

[54] **ELECTRIC SONIC DEVICE FOR CLEANING SMALL ARTICLES**

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 259/72, 259/DIG. 44
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 259/DIG. 44, DIG. 41; 68/3 SS; 310/29

[56] **References Cited**

UNITED STATES PATENTS

1,012,956 12/1911 Woodland.....310/29 X
 2,776,558 1/1957 Vang.....68/3 SS X

2,875,989 3/1959 Toulmin 259/72
 3,151,846 10/1964 George 259/1 R UX
 3,386,706 6/1968 Leifman et al. 134/184 X
 3,472,493 10/1969 Blank et al. 259/72

FOREIGN PATENTS OR APPLICATIONS

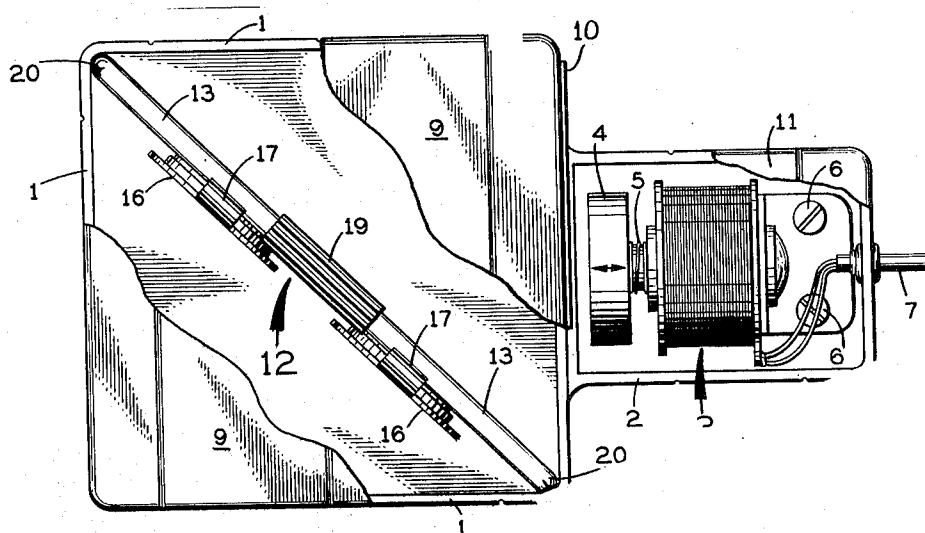
560,858 7/1958 Canada 259/DIG. 41

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[57] **ABSTRACT**

A rigid container for holding a cleaning liquid including a removable holder for suspending articles to be cleaned in the liquid and an electromagnetic device secured to said container for oscillating the container and liquid therein at sonic frequencies when energized for rapidly cleaning the aforesaid articles.

3 Claims, 4 Drawing Figures



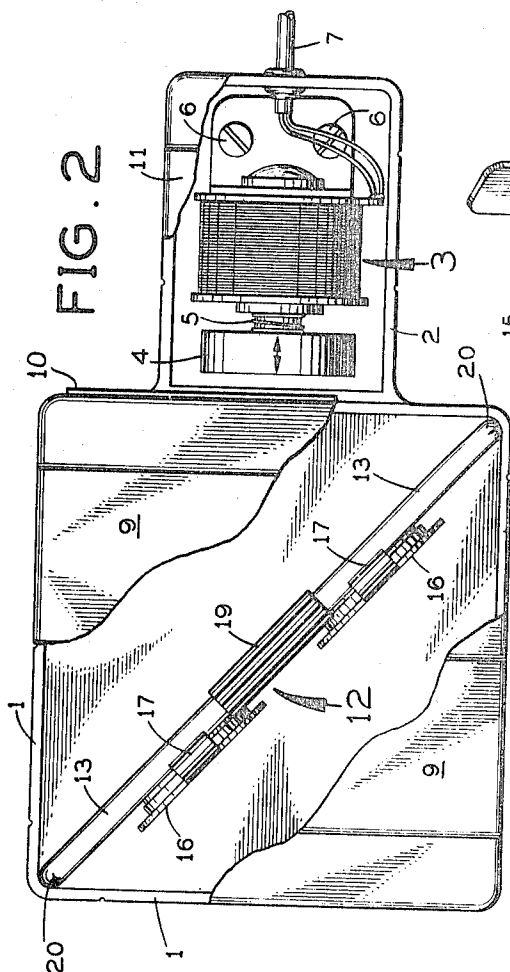


FIG. 1

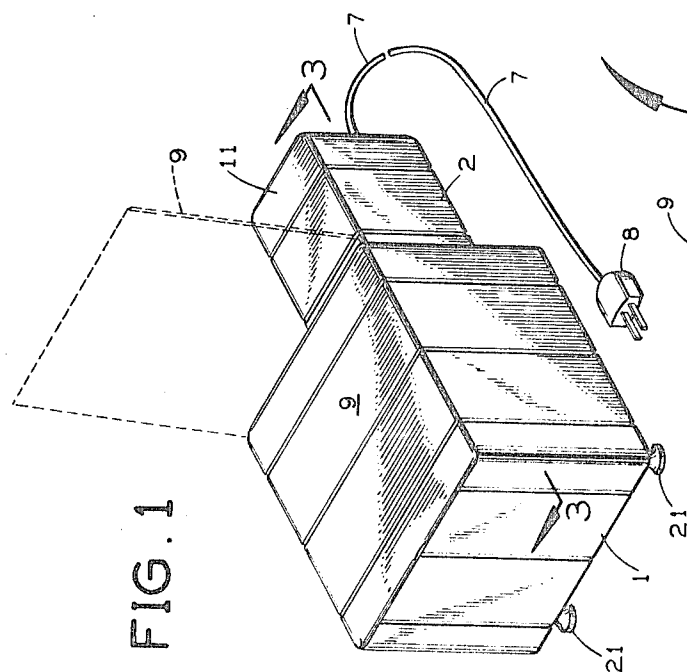


FIG. 2

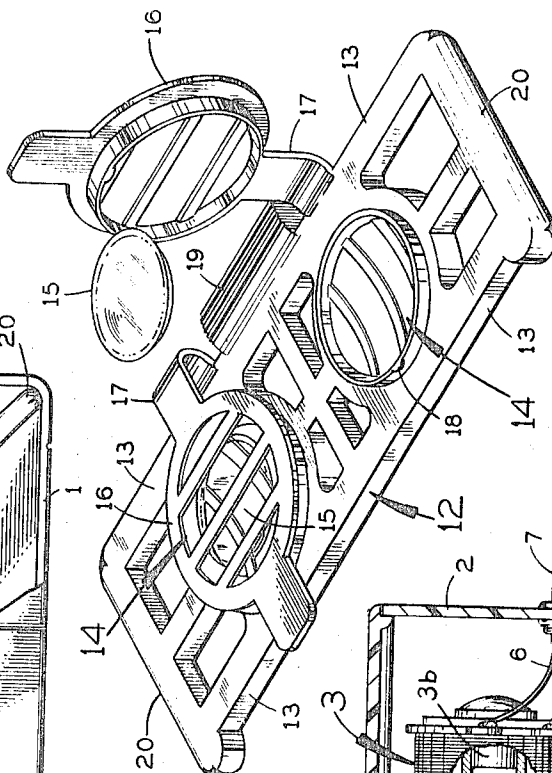


FIG. 3

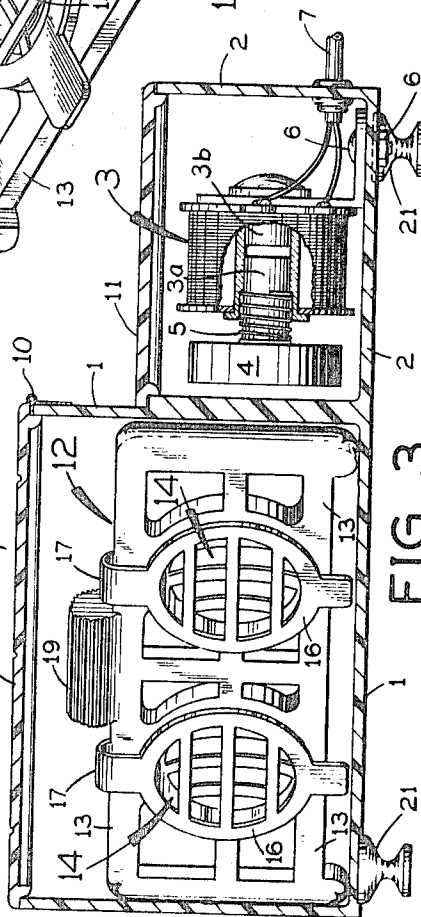


FIG. 4

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ELECTRIC SONIC DEVICE FOR CLEANING SMALL ARTICLES

This invention relates in general to a cleaning device for retaining liquid including electric means associated with said device for oscillating the liquid at sonic frequencies for cleaning articles submerged therein.

Prior devices for cleaning contact lenses, dentures, and other small articles, include a simple container for holding chemical liquids having cleaning power without agitation and supersonic devices in which the cleaning elements are submerged in a liquid oscillated at supersonic frequencies. The chemical means of cleaning is time consuming and often ineffective, and in some cases has an undesirable etching effect on certain materials. The use of supersonic devices are effective, but limited in use because of their relative complication and high cost.

The present invention overcomes the above objections and disadvantages by the provision of a relatively low-cost dependable device having a rigid container for liquid cleaning solutions, such as water containing one of the well-known detergents, and simple electric motivation for producing sonic oscillation in the cleaning liquid.

A principal object of the invention is the provision of a rigid container for retaining a cleaning solution with a holding means removably positioned in said container for submerging the article in the liquid including a simple electromagnetic means secured to the container for oscillating the container and the cleaning solution at sonic frequencies when energized by connection to an ordinary AC electric outlet receptacle.

A further object of the invention is the provision of a rigid container including a cleaning solution therein adapted and constructed to be oscillated at sonic frequencies by electromagnetic means and supported by a plurality of resilient legs for preventing transmission of oscillation into the surface supporting the device.

Another object of the invention is the provision of a rigid container for holding a removable foraminated contact lens holder submerged in the cleaning liquid in said container including an electromagnetic means for oscillating the container and the liquid therein at the fundamental and harmonic frequencies of an electromagnetic means when the latter is energized by 115-volt AC electric power.

These and other objects and advantages in one embodiment of the invention are described and shown in the following specification and drawing, in which:

FIG. 1 is a right-hand perspective view of the cleaning device in reduced scale.

FIG. 2 is an enlarged top plan view of the device shown in FIG. 1 with portions thereof broken away.

FIG. 3 is a cross-sectional side view taken through section line 3—3, FIG. 1 with a portion thereof broken away.

FIG. 4 is a left-hand perspective view of a holder for a pair of contact lenses shown with one lens removed therefrom.

Referring to FIGS. 1, 2, and 3, a rectangular liquid container 1, for retaining a cleaning liquid, includes an integral housing 2 for an electromagnetic solenoid assembly 3 having a movable core 3a terminating at its outer end in a relatively high mass weight 4 retained in a predetermined outward idle position by a spring 5. The fixed core 3b is spaced a predetermined distance from the inner end of core 3a and the cores are prevented from mutual contact by spring 5. The solenoid assembly 3 is secured to the base of the housing 2 by screw means 6—6. The two terminals of the solenoid coil are connected to a two-conductor power cord 7 with a suitable grommet and strain clip and terminating at opposite ends thereof in a conventional receptacle plug 8, shown in FIG. 1.

The liquid container includes a cover 9 secured along one edge thereof to the container 1 by a hinge 10 which may be of plastic material or any one of many suitable types. The housing 2 has a cover 11 which may be permanently secured on the housing by a suitable adhesive.

It is to be noted that the container 1 and housing 2 and covers 9 and 11 may be economically made from die-cast metal or molded plastic material.

FIG. 4 illustrates a holder 12, molded from plastic material, such as polyethylene, for a right and a left contact lens, in which the main frame 13 thereof is foraminated and includes a pair of cavities 14 which are formed to loosely hold a pair of contact lenses 15. The frame has a pair of foraminated covers 16—16 with a thin section hinge 17 integral with the cover and frame which is movable from a closed to an open position, as illustrated in FIG. 4. The cover also includes a latch recess, not shown, for engaging a latching projection 18. The frame 13 includes an integral straight knurled grip 19 for finger grasp. The opposite edges 20 of the frame 13 are curved to fit the radius in the fillets on opposite corners of the container, as shown in FIG. 2.

The coplanar bottom of container 1 and housing 2 are supported by three relatively soft elastomer legs 21, having narrow midsections, which are secured to the bottom of container 1 and housing 2 by an adhesive in appropriate cylindrical cavities, as shown.

In operation and assuming the device is used for cleaning contact lenses, the container 1 is filled to two-thirds capacity with a suitable cleaning solution, such as filtered water with a small proportion of well-known detergent added, and the right and left contact lenses are placed in corresponding cavities 14 and the covers snapped thereover, permitting the lens to be loosely held in the cavities 14. The lens holder is then placed in the container 1, as shown in FIGS. 2 and 3, and the solenoid 3 energized by connecting receptacle plug 8 in a suitable receptacle for delivering predetermined alternating electric energy to the solenoid. Then the core of the solenoid will oscillate against the resilience of spring 5 in the direction shown by double arrow in FIG. 2. Because of the relatively high inertia of weight 4 the entire container will oscillate in a like direction including the liquid in container 1 which will effectively clean residue and undesirable microscopic particles from the surface of the lenses, or any other articles placed in the container with appropriate solvents as the cleaning liquid.

It is apparent that the holder 12 may be formed to retain other particular articles or a variety thereof.

It is well known that the waveform of ordinary AC power does not follow a true sine wave and hence is rich in high-frequency harmonics according to Fourier's theorem. It is believed that the many harmonics transmitted into the cleaning liquid greatly enhance the cleaning power of the conventional 60-cycle AC power.

It has also been found that articles having substantially flat surfaces are best cleaned when they are suspended oblique to the direction of the wave motion in the liquid.

This invention comprehends modifications that come within the scope and spirit of the above specification.

Having described my invention, I claim:

1. A device for sonic cleaning articles comprising a rigid container having a substantially rectangular open top cavity therein adapted to hold
 - a predetermined quantity of cleaning liquid,
 - an electromagnetic solenoid with a stationary coil and core thereof secured to the container adjacent to and at one outer side of said cavity,
 - a movable core slidably positioned in said solenoid with an outer end thereof projecting therefrom,
 - said movable core terminating at its said outer end in a weight of predetermined mass,
 - a source of alternating electric energy,
 - a compression spring on said movable core biased between said stationary coil and core and said movable core for preventing the latter from contacting said stationary core when said coil is connected to and energized by said electric energy,
 - a foraminated holder for loosely retaining articles to be cleaned having spaced parallel outer edges for manual insertion in oblique substantially vertical position into opposite corner junctions of the said cavity for retaining said articles submerged in said liquid whereby said reactionary oscillatory forces from said movable core and said weight

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will oscillate said stationary core and transmit waves in said container and said liquid to clean articles submerged therein when said coil is connected to said source of electric energy, said solenoid being so positioned that the work in the holder is subjected to liquid oscillations at an oblique angle.

2. The construction recited in claim 1 in which said holder is substantially rectangular and is molded from plastic material for loosely retaining a pair of contact lenses in substantially spaced coplanar relation,

said holder having said parallel outer edges for manual in-

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section in oblique vertical position in opposite corners of said cavity for submerging said lenses in said liquid for cleaning when said coil is connected to and energized by said source of energy.

3. The construction recited in claim 1 including at least three elastomer legs secured in coplanar relation to the bottom of said container for supporting same on a surface, each of said legs having a narrow waist section whereby the transmission of oscillation of said container is not substantially restricted when said device is operated.

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