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(54) DEPRESSION CONTAINER

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Publication Classification

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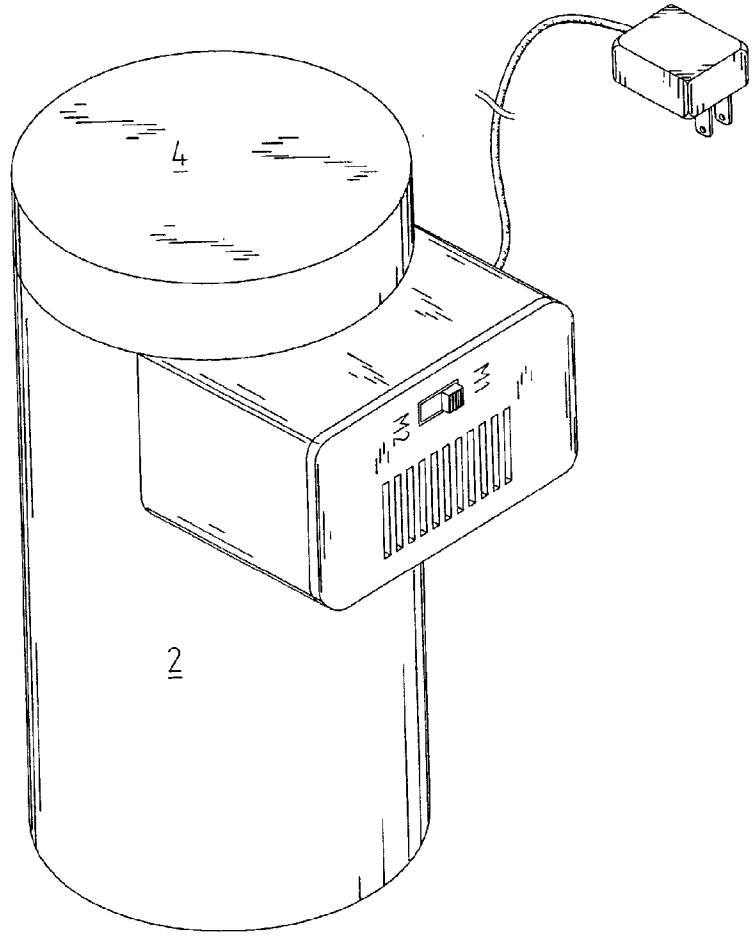
(57) **ABSTRACT**

In an aspect, a depression container includes a vessel, a cover, a pump, a pressure-activated switch and a power supply. The vessel includes an open end. The cover is used for sealing the open end of the vessel. The pump is used for drawing air out of the vessel. The pressure-activated switch is used for controlling ON and OFF of the pump. The pressure-activated switch detects the pressure in the vessel, and turns on the pump when the pressure is higher than a predetermined upper limit, and turns off the pump when the pressure is lower than a predetermined lower limit. The pressure-activated switch and the pump are powered by the power supply. In another aspect, a depression container includes a vessel, a cover, a pump, a pressure-activated switch and a power supply. The vessel includes an open end. The cover is used for sealing the open end of the vessel. The pump is used for drawing air out of the vessel. The pressure-activated switch and the pump are powered by the power supply. The pressure-activated switch is used for controlling ON and OFF of the pump. The pressure-activated switch detects a pressure difference resulting from closure of the open end of the vessel by the cover, and turns on the pump so as to draw air out of the vessel, and turns off the pump when the pressure in the vessel is lower than a predetermined lower limit.



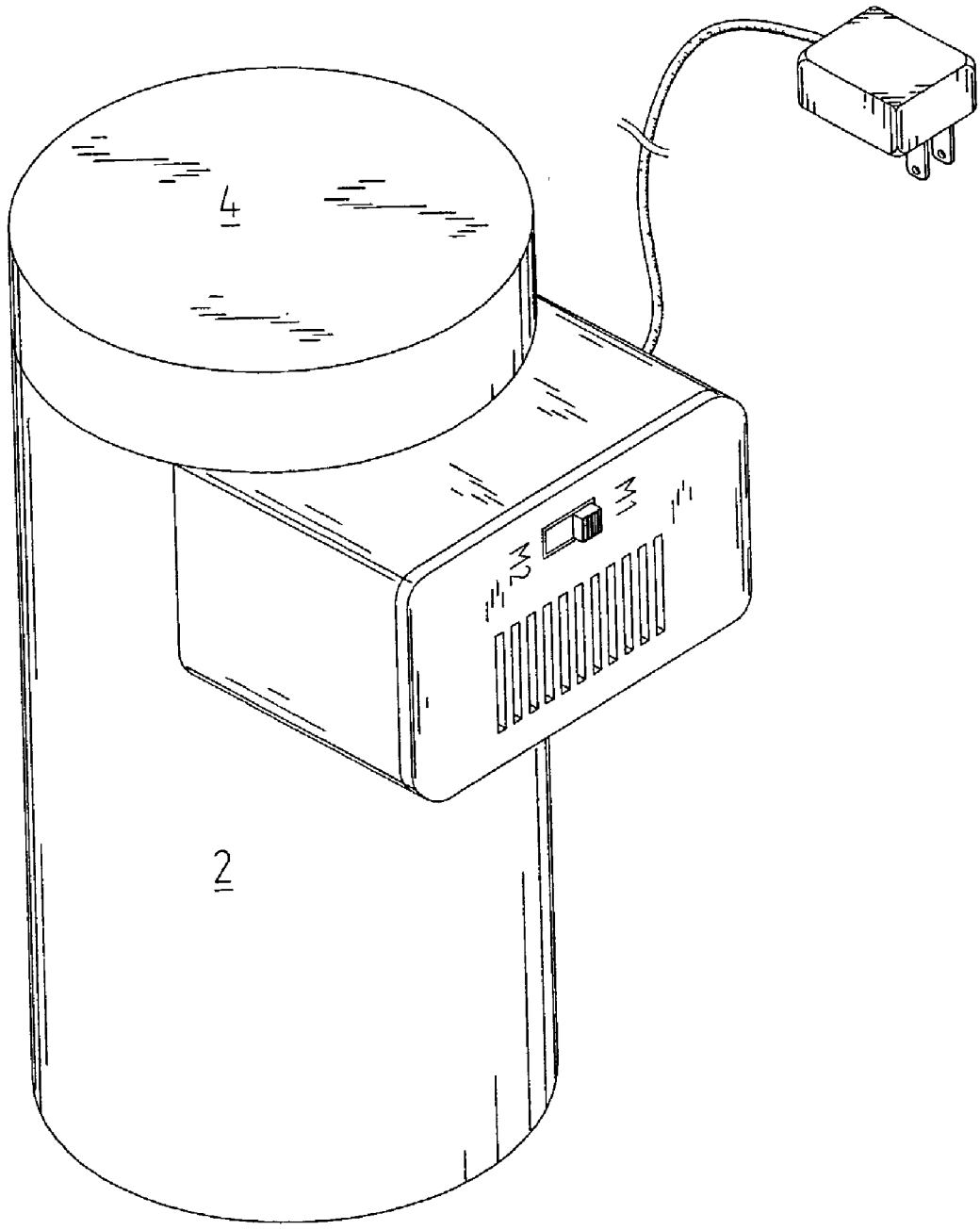


Fig. 1

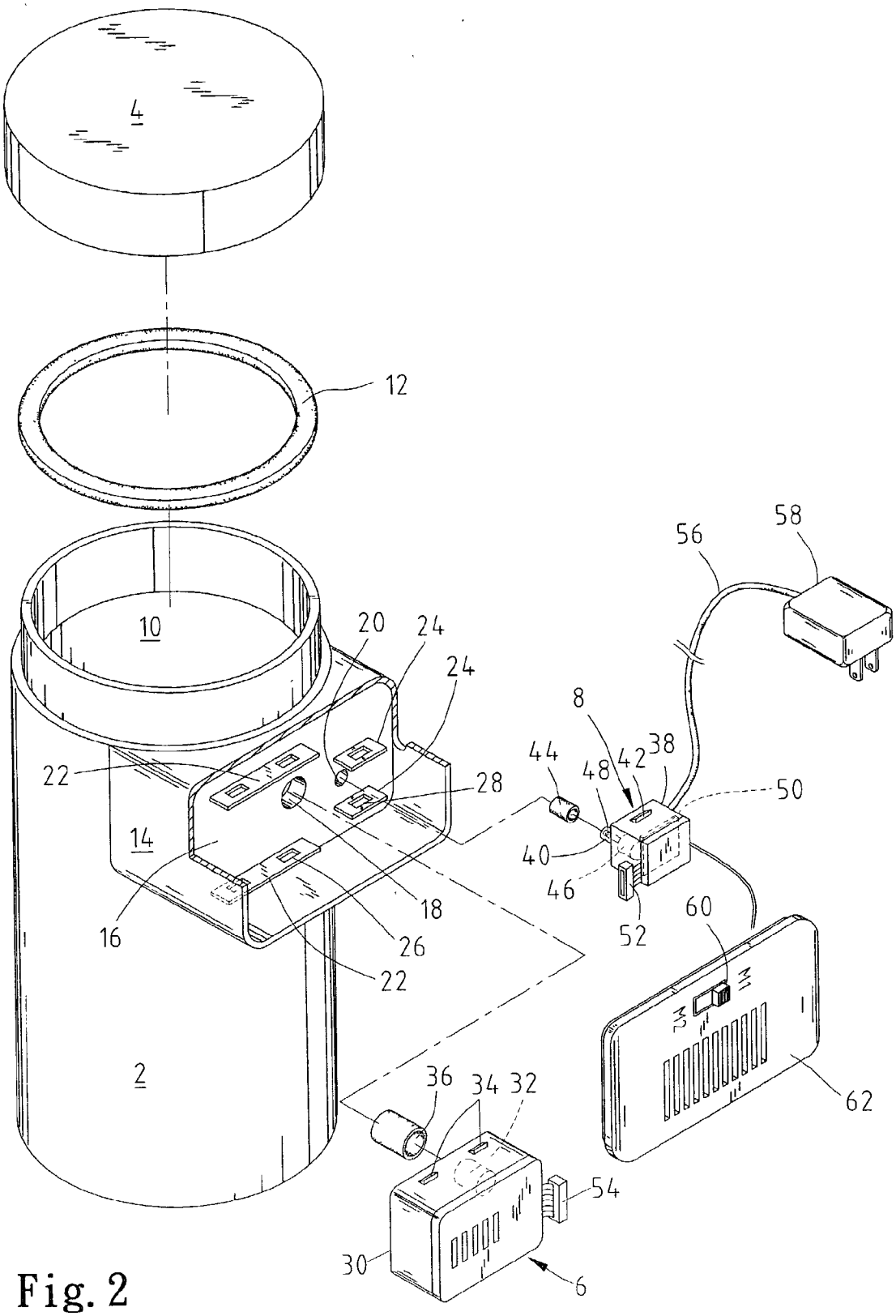

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Fig. 2

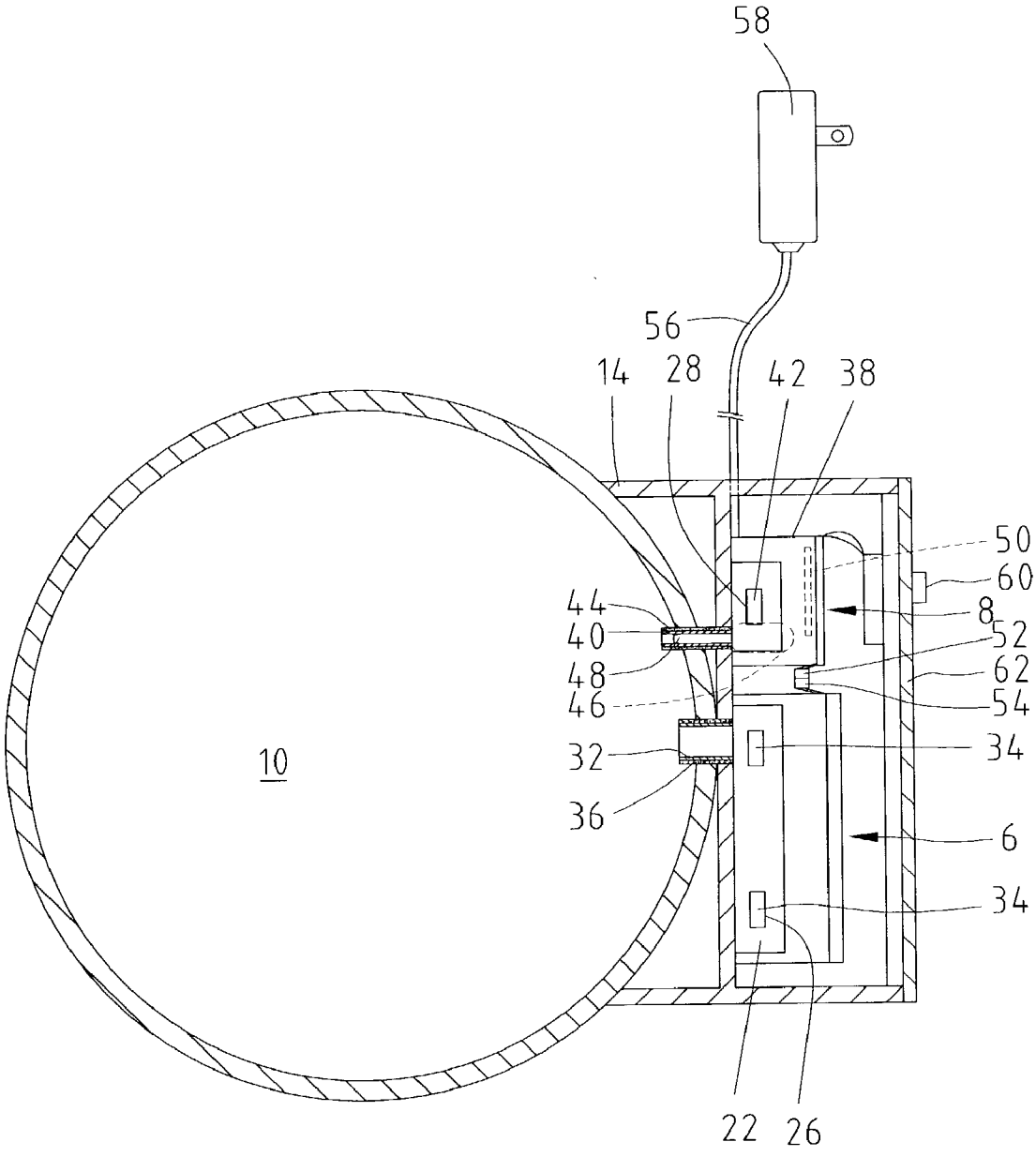

Fig. 3

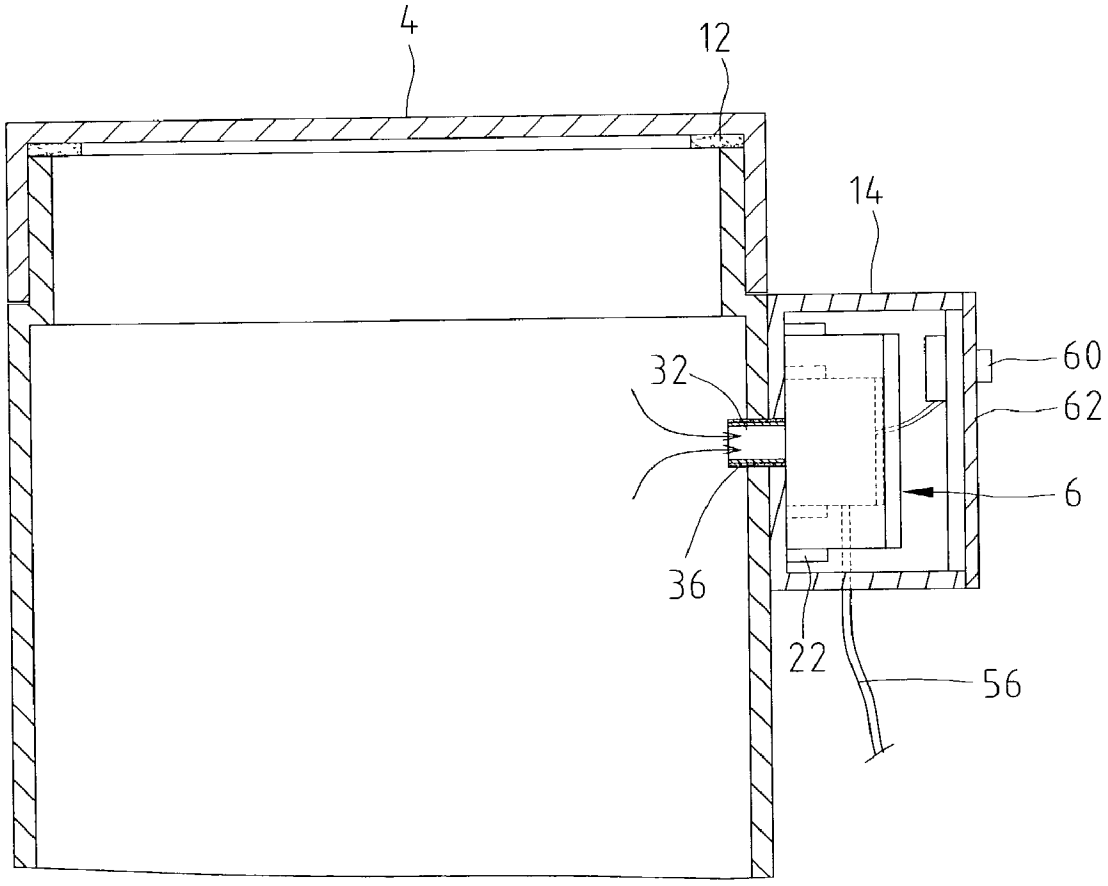

Fig. 4

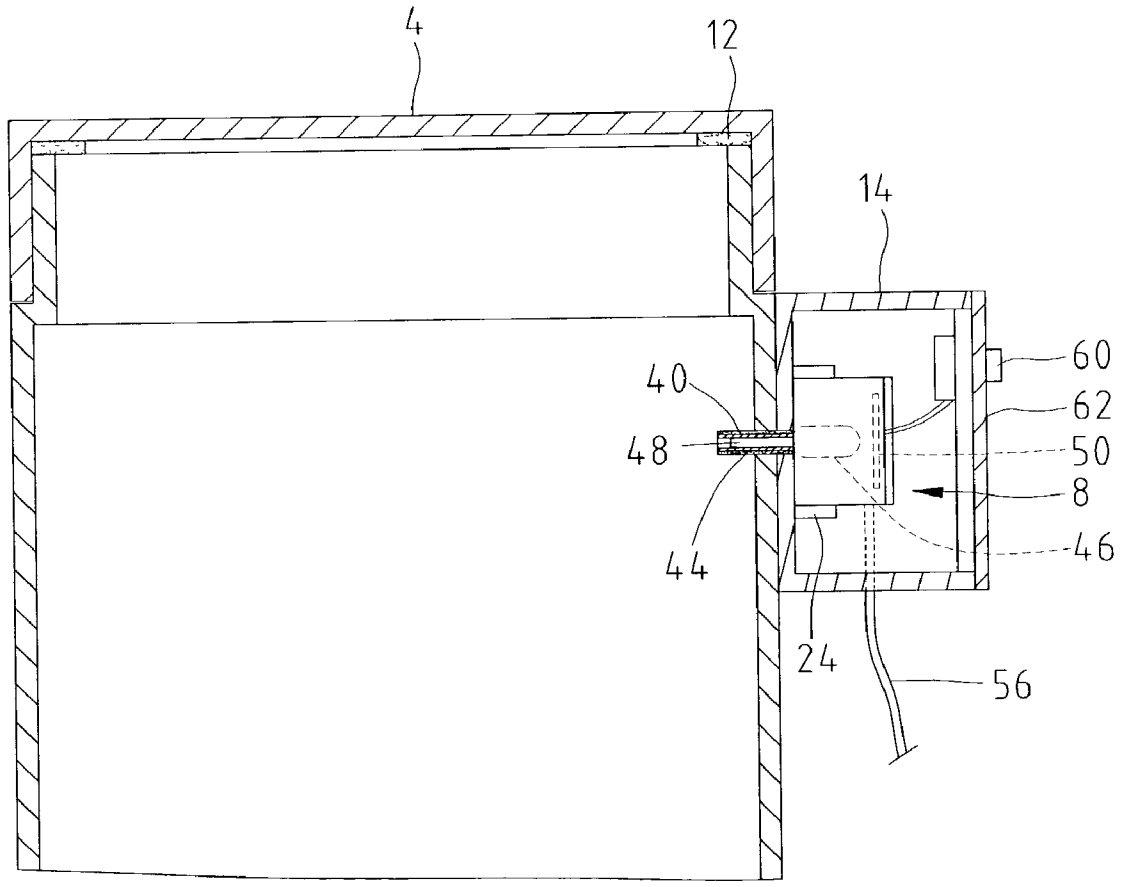

Fig. 5

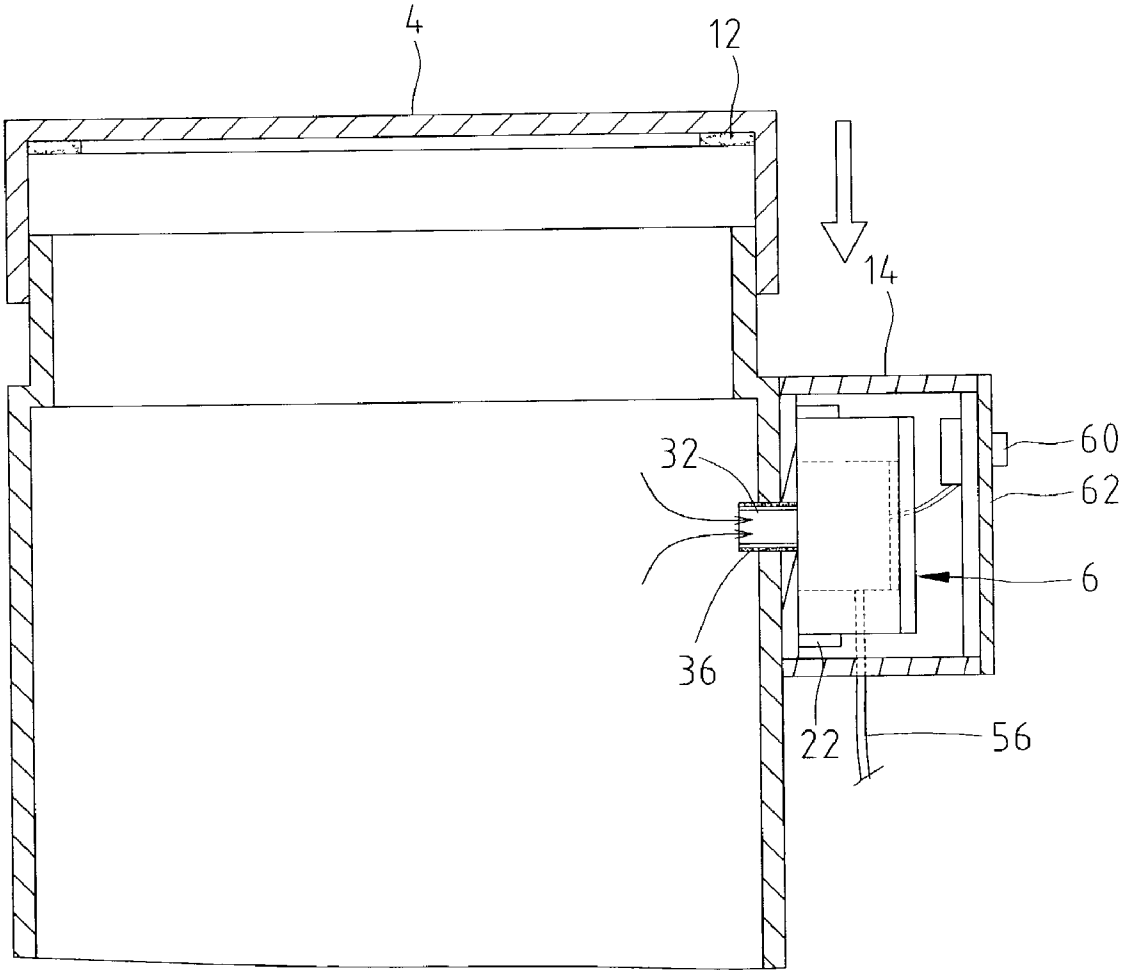

Fig. 6

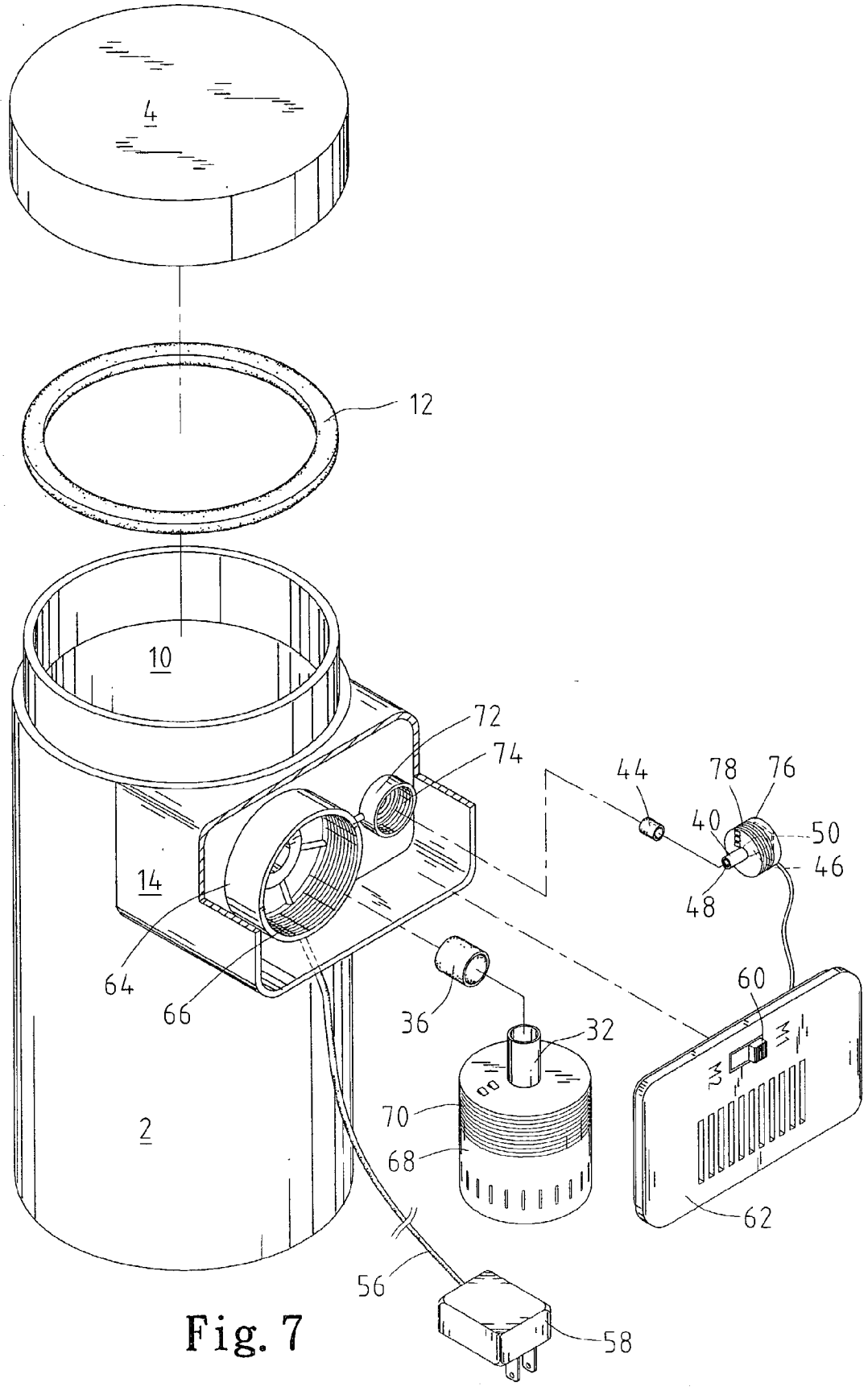

Fig. 7

DEPRESSION CONTAINER

CROSS REFERENCE

[0001] This is a continuation-in-part application of U.S. patent application Ser. No. 09/883,813 filed on Jun. 18, 2001.

BACKGROUND OF INVENTION

[0002] 1. Field of Invention

[0003] The present invention relates to a depression container equipped with a pump that can be activated when the pressure in the depression container is above a value.

[0004] 2. Related Prior Art

[0005] A typical depression container includes a check valve. A user draws air out of the depression container via the check valve with a manual pump including a piston and a cylinder, thus reducing the pressure in the depression container to a low valve. This reduces the risk of articles in the depression container getting wetted or rotten, thus lengthening the preservation period. It is, however, troublesome and labor-intensive for the user to reciprocate the piston relative to the cylinder. In addition, the user cannot know the pressure in the depression container. Furthermore, the depression container cannot provide an adequate sealing effect so that the pressure in the depression container may rise after some time and adversely affect the preservation of the articles therein.

SUMMARY OF INVENTION

[0006] It is an objective of the present invention to provide a depression container that can automatically draw air out of it after a cover seals its open end. The pressure in the depression container is reduced to a predetermined value.

[0007] It is another objective of the present invention to provide a depression container that shows the value of the pressure. Moreover, the depression container allows a user to set a value of the pressure desired for preserving articles.

[0008] It is a further objective of the present invention to provide a depression container that can maintain the pressure therein under a predetermined valve for a long time.

[0009] In accordance with a first aspect of the invention, a depression container includes a vessel, a cover, a pump, a pressure-activated switch and a power supply. The vessel includes an open end. The cover is used for sealing the open end of the vessel. The pump is used for drawing air out of the vessel. The pressure-activated switch is used for controlling ON and OFF of the pump. The pressure-activated switch detects the pressure in the vessel, and turns on the pump when the pressure is higher than a predetermined upper limit, and turns off the pump when the pressure is lower than a predetermined lower limit. The pressure-activated switch and the pump are powered by the power supply.

[0010] In accordance with a second aspect of the invention, a depression container includes a vessel, a cover, a pump, a pressure-activated switch and a power supply. The vessel includes an open end. The cover is used for sealing the open end of the vessel. The pump is used for drawing air out of the vessel. The pressure-activated switch and the pump are powered by the power supply. The pressure-activated switch is used for controlling ON and OFF of the pump. The pressure-activated switch detects a pressure difference resulting from closure of the open end of the vessel by the cover, and turns on the pump so as to draw air out of the vessel, and turns off the pump when the pressure in the vessel is lower than a predetermined lower limit.

[0011] In the second aspect of the present invention, when the pressure rises and exceeds an upper limit, the pressure-activated switch turns on the pump again until the pressure is reduced to the lower limit. Thus, the articles in the vessel can be preserved for a long time by means of maintaining the pressure in the vessel under a predetermined low pressure suitable for preservation of articles.

[0012] Other objects, novel features and advantages of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0013] **FIG. 1** is a perspective view of a depression container in accordance with the present invention.

[0014] **FIG. 2** is an exploded perspective view of the depression container in accordance with the present invention.

[0015] **FIG. 3** is a sectional view of an upper portion of the depression container in accordance with the present invention.

[0016] **FIG. 4** is a sectional view similar to **FIG. 3**, illustrating operation of the depression container upon closing of a cover.

[0017] **FIG. 5** is a sectional view similar to **FIG. 4**, wherein the cover is moved to its completely closed position.

[0018] **FIG. 6** is a perspective view illustrating a modified embodiment of the depression pump in accordance with the present invention.

[0019] **FIG. 7** is an exploded perspective view illustrating a further modified embodiment of the depression pump in accordance with the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0020] Referring to **FIGS. 1 through 3**, in accordance with a first embodiment of the present invention, a depression container includes a vessel **2**, a cover **4**, a pump **6** and a pressure-activated switch **8**.

[0021] The vessel **2** defines a compartment **10** for receiving articles to be preserved. The vessel **2** includes a closed lower end and an open upper end.

[0022] The cover **4** can be mounted on the open upper end of the vessel **2** so as to close the compartment **10**. An annular seal **12** can be mounted on the open upper end of the vessel **2** before the cover **4** in order to seal the compartment **10**.

[0023] A box **14** is formed on the vessel **2**. The box **14** defines a space **16** in order to receive the pump **6** and the pressure-activated switch **8**. A first orifice **18** and a second orifice **20** are defined in the vessel **2**. The compartment **10**

is communicated with the space **16** through the first orifice **18** and the second orifice **20**. Two parallel first walls **22** and two parallel second walls **24** are formed on the vessel **2**, located in the box **14**, best shown in **FIG. 2**. Each of the first walls **22** includes two slots **26**, for example. Each of the second walls **24** includes two slots **28**.

[**0024**] The pump **6** includes a casing **30** and a duct **32** extending from the casing **30**. The casing **30** includes two parallel sides on each of which two engaging members **34** are formed. The engaging members **34** are engaged with the slots **26** so as to securely mount the pump **6** on the vessel **2**, in the box **14**. Further referring to **FIG. 4**, an airtight sleeve **36** is mounted on the duct **32**. The sleeve **36** is inserted through the first orifice **18** in order to prevent leakage of air through the first orifice **18**.

[**0025**] The pressure-activated switch **8** includes a casing **38** and a duct **40** extending from the casing **38**. The casing **38** includes two parallel sides on each of which an engaging member **42** is formed. The engaging members **42** are engaged with the slots **28** so as to securely mount the pressure-activated switch **8** on the vessel **2**, in the box **14**. Further referring to **FIG. 5**, an airtight sleeve **44** is mounted on the duct **40**. The sleeve **44** is inserted through the second orifice **20** in order to prevent leakage of air through the second orifice **20**.

[**0026**] The pressure-activated switch **8** includes a differential type pressure transducer **46** that includes a sensor **48**. The differential type pressure transducer **46** is received in the casing **38** so that the sensor **48** is received in the duct **40**. The pressure-activated switch **8** includes a control chip **50** received in the casing **38**. The differential type pressure transducer **46** is electrically connected with the sensor **48** and the control chip **50**. The control chip **50** is electrically connected with the pump **6** through female and male connectors **52** and **54**.

[**0027**] A wire **56** includes an end electrically connected with the control chip **50** and an opposite end electrically connected with an adaptor **58**. The control chip **50** can be electrically connected with an external AC power supply (not shown) via the wire **56** in order to power the pump **6** and the pressure-activated switch **8**.

[**0028**] The pressure transducer **46** outputs a voltage in response to a difference between a reference pressure (the pressure in the atmosphere for example) and a detected pressure in the compartment **10** of the vessel **2**. Namely, the output voltage of the pressure transducer **46** is in proportion to the pressure difference. In an embodiment, the output voltage is 3.3V if the detected pressure is equal to or above a first threshold (1.15 atm for example). The output voltage is 1.2 V if the detected pressure is equal to or below a second threshold (0.1 atm for example). The output voltage is 1.5V if the detected pressure is equal to or above a third threshold (0.25 atm for example).

[**0029**] A set of controlling programs is recorded in the control chip **50**. The control chip **50** can be switched between two logic control modes M1 and M2 via operation of a switch **60** electrically connected with the control chip **50**. The switch **60** is mounted on a panel **62** that can be attached to the box **14** in order to close the space **16**. In the control mode M1, the pump **6** is activated when the output voltage of the pressure transducer **46** is higher than or equal to 3.3 V. The pump **6** is turned off when the output voltage of the pressure transducer **46** is lower than or equal to 1.2 V. In the control mode M2, the pump **6** is activated when the output voltage of the pressure transducer **46** is higher than or equal to 1.5 V. The pump **6** is turned off when the output voltage of the pressure transducer **46** is lower than or equal to 1.2 V.

[**0030**] In use, referring to **FIG. 6**, the switch **60** is firstly switched to the control mode M1, and the cover **4** is mounted on and thus encloses the vessel **20**. During closing of the cover **4**, i.e., the cover **4** is moved downward relative to the vessel **20**, the air inside compartment **10** of the vessel **2** is compressed and thus generates a temporary pressure greater than 1.15 atm. The pressure transducer **46** of the pressure-activated switch **8** detects such a temporary pressure and outputs a voltage higher than 3.3 V. The pump **6** is thus activated under the control of the control chip **50**, thus drawing air out of the vessel **2**. The pressure in the vessel **2** is accordingly reduced. When the pressure in the vessel **2** is equal to or below 0.1 atm, the output voltage of the pressure transducer **46** is lower than 1.2 V. The pump **6** is thus turned off.

[**0031**] Referring to **FIGS. 4 and 5**, the switch **60** is switched to the control mode M2 after depression. If the pressure in the vessel **2** rises as a result of entrance of ambient air into the vessel **2**, the sensor **44** detects the pressure and the pump **6** is turned on when the pressure in the vessel **2** is equal to or above 0.25 atm upon outputting an output voltage higher than 1.5 V. When the pressure inside the vessel **2** is equal to or lower than 0.1 atm, the pressure transducer **46** outputs a voltage lower than 1.2 V to turn off the pump **6**. Thus, the pressure in the vessel **2** is kept at about 0.1 atm.

[**0032**] The switch **60** and the control modes M1 and M2 can be simplified. For example, the control mode M1 is OFF and the control mode M2 is ON. More specifically, the pressure transducer **46** is turned on when in the control mode M2 and is turned off when in the control mode M1. Thus, when in use, the user may attach the cover **4** to the vessel **2** and switch to the control mode M2 after the cover **4** is in position. The pump **6** is turned on when the pressure in the vessel **2** is equal to or above 0.25 atm and the pump **6** is turned off when the pressure in the vessel **2** is equal to or lower than 0.1 atm.

[**0033**] **FIG. 7** shows a depression container according to a second embodiment of the present invention. The second embodiment is different from the first embodiment in that the first plates **22** are replaced with a collar **64** including a thread **66** formed on an internal face, that the casing **30** is replaced with a cylindrical casing **68** including a thread **70** formed thereon, that the second plates **24** are replaced with a collar **72** including a thread **74** formed on an internal face and that the casing **38** is replaced with a cylindrical casing **76** including a thread **78** formed thereon. The thread **70** can be engaged with the thread **66**, thus mounting the casing **68** on the collar **64**. The thread **78** can be engaged with the thread **74**, thus mounting the casing **68** on the collar **64**. The second embodiment is otherwise identical to the first embodiment.

[**0034**] Although the invention has been explained in relation to its preferred embodiment, it is to be understood that

many other possible modifications and variations can be made without departing from the scope of the invention as hereinafter claimed.

What is claimed is:

1. A depression container including:

a vessel including a compartment with an open end;

a cover for enclosing the open end of the vessel, thus sealing the compartment;

a pump mounted on and communicated with the vessel for drawing air from the compartment; and

a pressure-activated switch mounted on and communicated with the vessel for detecting a pressure in the compartment, turning on the pump when the pressure is higher than an upper limit, and turning off the pump when the pressure is lower than a lower limit.

2. The depression container according to claim 1 wherein the vessel defines an orifice communicated with the compartment, and the pump includes a duct inserted through the orifice.

3. The depression container according to claim 2 including an airtight sleeve mounted on the duct and inserted through the orifice.

4. The depression container according to claim 1 wherein the vessel defines an orifice communicated with the compartment, and the pressure-activated switch includes a duct inserted through the orifice.

5. The depression container according to claim 4 including an airtight sleeve mounted on the duct and inserted through the orifice.

6. The depression container according to claim 1 wherein the vessel includes a collar with a thread formed on an internal face, and the pump includes a cylindrical casing formed with a thread for engagement with the thread of the collar.

7. The depression container according to claim 1 wherein the vessel includes a collar with a thread formed on an internal face, and the pressure-activated switch includes a cylindrical casing formed with a thread for engagement with the thread of the collar.

8. The depression container according to claim 1 including a box formed on the vessel for receiving the pump.

9. The depression container according to claim 1 including a box formed on the vessel for receiving the pressure-activated switch.

10. A depression container including:

a vessel including a compartment with an open end;

a cover for enclosing the open end of the vessel, thus sealing the compartment;

a pump mounted on and communicated with the vessel for drawing air from the compartment; and

a pressure-activated switch mounted on and communicated with the vessel for detecting a pressure difference resulting from a motion of closing the vessel via the cover, turning on the pump so as to draw air out of the compartment, and turning off the pump when an pressure in the compartment detected by the pressure-activated switch is lower than a lower limit.

11. The depression container according to claim 10 wherein the pressure-activated switch includes a differential type pressure transducer and a control chip electrically connected with the pump, and the pressure transducer includes a sensor inserted into the compartment for detecting the pressure in the compartment and sending a voltage to the control chip in response to a difference between a reference pressure and the pressure detected by the sensor.

12. The depression container according to claim 11 wherein the reference pressure is the atmosphere pressure.

13. The depression container according to claim 10 wherein the vessel defines an orifice communicated with the compartment, and the pump includes a duct inserted through the orifice.

14. The depression container according to claim 13 including an airtight sleeve mounted on the duct and inserted through the orifice.

15. The depression container according to claim 10 wherein the vessel defines an orifice communicated with the compartment, and the pressure-activated switch includes a duct inserted through the orifice.

16. The depression container according to claim 15 including an airtight sleeve mounted on the duct and inserted through the orifice.

17. The depression container according to claim 10 wherein the vessel includes a collar with a thread formed on an internal face, and the pump includes a cylindrical casing formed with a thread for engagement with the thread of the collar.

18. The depression container according to claim 10 wherein the vessel includes a collar with a thread formed on an internal face, and the pressure-activated switch includes a cylindrical casing formed with a thread for engagement with the thread of the collar.

19. The depression container according to claim 7 including a box formed on the vessel for receiving the pump.

20. The depression container according to claim 7 including a box formed on the vessel for receiving the pressure-activated switch.

* * * * *