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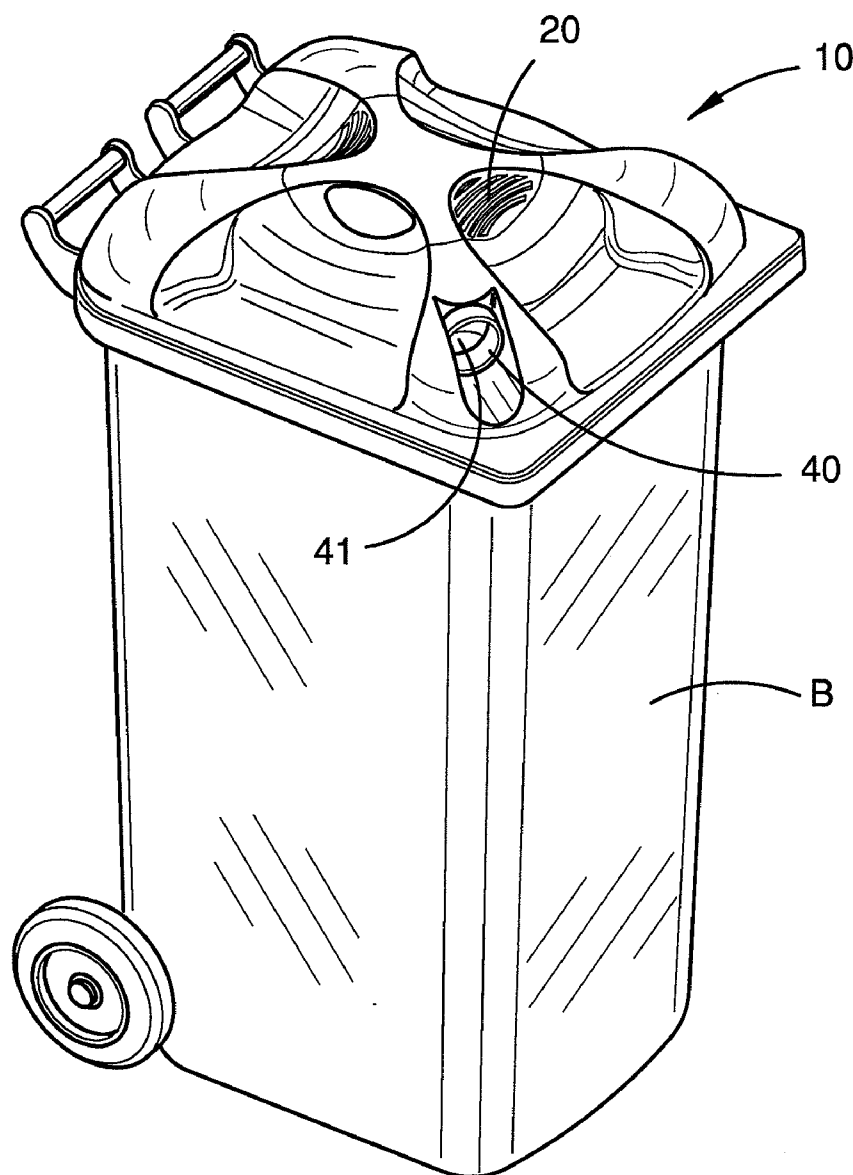
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(52) **U.S. Cl.** **15/327.1**(57) **ABSTRACT**

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An attachment device **10** for a receptacle, the attachment device **10** comprising a plate **11** adapted to fit onto the top of the receptacle, the plate **11** supporting a powered fan **20** that communicates with the receptacle through an aperture **12** in the plate **11**, the device **10** having a second aperture adapted to engage one end of a flexible hose whereby in use the plate **11** is placed in sealed engagement on the top of the receptacle and the fan **20** causes air to be sucked into the receptacle through the hose to establish a vacuum that draws material through the conduit into the receptacle.

(21) Appl. No.: **11/774,043**(22) Filed: **Jul. 6, 2007**

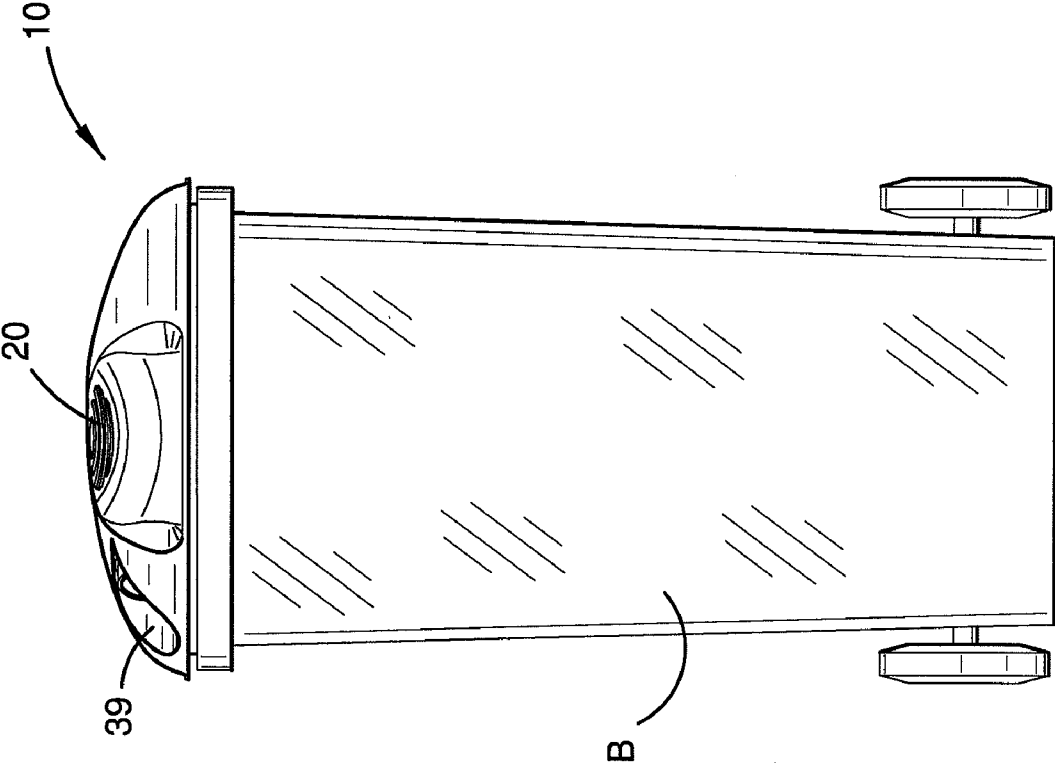


FIGURE 1

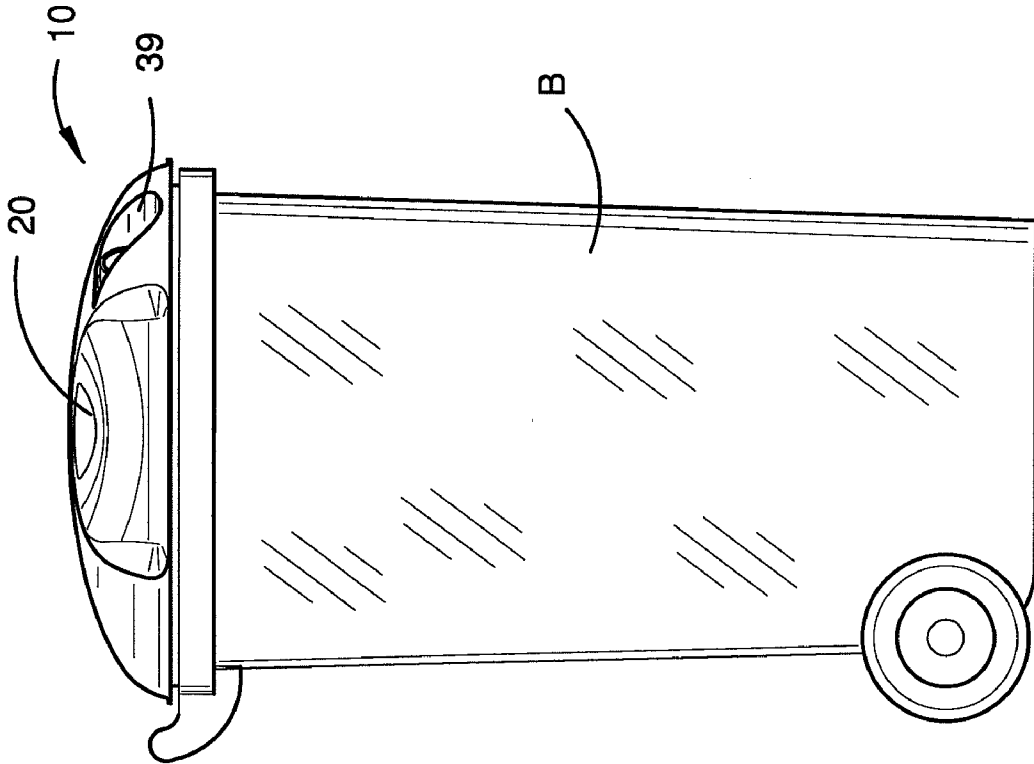


FIGURE 2

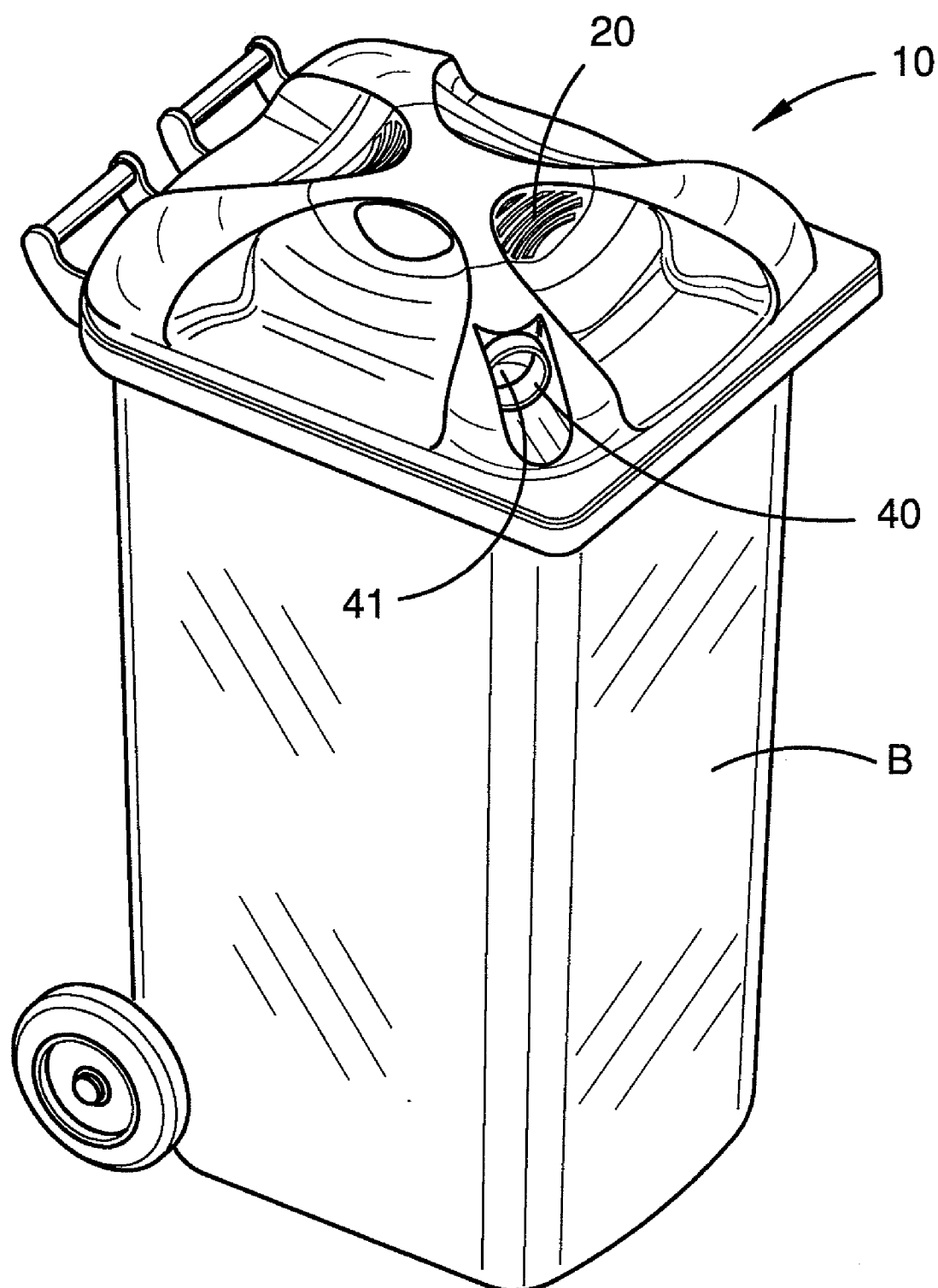


FIGURE 3

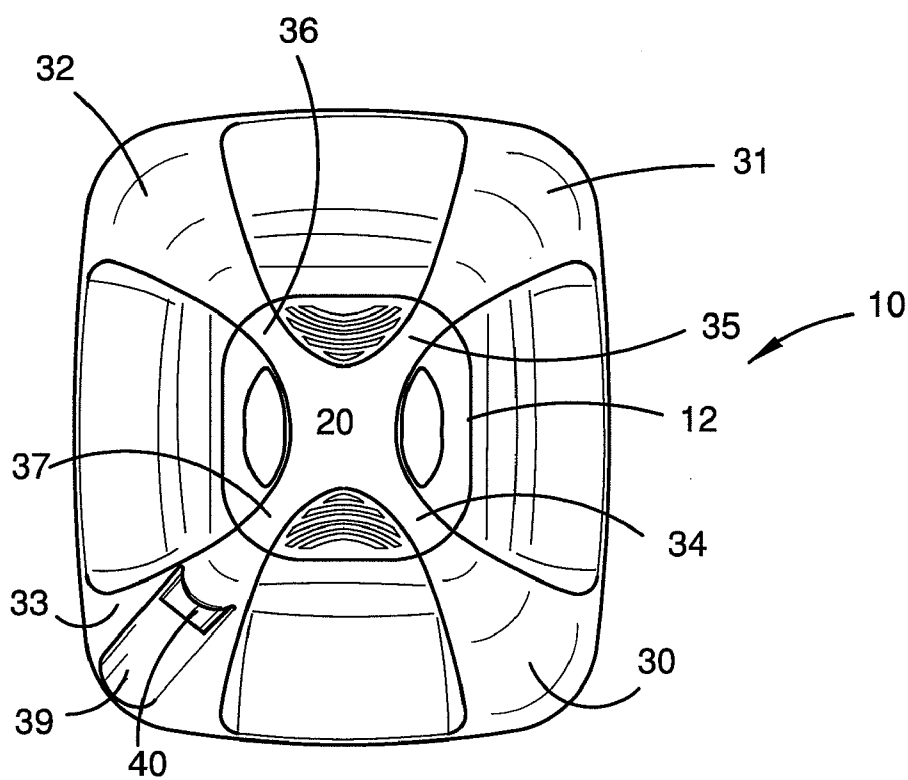


FIGURE 4

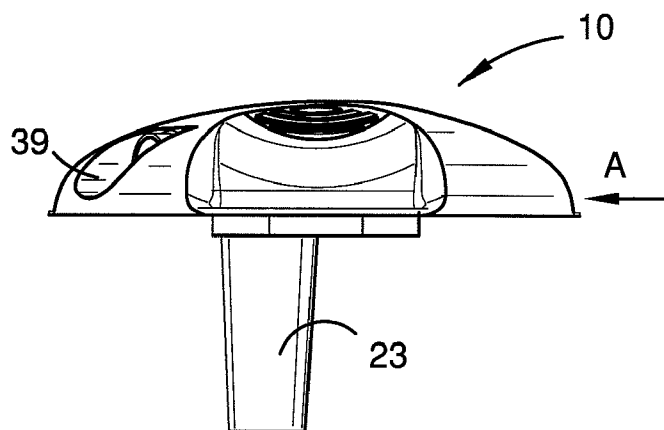


FIGURE 5

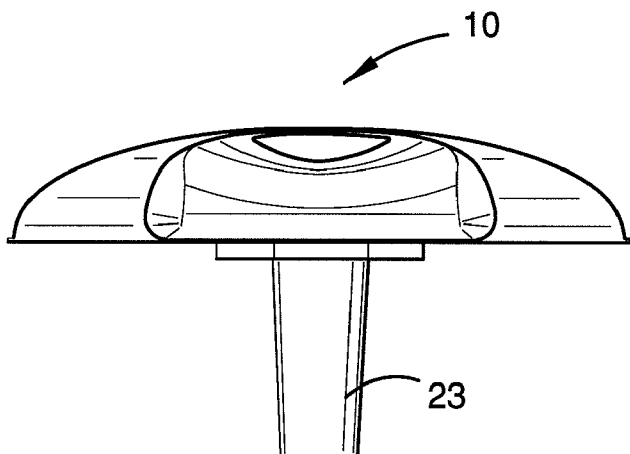
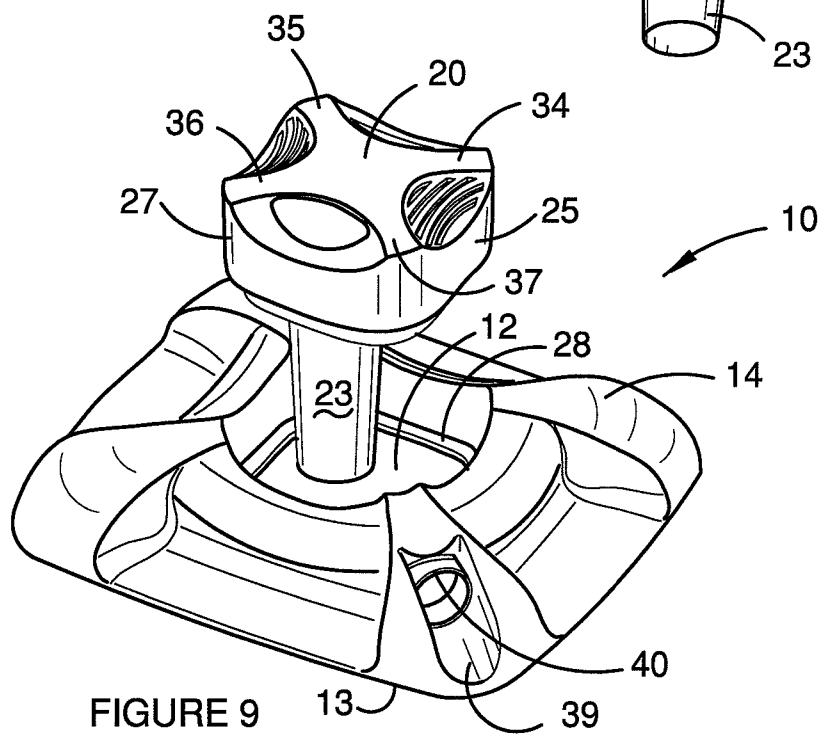
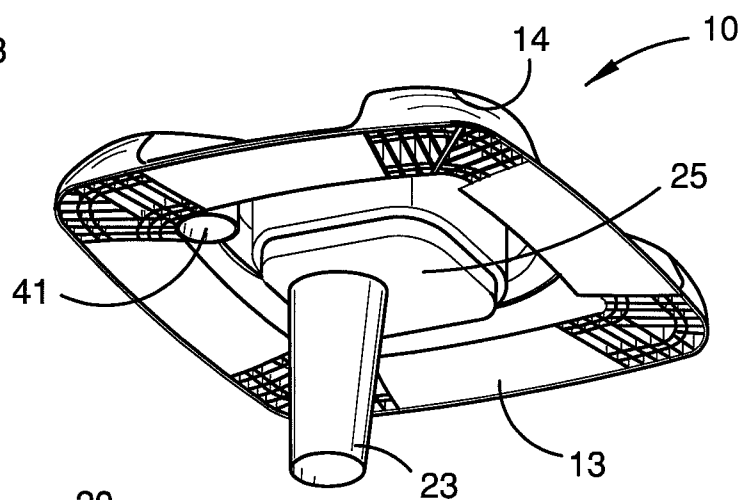
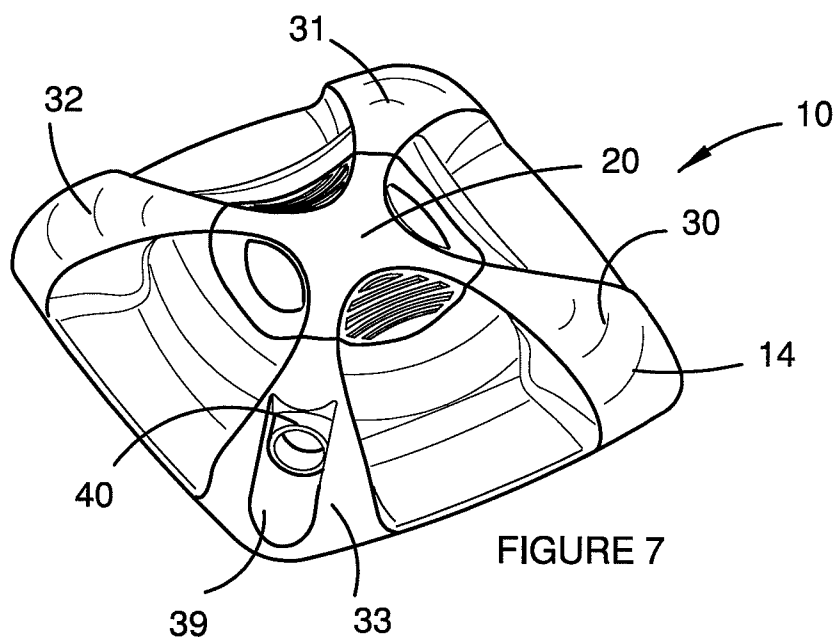


FIGURE 6



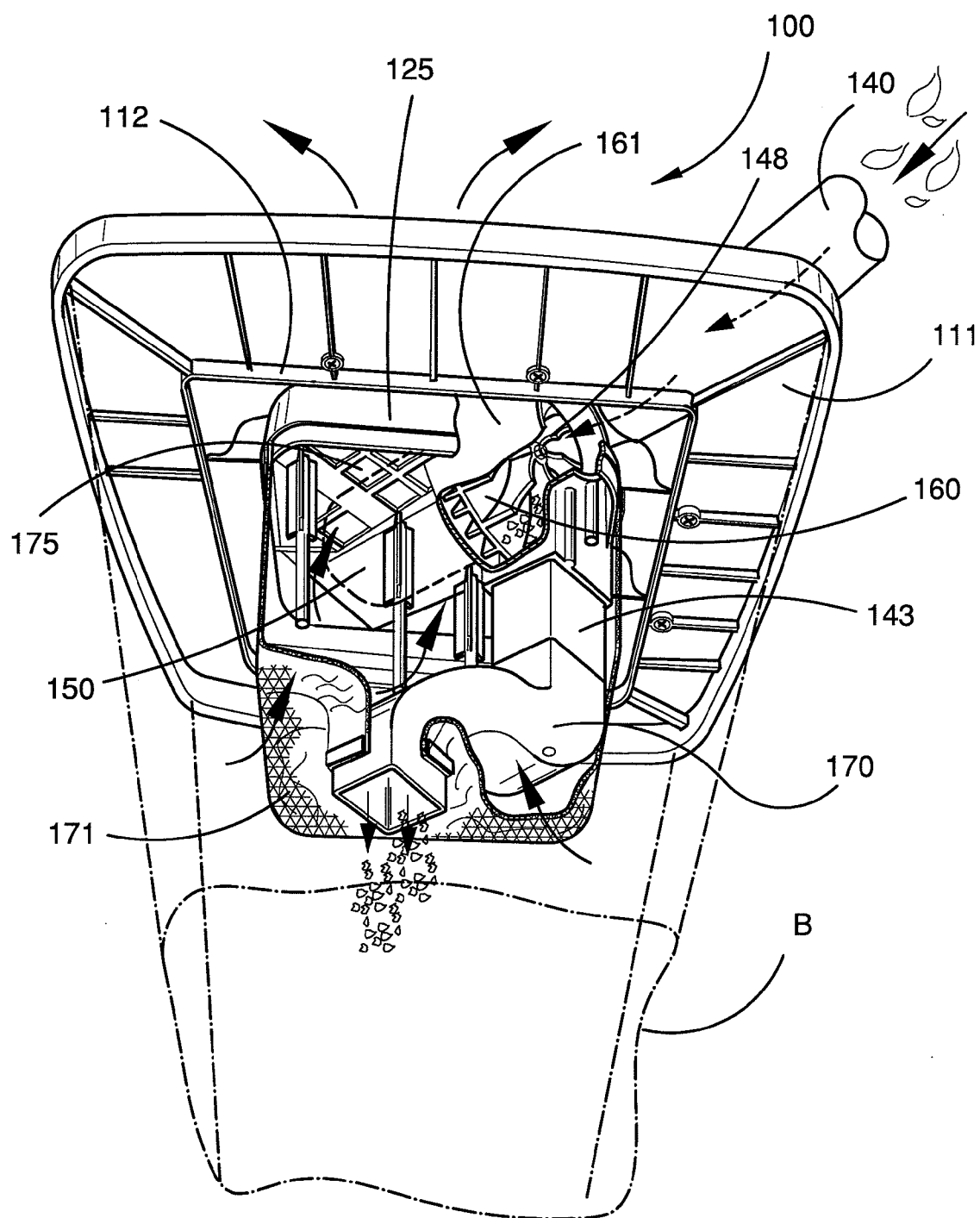


FIGURE 10

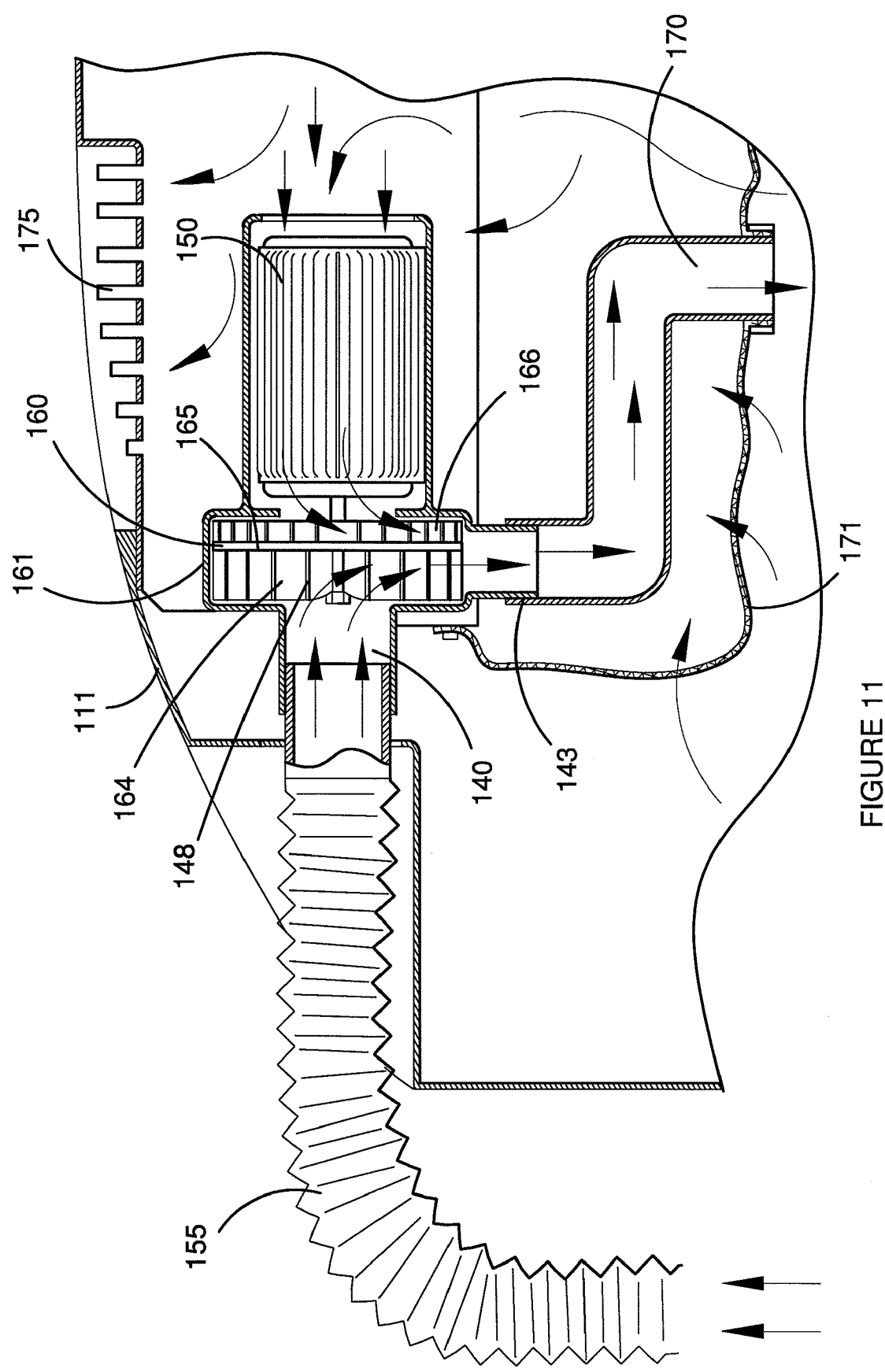


FIGURE 11

ATTACHMENT DEVICE

[0001] This invention relates to attachment devices to receptacles such as bins, drums and in particular wheeled rubbish bins.

FIELD OF THE INVENTION

[0002] Vacuum/blower devices are frequently used to collect leaves and other waste material from gardens. These devices are usually electrically powered and incorporate a bag or other collection means into which the leaves and other debris can be collected. It is then common practice to empty the bags into a green rubbish bin, often of the wheeled variety that is supplied by the local council. Households frequently have receptacles such as rubbish bins, drums or wheeled rubbish bins and this invention relates to a device that extends the use of such receptacles.

SUMMARY OF THE INVENTION

[0003] According to the present invention there is provided an attachment device for a receptacle, the attachment device comprising a plate adapted to fit onto the top of the receptacle, the plate supporting a powered extraction fan that communicates with the receptacle through an aperture in the plate, the device having a second aperture adapted to engage one end of a flexible hose whereby in use the plate is placed in sealed engagement on the top of the receptacle and the fan causes air to be sucked into the receptacle through the hose.

[0004] Preferably, the underside of the plate is provided with a peripheral seal that ensures that the plate is in sealed engagement on the receptacle. The attachment device may also include one or more clamps to clamp the plate against the top of the receptacle.

[0005] The fan may be driven by an electric motor, powered by a source of mains electricity, or by a small petrol engine.

[0006] In a preferred embodiment, the motor and fan are supported by a housing that locates in a centrally positioned aperture in the plate and the conduit is preferably a flexible concertina vacuum hose that, when not in use, can be wrapped around the device for storage. The plate may also incorporate a hook that allows the device to be hung for storage.

DESCRIPTION OF THE DRAWINGS

[0007] Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

[0008] FIG. 1 is a side elevational view of a vacuum attachment device in accordance with a first embodiment when attached to a wheeled rubbish bin,

[0009] FIG. 2 is another side elevation of the wheeled rubbish bin,

[0010] FIG. 3 is a perspective view of the wheeled rubbish bin,

[0011] FIG. 4 is a plan view of the attachment device,

[0012] FIG. 5 is a side elevational view of the front of the device,

[0013] FIG. 6 is a side elevational view along the line A of FIG. 5,

[0014] FIG. 7 is a perspective view of the device from the top,

[0015] FIG. 8 is a perspective view of the device from the underside,

[0016] FIG. 9 is a perspective view of the device from the top in exploded configuration,

[0017] FIG. 10 is a perspective view of the underside of a device in accordance with a second embodiment, and

[0018] FIG. 11 is a part cross sectional view through the device illustrating a fan blade assembly with a plenum chamber.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] As shown in FIGS. 1 to 9 of the accompanying drawings, in a first embodiment, an attachment device 10 is designed for use with the open top of a wheeled rubbish bin B. The attachment device 10 comprises a rectangular plate 11 with a flat underside 13 and upwardly curved top 14, supporting a centrally positioned aperture 12 of squarish cross section. The device 10 also includes a fan assembly 20 that comprises an electric motor, fan and filter 23 all contained within a housing 25. The housing 25 has a periphery 27 that is a sliding fit within the aperture 12 so that the filter 23 of the fan assembly 20 extends into the interior of the wheeled rubbish bin B. The aperture 12 has an upwardly projecting ledge 28 on which the underside of the housing 25 abuts, with a rubber or plastics seal (not shown) positioned therebetween.

[0020] The flat underside 13 of the plate 11 has a wide rectangular rubber seal (not shown) secured to the outer periphery. The rubber seal is adapted to engage the upper surface of the bin B to improve the seal between the device 10 and the bin B.

[0021] The upper surface 14 of the plate 11 comprises raised arcuate ribs 30, 31, 32, 33 in each corner that extend towards the center of the aperture 12. As shown in FIG. 7, the fan assembly 20 has similarly profiled ribs 34, 35, 36, 37 that merge with the arcuate ribs of the plate to define complete ribs that extend diametrically across the top of the assembly. One rib 23 on the upper surface of the plate includes a cutout 39 that includes a cylindrical hollow projection 40 that is in communication with a second aperture 41 in the base of the lid. The cylindrical projection 40 is adapted to engage a concertina flexible vacuum hose (not shown) that can be pressed into the projection so that the hose is firmly secured to the attachment device.

[0022] The hose terminates in a head of tapered configuration that could be coupled to a variety of different vacuum tools (not shown). A pair of clamps (not shown) may be positioned on either side of the top 14 of the plate 11 each having a downwardly extending clip that extends under the rim of the bin B to clamp the plate 11 across the mouth of the bin. It is understood that the design and operation of the clamps and tie down clips would vary and a number of proprietary items are envisaged.

[0023] The electric motor that drives the fan would be of comparatively heavy duty, that is with an output of between 1500 and 2200 w. A small petrol engine, usually two-stroke could be used instead of the electric motor. For dry use, the downwardly projecting component of the fan assembly would include a bag type filter 23 that could be removed and cleaned as necessary. In a situation where the device is to be used in a wet mode, a wet one way valve seal would be provided on the underside of the fan assembly 20.

[0024] In use, the lid (not shown) of the bin B is opened to hang against the rear of the bin, the plate 11 is firmly secured through the clamps to the top of a wheeled rubbish bin B. The vacuum hose is coupled to the connector 40 and then the

electric motor is coupled to a source of mains electricity. When the motor starts the extraction fan draws air out of the bin B through the filter 23 to set up a partial vacuum within the bin that in turn draws air into the bin through the vacuum hose and second aperture 41. The power of the fan provides an effective suction through the vacuum hose and the bin B can be wheeled to a suitable place in the garden where leaves and other such debris can be collected directly into the bin B. As described earlier, the bin B can also be used in both a wet or dry mode and can be used to pick up liquids, slurries and like materials.

[0025] In a second embodiment illustrated in FIGS. 10 and 11, a mulching unit has been incorporated into the device 100, thus allowing the bin B to hold more material than would be the case where no attempt is made to reduce the size of the material which is sucked in through the flexible hose.

[0026] As in the first embodiment, a central housing 125 that includes the electric motor 10 and fan is located in an aperture 112 in the plate 111 that is adapted to sit on the top of a rubbish bin B.

[0027] The difference in this embodiment is that the fan assembly 160 is mounted in a plenum chamber 161 and the plenum chamber 161 is in direction communication with the aperture 140 which is coupled to the flexible hose 155. The housing 125 supports the plenum chamber 161 which is surrounded by open grilles 175 with the housing 125 being fixed across the top of the aperture 112. The fan assembly 160 has the effect of sucking air into the plenum chamber 161 via the aperture 140 and hose 155 and then blowing the air into the bin B via an outlet duct 143. The air escapes from the bin B through the aperture 12 in the centre of the plate which is surrounded by a mesh filter 171 to prevent particulate material escaping. The air then escapes through the grilles 175 in the housing 125. The fan is driven by the electric motor 150 that is located centrally of the housing 125.

[0028] The fan blade assembly 160 in is two parts and comprises a set of radial blades 164 that serve a dual role of generating the air current and operating as mulching blades. A dividing wall 165 separates the blade set 164 from cooling blades 166 on the opposite side of the wall facing the electric motor 150. The radial blades 164 have leading cutting edges 148 that serve to cut up material that is drawn into the unit. The mulched material is then forced by the air current via an elbow shaped chute 170 in to the bin B. The air escapes from the bin B via the mesh filter 171 and through the grilles 175 in the top of the housing 125. The mulching ratio is designed to be approximately 10:1.

[0029] Although the device 10 has been designed with specific use in a garden on a wheeled rubbish bin, it is understood that the device could be used on other receptacles such as 44 gallon drums, or normal rubbish bins, or any receptacle that has an open top on which the device can be secured.

[0030] The peripheral seal is designed to have the width to accommodate the mouths of bins of differing sizes.

[0031] The fan assembly 20 is removable from the device so that bulky items can be added to the bin through the aperture 12. It is however understood that in other embodiments the motor and fan assembly would form an integral part of the device.

[0032] The housing 25, 125 or upper surface 14 of the plate 11, 111 may have an upstanding handle that allows the device to be lifted and transported and the handle also serves as a hook on which the device can be hung for storage. It is also

envisaged that the device would include means to allow the vacuum hose to be wrapped around the top of the device for storage.

[0033] In the embodiment shown in the accompanying drawings the device is moulded in polypropylene. However, it is understood that the device could also be manufactured in diecast aluminum.

[0034] To improve the packaging of the product the plate could include a central fold line of thin walled material or hinges that allow the plate to be folded in half for storage in the side of a box that would carry the motor. Suitable locking pins could be used to hold the two halves open to define the rectangular planar plate that is placed on a wheeled rubbish bin.

Having now described my invention, what I claim is:

1. An attachment device for a receptacle, the attachment device comprising a plate adapted to fit onto the top of the receptacle, the plate supporting a powered fan that communicates with the receptacle through an aperture in the plate, the device having a second aperture adapted to engage one end of a flexible hose whereby in use the plate is placed in sealed engagement on the top of the receptacle and the fan causes air to be sucked into the receptacle through the hose.

2. The attachment device according to claim 1 wherein the underside of the plate has a substantially flat peripheral rim which is provided with a peripheral seal that ensures that the plate is in sealed engagement with a peripheral rim of the receptacle.

3. The attachment device according to claim 2 wherein the device includes one or more clamps to clamp the plate against the rim of the receptacle.

4. The attachment device according to claim 1 wherein the powered fan comprises a motor that drives a fan blade, the motor being supported by the plate.

5. The attachment device according to claim 4 wherein the motor and fan blade are supported by a housing that locates within the aperture.

6. The attachment device according to claim 5 wherein the housing is detachably secured to the plate.

7. The attachment device according claim 4 wherein the housing is adapted to be a sliding fit into the aperture.

8. The attachment device according to claim 5 wherein the housing defines a plenum chamber having an inlet in communication with the second aperture and an outlet communicating with the inside of the receptacle, the fan being positioned in the plenum chamber to force air to flow from the inlet to the outlet.

9. The attachment device according to claim 8 wherein the fan has blades adapted to mulch material drawn into the chamber.

10. The attachment device according to claim 9 wherein the fan has a first blade set on an inner side of a dividing wall and a second blade set on the outer side, the second blade set being adapted to mulch.

11. The attachment device according to claim 1 wherein the aperture is covered on the inside of the receptacle by a filter that prevents escape of particulate material.

12. The attachment device according to claim 11 wherein the filter is a flexible mesh secured to the underside of the housing.

13. The attachment device according to claim 1 wherein the fan draws air out of the receptacle causing air to be drawn in to the receptacle via the second aperture and hose.

14. The attachment device according to claim **13** wherein the fan includes a filter to filter outgoing air.

15. The attachment device according to claim **1** wherein the powered fan is driven by an electric motor or a small petrol engine.

16. The attachment device according to claim **1** wherein the hose is a flexible concertina vacuum hose that clips into engagement with the second aperture.

17. The attachment device according to claim **1** wherein the plate incorporates a hook that allows the device to be hung for storage.

18. A vacuum device comprising a wheeled rubbish bin and an attachment device according to claim **1** clamped to the open top of the bin.

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