ABSTRACT OF THE DISCLOSURE

A vibrator pump is disclosed which is mounted on a rigid base member for absorbing vibrations resulting in a quieter running pump.

FIELD OF THE INVENTION

This invention relates to aquarium pumps and particularly to vibrator pumps for aquariums.

BACKGROUND OF THE INVENTION

Vibrator pumps are used both for aerating and filtering in fish tanks or aquariums. The most common usage of vibrator pumps in aquariums is for aeration. When a small aquarium is used, however, such as one in which the flow of 5 gallons of water per hour through a filter is sufficient, a vibrator pump may be employed for filtering.

Vibrator pumps are used because they are simple and inexpensive. They have, however, one major drawback. Due to the vibratory operation of the pump, noise is generated which can be disturbing in a home environment. To compensate for this, most manufacturers of vibrator pumps attach their pumps to a plastic housing. However, this has generally failed to appreciably reduce the noise level.

It is an object of this invention to provide a vibrator pump which does not produce an undesirable noise level.

It is another object of this invention to provide an inexpensive vibrator pump which is quiet in operation and does not transmit vibrations to its adjacent environment.

BRIEF DESCRIPTION OF THE INVENTION

With these and other objects in view, the present invention contemplates a vibrator pump for aquariums which includes a pumping chamber having a diaphragm therein mounted on a housing, an armature pivotally mounted on the housing and attached at one end to a magnet, the armature being secured to the diaphragm and having a combined natural frequency of vibration. The pump further includes an electromagnet responsive to excitation at a frequency near the natural frequency of the armature combination which is mounted on the housing adjacent to the magnet for vibrating the armature thereby causing a pumping action in the pumping chamber. The housing is mounted on a base having a natural frequency of vibrations below the excitation frequency, to absorb the vibrations in the housing resulting in a quieter running pump.

DESCRIPTION OF THE DRAWINGS

The sole figure is a side cutaway view of a vibrator pump constructed in accordance with the teachings of this invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the figure, we see a vibrator pump including a base 10, a pumping unit 11 and a cover 12. The base 10 is formed from a solid block of wood and has an upwardly extending peripheral lip 13 forming a cavity in the base 10 upon which the pumping unit 11 is securely fastened by screws 14. The base 10, in addition, has a lower depending peripheral lip 16. The cover 12 is constructed to fit in the cavity formed by the lip 13 and has an inside diameter to snugly engage the inner surface of the lip 13.

The pump mechanism 11 includes a U-shaped metal housing 17 upon which a pumping chamber 18 is mounted. The pumping chamber 18 is a standard variety which has an air intake port 19 and an air outlet hose 21 which extends through the side of the base 10. The pumping mechanism 18 has internal valving (not shown) to take air in through the opening 19 when a vacuum is created and to force air out the hose 21 when pressure is applied.

A diaphragm 22 made from a flexible material such as rubber encloses the open end of the pumping mechanism 18 to form a pumping chamber. An armature 23 is pivotally mounted at a point 24 on the housing 17. A central portion 26 of the armature 23 is affixed to the diaphragm 22 to move the diaphragm in response to pivotal motion of the armature 23. A permanent magnet 27 is affixed to the free end of the armature 23.

An electromagnet 28 is mounted on the bottom of the housing 17. An electrical cord 29 with a common house plug 31 is attached to energize electromagnet 28, normally a 60 cycle house current. The natural frequency of the pivoted armature 23 attached to the diaphragm 22 and carrying the electromagnet 27 is in the same order of magnitude as the 60 cycle excitation supplied to the electromagnet 28. When the electromagnet 28 is excited, the magnet 27 is moved thereby back and forth about its rest position causing pumping action. This back and forth motion sets up vibrations throughout the entire housing 17.

It has been discovered that by having a base 10 with a frequency response to vibration well below the vibratory frequency of the vibrator pump, the housing can be securely mounted to the base 10 without vibrations being transmitted by base 10 to surrounding objects. Rather, the base 10 absorbs the vibrations resulting in a quieter running, less expensive vibrator pump. It has been found that if the frequency response of the base 10 is made at least an order of magnitude below the excitation frequency of the electromagnet 28, a satisfactorily quiet commercial pump will be produced. It should be noted that the housing may be rotated 90 degrees before mounting so that the opened end of the housing extends upwardly without interfering with operation of the pump.

An additional cause of noise in a directly mounted vibrator pump has been found to be caused by a rocking of the base 10 due to the moment set up by the pendulum like vibratory motion of the armature 23. To minimize this source of noise, the depending lip 16 has been formed in the base 10. In this way by having the periphery of the base extend beyond the remaining bottom side of the base, no rocking action will occur.

It should be understood that while this invention has been described with respect to a specific embodiment, numerous others will become obvious to those of ordinary skill in the art in light thereof.

What is claimed is:
1. A vibrator pump for aquariums including:
a housing;
a pumping chamber including a diaphragm mounted on said housing;
an armature having first and second ends thereof; the armature being pivotally mounted at said first end thereof on said housing and having a permanent magnet attached to the second end thereof; means for connecting said armature to said diaphragm.
to urge said armature into a first position; said pivoted armature, magnet and diaphragm having a natural frequency of vibration;
an electromagnet responsive to excitation at a frequency near said natural frequency, mounted on said housing adjacent to said magnet for vibrating said armature about said first position to cause a pumping action in said pumping chamber;
a base having a natural frequency of vibration below said excitation frequency;
means for securely mounting said housing on said base;
and
said base has a top side and a bottom side, said bottom side having a periphery, said housing being mounted on said top side and said periphery of said bottom side projecting away from said top side to reduce rocking of said pump.

2. The vibrator pump for aquariums as defined in claim 1 also including a cover mounted on said top side of said base to enclose said housing.

3. The vibrator pump for aquariums as defined in claim 2 in which said natural frequency of vibration of said base is at least one decade below said excitation frequency.

4. The vibrator pump for aquariums as defined in claim 3 also including a cover mounted on said top side of said base to enclose said housing.

5. The vibrator pump for aquariums as defined in claim 4 wherein said base is made of wood.

References Cited
UNITED STATES PATENTS
2,899,124 8/1959 Chausson 417—416

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