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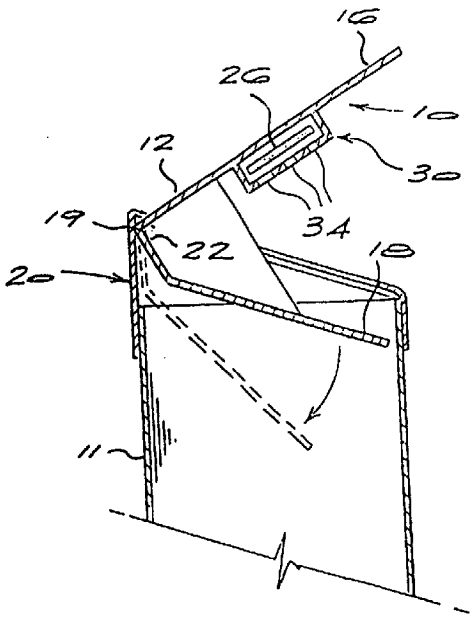
(54) Title: A CLOSURE MEMBER

(57) Abstract

A method is provided of disinfecting and/or deodorising waste material in a receptacle. The method comprises dispensing, substantially continuously, a disinfectant and/or deodorant vapour at or above the level of the waste material in the receptacle so that an amount of the deodorant and/or disinfectant circulates in an area above the level of waste material in the receptacle and downwardly through the material to disinfect and/or deodorise the interior of the receptacle. The disinfectant may comprise a mixture of a fragrance and a bactericide supported on the carrier.



A CLOSURE MEMBER

BACKGROUND OF THE INVENTION

THIS invention relates to a closure member.

Bins and other waste receptacles usually have a closure member in the form of a lid to retain, not only the waste matter itself but also any vapours and odours generated by it, within the receptacle. When the receptacles are used to contain medical or sanitary waste, it is important that any disease-causing microorganisms within the material be retained within the receptacle. Often, however, the lids are ill fitting and allow odours and microorganisms to escape.

Often very potent disinfecting chemicals, including sulphur dioxide (SO_2), are placed in the base of the receptacle in an attempt to disinfect the waste and to camouflage any odours which may result from the waste. This is only partly successful, however, as the chemical substance soon becomes covered by waste piling up in the receptacle. Odours and airborne disease-causing microorganisms are then not camouflaged or killed by the chemical substance and are likely to escape from the receptacle each time the lid is opened.

SUMMARY OF THE INVENTION

According to the invention a method of disinfecting and/or deodorising waste material in a receptacle comprises dispensing, substantially continuously, vaporised disinfectant and/or deodorant at or above the level of the waste material in the receptacle so that an amount of the deodorant and/or disinfectant circulates in an area above the level of waste material in the receptacle and downwardly through the material to disinfect and/or deodorise the interior of the receptacle.

The deodorant and/or disinfectant is preferably contained within a carrier and preferably contains a biocide.

The carrier is preferably suspended above the level of waste material in the receptacle.

More preferably, the carrier is attached to a lid or a side wall of the receptacle.

According to another aspect of the invention a closure member for a receptacle comprises a body which is attachable to the receptacle and a carrier retainer positioned on or in the body for retaining a liquid- or solid-material impregnated carrier therein, the body being movable relative to the receptacle between an open position and a closed position and the carrier retainer being positioned so that an amount of the liquid or solid becomes vaporised as the body is moved, and is dispersed inside the receptacle.

The body is preferably a flap which is pivotable relative to a frame which is attachable to the receptacle.

The carrier retainer is preferably a slideway attached to the underside of the flap.

The closure member is preferably moulded in a plastics material and the slideway is preferably moulded integrally with the flap.

The slideway preferably has an exposed surface and a number of apertures defined in its exposed surface to allow a passage of air into the slideway and over the carrier to facilitate the vaporisation of the liquid or solid within the carrier.

The apertures near one side of the slideway are preferably larger than the other apertures.

The retaining means is preferably angled in the closed position of the body and the slideway is preferably positioned with the larger apertures in a lower position to allow a greater passage of air over the carrier in this region where the deodorant and/or disinfectant tends to accumulate.

The carrier may be a fibrous material or a plastics material which is impregnated with the deodorant and/or disinfectant. If it is a fibrous material, it is preferably contained within a sleeve which transmits the deodorant and/or disinfectant in the carrier to the atmosphere.

The sleeve may be made of a plastics material, more preferably polyethylene.

The rate of transmission of the deodorant and/or disinfectant may be controlled by varying the thickness of the plastics material.

According to another aspect of the invention a waste receptacle and closure member assembly comprises a waste receptacle and a closure member attachable to it, the closure member comprising a body which is attachable to the receptacle and retaining means positioned on or in the body for retaining a liquid- or solid-impregnated carrier therein, the body being movable relative to the receptacle between an open position and a closed position and the retaining means being positioned so that an amount of the liquid or solid becomes vaporised as the body is moved, and is dispersed inside the receptacle.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a pictorial view of a waste receptacle and closure member assembly of the invention;

Figure 2 shows a pictorial view of the assembly of Figure 1 with the closure member in an open configuration;

Figure 3 is a sectional side view on 3-3 in Figure 2;

Figure 4 is an exploded view of another closure member for a waste receptacle showing a carrier retainer and a carrier;

Figure 5 is a sectional side view through the assembled closure member and carrier retainer of Figure 4;

Figure 6 is a sectional side view of a different carrier retainer; and

Figure 7 is a sectional side view through a waste receptacle with a carrier retainer mounted on its side wall.

DESCRIPTION OF PREFERRED EMBODIMENTS

The method of disinfecting and/or deodorising waste material, typically sanitary waste material, in a receptacle involves placing a disinfectant and deodorant mixture-impregnated carrier at or above the level of the waste material in the receptacle so that the deodorant/disinfectant mixture circulates downwardly through the space above the level of waste material in the receptacle and through the waste material itself. This system has been found to be far more effective than placing solid or liquid disinfectant in the

bottom of the receptacle, which in time becomes covered with waste material, and which has little or no deodorising or disinfecting effect on waste material near the top of the receptacle. It has been found that with the method of the invention the vaporised deodorant/disinfectant mixture permeates downwardly, continuously, through the waste material to the bottom of the waste material exerting a continuous bacteriocide and disinfecting and deodorising effect. This also allows the bin to be left for a longer period before it must be emptied and cleaned. Less toxic chemicals are required for effective long term disinfecting and bacterial inhibition as evidenced by the following tests conducted over a six week period. The present arrangement can, of course, be used in conjunction with a system where a disinfectant chemical is placed in the bottom of the bin.

It is important that the deodorant/disinfecting mixture is released from a point at least partly above the level of the waste in the receptacle so that the deodorant and disinfectant is released into the space above the waste material. By attaching a retainer for the carrier to the lid of the receptacle, as shown in Figures 1, 2, 3, 4 and 5 or by attaching it to a side wall of the receptacle, near the top of the receptacle, as shown in Figure 7, this is ensured.

The disinfectant/deodorant mixture kills bacteria and other microorganisms in and on the waste material and also acts as an aerial bacteriocide, killing bacteria and other microorganisms floating in the space above the waste material in the receptacle. This substantially eliminates the emission of bacteria and other microorganisms from the receptacle when it is opened. This also kills, and therefore inhibits growth of, bacteria and other microorganisms which enter the receptacle from the outside atmosphere when the receptacle is opened. It has been found that by using the method

of the invention a bin full of waste emits substantially no odour after a prolonged period of time and there is sustained inhibition of bacterial growth, as evidenced by the results set out below.

A unique closure member for a waste receptacle incorporating a retainer for the deodorant/disinfectant mixture carrier has been developed and forms another aspect of the invention.

A closure member of the invention, designated 10 in Figures 1, 2 and 3, hereinafter referred to as the lid 10, comprises a generally V-shaped body 12 with a top flap 16 and a bottom flap 18 joined at an apex 19. The body 12 is attached to a frame 20 which slides over the top of a waste receptacle or bin 11, as shown clearly in Figure 3. The apex 19 of the body 12 is pivotally attached to the frame 20 by a pair of opposed pins 22, shown in Figure 3.

When the lid 10 is fitted to the bin 11 to form the assembly of the invention illustrated in Figure 1 it is pivoted easily between its closed position as shown in Figure 1 and its open position as shown in Figures 2 and 3, by lifting the handle 24 upward.

A carrier retainer in the form of a slideway 30 is integrally moulded on the underside of the top flap 16 as shown in Figures 2 and 3. It is sized to accommodate and retain a carrier in the form of a fibrous web 26 of a liquid deodorant/disinfectant mixture-impregnated material. The carrier can also be in the form of a solid plastics material, for example polyvinyl chloride (PVC) which has been impregnated with the deodorant/disinfectant mixture or admixed with this mixture prior to molding. The plastics carrier controls the release of the mixture, helping to ensure its sustained release. A

plurality of apertures or perforations 34 are defined in the exposed surface 32 of the slideway 30 so that as the lid 10 is moved from its closed to its open position to receive an article of waste on its lower flap 18, air passes through the apertures 34, over the web 26, and the liquid within the web 26 is vaporised. The lid 10, and thus the slideway 30 are made from polypropylene which does not react with alcohol and other solvents in the deodorant/disinfectant mixture.

The movement of the lid 10 causes a flow of air over the apertures in the slideway 46 which ensures that a certain amount of the deodorant/disinfectant mixture becomes entrained in the air within the bin. It has been found that the entrainment is not substantially reduced by attaching the slideway to a side of the bin, as shown in Figure 7, as long as this is above the level of waste material in the bin and as long as there is a reasonable flow of air over it.

The carrier retainer may also be formed separately from the lid 10. This embodiment is illustrated in Figures 4 and 5. Here, the carrier retainer comprises a polypropylene base 40 which is attachable to the top flap 16 by adhesive. It has a series of clips 42 extending from it which clip into recesses 44 formed in a slideway 46 which hold the slideway 46 against the top flap 16. The slideway 46 may have a plurality of longitudinal ridges 45 formed along its inside surface 47, as shown in the sectional side view of Figure 6, to support the carrier 26 off the surface 47.

The carrier 26 is contained within a polyethylene sleeve 48. This sleeve 48 ensures that the liquid disinfectant/deodorant mixture does not leak onto the lid 10 and is not evaporated too quickly. However, it also has an osmotic- or wick-type effect on the liquid mixture, allowing its transmission through

the sleeve and into the atmosphere. The rate of transmission of the liquid mixture can be controlled by increasing or decreasing the thickness of the polyethylene sleeve. The slideway 46 extends across substantially the entire width of the flap 16 while the carrier 26, with dimensions of 190 mm x 50 mm, is slightly shorter which restricts unauthorised access to it and limits pilferage.

As shown in Figures 4 and 5, the apertures 34 in the exposed surface 32 of the slideway are arranged in three parallel rows. The top row 34c contains the largest apertures. These larger apertures 34c ensure a greater flow of air to the carrier and thus greater entrainment of the disinfectant/deodorant mixture. It will be appreciated that the top flap 16, in its closed position, is angled downwardly. Thus, the liquid deodorant/disinfectant mixture within the carrier tends to accumulate at the downward edge of the carrier where the apertures 34c are situated, thus ensuring a greater entrainment of the deodorant and disinfectant.

The liquid deodorant/disinfectant mixture contains a pleasant smelling perfume as well as a disinfectant and a biocide. The dispersion of this vaporised material each time the lid 10 is opened assists in circulating it around the inside of the bin 11 and in disinfecting the contents of the bin from the top of the bin downwardly. A certain amount of the vaporised mixture also passes out through the V-shaped opening in the lid 10 between the top and bottom flaps and masks any odours which may have built up within the bin 11. The rest is dispersed around the interior of the bin 11 when the lid 10 has been closed and the top flap 16 seals against the frame 20.

The weight of the slideway 46 tends to pull the lid 10 downwardly causing

the lid to close quickly. The downward pull also improves the seal between the top flap 16 and the frame 20 making it substantially air tight. This reduces the evaporation of deodorant and disinfectant to the air around the bin and ensures that it is retained within the bin where it has its maximum effect. It also limits the inflow of fresh air, which will have a certain amount of bacteria and other microorganisms contained in it, into the bin.

In order to evaluate the efficiency of the method and container of the invention over a period of time, soiled sanitary dressings were placed in container arrangements of the invention, labelled A, B and C. Soiled sanitary dressings were also placed in standard containers, not containing carriers, as controls. The efficacy of the container arrangements of the invention was tested against the following test organisms:

Escherichia coli	SATCC Esc 25
Staphylococcus aureus	SATCC Sta 53
Streptococcus feacalis	SATCC Str 6
Proteus vulgaris	SATCC Pr 8

The soiled sanitary towels were prepared by soaking them with 5ml of fresh human blood and applying 1ml of test organism to them.

CONTAINERS OF THE INVENTION

Samples	Contact Time	Percentage inhibition of:			
		E.coli	S.aureus	Str. feacalis	Pr.vulgaris
A	1h	99,9	<0,1	<0,1	47,8
	3h	<0,1	<0,1	61,6	<0,1
B	1h	99,3	<0,1	<0,1	<0,1
	3h	<0,1	<0,1	79,8	<0,1
	3d	99,9	90,7	87,0	99,9
	14d	99,9	99,9	99,9	99,9
	21d	99,9	99,9	96,5	99,9
	28d	-	-	99,9	-
	35d	-	-	99,9	-
	42d	99,9	99,9	99,9	99,9
C	1h	51,0	<0,1	<0,1	99,9
	3h	<0,1	<0,1	75,8	<0,1
	3d	99,9	98,5	99,0	99,9
	14d	99,9	99,9	99,9	99,9
	21d	99,9	99,9	99,3	99,9
	28d	-	-	99,9	-
	35d	-	-	99,9	-
	42d	99,9	99,9	99,9	99,9

CONTROLS

Samples	Contact Time	Number of viable organisms			
		E.coli	S.aureus	Str. faecalis	Pr.vulgaris
A	1h	$2,0 \times 10^2$	$2,5 \times 10^7$	$2,1 \times 10^6$	$2,4 \times 10^6$
	control	$1,0 \times 10^7$	$2,7 \times 10^6$	$6,1 \times 10^7$	$4,6 \times 10^6$
	3h	$2,8 \times 10^4$	$2,7 \times 10^7$	$3,8 \times 10^8$	$2,7 \times 10^2$
	control	$1,0 \times 10^3$	$2,2 \times 10^6$	$9,9 \times 10^3$	$1,0 \times 10^3$
B	1h	$7,1 \times 10^2$	$2,1 \times 10^7$	$2,9 \times 10^8$	$7,5 \times 10^2$
	control	$1,0 \times 10^7$	$2,7 \times 10^6$	$6,1 \times 10^7$	$4,6 \times 10^6$
	3h	$5,2 \times 10^4$	$1,5 \times 10^7$	$2,0 \times 10^3$	$1,7 \times 10^3$
	control	$1,0 \times 10^3$	$2,2 \times 10^6$	$9,9 \times 10^9$	$1,0 \times 10^2$
	3d	$6,0 \times 10^1$	$1,3 \times 10^7$	$1,3 \times 10^{10}$	$4,0 \times 10^2$
	control	$1,0 \times 10^9$	$1,4 \times 10^5$	$1,0 \times 10^{11}$	$1,0 \times 10^7$
	14d	0	0	$1,9 \times 10^7$	0
	control	$3,9 \times 10^{11}$	$5,0 \times 10^{11}$	$2,9 \times 10^{11}$	$1,2 \times 10^9$
	21d	0	$4,0 \times 10^1$	$2,3 \times 10^6$	$1,0 \times 10^1$
	control	$2,8 \times 10^{10}$	$1,9 \times 10^9$	$6,3 \times 10^9$	$1,0 \times 10^5$
	28d	-	-	$4,8 \times 10^3$	-
	control	-	-	$3,5 \times 10^{11}$	-
	35d	-	-	$3,2 \times 10^6$	-
	control	-	-	$5,1 \times 10^{11}$	-
	42d	0	0	$6,8 \times 10^7$	0
	control	$1,4 \times 10^{13}$	$2,5 \times 10^{12}$	$6,8 \times 10^{12}$	$1,0 \times 10^6$

Samples	Contact Time	Number of viable organisms			
		E.coli	S.auraus	Str.faecalis	Pr.vulgaris
C	1h	$4,9 \times 10^{6}$	$3,2 \times 10^{7}$	$1,2 \times 10^{8}$	$1,0 \times 10^{1}$
	control	$1,0 \times 10^{7}$	$2,7 \times 10^{6}$	$6,1 \times 10^{7}$	$4,6 \times 10^{6}$
	3h	$3,3 \times 10^{6}$	$4,9 \times 10^{6}$	$2,4 \times 10^{8}$	$7,0 \times 10^{7}$
	control	$1,0 \times 10^{3}$	$2,2 \times 10^{5}$	$9,9 \times 10^{8}$	$1,0 \times 10^{3}$
	3d	$4,7 \times 10^{4}$	$2,1 \times 10^{8}$	$1,0 \times 10^{9}$	$1,0 \times 10$
	control	$1,0 \times 10^{9}$	$1,4 \times 10^{8}$	$1,0 \times 10^{11}$	$1,0 \times 10^{7}$
	14d	0	0	$1,6 \times 10^{7}$	0
	control	$3,9 \times 10^{11}$	$5,0 \times 10^{11}$	$2,9 \times 10^{11}$	$1,2 \times 10^{9}$
	21d	0	0	$4,4 \times 10^{7}$	0
	control	$2,8 \times 10^{10}$	$1,9 \times 10^{9}$	$6,3 \times 10^{8}$	$1,0 \times 10^{6}$
	28d	-	-	$6,7 \times 10^{5}$	-
	control	-	-	$3,5 \times 10^{11}$	-
	35d	-	-	$1,4 \times 10^{7}$	-
	control	-	-	$5,1 \times 10^{11}$	-
	42d	0	0	$3,0 \times 10^{7}$	0
	control	$2,4 \times 10^{13}$	$2,5 \times 10^{12}$	$6,8 \times 10^{12}$	$1,0 \times 10^{5}$

The fluid which is used in the above mentioned method and apparatus may comprise about 90% deodorant/fragrance and about 10% disinfectant/bactericide. The bactericide may typically be constituted by the following materials:

Triethylene Glycol	Less than	98% m/m
Gluteraldehyde	" "	4%
Phenyl ethyl alcohol	" "	3%
Glycerolpolyethyleneglycol oxystearate	" "	3%

It will be appreciated that the percentages of the constituent parts of the disinfectant/bactericide may be varied depending on local conditions and applicable environmental regulations, and also on the degree of disinfectant/bactericidal efficacy required.

"Comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of disinfecting and/or deodorising waste material in a receptacle including dispensing, substantially continuously, vaporised disinfectant and/or deodorant at or above the level of the waste material in the receptacle so that an amount of deodorant and/or disinfectant circulates in an area above the level of waste material in the receptacle and downwardly through the material to disinfect and/or deodorise the interior of the receptacle, wherein the disinfectant and/or deodorant is provided in a liquid form in a removable carrier which is retained in or on the receptacle by a carrier retainer and which is contained within a sleeve of plastics material through which the deodorant or disinfectant is transmitted to the atmosphere.

2. A method according to claim 1, wherein the carrier is positioned above the level of waste material in the receptacle.

3. A method according to claim 2, wherein the carrier is attached to a lid or a side wall of the receptacle.

4. A method according to any of claims 1 to 3, wherein the waste material is sanitary waste material.

5. A method according to any of claims 1 to 4, wherein

the carrier is made of a fibrous material which is impregnated with the disinfectant and/or deodorant.

6. A method according to any preceding claim, wherein the rate of transmission of the deodorant and/or disinfectant is controlled by varying the thickness of the sleeve.

7. A method according to any one of claims 1 to 6, wherein the disinfectant and deodorant are combined in a liquid mixture, the disinfectant including a biocide which has both contact and aerial biocidal activity.

8. A closure member for a receptacle including a body which is attachable to the receptacle and a retainer positioned on or in the body for retaining a deodorant and/or disinfectant therein, the body being movable relative to the receptacle between an open position and a closed position and the retainer being positioned so that an amount of the deodorant and/or disinfectant becomes vaporised as the body is moved, and is dispersed inside the receptacle, the body being a flap which is pivotable relative to the receptacle, the retainer being a slideway on the underside of the flap, said slideway having an exposed surface with a number of apertures defined therein to allow a passage of air into the slideway and over the deodorant and/or disinfectant to

facilitate its vaporisation, and in the closed position of the body, the slideway being angled and having larger apertures in a relatively lower position to allow a greater flow of air over the deodorant and/or disinfectant in this region.

9. The closure member of claim 8, wherein the flap is pivotable relative to a frame which is attachable to the receptacle.

10. A closure member according to claim 9, which is moulded in a plastics material and wherein the slideway is moulded integrally with the flap.

11. A closure member according to claim 9, which is moulded in a plastics material and wherein the slideway is attachable to the flap.

12. A closure member according to any one of claims 8 to 11, wherein the deodorant and/or disinfectant is contained within a carrier.

13. A closure member according to claim 12, wherein the carrier is made of a fibrous or plastics material which is impregnated with the disinfectant and/or deodorant.

14. A closure member according to claim 13, wherein the

carrier is contained within a sleeve which transmits the deodorant and/or disinfectant to the atmosphere.

15. A closure member according to claim 14, wherein the sleeve is made of plastics material

16. A closure member according to claim 14 or claim 15, wherein the rate of transmission of the deodorant and/or disinfectant is controlled by varying the thickness of the sleeve.

17. A closure member according to any one of claims 8 to 16, wherein the disinfectant and deodorant are combined in a liquid mixture, the disinfectant including a biocide which has both contact and aerial biocidal activity.

18. A waste receptacle and closure member assembly including a waste receptacle and a closure member according to any one of claims 8 to 17.

19. A closure member substantially as herein described with reference to any one of Figures 1 to 7.

20. A waste receptacle substantially as herein described with reference to any one of Figures 1 to 3 and 7.

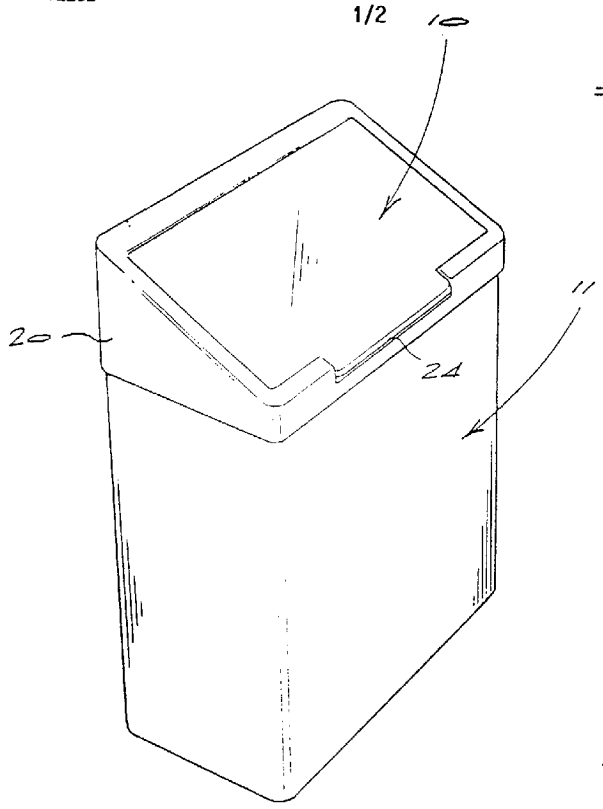


Fig 1

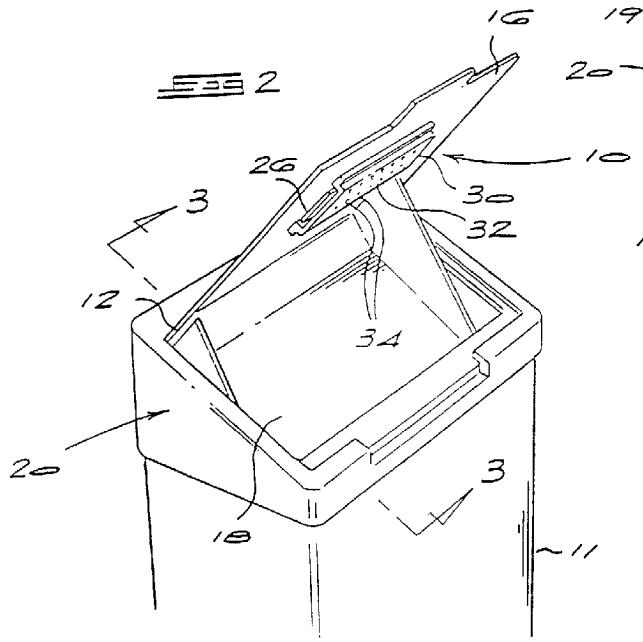


Fig 2

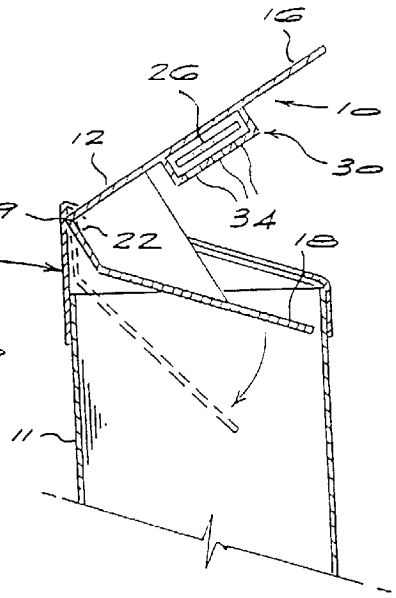
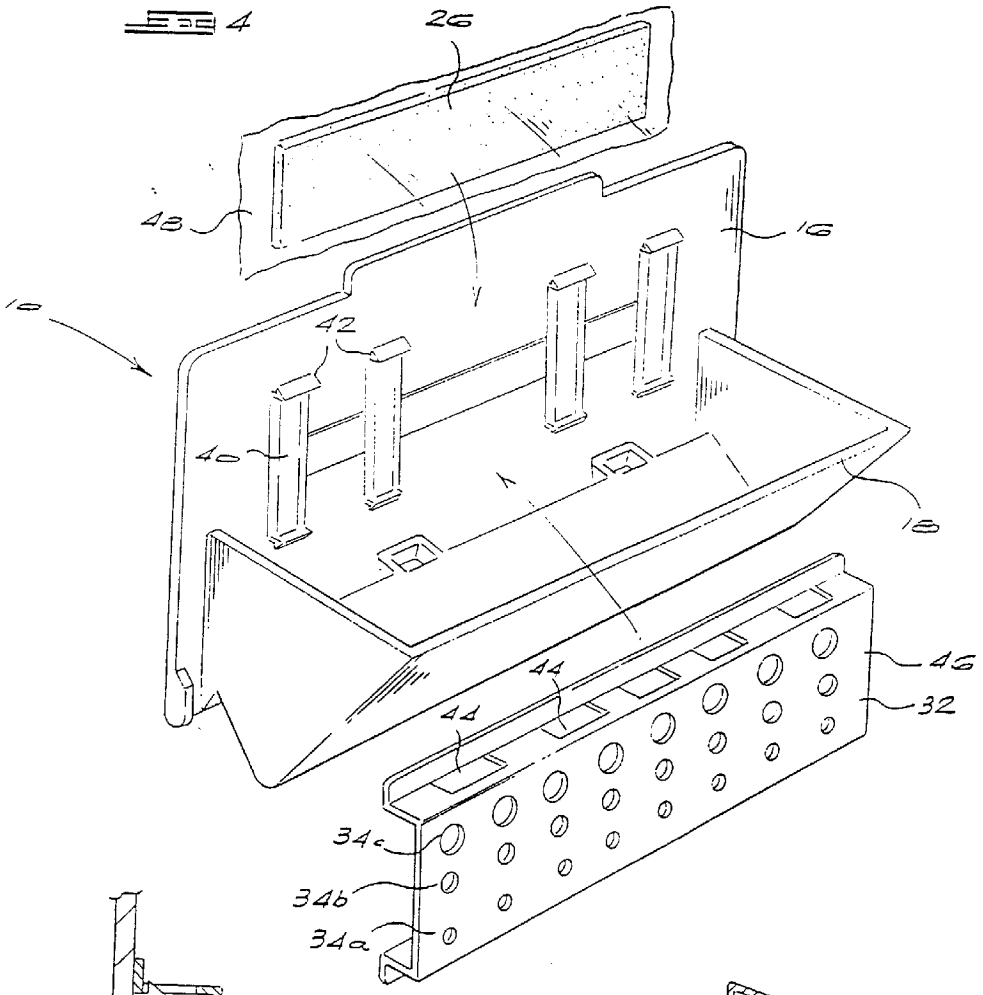


Fig 3

FIG 4



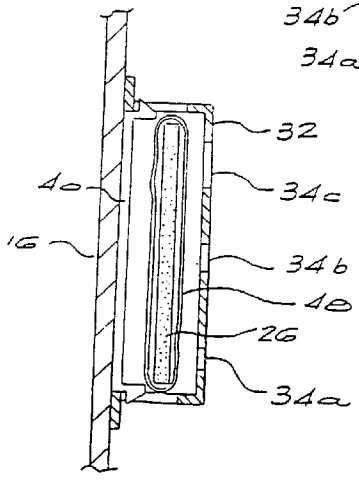


FIG 5

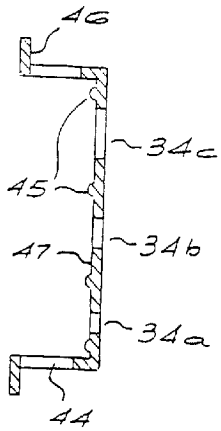


FIG 6

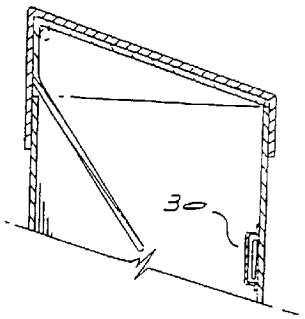


FIG 7