Nov. 21, 1961 E. KOLFERTZ 3,009,628

VENTING APPARATUS FOR AQUARIUMS

Filed Dec. 10, 1959

Fig. 1

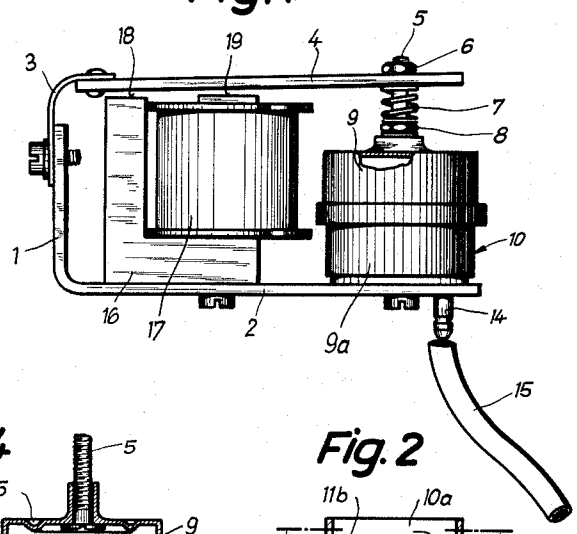


Fig. 4

Fig. 2

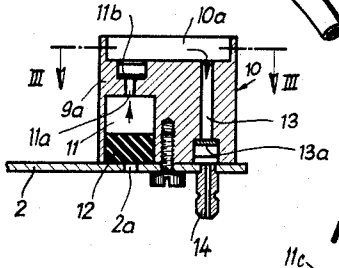


Fig. 3

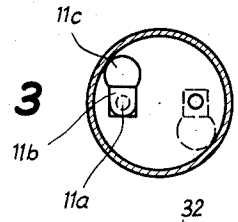


Fig. 3a

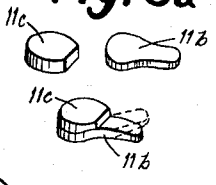
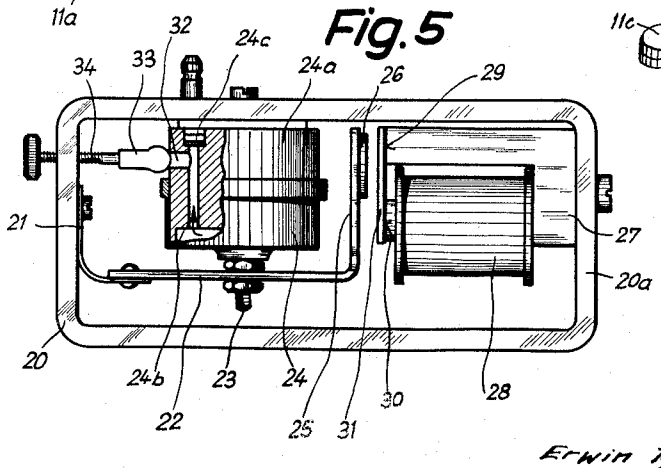


Fig. 5



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VENTING APPARATUS FOR AQUARIUMS

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The present invention relates to a venting apparatus for aquariums for feeding the required oxygen in form of air into aquariums.

Venting apparatuses for this purpose are known which are equipped with a magnetic coil with a U-shaped iron core and with an oscillating arm operable by said magnetic coil and connected to a pump diaphragm.

The heretofore known venting apparatuses of this type have the drawback that the oscillating frequency corresponds to twice the frequency of the fed current, which means that the oscillating arm operates at a frequency which is considerably higher than the frequency required for the pump.

A further drawback of the heretofore known venting apparatuses for aquariums consists in that with increasing voltage of the said current, for instance during evening and night hours, the oscillating amplitude of the oscillating arm increases. In connection therewith, the oscillating arm contacts the iron core whereby a noise is caused which disturbs the night rest of persons near said venting apparatus.

There are also known venting apparatuses for aquariums, which are operated on direct current and require an interrupter, and with which the end of an oscillating arm is substantially perpendicular to the axis of a coil magnet. This oscillating arm is journalled at approximately its central portion, whereas the second end of said arm is connected to the spindle of a diaphragm. Aside from requiring an interrupter, the entire apparatus of this type requires considerable space.

It is, therefore, an object of the present invention to provide a venting apparatus for aquariums, which will overcome the above mentioned drawbacks.

It is another object of this invention to provide a venting apparatus for aquariums, which will not produce a disturbing noise and will also require a minimum of space.

It is a still further object of this invention to provide a venting apparatus as set forth in the preceding paragraphs, which will make it possible in an extremely fine manner to control the air to be fed into the aquarium.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 represents a side view of a heretofore known venting apparatus with pump for aquariums.

FIG. 2 is a section through a pump of a heretofore known type used in connection with venting apparatuses for aquariums.

FIG. 3 is a section taken along the line III—III of FIG. 2.

FIG. 3*a* represents details of the pump.

FIG. 4 shows a diaphragm for a pump for use in connection with a venting apparatus.

FIG. 5 shows in side view and partially in section a venting apparatus according to the invention for aquariums.

The device according to the invention is based on a venting apparatus for aquariums which comprises a coil with U-shaped iron core through which coil alternating current is fed, and also comprises an oscillating arm which is operated by a magnetic coil at a frequency of

the current, said oscillating arm being connected to a pump diaphragm. According to the present invention, the oscillating arm has an angled-off extension extending around the pump, while the path of movement of said oscillating arm is parallel or nearly parallel to the end faces of the legs of the iron core. On that side of the pump which points away from the magnet there is provided a closure adjustable by a threaded spindle for opening and closing a bore in the pump body, said closure member being located ahead of the discharge valve when looking in the direction of flow of the air to be conveyed to the aquarium. While at one side of said pump there is provided said coil, the space on the other side of said pump is used for arranging an adjusting device for the air control.

It is of particular advantage to interconnect the two legs of the iron core by means of a ferro-magnetic plate or the like. In this way, it is possible, over magnetic coils of heretofore known apparatuses for venting aquariums, to employ a lower number of windings because a portion of the magnetic flux through the iron core will be passed through this ferromagnetic plate. At the same time, also a burning through of the windings of the magnetic coil will be prevented if, for instance, by sharp bending of the feeding hose to the aquarium, the pump should not be able to work and consequently the oscillating arm will be held stationary.

With heretofore known venting apparatuses for aquariums, a leaf spring **3** is mounted on one of the two legs **1**, **2** of an L-shaped yoke. The said leaf spring **3** carries an oscillating arm **4** the front end of which is passed through by a screw **5**. This screw **5** carries a nut **6** against which the oscillating arm **4** is pressed by one end of spring **7**. The other end of spring **7** is engaged by a further nut **8** which is likewise mounted on screw **5**. Screw **5** is connected to the lid portion **9** of the pumping device **10**. This lid portion **9** acts as a resilient diaphragm in such a way that a suction will be produced when lifting screw **5**, whereas when lowering screw **5**, the air will be pushed out of the pump.

The pumping device **10**, which consists primarily of the lid portion **9** and the pump body **9***a*, is connected to leg **2** of the L-shaped yoke. Pump body **9***a* has an inlet chamber **11** with a piece of cleaning felt **12**. The drawn-in air passes through an opening **2***a* of leg **2** and through felt **12** into the upper portion of chamber **11** (FIG. 2) and from there is conveyed into the channel **11***a* which latter is opened or closed by valve **11***b* known per se and having the shape of a rubber plate or washer. This rubber plate is held in its position by a lateral stud **11***c*. From passage **11***a*, the air passes into chamber **10***a* which latter is closed toward the top by means of said diaphragm **9**. From here the air passes into a passage **13** which is held in closed or opened condition by a plate **13***a*. This valve forms the discharge valve. The air passes through nipple **14** into the air conduit **15** leading to the respective aquarium.

Between leg **1** and pumping device **10** there is mounted on leg **2** a U-shaped iron core **16** of a magnetic coil **17**. The end faces **18** and **19** of the iron core are parallel to the oscillating arm **4**. At high voltage, the oscillating arm **4** contacts the end faces **18**, **19** which causes a noise that is particularly disagreeable during late evening and night hours.

The device according to the present invention is provided with a rectangular frame **20** (FIG. 5) which likewise carries a leaf spring **21** having connected thereto an oscillating arm **22**. The central portion of the oscillating arm has connected thereto a screw **23** which in its turn is connected to the diaphragm part of pump **24**, said pump being designed principally similar to the pump **10** in the embodiments of FIGS. 1 to 3. The free end of

the oscillating arm 22 ends in a bent-off or angled-off portion 25 equipped with a permanent magnet 26. Opposite said permanent magnet 26 and located at the second small side 20*a* of the rectangular frame 20 is a U-shaped iron core 27 of a magnetic coil 28, the end faces 29, 30 of the iron core being arranged substantially parallel to the angled-off portion 25 of oscillating arm 22 and thus being parallel to the permanent magnet 26. The path of movement of the permanent magnet 26 is along a parallel or nearly parallel line to the end faces 29, 30 of the iron core 27. The two end faces are bridged by a ferro-magnetic plate 31 whereby a saving of windings of the magnetic coil may be effected and whereby a burning through of the windings will be impossible when the venting hose connected to pump 24 and leading to the aquarium is bent sharply so that the pump itself cannot work any longer, and the oscillating arm 25 with is permanent magnet 26 will rest. A particularly advantageous effect of the pump according to the invention will be obtained when the diaphragm, as illustrated in FIG. 4, comprises a central annular-shaped depression 35.

The quantity fed to the aquarium may be controlled in a very fine manner by means of the pump according to the invention. Such a precise control was not possible with the heretofore known hose clamps. For purposes of said fine control, there is provided a bore 32 in the pump body 24*a*, which is adapted to be controlled very precisely by means of a closure 33 which in its turn is adapted to be adjusted very precisely in a closing or opening sense by means of a threaded spindle 34. Bore 32 leads from the circumference of body 24*a* to the passage 24*b* which latter corresponds to passage 13 in the embodiment of FIG. 2. Bore 32 thus is located ahead of the discharge valve 24*c*. In this connection, it will be appreciated that the valves will be relieved and can operate smoothly when bore 32 is open. Also the armature 25, 26 will work with considerably less noise than if a hose clamp is employed.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In an apparatus for ventilating an aquarium: an electromagnetic coil for connection with an alternating current source, said coil being provided with an iron core having two legs and being of U-shape; a pump having a pump body and a pumping diaphragm; said pump body comprising a pump chamber, a first bore communicating with said pump chamber and adapted to be connected to the aquarium to be ventilated; said pump body also comprising a second bore leading from the outside of said pump body to said first bore; adjustable closure means movable selectively for closing and opening said second bore; actuating means connected to said closure means and operable from the outside of said ventilating apparatus for finely adjusting said closure means; an oscillating arm connected to said diaphragm and provided with an angled-off portion normally extending and movable nearly parallel to the end surface of said legs; a permanent magnet carried by said angled-off portion and facing in the direction toward said legs; said angled-off portion being interposed between said legs and said pump body; and inlet and outlet valve means for respectively admitting air into and discharging air from said pump chamber.

2. An apparatus according to claim 1, in which said actuating means is formed by a threaded spindle.

3. In an apparatus for ventilating an aquarium: and electromagnetic coil for connection with an alternating current source, said coil being provided with an iron core having two legs and being of U-shape; a pump having a pump body and a pumping diaphragm; said pump body comprising a pump chamber, a first bore communicating with said pump chamber and adapted to be connected to the aquarium to be ventilated; said pump body also comprising a second bore leading from the outside of said pump body to said first bore; adjustable closure means movable selectively for closing and opening said second bore; actuating means connected to said closure means and operable from the outside of said ventilating apparatus for finely adjusting said closure means; an oscillating arm connected to said diaphragm and provided with an angled-off portion normally extending and movable nearly parallel to the end surface of said legs; a permanent magnet carried by said angled-off portion and facing in the direction toward said legs; said angled-off portion being interposed between said legs and said pump body; and inlet and outlet valve means for respectively admitting air into and discharging air from said pump chamber; said second bore leading from the outside pump body into said first bore at a point located ahead of said outlet valve means when looking in the direction of flow of air from said pump chamber to said outlet valve means.

4. An apparatus according to claim 1, which includes a ferromagnetic member interconnecting the legs of said iron core.

5. An apparatus according to claim 1, in which said pump diaphragm is provided with an annular bulged portion substantially coaxial with said pump diaphragm.

6. An apparatus according to claim 1, in which said inlet and outlet valve means are designed as check valve means operating in opposite directions.

7. In an apparatus for ventilating an aquarium: a frame member having a longitudinal arm and having one leg each at each end of said arm; said legs being substantially perpendicular to said arm; an electromagnetic coil for connection with an alternating current source, said coil being provided with a U-shaped iron core connected to one of said legs; a pump connected to said longitudinal arm and having a pump body and a pumping diaphragm; said pump body comprising a pump chamber, a first bore communicating with said pump chamber and adapted to be connected to the aquarium to be ventilated; said pump body also comprising a second bore arranged at an angle to said first bore and leading from said first bore to the outside of said pump body for selective communication with the atmosphere; adjustable closure means supported by the other one of said two legs and movable selectively for controlling the said second bore; actuating means connected to said closure means and operable from the outside of said frame member for finely adjusting said closure means; an oscillating U-shaped member having one of its legs formed by a leaf spring and connected to that leg of said frame member which supports said closure means; the other leg of said U-shaped member being interposed between said pump and said electromagnetic coil and being equipped with a permanent magnet for cooperation with said core; that portion of said U-shaped member which is intermediate its legs being connected to said diaphragm; and inlet and outlet valve means for respectively admitting air into and discharging air from said pump chamber.

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