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Work station for the cleaning with liquid.

The invention relates to work stations for cleansing articles, such as surgical instruments, using washing and/or rinsing liquids which emit harmful, obnoxious or unpleasant vapours and volatiles.

According to the invention the work station includes a lid (17,20), which closes the sink (14) from atmosphere whilst a cleaning operation is being performed, means for supplying and draining (30) washing and/or rinsing liquids to and from said sink (14), and an air circulating means (37,39) for circulating air from said sink (14), through a filter means (38) and back to said sink (14) to dry all liquid deposits from said sink (14) before the lid (17,20) is opened.

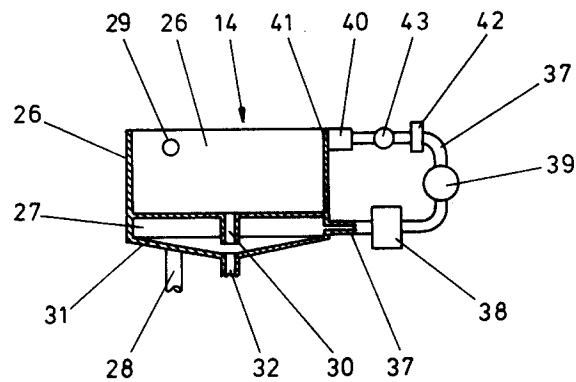


FIG. 4

EP 0 585 704 A1

This invention relates to work stations and, more particularly, to washing and cleaning work stations.

It is well known in the art to wash and cleanse articles at a work station including a sink or sump, hereinafter called a sink, for containing washing and cleansing liquids. In many uses the washing and/or cleansing liquids can emit volatiles which are obnoxious and, in many examples, harmful.

Thus, for example, in the medical profession many of the washing, cleansing and/or disinfecting liquids used for surgical tools and apparatus emit obnoxious, and often harmful, emissions.

It is known to overcome this problem by arranging the sink in which the washing, cleansing or disinfecting operation is to be performed in a specially built cabinet but with such an arrangement the cabinet takes up substantial floor space and there are problems in ventilating the cabinet after use to allow personnel to enter the cabinet.

In another well known arrangement the sink is arranged adjacent a ventilated wall, a low pressure is generated adjacent the wall and the emissions from the treatment liquids are drawn through the ventilated wall. This system suffers from the disadvantage that the ventilated wall must be operated continuously whilst the sink is in use and the evacuating air currents above the sink can be disrupted by, for example, opening or closing a door in the room within which the washing arrangement is located allowing the emissions to escape into the atmosphere.

Thus, in the practising of the prior art methods, it is difficult to avoid the escape of emissions into the atmosphere, to the detriment of personnel in the area.

According to the present invention there is provided a work station, including a sink, characterised by a lid arrangement adapted to be sealed over the open top of the sink to avoid the escape of volatile emissions therefrom whilst the work station is in use, means for supplying liquids to said sink, a drain for draining liquids from the sink, an air filter means arranged to extract volatiles from the air passed therethrough and an air circulating means arranged to circulate air from the sink through the said filter means and to return cleaned air from said filter to said sink.

Preferably the work station is characterised by a control unit programmable to control a washing and air circulating cycle for the work station.

In a preferred embodiment the control unit is programmable to effect a washing, rinsing, disinfecting and second rinse cycle for the sink before initiating the air circulating cycle. Preferably the work station includes means for locking the lid in its sealing condition whilst a programme cycle is being effect.

Preferably the work station is characterised by containers for liquids to be supplied to said sink, means for supplying liquids from said containers to said sink, an outlet in the lower regions of said sink and means for selectively ducting liquids drained from said sink to mains drain or back to aid containers for re-use.

In one embodiment the work station includes a plenum chamber beneath the sink and the said sink drains into said plenum chamber.

In such an embodiment the plenum chamber includes an air evacuation outlet whereupon, when the air circulating arrangement is operating, air flows from said sink to said plenum chamber and therefrom through said filter means before being returned to said sink.

Preferably the work station is characterised by a plurality of air outlets in the upper regions of the sink and means for ducting filtered air from said air circulating arrangement into the sink through said outlets.

Preferably the work station is characterised by an air pressurising means and duct means for circulating air withdrawn from said sink through said filter means and through aid pressurising means before being returned to the sink.

Preferably the work station is characterised by an air drying means in the air circulating arrangement.

In another embodiment the work station is characterised by air outlets for extracting air from the upper regions of the sink and duct means for directing the extracted air through said filter, through an air pump means and through a non-return valve before releasing said air back into the sink via the liquid drain outlet for the sink.

The invention will now be described further, by way of example, with reference to the accompanying drawings in which;

Fig 1 shows a front view of two work stations in accordance with the present invention, in a common cabinet,

Fig 2 shows a plan view of the work stations shown in Fig 1.

Fig 3 shows a side view of part of the work station shown in Figs 1 and 2, and

Fig 4 shows, diagrammatically, a cross-section through part of a work station on the line II-II in Fig 2.

The embodiment illustrated in Fig 1 is intended for washing, rinsing and disinfecting surgical apparatus and defines two work stations 11 and 12, arranged in side by side relationship in a common cabinet 13.

The work station 11 generally comprises a sink 14, surrounded by an inclined wall 15 upstanding from the otherwise plane surface 16 of the cabinet 13. The sink 14 is closeable by a lid 17, including a

surrounding downwardly and outwardly inclined side wall 17a, and the slope of the side wall 17a of the lid 17 substantially matches the slope of the wall 15, whereupon a sealing of the lid 17 to the side wall 15 and the top 16 of the cabinet 13 is facilitated to isolate the volume within the sink 14 from the surrounding atmosphere.

In a preferred embodiment a resilient seal may be positioned between inclined wall 15 and the inclined side wall 17a, and/or the lid 17 and the top 16, to seal the sink against the surrounding atmosphere.

In similar manner the work station 12 is defined by a sink 18, surrounded by an upstanding inclined wall 19, and the open top of the sink 18 is closeable by a lid 20 including inclined side walls 20a, in identical manner to the lid 17, and again having a substantially identical slope to the slope of the surround 19 to facilitate a sealing of the lid 20 with the surround 19 and the top 16 of the cabinet 13, whereupon to isolate the atmosphere within the sink 18 from the surrounding atmosphere.

The lids 17 and 20 have handle elements 21 and 22 respectively to facilitate the lifting and lowering of said lids 17 and 20.

The lids 17 and 20 each present a locking element 23 and 24, respectively, and each said locking element 23 and 24 is engaged in a recess, not shown, in the top 16 when the respective lid 17 and 20 is in its sink closure condition. The said locking elements 23 and 24 are engageable by locking mechanisms (not shown) when the respective work station 11, 12, is operating.

The sink 14 is made from sheet material and is defined by a relatively flat bottom 25 with a surrounding upstanding side wall 26. The vertical corners of the sink 14 are rounded and the unit includes a plenum chamber 27 formed below the bottom 25 of the sink 14.

The sink unit 14 receives liquid via a duct 28, which discharges liquid contents through an outlet 29 opening into the sink 14 through an upper side wall region of the sink 14. The sink unit 14 above bottom 25 drains via a drain duct 30 to the plenum chamber 27. The plenum chamber 27 includes a bottom wall 31, which slopes downwardly to a liquid exhaust duct 32 through the bottom 31 of the said plenum chamber 27.

The liquid supply duct 28 is conveniently arranged to supply a washing liquid from a container 33, via a duct 33a including a pump 33b, fresh water for rinsing via a link to mains (not shown) or a disinfectant liquid from a container 34, via a duct 34a including a pump 34b. The liquid exhaust duct 32 from the plenum chamber 27 is conveniently arranged to duct liquid flowing therethrough back to the washing container 33, via a drain duct 33c, back to the disinfecting liquid container 34, via a

drain duct 34c, or direct to the mains outlet, depending upon the condition of the liquid being exhausted from the plenum chamber 27.

The operation cycle for the work station 11, is conveniently controlled by a control unit 35 behind a display panel 36, which can visually display the programme being operated and the progression therethrough. Thus, for one cleaning cycle, the control unit 35 may effect the following operations in order;

(a) A plug (not shown) for sink unit 14, is brought to a position closing the outlet 30,

(b) The sink unit 14 is charged with articles to be cleaned, the lid 17 is manually lowered to its sealing condition and said lid 17 is locked in said sealing condition by the locking means (not shown) engaging the locking element 23.

(c) The duct 28 is connected to the duct 33a whereupon, on operation of the pump 33b by the control means 35, washing liquid is pumped from the container 33 into the sink unit 14 to a predetermined level above the bottom 25. On reaching the predetermined level the supply of washing liquid is terminated by stopping the pump 33b.

(d) Means (not shown), provided for agitating the washing liquid in the sink unit 14 are operated for a fixed period of time to effect a through washing of the articles in the sink 14.

(e) On completion of the wash cycle the control unit 35 is caused to connect the outlet duct 32 to the drain duct 33c and to displace the plug (not shown) to open the duct 30 to allow the washing liquid to drain from the sink 14 into the plenum chamber 27 and therefrom back to the washing liquid container 33.

(f) After a predetermined time, sufficient to allow the washing liquid to drain fully from the sink unit 14, the control unit 35 connects the duct 28 to the mains water supply, whereupon water flows from the outlet 29 into the sink unit 14 above bottom 25.

At this stage the control unit 35 may cause the plug closure member for outlet 30 to close the outlet 30, thus to effectually fill the sink unit 14 with rinsing water, whereupon the control unit 35 then opens the duct 30 to allow the rinsing water to flow through the plenum chamber 27 and through the outlet 32 to exhaust. In another embodiment the outlet 29 may comprise a spray outlet 29, which causes the rinsing water to be sprayed over all the articles within the sink unit 14 and the duct 30 may be left open to allow the rinsing water to drain readily therefrom (to mains drain).

(g) After the rinsing cycle the control unit 35 connects the duct 28 to the duct 34a and, by operating the pump 34b, disinfectant from the

container 34 is pumped through the outlet 29 and into the sink unit 14. During this operation the plug closure for outlet 30 may close outlet 30, allowing the sink unit 14 to charge with disinfectant liquid, or the outlet 30 may be left open and the disinfectant liquid simply sprayed from the outlet 29.

(h) After a predetermined period the supply of disinfectant liquid is terminated, the duct 32 is connected to the drain duct 34c and the disinfectant liquid is allowed to drain from the sink unit 14 through duct 32 and duct 34c back to the disinfectant liquid container 34.

(i) The control unit then causes a second rinsing operation, with water from the main supply, to be effected within the sink unit 14 to cleanse the articles in sink 14 of disinfectant.

After the second rinsing cycle has been completed there may still be droplets of liquid in the sink unit 14 containing volatile contaminants in solution and which contaminants would be released into the atmosphere if the lid was opened.

To overcome this problem the control unit 35 initiates programme step

(j) and wherein the ducts 28 and 32 are closed by valve means (not shown) in said ducts 28 and 32 and air is drawn from the plenum chamber 27 via a duct 37, the extracted air is passed through a molecular filter 38 in the duct 37 and which filter 38 removes the greater part of the volatile contents from the air passing therethrough, and the air from the filter 38 is pumped, via a pump 39 in the duct 37, through a plenum chamber 40 and back into the sink 14 through small holes 41 in the wall of the plenum chamber 40.

Thus, by the air circulating arrangement described above, air is circulated from the sink unit 14, through the plenum chamber 27 into the duct 37 and through the filter 38, pump 39 and the plenum chamber 40 back to the sink unit 14 and the filter 38 works continuously on the circulating air removing contaminants therefrom.

(k) The air circulation system is allowed to run for a period sufficient to ensure that all the liquid droplets in the air circulation system have been evaporated and only after said period has expired is the lid released by the locking mechanism to allow the lid to be safely lifted to allow the cleaned and disinfected articles to be removed from the sink.

Preferably such an arrangement includes an air dryer, conveniently defined by a heating element 42 in the duct 37, so that dry air is released through the holes 41 into the sink unit 14 to rapidly evaporate any residual liquid in said sink unit 14.

The supply of air through the duct 37 may be terminated by closing a valve 43 in the duct 37.

The sink unit 14 may also include a nozzle (not shown) connectable to the duct 28 and whereupon hollow surgical apparatus, such as endoscopes, may be attached to the nozzle to have their bores thoroughly washed, cleansed, and disinfected.

It will be appreciated that the control unit 36 allows the programme to be performed to be set and adjusted, as desired.

The unit 18 has its bottom 25 contoured, to facilitate the cleansing of specially shaped articles, but otherwise the work station 12 is substantially identically arranged and can operate in the manner described above for the work station 11. Thus, the work station 12 will include a plenum chamber 27, ducts and outlets identical to ducts and outlets 28, 29, 30, 31 and 37, and with an air circulating system including a filter 38, air pump 39, plenum chamber 40, and air dryer 42, together with containers 33 and 34 with their respective ducts 33a, 34a, pumps 33b, 34b and return ducts 33c, 34c, all identical with and arranged to operate in identical manner to the work station 11, under the control of a control unit 44 individual thereto.

The work station 11 and its associated apparatus may all be contained in the right side of the cabinet 13, as viewed in Fig. 1, and the work station 12 with its associated apparatus may be contained in the left side of said cabinet 13.

Thus the work stations 11 and 12 may be operated in complete independence of one another.

In another embodiment the work stations 11 and 12 may share common liquid containers 33 and 34.

In another embodiment the inclined walls 15 and 19 may be omitted and the lids 17 and 20 may seal directly against the top surface 16, or against the top edge regions of the sinks 14 and 18.

In a further embodiment the washing liquid or detergent and/or the disinfectant may be charged directly into the sinks 14 and 18 by hand or via a dispensing means, preferably a dosing dispensing means. In such an embodiment the storage containers 33 and/or 34 may be omitted and the washing liquid or detergent and/or the disinfectant liquid may be ducted direct to mains draining or to a waste disposal container, which may be remote from the work stations.

In a further embodiment the plenum chamber 27, may be omitted from the work station and with such an embodiment, during the air circulating cycle, air is extracted from the upper regions of the respective sink, the extracted air is passed through a filter for removing contaminants from the air said cleaned air is then passed through an air pump and through a non-return valve before being re-

turned to the respective sink 14 or 18, via the liquid outlet 30 from the sink 14 or 18.

Claims

1. A work station, including a sink, characterised by a lid arrangement (17, 20) adapted to be sealed over the open top of the sink (14, 18) to avoid the escape of volatile emissions therefrom whilst the work station (11, 12) is in use, means for supplying liquids to said sink (14, 18), a drain (30) for draining liquids from the sink (14, 18), an air filter means (38) arranged to extract volatiles from the air passed therethrough and an air circulating means (37, 38, 39) arranged to circulate air from the sink (14, 18) through the said filter means (38) and to return cleaned air from said filter means (38) to said sink (14, 18). 5
2. A work station according to claim 1, characterised by a control unit (35) programmable to control a washing and air circulating cycle for the work station (11, 12). 10
3. A work station according to claim 2, characterised in that the control unit (35) is programmable to effect a washing, rinsing, disinfecting and second rinse cycle for the sink (14, 18) before initiating the air circulating cycle. 15
4. A work station according to claims 2 or 3, characterised in that the work station includes means (23, 24) for locking the lid (17, 20) in its sealing condition whilst a programme cycle is being effect. 20
5. A work station according to claims 1, 2, 3 or 4, characterised by containers (33, 34) for liquids to be supplied to said sink (14, 18), means (33a, 33b or 34a, 34b) for supplying liquids from said containers (33, 34) to said sink (14, 18), an outlet (30) in the lower regions of said sink (14, 18) and means (33c, 34c) for selectively ducting liquids drained from said sink (14, 18) to mains drain or back to said containers (33, 34) for re-use. 25
6. A work station according to any one of the preceding claims, characterised in that the work station (11, 12) includes a plenum chamber (27) beneath the sink (14, 18) and the said sink (14, 18) drains into said plenum chamber (27). 30
7. A work station according to claim 6, characterised in that the plenum chamber (27) includes an air evacuation outlet (37) whereupon, 35
8. A work station according to claims 6 or 7, characterised by a plurality of air outlets (41) in the upper regions of the sink (14, 18), and means (40) for ducting filtered air from said air circulating arrangement (37) into the sink (14, 18) through said outlets (41). 40
9. A work station according to any one of the preceding claims characterised by an air pressurising means (39) and duct means (37) for circulating air withdrawn from said sink through said filter means (38) and through said pressurising means (39) before being returned to the sink (14, 18). 45
10. A work station according to any one of the preceding claims characterised by an air drying means (42) in the air circulating arrangement (37). 50
11. A work station according to claims 1, 2, 3, 4 or 5 characterised by air outlets for extracting air from the upper regions of the sink (14, 18) and duct means for directing the extracted air through said filter means (39), through a air pump means (39) and through a non-return valve before releasing said air back into the sink (14, 18) via the liquid drain outlet (30) for the sink. 55

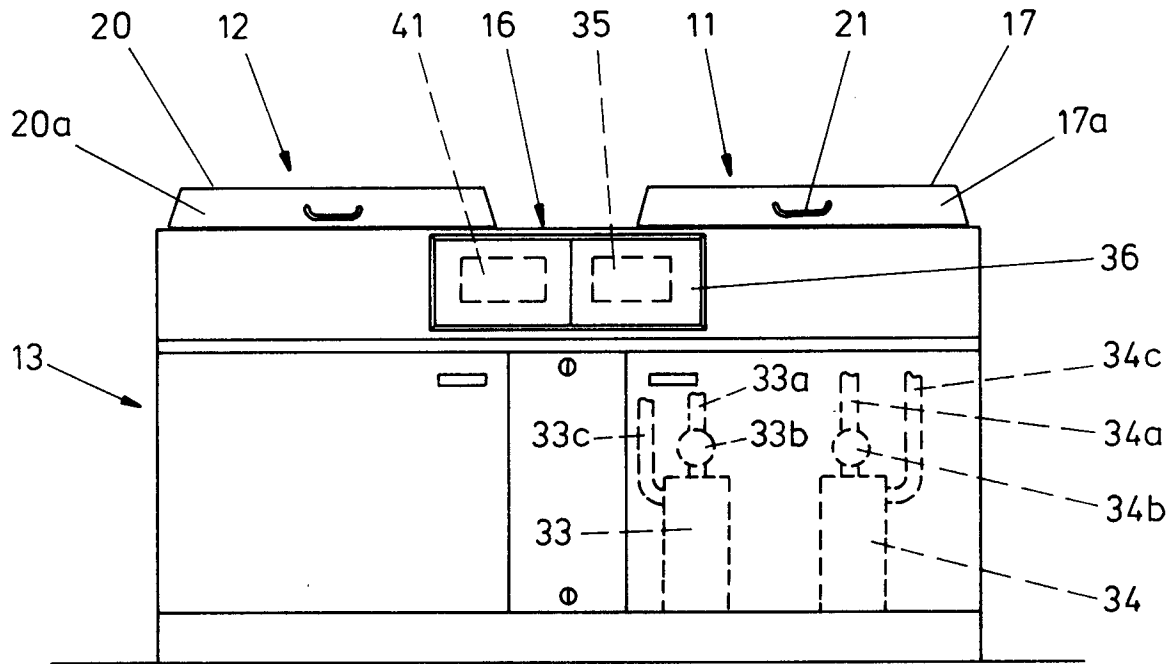


FIG. 1

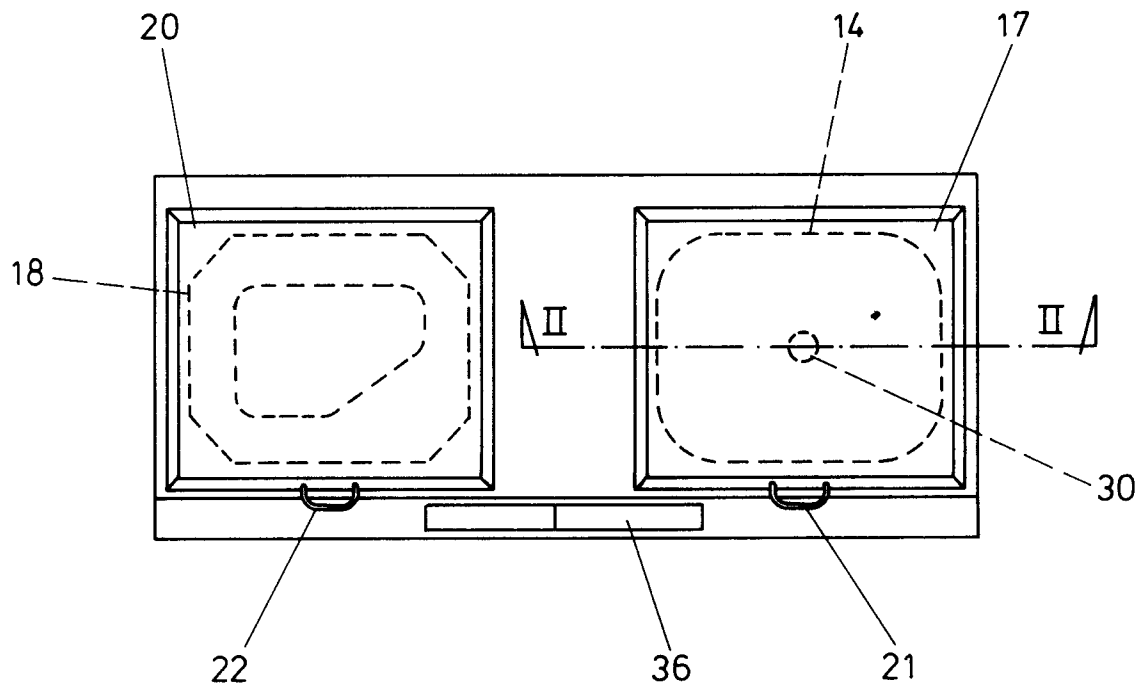


FIG. 2

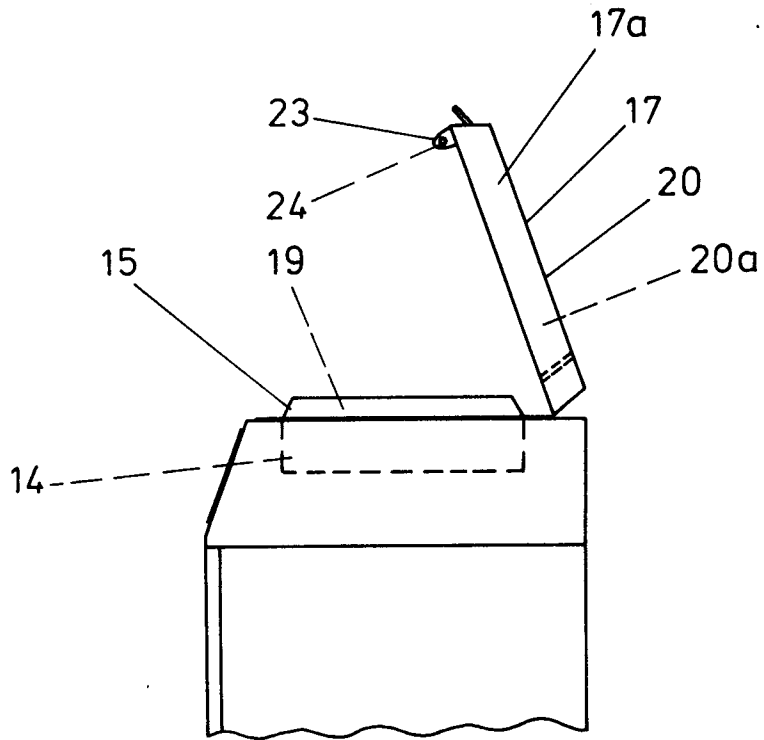


FIG. 3

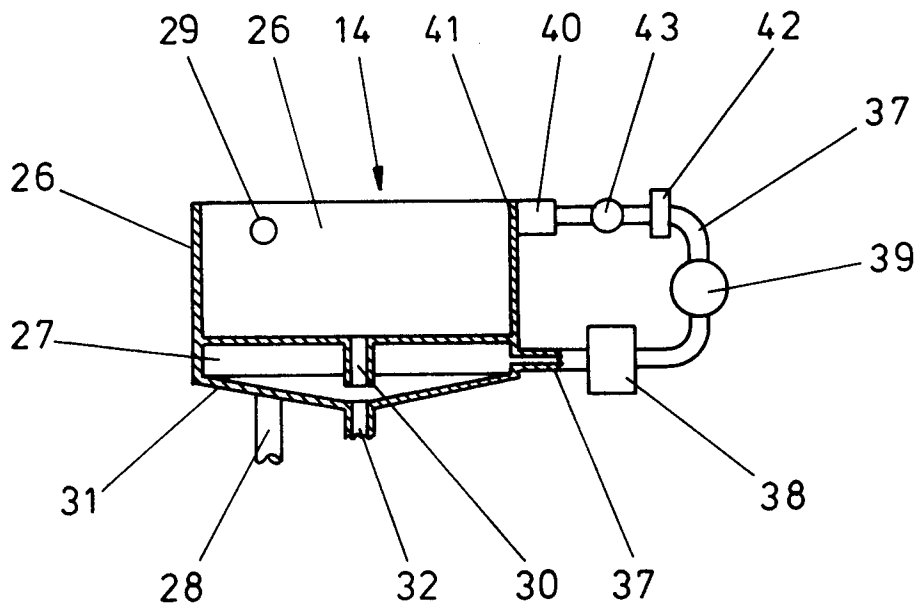


FIG. 4



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	US-A-4 051 858 (MELE) 4 October 1977 * column 3, line 1 - column 5, line 50; figures 1-5 *	1	B08B3/04
A	US-A-4 832 753 (CHERRY) 23 May 1989 * column 5, line 1 - line 21; figures 1-6 *	1	
A	DE-A-34 38 651 (SCHMITZ) 15 May 1985 * page 13, line 32 - page 14, line 17; figures 1-3 * * page 19, line 1 - page 20, line 22 *	1	
A	CH-A-107 864 (WYLER) 17 November 1924 * page 1 - page 2; figure 1 *	6	
A	US-A-5 107 876 (OZYJIWSKI) 28 April 1992		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B08B A61B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 November 1993	Examiner Vollering, J
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			