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(54) **DISPOSABLE BAG WITH HIGH AIR PERMEABILITY**

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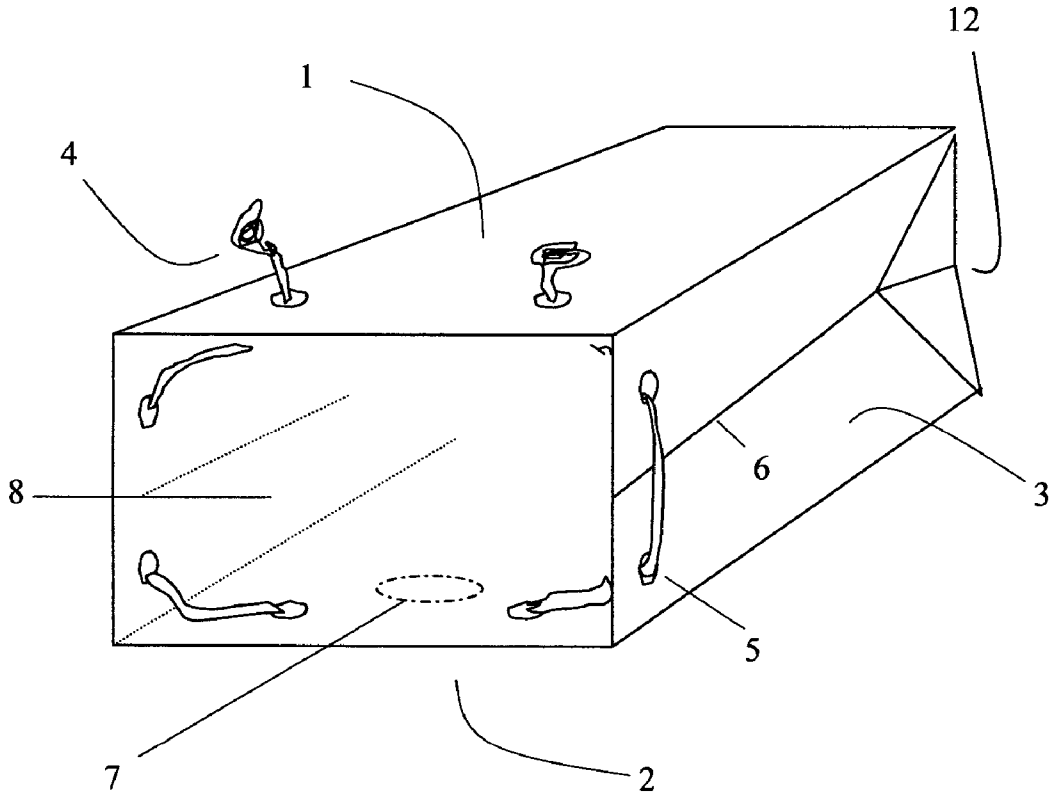
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(57) **ABSTRACT**

The disposable bag is comprised of at least one layer of air permeable and flexible thin material at each portion of the said bag. The air permeability of some portions of the bag is in the range of 300 $ft^3/ft^2/min$ to 1500 $ft^3/ft^2/min$. The lawn debris, leaves, and particulate maters are blown into the said disposable bag by a powered machine. The said bag provides a convenient means of effective collection of the debris, leaves, and particulate maters with easy air ventilation.



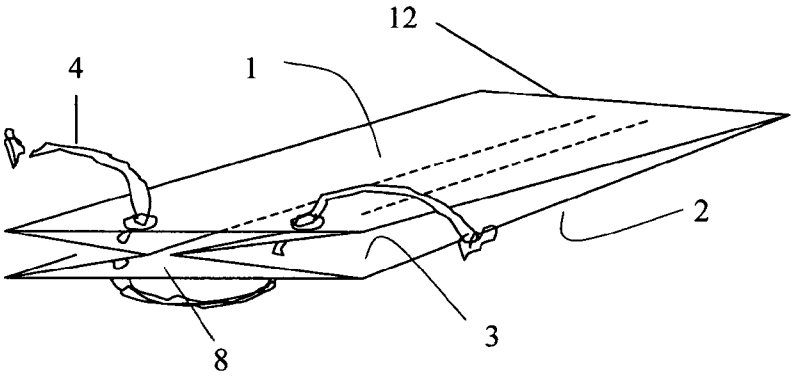


Fig 1

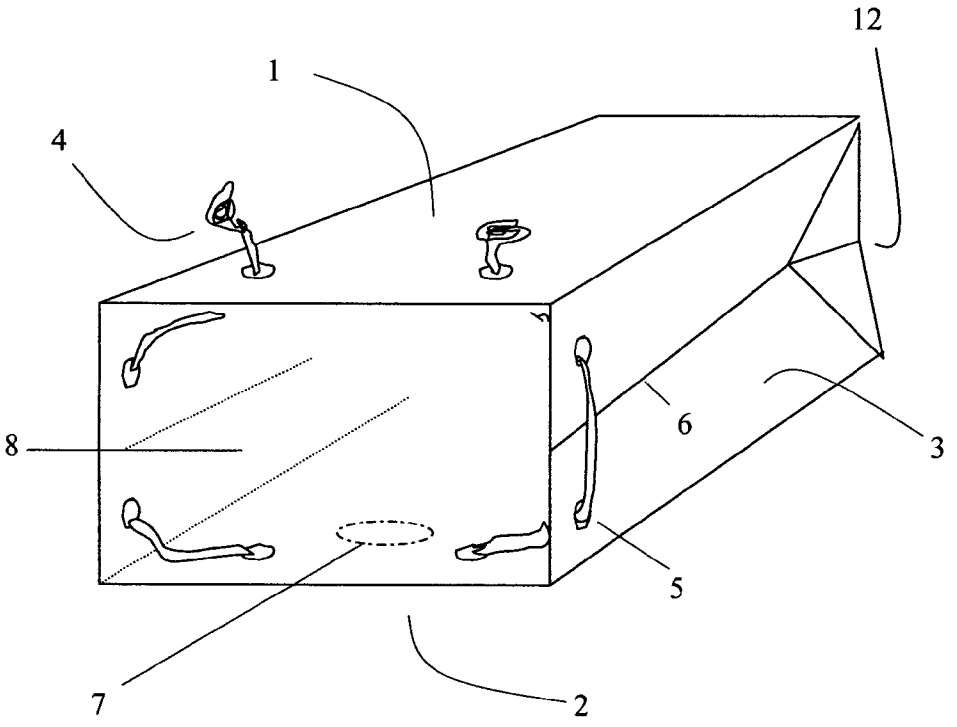


Fig 2

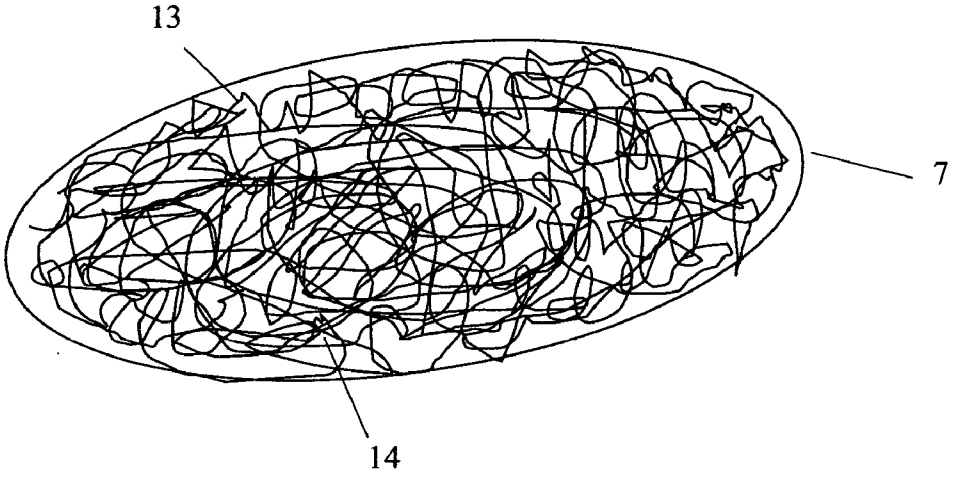


Fig. 3

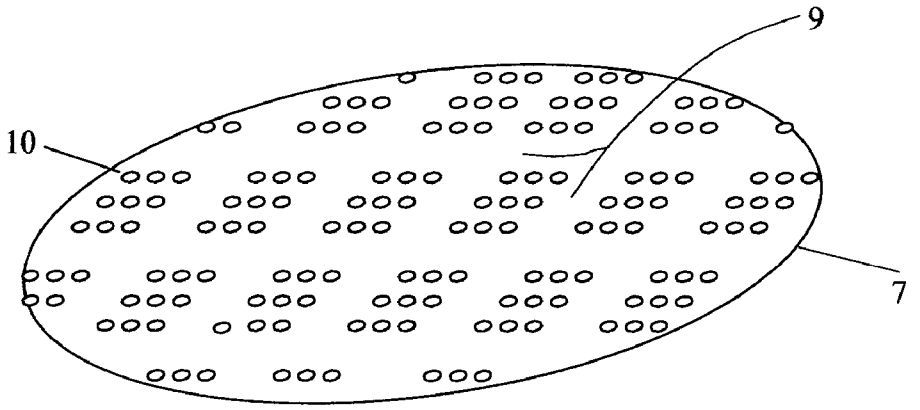


Fig 4

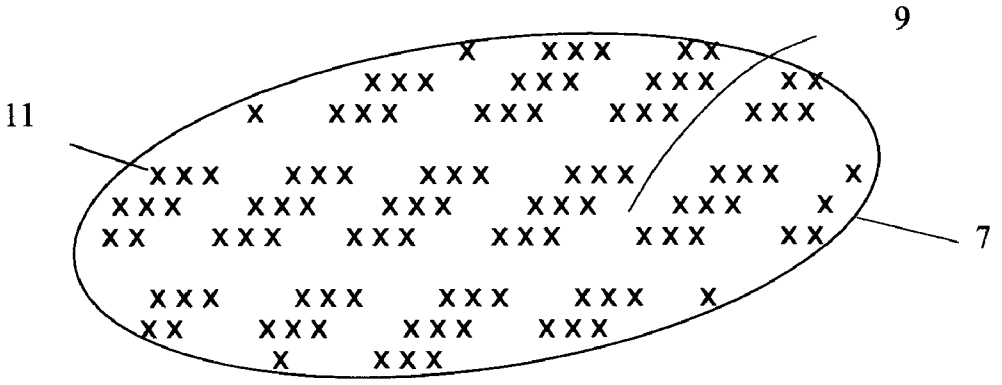


Fig 5

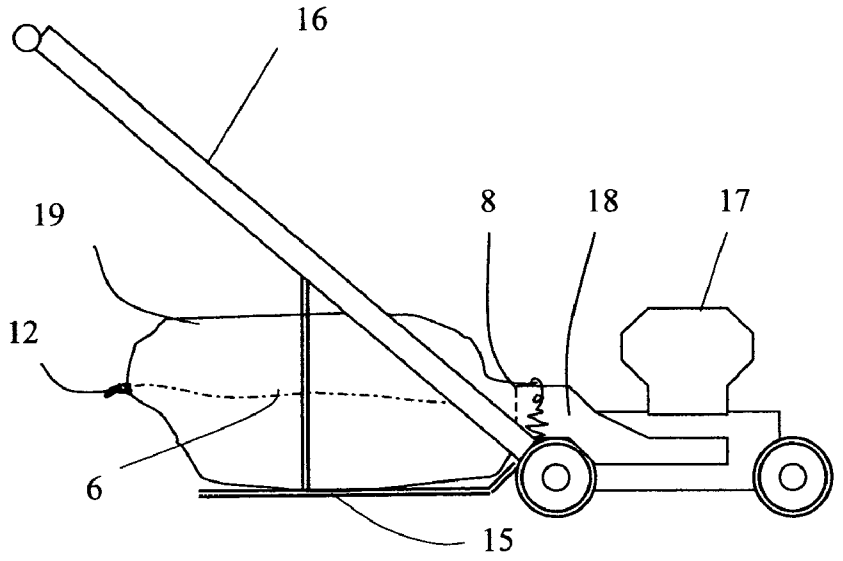


Fig 6

DISPOSABLE BAG WITH HIGH AIR PERMEABILITY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] (Not Applicable)

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] (Not Applicable)

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISC APPENDIX

[0003] (Not Applicable)

BACKGROUND OF THE INVENTION

[0004] 1. The Field of the Invention

[0005] The present invention related to a breathable and disposable bag for collecting and bagging lawn debris, leaves, and particulates. The said bag may be used with a manual tool, such as a dustpan, or in conjunction with a common powered apparatus. A powered apparatus hereinafter refers to, but not limited to, lawn mowers, leaf blowers, vacuum cleaners, grinders, and saws.

[0006] 2. Description of the Prior Art

[0007] Many devices are known to the prior art for collecting lawn debris, leaves, and particulate matters. U.S. Pat. No. 4,615,096 embodies a device wherein an open mesh collecting bag is attached to a garden lawn air-blower for use in vacuuming and shredding lawn debris. This invention necessitates the extra step of dumping the collected debris into another container. U.S. Pat. No. 4,848,070 disclosed a grass catching device for use on a rear bagger mower that has a rearwardly facing grass discharge chute and a bag support for holding disposable plastic garbage bag in position to receive air and grass chippings from the discharge chute. Although an air outlet is available at the base housing that connects the discharge chute and the bag opening, the returning air flow will carry a portion of the debris out off the disposable bag.

[0008] U.S. Pat. No. 4,186,546 claimed disposable thin polyethylene plastic bags, which included a plurality of small air holes for ventilation. U.S. Pat. No. 5,673,544 disclosed a disposable lawn mower debris bag system that comprises a plurality of disposable, debris collection bags with perforated small holes. A said bag is attached one at a time to a discharge chute on a power lawn mower. U.S. Pat. No. 4,864,919 depicted a bag perforated with longitudinal slits for a lawn maintenance apparatus. The above thin plastic bags become very weak in strength due to the throughout perforation, thus, bursting and breaking of said bags may happen during handling the filled bag.

[0009] A newer generation of lawn mowers in the market is able to cut short grass or leaves so fine that the debris can be disposed into lawn/garden directly. However, taller grass left on the lawn surface still need to be raked up. In many occasions, lawn owners wish to collect the clippings to maintain the neat appearance or to remove the weeds' seeds.

OBJECTS OF THE INVENTION

[0010] It is an object of the present invention to provide a disposable bag that will be used with a powered apparatus, such as power lawn mower, lawn blower/vacuum, grinder and the like.

[0011] It is another object of the present invention to provide a disposable bag that is highly breathable and strong enough to survive the handling process after it is filled.

[0012] It is a further object of the present invention to provide a disposable bag that collects the debris and the weeds' seeds to enhance a healthy lawn.

[0013] An additional object of the present invention is to provide a disposable bag that protects the operator of the powered apparatus from the air stream.

[0014] It is still an object of the present invention to provide a disposable bag that will eliminate raking up the clippings afterwards and avoid a manual transfer of debris into another container

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] **FIG. 1**. is a side view of a disposable bag of one embodiment of the present invention, illustrating the structure before being attached to the chute of a powered apparatus.

[0016] **FIG. 2**. is a side view of a disposable bag of one embodiment of the present invention, illustrating the bag structure while being filled with air and debris (from the discharge chute of a powered apparatus, not shown).

[0017] **FIG. 3**. is an enlarged view of a small portion (i.e. section **7** of **FIG. 2**) of the disposable bag of the present invention, displaying an example of a nonwoven fabric.

[0018] **FIG. 4**. is an enlarged view of a small portion (i.e. section **7** of **FIG. 2**) of the disposable bag of the present invention, depicting an example of perforation pattern.

[0019] **FIG. 5**. is an enlarged view of a small portion (i.e. section **7** of **FIG. 2**) of the disposable bag of the present invention, displaying another example of perforation pattern.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] The preferred embodiments of the invention are described in detail with reference to **FIGS. 1-5** wherein like numbers represent like parts throughout the views.

[0021] The disposable bag is made of a flexible thin material, such as nonwoven fabrics, polymeric film, paper, net, screen or their combinations. As shown in **FIGS. 1-2**, it has a top portion **1**, a bottom portion **2**, two side portions **3**, and a tightening mechanism **4**. The side portions **3** are folded inwardly along the folding line **6**. The top potion **1** and bottom portion **2** have an air permeability ranging from 20 $ft^3/ft^2/min$ to 1200 $ft^3/ft^2/min$, which is tested according to the standard of ASTM Standard D737-96. Preferably, either the said top portion **1** or the bottom portion **2** has an air permeability in the range of 50-500 $ft^3/ft^2/min$. The side portions **3** have an air permeability ranging from 300 $ft^3/ft^2/min$ to 1500 $ft^3/ft^2/min$.

[0022] In order to control the major air flow direction, some portions of the said bag have lower air permeability than the other portion(s). For instance, when the bag is designed for a powered lawn mower, both top portion **1** and bottom portion **2** have lower air permeability than that of the side portions. Preferably, the top portion **1** has lower air permeability than that of the side portions and the bottom portion.

[0023] The air permeability of the lawn bag of the present invention is achieved by different means depending on the bag materials. Referring to **FIG. 3**, the pores **14** between fibers **13** in a nonwoven material serve to vent the bag. The air permeability is controllable by fiber diameter, basis weight, and the packing density. For example, multiple layers of a given nonwoven material generally exhibit lower air permeability than that of a single layer. In the case of non breathable plastic film, paper, and their composites with reinforcing netting or screen materials, the air permeability is achieved by regional perforation and controlled by the size, shape, and density of the perforation. As shown in **FIGS. 4-5**, the regional perforated material presents a grid-like pattern with the apertures **10** or **11** between the grid lines, leaving the said grid lines not perforated.

[0024] The bag is sealed in one end **12** with the other end **8** wide open. The said tightening mechanism **4**, such as a string or the like, goes through the holes **5**, which is at least 0.5 inch from the bag opening **8** to fasten the bag to the discharging chute **18** of a powered apparatus.

[0025] As an example, by tightening the mechanism **4**, the operator connects the bag opening **8** to the discharging chute **18** of a powered lawn tool with the top portion facing upward before starting the said lawn tool engine **17**, as shown in **FIG. 6**. During operation, the grass/leaf clippings and other particulates are blown through the chute **18** into the lawn bag **19**, the air is vented out therefrom by means of the pores **14**, apertures **10**, or **11**, depending on the bag materials. The top portion with low air permeability facing upward protects the operator from the venting air stream. In the case that the bag material is perforated film or the like, the grid-like structure provides the bag enough strength and air permeability. The inflated lawn bag **19** rests on the supporter **15**, which is attached to the lawn tool handle **16**. After the lawn bag is filled with debris, the operator then stops the motor **17**, disconnects the bag and ties it at the opening, which is ready for disposal. It is also proven convenient and effective by inserting the disposable bag of the present invention into the rear grass catcher of an existing power lawn mower.

[0026] As will be apparent to those of ordinary skill within the art, numerous modifications may be made to the present invention without departing the spirit and scope thereof. This application is intended to cover any adaptations or variations thereof.

What is claimed is:

1. A disposable bag for collecting leaves, lawn debris, or particulate matter composing

a. a top portion and a bottom portion of the said bag, when the said bag is set horizontally, with at least one of the said top and bottom portions being made of a material with an air permeability ranging from 20 ft^3/ft^2/min to 1200 ft^3/ft^2/min, according to ASTM Standard D737-96;

b. two side portions of the said bag, when the said bag is set horizontally, made of a material with an air permeability ranging from 300 ft^3/ft^2/min to 1500 ft^3/ft^2/min, according to ASTM Standard D737-96;

c. an opening of the said bag to receive leaves, lawn debris, or particulate matter from a discharging chute of a powered tool, including but not limited to lawn mowers, leaf blowers, vacuum cleaners, grinders, and saws, or from a manual tool, such as a dustpan;

d. a tightening mechanism at the opening of the said bag;

e. a sealed end of the said bag sealing the said top, bottom and side portions, in the opposite to the above said opening;

2. The disposable bag of claim 1 wherein the said material is a fibrous nonwoven material.

3. The disposable bag of claim 1 wherein the said material is a fibrous nonwoven material reinforced with a woven screen or an extruded net.

4. The disposable bag of claim 1 wherein the said material is polymeric film, regionally perforated with holes, linear slits, biaxial slits, or the combinations, so that the perforated and the non-perforated areas form a grid-like pattern.

5. The disposable bag of claim 1 wherein the said material is paper, regionally perforated with holes, linear slits, biaxial slits, or the combinations, so that the perforated and the non-perforated areas form a grid-like pattern.

6. The disposable bag of claim 1 wherein the material of said top and/or bottom portions is a coated fibrous material with an air permeability ranging from 20 ft^3/ft^2/min to 1200 ft^3/ft^2/min.

7. The disposable bag of claim 4 wherein the regionally perforated film is reinforced with a nonwoven fabric, a woven screen, an extruded net, or their combinations.

8. The disposable bag of claim 5 wherein the regionally perforated paper is reinforced with a nonwoven fabric, a woven screen, an extruded net or their combinations.

9. The disposable bag of claim 1 wherein the said tightening mechanism is a string, a belt, or a ribbon, going through the holes at the opening end of the said bag.

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