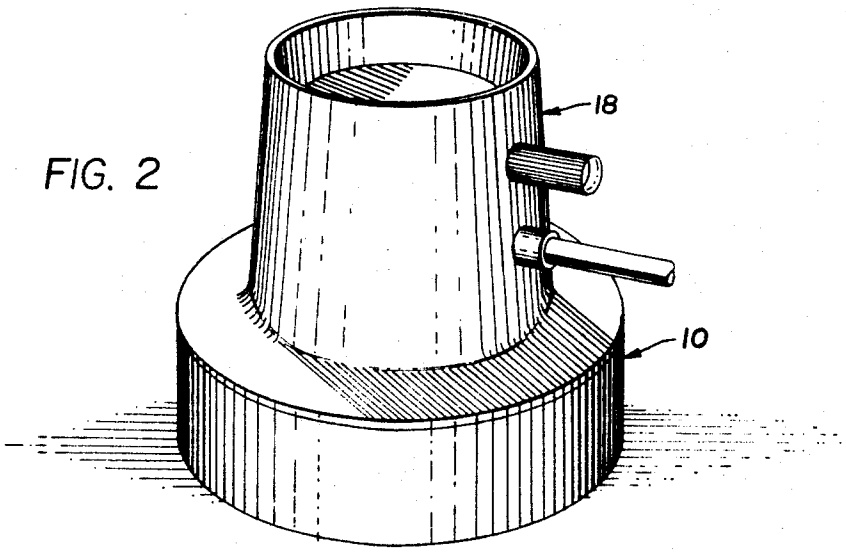
May 20, 1969 E. J. FIERLE ET AL 3,445,092

ULTRASONIC CLEANING DEVICE

Filed Feb. 28, 1968 Sheet 1 of 2

FIG. 2



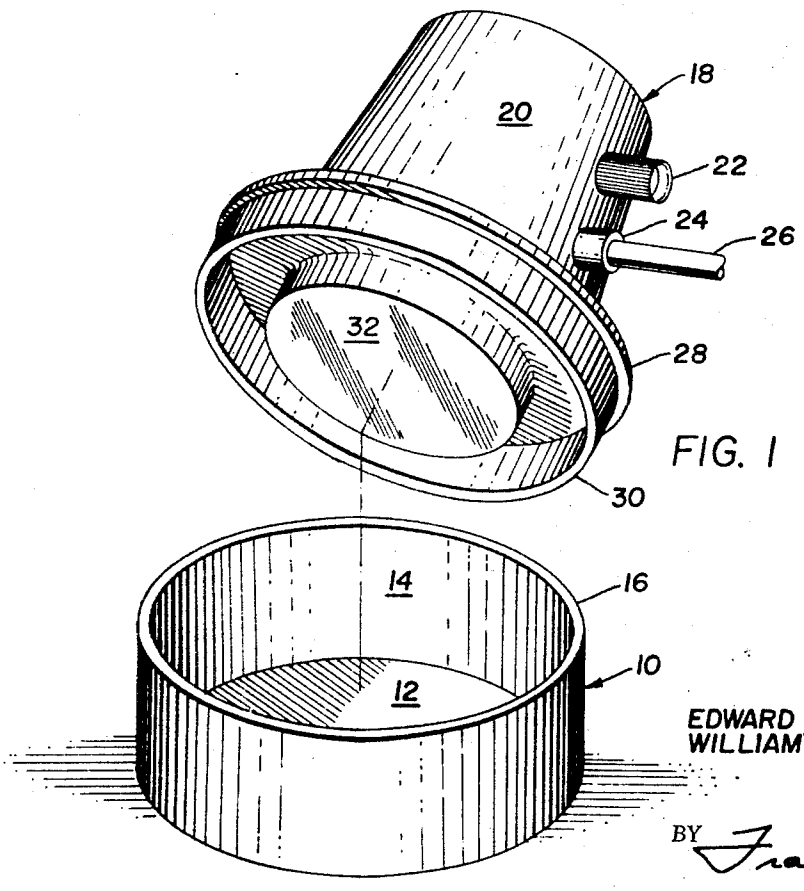


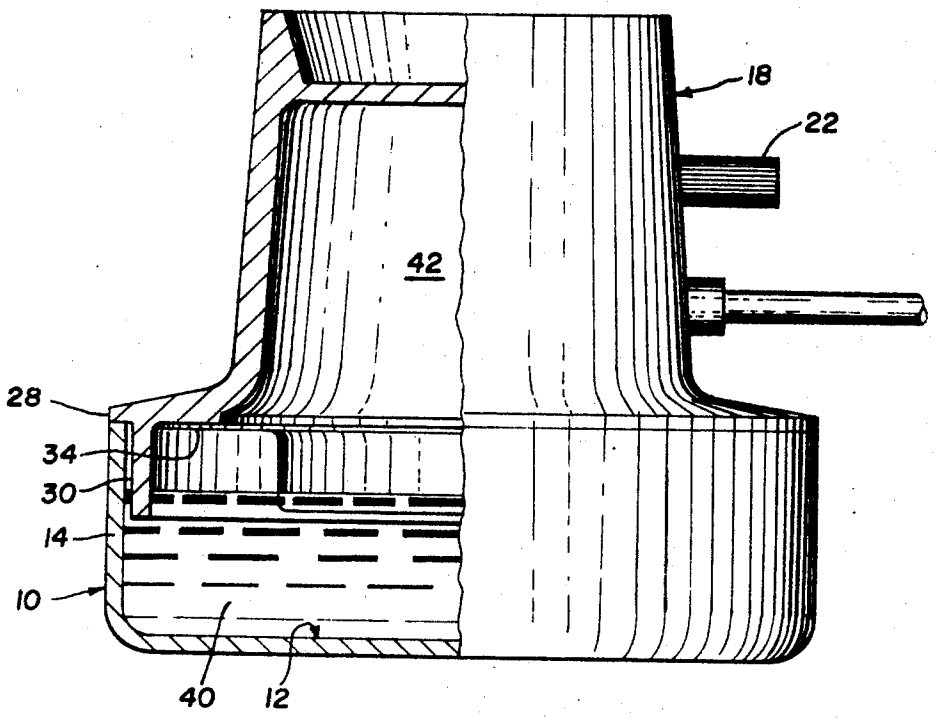
FIG. 1

EDWARD J. FIERLE
WILLIAM R. MELVILLE, JR.
INVENTORS

BY Frank C. Parker

ATTORNEY

FIG. 3



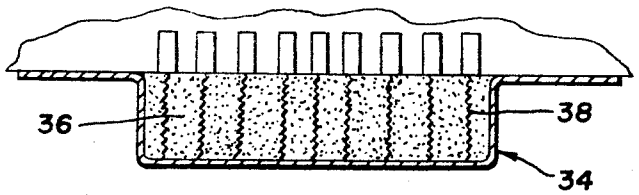


FIG. 4

EDWARD J. FIERLE
WILLIAM R. MELVILLE, JR.
INVENTORS

BY Frank C. Parker

ATTORNEY

United States Patent Office 3,445,092
Patented May 20, 1969

3,445,092

ULTRASONIC CLEANING DEVICE

Edward J. Fierle, Penfield, and William R. Melville, Jr., Scottsville, N.Y., assignors to Bausch & Lomb Incorporated, Rochester, N.Y., a corporation of New York

Filed Feb. 28, 1968, Ser. No. 708,981
Int. Cl. B01f 5/26; B08b 3/04
U.S. Cl. 259—116 6 Claims

ABSTRACT OF THE DISCLOSURE

An ultrasonic cleaning device comprising a solution receptacle and an ultrasonic generator of the type wherein the transducer and ultrasonic generator are one unit detachable from and acting as a cover for the fluid receptacle. The device is further characterized by the fact that the transducer is immersed into the fluid contained in the fluid receptacle when the cleaning device is in operating position.

Background of the invention

This invention relates to an improved ultrasonic cleaning device such as is useable for cleaning household articles. It is also useful for cleaning dentures.

Small ultrasonic cleaning devices for household articles are shown in U.S. Patent 3,113,761 granted Dec. 10, 1963 to P. M. Platzman and U.S. Patent 3,151,846 granted Oct. 6, 1964 to P. D. George. The devices according to the aforementioned patents are useable for cleaning small household articles such as rings, brushes, and also for cleaning dentures. The prior art ultrasonic cleaning devices show a common feature in that the transducer for the ultrasonic unit is either embedded in the fluid reservoir or intimately attached thereto. This tends to make a bulky cleaning device and makes cleaning of the fluid receptacle difficult.

Summary of the invention

In order to avoid the above-mentioned problem and, to more generally provide an improved ultrasonic cleaning device we have devised an improved small ultrasonic cleaning device.

The present invention provides for a fluid reservoir readily separable from the ultrasonic transducer and electronics case.

Accordingly it is the primary object of this invention to provide a more readily accessible fluid reservoir in an ultrasonic cleaning device.

It is a further object of this invention to provide an ultrasonic cleaning device without the transducer being embedded in or affixed to the fluid reservoir.

It is another object of this invention to provide an ultrasonic cleaning device that can be rapidly and easily cleaned.

Brief description of the drawings

FIGURE 1 is a perspective exploded drawing of one embodiment of the present invention.

FIGURE 2 is a perspective view of the device of the instant invention in operating position.

FIGURE 3 is an elevational view partially in section of one embodiment of the present invention in operating position.

FIGURE 4 is a partial cross-section view of the transducer of the instant invention.

Description of the preferred embodiments

Referring to the drawings and in particular to FIGURE 1, number **10** shows a fluid reservoir cylindrical in shape. Reservoir **10** has a generally flat bottom **12** and

vertical walls **14**. The top surface **16** of reservoir **10** is finished to a smooth configuration.

Number **18** designates generally the case containing the necessary electronics and the ultrasonic transducer. The case **18** contains a generally frusto-conical top portion wherein is housed the electrics for the ultrasonic generator (not shown). The top portion **20** is fitted with the necessary on-off switch **22**, electrical feedthrough **24** and electrical cord **26**. Formed as an integral part of portion **20** of the case is the bottom flange **28** of a diameter equal to or larger than the outside diameter of fluid receptacle **10**. Depending from the bottom of flange **28** is cylindrical ring **30**, and a combination transducer cover and cover **32** for the electronics case **18**. As with bottom plate **28** the cylindrical ring **30** can be formed as an integral part of the top case **18**. The transducer cover **32** can be formed from the same material as case **18**. It is necessary that the bottom of flange **28** and surface **16** form a water barrier when the unit is in operating position. The diameter of ring **30** is less than the inside diameter of the fluid reservoir **10**. This can be seen in FIGURE 3 wherein the ring **30** stands apart from vertical wall **14** of bottom reservoir **10**.

While the transducer cover **32** can be formed as an integral part of the cover plate **32** it may be formed of a metal such as stainless steel. This is shown in FIGURE 4 where the transducer case is designated **34** and contains therein suitable ceramic material **36** and conducting means **38**. In this manner the transducer case can be formed separately and thereafter attached to an electronics case **42**, this is then placed inside case **18** and cover plate **34** sealed to flange **18** by conventional bonding techniques in order to hermetically seal the electronics.

In operation, the article to be cleaned is placed at the bottom **12** of container **10** and the container is filled with a suitable cleaning fluid designated **40** in FIGURE 3. The top member **18** is then placed upon the receptacle **10**, the cord plugged into a suitable outlet and the ultrasonic unit energized by switch **22**. After the prescribed cleaning time has elapsed the electronics are switched off, the top **18** removed and the article extracted from the reservoir **10**.

With this device the reservoir **10** is of necessity shallow in depth and can be readily placed under a household water faucet to be rinsed and otherwise cleaned. There being no protrusions in the bottom of the reservoir it may be readily cleaned using normal household cleaning devices. In addition the bottom portion **28–30–32** of the top member **18** may also be readily cleaned since there are no sharp or narrow recesses to trap residue from the cleaning fluids.

It is also possible to manufacture the device of the instant invention without depending ring **30** since the weight of the electronics case will make a fluid seal between members **18** and **10**.

We have found it desirable to fabricate the electronics case and fluid receiving reservoir of commercial plastic materials. However, it may be desirable to use other materials such as aluminum, steel, etc. and we do not wish to be limited to any particular materials.

While the invention has been disclosed by reference to a preferred embodiment, it should be understood that it may be modified or embodied in other forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A household cleaning device comprising:

a generally cylindrical article and fluid receiving tank having a flat bottom with an open top;

a generally frusto-conical upper housing with an open flanged end;
said flange being equal to or larger in diameter than the diameter of the tank;
a downwardly projecting annulus smaller in diameter than said tank depending from said flange;
an ultrasonic transducer mounted within said annulus;
electrical means for exciting said transducer mounted within said upper housing and connected to said transducer;
means for sealing said transducer and said electrical means to said upper housing, and
means for supplying electrical energy to said electrical means.

2. A household cleaning device comprising:
a generally cylindrical article and fluid receiving tank having a generally flat bottom with an open top;
a generally flat cover equal to or larger in diameter than said tank;
said cover containing a downwardly projecting annulus of smaller diameter than said tank with generally vertical sides;
mounted within said annulus an ultrasonic transducer;
electrical means for producing excitation of said transducer electrically connected to said transducer;
an electrically insulated shield over said electrical means sealably attached to said cover; and
hermetically sealed feed-through means in said shield for introducing electrical energy to said electrical means.

3. The device of claim **1** wherein the tank and cover are fabricated of stainless steel.

4. The device of claim **1** wherein the tank and cover are fabricated from rigid durable plastic.

5. The device of claim **2** wherein the cover is generally curvilinear in cross-section and fabricated from a thin flexible non-corroding plastic.

6. An ultrasonic household cleaning device comprising:
a generally cylindrical article and fluid receiving tank having a flat bottom with an open top;
a generally flat cover equal to or larger in diameter than said tank;
an ultrasonic transducer mounted on the bottom side of said cover and projecting downwardly therefrom;
an ultrasonic generator mounted on top of said cover;
means connecting said generator to said transducer;
an electrically non-conducting shield covering said generator and sealably attached to said cover, and
hermetically sealed means in said shield for directing electrical energy to said generator.

References Cited

UNITED STATES PATENTS

3,113,761	12/1963	Platzman	259—72
3,151,846	10/1964	George	259—72 X
3,399,869	9/1968	Loria	259—114

ROBERT W. JENKINS, *Primary Examiner.*

U.S. Cl. X.R.

134—184; 259—114