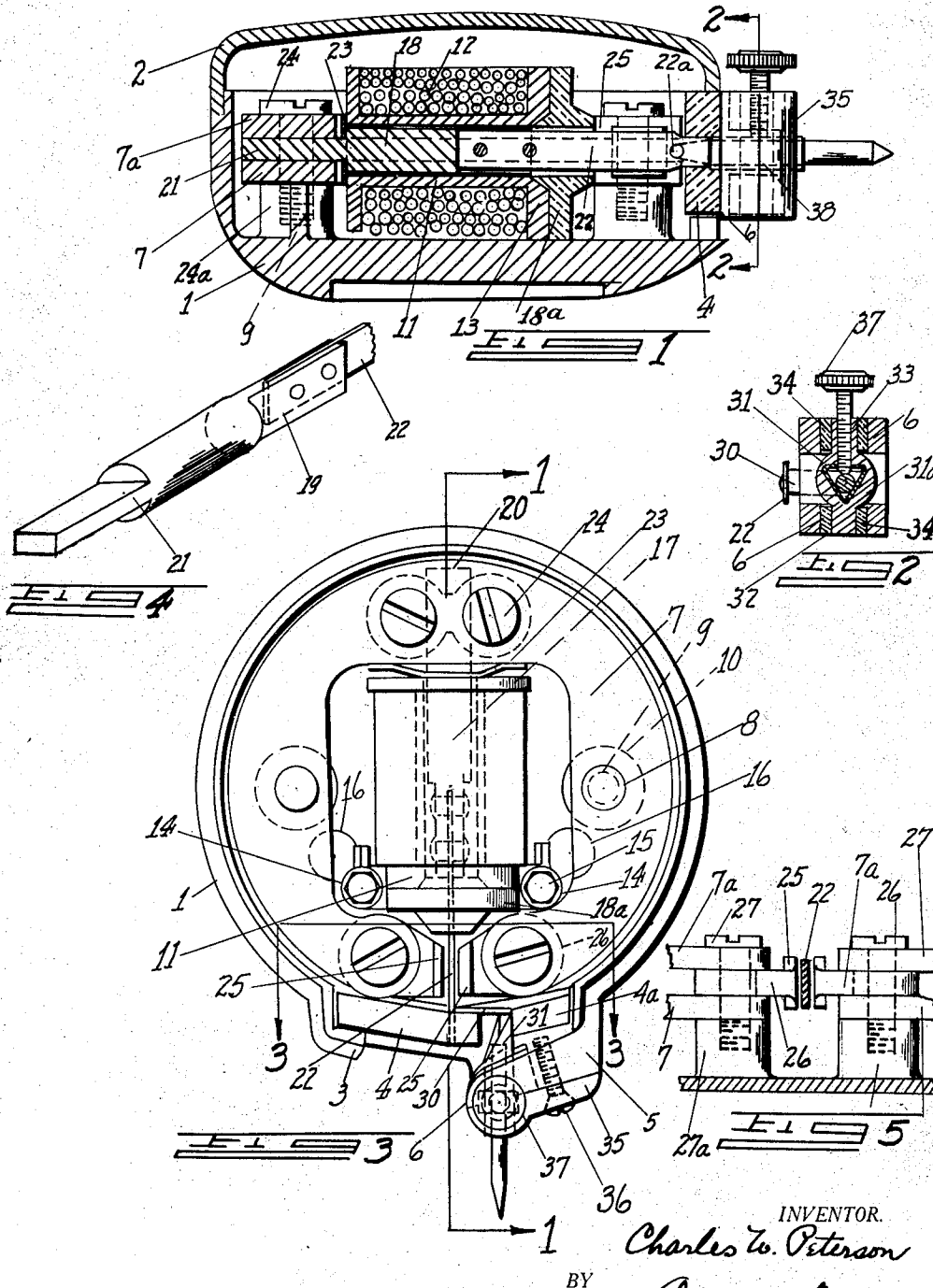


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ELECTRICAL REPRODUCER

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ELECTRICAL REPRODUCER.

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My invention relates to reproducers for use with phonographs or the like for transferring into electrical energy the vibrations imparted to a suitable stylus by means of a sound record.

My invention relates to the structure of the reproducer parts, and in general principle follows the lines of my Letters Patent in the United States, No. 1,591,233, for electrical phonograph reproducer and the like.

In other words, I provide for a paramagnetic armature, which is damped by means of a rubber element, or in some similar way, which armature is resilient and is connected to the neutral point of a permanent magnet. The armature vibrates under impulses from sound, and changes the flux in the coil through which the armature end passes, due to magnetic changes in the armature under influence of the permanent magnet.

It is my object to reduce the inertia in the armature and stylus holding system of my former patent, thus permitting the stylus to follow more accurately the sound grooves of a record and increasing the accuracy of movement of the armature. It is my object to improve the structure of stylus holders for electrical reproducers in general. I cut down the magnetic reluctance of my armature by the use of a special alloy of very high permeability. I have improved also the permanent magnet system by the use of spaced magnet elements, and the pole pieces of my structure are adjustable to get the best armature effects.

The coil bobbin and winding, and the structural parts of the device are so arranged that all terminals are within the reproducer case, thus avoiding any chance of the operator getting a shock.

I accomplish my objects by that certain construction and arrangement of parts to be hereinafter more specifically pointed out and claimed.

In the drawings:

Figure 1 is a section taken centrally and longitudinally on the line 1—1 of Figure 3.

Figure 2 is a detail section taken through the stylus holder structure, on the line 2—2 of Figure 1.

Figure 3 is a plan view of the reproducer with the cover removed, and stylus holder removed.

Figure 4 is a detail of the armature and its mounting elements.

Figure 5 is a section through the permanent magnet assembly, showing the pole shoes.

I employ in my device a casing 1, having a lid 2, which is screwed thereover. The case is open at the bottom, with the side wall bent under as at 3, to form one side of a pocket for a rubber piece 4, which will be later described further. The side of the case opposite to the portion 3, is brought out into a bifurcated lug 5, which has half round outer faces, as indicated at 6.

The magnets are formed of two pieces of horseshoe shape, as indicated at 7 and 7^a, which are secured together, and into the shell by means of screws 8, which screw into holes 9 formed in bosses 10 on the face of the casing. Other screws which hold other parts between the magnets, will be described later.

The bobbin 11 for the coil 12 will be provided with a base 13, which has two spaced bosses 14, through which screws 15 pass that serve as terminals for the two ends of the wire, which pass into the casing, and the two ends of the coil wire are brought out and soldered to these terminals. There are two holes 16 in the casing through which the feed wires enter, and this structure keeps the terminals out of the way of being shortened by the fingers of the operator.

The bobbin is held in place by means of the armature holder 17, which is of paramagnetic material. The armature itself is preferably formed of an alloy of nickel, copper and iron, bearing the trade name "Ajax" metal. It is about forty per cent iron, forty per cent nickel, and twenty per cent copper. The armature holder may be of this metal, or of soft iron or silicon steel.

The holder is rounded as at 18, where it forms a core for the bobbin. is bifurcated as at 19, where it lies at its ends in between the two magnets, at their neutral point 20, the armature 22 being inserted and riveted in place in the bifurcated portion. It is flat at 21.

The bobbin has a flat spring 23 set between it and the magnets, and in setting up the device, the bifurcated end of the armature holder is set between the two magnets, and the upper magnet screws 24 are inserted and passed through holes in the two magnets and screwed down into the bosses 24^a on the inner face of the casing. This clamps the

armature holder in place. The bobbin is slipped over the armature holder, and the bobbin rests on the lower ends of the magnets, with the leaf spring 23 pressing down on the top of the bobbin.

The armature itself is a resilient metal strip, and to dampen its action above the magnet pole pieces, a plug 18^a of suitable material such as rubber is set over the armature, and thrust up against the lower face of the bobbin where it will abut the lower end of the round portion 18 of the armature holder. The rubber plug will have a slot in it to permit its being thrust over the armature. The plug lies between the end of the bobbin and the lower ends of the magnets, and fits fairly snugly into a space left between the two bosses 14 in the base of the bobbin.

The pole shoes of the magnets are separate pieces of soft iron or other suitable alloy, which are of a shape to present the faces 25 of the desired width, and have slotted bodies 26 which lie between the two lower ends of the magnet assembly. The lower mounting screws 27 of the magnet assembly pass through the two magnets, through the slots of the portions 26 of the shoes, and thence into the bosses 27^a in the inner face of the casing.

The shoes can be adjusted by loosening the screws, and moving the shoes, because of the play permitted by the slots therein, to desired spacing, and then turning down the screws to clamp the shoes in permanent position.

The armature passes between the two pole shoes, with the correct intermediate spacing between them, and the gap adjusted for best operation. The lower end of the armature is reduced in width and thrust into a slot in the rubber piece 4, which as stated, is thrust into the pocket formed beneath the magnet assembly and by the inturned lower ends of the casing. This rubber piece closes the opening at the base of the casing.

The armature has a hole 22^a therein, through which is secured in any desired way, by soldering preferably, the operating arm of the stylus holder element. The rubber piece 4 is slotted as at 4^a, for the clearance of the said stylus holder connection.

The stylus holder is in the form of a piece of metal having an arm 30, which is connected to the armature, and a triangular shaped hollow body 31, which extends outwardly from the arm 30. The stylus holder has a hole in its side, and is thrust into a triangular pivot piece. This piece is formed of a body 31^a having a triangular hole therein. It has a pin 32 projecting in one direction, and a hollow internally threaded pin 33 extending in the opposite direction. In this hollow pin a stylus holding screw 37 is mounted, so that upon turning down on the screw, it will clamp a needle thrust into the

triangular body of the holder. The hole in the holder registers with the bore of the hollow pin of the pivot piece.

To retain the two pins 32 and 33 in position so that the stylus holder can rock thereon, I provide two rubber tubes 34, and set one tube over each pin. The tubes are then set into the half round pockets 6 in the bifurcated lug 5 of the casing, which will permit the stylus holder to project into the casing, for its connection with the armature, and exposes the open triangular end of the holder for use. The piece 35, having two half round sockets therein, to complete a clamp about the two rubber pieces, is set over the end of the bifurcated lug, embracing the two rubber tubes 38, and screwed down to the lug by the screws 36.

It will be understood that a cover plate will enclose the parts described within the casing.

As so constructed, the device operates as follows: The parts will be considered as assembled with the stylus socket empty. A stylus or needle is inserted into the socket and the stylus screw turned down to clamp it. The device, on the end of a suitable arm which will permit of the usual movements, is set over a record with the stylus in the sound groove thereof. As the record moves, the stylus is moved to and fro. This rocks the holder in the rubber tube connection in the bifurcated lug of the casing, and through the connecting arm causes the armature to vibrate between the magnet pole shoes. The armature is resilient, but it is engaged at both its lower and upper end by means of the inserted plugs of rubber, so that its action is radically damped.

As the armature moves to and fro, and due to the fact that at one end it is connected to the neutral point of the magnets, it will set up a flux lengthwise thereof. This flux will be inductively transmitted to the coil wound about the bobbin, which will set up a flux therein, same passing out over the feed wires from the base of the bobbin.

A suitable audio amplifier set is coupled to the circuit in which the feed wires form a part, thus resulting in amplifying of the sound. In usual practice I provide a plug (not shown) which will fit into the detector tube socket of the usual radio receiving set, and a terminal for clamping to the B battery terminal best suited to my results, so that the radio set may be used to reproduce the sound resulting from the flux set up in the bobbin winding.

It will be evident that I have provided for a strong magnetic field by the use of the two magnets in the place of one, and that I have economically employed these magnets in mounting the armature holder and the pole shoes. The adjustability of the pole shoes is a very desirable feature, since the

characteristics of devices such as the one in question are not always uniform, and a fixed setting of pole shoes for best results should form part of the assembly job.

5 The armature itself is relieved from the necessity of taking the thrust of the weight of the device which applied to the stylus bearing. This bearing is of rubber, which damps its action, and furthermore provides
10 for a pivot without any bushings, finely ground and polished bearings, or needle point bearings, all of which are expensive.

It will be evident that the main principles of my structure will be applicable to other
15 mechanical arrangements than those which I have provided, and I do not wish to limit my claims to the particular arrangements where same are not specified in the claims.

Having thus described my invention what
20 I claim as new and desire to secure by Letters Patent is:—

1. In an electrical reproducer, the combination of a permanent magnet terminating in north and south poles, an armature element of paramagnetic material movable
25 with relation to the magnet poles, and including a paramagnetic connection at one end of the armature with the magnet at the neutral point thereof, a stylus holder mounted independently of the armature, and having
30 connection thereto, whereby the armature does not bear the weight of the reproducer when in use, an armature coil about the armature, and a deadener in contact with
35 said armature.

2. In an electrical reproducer, the combination with a permanent magnet having north and south poles, a resilient paramagnetic strip passing between the pole pieces,
40 paramagnetic means for connecting the paramagnetic strip to the neutral point of the magnet, a coil about said paramagnetic means, and a deadener applied to the armature both above and below the pole pieces,
45 and means operated by a stylus for vibrating the armature.

3. In an electrical reproducer, the combination with a permanent magnet having north and south poles, a resilient paramagnetic strip passing between the pole pieces,
50 paramagnetic means for connecting the paramagnetic strip to the neutral point of the magnet, a coil about said paramagnetic means, and a deadener applied to the armature both above and below the pole pieces,
55 and means operated by a stylus for vibrating the armature, said means connected to the armature between one of the deadeners and the pole pieces.

4. In an electrical reproducer, the combination of a pair of permanent magnets, pole shoes adjustably retained between them, an
60 armature element passing between the pole shoes, and set between said two magnets at the neutral point thereof, a coil about the

armature element, and stylus energized means for vibrating the armature.

5. In an electrical reproducer, the combination of a pair of permanent magnets, pole shoes adjustably retained between them, an
70 armature element passing between the pole shoes, and set between said two magnets at the neutral point thereof, a coil about the armature element, and stylus energized means for vibrating the armature, said armature element comprising a resilient paramagnetic strip, and a holder therefor.
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6. In an electrical reproducer, the combination of a pair of permanent magnets, pole shoes adjustably retained between them, an armature element passing between the pole shoes, and set between said two magnets at the neutral point thereof, a coil about the armature element, and stylus energized means for vibrating the armature, said armature element comprising a resilient paramagnetic strip, and a holder therefor, and
said resilient strip having deadening means applied thereto.

7. In an electrical reproducer, the combination of a pair of permanent magnets, pole shoes adjustably retained between them, an armature element passing between the pole shoes, and set between said two magnets at the neutral point thereof, a coil about the armature element, and stylus energized means for vibrating the armature, said armature element comprising a resilient paramagnetic strip, and a holder therefor, and said resilient strip having deadening means applied thereto, both above and below the point where the same passes between the pole shoes.

8. Means in an electrical reproducer to vibrate the armature thereof, comprising a stylus holder connected to the armature, and having an aperture into which a stylus is to be set, mounting pins projecting from said stylus holder, rubber elements surrounding said mounting pins, and means for engaging said rubber elements to hold them in position, to provide a pivot for the holder, one of said pins being internally threaded, and a stylus clamping screw mounted in said internally threaded pin, and passing into the said aperture.

9. An armature magnet and a coil device for electrical reproducers comprising a magnet element of horseshoe shape, an armature holder secured to said magnet element at the neutral point thereof, a bobbin and coil set about the holder, a resilient strip projecting from the holder and constituting the armature proper, and rubber set over the resilient strip, said strip lying between the poles of said magnets.

10. An armature and magnet device for electrical reproducers comprising a casing, a pair of permanent magnets of horseshoe type, an armature holder clamped between

said magnets at the neutral points thereof, and extending across toward the poles thereof, a resilient strip mounted in the holder and projecting between the poles, and rubber pieces located about the resilient strip at both sides of the point where it passes between the said poles.

11. An armature and magnet device for electrical reproducers comprising a casing, a pair of permanent magnets of horseshoe type, an armature holder clamped between

said magnets at the neutral points thereof, and extending across toward the poles thereof, a resilient strip mounted in the holder and projecting between the poles, and rubber pieces located about the resilient strip at both sides of the point where it passes between the said poles, said poles formed of shoes clamped adjustably between the two magnets. 15

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