

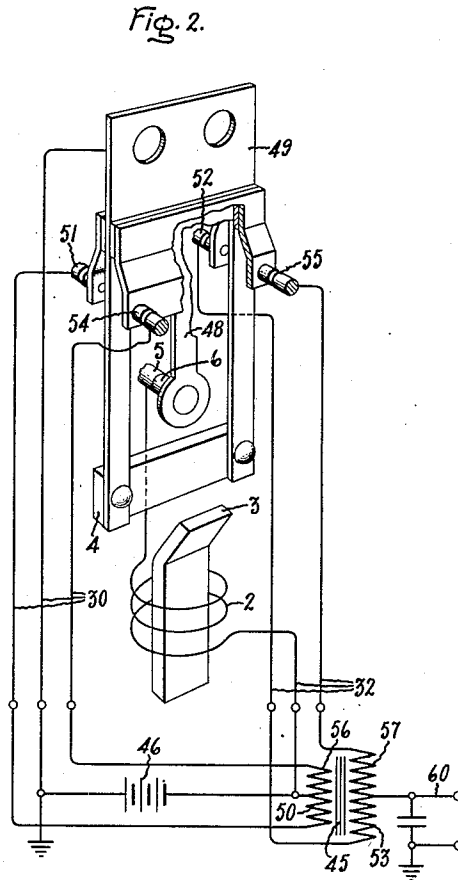
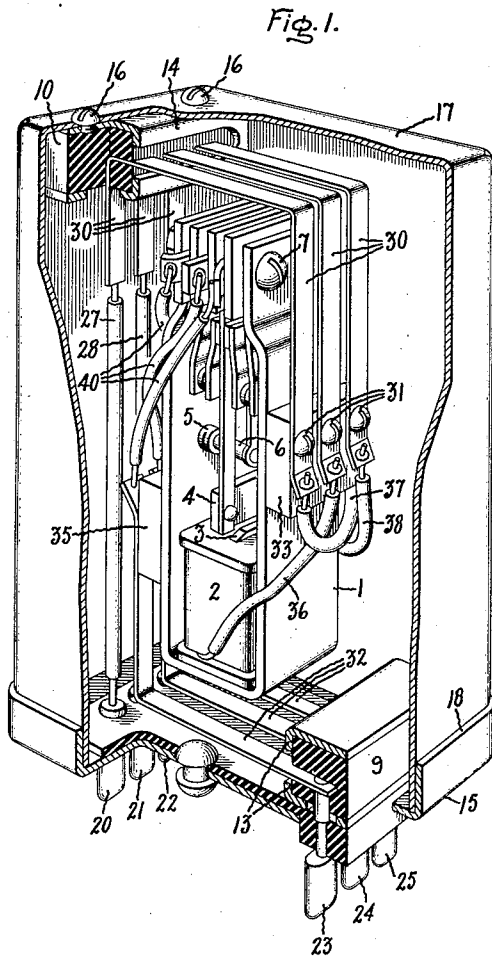
Dec. 25, 1945.

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2,391,668

MOUNTING MEANS

Filed Feb. 9, 1943



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UNITED STATES PATENT OFFICE

2,391,668

MOUNTING MEANS

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Application February 9, 1943, Serial No. 475,288

15 Claims. (Cl. 200—90)

My invention relates to mounting means for vibratory devices. It has to do more particularly with mounting means for vibratory devices such as those employed for converting low unidirectional voltage to high unidirectional voltage, as for operation of radio apparatus.

An object of my invention is to provide an improved mounting means for such devices of character to reduce transmission of vibrations generated by the device to its supports and to adjacent apparatus.

A further object of my invention is to provide a resilient mounting means for such vibrations of such character as to reduce damping of the desired vibrations and thus substantially to increase the efficiency of operation of the vibrator.

A further object of my invention is to provide such an improved mounting means providing resilient support for the device in all directions.

Still another object of my invention is to provide such resilient mounting means of character such that all of the circuit connections to the vibratory device are effected through the resilient supporting means.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 represents a vibratory device embodying my invention, and Fig. 2 shows schematically certain of the essential elements and circuit connections therefor.

Referring first to Fig. 1 of the drawing, the vibratory device comprises a U-shaped member 1 supporting an electromagnet 2 within the lower bend of the U. The magnet 2 has an upwardly projecting pole piece 3 which when energized attracts an armature 4, which armature causes certain contacts 5 and 6 to be separated. These contacts are included in the circuit of the magnet and their separation thus causes the magnet to be deenergized. The armature is then no longer attracted and springs back to its original position again closing contacts 5 and 6 and reenergizing the magnet. In this way, armature 4 is maintained in vibration.

The armature 4 and various other contacts of the mechanism of the vibrator, later to be more particularly indicated, are supported between the upper ends of the U-shaped member 1 between which extend bolts, one of which is indicated at

7. The circuit connections to these various contacts will later be described.

This vibrating mechanism, including the U-shaped member, the vibrating armature 4 and its various contacts which oscillate with it and which cooperate with other stationary contacts all of which are supported between the upper ends of the legs of the U-shaped member 1, comprises a unitary assembly which is supported between two fixed supports 9 and 10 positioned at diagonally opposite sides of the vibratory device. The support 9 comprises suitable resilient insulating material, such as sponge rubber, clamped or pressed into a metallic frame 13 and supported upon a base member 15. Support 10 likewise comprises a resilient insulating member, which may be sponge rubber, and which may be pressed into clamping member 14, the latter of which may be attached by means of screws 16 to the housing 17 of the mechanism. This housing 17 is arranged to fit within the upturned portion 18 of the base member 15 completely to house and shield the apparatus. It may be removed simply by removing the screws 16 and withdrawing the housing from the base member 15.

The base member 15 is provided with six electrical terminals 20, 21, 22, 23, 24 and 25 which may be of the plug type arranged to be inserted in a suitable jack, not shown, for establishing connections with external apparatus. Suitable conductors, of which two are shown in Fig. 1, and which are indicated at 27 and 28, extend upward from the contacts 20, 21 and 22 and their upper terminals are connected to one end of a plurality of U-shaped resilient members 30 each of which has an elbow molded into the sponge rubber member 10, the bottom of the U of these U-shaped members extending across the upper side of the vibrator mechanism and thence about a substantial right angle and downward to fixed points comprising screws 31 on the opposite side of the vibratory device whereby the ends of these members 30 are rigidly attached to the vibratory device, these screws extending into insulating block 33, which is secured to the respective leg of U-shaped member 1. Similarly contacts 23, 24 and 25 are connected through resilient L-shaped members 32, which extend across the lower end of the vibratory device, about an angle, and thence upward to fixed points where they are similarly secured to the insulating block 35, which is attached to the opposite leg of the U-shaped member 1 of the vibratory device. Additional connections extend from the ends of the U-shaped members 30, one comprising the conductor 36 ex-

tending to the electromagnet 2 and others comprising the connections 37 and 38 extending to certain contacts in the apparatus. Similar connections 40 extend from the upper ends of the members 32 to various contacts in the vibratory apparatus.

These resilient members 30 and 32 comprise the sole support for the vibratory apparatus and they support it within the substantial rectangle defined by the shape of the supports. In addition, they carry all of the electrical circuits to this vibratory apparatus. These members 30 and 32 are resilient throughout their length and thus they afford resilient support for the device in all directions including directions at right angles to each side of the device. This resilience is sufficient substantially to prevent the transmission of vibrations generated by the device to its supports and insulates it from shock arising from without the housing 17. At the same time, it is of such character that it permits such movement of the vibratory device as results from the operation thereof but resiliently resists such movement. It has been found in the operation of the vibratory device when so supported that its tendency is to rock about its center of mass. This center of mass is on an axis extending through the device parallel with the broad sides of block 33. The blocks 33 and 35 are positioned as near this axis as possible but block 35 is offset to some extent to permit access to a screw on the back of the device which carries contact 5 and by which contact 5 is adjusted in position. This rocking action actually occurs to some extent but is resisted by the resilience of the members 30 and 32 without appreciably damping the vibratory action of the device. This results to some extent from the fact that members 30 and 32 are attached to the vibratory device at points intermediate its length, near the center of mass, thus allowing somewhat freer movement of the ends of the device than occurs if the supporting means were attached to these ends.

While the structure of the vibratory device supported within the U-shaped member 1 may vary widely, I have shown the essential features of the particular device illustrated schematically in Fig. 2. In this figure I have shown at the left side of the drawing the conductors 30 extending to the apparatus and at the right side of the drawing the conductors 32 extending to the apparatus. In the lower portion of the drawing I have shown transformer or inductance device 45, which may be connected to the vibratory apparatus through the plug and jack arrangement previously described and through the circuits comprising conductors 30 and 32. This apparatus is normally energized from a battery 46 which may comprise an automobile storage battery, for example.

The further details of the device may best be understood by reference to its operation. With the apparatus in the position schematically shown in Fig. 2, the winding 2 of the electromagnet is energized through a circuit extending from the negative side of the battery 46, through the winding 2 thence through contacts 5 and 6, resilient member 48 which is attached integrally with member 49 supported between the upper two arms of the U-shaped member 1, and thence through the middle one of the three conductors 30, as shown in Fig. 2, back to the positive terminal of the battery. Since coil 2 is energized, flux produced in magnet pole piece 3 attracts armature 4 which operates to separate contacts 5 and 6, thus breaking the circuit of coil 2 and completing

circuits through contacts 54 and 55 and the upper halves 56 and 57 of the primary and secondary windings, respectively, of the transformer 45. The circuit through the upper winding 56 extends through contacts 54 and member 49 back to the positive side of battery 46 and that through the upper winding 57 extends through contacts 55 and member 49 back to the positive side of the battery. When winding 2 is deenergized, the flux in the pole piece 3 decays and the armature deflects back through its original position again closing contacts 5 and 6, reenergizing coil 2, and closing contacts 51 and 52. Contacts 51 and 52 close respective circuits through the lower halves 50 and 53 of the windings of transformer 45, both through member 49 back to the positive side of the battery. In this way, through action of the coil 2 and the magnet 3 the armature 4 is maintained in continuous vibration alternately breaking the contacts 51 and 52 and closing the contacts 54 and 55. This alternate closing of the circuits to the upper windings of the transformer 45, then breaking them and completing them through the lower windings of the transformer 45, then breaking the circuits to the lower windings and again reestablishing those through the upper windings of the transformer 45 causes a voltage to be produced between the terminal 60 and ground which is unidirectional and of a value higher than the voltage of the battery 46 to an extent dependent upon the ratio of turns of the primary and secondary windings of the transformer 45.

It has been found that the resilient means described for supporting vibratory apparatus of the character indicated operates extremely satisfactorily both to prevent the transmission of vibrations generated by the device to external apparatus, to protect the vibratory device from shock from without the apparatus, and also to permit such movement of the vibratory device as is produced by the action thereof in its operation while resiliently resisting such movement and thus avoiding any appreciable damping of the action thereof.

This action of my improved mounting very materially improves the operating efficiency of the device and reduces the energy required for its excitation. For example, if the same voltage be applied to coil 2 that would be required were the vibrator device mounted in conventional sponge rubber mounting means, as is commonly done, the armature 4 of my device would vibrate to such an extent that it would hit the legs of the U-shaped member 1. This is, of course, undesirable and the voltage applied to coil 2 of the vibrator having my improved mounting means may be substantially reduced while still producing desired excitation of the vibrator. Thus the power requirements of the device are reduced. This is important especially when the device is energized from batteries carried on the person, as in so-called "walkie talkie" radio apparatus.

Since the devices dispense with the usual semi-flexible stranded conductors leading to the vibrating portion of the device, the transmission of vibrations through such conductors, which is ordinarily objectionable, is obviated. In addition, air borne vibrations are largely reduced by the housing 17 which completely encloses the device. Preferably this housing is mounted resiliently within an outer housing, not shown, which completely encloses the equipment to reduce transmission of vibrations through the air.

While I have shown a particular embodiment

of my invention, it will of course be understood that I do not wish to be limited thereto since different modifications may be made, and I contemplate by the appended claims to cover any modifications which fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A mounting for a device which generates vibration in operation comprising resilient support members attached to opposite sides of said device, each of said members extending around an angle and thence to a fixed support, and each of said support members being resilient in two directions through said device.

2. A mounting for a vibratory device comprising fixed supports positioned at opposite sides of said device and a resilient support secured to and extending from each fixed support to that side of said vibratory device opposite the respective fixed support, each resilient support being resilient in two directions.

3. In combination, a device which in operation generates vibrations, fixed supports for said device at opposite sides thereof, means to support said device from said fixed supports and to prevent transmission of said vibrations from said device to said fixed supports, said means comprising resilient members extending from said fixed supports to said device, each resilient member extending about an angle and being resilient in both arms of said angle.

4. In combination, a device which in operation generates vibrations, fixed supports for said device on opposite sides thereof, resilient supports secured to and extending from said fixed supports to said device, each resilient support extending from its respective fixed support along the adjacent sides of said device to a point on said device, and that part of each support adjacent any side of said device being resilient in a direction at right angles to the respective side.

5. In combination, a device which in operation generates vibrations, fixed supports for said device on opposite sides thereof, resilient supports secured to and extending from said fixed supports to said device, the resilient supports extending from different of said fixed supports extending in opposite directions therefrom and thence about an angle to a point on a side of said device opposite the respective fixed support, said resilient supports substantially defining a rectangle enclosing said device, and said resilient supports being resilient at right angles to all sides of said rectangle.

6. In combination, a vibratory device, a pair of fixed supports therefor positioned on opposite sides of said device, each of said fixed supports carrying a plurality of resilient conductors, the resilient conductors carried by each support extending in parallel along two adjacent sides of said device and being attached to said device at a point intermediate the length of said device, said resilient conductors comprising the entire support for said device, and circuit connections for said device extending through said resilient conductors.

7. In combination, a vibrator, resilient supports attached to said vibrator at points intermediate its length and on opposite sides of its center of mass, each support extending from its respective point of attachment to said vibrator along said vibrator and across the end thereof and being resilient at right angles to both said side and end and fixed means supporting said re-

silient supports at the ends thereof opposite said point of attachment to said vibrator.

8. In combination, a vibrator having elongated form and having a center of mass intermediate the length thereof, resilient supports attached to opposite sides of said vibrator near said center of mass, said supports attached to opposite sides of said vibrator extending in opposite directions along said vibrator and across the end thereof to respective fixed points, and each support being resilient in two directions through said vibrator thereby to reduce damping of the desired vibrations of said vibrator and permitting said vibrator to rock about said center of mass and means securing said resilient supports at said fixed points.

9. In combination, a device to be shock mounted, resilient supports attached thereto at opposite sides of the center of mass of said device, each support extending along two adjacent sides of said device and being resilient throughout its length and fixed means securing said supports at the ends remote from the point of attachment to said device.

10. In combination, a device to be shock mounted, resilient supports attached thereto at opposite sides of the center of mass of said device, said supports extending along two adjacent sides of said device at a substantial angle to each other and being resilient in directions at right angles to both of said sides and means supporting said device through said resilient supports.

11. In combination, a device to be shock mounted, resilient supports attached thereto at opposite sides of the center of mass of said device, said supports extending along the respective side of said device and thence about a substantial angle to respective fixed points, and each support having resilience at right angles to both sides of said angle and means securing said resilient supports at the ends remote from the point of attachment to said device.

12. In combination, an electromagnetic vibrator, a housing therefor, means to support said vibrator in said housing, said means comprising resilient supports extending from points on said vibrator opposite the center of mass thereof to respective points on said housing to which said supports are attached, each of said resilient supports extending about a substantial angle and having sufficient length in both arms of said angle to afford resilience to said vibrator in two directions through said vibrator.

13. In combination, an electromagnetic vibrator, a housing therefor, means to support said vibrator in said housing, said means comprising resilient supports extending from points on said vibrator opposite the center of mass thereof to respective points on said housing to which said supports are attached, each of said resilient supports extending about a substantial angle and having sufficient length in both arms of said angle to afford resilience to said vibrator in two directions through said vibrator, and operating circuit connections for said vibrator extending thereto through said resilient supports.

14. A support for a vibrator including a U-shaped member having an electromagnet supported within and at one end of said U and a vibratory armature supported within said U and at the opposite end thereof, stationary contacts cooperating with said armature, and a housing for said vibrator, said support comprising circuit connections extending from said contacts through the wall of said housing, each of said connections

including an elongated resilient member having the general shape of an L and being resilient in both arms of the L, certain of said members being attached at one end to said vibrator at opposite sides thereof and at a point intermediate the length of the U and being attached at the opposite end thereof to said housing, said certain members forming the sole support of said vibrator.

15. A support for a vibrator having an electromagnet, a vibratory armature cooperating therewith, contacts cooperating with said armature, said electromagnetic armature and contacts being

assembled in a unitary assembly, and a housing for said assembly, said support comprising a plurality of electrical connections extending through the wall of said housing to said assembly, each of said connections including a resilient conducting strip attached at one end to said housing and at the other to said assembly and having a substantial angle at a point intermediate its length to produce resilience in two directions, a plurality of said strips being attached to said assembly on each of two opposite sides thereof to support said assembly.

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