 and 8′, held together by rivets or screws 9. Between these two halves, is provided a tubular recess, within which is held the reciprocating pin 10 which is pressed against the casing by spring 11. On raising the tone arm to change needles, the pin 10 engages under the projection 12 in the casing and holds the tone arm in an inclined position until it is desired to again lower the pick-up upon the record. To do this, it is only necessary to move the pick-up head a little to the right, when the pin disengages from projection 12, as will be evident from an inspection of Figure 1.

The pick-up head includes the spool 15 held in the casing 16, which is preferably of insulating material. 17 and 18 are pole-pieces and 19 a cover of thin material to keep foreign matter out of the pick-up. Screws 20 secure the pick-up head with associated pole-pieces and cover plate to the legs of the tone arm magnet. Leads from the magnet spool are carried along the tone arm legs and into the arm support casing, being secured to the legs by small clamps 20′ or any other suitable means. The armature system is de-

tachably secured to the pick-up head by means of screws 21 and consists of cover plate 22, rubber gaskets 23, washer 24, securing screws 25 and armature 26. The armature is provided at its lower end with a flange which is secured between the two gaskets. The rubber gaskets serve both as positioning and damping members for the armature. The armature and tone head structure just described has been given only by way of illustration and it is understood that entirely different systems might be combined with the novel form of magnet-tone arm which constitutes the main feature of my invention.

By way of illustrating an alternative method of carrying out my invention, I have shown in Figures 5 and 6 the magnet in a form such as is current in the telephone receiver standard in the United States. The outer casing tube constitutes in this case the tone arm proper, but the magnet is associated with and forms part of the tone arm structure. This I conceive to be the essence of the main feature of my invention.

It will be noted that in both the embodiments of my invention just described, the pick-up head is greatly reduced in size and simplified by comparison with the types now current. This compensates in manufacturing cost for the somewhat increased bulk of the tone arm. The increase in size and strength of the magnet combined, in accordance with the invention, with the tone arm, contributes to increased loudness and clarity of signal from the record.

While I have described my invention more or less specifically with reference to the drawings herein, it is obvious that I would have it understood that my invention may be practical in many ways, without departing from the spirit and scope thereof, in attaining the objects herein set forth.

What I claim to be secured by Letters Patent of the United States, is:

1. In combination with an electro-magnetic pick-up device, a pick-up head carrying a phonograph needle and a cooperating armature, a magnetic structure for said armature having an extended portion pivotally arranged to serve as a tone arm for said pick-up head.

2. In combination with an electro-magnetic pick-up device, a pick-up head carrying a phonograph needle in operating position and a cooperating magnetic armature of an extended magnet pivotally arranged at one of its ends and carrying said pick-up head at the remaining end to serve as a supporting arm thereof and as an operating magnet of said armature.

3. In combination with an electro-magnetic pick-up device, a pick-up head including means for carrying a phonograph needle in operating position and a cooperating magnetic armature associated therewith, a tone arm support, a magnet extending from said pick-up head to said tone arm support, constituting a tone arm and serving as an operating magnet for said armature.

4. In a device for transforming mechanical oscillations into corresponding magnetic variations comprising in combination, a pick-up head including means for carrying a pick-up needle in operating position to be subjected to said mechanical oscillations and an operating magnetic armature associated therewith, a supporting member of said pick-up, a magnet extending from said pick-up head to said supporting member to serve simultaneously as a supporting arm of said pick-up head and as operating magnet of said armature.

5. In combination with an electro-magnetic pick-up device for phonographs and the like, a pick-up head including means for carrying a phonograph needle in operating position and a cooperating magnetic armature associated therewith, a tone arm support, a U-shaped magnet extending from said pick-up head to said support, to constitute a tone arm of said device and to serve as operating magnet of said armature.

6. In combination with an electro-magnetic pick-up device for phonographs and the like, a pick-up head including means for holding a phonograph needle in operating position and a cooperating magnetic armature associated therewith, a tone arm support having a casing, a magnet extending from said pick-up head to said support, to serve simultaneously as a tone arm for said pick-up head and as operating magnet of said armature, a pin held at the bottom of said casing to pivot said magnet passing through a slot of said casing and means for resiliently holding said magnet against its pivot and at the same time to draw the portion of said magnet passing through said slot against the upper edge thereof.

7. In combination with an electro-magnetic pick-up device for phonographs and the like, a pick-up head, including means for carrying a phonograph needle in operating position, a tone arm support having a casing, a tone arm extending from said pick-up head to said support, a pin held in the bottom of said casing for pivoting said tone arm passing through a slot of said casing, and means for resiliently holding said tone arm against its pivot and at the same time, to draw the portion of said tone arm passing through said slot against one edge thereof.

8. In combination with an electro-magnetic device for phonographs and the like, a pick-up head including means for carrying a phonograph needle in operating position and a cooperating magnetic armature associated therewith, a tone arm support, a U-shaped magnet, pole pieces of said magnet cooperatively associated with said armature, said

magnet extending from said pick-up head to said support to serve as a tone arm of said pick-up device.

9. In combination with an electro-magnetic device for phonographs and the like, a pick-up head including means for carrying a phonograph needle in operating position and a cooperating magnetic armature associated therewith, a tone arm support having a casing, a U-shaped magnet, pole-pieces of said magnet cooperatively associated with said armature, said magnet extending from said pick-up head to said support to serve as a tone arm of said pick-up device, a pin held in the bottom of said casing to pivot said magnet at its U-shaped end, whereby the legs of said magnet pass through slots of said casing, and means to resiliently hold said magnet against its pivot and at the same time to draw the portion of one of said legs against the upper edge of its slot.

In testimony whereof I affix my signature.

STANLEY McCLATCHIE.