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E. L. BARRETT  
VIBRATORY MOTOR DEVICE  
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Fig. 1.

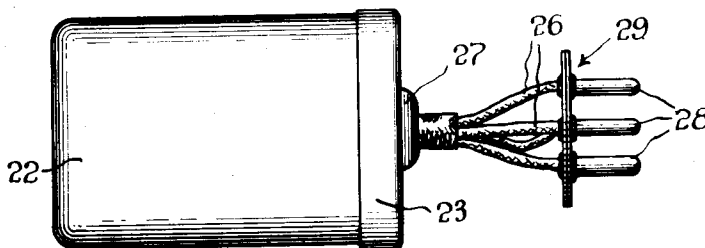
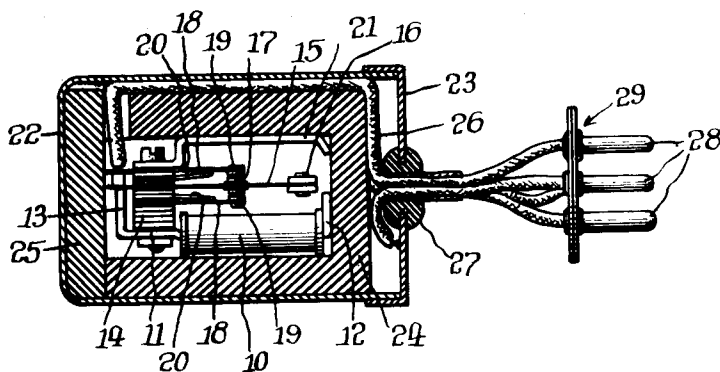


Fig. 2.



Inventor:  
Edward L. Barrett,  
By *Chas. L. Parker* *Attys.*

## UNITED STATES PATENT OFFICE

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## VIBRATORY MOTOR DEVICE

Edward L. Barrett, La Grange, Ill., assignor to  
Utah Radio Products Company, Chicago, Ill., a  
corporation of Illinois

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2 Claims. (Cl. 200-90)

The invention relates generally to vibratory motor devices and more particularly to devices of this character which are especially adapted for use in connection with circuit making and breaking means for direct current converters of the type known generally as "B" battery eliminators.

A general object of the invention is to provide a device of this character which is small and compact, is efficient in operation yet may be manufactured and sold at a comparatively low cost, and which is practically noiseless and vibrationless in operation.

Another object is to provide a device in which the dimensions and weight are minimized by the elimination of the supporting frame usually employed.

More particularly stated, another object is to provide a new and improved device of this character which comprises merely a vibratory reed or contact which is recurrently attracted by an intermittently energized electromagnetic winding or motor to make and break circuits through one or more relatively fixed contacts, said contacts and reed being guarded on one side by said winding and on the opposite side by a fixed and relatively light-weight guard.

Another object is to provide a vibratory motor device which is mounted in an enclosing case having means therein for absorbing and minimizing noise of operation and which is arranged to be connected in a circuit by novel means which cannot be loosened by the vibration produced in the operation of the device.

Heretofore, vibratory motor devices for direct current converters have usually been connected permanently in the circuit and the connections of the leads to the device with the proper leads of the converter circuit was by soldering or by a comparable means. However, it is sometimes desirable to provide a disengageable connection between the motor device and the circuit and in some instances this has been done by enclosing the device within an iron casing which has disengageable means or prongs rigidly affixed to one wall thereof for engagement with a cooperating socket to complete the connection. In such a construction it has been found that the vibration of the casing incident to the operation of the motor is quite apt to cause the prongs to work out of the socket, thus breaking the electrical connections. In fact, vibration of the prongs in the socket is more or less disadvantageous from an operating standpoint.

Another object of the invention, therefore, is

to provide a vibratory motor device which is housed within a suitable casing and which includes flexible leads which extend a considerable distance from the casing and terminate in a disengageable connector means by which the device may be properly connected in an operating circuit whereby vibration of the case cannot be transmitted to the connector means.

Other objects and advantages will become apparent in the following description and from the accompanying drawing, in which:

Figure 1 is a side elevation of a device embodying the features of the invention.

Fig. 2 is a central longitudinal section through said device.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawing and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

In one preferred form of device which has been chosen merely for illustrative purposes, the structure of the vibratory motor may best be seen in Fig. 2. The numeral 10 designates generally an electromagnetic winding which is enclosed within the conventional casing. The winding is formed about a core which extends beyond one end of the winding, as at 11, and terminates in an angularly turned end 13. The core extends from the other end of the winding, and is there bent to project laterally, as at 12, beyond one side thereof to form an active magnetic pole. The bent ends 12 and 13 of the core extend beyond the side of the winding in the same direction. Secured to the portion of the core designated 11 and extending along but in spaced relation to the end 13 is a stack of spacer plates and insulation of conventional design constituting a supporting means 14 to which one end of a vibratory reed or movable contact element 15 is secured.

In its normally unextended position, the reed 15 supports an armature 16 on its free end in an off-center position with respect to the magnetic force exerted by the core end or pole 12. Moreover, the reed and armature are so arranged that in the swinging movement of the armature it moves through a plane which is substantially parallel to the pole but never in contact therewith. The end 13 of the L-shaped bracket ex-

tends to the fixed end of the vibratory reed to include the reed in the path of the magnetic flux resulting from the energization of the electromagnetic winding 10. Intermediate its ends the vibratory reed carries a double contact point 17.

The support 14 also has relatively fixed contact fingers 18 secured thereto and disposed one on either side of the vibratory reed. These fingers at their outer ends carry contact points 19 for cooperation one with either side of the double contact point 17. A bumper finger 20 is mounted on the support for engagement with the inner side of each of the contact fingers 18 and these fingers are preferably under a spring tension which urges them toward each other into engagement with said fingers whereby the fingers may be adjusted to determine the spacing between the contact points 19 and the double contact point 17.

By this construction the electromagnetic winding structure is protectively disposed along one side of the vibratory reed and the cooperating contacts. A relatively light guard member 21 is secured to the support 14 to extend in spaced and substantially parallel relation along the opposite side of the reed and contacts.

The circuit by which the electromagnetic winding is energized may be of any suitable character but it is preferred that a circuit substantially similar to that shown in my Patent No. 1,924,082, issued August 22, 1933, be employed. Briefly, in such a circuit the electromagnetic winding 10 is permanently connected with the source of electrical energy so that upon closing of a master control switch the electromagnetic winding is energized to produce a swing of the armature and reed to establish a circuit through the double contact 17 and one of the fixed contacts 19. Closing of this circuit establishes a shunt circuit around the electromagnetic winding and through a load which may be all or a part of the primary winding of a transformer, whereupon the effective force of the winding 10 is diminished to the extent that the armature is freed for a reverse swinging movement to establish a circuit through the contact 17 and the other contact 19. Breaking of the first established circuit reenergizes the electromagnetic winding again to attract the armature and this cycle of operation continues with a resulting high frequency vibration of the reed 15.

The vibratory motor is preferably supported within a case which may be formed of aluminum or other light-weight metal or of a fibrous material such as cardboard. The case in this instance comprises a substantially deep cup 22 having a cover element 23 for its open end face. The case is substantially larger than the overall dimensions of the electromagnetic motor structure to receive a sound insulating container 24 formed of sponge rubber or the like and arranged completely to enclose the vibratory motor structure.

The container 24 substantially fills the space

between the motor structure and the case and hence said structure is merely dropped into the container through an open end which is closed by a layer 25 of the material. Thus, the motor structure is free to vibrate within the receptacle 24 and there is no fixed supporting connection between the unit and the enclosing case through which vibrations could be transmitted. The winding and the guard on opposite sides of the vibrating reed engages and maintains a spaced relation of the reed from the inner surfaces of the container.

Electrical leads 26 of a quite flexible nature are preferably employed for conducting current to the vibratory motor and in this instance these leads emerge from the case through a gasket 27 of rubber or the like which is mounted in an aperture in the case. Only three leads are usually provided and these leads extend a substantial distance away from the case where each is connected to a prong 28 of a disengageable connector means 29. However where a metal case is employed a fourth lead and prong may be used, the lead being grounded to the case, as shown.

When the device is in operation, the free mounting of the vibratory motor structure within the receptacle 24 allows the motor to move with substantially complete freedom therein. The yielding nature of the receptacle absorbs most of such vibration and effectively dampens the noise incident to the operation of the motor. The case will vibrate to some extent but such vibration is ineffective to disturb the engagement of the connector 29 and its cooperating socket (not shown) due to the fact that the flexible leads 26 cannot transmit the vibrations of the case to the connector.

I claim as my invention:

1. A vibratory motor device comprising, in combination, a support having a vibratory member mounted thereon, a winding secured to said support to extend along said member and cooperating therewith to induce a vibratory movement thereof, an enclosing case for the unit formed by said support and its associated parts including an inner case of yielding material by which said unit is freely supported for self-induced vibratory movement, and a guard on said support extending along the side of said vibratory member opposite said winding whereby said guard and winding cooperate in spacing said member from said inner case.

2. A vibratory motor device comprising a support having a vibratory reed and cooperating contact means secured thereto, an energizable winding having a pole piece extending from one end and secured to said support to position said winding along and substantially parallel to said reed, said pole piece being cooperatively associated with said reed to induce a vibratory movement thereof, and a guard means secured to said support and extending therefrom in spaced substantially parallel relation to the side of said reed opposite to said winding.

EDWARD L. BARRETT.