# A Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable

## Field of the invention

This invention relates to a Collapsible DC Powered Fluid Spray Apparatus. In particular, it relates to a Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable for outdoor use.

## Background

Finding a clean water source outdoor can be a challenging task. People, living in regions blessed with unpolluted natural water sources, can draw from the pond, river and/or lake. However, such nature gifts become luxuries in resource-scare countries and regions where water sources are polluted.

In view of that, it is desirable to have a Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable to transport fluid, like tap water, when at the outdoor. Hitherto, portable vehicle washing apparatus and camper shower water bag are inventions that can serve the aforementioned purpose. However, the former is bulky as it is not collapsible; whiles the latter becomes very heavy and hence difficult to manoeuvre once filled with fluid.

As such, it will be desirable to have a Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable for outdoor use that can be transported and stored easily.

## Summary

Portable vehicle washing apparatus and camper shower water bag are inventions that can provide a water source when at the outdoor. However, portable car washers currently available in the market are bulky as they are not collapsible. Camper shower water bags, on the other hand become heavy and difficult to manoeuvre once filled with fluid. Without true mobility, not only is it difficult to move the camper shower water bag away

from the water source unaided, it also renders the bag unsuitable for tasks such as garden watering and vehicle washing.

A useful Collapsible DC Powered Fluid Spray Apparatus should be a sufficiently large container, for example one having a capacity of approximately 20 litres, as seen in Fig.1.

Rubber or plastic are suitable material for building the body of the Collapsible DC Powered Fluid Spray Apparatus.

On one hand, to provide a stronger structure when rubber is used to construct the Collapsible DC Powered Fluid Spray Apparatus, an outer body of identical shape and configuration as the rubber container can be considered to strengthen the structure and form. On the other, to allow medium rigid plastic to be collapsible easily, the body can be built with pleats.

As seen in Fig.2 is an inner body 201 with accordion pleats 202, which allow the inner body to fold neatly for easy storage when collapsed.

The inner body should be long yet shallow. This is to reduce the number of accordion pleats and provide a wider top surface 203 for mounting required fitments. Another benefit of a wide base is that the container remains stable even when it is filled with fluid.

All components should be mounted on top plain 203 to lower the risk of water leakage as well as to ensure easy access.

The pumping mechanism 501 is comprised of a DC-powered centrifugal pump 502 mounted inside a housing 505 and powered by a rechargeable battery 507 and controlled by a power switch 506. Fluid can be dispensed from the collapsible container 201 through the centrifugal pump 502 into a thin hose 512, an adaptor 513, a thicker hose 511, a male coupler 510 and finally out from another male coupler 509.

The pumping mechanism 501 is mounted inside the cavity 605 on the left of the top plain 203 of the inner body with the suction nozzle fitted into an opening 606 of the container to suck fluid out. An opening 602 is made on the right of the top plain 203 of the inner body for conveying fluid into and out of the inner body.

Fig.7 is a top view of the Collapsible Fluid Sprayer Apparatus, with the necessary component in place.

As seen in Fig.8, the Collapsible DC Powered Fluid Spray Apparatus is lifted up from it base to a vertical position. Consequently, the opening 602 is on top and the pumping mechanism 501 at the bottom. By maintaining the opening 602 on top, the risk of leakage is greatly reduced. Meanwhile, by maintaining the pumping mechanism 501 at the bottom, the suction nozzle of the centrifugal pump 502 is kept immersed and the liquid pressure acting on the suction nozzle 503 will increase the efficiency of the pumping mechanism.

A multi-pattern water nozzle 802 can then be connected to the male coupler 509 of the pumping mechanism 501.

The inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus can be installed into a sturdy outer body 901, as seen in Fig.9 for better support. The outer body should be collapsible too, although not necessary waterproof. Suitable materials for the outer body include fabrics or animal skin or leather. For the Collapsible DC Powered Fluid Spray Apparatus to fold effortlessly, the linings and seams of the outer body 901 should synchronise with the join lines of the inner body 201.

For portability and easy steering, a retractable handle 902, wheels 903 can be added. The retractable handle 902 and wheels 903 can be of similar form to those of a collapsible luggage trolley. In addition, a side zip 904 and another side zip 905 is provided. The side

zip 905, similar to that found on a collapsible luggage trolley, can help to regulate the size of it to fit the inner body of Collapsible DC Powered Fluid Spray Apparatus when it is at the expanded or compressed position. Finally another side zip 904 allows the outer body to open up for the inner body to be inserted or removed for occasional maintenance. At the top of the outer body, there are openings for the inner body's opening and cover, control panel as well as the handles' flange.

The Collapsible DC Powered Fluid Spray Apparatus hence comprises of four main components as seen in Fig. 10, the inner body, the outer body, the water nozzle and the pumping mechanism, in which they can be changed individually if any one of them breakdown.

**Brief Descriptions of the Drawings**

Embodiments of the invention are described hereinafter with reference to the following drawing in which:

Fig.1 shows the perspective view of a plastic or rubber container having a capacity of approximately 20 litres

Fig.2 shows the perspective view of the inner body of the Collapsible DC Powered Fluid Spray Apparatus with pleated design

Fig.3 shows the front view of Fig.2 when it is expanded

Fig.4 shows the front view of Fig.2 when it is compressed

Fig.5 shows the front view of the pumping mechanism of the Collapsible DC Powered Fluid Spray Apparatus

Fig.6 shows the front view of the pumping mechanism as in Fig 5 to be inserted to the inner body of the Collapsible DC Powered Fluid Spray Apparatus as in Fig.2 with additions of a cavity, flanges and an opening.

Fig.7 shows the perspective view of Fig.6 with the pumping mechanism inserted into the inner body of the Collapsible DC Powered Fluid Spray Apparatus

Fig.8 shows the perspective view Fig.7 with the inner body of the Collapsible DC Powered Fluid Spray Apparatus in a vertical position together with a multi-pattern water nozzle

Fig.9 shows the perspective view of the outer body of the Collapsible DC Powered Fluid Spray Apparatus

Fig.10 shows the perspective view of the main components of the Collapsible DC Powered Fluid Spray Apparatus

**Detailed Description**

A Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable for easy storage and manoeuvring is described hereinafter. Embodiments of the invention are described with reference to the figures, wherein like elements are identified with like reference numerals.

Finding a clean water source outdoor can be a challenging task. People, living in regions blessed with unpolluted natural water sources, can draw from the pond, river and/or lake. However, such nature gifts become luxuries in resource-scare countries and regions where water sources are polluted.

In view of that, it is desirable to have a Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable to transport fluid, like tap water for outdoor use. Hitherto,

portable vehicle washing apparatus and camper shower water bag are inventions that can serve the aforementioned purpose. However, the inventions have a couple of shortcomings. Portable car washers, currently available in the market, are bulky as they are not collapsible. In addition, many of them are not energy efficient. Camper shower water bags, on the other hand, may be energy efficient but they become heavy and difficult to manoeuvre once filled with fluid. Without true mobility, not only is it difficult to move the camper shower water bag away from the water source unaided, it also renders the bag unsuitable for tasks such as garden watering and car washing. Hence, there is a need to design a Collapsible DC Powered Fluid Spray Apparatus that is Portable and Steerable that is convenient to store as well as easy to transport.

Hereinafter is a description of suitable materials for constructing the Collapsible DC Powered Fluid Spray Apparatus. A useful Collapsible DC Powered Fluid Spray Apparatus should be a sufficiently large container, for example one having a capacity of approximately 20 litres, as seen in Fig.1. To provide as strong a protection as possible against repeated knocks and bumps; as well as collapses and expansions, the material used for building the container should possess both stress-strain and liquid impervious properties. An example of such material is rubber. Another plausible material for constructing the Collapsible DC Powered Fluid Spray Apparatus will be plastic.

It should be noted that the properties of rubber and plastic are different. Given the property of elasticity, a DC Powered Fluid Spray Apparatus built using thin and soft rubber sheet to provide elasticity is likely to have less structure and form than one constructed from medium hardness plastic of the same thickness. That, in turn, may render manoeuvre of the rubber Apparatus filled with 20 litres of fluid more difficult than one made of plastic. On the other hand, medium hardness plastic can provide a more rigid structure but that makes it difficult to be collapsible.

To provide a stronger structure when rubber is used to construct the Collapsible DC Powered Fluid Spray Apparatus, an outer body of identical shape and configuration as the

rubber container can be considered to circumvent the problem of structure and form. On the other hand to allow medium hardness plastic to be collapsible easily, the body can be built with pleats. The configuration of the outer body as well as pleated design for the inner body will be discussed in detail in later paragraphs.

While rubber is a more durable material, plastic provides a better finishing. Hence, both materials can be considered.

Hereinafter is a description on a suitable design for the inner body of the DC Powered Fluid Spray Apparatus. Seen in Fig.2 is an inner body 201 with accordion pleats 202, which is a more superior structure to that in Fig. 1. The accordion pleats 202 allow the inner body to fold neatly for easy storage when collapsed. Another beneficial outcome of such design is that it strengthens the shape and form of elastic material, like rubber. Conclusively, an inner body of the Collapsible DC Powered Fluid Spray Apparatus in the form illustrated in Fig2 is preferred over that seen in Fig.1.

In addition, the inner body should be long yet shallow. This is to reduce the number of accordion pleats and provide a wider top surface 203 for mounting required fitments. Another benefit of a wide base is that the container remains stable even when it is filled with fluid. By keeping the number of accordion pleats minimal, the structural integrity of the liquid chamber 202 is not heavily undermined when more rigid material, like plastic, is used for construction. In other words, by minimising the number of accordion pleats minimal, the risk of water leakage is minimised too.

Furthermore, the top plain 203 should have a certain thickness to facilitate mounting of components. All components should be mounted on top plain 203 for a couple of reasons. First, the risk of water leakage is heightened should fitments, especially a pumping mechanism, be mounted at the bottom plain, as constant fluid pressure will be acting on the openings. Second, in consideration of an outer body, fitments mounted at the bottom plain will be difficult to reach.

Fig.3 and Fig. 4 show the front view of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus. Constructed like an accordion, the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus can expand and compress easily even if it is made of relatively rigid material like plastic. Fig. 3 demonstrates how the accordion-shaped liquid chamber 202 can be expanded for filling a higher capacity of fluid whereas Fig.4 shows how it can be collapsible when empty for easy storage.

Hereinafter is an explanation of a pumping mechanism 501, which can be mounted on the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus. As seen in Fig. 5 are the embodiments of the pumping mechanism 501. The pumping mechanism 501 is comprised of a DC-powered centrifugal pump 502. At one end of the DC-powered centrifugal pump 502 is a suction nozzle 503 for extracting fluid from the collapsible container 201 into the DC-powered centrifugal pump 502. At the other end is a discharge nozzle 504 for dispensing fluid from the DC-powered centrifugal pump 502.

Next, a thin hose 512 or the like conduit is connected at one end to the discharge nozzle 504 and at the other to an adaptor 513. An adaptor 513 is necessary given that a typical discharge nozzle 504 of a centrifugal pump available in the market is about a quarter inch in diameter while a common gardening coupler is approximately three quarter inch in diameter. A thicker hose 511, in turn, links the adaptor 513 to the male end of a mating coupler 510. A multi-pattern water nozzle can then be connected to the end of the mating coupler 509. With the entire system in place, fluid can be conveyed from the collapsible container 201 through the centrifugal pump 502 into a thin hose 512, an adaptor 513, a thicker hose 511, a male coupler 510 and finally out from another male coupler 509.

The pumping mechanism 501 (Fig.5) is supplied with power from a rechargeable battery 507, mounted inside a housing 505. A battery charging point 508 is mounted at the top of the pumping mechanism for recharging the rechargeable battery 507. The operation of the pumping mechanism 501 is controlled by a power switch 506.

Next is a description of the mounting of fitments on the top plain 203 of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus. The positions of necessary fitments mounted on the top plain 203 of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus are illustrated in Fig 6.

The pumping mechanism 501 should be mounted on the left of the top plain 203 of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus with the suction nozzle fitted into an opening 606 of the container to suck fluid out. To ensure that the pumping mechanism 501 will flush with the top of the top plain of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus, a cavity 605, that is marginally bigger in terms of length, width and height than the pumping mechanism 501 should be made on the left of the top 203. As such, the entire pumping mechanism 501 can be housed within the cavity 605.

An opening 602 is made on the right of the top plain 203 of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus to supply fluid into and dispense fluid from the collapsible container 201. A flange can be added to strengthen the opening and facilitate tightening of a lid to keep liquid from spilling from the container (not shown).

The body of the collapsible container can come with two flanges 607 608 for mounting a handle onto it. The handle is important to stretch the body of the collapsible body to the heighten state for filling fluid to the maximum. There are also four flanges 609, 610, 611, 612 to provide an attachment area for the outer body onto the inner body.

Fig.7 is a top view of the Collapsible Fluid Sprayer Apparatus, with the necessary component in place. On the left is the pumping mechanism 501 and on the right is the opening 602 for conveying fluid into and out of the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus.

The advantages to the aforementioned location of the pumping mechanism 501 and the opening 602.become clear in Fig. 8. Fig.8 shows the position of the Collapsible DC Powered Fluid Spray Apparatus when it is in operation. As seen in Fig.8, the Collapsible DC Powered Fluid Spray Apparatus is lifted up from it base to a vertical position. The top 603 and bottom 604 part of the collapsible container does not have pleats and the body can come in rectangular form instead of circular form to allow it to stand vertically during operation. Consequently, the opening 602 is on top and the pumping mechanism 501 at the bottom. The reasons for lifting up the container to a vertical position are explained in detail hereinafter. By maintaining the opening 602 on top, the risk of leakage is greatly reduced. Meanwhile, by maintaining the pumping mechanism 501 at the bottom, the suction nozzle of the centrifugal pump 502 is kept immersed and the liquid pressure acting on the suction nozzle 503 will increase the efficiency of the pumping mechanism. While not in use, the container should be lay back in the more stable horizontal position to prevent water for leaking through the opening if any.

Next is a description of the assembly of a common gardening hose 801 to the Collapsible DC Powered Fluid Spray Apparatus. A multi-pattern water nozzle 802 or the like conduit is attached to a hose 803 at one end and one the other, a female coupler 804, which can be connected to the male coupler 509 of the pumping mechanism 501.

The following is a description on the assembly of an outer body onto the inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus. The inner body 201 of the Collapsible DC Powered Fluid Spray Apparatus can be installed into a sturdy outer body 901, as seen in Fig.9 regardless of whether it is made of plastic or rubber for better support. The outer body should be collapsible too, although not necessary waterproof. Suitable materials for the outer body include fabrics or animal skin or leather. Hence, material for the construction of the outer body 901 can be fabrics or animal skin or leather. For the Collapsible DC Powered Fluid Spray Apparatus to fold effortlessly, the linings and seams of the outer body 901 should synchronise with the join lines of the inner body 201.

For portability and easy steering, a retractable handle 902, wheels 903 can be added. The retractable handle 902 and wheels 903 can be of similar form to those of a collapsible luggage trolley. In addition, a side zip 904 and another side zip 905 is provided. The side zip 905, similar to that found on a collapsible luggage trolley, can help to regulate the size of it to fit the inner body of Collapsible DC Powered Fluid Spray Apparatus when it is at the expanded or compressed position. Finally another side zip 904 allows the outer body to open up for the inner body to be inserted in or removed for occasional maintenance of the inner body. At the top of the outer body, there are openings for the inner body's opening, control panel as well as the handles' flange.

The Collapsible DC Powered Fluid Spray Apparatus hence comprises of four main components as seen in Fig. 10, the inner body, the outer body, the water nozzle and the pumping mechanism, in which they can be changed individually if any one of them breakdown.