April 20, 1965 L. A. BOGAR 3,178,730

LIQUID AERATING AND AGITATING DEVICE

Filed Aug. 17, 1962

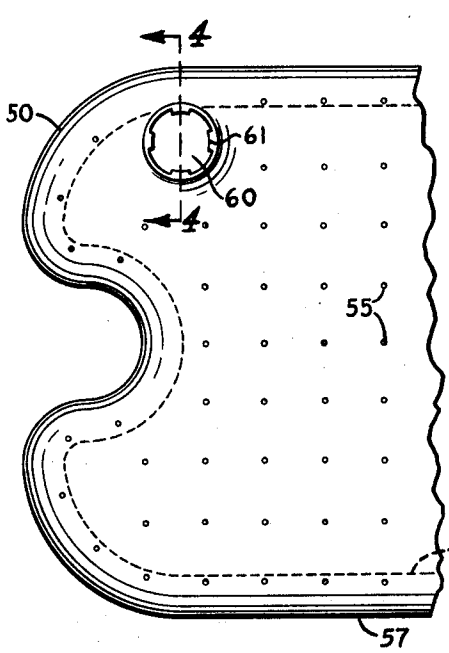



Fig. 1

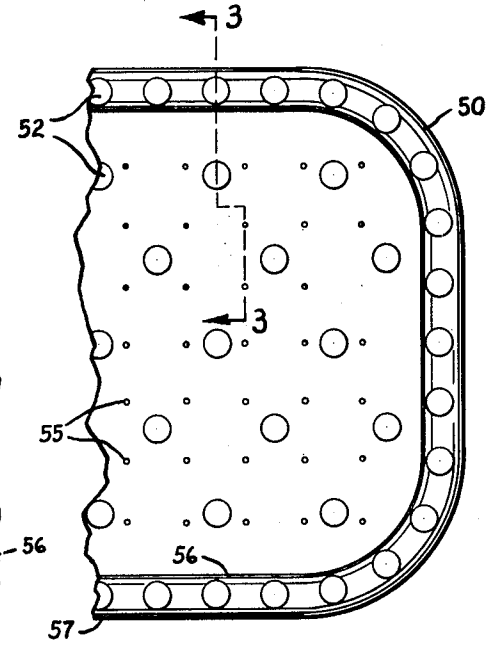



Fig. 2

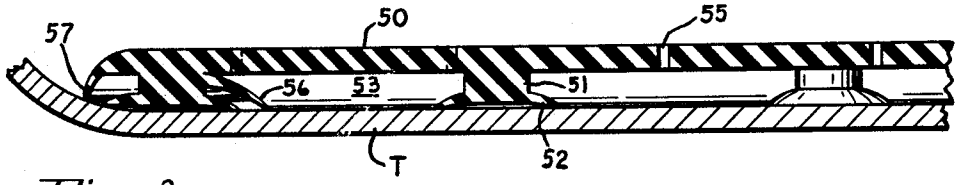



Fig. 3

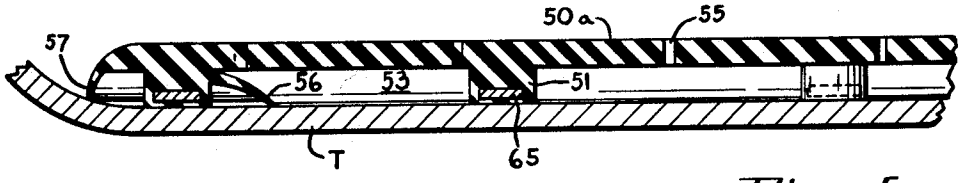



Fig. 5

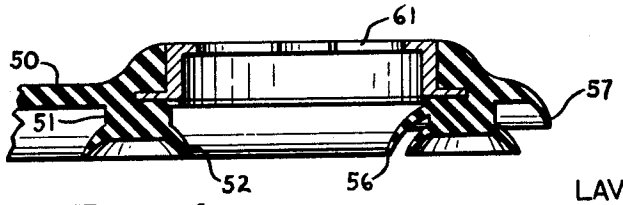



Fig. 4

INVENTOR.
LAWRENCE A. BOGAR
BY
Lee R. Schermerhorn
Attorney

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3,178,730

# LIQUID AERATING AND AGITATING DEVICE

Lawrence A. Bogar, W. 3218 Daisy Ave., Spokane, Wash.

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3 Claims. (Cl. 4—180)

This invention relates to a device for aerating and agitating a liquid in a tub or tank.

This application is an improvement over my co-pending application Serial No. 173,955, filed February 19, 1962, titled "Liquid Aerating and Agitating Device," now Patent No. 3,076,976.

The device is made in the form of a rubber mat arranged to be attached to the bottom of a tub or tank. It is connected with an air blower and forms a vented air chamber that discharges air in streams of bubbles which rise through the liquid to aerate it and produce an agitating effect. The device may be used in a bath tub, for example, to produce a pleasant and therapeutic effect on the human body.

Objects of the invention are to provide a mat which may be affixed to the bottom of a tub or tank to aerate and agitate liquid such as water therein, to provide an improved form of construction for a device of the type described, to provide a form of construction which is easily molded of rubber without requiring complicated molds to form air channels in the mat, to provide a mat having a single air chamber communicating with openings distributed over the top surface of the mat, and to provide a mat having a single air chamber which is open on the bottom side of the mat and adapted to be closed by the bottom of the tub or tank to which it is affixed.

Whereas, in my prior construction above referred to, the mat has a plurality of open bottom air channels which communicate with rows of top apertures, in the present mat there is but a single open bottom air chamber extending substantially the length and width of the mat and all of the top apertures communicate with this single chamber. This greatly simplifies the molding operation including the construction of the mold itself and makes the mat easier to clean after it has been used. While the mat is described as made of rubber, it is to be understood that in practice it may be made of any suitable material having the flexibility and resilience to function in the manner described.

Further details of construction will be explained and additional objects and advantages will become apparent from the following description of certain preferred embodiments of the invention illustrated on the accompanying drawing. Various changes may be made, however, in the details of construction and arrangement of parts, and all such modifications within the scope of the appended claims are included in the invention.

In the drawing:

FIGURE 1 is a top plan view of one end of a device embodying the principles of the invention;

FIGURE 2 is a bottom plan view of the opposite end of the device;

FIGURE 3 is an enlarged sectional view taken on the line 3—3 of FIGURE 2 showing the mat secured to the bottom of a tub or tank;

FIGURE 4 is an enlarged sectional view taken on the line 4—4 of FIGURE 1; and

FIGURE 5 is a view similar to FIGURE 3 showing a modified form of construction.

The mat **50** is of one piece integral construction having substantially all parts and appurtenances thereof made from a single body of rubber in a simple molding operation. The underside of the mat is provided with a plurality of pillars **51**, the lower ends of which are shaped to form vacuum cup feet **52** for supporting the mat.



These pillars and feet hold the main body of the mat spaced above the bottom of the tub or tank T to form a single air chamber **53** which communicates with the apertures **55** over substantially the full length and width of the mat. These pillars and suction cups are distributed over the whole area of the mat and are preferably located quite close together around the edge of the mat, as shown in FIGURE 2, to hold the edge portions down securely. Within the chamber **53** the pillars are spaced closely enough together to prevent collapse of the chamber under the weight of a body on the mat.

Projecting within the marginal ring of pillars and suction cups is a flexible sealing lip **56** which is inclined downward to engage the tank or tub. The lower edge of this lip extends down to the plane of the bottom edges of the suction cups in relaxed condition, as shown in FIGURE 4, so that when the suction cups are applied to a rigid surface the lip will be deflected upward slightly and bear against said surface to form a good seal as shown in FIGURE 3. Lip **56** extends around the entire periphery of the mat as shown in FIGURES 1 and 2. In order to provide a neat appearance, the outer edge of the mat may be provided with a downturned lip **57** just outside of the marginal suction cups but this lip has no function and should not project as far down as the suction cups and lip **56** so as not to interfere with the grip of the suction cups or the seal of the lip **56**.

At any convenient location the mat is provided with an air inlet opening **60** having a suitable fitting **61** to make connection with an air supply hose from a blower. Thus, air delivered by such blower under light pressure is introduced into the chamber **53** from whence it can escape only through apertures **55** from whence it bubbles up through the liquid above the mat to aerate and agitate the liquid.

With the present form of construction, cores are not needed in the mold and the mat may be readily stripped from the mold without removing any of the mold parts, owing to the flexibility of cups **52** and lip **56**.

A portion of the uplift force of the air pressure in chamber **53** is balanced by the downward force exerted by the air pressure against the upper side of lip **56** and the upper side of the marginal outstanding portions of the suction cups within chamber **53**, there being a considerable number of the latter, as shown in FIGURE 2. The marginal suction cups obtain a firm grip on the bottom of the tub or tank since they are disposed outside of lip **56** and are subject to both liquid pressure and atmospheric pressure acting downward over the whole area of each cup without any direct uplift force. Also, of course, the upward reaction of air pressure in chamber **53** is opposed by the downward force of liquid pressure and atmospheric pressure acting over the whole top surface of the mat and applied through pillars **51**. Thus, the net uplift force is not of large magnitude and the present arrangement of suction cups is adequate to hold the mat securely on the bottom of a smooth tub or tank.

FIGURE 5 shows a modification wherein the pillars **51** are secured to the bottom of an iron or steel tub or tank by means of magnets **65**. These magnets are molded within the rubber as close to the bottom surface of the pillars as possible so that magnetic attraction will provide a secure attaching force to the underlying metal. In other respects the mat in FIGURE 5 is the same as the first embodiment.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A liquid aerating and agitating device comprising an integral, one piece flat mat of a moldable resilient material such as rubber, pillars on the underside of said mat to support the body of the mat spaced above the bottom

of a tub containing a liquid and form an open bottom air chamber under the mat, a compressed air connection in the top of the mat communicating with said chamber, means on the lower ends of said pillars for securing the mat to the bottom of the tub and prevent uplift from said air pressure and the buoyancy of said chamber, apertures in the top side of the mat communicating with said chamber, and an inwardly directed relatively thin and flexible sealing lip on the bottom of the mat around its periphery arranged to be pressed against the bottom of the tub by the air pressure in said chamber to prevent escape of air under the edges of the mat, said pillars being distributed over the area of the mat to prevent collapse of said air chamber when a weight is placed on top of the mat and spaced around the margin of the mat to assist in holding said lip against the tub.



2. A device as defined in claim 1, said securing means comprising suction cups on the lower ends of said pillars.

3. A device as defined in claim 1, said securing means comprising magnets in the lower ends of said pillars.

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EDWARD V. BENHAM, *Primary Examiner.*

FRANK H. BRONAUGH, *Examiner.*