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(54) **A waste receptacle in the form of a bucket**

(57) A waste receptacle bucket (1) for use with a bin liner bag (40) whereon the interior wall surface (2) is a first circumferential row of portions or protuberances (4, 6, 20, 22, 32, 33, 50, 52) with substantially round bases (41, 43) intermediate the bucket base (26) and half the length or less to the bucket opening (27), whereby the interior wall surface (2) is smooth intermediate the first row and the bucket opening (27) so as to permit egress of air between the interior wall surface (2) and bin liner bag (40), to restrict the area of contact of the interior wall surface (2) against the bin liner bag (40) to restrict friction, and to restrict settling of contents in the bin liner bag (40) due to gravity and thereby ease lifting the bin liner bag (40) from the waste receptacle bucket (1).

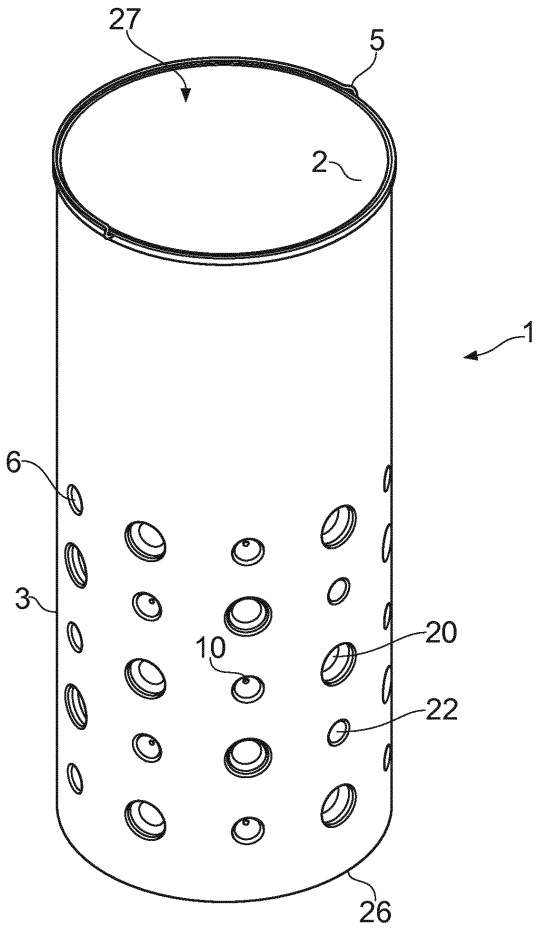


FIG. 3

EP 3 028 959 A1

## Description

### Field of the Invention

**[0001]** The present invention relates to a waste receptacle in the form of a bucket or bin, more particularly but not exclusively a waste receptacle used with bin liner bags.

### Background

**[0002]** A bin is typically an open bucket used for collection of waste. A bin liner bag is usually inserted into the bin so that rubbish can be readily removed by pulling the bag out of the bucket and so as not to soil the bin.

**[0003]** As the bin is filled the waste tends to become difficult to remove by lifting out the bin liner bag. When the time comes to empty the bin a user may require considerable strength to separate the bag full of waste from the bin, therefore some users may struggle, for example elderly or disabled users.

**[0004]** Furthermore the difficulty in removing the bag may cause the bag to split resulting in spillage of contents.

### Prior Art

**[0005]** Accordingly a number of patent applications have been filed in an attempt to resolve the problem or similar, including the following:

Granted United States patent US 8 079 489 (WELCH) discloses a divider device for emplacement within the interior of a plastic trash container of vertically upright configuration designed to accommodate a removable trash-receiving plastic bag.

Granted United States patent US 7 438 199 (TIDRICK) discloses a trash container for use with trash container bags.

**[0006]** Granted United States patent US 6 736 281 (JOSEPH) discloses a waste receptacle for use in combination with a trash can liner, said receptacle comprising: a plurality of sidewalls.

**[0007]** In light of the foregoing prior art which do not reveal practical methods to release a bin liner bag from a waste receptacle bucket, there is a need for a bucket from which a bin liner bag is easily removed.

### Summary of the Invention

**[0008]** According to a first aspect of the invention there isa waste receptacle bucket for use with a bin liner bag whereon the interior wall surface is a first circumferential row of protuberances with substantially round bases intermediate the bucket base and half the length or less to the bucket opening, characterised in that the wall surface is smooth intermediate the first row and bucket opening so as to permit egress of air between the interior wall surface and bin liner bag, Advantageously the circumferential row of protuberances with substantially round bases intermediate the bucket base and half the length or less to the bucket opening also restrict area of contact of the wall surface against the bin liner bag to restrict friction. Advantageously circumferential row of protuberances also restricts settling of contents in the bin liner bag due to gravity.

**[0009]** The smooth area of the interior wall has no protuberances. Preferably the smooth area of the interior wall surface has no irregularities.

**[0010]** Advantageously a bin liner bag with contents requires less force to lift out of the waste receptacle bucket according the invention than the same bin liner bag with contents requires to be lifted out of a bucket that only differs in that it has an interior wall surface that is only smooth from the base to the bucket opening.

**[0011]** Preferably a waste receptacle in the form of a bucket has protrusions with circular or oval bases located on the interior wall surface in circumferential rows intermediate the base and substantially a half of the length or less from the base to the bucket opening characterised in that the interior wall is smooth intermediate the furthest row of protuberances from the base and the bucket open edge so as to permit egress of air between the interior wall surface and bin liner bag, restrict area of contact of the wall surface against the bin liner bag to restrict friction, and restrict settling of contents in the bin liner bag due to gravity.

**[0012]** Examples of a substantially round base are a circular base, an oval base where the minor diameter is no less than substantially two thirds of the major diameter, and an equilateral polygon with rounded corners having arclengths longer than straight side lengths. These examples are not meant to restrict the rounded bases to these precisely shapes, but to provide a guide to the skilled person for bases that may be considered substantially round.

**[0013]** Preferably the first row is intermediate the bucket base and a third of the distance or less to the bucket opening. Advantageously the protuberances are effective in this area of the interior wall for restricting the amount of lifting force required to lift a rubbish bin liner bag holding contents out of the bucket.

**[0014]** Preferably the bucket comprises a rolled pad forming the interior wall surface of the bucket from which the protuberances protrude.

**[0015]** Preferably there is a waste receptacle bucket for use with a bin liner bag wherein a portion of the interior wall surface is formed by an insertable rolled pad having a first circumferential row of protuberances on a face of the pad, wherein the protuberances have substantially round bases and are located intermediate the bucket base and half the length or less to the bucket opening, characterised in that the wall surface is smooth intermediate the first row and bucket opening.

**[0016]** Preferably on the interior wall surface of the bucket is a second row of protuberances substantially round bases intermediate the first row and the base. Advantageously the second row reduces the force required to lift a bin liner bag holding contents out of the bucket to a lesser force than is required if the first row alone is present.

**[0017]** Preferably the bucket comprises at least a cylindrical type of protuberances which are substantially cylindrical with a circular base. Advantageously this type of protuberance is effective for reducing the amount of force required to lift the bag out of the bucket by reducing friction by permitting air to enter a space between the bin liner bag and the interior wall surface of the bucket. Preferably the diameter of the circular base of the cylindrical shape protuberance is substantially 4 cm and length of the cylinder is substantially 0.7 cm. Advantageously protuberances with these dimensions are particularly effective at reducing the amount of force required to lift a bin liner bag with contents out of the bucket.

**[0018]** Preferably the bucket comprises at least a dome type of protuberance which are substantially dome shaped with a circular base. Advantageously this type of protuberance is effective for reducing the amount of force required to lift the bag out of the bucket because the tips of the domes push the bin liner bag away from the area of the interior wall surface between the protuberances. The friction between the bin liner bag and the interior wall surface is reduced which reduces the amount of force required to lift a bin liner bag with contents out of the bucket. The length from the base of the dome to the tip of the dome is designed to invade and to extend into the interior and contents of the bucket so as to grip and support the rubbish in the bag. This prevents the immediate/sudden drop and collapsing of the rubbish into hard mass at the bottom of the bucket, which presses hard against the base and interior wall surface and makes the bag hard to left out of the bucket. Preferably the diameter of the circular base of the dome shape protuberance is substantially 3 cm and length of the dome from base to peak is substantially 1.7 cm. Advantageously protuberances with these dimensions are particularly effective at reducing the amount of force required to lift a bin liner bag with contents out of the bucket.

**[0019]** Preferably alternating along the row(s) is (are) first and second types of protuberances. Advantageously the advantageous effects of both types of protuberances that reduce the problem of the bin liner bag sticking in the bucket are present so that the bin liner bag is especially easy to lift out of the bucket. Preferably the first row protuberances is a row of alternating types of protuberances and the second row of protuberances is a row of alternating types of protuberances. Preferably the two types of rows are offset so that the first and second types of protuberances also alternate in the lengthwise direction so as to create a chequered pattern on the wall surface.

**[0020]** Preferably cylindrical types of protuberances having circular bases alternate with dome types of protuberances having circular bases along the row(s), and the ratio of the diameter of the base of the cylindrical protuberances to the diameter of the base of the dome type protuberances is in the range between 1:1 and 5:3. The diameter of the cylindrical protuberances is typically the same to fractionally larger than the dome type protuberances because the cylindrical protuberances provide air spaces and dome type prevent settling of the contents of the bin liner bag and help reduce friction. Preferably the ratio of the length of the cylindrical protuberances to the length of the dome type protuberances from base to peak is in the range between 1:2 and 1:3. The protuberances intrude into the interior of the bucket from the interior wall of the bucket. The distance the protuberances intrude is length of the protuberances. The dome type of protuberances intrude farther into the interior than the cylindrical type because the dome type reduce friction by keeping the bin liner bag mostly on the tips of the dome type protuberances.

**[0021]** Preferably the first and second rows are offset so that the dome type and cylindrical type of protuberances also alternate in the lengthwise direction so as to create a chequered pattern on the wall surface.

**[0022]** Preferably the shape of the perimeter interior wall surface of the bucket is round, oval, square, or rectangular.

**[0023]** Preferably the bucket is substantially cylindrical having a base substantially 24 cm in diameter and length from the base to the opening substantially of substantially 54 cm; comprising two circumferential rows of protuberances each consisting of alternating equidistant cylindrical type of protuberances and dome type of protuberances, wherein the first and second rows are offset so that the cylindrical and dome types of protuberances also alternate in the lengthwise direction so as to create a chequered pattern on the wall surface; wherein the first row is substantially 12 cm to 14 cm from the base and the second row is substantially 4 cm to 5 cm from the base; and the cylindrical type protuberance diameter of the circular base is substantially 4 cm and length of the cylinder is substantially 0.7 cm; and the dome type protuberances diameter of the circular base is substantially 3 cm and length of the dome from base to peak is substantially 1.7 cm. Advantageously this particular combination of dimensions is for a waste receptacle bucket for which it is substantially easier to pull out the bin liner bag than a similarly dimensioned ordinary bucket having only an interior wall surface that smooth without any protuberances.

**[0024]** According to as second aspect of the invention there is a method of manufacturing a waste receptacle bucket for use with a bin liner bag whereby the interior wall surface is formed with a first circumferential row of protuberances with substantially round bases intermediate the bucket base and half the length or less to the bucket opening and forming the wall surface that it is smooth intermediate the first row and bucket opening.

**[0025]** Preferably the bucket is made by affixing to an ordinary bucket with a smooth interior wall a first circumferential row of protuberances with substantially round bases that is applied intermediate the bucket base and half the length or less to the bucket opening.

**[0026]** Preferably the circumferential row of protuberances comprises protuberances with an adhesive applied to their base. The protuberances are affixed to the interior wall surface of the bucket by the adhesive. Advantageously an ordinary bucket with a smooth interior wall surface is converted to the bucket according to the first aspect of the invention by affixing protuberances with a sticky base to the interior wall surface of the bucket.

**[0027]** Preferably the bucket is formed with a rolled pad forming the interior wall surface of the bucket from which the protuberances protrude. Preferably the rolled pad is insertable into an ordinary waste receptacle bucket having a smooth interior wall surface.

**[0028]** Preferably the waste receptacle bucket is formed by inserting a flexible and resilient rolled pad into to a waste receptacle bucket with a smooth interior wall. Preferably the rolled pad has protuberances on one face and the opposite face is smooth. The opposite face is preferably pressed against the interior wall surface of an ordinary bucket with a smooth wall as the pad is formed of a resilient material and the rolled pad is urged by the resilience to unroll and press the smooth face of the pad against the smooth interior wall of the bucket to form the waste receptacle bucket according to the first aspect of the invention. Preferably a whole circumferential row of protuberances are affixed the bucket by inserting the rolled pad and releasing it to expand against the interior wall surface of the ordinary bucket.

**[0029]** According to another aspect of the present invention there is provided a waste receptacle for receiving a bag, in which the receptacle has an elongate body having an interior face having a plurality of vertically and horizontally spaced apart raised portions projecting inward, each portion having an edge where it meets the interior face that is circular or oval, wherein the raised portions comprise first and second types arranged in an alternating pattern with the second type having a smaller maximum diameter of the edge than the first and projecting further into the interior of the receptacle so as to enable progressive filling and/or compression of the bag.

**[0030]** Preferably there is provided a waste receptacle for receiving a bag, in which the receptacle comprises at least one side arranged to define an elongate body having an interior face, said body providing a plurality of raised and lowered portions to provide an irregular interior face, in which said portions are located along the length of the elongate body so as to enable progressive filling and/or compression of the bag.

**[0031]** The portions may be located at a variety of locations along the length of the body. The body may be arranged to extend substantially vertically in use. The portions are ideally located at various heights along the length of the body and spread around the width.

**[0032]** The at least one side preferably provides a cylindrical body, although the receptacle may be provided in respect of all known waste receptacle forms.

**[0033]** In preferred embodiments said portions are arranged at a plurality of spaced apart, vertically and horizontally varied locations about the interior face, extending into the body. Said portions may be provided or arranged on the side or receptacle at manufacture, retail, or in use.

**[0034]** Said portions in all preferred embodiments are arranged on the interior face or faces of the side(s).

**[0035]** In some embodiments lowered portions may be provided on the exterior face(s) corresponding to or as a consequence of raised portions on the interior face(s), or vice versa. In addition or the alternative lowered portions, depressions or pockets may be provided on the interior face and a smooth exterior face may be available. For example a double skin may facilitate dual-face arrangements.

**[0036]** In this way a bag inserted into the body is capable of progressive filling and/or compression in order to maximise storage capability for the bag. A large and varied expanse of the bag's outer will contact the interior face(s) and raised portions and varied and consequentially not capable of closely clinging to any expanse of face. The portions are therefore arranged to allow easy removal of a filled bag from the body. In this way the raised portions are ideally rounded and/or smooth, to avoid damage to the bag during extraction.

**[0037]** The portions may be circular, oval or similar so as to minimise damage resulting from movement of the bag against the portions in any direction.

**[0038]** The raised portions or lowered may furthermore advantageously provide a surface that is not conducive to mating closely with stretched or pushed plastic from a filled bag within the waste receptacle or bin.

**[0039]** In typical embodiments the present invention provides a bin lining aid for insertion into a bin, in which the aid comprises: a plurality of raised portions directed to project inwards from a bin interior wall, wherein the raised portions are adapted to be exposed to a bag in use so as to create an imperfect seal between the bag and the bin interior wall to enable easy removal of the bag with reduced resistance.

**[0040]** In preferred embodiments the plurality of raised portions may be provided on an aftermarket or separate insert dimensioned to, or capable of being dimensioned to match the bin interior face. For example a cylindrical interior face with plural raised portions on an interior face may be provided for inserting into a cylindrically shaped bin.

**[0041]** In this way raised portions serve to disrupt the interior face that receives the bag so that the bag cannot create a seal with the interior face which may make removal of the bag difficult and/or lead to splitting of the bag. Therefore when the bag is pulled from the bin with the bin lining aid it does not create a vacuum as the raised portions disrupts formation of the seal which can create

resistance when removing the bag. In preferred embodiments therefore the raised or lowered portions are not liable to cause snagging of the bag during removal.

**[0042]** Thereby reducing the likelihood of the bag being ripped and contents being spilt which is undesirable, in particular if the bin contents may present a health hazard. Additionally the resistance created by the vacuum may prevent some users being able to remove the bag, for example the elderly or disabled.

**[0043]** In some embodiments the interior face includes both raised and lowered portions, for example projections and depressions that serve to reduce the likelihood of a bag becoming stuck due to formation of a vacuum. Consequently the exterior wall may have resulting corresponding raised and lowered portions.

**[0044]** Ideally the interior face and/or insert is comprised from a strong, lightweight durable material suitable for repeated use that can be readily cleaned if required. For example the face may be formed from metal or metal alloy such as aluminium or from a synthetic plastic.

**[0045]** Preferably the face is manufactured to include the raised portions, for example the raised portions may be pressed or moulded into the surface. In this way the raised portions are integral with the face.

**[0046]** A flexible insert with raised portions may be provided so as to accommodate different bin shapes by being flexed in order to be fitted in, and moulded to, the shape of the bin's interior wall. For example the face at least in part, and/or raised portions may be formed from flexible synthetic plastic or rubber.

**[0047]** Some bins include an internal bucket, such as in pedal bins, therefore it may be envisaged that in some embodiments said bucket may be adapted to include raised portions.

**[0048]** Preferably the face with the raised portions may also include at least one handle so that it can be readily removed from the bin for example for cleaning purposes.

**[0049]** Ideally the face with the raised portions is fixed, in use, within the bin so as to prevent it being removed when the bag is pulled from the bin. For example the face may be fixed in place by clips, hooks, a twist fitting, interlocking or mating parts. In this way the face is removably fixed to the bin.

**[0050]** In some embodiments the face with the raised portions may be the bin's interior wall wherein the raised portions are integral with the bin design.

**[0051]** The raised portions may be smooth and arcuate so as not to snag the bag during use and in particular whilst the bag is pulled from the bin so as to be emptied. For example the raised portions may have a shiny, polished finish so that the bag readily slips over the raised portions when being removed.

**[0052]** The raised portions may comprise domes so as to expose a smooth profile to the bag in use. In other embodiments the raised portions may be stepped so as to have parts raised to different levels and so as to assist with creating an uneven surface thereby preventing the bag creating a seal with the interior face and thereby causing a vacuum when trying to remove the bag.

**[0053]** In some embodiments the raised portions may comprise finger like projections or further texture for example forming a cross or star so as to further provide an uneven interior face. Typically all edges of such projections or texture are rounded and/or smooth so as to prevent the bag from snagging on the raised portions.

**[0054]** The interior face may include a plurality of raised portions arranged to be spread about and/or form the bin's interior wall. Preferably the raised portions are of various sizes. For example the diameter and depth of the raised portions may vary so as to improve ease of removal of the bag from the bin.

**[0055]** In a preferred embodiment the interior face may include a mixture of two or more types of dome for example a first larger shallow dome and a second smaller deeper dome that projects further than the first larger dome. This creates a rippled uneven surface so as to aid in reducing likelihood of any consistent vacuum suction forming when removing the bag from the waste receptacle or in use.

**[0056]** It may be envisaged that diameter and depth of all raised or lowered portions may be varied to aid with preventing the bag from becoming stuck and ultimately aiding removal of the bag from the waste receptacle.

**[0057]** The raised portions in addition or the alternative may be provided in various arrangements. For example in some embodiments the raised portions may be evenly spaced whereas in other embodiments they may be randomly spaced. Furthermore the raised portions may be arranged orderly, for example in lines, or randomly.

**[0058]** In some embodiments the raised portions may be provided on only part of the face or the bin's interior wall. For example the raised portions may only be provided in the bin's bottom half or third, where contents added to the bag will first accumulate from, at the bin's top may not include any raised portions. Typically the bin has a top and the interior face has an upper that may not require raised portions as the action of first pulling the bag will draw it away from this region. Advantageously this may reduce the associated cost of manufacture.

**[0059]** In other preferred embodiments the raised portions may be provided individually as a patch or grouped, such as in a string, for attachment to the bin interior wall. In this way a standard bin may be adapted to include the bin lining aid.

**[0060]** The patches may be adhesive backed so as to be stuck to the interior face. It may be envisaged that the patches may be provided in variety of shapes as before mentioned. In particular the patches may be dimensioned so as to provide suitable shapes for attachment to the bin's interior face.

**[0061]** Preferably the patches are formed from a resiliently deformable material such as rubber or silicone so as to enable fitting to even arcuate surfaces. It may be envisaged that the patches are formed so as not to significantly deform in use so as to ensure they do not flatten in use but to ensure they remain raised. For example the

raised portion may be solid with no hollow sections but capable of flexing so as to be adhered to an arcuate interior face.

**[0062]** In some embodiments the patches may be rigid with a flexible backing and/or intermediate layer so as to enable securement to an arcuate surface and maintain the raised profile in use.

**[0063]** In some embodiments the raised or lowered portions may include apertures so as to enable through-passage airflow thereby further reducing the likelihood of restricted removal of the bag due to vacuum or suction issues.

**[0064]** In some embodiments the waste receptacle or insert may include scented means s to release an odour or neutraliser to mask undesirable odours from collected waste in the bin. For example the raised portions may be formed for a scent impregnated material.

**[0065]** The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

## Brief Description of the Figures

**[0066]**

Figure 1 shows a view from above into the interior of an embodiment of a waste receptacle according to the present invention;

Figure 2 shows a view from above into the interior of an another embodiment of a waste receptacle according to the present invention;

Figure 3 shows an isometric view of the embodiment shown in Figure 1 or 2;

Figure 4 shows a side view of the embodiment shown in Figure 1 or 2;

Figure 5 shows a waste bin to receive a waste bucket shown Figure 1, 2, 3, and 4;

Figure 6 shows an isometric view of an insert for forming a waste receptacle according to the present invention.

Figure 7 shows a profile view of the insert in Figure 6.

Figure 8 shows a front view of a protrusion in the form of a patch to insert and adhere to the interior wall surface of a bucket to make an embodiment of a waste receptacle according to the present invention.

Figure 9 shows a side view of another protrusion in the form of patches to inserts and adhere to the interior wall surface of a bucket to make an embodiment of a waste receptacle according to the present invention.

Figure 10 shows a profile view of the protrusions in Figures 8 and 9.

Figure 11 shows an isometric view of an insert for forming a waste receptacle according to the present invention.

Figure 12 shows the insert of Figure 11 rolled for insertion into a bucket to make a waste receptacle according the invention similar to the embodiment illustrated in Figures 1, 2, 3, and 4.

Figure 13 shows a wide protrusion according to the invention with dimensions as tested.

Figure 14 shows a narrow protrusion according to the invention with dimensions as tested.

Figure 15 shows a cutaway side view of a bucket of a bucket according to the invention illustrating protrusions on the inner wall surface.

Figure 16 shows an isometric view looking into the interior of a bucket according to the invention.

Figure 17 shows an array of protrusions according to the invention with dimensions as tested.

Figure 18 shows a waste receptacle according to the invention with a bin liner bag inserted; and

Figure 19 shows and ordinary waste receptacle with a smooth interior wall surface.

## Detailed Description of the Invention

**[0067]** With reference to the figures a waste receptacle bucket 1 is shown in use, or more particularly the portions or protuberances 4, 6, 50, 52, 20, 22 are shown incorporated in a waste receptacle bucket in Figures 1 to 4, wherein the interior face 2 of the waste receptacle's single side has raised portions 4 and exterior face 3 lowered portions 6, such that the bucket 1 is formed with depressions on the side. The bucket 1 is an insert with a handle for an outer case 8 shown in Figure 5. The outer case 8 has a lid 7 and pedal 9 for operation of the lid 7.

**[0068]** Preferably the raised portions or protuberances 4, 6, 50, 52, 20, 22 are shallow, for example projecting into the body's interior from the interior face 2 preferably no further than 20mm and ideally no further than 10mm so as prevent the bag becoming caught during removal. The portions vary in depth that they intrude from the interior wall surface 2 as shown in Figures 1, 2, 7, 13, 14, and 15.

**[0069]** Advantageously some of the portions 22 may include a through aperture or pinhole aperture 10 as

shown in Figure 4 in order to allow air passage and prevent a vacuum forming between the bag liner and the waste receptacle's interior face 2. However the protuberances are effective without an aperture 10.

**[0070]** In further embodiments the portions are depressions in the interior face and raised on the exterior face the bucket as shown for example in Figures 3 and 4.

**[0071]** Figures 8, 9, and 10 show a plurality of raised portions or protuberances 32, 33 on patches 31, wherein said patches 31 may be detached from a sheet and affixed an interior wall surface 2 of a bucket. The sheet may comprise multiple patches or a single group.

**[0072]** The protuberances 33, 32 on patches 31 are shown in two different sizes. The smaller patches include a pinhole aperture 10 and the larger patches do not. Pinhole apertures are not necessary.

**[0073]** Ideally each patch may be at least 50mmx50mm or have a diameter of at least 50mm so as to enable the patches to be readily stuck to the bin. The lengthwise dimesions 35, 37 of the patches are shown.

The bucket in Use

**[0074]** As shown in Figure 4 the bucket is arranged to be inserted into a pedal bin receptacle 8.

**[0075]** As shown in Figure 18 shows the bucket 1 is in use lined with a bin liner bag 40.

The bucket design - circumferential rows of protuberances

**[0076]** As shown in Figures 1, 2, and 16, the interior surface 2 of the bucket 1 is rippled by raised portions 4 or protuberances 20, 22. The raised portions or protuberances are bubbles on the interior surfaced of the bucket 1 that protrude only little way into the bucket interior. Nearly the entire bucket interior remains for filling the bag in the bucket with items such as rubbish. The ripples bubbles make it easy to remove the bag from the receptacle after it is filled with rubbish.

**[0077]** In some examples of the bucket there are at least first and second types of protuberances arranged in circumferential rows about on the interior of the bucket interior surface. These rows are shown in Figures 1, 2, 3, 4, 12, 15, and 16. In some examples there are first and second types of protuberance arranged in an alternating pattern in each row. In some examples the protuberances also alternate by adjacent rows to make a type of chequered pattern of protuberances on the interior surface of the bucket.

**[0078]** As shown in Figure 3 the bottom of the bucket 1 is defined by base 26. The top of the bucket has an opening 27. However it is not necessary locate the protuberances 4, 20, 22 on the base 26 of the bucket. It is necessary to locate the protuberances on the interior surface 2 of the wall of the bucket. Typically the wall of the bucket is cylindrical, but this is not necessary.

**[0079]** The raised portions or protuberances are located around the bottom half of the interior surface of the bucket or the bottom third. This is shown in Figures 3, 4, 15, and 16.

**[0080]** In one example the interior surface of the bucket therefore has a wall with the lower third covered with two types of protuberances. The two types of protuberances have two different widths and depths. The first type of protuberance 20 is substantially cylindrical or dome shaped and has a wide diameter base 43. The second type of protuberance is substantially cylindrical or dome shaped and has a narrow diameter base 41. The profiles of the wide base 41 and narrow base 43 are shown in Figure 15.

**[0081]** The first type of protuberance is has a length that it extends from the 41. This length is the distance that the first type of protuberance extends from the interior surface of the wall of the bucket into the interior of the bucket. The first protuberance 20 is shown protruding into the interior of the bucket in Figure 2.

**[0082]** The length of the first protuberance is less than the length of the second protuberance. The length the first protuberance 20 can be seen in Figure 13. The length the second protuberance 20 can be seen in Figure 14. The peak 45 of the dome type protuberance is shown, as is the base 41. The cylindrical protuberance peak 47 and base 43 shown.

**[0083]** As can be seen in Figure 2 in one example the first protuberance 20 does not protrude as far into the bucket as the second protuberance 22 because the first protuberance is not as long from base to top as the second.

**[0084]** As can be seen in Figure 1 in another example the first protuberance 20 protrude about the same distance into the bucket as the second protuberance 22.

**[0085]** The protuberances are a three dimensional surface on the interior wall of the bucket against which a bin liner bag and contents inside the bin liner bag rest.

**[0086]** The rounded shaped of the raised portions 4 or protuberances 20, 22 prevent them from catching and tearing the bag. The best surface texture of the protuberances is a substantially polished and smooth surface to allow for a smooth gliding of the bag against them.

Method of Manufacture

**[0087]** In one method of making the bucket the protuberances are moulded or pressed into the wall of the bucket.

**[0088]** In other method making the bucket the protuberances 4, 20, 22, 50, 52 are moulded first. An adhesive is put onto the base 41, 43 of the protuberances. The base of each protuberance is then affixed to the interior wall surface of the bucket. To increase the reliability of the protuberances and prevent the protuberances from being pulled off of the interior wall of the bucket each protuberance is formed with and extended area base sheet 31 as shown in Figure 10. The extended area base sheet has a larger surface area than the base of the pro-

tuberance itself. The extended area base sheet is covered with adhesive. The larger surface area of the extended area base sheet affords a greater amount of adhesion between the interior surface of the cylinder wall and the protuberance than the area of the base 41, 43 of the protuberance alone could afford.

**[0089]** Another method of making the bucket is to mould a pad 60 such as shown in Figure 11. The pad is has is a flexible resilient card 11 formed with the protuberances 20, 22 on it. Alternatively the protuberances are adhered by adhesive to the pad as described above. The pad is made from a flexible material such an elastomeric polymer. The pad is then rolled to conform to the interior wall surface of bucket. Figure 12 shows pad in rolled form. The pad is then inserted into the bucket. The resilience of the pad causes it to unroll and adhere to the interior wall of the bucket. In one example the face 62 of the pad without the protuberances is covered with adhesive to aid the pad to adhere to the interior wall of the bucket.

Three Forces

**[0090]** The protuberances negate the three forces which act together to cause a full bin liner bag and contents to stick to the interior wall surface of a bucket which has only a smooth wall. The protuberances thus prevent the bin liner bag from sticking in the bucket when it is pulled in an upward motion for removal.

**[0091]** The three forces are due to: vacuum, friction and gravity. Vacuum is the lack of air between the bin liner bag and the interior surface of the wall. The vacuum causes the bin liner bag to press against the interior wall surface of the bucket. Rubbing of the bag causes a friction force between the bag and the interior surface of wall. Gravity acts on rubbish inside the bag and causes the rubbish to drop and press against the interior surface of the wall.

**[0092]** These forces manifest and act together at the base of the bin immediately the bin liner is pulled in an upward motion for removal.

**[0093]** The raised portions target and negate all three of the forces collectively responsible for causing full bin liners of rubbish to stick fast inside a waste receptacle. This then allows the bin liner and contents to be comfortably and easily removed.

**[0094]** No other prior art addresses all three forces involved together, and therefore cannot be as efficient and effective.

**[0095]** As a bin liner bag is pulled out of the bucket, the protuberances kill the vacuum as the pull action commences. The protuberances also disrupt the contents as the pull action commences preventing mating and sticking of the bin liner bag with the surface.

Vacuum and Friction

**[0096]** The protuberances create air space between the bag and the interior wall surface of the bucket and prevent the formation of a vacuum.

**[0097]** When a full bin liner and contents are removed by a pulling up action, the space between the recess between the protrusions and the bin liner bag provide air pockets. As the pulling up action commences the air pocket instantly prevent the formation of a vacuum.

**[0098]** As the bag is pulled up out of the bucket the protrusions prevent the effect of friction by reducing surface area of the bag in contact with the inner wall surface and eliminating a smooth flat surface for the bin liner and contents to rub against. The surface area of the bag in contact with the inner wall surface is reduced because the bag is urged to only touch the peaks of the protuberances.

**[0099]** Protrusions with circular or oval bases and domed or gently curved protruding profiles gently ruffle a filled bin bag as it is removed from the bucket. The ruffling action breaks any vacuum between the bag and the interior face. The rounded shaped of the raised portions prevents them from catching and tearing the bag.

**[0100]** In the prior art there are bucket with long longitudinal aligned ridges on the interior surface of the bucket extending from top open to bottom base of bucket. There long ridges or spines are not as effective as present invention the present invention is advantageous because the protrusions with circular or oval bases ruffle the bag as it is lifted out

**[0101]** Additionally the protrusions provides disruption against the surface area of the bin liner and to the contents, so preventing the settling and sticking effect of the bag and contents at the base.

**[0102]** The bin liner can then be removed with ease, as both of these 'trapping' forces are prevented and dealt with at the same time.

**[0103]** By arranging the protrusions at the bottom half or bottom third of the bucket, the vacuum and friction forces are broken at their strongest point area. Any further effect of these forces is minimal which allows ease of removal through the remaining length of the bin. It is therefore not necessary to provide these protrusions for the whole of the length and surface area of the bin.

Settling and Gravity

**[0104]** The protrusions provide disturbance and disruption to the contents of the bin bag as it is pulled out for removal. In so doing the protrusions also prevents the contents 'settling' and sticking at the base.

**[0105]** As a full bin liner of rubbish is pulled up for removal the grip of the protrusions on the rubbish inside the bin liner bag is reduced. However the protrusions continue to aid prevention of the rubbish in the bag from falling into a compacted mass by falling to the bottom of the bag making the bag perfectly manageable for removal. Without the protrusion the effect of gravity is to cause the rubbish in the bag to drop immediately, compress and stick at the bottom of the bucket. The protrusions

grip and provide support to the rubbish slowing down this process and negating this effect.

The Wide Protuberances

**[0106]** A combination of broader flatter shaped raised protrusions together with a narrower but more pronounced raised portion in the formation described is effective for reducing the amount of force required to lift the bag out of the bucket.

**[0107]** The wider protrusions 20, 50 have a base diameter greater than the base diameter of the narrow protrusions 22, 52. The protrusions with the wider base diameter are designed to create and maximize air space between the bin liner and the surface of the waste receptacle. These wider protrusions 20, 50 prevent the formation and sticking effect of a vacuum.

**[0108]** The wider diameter protrusions also have a less acutely curved protruding profile. As shown in Figures 1, 2 and 7 the top of the wider protrusion 50 may even be flat or nearly flat as shown for the wider protrusions 2. These protrusions 20, 50 are flatter and wider to lift and create airspaces wide airspaces between the bin liner bag and interior wall surface the bucket. These air pockets release the vacuum.

The Narrow Protuberances

**[0109]** The narrow protuberances 22, 52 have a less wide base diameter than the wide protuberances 20, 50. The narrow protuberances also have dome profile designed to protrude and push further into the interior of bucket from the bucket wall surface than the wider protuberances. As a result the narrow protuberances provide additional air pockets, but primarily and more importantly greatly reduce surface area whilst pushing against the bin liner into the interior of the bucket, supporting but providing the necessary disruption to the contents when the bag is pulled out. This negates the sticking effect otherwise produced by friction. Primarily the long lengths of the narrow protuberances makes these protuberance protrude the long length into the interior of the bucket and create disturbances to the rubbish in the bin liner bag as it is pulled out of the bucket. This has the technical effect of preventing settling of the rubbish and sticking of the bag to the interior wall surface of the bucket.

**[0110]** The longer length of the narrow dome is designed to be more invasive and to extend further into the interior and contents of the bucket, in order to grip and support the rubbish in the bag. This prevents the immediate/sudden drop and collapsing of the rubbish into hard mass at the bottom of the bucket, which presses hard against the base and interior wall surface and makes the bag hard to left out of the bucket. By placing the wider protrusions 20, 50 and narrow protrusions 22, 52 in consecutive alternating formation, i.e. wide protrusion - narrow protrusion - wide protrusion - narrow protrusion circumferentially around the horizontal and also through the vertical it is possible to achieve a great disruptive effect on the vacuum, friction, and gravity which would otherwise make it difficult to remove the bag from the bucket.

**[0111]** The protuberances require to be of a polished/smooth surface to allow for a smooth gliding of the bag against them, but the protuberance do not require a puncture 10 as illustrated in Figure 3 to be effective.

Test information

**[0112]** Tests were carried out to verify the effectiveness of the protuberances on the interior surface of the bucket. The tests quantified the benefit of the protuberances effect. The tests showed the protuberances reduce the amount of force required to lift a bin liner bag filled with rubbish out of a bucket.

**[0113]** Firstly, an unmodified plastic bucket with an interior wall surface that was smooth and not rippled was tested. The bucket was a standard bucket for a pedal bin. The bucket was a typical removable smooth plastic bucket to hold a bin bag.

**[0114]** The bucket was cylindrical. The dimensions of the plastic bucket itself were: Base diameter - 24 cm, Top diameter - 28 cm, Length 54 cm. The top diameter was the diameter of the bucket opening. The length was the height of bucket when it was standing on its base. The bucket is shown in Figure 19.

**[0115]** A fresh bin liner bag was inserted into the bucket with a smooth interior surface. The bag was filled with contents typical of household rubbish. The plastic bucket was then agitated for 30 seconds and then left for 10 minutes before a measurement was taken.

**[0116]** A digital hanging weight scale with a hook to lift the bin liner bag was used. The force required to pull the bin liner bag filled with rubbish from the bucket with a smooth interior surface was measured on the scale.

**[0117]** Five force readings were recorded in kilograms and rounded to the nearest whole number.

**[0118]** Each time a reading was taken a fresh bin liner was used. The previous bin liner bag was removed from the plastic bucket and a fresh bin liner bag was opened and inserted into the bucket with a smooth interior surface. The rubbish was placed into the fresh liner by holding the previous bin liner bag over the plastic bucket, cutting the previous bag at the base and allowing the contents to fill the new liner. This was done to ensure the contents filled the liner in a similar order each time. The plastic bucket was then agitated for 30 seconds and then left for 10 minutes before the measurement was taken. This was repeated 5 times resulting in 5 different measurements, one for each bin liner.

**[0119]** The force measurements to pull bin liner bag full of rubbish our of the bucket with an interior wall surface that was smooth and not rippled were as follows:

Measurement 1 : 9 Kg

Measurement 2 : 12 Kg

Measurement 3: 10 Kg

Measurement 4: 13 Kg

Measurement 5: 11 Kg

Average of the five measurements: 11.0 Kg

**[0120]** The average force was 11.0 Kg to pull the bag to pull bin liner bag full of rubbish out of the bucket with an interior wall surface that was smooth and not rippled.

**[0121]** The same method was then used with the same plastic bucket modified. The same bucket was modified with the protuberances affixed to the interior surface of same bucket as used in the previous tests.

**[0122]** Twelve protuberances were affixed in total to the interior surface of the bucket. The twelve protuberances were arranged in two circumferential rows. Each row had six protuberances equidistant apart.

**[0123]** The dimensions of protuberances affixed to the interior surface of the bucket are shown in Figure 13 and Figure 14.

**[0124]** Each wide protuberance shown in Figure 13 was substantially cylindrical with a rounded top. Each wide protuberance had a circular base that was 4 cm in diameter. With the base of the wide protuberance fixed to the interior wall of the bucket, the protuberance protruded 0.7 cm from the base into the interior of the bucket. The cylindrical length of the wide protuberance was 0.4 to 0.5 cm long and the rounded top of the cylinder extended a further 0.2 to 0.3 cm so that the total length was the 0.7 cm.

**[0125]** Each narrow protuberance shown in Figure 14 was dome shaped with a circular base. The base diameter was 3 cm. The length of the dome from the nose to the peak was 1.7. Hence with the base fixed to the interior surface of the bucket the narrow protuberance protruded from the base 1.7 cm into the interior of the bucket.

**[0126]** As shown in Figure 15 and Figure 16 the protuberances were fixed the interior wall of the bucket. The first circumferential row commenced substantially between 2 cm to 3 cm from the base of the bucket. In each row the protuberances were set equidistant apart and placed alternate and opposite each other in size

**[0127]** As shown in Figure 17 the two circumferential rows protuberances were spaced substantially 5 cm to 6 cm apart. The distance from the base to the farthest edge of a protuberance in the second row was substantially 15 cm to 16 cm. With the bucket arranged standing on the base in use the top of the second row of protuberances was substantially 15 to 16 cm above the base.

**[0128]** A fresh bin liner bag was inserted into the bucket with the interior surface having the two circumferential rows of protuberances. The bag was filled with same contents typical of household rubbish as used for the previous tests on the bucket with a smooth unrippled interior surface.

**[0129]** The plastic bucket the interior surface having the two circumferential rows of protuberances was then agitated for 30 seconds and then left for 10 minutes before a measurement was taken.

**[0130]** The same digital hanging weight scale with a hook to lift the bin liner bag was used s for the previous tests. The force required to pull the bin liner bag filled with rubbish from the bucket with the interior surface having the two circumferential rows of protuberances was measured on the scale.

**[0131]** Five force readings were recorded in kilograms and rounded to the nearest whole number.

**[0132]** Each time a reading was taken a fresh bin liner was used. The previous bin liner bag was removed from the plastic bucket and a fresh bin liner bag was opened and inserted into the bucket with the interior surface having the two circumferential rows of protuberances. The rubbish was placed into the fresh liner by holding the previous bin liner bag over the plastic bucket, cutting the previous bag at the base and allowing the contents to fill the new liner. This was done to ensure the contents filled the liner in a similar order each time. The plastic bucket was then agitated for 30 seconds and then left for 10 minutes before the measurement was taken. This was repeated 5 times resulting in 5 different measurements, one for each bin liner.

**[0133]** The force measurements to pull bin liner bag full of rubbish our of the bucket with an interior wall surface having the two circumferential rows of protuberances were as follows:

Measurement 1: 6 Kg

Measurement 2: 8 Kg

Measurement 3: 8 Kg

Measurement 4: 8 Kg

Measurement 5: 7 Kg

Average of the five measurements: 7.3 Kg

**[0134]** The average force was 7.3 Kg to pull the bag to pull bin liner bag full of rubbish out of the bucket with an interior wall surface having the two circumferential rows of protuberances.

**[0135]** In summary the average force to lift a bin liner bag filled with rubbish out of the bucket with an interior wall surface that was smooth and not rippled was 11.0 Kg. The average force to lift a bin liner bag filled the same rubbish out of the bucket with an interior wall surface having the two circumferential rows of protuberances was 7.3 Kg. The two rows of circumferential rows of protuberances on the interior wall surface reduced the force required by thirty-three percent.

**[0136]** A further test was made several days later with a denser sample of rubbish. The same test method was adopted. The bin liner bag could not be removed by at-

tempt to pull it vertically out of the bucket with an interior wall surface that was smooth and not rippled. The bin liner bag stuck fast and bucket had to be tipped on its side to facilitate removal. In contrast the bin liner bag filled with the same dense rubbish was relatively easily removed by lifting the bag straight up out of the bucket with an interior wall surface having the two circumferential rows of protuberances by using an average force of 9.5 Kg.

**[0137]** The inventor appreciates that a skilled person may be able to further improve the reduction in force required to remove a bin liner bag filled with rubbish from a bucket having an interior wall surface having the circumferential rows of protuberances by trying various numbers of rows and varying the base diameter and shape of the protuberances as well as the length of the protuberances. However the inventor's tests have uniquely proven the advantage of two rows of protuberances. The inventor's tests have also uniquely proven the advantage of arranging substantially cylindrical protuberances with a rounded top alternately with dome shaped protuberances having narrower base diameter.

**[0138]** The inventor's tests have uniquely proven that cylindrical domes have a base diameter substantially 4/3 the base diameter of adjacent dome shaped protuberances is particularly effective reducing the amount of force required to pull a bin liner bag filled with rubbish from a bucket. The inventor's tests have shown this to be the case when the length of the narrow protuberances is 1.7/0.7 time the length of the cylindrical protuberance.

**[0139]** Especially significantly the inventor's tests have shown surprisingly that it is not necessary to have ripples or protuberances arranged on the interior surface of the bucket from the bottom to the top of the bucket. The inventor's first row of circumferential protuberances commenced substantially 2 cm to 3 cm from the base of the bucket. The second row was at the furthest substantially 15 cm to 16 cm from the base of the bucket. The length of the bucket was 54 cm. Thus the protuberances were located at furthest proportionately 16/54 along the length of the bucket. This proportion is equivalent to the length of the bucket. The inventor has carried out further tests which show that the protuberances are effective when set on the interior surface of the bucket intermediate the base up to substantially fifty percent of the length of the bucket. Placing the protuberances along the interior surface of this part of the length of the bucket is most effective for reducing the amount of force required to lift a bin liner bag out of the bucket.

**[0140]** The protuberances tested were had a smooth unbroken and unpunctured surface. Surprisingly but the protuberances were effective without any holes through them. So the protuberances do not require any hole through them to break a vacuum between the bin liner bag and interior wall surface of the bucket to be effective. So advantageously the bucket does not leak even if the bag breaks.

**[0141]** The invention has been described by way of examples only. Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the claims.

## Claims

1. A waste receptacle bucket for use with a bin liner bag whereon the interior wall surface is a first circumferential row of protuberances with substantially round bases intermediate the bucket base and half the length or less to the bucket opening, **characterised in that** the wall surface is smooth intermediate the first row and bucket opening so as to permit egress of air between the interior wall surface and bin liner bag, restrict area of contact of the wall surface against the bin liner bag to restrict friction, and restrict settling of contents in the bin liner bag due to gravity and thereby ease lifting the bag from the bucket.

2. A bucket according to claim 1 wherein first row is intermediate the bucket base and a third of the distance or less to the bucket opening.

3. A bucket according to claim 1 or 2 comprising a rolled pad forming the interior wall surface of the bucket from which the protuberances protrude.

4. A bucket according to any preceding claim whereon the interior wall surface is a second row of protuberances substantially round bases intermediate the first row and the base.

5. A bucket according to any preceding claim comprising at least a cylindrical type of protuberances which are substantially cylindrical with a circular base.

6. A bucket according to claim 5 where the diameter of the circular base is substantially 4 cm and length of the cylinder is substantially 0.7 cm.

7. A bucket according to any preceding claim comprising at least a dome type of protuberances which are substantially dome shaped with a circular base.

8. A bucket according to claim 7 wherein the diameter of the circular base is substantially 3 cm and length of the dome from base to peak is substantially 1.7 cm.

9. A bucket according to any proceeding claim wherein cylindrical types of protuberances having circular bases alternate with dome types of protuberances

having circular bases along the row(s), wherein the ratio of the diameter of the base of the cylindrical protuberances to the diameter of the base of the dome type protuberances is in the range between 1:1 and 5:3.

**10.** A bucket according to any proceeding claim 9 wherein the ratio of the length of the the cylindrical protuberances to the length of the dome type protuberances from base to peak is in the range between 1:2 and 1:3.

**11.** A bucket according to claim 9 or 10 as dependent on claim 4 wherein the first and second rows are offset so that the first and second types of protuberances also alternate in the lengthwise direction so as to create a chequered pattern on the wall surface.

**12.** A bucket according to any preceding claim wherein the bucket is substantially cylindrical having a base substantially 24 cm in diameter and length from the base to the opening substantially of substantially 54 cm; comprising two circumferential rows of protuberances each consisting of alternating equidistant cylindrical type of protuberances and dome type of protuberances, wherein the first and second rows are offset so that the cylindrical and dome types of protuberances also alternate in the lengthwise direction so as to create a chequered pattern on the wall surface; wherein the first row is substantially 12 cm to 14 cm from the base and the second row is substantially 4 cm to 5 cm from the base; and the cylindrical type protuberance diameter of the circular base is substantially 4 cm and length of the cylinder is substantially 0.7 cm; and the dome type protuberances diameter of the circular base is substantially 3 cm and length of the dome from base to peak is substantially 1.7 cm.

**13.** A method of manufacturing a waste receptacle bucket for use with a bin liner bag whereby the interior wall surface is formed with a first circumferential row of protuberances with substantially round bases intermediate the bucket base and half the length or less to the bucket opening and forming the wall surface that it is smooth intermediate the first row and bucket opening.

**14.** A method according to claim 13 of affixing to a bucket with a smooth interior wall a first circumferential row of protuberances with substantially round bases, having adhesive on their bases, intermediate the bucket base and half the length or less to the bucket opening.

**15.** A method according to claim 13 whereby a flexible and resilient rolled pad the rolled pad having the protuberances on one face and the opposite face is smooth is inserted into to a smooth walled bucket with a smooth interior wall and releasing the rolled pad so that the opposite face of the pad presses against the smooth wall surface of the smooth walled bucket.

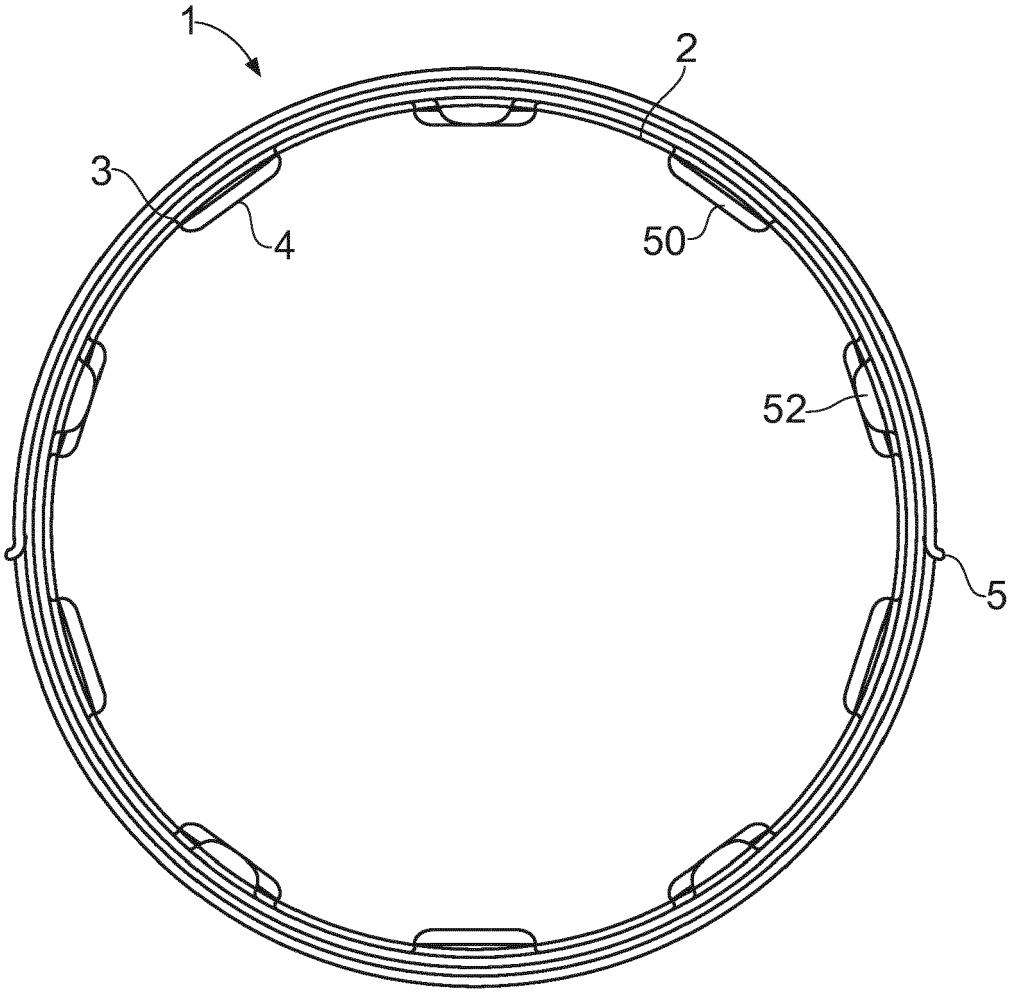


FIG. 1

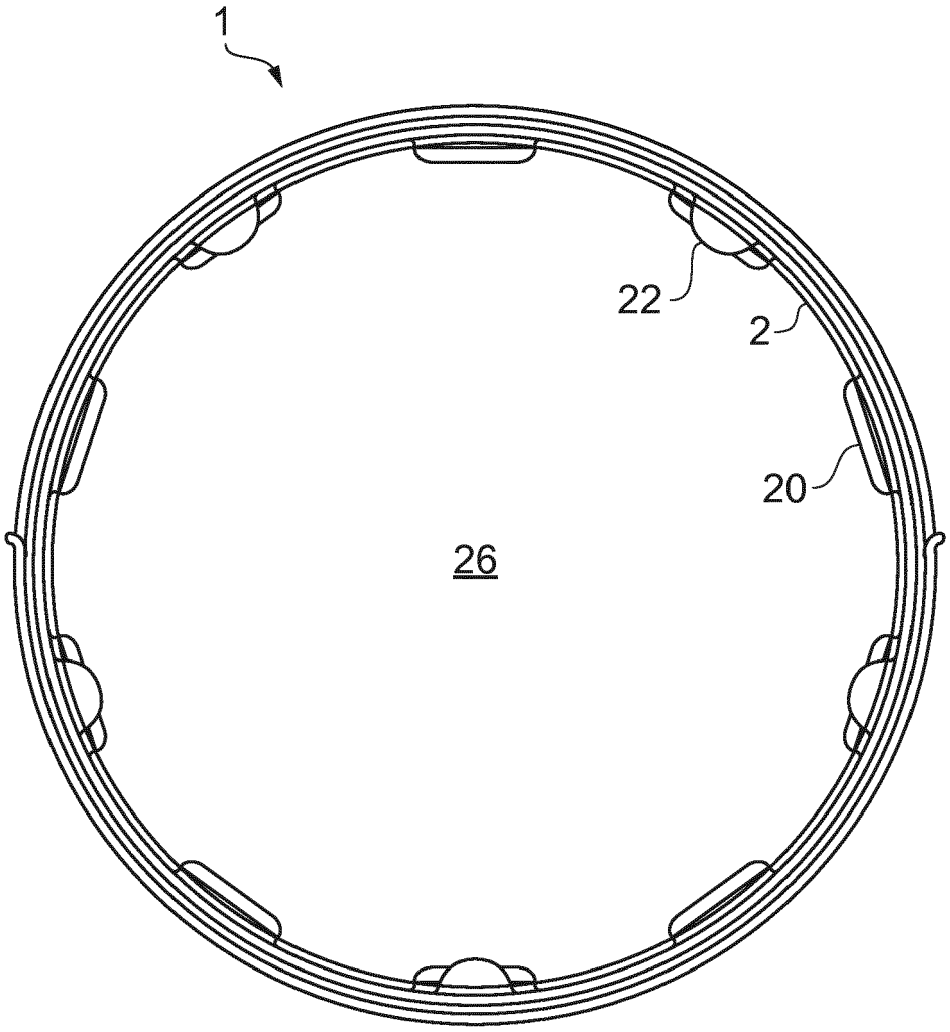


FIG. 2

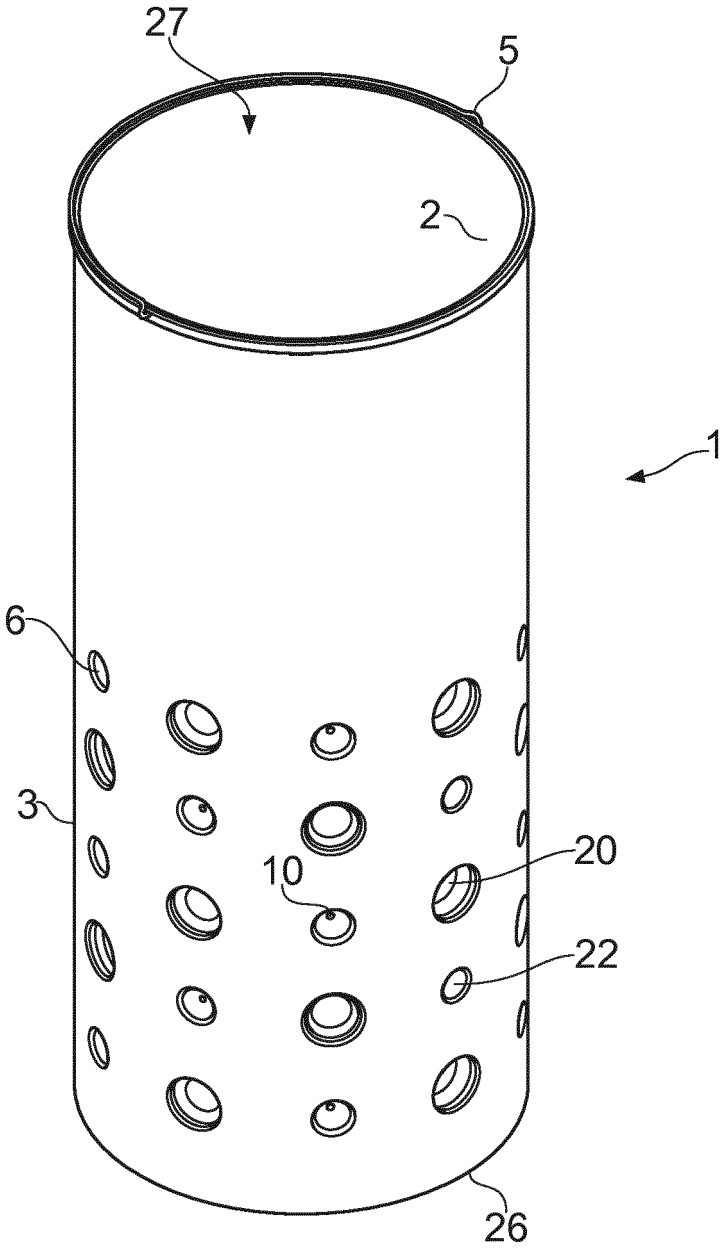


FIG. 3

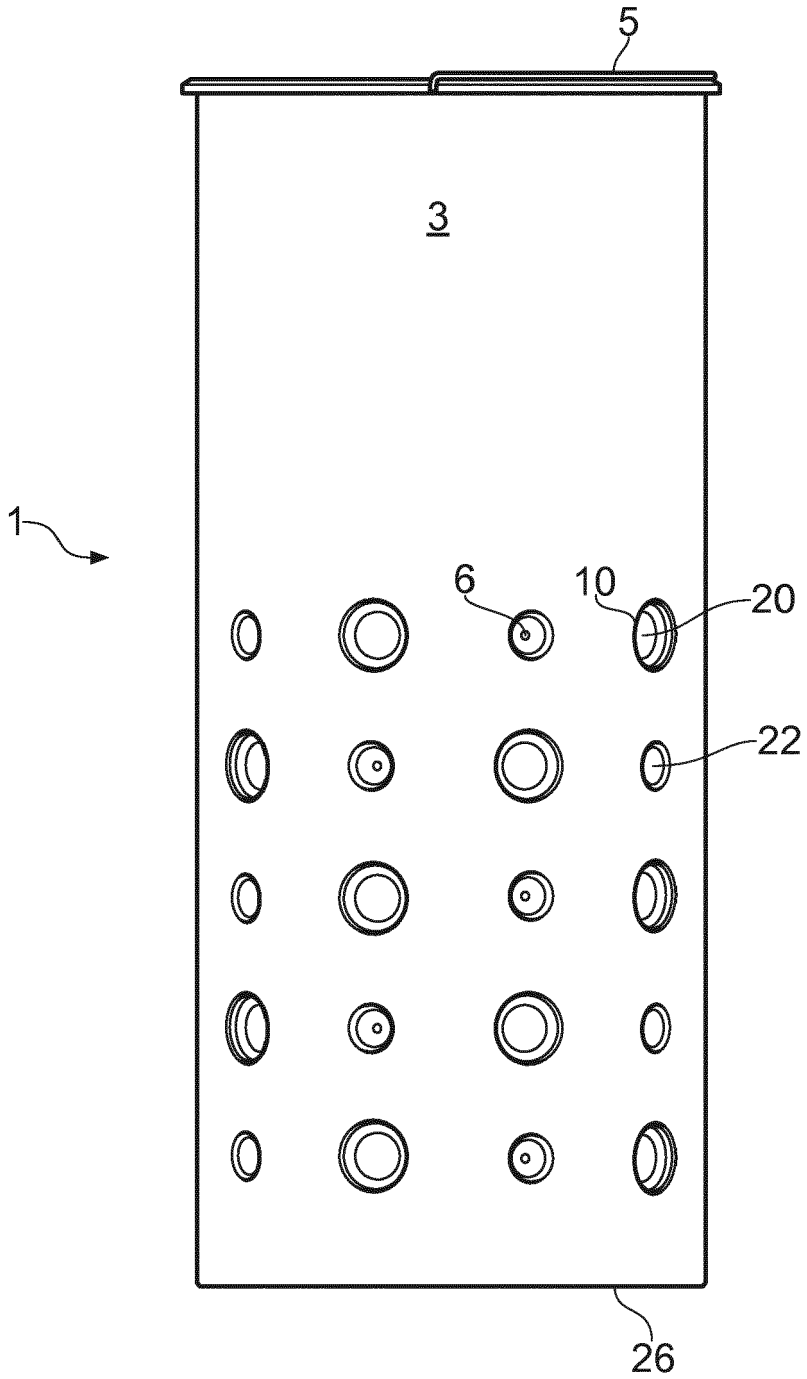


FIG. 4

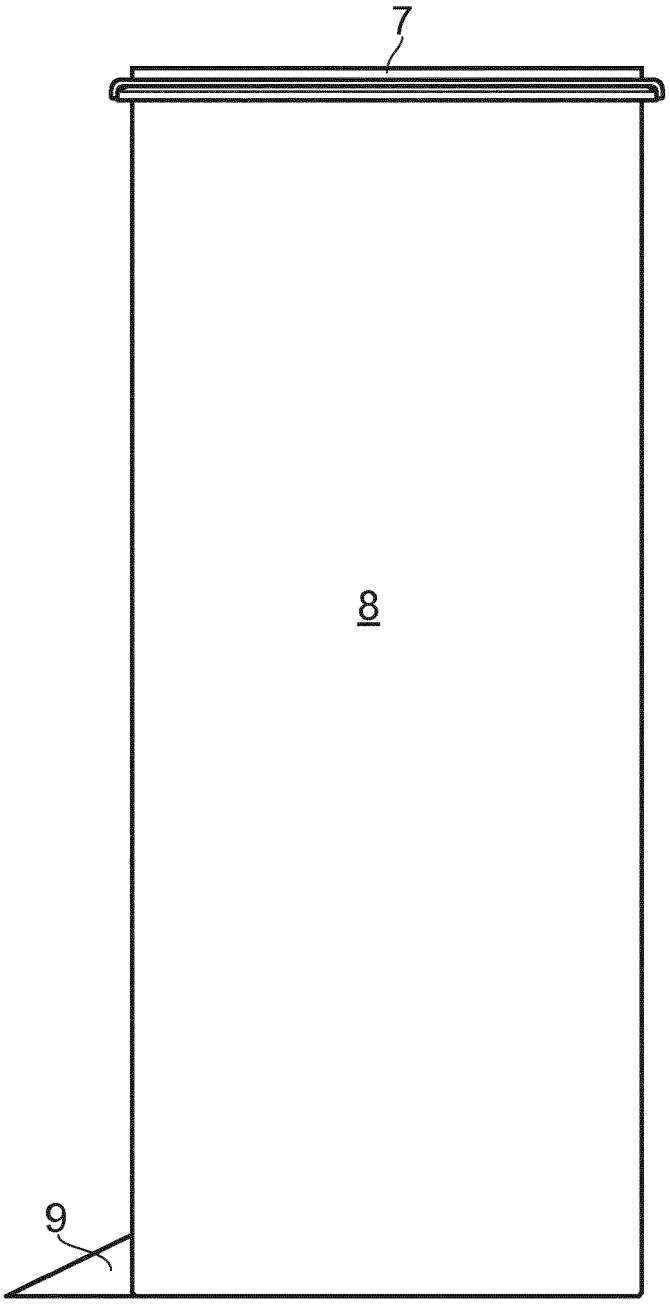


FIG. 5

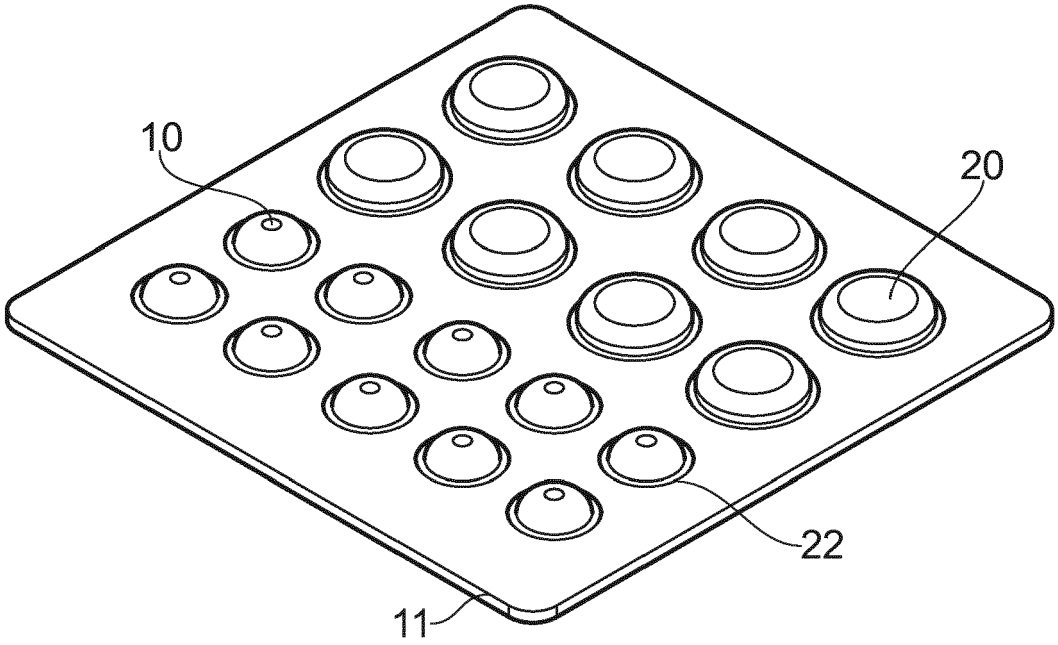


FIG. 6

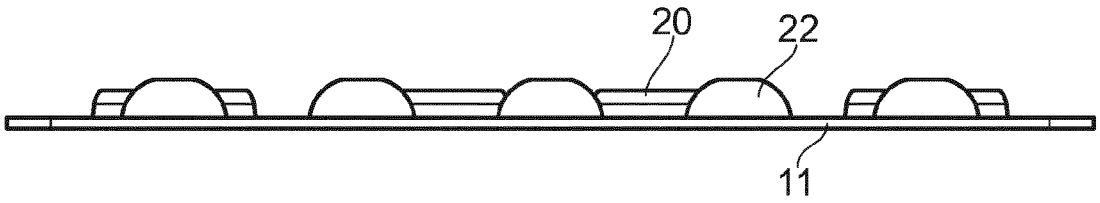


FIG. 7

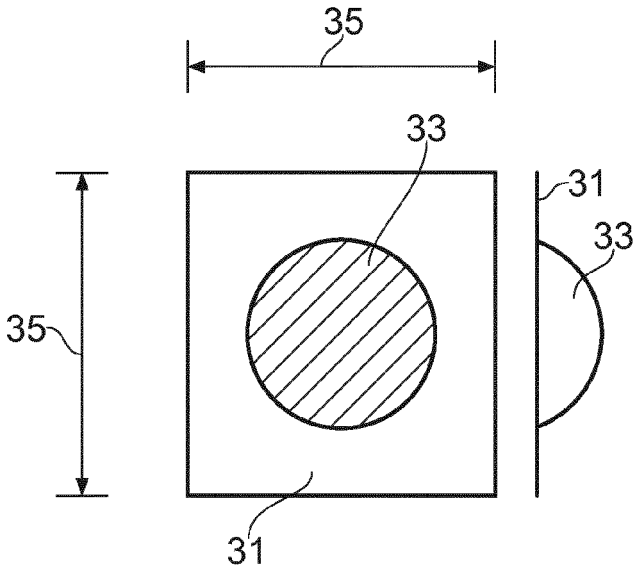


FIG. 8

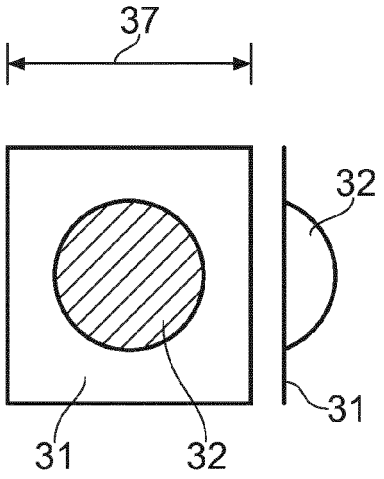


FIG. 9

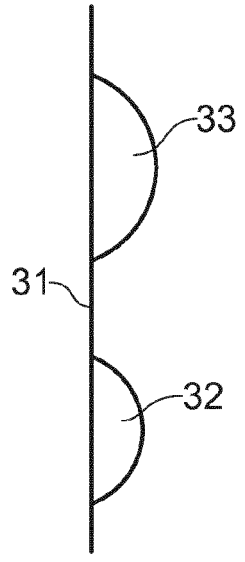


FIG. 10

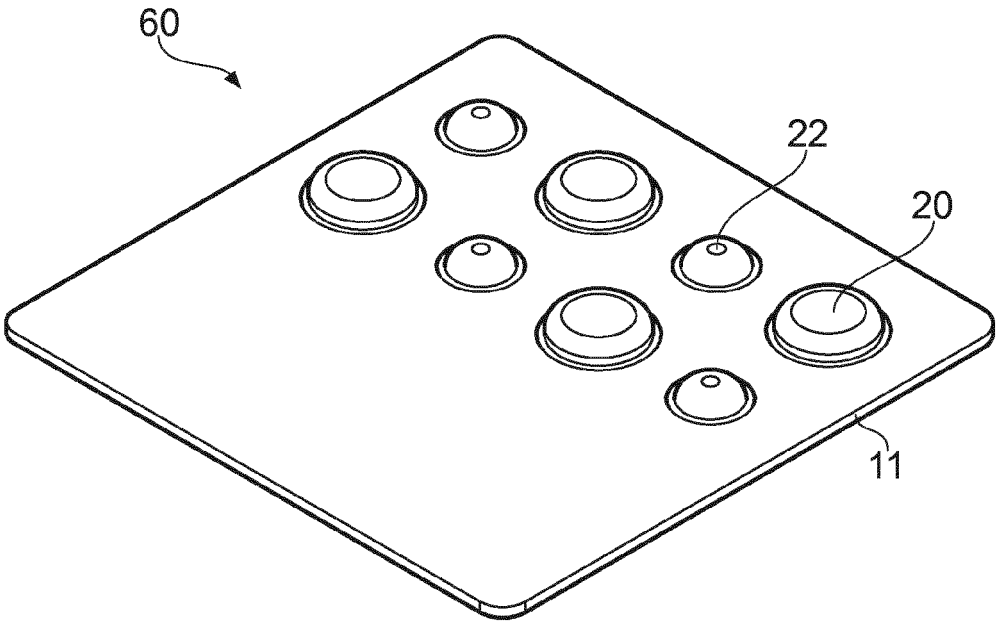


FIG. 11

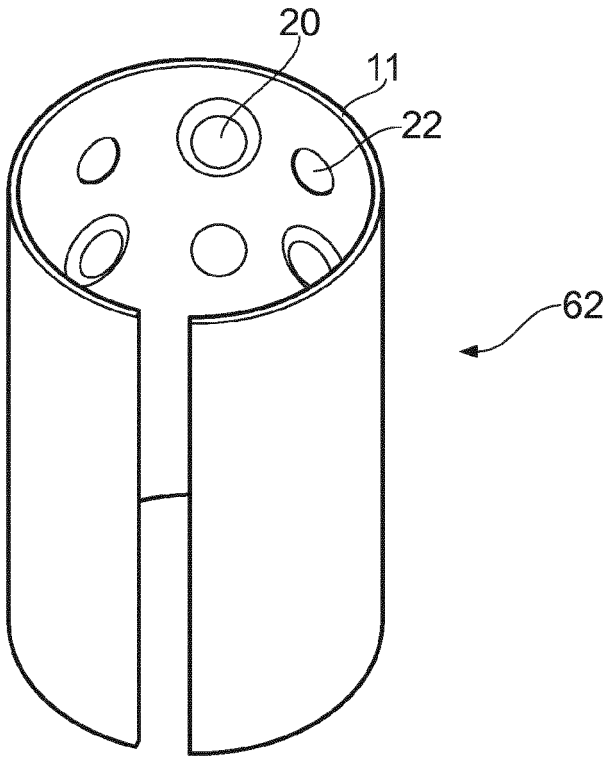


FIG. 12

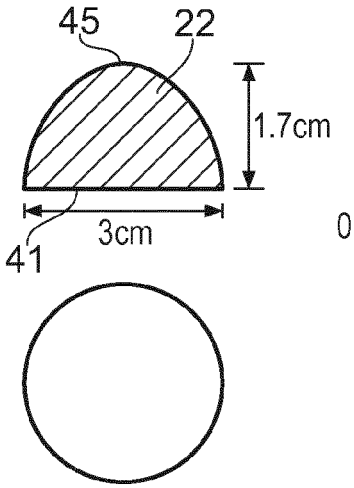


FIG. 14

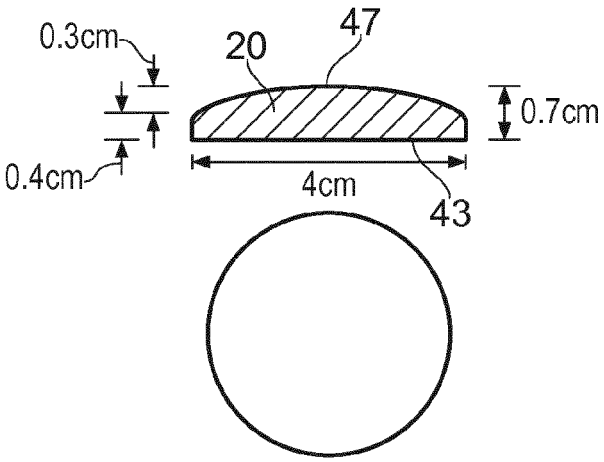


FIG. 13

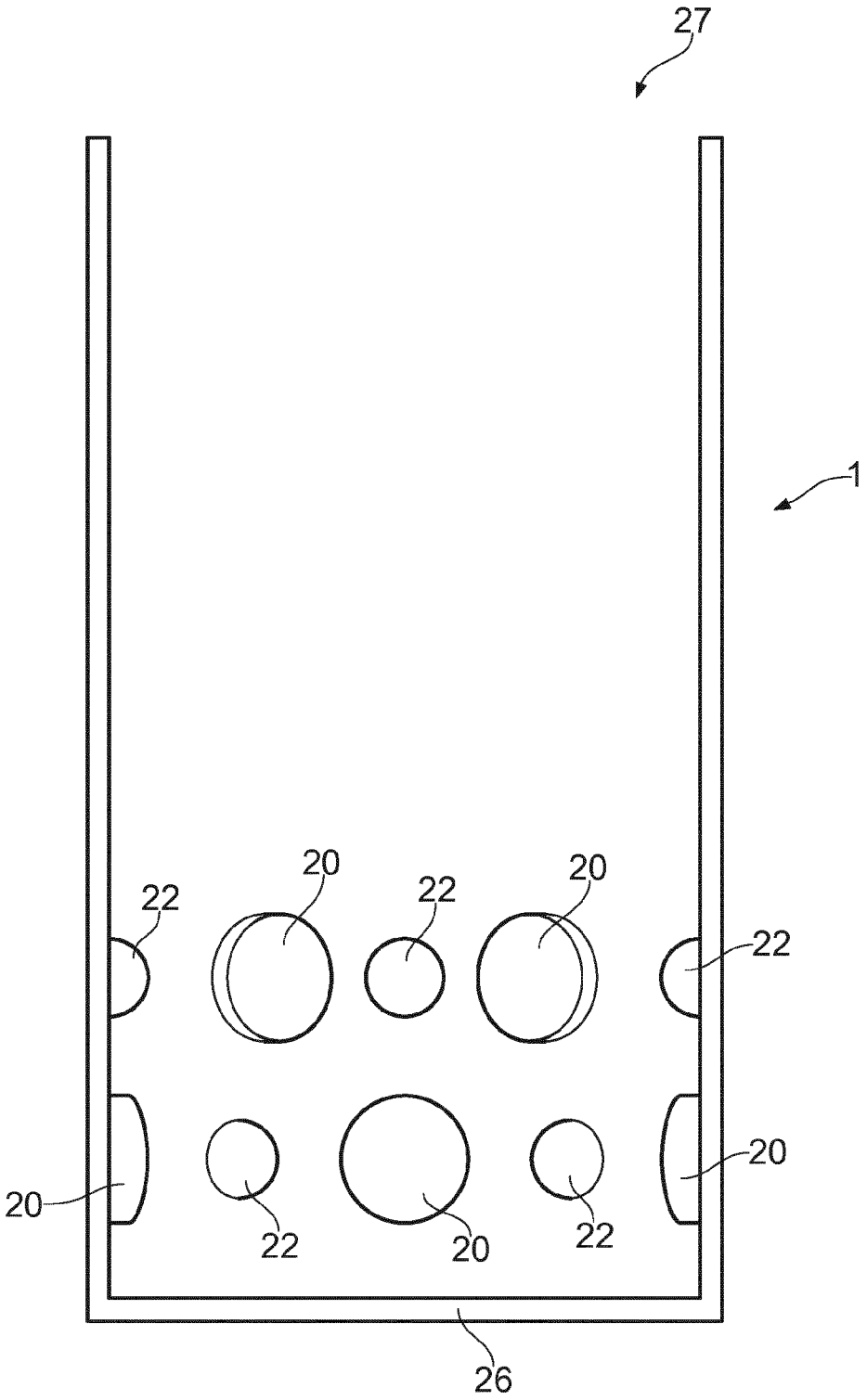


FIG. 15

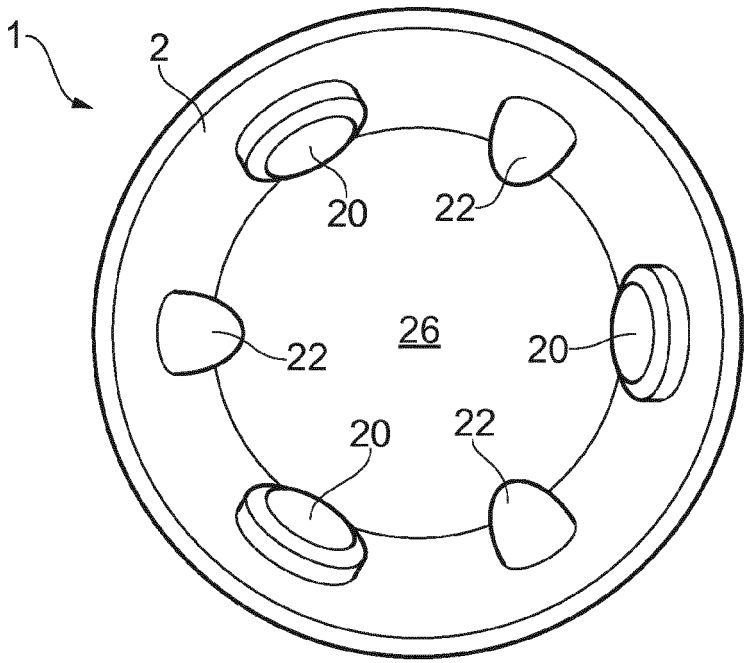


FIG. 16

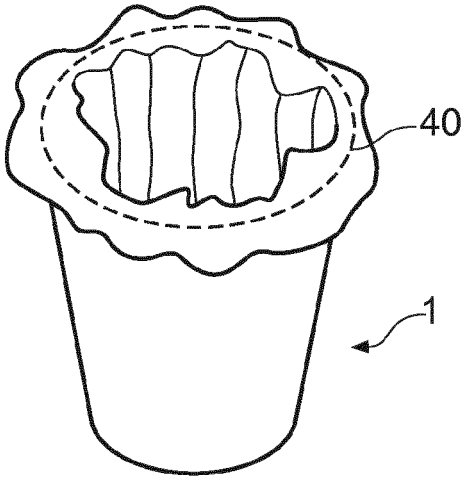


FIG. 18

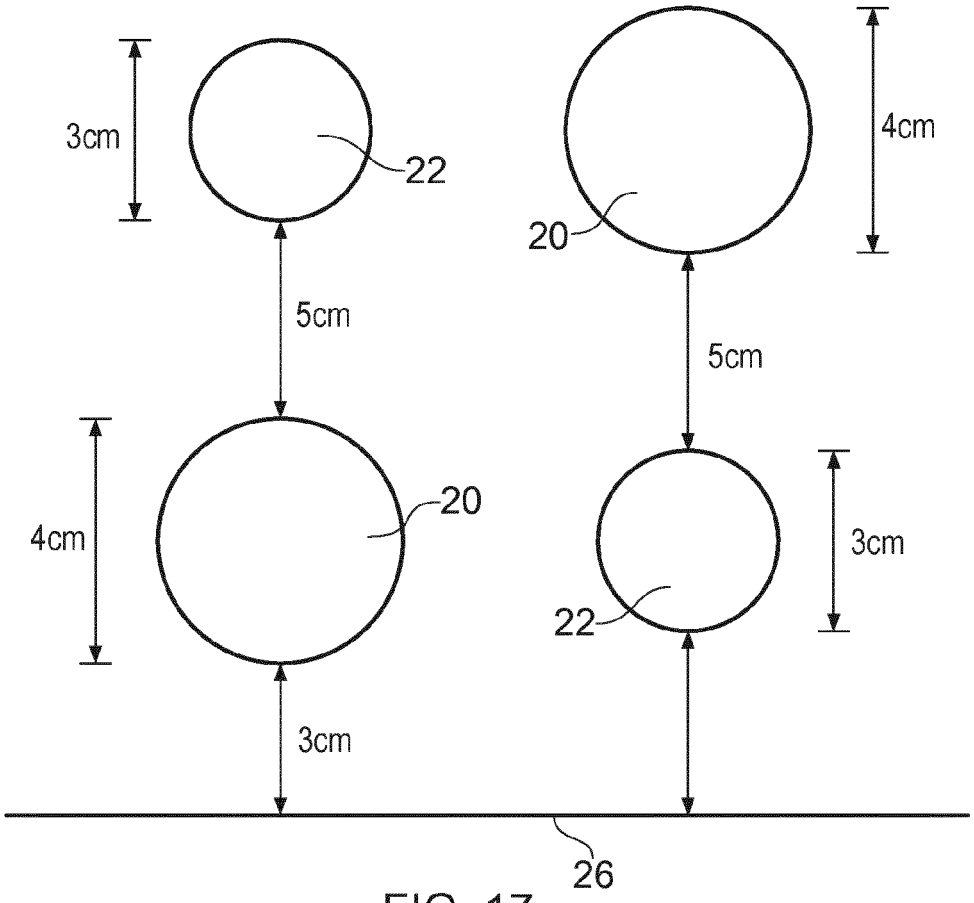


FIG. 17

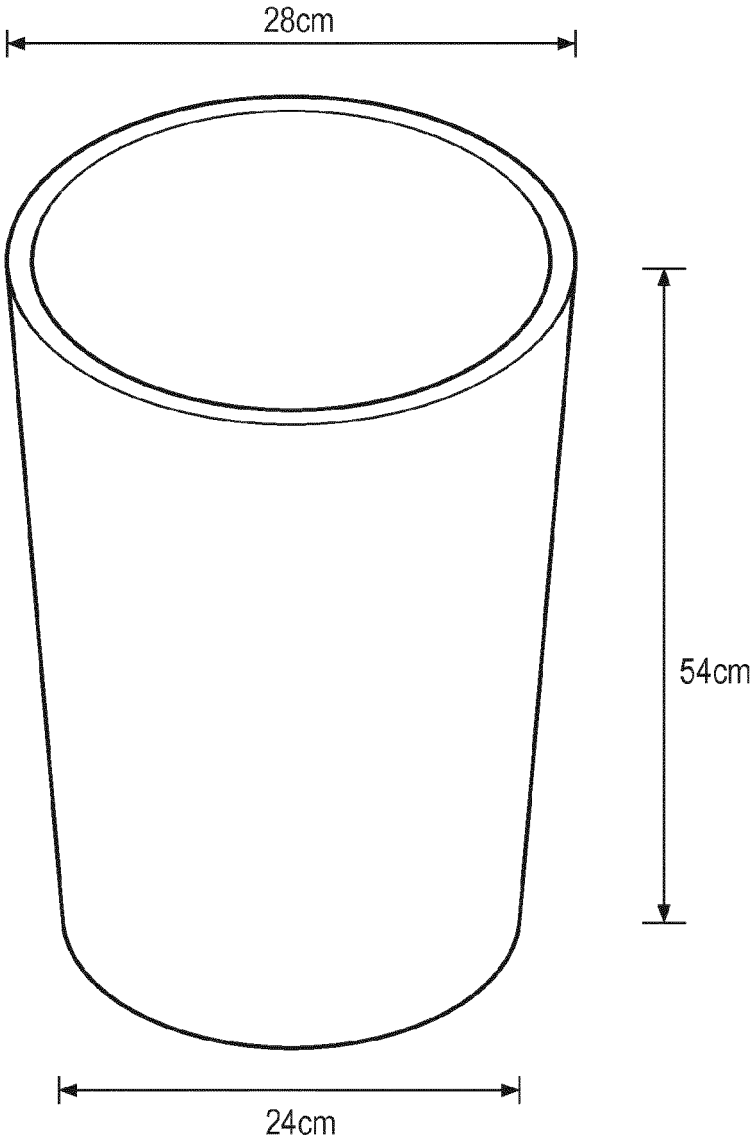


FIG. 19

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# EUROPEAN SEARCH REPORT

Application Number
EP 14 25 0120

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
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