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J. J. ROOT

2,429,137

ELECTRIC PHONOGRAPH RESISTANCE TYPE PICKUP

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FIG. 1.

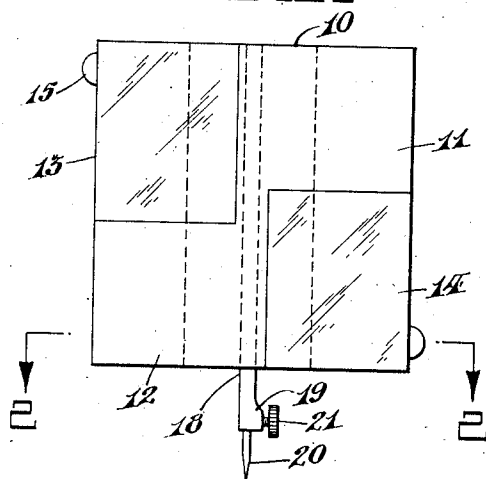


FIG. 2.

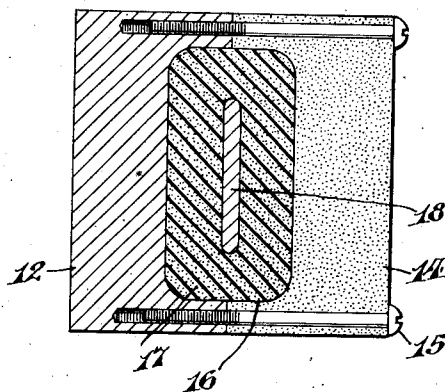


FIG. 3.

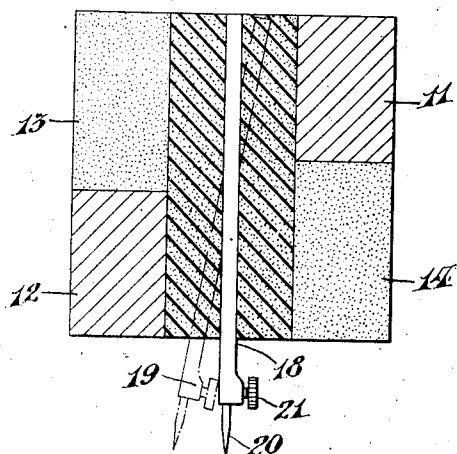


FIG. 4.

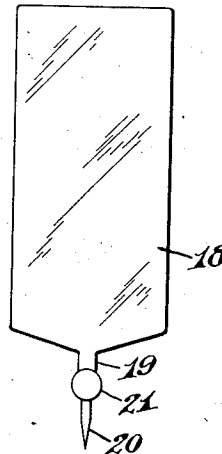
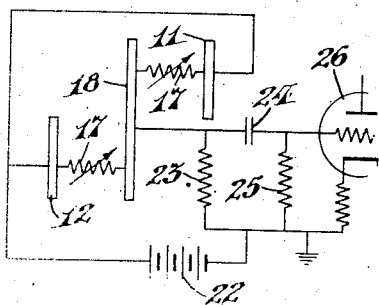


FIG. 5.



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ELECTRIC PHONOGRAPH RESISTANCE
TYPE PICKUP

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3 Claims. (Cl. 179-100.41)

1

This invention relates to vibration responsive devices such as phonograph pick-up elements.

One of the objects of my invention is to provide such a device which shall be capable of producing fluctuating currents of high amplitude in response to slight excitation so that the device may be highly sensitive and its output require but little amplification.

Another object of my invention is to provide a vibration responsive device which shall offer considerable manufacturing economies. These considerable economies may be realized both in the cost of the materials utilized and in the simple method by which they can be assembled.

Other objects of my invention will be apparent from the following description it being understood that the above general description of the objects of my invention are intended to describe and not to limit it in any manner.

Referring to the drawing:

Fig. 1 is an elevational view illustrating an embodiment of the invention.

Fig. 2 is a section on the line 2-2 of Fig. 1.

Fig. 3 is a sectional view taken on the same plane as Fig. 1.

Fig. 4 is separate view of the armature used in the embodiment illustrated.

Fig. 5 is a schematic view illustrating the electrical equivalent of the device and as disposed in a conventional circuit.

The device comprises a metallic member 10 of stepped construction formed by the lower block 11 and the integral upper block 12. The rectangular shape of the device is effected by securing individual blocks 13 and 14 into the staggered opposite rectangular spaces formed by the stepped blocks 11 and 12. Blocks 13 and 14 are of electrical insulation material such as Bakelite or any of a variety of plastics. However, any well known insulation material may be employed. The blocks 13 and 14 are connected to the member 10 as by bolts 15.

A central opening 16 is formed in the device, the opening extending into all of the blocks as indicated in the dotted lines of Fig. 1.

A resilient member 17 which is adapted to vary its electrical conductivity in response to compression is disposed in the opening 16. Resilient member 17 may take the form of a plug which is inserted into the opening 16 and retained by its inherent elasticity.

Member 17 is formed of a rubber material in which conductive media such as carbon particles have been dispersed. These discrete particles which may average from 40 to 100 microns in size

2

may be loaded into the rubber in a molding process or incorporated in a sponge rubber so as to be capable of considerable resistance variations. Either high or low resistances are obtainable depending upon the concentration of the dispersion. A product having the foregoing characteristics is manufactured by the United States Rubber Company under the trade-mark Uskon and is referred to in the industry as conductive rubber.

10 An armature 18 is embedded centrally of the member 17 so as to be separated thereby from the blocks 11 and 12. Armature 18 is formed with a tubular holder 19 which is adapted to receive a needle 20 such as used in phonographs. Set screw

15 21 serves to maintain the needle 20 in holder 19. Lateral actuation of the armature 18, as by movement of the needle 20 on a phonograph record, will vary the electrical resistance between the armature and both blocks 11 and 12 by compressing the member 17. This action is illustrated in Fig. 3, the changed position of the armature 18 being shown in dotted lines.

Referring to Fig. 3, it will be observed that whereas the armature is swung or pivoted so that its lower portion moves in a direction opposite from its upper portion, the staggered or stepped disposition of the conductive blocks 11 and 12 produces mutually similar compression actions so that the abovementioned opposite movements do not effect a mutual cancellation of the resistance changes. The resistance changes between the armature 18 and the blocks 11 and 12 respectively, are therefore additive. The term "additive" is used because the resistance changes are in phase rather than out of phase, although it is understood that the joint effect of the parallel resistances will be to lower the resistance path.

The use of an article such as above described in a conventional amplifier circuit is illustrated in Fig. 5. Blocks 11 and 12 are shown in their electrically parallel relationship in respect to armature 18. A battery 22 provides the potential source, the resistor 23, coupling condenser 24 and grid resistor 25 serving their usual functions in feeding the signal to the electronic tube 26. Resistor 23 may be selected to approximate the average resistance of member 17. The member 17 is illustrated as a pair or variable resistances on both sides of the armature 18.

It will be apparent that the invention as above described will feed fluctuating voltages to the vacuum tube 26 in response to the resistance changes in the circuit of battery 22. It will be further noted that the tendency of the pivoted

armature to produce cancelling resistance changes is substantially eliminated.

I have shown a preferred embodiment of my invention but it is obvious that numerous changes and omissions may be made without departing from its spirit.

For example, while I have described the resilient member 17 as comprising rubber in which conductive particles have been dispersed, variations in conductivity in the manner described may be achieved by coating or spraying ordinary resilient rubber with such conductive material. The stretching of the material by the movable armature would effect resistance changes in the material and would be suitable in the circuit described.

I claim:

1. A device of the character described comprising a metallic support, said support being formed of integral stepped areas and having a central opening formed therein, a resilient member adapted to vary its electrical conductivity upon compression thereof disposed in said opening and a swingable armature embedded in said resilient member and adapted to compress portions of said resilient member against said stepped areas of said support when said armature is actuated whereby the electrical conductivity between said armature and each of said areas is varied additively.

2. A device of the character described comprising a metallic support having an opening formed therein, an upper member integral with said support and a lower member integral with said support and with said upper member, each of said members being respectively located on opposite sides of said opening, a plug of resilient material in said opening and abutting said members at its upper and lower ends respectively, said plug being of electrically conductive material which is

adapted to vary its conductivity in response to compression, and an armature disposed in said plug and adapted to be swung so as to compress said plug against said members, said armature being operative upon actuation to effect simultaneous compression of plug areas against said integral members whereby the respective resistance changes between said armature and members are additive.

3. A vibration responsive device comprising an armature arranged for swinging action so that upper and lower portions thereof move in opposite directions, a resilient member surrounding said armature, said resilient member being adapted to vary its conductivity in response to pressure, and electrically conductive members respectively disposed on opposite sides of said armature and adjacent said upper and lower portions so that the swinging of the armature will cause each of said portions to compress said resilient member against one of said conductive members whereby resistance changes produced between each of said portions and said conductive members are additive.

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The following references are of record in the file of this patent:

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