Feb. 14, 1939. P. H. DUDECK 2,147,092

ELECTROSTATIC REPRODUCER
Filed Oct. 11, 1937 2 Sheets-Sheet 1

Fig. 1.

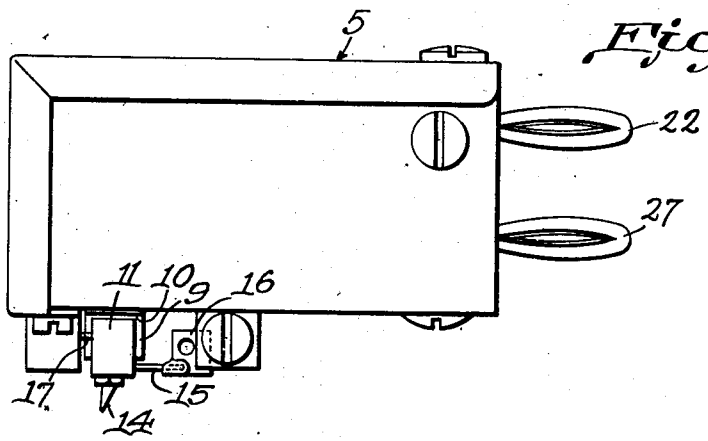


Fig. 2.

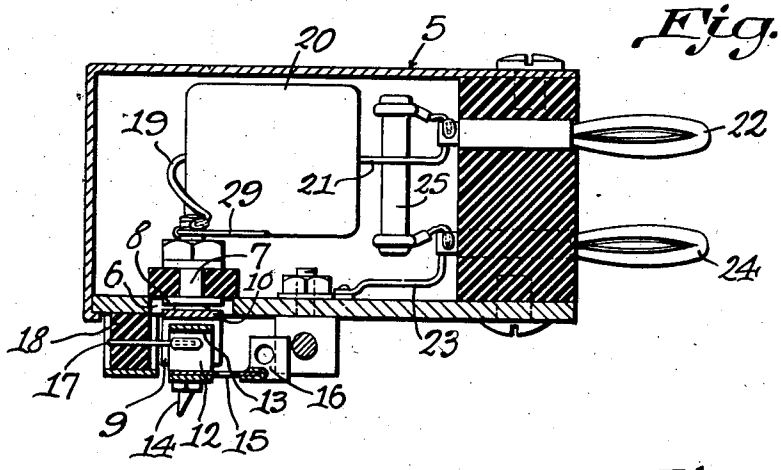
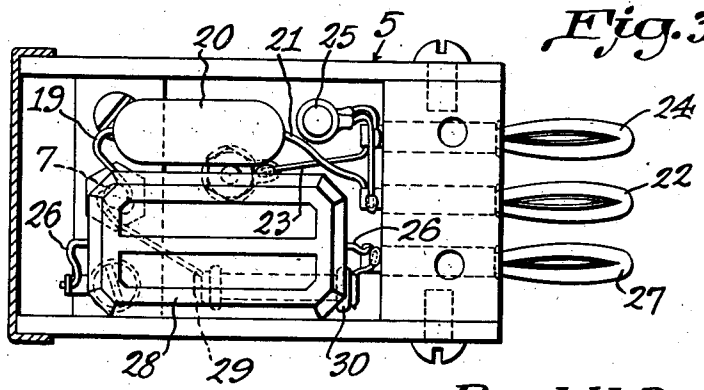


Fig. 3.



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Fig. 4.

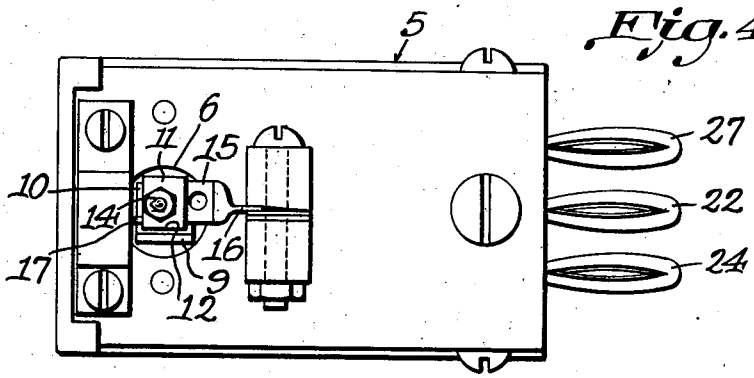


Fig. 5.

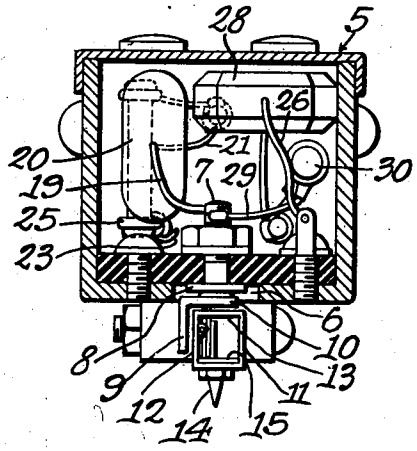


Fig. 6.

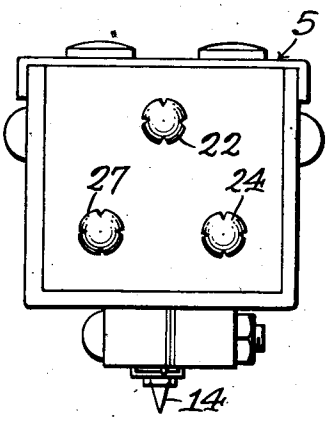
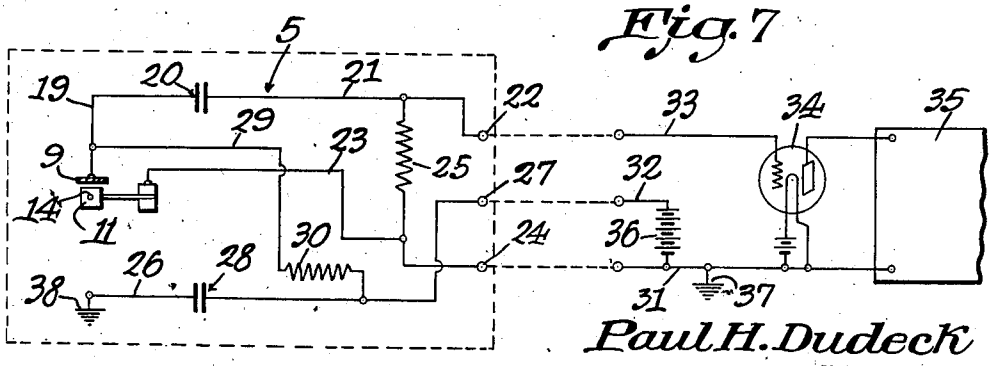


Fig. 7



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UNITED STATES PATENT OFFICE

2,147,092

ELECTROSTATIC REPRODUCER

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Application October 11, 1937, Serial No. 168,484

5 Claims. (Cl. 179—100.41)

This invention relates to reproducers, and more particularly to reproducers of the electrostatic type, used in reproducing phonograph records, mechanically cut film records or the like, wherein the recordings are cut either laterally or vertically.

The primary object of the invention is to provide a reproducer of this character wherein the recordings will be reproduced with the utmost fidelity, due to the light weight of the moving parts of which the reproducer is constructed.

Still another object of the invention is to provide a reproducer designed for electrical transcription, which will operate to reproduce lateral cut and vertical cut records eliminating the necessity of changing the needle or making adjustments in the reproducer construction to adapt the reproducer for use in connection with either type of record.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein described, may be made within the scope of what is claimed, without departing from the spirit of the invention.

Referring to the drawings:

Figure 1 is a side elevational view of a reproducer constructed in accordance with the invention.

Figure 2 is a longitudinal sectional view through the reproducer.

Figure 3 is a plan view of the reproducer, the cover having been removed.

Figure 4 is a bottom plan view of the reproducer.

Figure 5 is a transverse sectional view through the reproducer.

Figure 6 is an end elevational view of the reproducer.

Figure 7 is a diagram illustrating the elements and circuits within the casing of the reproducer, as well as the circuit leading to the amplifier, with which the reproducer is used.

Referring to the drawings in detail, the reproducer, indicated generally by the reference character 5, includes a body portion or casing, and is of the electrostatic type in which the usual coils, permanent magnets or magnetic circuits are eliminated, thereby insuring the reproduction of recordings with the utmost fidelity.

The casing 5 has an opening 6 formed in the bottom thereof, through which the shank 7 of the plug 8 extends, the plug providing a support for the stationary vertical plate 9 and horizontal plate 10, formed integral therewith, the latter plate extending at right angles with respect to the plate 9. Cooperating with the plates 9 and 10, is a movable or flexible metallic member 11 having its side plate 12 spaced from the vertical plate 9, while the upper plate 13 thereof is disposed in spaced relation with the horizontal plate 10. These plates form an electrostatic condenser, the air gaps between the stationary plate and the movable or flexible plate being the dielectric.

Since as well known, the capacity of an electrical condenser is an inverse function of the depth or thickness of the dielectric between the condensing plates supported thereby, when the movable plate is moved either laterally or vertically, the capacitance between the stationary plates and movable plate is varied causing a change in an electric current in the amplifier circuit connected therewith, insuring a high quality of reproduction.

The stylus which is indicated by the reference character 14, is mounted directly on the movable or flexible member 11 with the result that when the stylus is moved in following the groove of a phonograph record, the member 11 will move laterally or vertically, according to the type of record being played, to cause a variance in the air gap between the plates with the resultant variance in capacity. The arm which supports the flexible member 11, embodies a flat spring member 15 connected directly to the member 11 and operates to flex vertically, while the spring member 16, which connects with the member 15, has its side faces disposed vertically and at right angles to the side faces of the member 15, to flex laterally. This construction adapts the device for use with phonograph records having either vertical or lateral cut grooves.

In order that the movements of the movable member 11 will be regulated, a pin indicated by the reference character 17 extends from the movable member 11 and is held within the damping block 18. This damping block 18 is constructed of a suitable rubber material to yield with the movements of the member 11, and offers sufficient resistance to hold the movable member 11 in a position to determine the capacity of the unit while at rest, and the capacity between the member 11 and plates 12 and 13 of the plug will be a maximum when at rest and can-

not short out when in operation at the lowest frequencies.

Disposed within the casing or housing 5 and in circuit with the stationary plates 12 and 13, through wire 19, is a fixed condenser 20 of .001 microfarad capacity. The wire 21 completes the circuit between the fixed condenser 20 and grid plug 22. Wire 23 provides a circuit between the movable member 11 and ground plug 24, there being provided a suitable resistance element 25 in circuit with the wires 21 and 23. Wire 26 which is grounded to the casing or housing 5, connects with the polarizer plug 27 and has a fixed condenser 28 connected in the circuit, the condenser 28 being of .02 microfarad capacity.

Connecting with the wire 19 is a wire 29 that also connects with the wire 26. A resistance element 30 is connected in this circuit, completing the circuit.

The amplifier circuit comprises the wire 31, wire 32 and wire 33, the wires 31 and 33 being in circuit with the pick up tube 34 that is in turn, in circuit with the amplifier 35. As shown, the source of electricity supply is in the form of a battery, indicated by the reference character 36. The battery is in circuit with the wires 31 and 32 of the amplifier circuit, the circuit being grounded at 37. It might be further stated that the reproducer circuit is grounded at 38.

From the foregoing it will be seen that due to the construction shown and described, the movable member is free to move either vertically or laterally, according to the type of record with which the reproducer is used, the stylus being of the permanent or fixed type, as it is unnecessary to change the stylus, in order to play either type of record.

I claim:

1. In an electrostatic reproducer, a casing, a stylus arm mounted on the casing, an electrostatic condenser comprising a vertical plate and a horizontal plate, a stylus carrying arm on the casing and mounted for vertical and horizontal movement with either vertical or lateral cut phonograph records, vertical and horizontal plates on the stylus arm and being operatively associated with the first mentioned plate to provide electric impulses when the stylus carrying arm vibrates either vertically or laterally, and means for normally holding the movable plate in predetermined spaced relation with the stationary plate.

2. In an electrostatic reproducer, a casing, a stylus carrying arm mounted on the casing, said arm embodying a laterally flexible section and a vertically flexible section, vertical and horizontal condenser plates mounted on the stylus carrying arm, vertical and horizontal condenser plates mounted on the casing and operatively associated with the first mentioned plate to provide electric impulses when the stylus carrying arm vibrates either vertically or laterally.

3. In an electrostatic reproducer, a casing, a stylus carrying arm mounted on the casing, vertical and horizontal condenser plates on the stylus carrying arm, vertical and horizontal condenser plates mounted on the casing, and said plates being operatively associated to produce electric impulses when the stylus arm vibrates either vertically or laterally as the stylus is moving over either a lateral cut or a vertical cut phonograph record.

4. In an electrostatic reproducer, a casing, a stylus arm mounted on the casing and adapted to vibrate vertically or laterally, condenser plates mounted on the casing, condenser plates mounted on the stylus arm, and the condenser plates of the arm and casing being operatively associated to produced electric impulses when the stylus arm vibrates either vertically or laterally.

5. In an electrostatic reproducer, a casing, a stylus carrying arm mounted on the casing and including a vertically movable section and a laterally movable section, condenser plates on the stylus carrying arm, condenser plates mounted on the casing and operatively associated with the first mentioned plate to provide electric impulses when the stylus carrying arm vibrates either vertically or laterally, a pin extending from the stylus carrying arm, a yieldable member in which the pin is embedded whereby the stylus arm may vibrate vertically or laterally, and said yieldable member adapted to normally hold the stylus arm in a predetermined position, whereby the movable condenser plates are normally held in predetermined spaced relation with respect to each other.

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