

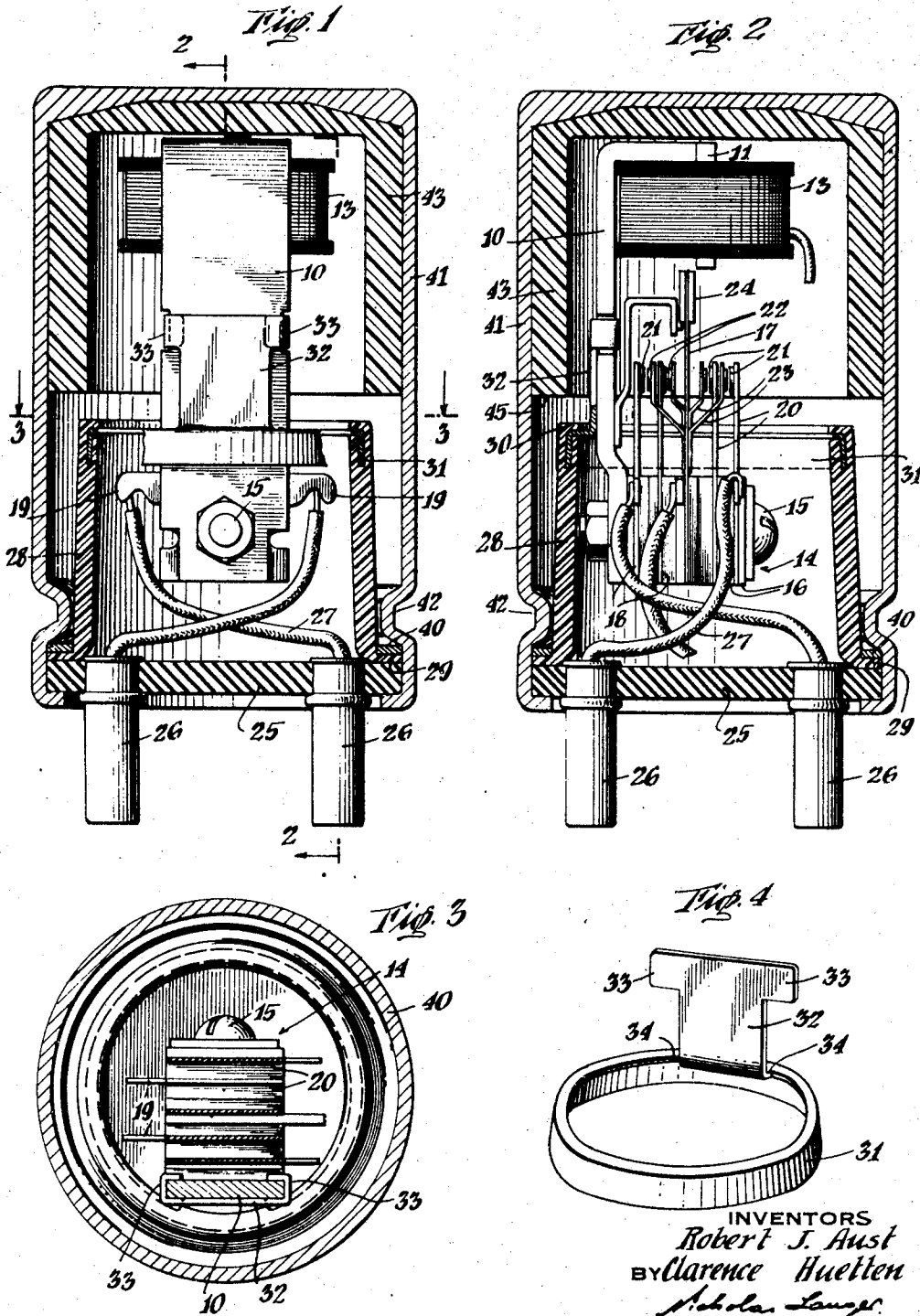
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SUPPORT FOR VIBRATORY MOTORS

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SUPPORT FOR VIBRATORY MOTORS

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This invention relates to a support for a vibratory motor and, more particularly, to a support wherein the vibrations transmitted from the vibrator unit through the support are reduced to a minimum.

In power supplies for radio sets and for other purposes, wherein a storage battery or other low voltage current source is to be utilized, it is common practice to provide a vibratory motor for periodically interrupting the current produced by the direct current source to alternately energize the two sections of a center tapped primary winding. The primary current is then stepped up by the transformer and appears across the secondary thereof after which it is rectified and used for the high voltage power supply to the tubes and other electrical apparatus. When utilizing such vibrators for the purpose stated, the vibrations of the reed and other vibrating parts, both mechanical and acoustical, are oftentimes transmitted mechanically through the vibrator support to the radio set establishing undesirable oscillations therein. In addition, the noise of the vibrating reed is heard by the user of the radio set or other apparatus which is annoying and interferes with the reception of the programs. Various attempts and proposals have heretofore been made to overcome the problems established by the mechanical and acoustical vibration of the reed. However, insofar as we are aware, none of these proposals and attempts has been completely satisfactory in solving the outstanding problem.

It is an object of this invention to provide a vibrator in which both mechanical and acoustical vibrations are effectively isolated thus providing noise free operation of the radio set.

It is a further object of the invention to provide a support for a vibrating unit in which the vibrations transmitted from such units through the base or other support are reduced to a minimum.

It is a still further object of the invention to provide a solution to the outstanding problem of eliminating mechanical vibration of the radio set resulting from operation of the reed and also for eliminating the audible noise caused by the motion of the reed.

It is a still further object of the invention to provide a vibrator in which all adjusting operations may be performed before the mounting of the vibrator unit in position upon the base.

It is a still further object to provide a resilient vibrator mounting which is subjected to shearing stresses rather than tensile or compressive stresses during operation of the vibrator.

Other objects of the invention will be apparent from the following description and accompanying drawings taken in connection with the appended claims.

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The invention accordingly comprises the features of construction, combination of elements, arrangement of parts, and methods of manufacture referred to above or which will be brought out and exemplified in the disclosure hereinafter set forth, including the illustrations in the drawings, the scope of the invention being indicated in the appended claims.

For a fuller understanding of the nature and objects of the invention as well as for specific fulfillment thereof, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical, sectional view of a vibrator embodying the principles of the present invention;

Figures 2 and 3 are, respectively, sectional views taken along the lines 2—2 and 3—3 of Figure 1; and

Figure 4 is a perspective view of the supporting ring and bracket.

While a preferred embodiment of the invention is described herein, it is contemplated that considerable variation may be made in the method of procedure and the construction of parts without departing from the spirit of the invention. In the following description and in the claims, parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring now to the drawings in detail, the vibratory motor or unit may include an L-shaped frame 10 having, at one end thereof, a pole piece 11. Mounted on the pole piece 11 is a driver coil 13 which is adapted to be energized, in the manner hereinafter explained, by any suitable source of direct current. A stack 14 is secured to the other end of the frame by a screw 15, the stack consisting of a plurality of insulating spacers 16 between which are mounted a vibratory reed 17 and metal plates 18, the latter being provided with lugs or connections 19. A plurality of side springs 20 may be formed integrally with the plates 18, the springs 20 carrying contacts 21 at their free ends which are engageable with contacts 22 mounted on reed arms 23. As shown, two sets of contacts are provided at each side of the reed, one set for interrupting the current supplied to a transformer primary winding, the other set for rectifying the high voltage output appearing across the secondary winding of the transformer. However, this contact structure is optional and the invention is applicable to vibrators having only one set of contacts, to vibrators utilizing a driver contact for energizing the driver coil, and to vibrators utilizing any desired contact arrangement. A weight or armature 24 is mounted at the free end of the reed 17 adjacent the driver coil 13. When the driver coil is pe-

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riodically energized, the armature is periodically attracted and continuous vibrations of the reed and alternate operation of the contacts on the respective opposite sides of the reed is thereby effected.

The support for the vibrating unit includes a base 25 to which is attached, in any suitable manner, a plurality of prongs or connectors 26. These prongs are connected to the contacts, the driver coil, and the reed, through conductors 27 and the lugs 19.

In accordance with the invention, a tapered frusto-conical socket 28 of resilient sponge material is provided which has a lower flange 29 and an upper flange 30, the flange 29 resting on the base 25. A metal ring 31 is molded into the top flange 30 of the resilient socket and this ring carries an integral bracket 32 which is of slightly less width than the frame 10 and which is spaced from the frame at the lower end thereof. The bracket 32 is provided, at the top thereof, with a pair of ears 33 which are adapted, respectively, to fit into and engage complementary recessed portions formed in the frame 10. In this manner, the central portion of the frame 10 is rigidly held or clamped by the ears 33 and resilient support for the frame is effected by cut-away portions 34 formed at the lower part of the bracket, these cut-away portions forming seats which are adapted to receive the vibrator frame and resiliently hold it in position against the top flanged portion 30 of the socket.

In order to firmly retain the socket 28 in position upon the base 25, a metal ring 40 is provided which rests upon the lower flange 29 of the socket. A metal can 41 is secured to the lower portion of the base 25 and this can has an integral interior abutment 42 formed therein which engages the top surface of the ring 40 and serves to force this ring together with the flange 29 into proper assembled position upon the base.

It will be noted that the flexible socket 28 is so shaped and constructed as not to touch the can or vibrator mechanism except for the lower flange 29 which is secured to the base and the upper flanged portion 30 which carries the ring 31 and its integral supporting bracket 32. It will be apparent that the socket touches the can and the vibrator mechanism only in these two places regardless of the position of the vibrator and the effect of gravity thereon. Accordingly, the vibrator assembly is held in "floating" position within the can and the vibrations thereof are effectively isolated. Due to the tapered construction of the socket and the manner of supporting the vibrator thereon, vibration of the unit imparts a shearing stress to the socket rather than a tensile or compressive stress. This is advantageous in providing improved compliance characteristics for the socket as the compliance of sponge rubber in shear is substantially linear with deflection while the compliance in tension or compression decreases rapidly with deflection.

The novel mounting structure is also advantageous in that the vibrator unit may be connected to the base by the conductors 27 and the unit completely adjusted before the mounting is attached thereto. After adjustment, the socket may be slipped over the top of the vibrator unit and the ears 33 attached to the frame, whereupon the ring 40 and can 41 may be placed in position to complete the mounting of the vibrator unit. This is in direct contrast to conventional vibrators in which the vibrator mounting

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is completely assembled before the adjusting operations are performed.

The top portion of the metal can 41 has an interior lining or layer 43 of resilient sponge material, this lining being fitted into the top of the can and extending down the sides thereof so that the lower edge 45 is spaced from the top of the flange 30 on the socket. It is important that the lining be spaced from the top of the flange and not in engagement therewith in order that the socket may be free to move in any direction during normal operation of the vibrator. However, the spacing between the liner and the vibrator unit should be small enough that such lining will limit the deflection of the vibrator unit resulting from extreme external vibrations or sudden shocks and jars thus preventing damage of the vibrator unit or the can. The lining is also effective in minimizing the transmission of audible noises from the vibrator unit.

We have discovered that the above-described mounting effectively prevents mechanical transmission of vibrations from the reed to the base. Improved results are obtained by our own novel mounting structure when the ears 33 are clamped to the frame at any portion thereof between the lower end of the driver coil and the stack. The results obtained by our novel mounting structure, from the standpoint of vibration transmitted from the reed to the base or can, are far superior to the results obtained when the stack is mounted directly upon a rubber socket without the use of the ring 31 and bracket 32 for clamping the frame at a position between the stack and the driver coil. In addition, it will be observed that the vibratory parts are substantially completely enclosed by the resilient material 43, the socket 28, and the base with the result that little or no audible vibration is conducted through the can. Thus, the operation of the novel support is outstanding both in reducing audible vibrations and in reducing mechanical vibrations transmitted through the vibratory motor support.

While the present invention, as to its objects and advantages, has been described herein as carried out in specific embodiments thereof, it is not desired to be limited thereby but it is intended to cover the invention broadly within the spirit and scope of the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. The combination, with a vibratory unit including an elongated frame, the major portion of the mass of said unit being substantially equally divided between the opposite ends of said frame, of means for mounting said vibratory unit comprising a base, a resilient socket secured to said base, a ring molded in said socket having an integral bracket, and ears formed on said bracket for gripping a central portion of said frame.

2. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a weighted reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a plurality of connectors mounted on said base, leads interconnecting said reed, said driver coil, said contacts, and said connectors, a tapered sponge rubber socket adapted to rest on said base, a ring molded in said socket, a bracket formed integrally with said ring and having ears thereon which are adapted to engage a portion of the vibrator frame which is located between the stack and the driver coil to thereby

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minimize the transmission of vibrations from the vibratory unit to said base, said socket being adapted to be slipped over said driver coil and attached to said frame after said leads have been connected between the base and the vibrator unit and after the vibrator unit has been adjusted.

3. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a weighted reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a plurality of connectors mounted on said base, leads interconnecting said reed, said driver coil, said contacts, and said connectors, a sponge rubber socket adapted to rest on said base, a ring molded in said socket and having cut-away portions defining a seat for said frame, a bracket formed integrally with said ring and having ears thereon which are adapted to engage a portion of the vibrator frame which is located between the stack and the driver coil to thereby minimize the transmission of vibrations from the vibratory unit to said base.

4. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a plurality of connectors mounted on said base, leads interconnecting said reed, said driver coil, said contacts, and said connectors, a socket of resilient sponge material adapted to be anchored to said base, a ring molded in said socket, and a bracket formed integrally with said ring and adapted to engage a portion of the vibrator frame located between said driver coil and said stack, said socket being so shaped as to touch the vibrator mechanism only at the portion thereof which is anchored to the base and the portion thereof which supports the vibrator frame.

5. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a plurality of connectors mounted on said base, leads interconnecting said reed, said driver coil, said contacts, and said connectors, a flanged sponge rubber socket adapted to rest on said base, a ring molded in said socket, a bracket formed integrally with said ring and adapted to engage a portion of the vibrator frame located between said driver coil and said stack, a washer disposed on the flanged portion of said socket, and a metal cap secured to said base, said cap having an internal abutment which bears against said washer to hold the flanged portion of said socket in position upon the base.

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6. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a plurality of connectors mounted on said base, leads interconnecting said reed, said driver coil, said contacts, and said connectors, a flanged sponge rubber socket adapted to rest on said base, a ring molded in said socket, a bracket formed integrally with said ring and adapted to engage a portion of the vibrator frame located between said driver coil and said stack, a metal cap secured to said base, and a layer of resilient sponge material secured to the inner surface of the top and side portions of said cap, the lower edge of said layer being spaced from the top of said socket.

7. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a socket of resilient sponge material adapted to rest on said base, and a metal supporting member molded in said socket having an integral bracket which is adapted to engage a portion of the vibrator frame located between said driver coil and said stack, the portion of said socket between the base and the supporting member being spaced from contact with the vibrator structure in all positions of said vibrator.

8. The combination, with a vibrator unit including a frame, a driver coil and a stack mounted at opposite ends of said frame, a reed secured by said stack, and contacts adapted to be alternately opened and closed by vibratory motion of said reed, of means for mounting said unit comprising a base, a socket of resilient sponge material adapted to rest on said base, and a metal supporting member molded in said socket having an integral bracket which is adapted to engage a portion of the vibrator frame located between said driver coil and said stack, a cap secured to said base, means cooperating with said cap to hold the socket in position on the base, and a layer of insulating material secured to the inner surface of the upper portion of said cap, the lower edge of said layer being spaced from the upper surface of said socket.

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