United States Patent

[11] 3,575,350

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[54] **AIR STONE FOR AN AQUARIUM**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **239/145,** 261/122, 210/169, 43/56, 119/5, 210/220
[51] **Int. Cl.** **B01f 3/04,** A01k 63/00
[50] **Field of Search** ..... 261/77, 121—124; 210/169, 220, 221; 55/255, 256; 43/56, 57; 119/5

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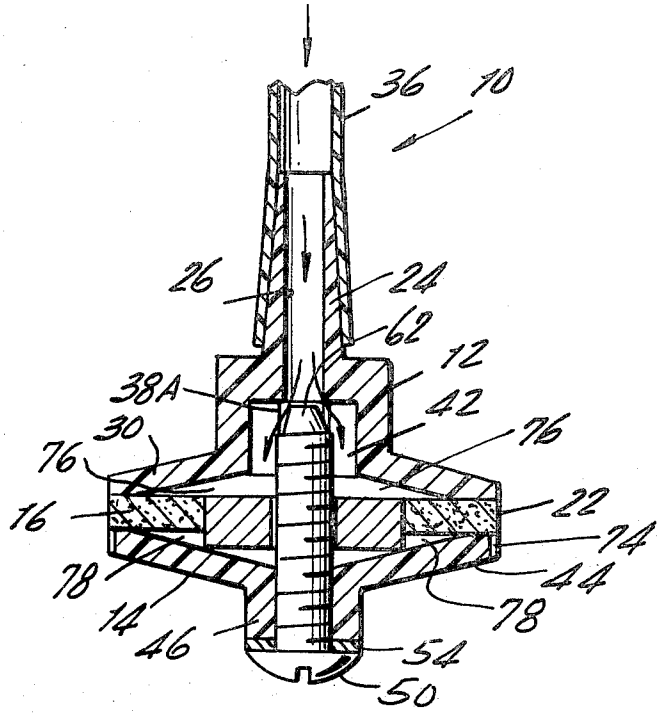
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ABSTRACT: An air stone for an aquarium comprising an air-receiving element, a baseplate connect to the air-receiving element and a water insoluble annular-shaped fiber mat. The fiber mat contains a weight therein in concentric relation thereto and the mat is disposed intermediate the air-receiving element of the baseplate. The air stone is adapted to supply a uniform stream of air bubbles to the water contained in the aquarium when connected to an air supply. The air-receiving element further comprises an air inlet tube, an air inlet aperture located therein, a shoulder portion located at the base of the air inlet tube and a cap portion disposed at the base of the shoulder portion. The air inlet tube, the shoulder portion and the cap portion are integrally connected. The air inlet tube flares outwardly toward the base juncture with the shoulder portion so that when an air supply tube from the air supply is connected to the air inlet tube the air supply tube is held in airtight relationship therewith. The air-receiving element has a cloverleaf-shaped aperture disposed in the cap portion and extending into the shoulder portion from the face of the cap portion. The cloverleaf-shaped aperture defines three arc portions in circular relationship to each other in the central portion of the cloverleaf-shaped aperture. The baseplate comprises a cylindrical-shaped element and a cap portion integrally connected thereto with an aperture extending into the cap portion. The air-receiving element and the weight having a central aperture. The arc portions form walls. The baseplate and the fiber mat are connected by threaded screws having a tapered end which pass through the aperture in the cylindrical element and cap portion thereof. Finally the screw is thread into the walls formed by the arc portions of the cloverleaf-shaped aperture to an extent to allow the passage of air over the tapered end of the screw. The air courses downwardly through the air inlet aperture into the cloverleaf-shaped aperture and thence outwardly through the fiber mat and emerging as uniform air bubbles in the water from the periphery of the fiber mat with the result that uniform aeration of the aquarium is achieved.



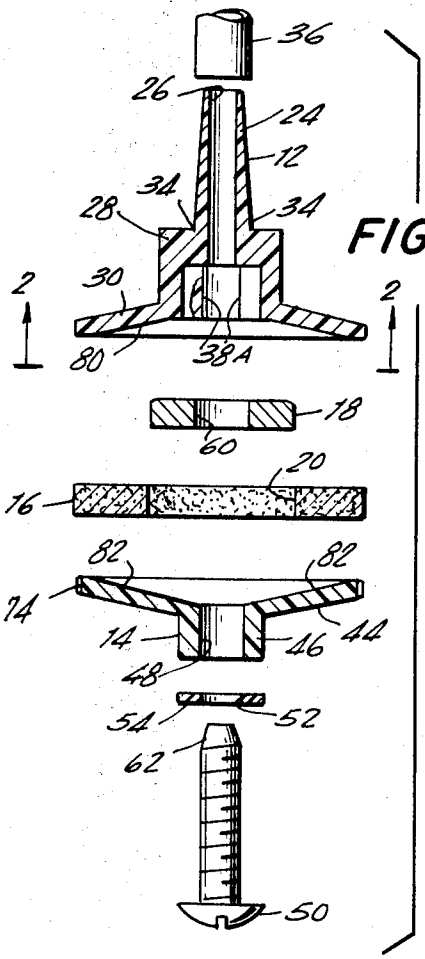


FIG. 1

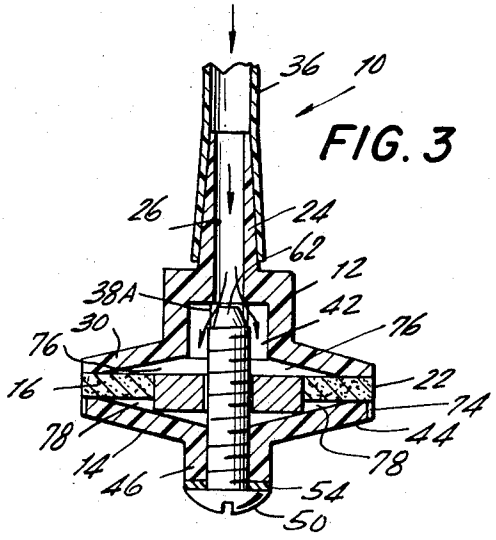


FIG. 3

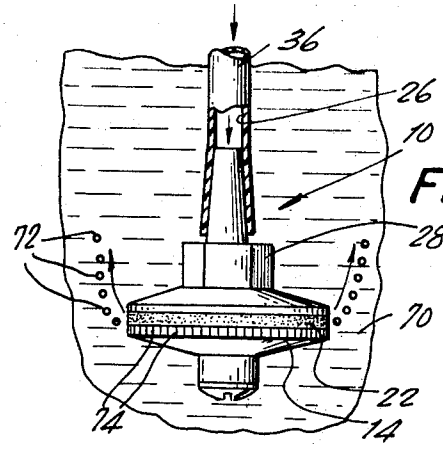


FIG. 4

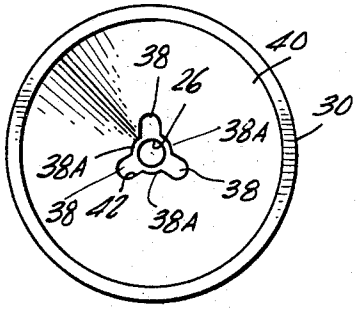


FIG. 2

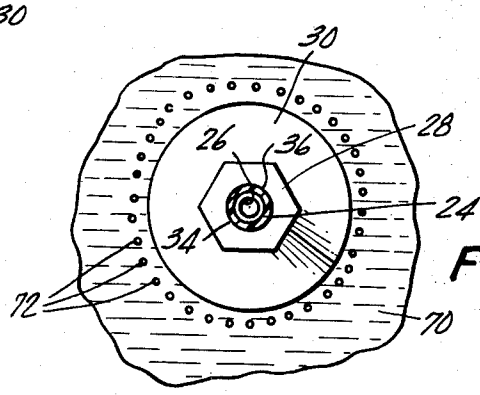


FIG. 5

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AIR STONE FOR AN AQUARIUM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to an air stone or air release for an aquarium. More particularly, the invention relates to an air stone which is adapted to supply a uniform stream of small air bubbles to an aquarium.

2. Description of the Prior Art

Aeration is one of the modern developments in aquarium usage. A small electric pump, or the like, forces the air through a tube connected to an air release at the bottom of the aquarium, sending up a spray of air bubbles. While it is commonly believed that the air is forced into the water, this is inaccurate since the air is sorbed, some from the air bubbles and the majority at the surface. The action of the rising bubbles causes a circulation of the water and in this way fresh oxygen is circulated throughout the aquarium. Aeration has been found to be advantageous in ridding the aquarium of carbon dioxide, for providing extra oxygen to water during the summer months, and for providing an aquarium with increased fish holding capacity, such as for example in a relatively small tank at home, or in the larger tanks at pet shops where many fish must be accommodated. There are a number of prior art air stones on the market, some resembling long stemmed smoking pipes, some merely being long tubes with an upturned loop at their extreme ends placed in the water. While there are a number of such air stones, as mentioned, all have the common disadvantages that they release too much air causing a turbulence at the water surface, or they release uneven streams of air bubbles causing nonuniform aeration of the water, or still further the prior art devices become clogged with dirt, algae, or similar impurities requiring their frequent replacement.

SUMMARY OF THE INVENTION

It is, therefore, among one of the principal objectives of this invention to provide a new and improved air stone for an aquarium which will release a uniform stream of small air bubbles causing uniform aeration throughout, and which air stone will resist clogging requiring very little care and attention therefor.

In accordance with the present invention, there has now been devised a novel and improved air stone for an aquarium, said air stone being adapted to supply a uniform stream of small air bubbles to the water contained in said aquarium and comprising an air-receiving element, a baseplate connected to the air-receiving element which a suitable fiber ring-shaped mat, containing a weight therein in concentric relation thereto, being placed intermediate the said air-receiving element and baseplate.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be hereinafter more fully described with reference to the accompanying drawing, in which:

FIG. 1 is a cross-sectional elevated view of the inventive device showing all the parts thereof in detached relationship.

FIG. 2 is a bottom plan view of the top portion of the device looking along line 2–2 of FIG. 1 in the direction of the arrows located near the numerals.

FIG. 3 is a cross-sectional elevated view, similar to FIG. 1, except that all the parts are shown in connected relationship.

FIG. 4 is an elevated view, partly in cross section, and shows the device in an aquarium water medium.

FIG. 5 is a top plan view, partly in cross section, and shows the device in the water medium as in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the FIGS. of the drawing, the novel air stone device is generally identified by the numeral 10 and comprises an air-receiving element 12, a baseplate 14, a fiber mat 16, preferably polyester fiber, a metal washer 18 acting as a weight, the fiber mat 16 and metal washer 18 being in concentric relation to one another, that is the metal washer 18 being fitted into aperture 20 of the fiber mat 16. As can be seen by referring to FIG. 1 the outside diameter of metal washer 18 is substantially equal to the diameter of the aperture 20 of the fiber mat 16, with the result that the said metal washer 18 fits snugly into the aperture 20 of the said fiber mat 16. The fiber mat 16 with metal washer 18 positioned therein, referred to as the numeral 22 in FIGS. 3 and 4 is located between the air-receiving element 12 and baseplate 14.

Referring to FIG. 1, it can be seen that the air-receiving element 12 comprises an air inlet tube 24 with air inlet aperture 26, a shoulder portion 28 and a cap portion 30, all integrally connected. The air inlet tube 24 is flared outwardly towards its terminus points 34 with shoulder 28, so that it is adapted to hold air supply tube 36 (connected to an electric pump supplying air, not shown) tightly in place. Air supply tube 36 is generally made of rubber or polyethylene so that when it is forced down on air inlet tube 24 it will form a tight seal therewith so that no air will escape at this juncture.

By referring to FIG. 2, it will be seen that three slots 38 are cut into the bottom face 40 of cap portion 30 extending into shoulder portion 28 forming a cloverleaf-shaped aperture 42 which connects with aperture 26 of air inlet tube 24. Shoulder portion 28 is substantially hexagonal in shape and slots 38 extend in the direction of three of the hexagonal corners to form the said cloverleaf-shaped aperture 42. Aperture 26 is substantially in registry with that portion of aperture 42 formed by arc portions 38A. It can be seen that said arc portions 38A would define a circular aperture if lines were drawn connecting all three arc portions 38A.

Baseplate 14 (FIG. 1) comprises a cap portion 44 integrally joined to a cylindrical element 46. An aperture 48 is located in cylindrical element 46 and extends into cap portion 44 of baseplate 12, said aperture 48 being in central relation to said cap portion 44. A threaded screw 50, passing through aperture 52 of plastic washer 54, is inserted into aperture 48 of baseplate 14, passes through metal washer 18 by means of aperture 60 and is threaded into the walls of the aperture provided by arc portions 38A of shoulder portion 28 and bottom face 40. Thus, as seen in FIG. 3, the entire air stone device is held in threaded and securing relation by means of the threaded screw 50 and arc portions 38A on air-receiving element 12. The aperture defined by the arc portions 38A is slightly smaller than the diameter of the screw 50 and thus effectively the said screw 50 threads its own way into said arc portions 38A, after initially passing into aperture 42 by means of tapered end 62. However, it will also be noted that said tapered end 62 of screw 50 does not block aperture 26 of air-receiving element 12 for reasons subsequently to be discussed hereinbelow.

Following the operation of the air stone 10 in FIGS. 3 and 4, it will be seen that air is caused to flow into aperture 26 of air inlet tube 24 means of air supply tube 36 (connected to suitable air supply, not shown). The direction of the air flow is shown by means of arrows coursing downwardly through aperture 26. Picking up this flow of air at FIG. 3, it is seen that said air courses down aperture 26, passes over tapered end 62 of screw 50, which tapered end 62 is free of the aperture 26, passes into aperture 42 and is forced into polyester mat 22, finally passing out of said mat 22 into the surrounding water 70 (the remainder of the aquarium, not shown), and rises upwardly as fine air bubbles in the direction of arrows coming out of said mat 22 (FIG. 4). The cloverleaf arrangement of the slots 38 aids in the dispersement of air throughout the fiber mat 22 as can be seen by referring to FIG. 2 once again, wherein the air is uniformly dispersed outwardly in radial directions from the general center of said cloverleaf-shaped aperture 42. By referring to FIG. 5, it is noted that such cloverleaf arrangement of said slots 38 results in a uniform generally circular arrangement of small air bubbles 72 being

caused to flow into said surrounding water **70**. Thus, it can be seen that a uniform, even stream of small air bubbles is released into the water which results in a mild circulation of the water throughout the aquarium with the further result that a more uniform aeration is achieved than is known in the prior art. Air spaces or plenum **76** and **78**, defined by the sloping walls **80** of bottom face **40** and sloping inner walls **82** of cap portion **44**, respectively, also aid in the dispersement of air throughout the said fiber mat **16**.

The fiber mat **16**, as mentioned, is preferably made of polyester fiber since this is found to be insoluble in water, which is a necessary prerequisite of the fiber mat of the invention. Any other suitable porous fiber can be employed so long as it is water insoluble and allows the passage of air therethrough. If after prolonged periods of use said fiber mat **16** should become clogged it may be either washed with a mild soap solution or discarded and a new one inserted. Either way, all that need be done is simply to unscrew the screw **50** from the air-receiving element **12**, remove the fiber mat **16** from the metal washer **18**, replace the fiber mat with either a new one or a clean one and then screw the whole device back together again. As mentioned the washer **18** is made of metal, and acts as a weight to keep the invention air stone down at the bottom of the aquarium where it is best placed. The air-receiving element **12** and base plate **14** are made of any suitable plastic material which can be readily molded to the desired shapes and sizes. Vertical ribs **74** may be provided along the peripheral edge of baseplate **14**, shown in FIG. **4**, as a decorative feature thereof.

Having thus described the fundamental novel features of the invention, as applied to a specific embodiment, it is understood that various changes may be made by those skilled in the art without departing from the scope and spirit therefrom.

I claim:

1. An improved air stone for an aquarium comprising an air-receiving element, a baseplate connected to said air-receiving element, the joinder of said baseplate and air-receiving element defining a plenum and a water insoluble generally annular-shaped fiber mat, containing a weight therein in concentric relation thereto, said fiber mat being disposed intermediate of said air-receiving element and said baseplate, said air stone being resultingly adapted to supply a uniform stream of air bubbles to the water contained in said aquarium when connected to an air supply with the result that uniform aeration of said aquarium is achieved, said air-receiving element comprising an air inlet tube, an air inlet aperture located therein, a shoulder portion located at the base of said air inlet tube, and a cap portion disposed at the base of said shoulder portion, said air inlet tube, said shoulder portion and said cap portion being integrally connected, said air inlet tube also being characterized as flaring outwardly towards its base juncture with said shoulder portion, so that when an air supply tube from said air supply is connected to said air inlet tube said air supply tube is held in airtight relationship therewith, said air-receiving element having cloverleaf-shaped aperture disposed in said cap portion and extending into said shoulder portion from the face of said cap portion, said cloverleaf-shaped aperture defining three arc portions in circular relationship to each other in the central portion of said cloverleaf-shaped aperture.

2. An air stone according to claim **1** wherein said shoulder portion is hexagonal in shape.

3. An air stone according to claim **2** wherein cloverleaf-shaped aperture extends in the direction of three corners of said hexagonally shaped shoulder portions.

4. An improved air stone for an aquarium comprising an air-receiving element, a baseplate connected to said air-receiving element and a water insoluble generally annular-shaped fiber mat, containing a weight therein in concentric relation thereto, said fiber mat being disposed intermediate of said air-receiving element and said baseplate, said air stone being adapted to supply a uniform stream of air bubbles to the water contained in said aquarium, when connected to an air supply, said air-receiving element further comprising an air inlet tube, an air inlet aperture located therein, a shoulder portion located at the base of said air inlet tube, and a cap portion disposed at the base of said shoulder portion, said air inlet tube, said shoulder portion and said cap portion being integrally connected, said air inlet tube also being characterized as flaring outwardly towards its base juncture with said shoulder portion, so that when an air supply tube from said air supply is connected to said air inlet tube said air supply tube is held in airtight relationship therewith, said air-receiving element further having a cloverleaf-shaped aperture disposed in said cap portion and extending into said shoulder portion from the face of said cap portion, said cloverleaf-shaped aperture defining three arc portions in circular relationship to each other in the central portion of said cloverleaf-shaped aperture, further comprising a generally cylindrically shaped element and a cap portion integrally connected thereto with an aperture defined in said cylindrical element extending into said cap portion and being centrally located in said cap portion, said air-receiving element, said weight having a central aperture, said arc portions forming walls, said baseplate and said fiber mat being connected by threaded screw means having a tapered end which pass through said aperture in said cylindrical element and cap portion thereof, then further passing through said central aperture located in said weight and finally said screw means threading into the walls formed by said arc portions of said cloverleaf-shaped aperture to an extent sufficient to allow the passage of air over said tapered end of said screw means, said air coursing downwardly through said air inlet aperture into said cloverleaf-shaped aperture and thence outwardly through said fiber mat, finally emerging as uniform air bubbles in said water from the periphery of said fiber mat with the result that uniform aeration of said aquarium is achieved.

5. An air stone according to claim **4** wherein said weight is a metal washer.