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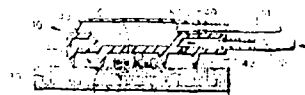
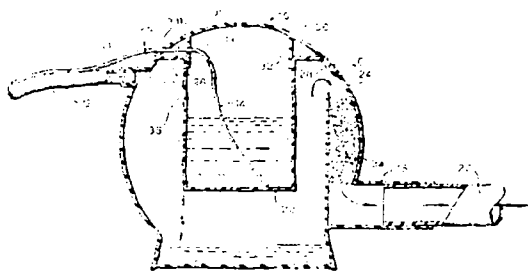
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(54) Title: CLEANING DEVICE WITH CLEANING HEAD AND CLEANING PRODUCT SUPPLY MEANS



(57) Abstract: A cleaning device is adapted to be secured to a vacuum pump, said cleaning device comprising a cleaning head (10) and cleaning product supply means (16), wherein a first cleaning product is located in a cleaning product section of the head section, the cleaning device comprises a first path (14) from the cleaning product supply means (16) to the cleaning head (10) and a second path (12) from the cleaning head (10) to a reservoir (16), wherein an ejection section (52) of the cleaning head (10) is operable to eject cleaning product (19) from the cleaning product supply means (16) onto a surface (38) to be cleaned and a suction section (42, 44, 46) of the cleaning head (10) is operable to draw ejected cleaning product (19) from said surface (38) along said second path (12).

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CLEANING DEVICE WITH CLEANING HEAD AND CLEANING PRODUCT SUPPLY MEANS

This invention relates to a cleaning device and to a
5 cleaning product cartridge therefor.

When a substance is spilled on a carpet or fabric a
problem arises in how the spill should be cleaned. Simply
wiping the spill with a cloth often has the effect of only
10 diluting and spreading the material that has been spilled.
Sucking the spill from the carpet or fabric with a suction
device such as a vacuum cleaner is also inappropriate,
because the spilled material often penetrates into the
carpet or fabric to such an extent that suction alone will
15 not work.

It is an object of the present invention to address the
above mentioned disadvantages.

20 According to a first aspect of the invention, a cleaning
device is adapted to be secured to a vacuum pump, said
cleaning device comprising a cleaning head and cleaning
product supply means, wherein a first cleaning product is
located in a cleaning product section of the head section,
25 the cleaning device comprises a first path from the
cleaning product supply means to the cleaning head and a
second path from the cleaning head to a reservoir, wherein
an ejection section of the cleaning head is operable to a
eject cleaning product from the cleaning product supply
30 means on/in to a surface to be cleaned and a suction
section of the cleaning head is operable to draw ejected
cleaning product from said surface along said second path.

- The reservoir may comprise a part of the cleaning product supply means (i.e. the reservoir and the cleaning product supply means may be combined as a single vessel).
- 5 Alternatively the reservoir may be separate from the cleaning product supply means.

Preferably, on application of suction from the vacuum pump, the cleaning head is adapted to at least partially
10 seal against a surface on which it is placed, thereby causing suction on the ejection section, which suction is preferably operable to cause ejection of cleaning product from the ejection section.

- 15 Advantageously, suction is used to draw cleaning product from the cleaning product supply means to the cleaning head for ejection therefrom. Cleaning product is advantageously ejected from the cleaning head when the cleaning head is placed against a surface to be cleaned
20 and at least partly seals against the surface.

Preferably, the suction section incorporates a peripheral sealing element, preferably a peripheral flange. The suction section preferably incorporates an inner sealing
25 element, preferably an inner flange. The inner and outer flanges preferably form a cavity. The cavity preferably leads to a suction chamber, which preferably leads to the second path.

- 30 Preferably, one of the suction section and the ejection section is located within the other. More preferably, the ejection section is located within the suction section.

The ejection section is preferably located within the inner flange of the suction section.

Advantageously, suction from the suction section causes
5 cleaning product from the ejection section to be drawn into a surface to be cleaned to move around the inner flange and into the suction section.

Preferably, cleaning product to be ejected from the head
10 section comprises a second cleaning product, preferably water, from the cleaning product supply section and the first cleaning product.

The first and second cleaning products are preferably
15 mixed in the cleaning product section. The cleaning product section may be a cartridge received on or in a remainder of the cleaning head.

The cleaning product may be a gel or a powder or a liquid
20 or may be another material that may be mixed with water. The cleaning product may be a detergent.

Advantageously a supply of water in the cleaning product
25 section is used to dilute/dissolve or is mixed with a cleaning product in the cleaning product section.

Preferably, the cleaning device is adapted such that on
placing the cleaning head on a surface to be cleaned
suction along the second path draws free material, such as
30 a spill, from the surface. After a delay cleaning product is ejected from the ejection means. Preferably, the delay is dictated by a strength of suction along the second path, a length of the first path, a length of the second

path, sizes of the two paths and any constrictions therein.

Preferably, the cleaning product supply means includes a
5 second cleaning product store. Preferably, the cleaning product supply means includes a waste product store, adapted to receive material from the cleaning head, via the second path.

10 Preferably, an obstruction element is located in the path of an air stream carrying material received from the cleaning head. The obstruction plate is preferably a generally vertically aligned surface.

15 Advantageously, material impinging on the obstruction element is separated from the air stream and passes to the waste product store.

Preferably, the second cleaning product store is received
20 in a body section of the cleaning product supply means. Preferably, the first path leads from the second cleaning product store to the cleaning head.

The cleaning product supply means preferably incorporates
25 a filter section, which is adapted to filter the air stream, after the air stream has passed the obstruction element.

The vacuum pump is preferably a vacuum cleaner.

30

According to a second aspect of the invention a cartridge for a cleaning device as described in the first aspect is adapted to be secured to a cleaning head of the cleaning

device and to form part of a first path thereof, said cartridge including a first cleaning product.

5 The cartridge is preferably adapted to eject the first cleaning product from an ejection section of the cleaning head on receipt of a second cleaning product from a cleaning product supply means of the cleaning device.

10 Advantageously, the use of a cartridge to contain the first cleaning product allows simple replacement of the first cleaning product, without the need for a user to contact that product, which may be unsuitable for human contact.

15 The invention extends to a replaceable cleaning head operable to be secured to the remainder of the cleaning device of the first aspect.

20 According to a third aspect of the invention a method of cleaning comprises:

securing a vacuum pump to a cleaning product supply means of a cleaning device, said cleaning device further incorporating a cleaning head;

25

drawing material into a suction section of the cleaning head and along a second path to a reservoir; and

30 drawing a second cleaning product from the cleaning product supply means along a first path for mixing with a first cleaning product;

ejecting the mixed first and second cleaning products from an ejection section of the cleaning head; and

5 drawing the mixed first and second cleaning products and material cleaned from a target surface into the suction section and along the second path.

As in the first aspect of the invention the reservoir may comprise a part of the cleaning product supply means (i.e. 10 the reservoir and the cleaning product supply means may be combined as a single vessel). Alternatively the reservoir may be separate from the cleaning product supply means.

The method may include the additional step of continuing 15 suction with the suction means after the first and/or second cleaning products have been exhausted.

The method may include partially sealing the cleaning head against a surface to be cleaned to allow a partial vacuum 20 to be created in the ejection section in order to draw the first cleaning fluid along the first path.

A partial seal created by the cleaning head preferably partially seals both the suction section and the ejection 25 section.

Preferably, cleaning product from the ejection section must pass into a surface to be cleaned, such as a carpet or fabric, in order to enter the suction section.

30

Advantageously a first suction stage draws free material from the surface to be cleaned; a second suction stage draws the second cleaning material along the first path

and through the surface to be cleaned; and a third suction stage draws remaining free material from the surface.

All of the features described herein can be combined with
5 any of the above aspects, in any combination.

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the
10 accompanying diagrammatic drawings in which:

Figure 1 is a schematic perspective view of a head section of a cleaning device showing connecting tubes extending towards a body section of the cleaning device;

15

Figure 2 is a schematic cross-sectional side view of the body section of the cleaning device showing the connecting tubes extending leftwards towards the head section shown in Figure 1;

20

Figure 3 is a schematic cross-sectional side view of the cleaning head during a first stage of a cleaning operation;

25 Figure 4 shows the same view of the cleaning head as shown in Figure 3 but in a second stage of a cleaning operation;

Figure 5 shows the cleaning head in the same view as shown in Figures 3 and 4 in a third stage of a cleaning
30 operation;

Figure 6 shows a side view of the cleaning head in the same view as shown in Figures 3 to 5, but in a fourth stage of a cleaning operation; and

- 5 Figure 7 shows a schematic plan view of an underside of the head section of the cleaning device.

As shown in Figures 1 and 2, a cleaning device comprises a head section 10 having a vacuum tube 12 and a water supply
10 tube 14 extending towards a body section 16 (in Figure 2). The body section 16 also has a port 18 for connection to a vacuum cleaner hose 20 of a vacuum cleaner (not shown).

In use, when the body section 16 is connected to the
15 vacuum cleaner hose 20 suction from the vacuum cleaner causes material at the head section to be sucked back towards the body section 16. Also, water from a subsidiary section of the body section 16 is sucked from the body section 16 to the head section 10 for cleaning of
20 a surface to be cleaned and is then sucked down the vacuum tube 12 and into a main part of the body section 16 for retention.

In more detail, the body section 16 comprises a clean
25 water vessel 22 which sits on a main portion 24 of the body section 16. The clean water vessel 22 has a peripheral flange 26 which is received on an upper flange 28 of the main portion 24. The clean water vessel 22 is removable from the main portion 24 to allow for filling
30 thereof with clean, warm water or the like.

A lid section 30 is provided to cover the clean water vessel 22. The lid section 30 has an opening 31 therein

to allow the ingress of air to replace water that is drawn from the vessel 22. A downward protruding flange 32 of the lid section 30 is received in an upper part of the clean water vessel 22 to seal said water vessel 22. The
5 water supply tube 14 extends downwards towards a base of the clean water vessel to allow water to be sucked from the clean water vessel 22 and along the water supply tube 14.

10 The water supply tube 14 passes through openings 34a and 34b in the lid section 30 before extending towards the head section 10.

The port 18 is located at a lower section of the main
15 portion 24. The port 18 provides a spigot on or in which the vacuum cleaner hose 20 can be secured. Leading into the port 18 from the body section 16 is a cavity 34 in which is placed a coarse absorbent filter material which removes any residual moisture or particulate matter from
20 air being sucked towards the port 18.

At a bottom section of the body section 16 soiled water from the vacuum tube 12 is received and retained. A side wall 36 of the clean water vessel 22 forms an obstruction
25 plate, against which air and entrained water from the suction pipe 12 impinges. Water that hits the side wall 36 runs down the side wall 36 and drips to the bottom of the body section 16. Such use of the side wall 36 beneficially removes water from the air flow so that only
30 air is sucked into the port 18, after filtration by the coarse absorbent filter in the cavity 34.

As shown in Figure 3, when the head section 10 is placed on a carpet 38 on which e.g. wine 40 has been spilled, air being sucked through the vacuum tube 12 sucks the wine 40 into an annular ring cavity 42 which leads into an upper cavity 43 and into the vacuum tube 12. When the head section 10 is placed on the carpet 38 outer and inner side walls 44 and 46 respectively of the annular ring cavity 42 form a partial seal due to a partial vacuum created by suction from the vacuum cleaner. This causes material from beneath the annular ring cavity 42 and in the carpet 38 to the sides of annular ring 42 to be subject to suction. This provides good suction through the carpet, where the wine 40 is located.

It is important to note that when the head section 10 is not placed on a carpet or pressed against a surface air is simply sucked into the annular ring cavity 42 and back to the vacuum cleaner with no or a much smaller vacuum or partial vacuum being created in the annular ring cavity 42.

When the head section 10 has been placed on the carpet 38 or another fabric a vacuum or partial vacuum builds up in a centre portion 48 by virtue of the seal formed by the inner wall 46 of the annular ring cavity 42. The vacuum or partial vacuum thus created causes clean warm water to be drawn from the clean water vessel 22 and along the water supply tube 14. A period of approximately thirty seconds elapses to allow for the vacuum pressure to build and to allow for water to be pulled along the tube 14 from the clean water vessel 22. The thirty second period is chosen to allow free wine 40 to be drawn up by the vacuum before a detergent is released as will be described below.

The period of thirty seconds is chosen for convenience, but of course could be varied. The length of time taken for water to be drawn from the clean water vessel 22 is based on the length of the water supply tube 14, its diameter and any constriction therein. Thus, suitable variation of these factors can be made to achieve a desired length of time between initial placement of the head section 10 on the soiled carpet 38 or other material and the arrival of clean water at the head section 10.

10

The water supply tube 14 enters a cavity 50 of the head section 10, in which cavity 50 is located a cleaning product 49, such as a suitable detergent. The clean water from the clean water vessel 22 causes the cleaning product to be either dissolved or liquefied and is then carried into the centre section 48 via an opening 52, as shown in Figure 4.

The mixture of water and cleaning product can be worked into the carpet 38 by movement of the head section 10. Bristles 54 extend downwardly through the centre section 48 and are used to work the water and cleaning product into the carpet 38. The bristles 54 may be moulded into the centre section 48 or may be inserted after production of the remainder of the head section 10.

Water alone is passed through the cleaning head 10 via the cavity 50, opening 52 and centre section 48 after sufficient water has passed through the cavity 50 to remove all of the cleaning product. This is done in order to provide a rinsing action in the carpet 38 that is being cleaned, as shown in Figure 5.

After the water in clean water vessel 22 has been exhausted, as shown in Figure 6, excess water is removed by further suction from the vacuum cleaner, causing drying of the carpet 38.

5

Thus, it is expected that all of the water in the clean water vessel 22 will be used up during a single cleaning operation, as will the cleaning product in the cavity 50. Thus, the base of the body section 16 should be
10 sufficiently sized to take all of the water from the clean water vessel 22 and also the cleaning product from the cavity 50.

Preferably, the head section 10 is made of a flexible or
15 resilient material, possibly out of synthetic or natural rubber or a suitable thermoplastic elastomer.

The head section 10 may be in the form of a cartridge which is replaceable after each use, with the cavity 50 in
20 the cartridge carrying a fresh supply of cleaning product 49. The cartridge may attach to the vacuum tube 12 and the water supply tube 14 by a snap fit action.

In order to more easily facilitate connection of the head
25 section 10 to the vacuum tube 12 and water supply tube 14. The tubes may be concentric with the water supply tube 14 being housed within the vacuum tube 12 with a suitable connector at the end thereof to allow connection to the head section 10.

30

The embodiment described above is a "one shot" system, in which all of the water in the clean water vessel 22 is used. However, it would be possible to incorporate a

mechanism by which the water supply from the clean water vessel 22 could be turned on or off with a suitable valve in order to use only part of the water in the water vessel 22.

5

In use, the water vessel 22 would typically be filled by removal of the water vessel 22 and filling it from a tap or the like.

- 10 An alternative arrangement for the head section 10 is to have the cavity 50 forming a removable cartridge for containing the cleaning product and for replacement by a fresh cartridge after use of the cleaning product 49 therein. This would leave the remainder of the head
- 15 section 10 for repeated use attached to the vacuum tube 12. The cartridge of cleaning product 49 would have a connection for the water supply tube 14.

The cartridge and/or the head section 10 may be formed by

20 injection moulding, or may be thermo-formed or be produced by blow moulding.

A further embodiment of the cleaning device formed by the head section 10 water supply tube 14, vacuum tube 10 and

25 body section 16 is to combine the head section 10 and body section 16 into a single unit. The connections between the two would still be the same in that a flow path from a portion corresponding to the body section 16 to a portion corresponding to the head section 10 and back from that

30 section to the body section 16 would still be present, although a user would manipulate the combined head and body section in order to clean the carpet 38 or other material as described above.

The cleaning device described herein is of particular use for cleaning spills or stains, such as wine stains as described above. However, the device could also be used
5 for more general cleaning purposes, in which case a larger clean water vessel 22 would be required, as well as larger cavity 34 for provision of a greater amount of cleaning product 49.

10 The cleaning device described herein has particular advantages in allowing spills to be cleaned using a simple attachment to a vacuum cleaner which can easily filled with a small amount of water to provide the necessary cleaning of a relatively small spill. The provision of a
15 cavity for including cleaning product provides additional advantages over simply using water to clean a spill. Furthermore, the provision of a cartridge of cleaning product allows for easy replacement and easy repeated use of the cleaning device.

20 The cleaning product used may be any of those suitable for cleaning stains in carpets or fabrics etc. The products may be in the form of a gel, a liquid, a powder (which may be compressed), or any other suitable type that will be
25 dispersed, dissolved or mixed with water.

CLAIMS

1. A cleaning device is adapted to be secured to a vacuum
5 pump, said cleaning device comprising a cleaning head and
cleaning product supply means, wherein a first cleaning
product is located in a cleaning product section of the
head section, the cleaning device comprises a first path
10 from the cleaning product supply means to the cleaning
head and a second path from the cleaning head to a
reservoir, wherein an ejection section of the cleaning
head is operable to a eject cleaning product from the
cleaning product supply means on/in to a surface to be
15 cleaned and a suction section of the cleaning head is
operable to draw ejected cleaning product from said
surface along said second path.

2. A cleaning device as claimed in claim 1, in which the
reservoir comprises a part of the cleaning product supply
20 means or is separate from the cleaning product supply
means.

3. A cleaning device as claimed in claim 1 or 2, in
which, on application of suction from the vacuum pump, the
25 cleaning head is adapted to at least partially seal
against a surface on which it is placed, thereby causing
suction on the ejection section, which suction is operable
to cause ejection of cleaning product from the ejection
section.

30

4. A cleaning device as claimed in either claim 1, 2 or
3, in which the cleaning head is adapted, in use, to eject
cleaning product from the cleaning head when the cleaning

head is placed against a surface to be cleaned and at least partly seals against the surface.

5. A cleaning device as claimed in any preceding claim,
5 in which, the suction section incorporates a peripheral sealing element and an inner sealing element forming a cavity.

6. A cleaning device as claimed in any preceding claim,
10 in which one of the suction section and the ejection section is located within the other.

7. A cleaning device as claimed in any preceding claim,
in which, in use, suction from the suction section causes
15 cleaning product from the ejection section to be drawn into a surface to be cleaned and to move around the inner flange and into the suction section.

8. A cleaning device as claimed in any preceding claim,
20 in which cleaning product to be ejected from the head section comprises a second cleaning product from the cleaning product supply section and the first cleaning product.

25 9. A cleaning device as claimed in any preceding claim, in which the first and second cleaning products are preferably mixed in the cleaning product section.

10. A cleaning device as claimed in any preceding claim,
30 in which the cleaning product section is a cartridge received on or in a remainder of the cleaning head.

11. A cleaning device as claimed in any preceding claim,
in which the cleaning device is adapted such that on
placing the cleaning head on a surface to be cleaned
suction along the second path draws free material from the
5 surface.

12. A cleaning device as claimed in any preceding claim,
in which the cleaning device is adapted such that after a
delay following placing the cleaning head on a surface to
10 be cleaned cleaning product is ejected from the ejection
means.

13. A cleaning device as claimed in any preceding claim,
in which the cleaning product supply means includes a
15 second cleaning product store.

14. A cleaning device as claimed in any preceding claim,
in which, the second cleaning product store is received in
a body section of the cleaning product supply means.

20

15. A cleaning device as claimed in any preceding claim,
in which an obstruction element is located in the path of
an air stream carrying material received from the cleaning
head

25

16. A cleaning device as claimed in claim 15, in which the
cleaning product supply means incorporates a filter
section, which is adapted to filter the air stream, after
the air stream has passed the obstruction element.

30

17. A cartridge for a cleaning device as claimed in any
one of claims 1 to 16 is adapted to be secured to a
cleaning head of the cleaning device and to form part of a

first path thereof, said cartridge including a first cleaning product.

18. A cartridge as claimed in claim 17, which is adapted to eject the first cleaning product from an ejection section of the cleaning head on receipt of a second cleaning product from a cleaning product supply means of the cleaning device.

19. A replaceable cleaning head operable to be secured to the remainder of the cleaning device claimed in any one of claims 1 to 16.

20. A method of cleaning comprises:

15

securing a vacuum pump to a cleaning product supply means of a cleaning device, said cleaning device further incorporating a cleaning head;

20

drawing material into a suction section of the cleaning head and along a second path to a reservoir; and

25

drawing a second cleaning product from the cleaning product supply means along a first path for mixing with a first cleaning product;

ejecting the mixed first and second cleaning products from an ejection section of the cleaning head; and

30

drawing the mixed first and second cleaning products and material cleaned from a target surface into the suction section and along the second path.

21. A method as claimed in claim 20, in which the reservoir comprises a part of the cleaning product supply means or is separate from the cleaning product supply means.

5

22. A method as claimed in claim 20 or 21, which includes the additional step of continuing suction with the suction means after the first and/or second cleaning products have been exhausted.

10

23. A method as claimed in claim 20, 21 or 22, which includes partially sealing the cleaning head against a surface to be cleaned to allow a partial vacuum to be created in the ejection section in order to draw the first cleaning fluid along the first path.

15

24. A method as claimed in claim 23, which includes the partial seal created by the cleaning head sealing both the suction section and the ejection section.

20

25. A method as claimed in any one of claims 20 to 24, in which cleaning product from the ejection section passes into a surface to be cleaned in order to enter the suction section.

25

26. A method as claimed in any one of claims 20 to 24, in which a first suction stage draws free material from the surface to be cleaned; a second suction stage draws the second cleaning material along the first path and through the surface to be cleaned; and a third suction stage draws remaining free material from the surface.

30

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Fig.1.

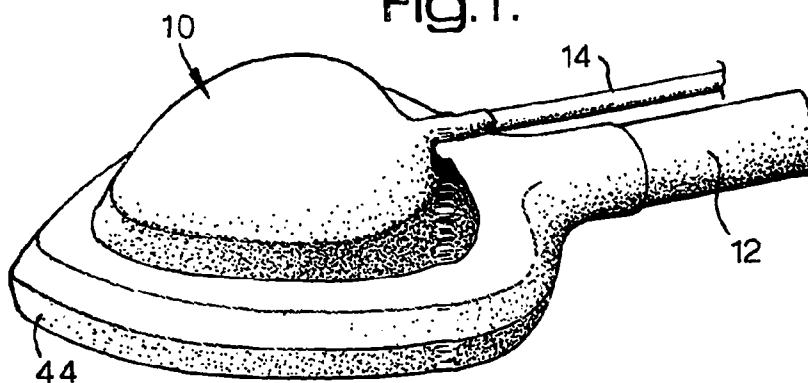
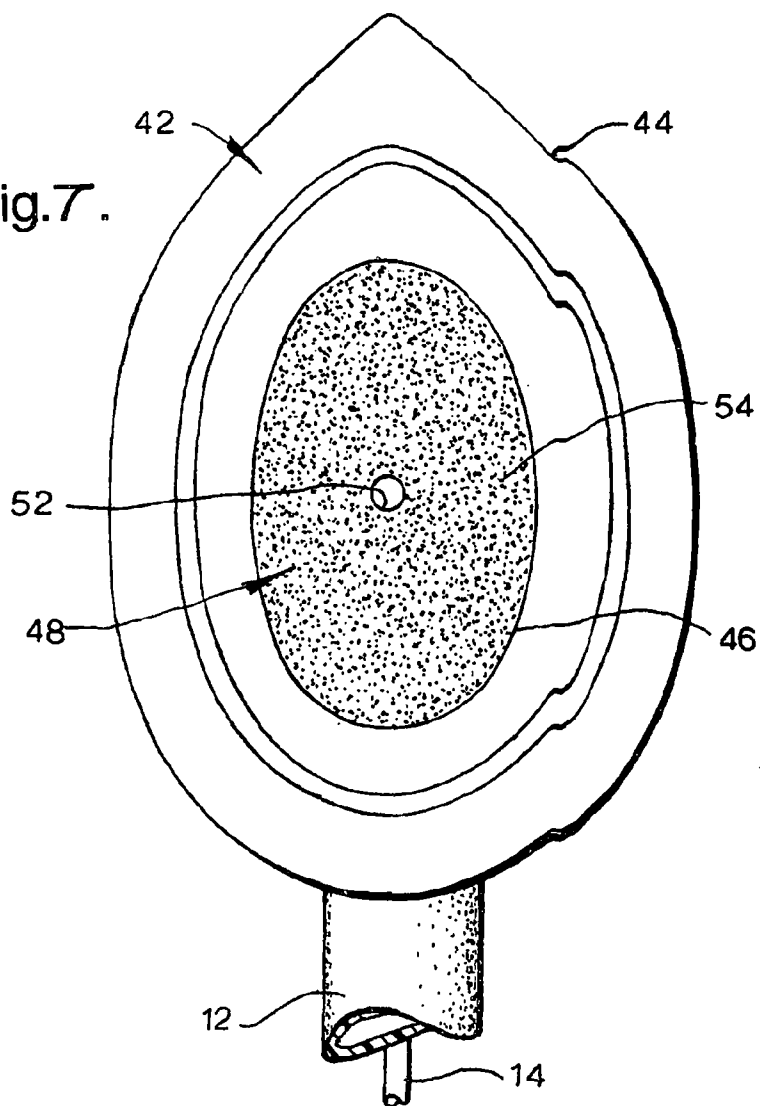


Fig.7.



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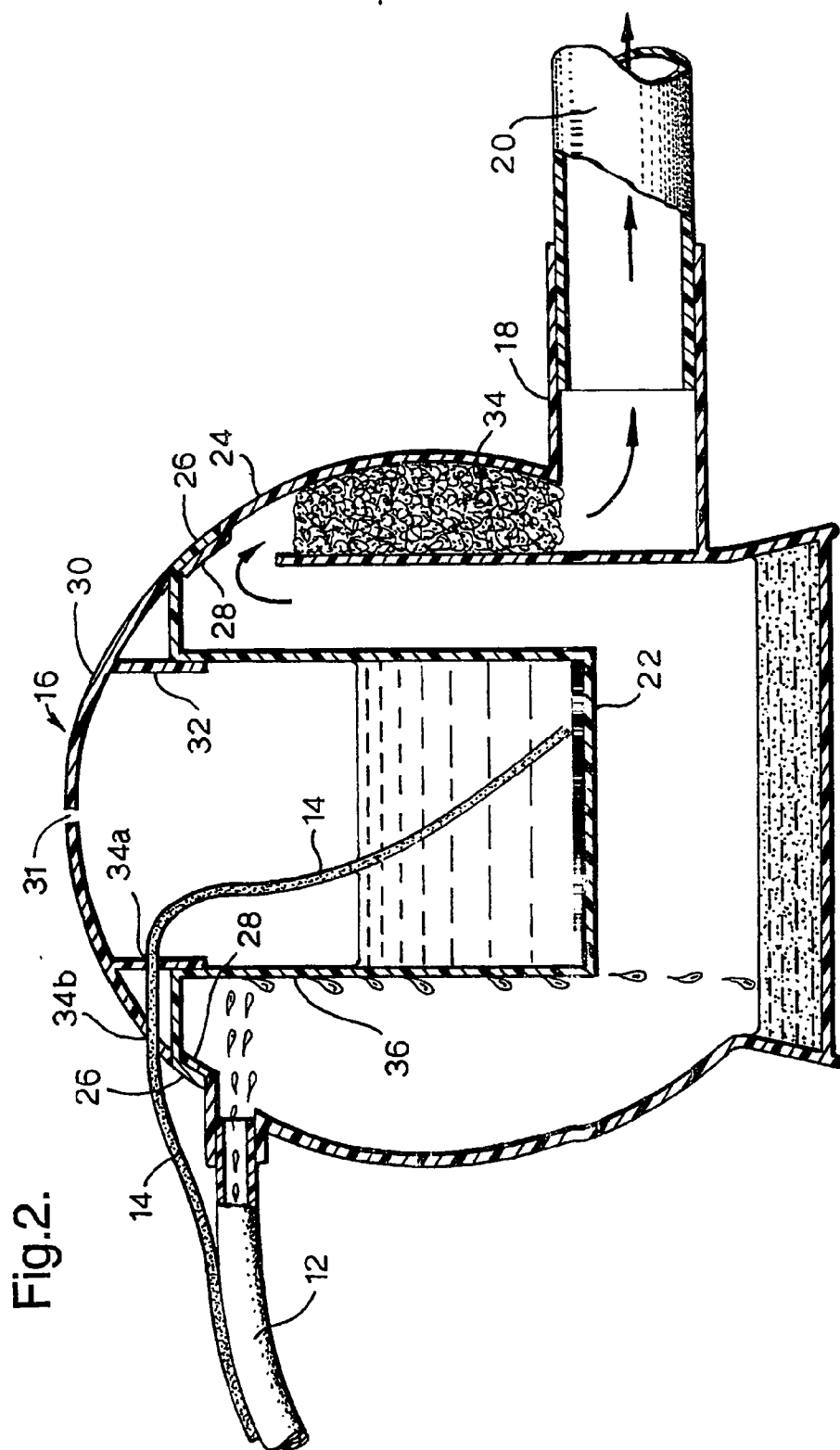


Fig. 2.

