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ELECTROMAGNETIC VIBRATORY MOTOR

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Fig. 1.

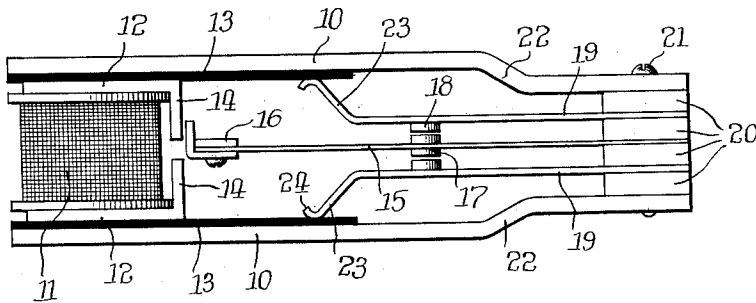
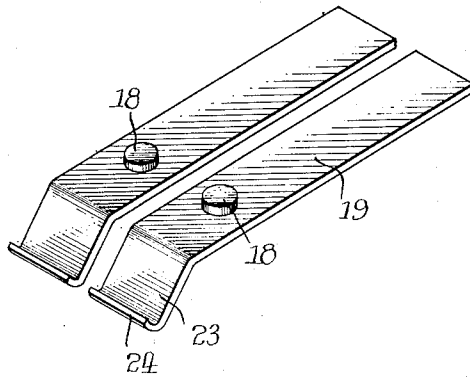


Fig. 2.



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ELECTROMAGNETIC VIBRATORY MOTOR

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5 Claims. (Cl. 200-90)

The invention relates generally to electromagnetic vibratory motors and more particularly to devices which are especially well adapted for use in electrical systems wherever a vibratory member is arranged to establish correlated circuits for converting direct current of low potential into direct current of high potential. An example of such a system is found in "B" battery eliminators for use in automobile installations of radio receiving sets.

Electromagnetic vibratory devices of the type to which this invention relates usually include a vibratory member or reed which coacts with what may be termed "fixed" contacts to establish certain electrical circuits. The vibratory frequency of the reed is high and the amplitude of swing is comparatively small, hence the adjustment of the fixed contacts relative to the reed must be accurate to obtain efficient operation.

An object of the invention is to provide in a device of this character new and improved means by which an accurate adjustment of the fixed contacts relative to the vibratory reed may be quickly and easily obtained.

Another object is to provide in a vibratory motor new and improved means for adjusting the position of each fixed contact relative to a cooperating contact part carried by the vibratory reed, which means includes an elongated resilient member fixed at one end and free for adjustable movement at the other end with respect to a stationary part of the device, such as the frame, from which the resilient member is electrically insulated during such adjustment, the fixed contact being mounted intermediate the ends of said elongated resilient member so that the amplitude of adjustment is less at the fixed contact than at the end of said member.

Another object of the invention is to provide an electromagnetic vibratory motor embodying an improved frame structure for supporting the cooperating parts of the device.

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 the vibratory motor embodying the features of the invention.

Fig. 2 is a perspective view of the fixed contacts on one side of the vibratory reed and the supporting members therefor.

While the invention is susceptible of various modifications and alternative constructions, we have shown in the drawing and will herein describe in detail the preferred embodiment, but

it is to be understood that we 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.

The vibratory motor which has been shown herein for illustrative purposes is intended to be used in effecting full wave synchronous interruption and rectification in a system which transforms direct current of relatively low potential to direct current of relatively high potential. In these systems direct current from such a source as a storage battery is first interrupted and alternately and reversely directed into the opposite sections of a center tapped primary winding. The flow of alternating current of high potential from a center tapped secondary winding is rectified to produce a direct current of high potential. The electromagnetic vibratory motor herein illustrated embodies a vibratory reed which swings between two spaced fixed contacts alternately to establish circuits therethrough which include the end sections of the primary winding. The vibratory reed also swings between a similar pair of fixed contacts to establish rectifying circuits, first, through one half and, then, through the other half of the divided secondary winding.

Referring more particularly to Fig. 1 of the drawing, the instant vibratory motor construction comprises a pair of spaced opposed and elongated frame members 10. Between said frame members at one end thereof is secured an electromagnetic winding 11 having a pair of pole pieces 12, each of which is disposed in opposition to an adjacent frame member 10 but is spaced therefrom by a sheet of suitable insulation 13. Any suitable means (not shown) may be employed for securing these parts rigidly together. Inside the frame the ends of the pole pieces are turned toward each other, as indicated at 14, but are spaced apart to provide a magnetic gap located substantially upon the center longitudinal line of the frame.

A vibratory reed 15, preferably in the form of an elongated flat sheet of spring steel, is supported between the opposite ends of the frame members and terminates immediately adjacent to the magnet gap between the ends of the pole pieces 12. This free end of the reed carries an armature 16 of magnetic material. The reed is normally untensioned and the reed and armature are so located as to position the armature for free swinging movement past but never in contact with the intumed ends of the pole pieces.

Moreover, the armature is preferably located at one side of the center of magnetic force created by the magnetic winding so that initial energization of the winding causes the reed to swing in one direction. Thereafter intermittent energization of the winding, effected in any suitable manner, will continue vibratory movement of the reed.

Approximately intermediate its ends the reed is provided with contact points 17 in the form of double contacts projecting beyond each face of the reed. A pair of such contact points 17 are provided, only one of which may be seen, since the points are mounted on the reed in transversely aligned relation. One contact point controls the primary interrupting circuits, while the other contact point controls the secondary rectifying circuits.

Cooperating with the pairs of movable contact points 17 are fixed contact points disposed on opposite sides of the reed for alternate engagement by the movable contact points 17, there being in the present instance two oppositely disposed fixed contact points for each contact point 17. The fixed contact point assembly may best be seen in Fig. 2, wherein 18 designates a fixed contact point which is mounted intermediate the ends of an elongated resilient member 19. It is thus evident that when the contacts 17 carried by the vibrating reed strike the contacts 18, the members 19 will be flexed away from the reed in view of their resiliency and the location of contacts 18 intermediate the ends of the supporting members. Also, such flexure of the members 19 out of their normal configuration caused them to tend to return to such configuration due to their resiliency so that they consequently exert a restoring force on the reed.

The reed and the resilient members are each rigidly supported at one end between the ends of the frame members 10 by such means as pieces or blocks of insulation 20, the assembly being completed by screws 21 or the like which maintain the parts securely in electrically independent relation. Preferably the frame members 10 intermediate their ends are inwardly offset, as indicated at 22, to decrease the gap between the ends of the frame which mount the reed, supporting members 19, and insulation.

Each of the supporting members 19 is flat, extends substantially parallel along the reed 15, and the contact point 18 thereon is carried by this flat portion of the supporting member intermediate its ends for cooperation with the contact points 17 on the reed. The outer free end of each of the supporting members 19 is turned outwardly away from the reed to provide an angular portion 23 which reaches substantially to the adjacent frame member 10 and there terminates in a short inturned curl 24 adapted to rest against and bear smoothly on an extension of the insulated sheet 13. This angular portion 23 provides a simple and efficient means for adjusting the relationship of the contact point 18 relative to its cooperating point 17, since it is only necessary in assembly to bend the portion 23 in one direction or the other to obtain an accurate adjustment between the cooperating contact points. By providing this adjustment at the outer end of each supporting member 19 and beyond the fixed contact point 18, sensitive adjustments are possible, since the extent to which the end 23 is bent results in a proportionately smaller movement of the fixed contact point 18.

Hence, an accurate spacing between the cooperating points may be readily achieved.

We claim as our invention:

1. In a vibratory motor, the combination of a frame, a vibratory reed fixed at one end to said frame, means for vibrating said reed, a resilient flexible member extending along said reed in spaced relation thereto and supported at the same end as said reed, and cooperating contact points on said reed and member intermittently engageable in the vibration of said reed, said member having its free end bent for adjustable engagement with an opposed part of said frame to determine the amplitude of swing of said reed prior to the closure of said contact points, the flexure of said resilient member upon closure of said contact points causing it to exert a restoring force on said reed.
2. A vibratory motor comprising, in combination, a frame including spaced substantially parallel side members, a vibratory reed secured at one end of said frame to extend between said side members substantially parallel thereto and having contacts on opposite side faces thereof, electromagnetic means mounted at the opposite end of said frame for effecting vibratory movement of said reed, a pair of yieldable members secured to the same end of said frame as said reed and disposed one on each side of said reed to extend therealong in substantially parallel relation thereto, contacts carried by said yieldable members for cooperation with the contacts on said reed, and means providing an electrically insulated adjustment between each of said yieldable members and the side member adjacent thereto for adjustably determining the amplitude of swing of said reed prior to the closure of said contacts.
3. A vibratory motor comprising, in combination, a frame including elongated side members disposed side-by-side in spaced relation, a vibratory reed secured at one end of said frame to extend between said side members in the general direction thereof and having contacts on opposite side faces thereof, electromagnetic means mounted at the opposite end of said frame for effecting vibratory movement of said reed, a pair of elongated yieldable members secured to said frame and disposed one on each side of said reed to extend therealong longitudinally of said reed, contacts carried by said yieldable members for cooperation with the contacts on said reed and disposed in spaced relation thereto when said reed is in its idle position, and means providing an electrically insulated adjustment between each of said yieldable members and the frame side member adjacent thereto.
4. A vibratory motor comprising, in combination, a frame including spaced substantially parallel side members, a vibratory reed secured at one end of said frame to extend between said side members substantially parallel thereto and having contacts on opposite side faces thereof, electromagnetic means mounted at the opposite end of said frame for effecting vibratory movement of said reed, a pair of yieldable members secured to the same end of said frame as said reed and disposed one on each side of said reed to extend therealong in substantially parallel relation thereto, contacts carried by said yieldable members for cooperation with the contacts on said reed, and means providing an electrically insulated adjustment between each of said yieldable members and the side member adjacent thereto.
5. A vibrator of the type set forth comprising,

5 in combination, a frame including a pair of rigid metal side members arranged in generally parallel spaced relation and presenting opposed faces, a cantilever type sheet metal reed fixed at one end to the frame and disposed to vibrate between said side member faces, a pair of resilient spring fingers each fixed at only one end to the frame and lying respectively between the reed and an adjacent frame side member, said

spring fingers and said reed carrying opposed contact points, strips of insulation on said side member faces underlying the free ends of said spring fingers, and the ends of said spring fingers being bent outwardly into resilient engagement with said insulating strips on said side members to adjust the spacing of said contact points. 5

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