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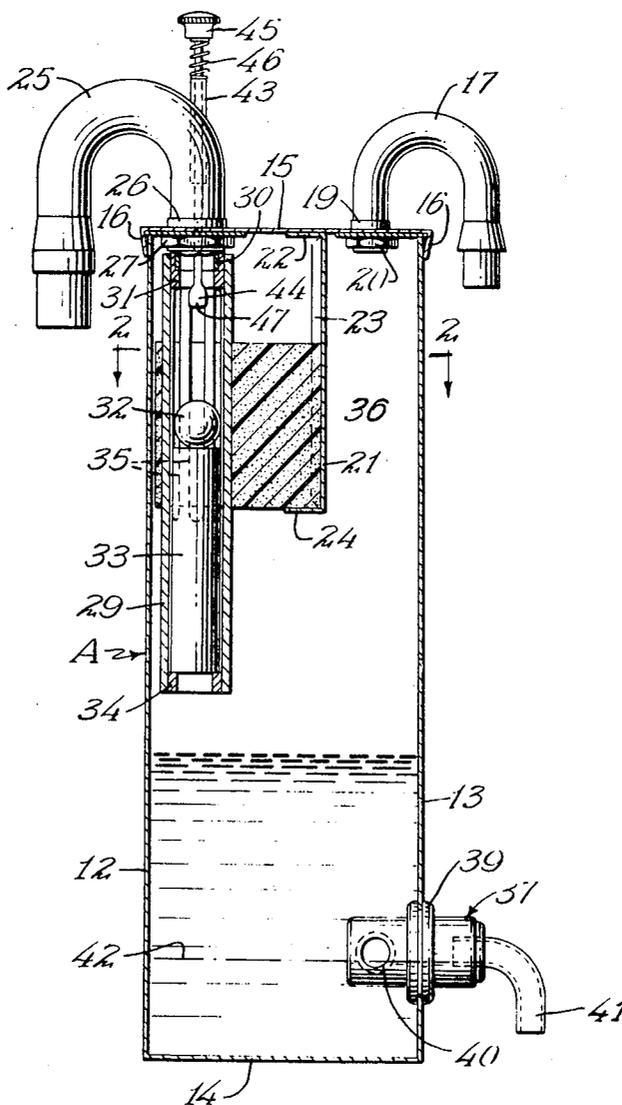
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[54] **VACUUM REACTIVATOR**
1 Claim, 3 Drawing Figs.

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 202, 204; 141/59; 32/33

ABSTRACT: A vacuum reactivator is provided for use with an oral evacuator used to draw water, tooth chips and the like to a collector chamber. The chamber is automatically drained when the suction is turned off. A ball float valve is provided to turn off the vacuum when the liquid in the chamber reaches a predetermined depth, emptying the chamber of water. A plunger is provided for manually disengaging the ball valve from its seat after the chamber has been drained to restore vacuum.



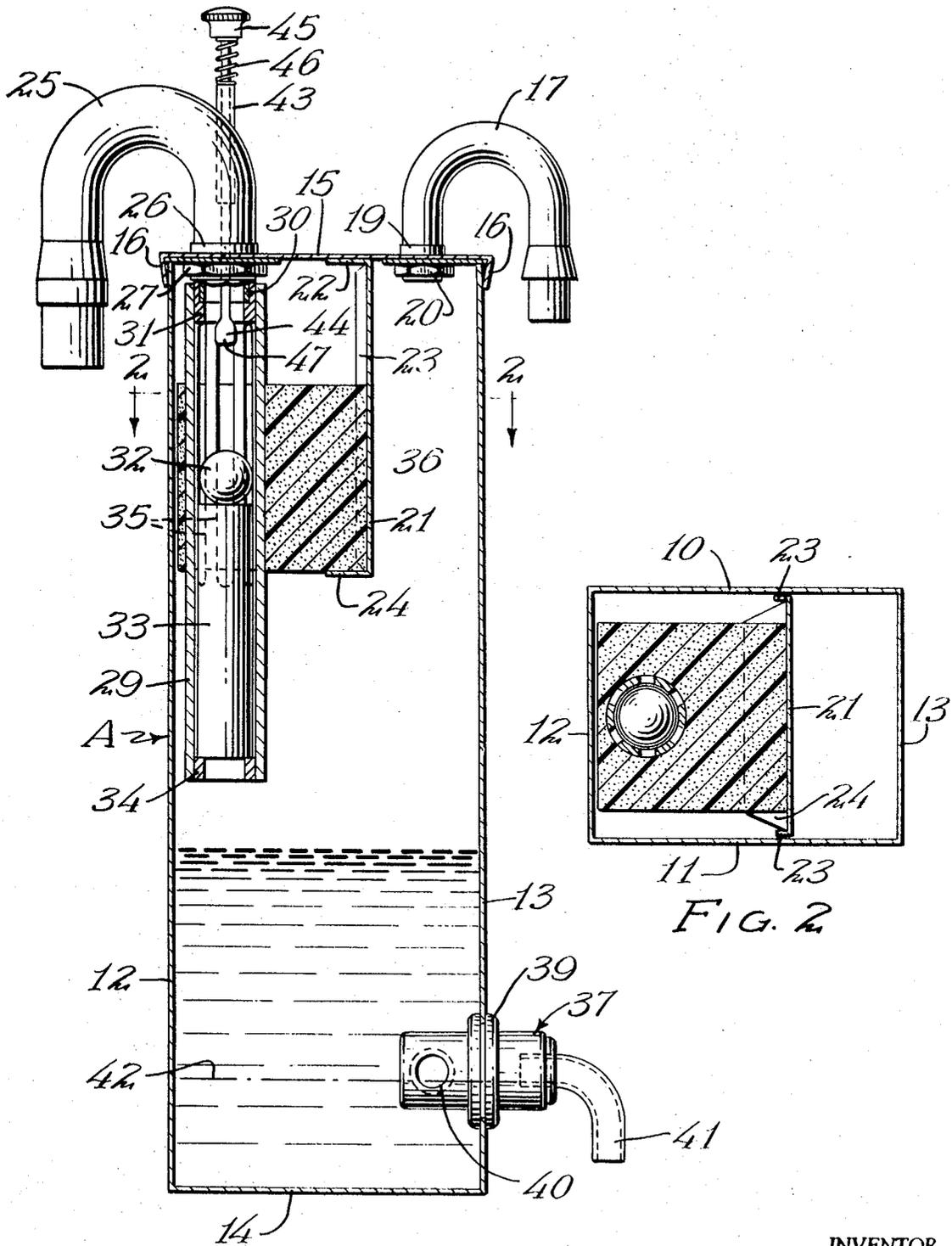


FIG. 1

FIG. 2

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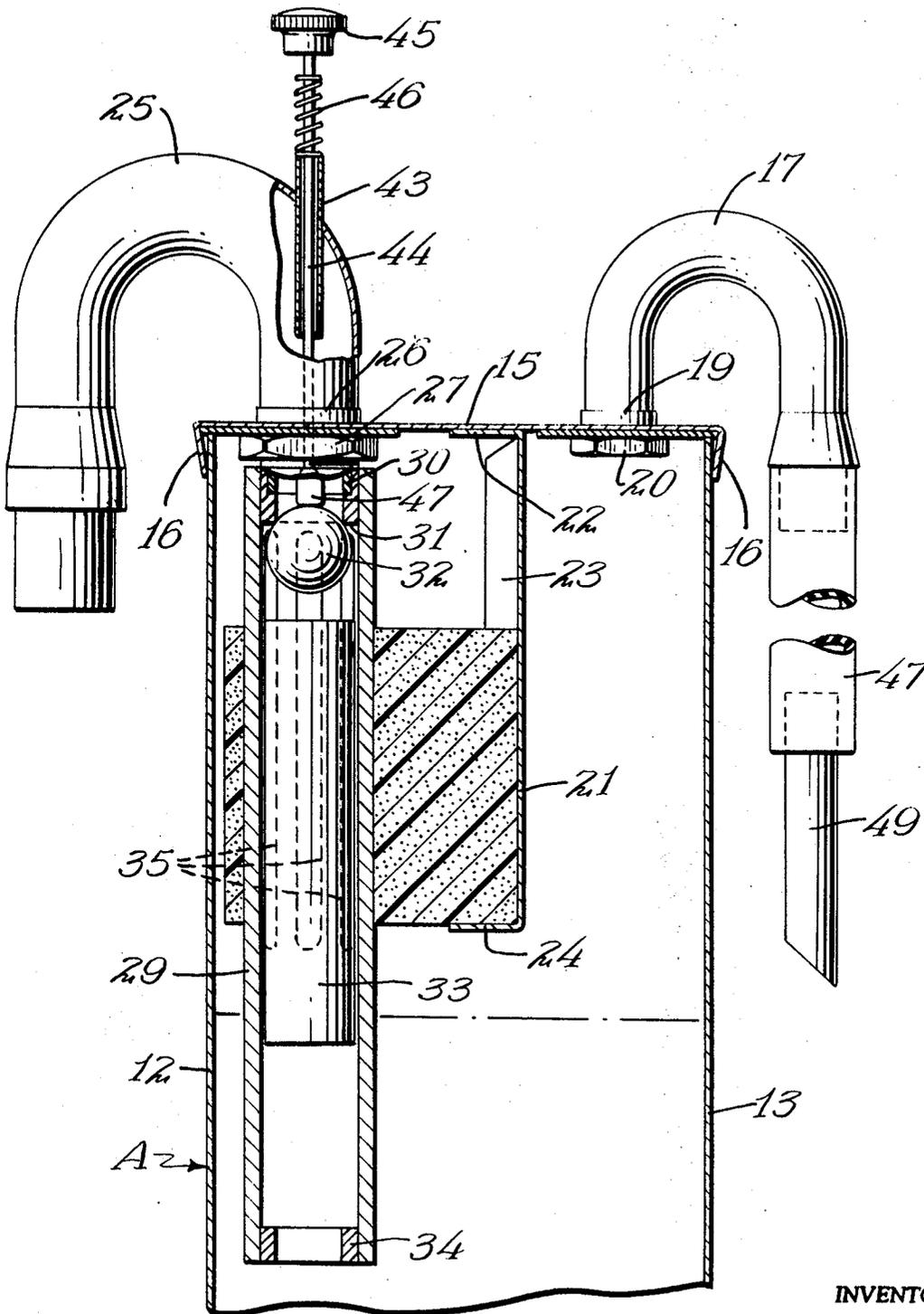


FIG. 3

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VACUUM REACTIVATOR

This invention relates to an improvement in vacuum reactivator, and deals particularly with a means for preventing the overflowing of the collector tanks of oral evacuators or the like.

Oral evacuators have become common accessories in dental offices. These evacuators provide a controlled amount of vacuum to a mouthpiece in order to draw liquid from the mouth of a patient, and also provide a means of conveying tooth chips and similar objects from the mouth while the dentist is working upon the teeth. In most instances, the liquid and various particles are drawn into a collection chamber where the liquid level gradually rises as the device is used. When the liquid level rises to a point where a possibility of drawing water into the suction fan exists, some means is usually provided for stopping the suction fan. In some instances, it is then necessary for the dentist to stop operation and to drain the collection chamber before proceeding. Often this operation requires considerable time and effort.

A feature of the present invention resides in the provision of a vacuum reactivator which may be used to empty the collection tank in a very short period of time so that the apparatus may be back in service within a matter of seconds rather than minutes. The collection tank is provided with a check valve which normally seals the drain when the suction fan is in operation, but which automatically opens the drain as soon as the suction fan is cut off. In addition, the outlet of the tank through which air is drawn is provided with a check valve in the form of a ball valve which floats on the surface of the liquid. As soon as the liquid level in the collection chamber reaches a predetermined depth, the ball valve will be drawn against the suction outlet so that no additional air will be drawn from the collection tank. Thus the ball valve stops the liquid from being drawn into the suction fan.

A feature of the present invention resides in the provision of a check valve which will open as soon as the above-mentioned ball valve closes the suction outlet. As soon as the check valve opens, the liquid in the chamber drains out. The ball valve would normally remain closed as long as the suction source is connected. A reactivator is provided in the form of a manually or mechanically operable plunger which is designed to engage the ball valve and force it open. Once open, the ball valve drops into inoperative position and will not close until the liquid level again rises sufficiently to raise the ball valve into proximity with the suction outlet.

A feature of the present outlet, resides in the provision of a tank of the type described including a partition wall which divides the upper portion of the collection chamber, the material entering the chamber coming in on one side of the partition, and the air leaving the chamber being removed from the area on the other side of the partition. An elongated slotted tube or valve guide is connected to the air outlet, and a ball valve is slidable in the tube and is designed to seat against the outlet when the liquid level of the tank raises to a predetermined degree. In order to assist the operation, a float is mounted in the tube beneath the ball valve, this float being operable to raise the ball valve toward the outlet so that the valve may close by suction somewhat before the liquid level reaches the outlet.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification.

FIG. 1 is a vertical sectional view through the collection chamber, showing the inlet thereto and the outlet therefrom.

FIG. 2 is a horizontal sectional view through the chamber, the position of the section being indicated by the line 2—2 of FIG. 1.

FIG. 3 is an enlarged sectional view of the upper portion of the collection chamber showing the general arrangement of parts therein.

The collection chamber is shown as comprising a generally rectangular tank having parallel sidewalls 10 and 11 and paral-

lel end walls 12 and 13 connected together at the corners to provide a tubular structure. A bottom wall 14 closes the lower end of the container. A top cover panel 15 closes the top of the chamber, the cover panel 15 having depending flanges 16 which fit snugly over the side and end walls of the chamber. An inverted generally U-shaped connector 17 extends through the top panel 15. A shoulder 19 near one end of the connector 17 engages the upper surface of the panel 15 to limit insertion of the end of the fitting 17. A nut 20 is fitted on the end of the connector beneath the top panel 15 to hold the container 17 in place. The connector 17 is connected by a suitable flexible tube or hose to the mouthpiece of the oral evacuator. In view of the fact that devices of this type are well known in the art, this arrangement is not shown in detail.

A partition wall 21 is secured to the undersurface of the top panel 15 parallel to the end walls 12 and 13, the partition substantially filling the space between the sidewalls 10 and 11 as is indicated in FIG. 2 of the drawings. The partition wall 21 is provided with a horizontal flange 22 at its upper extremity which is welded or otherwise secured to the undersurface of the top panel 15. The partition 21 is reinforced by vertical flanges 23 which lie inwardly of the sidewalls 10 and 11. A bottom flange 24 is also provided on the partition wall, this flange serving a purpose which will be described.

A second inverted U-shaped connector 25 extends through the top panel 15 on the opposite side of the partition wall 21 from the connector 17. The connector 25 is provided near one end with a shoulder 26 which rests upon the upper surface of the panel 15, and the connector is held in place by a nut such as 27 threaded on the lower end of the connector end which extends through the top panel. The connector 25 is connected by a suitable flexible hose or other such means to a suction device designed to draw air from the container. In view of the fact that suction devices of the type in question are well known in the art, the pump is not illustrated in the drawings.

An elongated tube 29 is secured to the end 30 of the connector 25 which is within the collection chamber A. A cylindrical valve seat 31 is provided within the upper end of the tube 29. A ball valve 32 is vertically movable in the tube 29. A generally cylindrical float 33 is also vertically slidable in the tube 29, and is held in the tube by a ring 34 of flange at the lower end of the tube 29. The tube 29 is slotted as indicated at 35 so that water may flow through the walls of the tube.

A block of foam plastic such as polyester, polyurethane having a porosity of 10p.m. encircles the tube 29 between the end wall 12 and the partition wall 21, and is supported by the flange 24. The plastic is sufficiently porous to allow air to be drawn through it. The main purpose of the plastic block is to prevent the foam created by cleaning elements from entering the tube 29 and freezing the float 33 from movement.

A check valve 37 extends through the end wall 13 of the tank chamber A and is sealed relative thereto by means of a grommet 39. The check valve 37 has an entrance opening 40 and a discharge tube 41. The check valve 37 may include a hollow body which includes a ball valve which seats against the opening 40 on the interior of the hollow body when the collection chamber is subject to vacuum so as to hold the drain closed. As soon as the suction to the collection chamber is cut off the check valve 37 is permitted to open, and the liquid within the chamber A is conducted through the tube 41 to a suitable drain receptacle. The liquid within the chamber will then quickly drain to the liquid level line 42.

The connector 25 is provided with a guide tube 43 extending therethrough in axial alignment with the lower end 30 of the connector. A plunger 44 is slidable in the tube guide 43, and includes a knob 45 at its exposed upper end which is usually supported above the upper end of the guide tube 43 by a spring 46. The lower end 47 of the plunger 44 is flattened so that the plunger cannot be pulled upwardly to the guide tube. The plunger 44 is in the path of movement of the ball thereof 32 and the ball valve is sufficiently buoyant, particularly when aided by the float 33, to raise the plunger and spring 46 above the upper end of the guide tube. Thus when the water level is

sufficiently high, the valve ball 32 will be drawn by suction against the valve seat 31 to prevent further air and water from being drawn from the receptacle A. The raising of the plunger 44 thus provides an indication or signal when the ball 32 is engaged with its valve seat.

When the liquid level raises sufficiently to engage the valve ball 32 with its valve seat, as indicated in FIG. 3 of the drawings, suction to the tank is cut off. As the connector 17 is connected to atmosphere through its flexible tube 47 and oral evacuator tip 49, the pressure in the tank raises. The check valve 37 immediately opens and the liquid will drain from the collector receptacle.

The ball valve 32 will remain closed due to suction from the suction source. The vacuum reactivator is then operated to start the device in operation. By manually depressing the plunger 44, the ball 32 is forced from its seat 31 to drop downwardly through the guide tube to again rest upon the float 33. The device will then continue to function until the liquid level again raises to the maximum liquid level line.

It should be understood that the vacuum reactivator is used only when sufficient liquid enters the tank to dangerously raise the liquid level. When the evacuator is not used and the vacuum supply turned off the tank automatically drains. However, the system protects the vacuum supply source in the event the evacuator is continuously used over a long period of time.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement

in vacuum reactivator, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A vacuum reactivator for use in conjunction with an oral evacuator tube and a source of partial vacuum, the reactivator including:

- a collecting chamber having an inlet and an outlet extending into the same at the upper end thereof,
- a drain connection including valve means adapted to close the drain when the interior of the chamber is subjected to partial vacuum,
- a guide means adjoining said outlet and supporting a buoyant valve ball,
- a valve seat at the end of said guide means and cooperable with said valve ball to close said outlet when said valve ball is engaged therewith,
- manually operable means engageable with said valve ball to disengage said valve ball from said valve seat,
- a vertical partition extending from the top of said chamber to a point spaced from the bottom thereof between said inlet and said outlet,
- said partition extending completely across said collecting chamber and a flock of porous foam on one side of said partition wall and encircling said guide means.

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