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2,472,637

VIBRATORY MOTOR

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Fig. 1

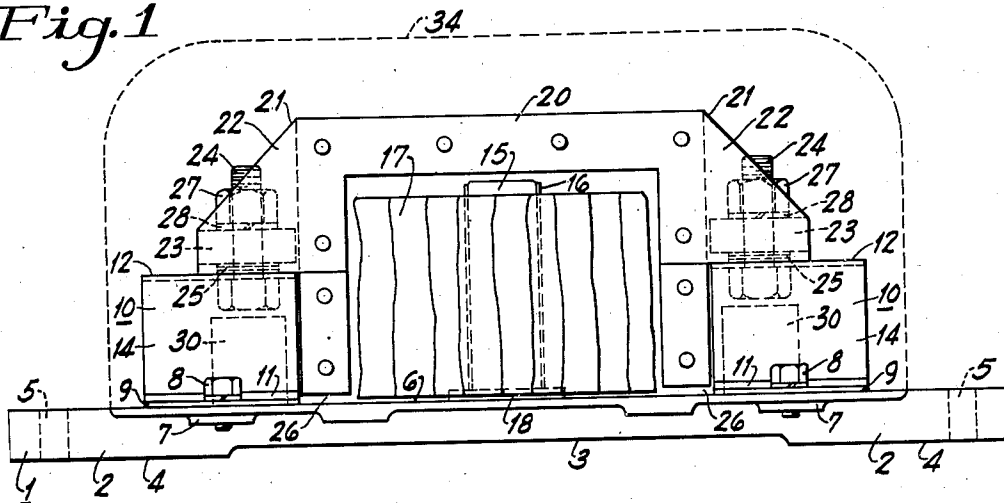


Fig. 2

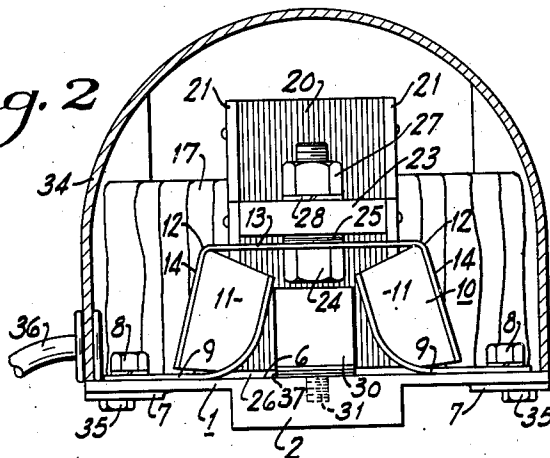
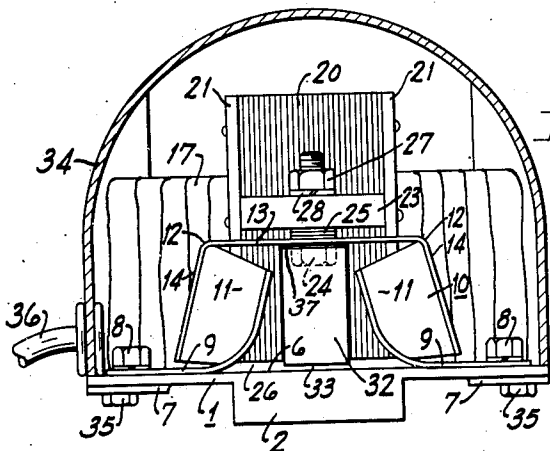


Fig. 3



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VIBRATORY MOTOR

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3 Claims. (Cl. 172-126)

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This invention relates generally to vibratory motors and more particularly to the manner of resiliently supporting the armatures of vibratory motors.

A vibratory motor generally comprises an electromagnetic field member and an armature member magnetically coupled therewith which is resiliently supported by spring members tuned to have a natural period of vibration close to the frequency of the current impulses employed to energize the electromagnetic field member. The vibrating armatures are provided with strikers which engage the base of the motor or the object to be vibrated or the forces of inertia of the armature are transmitted through the resilient support members without striking, to produce the desired vibratory action on an object such as a hopper. Those armatures equipped with strikers are preferably provided with "stellite" striking surfaces to prevent material wear. However hard surface strikers create a material amount of undesirable noise. This invention is principally directed to the problem of eliminating the noise of a vibratory motor having a striking or impacting armature without sacrificing the efficiency of the operation of the motor. This invention is also directed to a vibratory motor to operate without striking parts but equipped so that if it does strike there will not be excessive noise and the armature laminations will not be damaged.

The principal object is the provision of an improved vibratory motor of the impact type.

Another object is the provision of a resilient striker for the armature of a vibratory motor.

Another object is the provision of a stop for limiting the amplitude of the armature of a vibratory motor.

Another object is the provision of a stop arranged to snub the vibrations of the armature of a vibratory apparatus.

Another object is the provision of an armature having an adjustable stop which limits the amplitude of vibration of the armature.

Another object is the provision of a resilient stop for an armature of a vibratory motor arranged to receive the impact force of the armature and transmit its vibratory forces without producing noise.

Another object is the provision of emergency stops to prevent impact against the armature laminations if too great amplitude should occur due to improper adjustment or excessive voltage.

Other objects and advantages appear in the following disclosure and claims.

A practical embodiment illustrating the prin-

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ciples of this invention are shown in the accompanying drawing wherein:

Fig. 1 is a view in side elevation of an electromagnetic vibratory motor employing this invention.

Fig. 2 is a view in elevation of one end of the vibratory motor and showing the cover in section.

Fig. 3 is a view similar to Fig. 2 showing a modification of this invention.

Referring to Figs. 1 and 2 of the drawings the motor base 1 is preferably made of metal, such as cast steel, and comprises a heavy central rib section 2 extending longitudinally of the base and relieved along its intermediate section as indicated at 3 to form the spaced mounting pads 4 at the ends thereof. The pads 4 are ordinarily faced on the bottom to fit the object to be vibrated and are provided with the holes 5 for the purpose of attaching the motor to the object, such as a bin or hopper. The top of the base 1 extends laterally outwardly from each side of the rib 2 to provide a flat deck 6. Since the sides of the deck 6 are thin they are provided with bosses 7 for the threaded holes which receive the fastening bolts 8 that secure the strips 9 of the resilient armature support members 10 to the base. The strips 9 extend inwardly and upwardly with their inner ends spaced from one another. Resilient blocks 11 made of suitable material such as rubber or synthetic material are vulcanized to the angular and upwardly extending portion of the strips 9. The bracket 12 has an intermediate horizontal section 13 with depending end sections 14 which bridge the blocks and strips 9. The inner faces of the depending end sections 14 are vulcanized to the other side of their respective block members 11. Each resilient armature support member 10 is a unitary member and when mounted in spaced relation on the deck of the base they provide a resilient support for the armature of the vibratory motor.

An upwardly projecting central core member 15 is secured to the top surface of the deck 6 and is encircled with the insulating sleeve 16. The electromagnetic field coil 17 is mounted on the sleeve 16 and rests on the insulating washer 18 on the surface of the deck which surrounds the core 15.

The armature 20 is a riveted C-shaped laminated structure having heavy side plates 21 which extend in triangular sections 22 beyond the ends of the armature and are connected by the transverse plates 23. The plates 23 are provided with clearance holes to receive the bolts 24 which extend up through aligned holes in the horizontal

section 13 of the resilient support members 10. Shims 25 are placed on the bolts 24 between the resilient support members 10 and the plates 23 to properly adjust the air gap 26 between the pole faces of the C-shaped armature and the base. The armature is held in position by the nuts 27 which screw down on the lock washers 28.

A stop or bumper 30 is provided with a threaded stud 31 arranged to screw into a thread hole in the deck directly below the head of the bolt 24. This stop is preferably made of a resilient material such as rubber or a synthetic resilient product and the stud 31 is cast therein when it is formed.

When the field of the motor is energized with a rectified half wave or similar pulsating current, the armature is caused to vibrate in a vertical path and the heads of the bolts 24 rapidly strike the rubber stops or snubbers 30 thereby transmitting the vibratory force directly to the base and the object on which it is mounted.

In the structure shown in Fig. 3, the resilient stops or snubbers 32 are molded or otherwise cast around the heads of the bolts 24 and their free or depending ends are spaced from the surface of the deck to provide the gap 33 and functions when the armature is vibrated to strike the base for transmitting the vibratory forces directly thereon in the same manner as that of the structure shown in Figs. 1 and 2.

The stops or snubbers 30 and 32 may be made to provide for the proper transmission of the vibratory forces to the object to be vibrated. The rubber may be made in varying degrees of hardness to produce the desired characteristics regardless of the type of resilient supports that are employed to carry the armature as these supports are sometimes made with coil or flat leaf springs. The resilient stops or snubbers permit the transmission of the vibratory forces from the armature to the base without producing the noise created by the metal to metal strikers.

The vibrator may be adjusted and operated so that normally there is no contact between bolts 24 and stop 30, or between stop 32 and base 2. If abnormal conditions arise such as excessive voltage and amplitude of armature increases excessively then these relative stops may prevent the armature laminations from striking the base at the region of gaps 26 and injuring said lamination. The gaps 26 may be adjusted by adding or removing one or more of the shims 37.

The vibratory motor may be enclosed by the cover 34 which is rounded at the top and is pro-

vided with vertical side and end walls having inverted lugs which are tapped to receive the bolts 35 passing upwardly through the deck 6. The cover is provided with a suitably insulated washer for the purpose of passing the wires or leads 36 to the field for electrically energizing the same.

I claim:

1. A vibrator consisting of a base constructed for attachment to an object to be vibrated, a vibratory motor having an electromagnetic field member and an armature member supported in operative spaced relation to provide a magnetic coupling therebetween, means for securing one of said members to the base, resilient means supporting the other member for vibration relative to the base, and an elastomer means interposed between said other member and the base for directly receiving and transmitting the full impact of the vibratory force to the base.

2. A vibrator consisting of a base constructed for attachment to an object to be vibrated, a vibratory motor having an electromagnetic field member and an armature member supported in operative spaced relation to provide a magnetic coupling therebetween, means for securing one of said members to the base, resilient means supporting the other member for vibration relative to the base, and an elastomer means mounted on the base for receiving and directly transmitting the full impact of the vibratory force of said other member to the base.

3. A vibrator consisting of a base constructed for attachment to an object to be vibrated, a vibratory motor having an electromagnetic field member and an armature member supported in operative spaced relation to provide a magnetic coupling therebetween, means for securing one of said members to the base, resilient means supporting the other member for vibration relative to the base, and an elastomer means mounted on said other member for directly transmitting the full impact of the vibratory force of said other member to the base.

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