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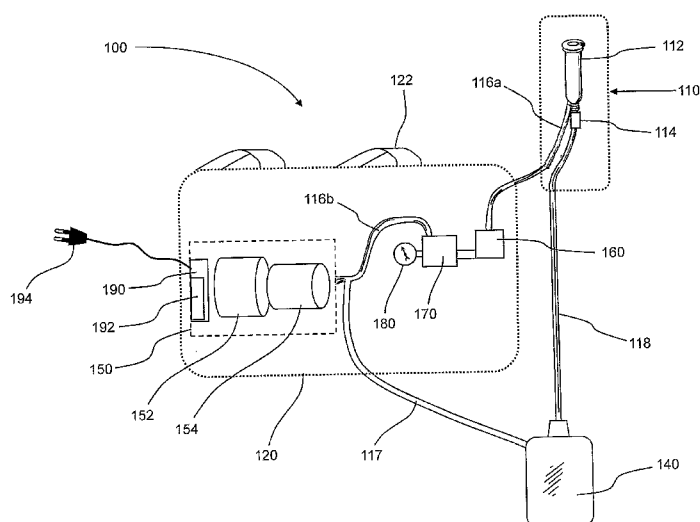


Fig 4

(57) Abstract: A portable apparatus for milking animals, that can be carried by a person to any location, preferably in a bag such as a hand bag, side bag or backpack. The portable apparatus includes a carrying device, a power unit including a vacuum pipeline, a milk pipeline having a milk reservoir, and a milking claw unit, having one or more teat-cups. The vacuum pipeline provides suction force to the teat-cups that operatively draw milk from the animal udder. The milk pipeline operatively connects the teat-cups to the milk reservoir. Vacuum force further creates partial vacuum in the milk reservoir, and along with gravity the drawn milk flows to the milk reservoir. The portable apparatus can be used to milk animals located at sites accessible only by foot. The portable apparatus can be used to milk colostrums after parturition, and to milk animals having infected udder/teat.



PORTABLE APPARATUS FOR MILKING ANIMALS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit from US provisional application 61/047,640
5 filed April 24th, 2008, the disclosure of which is included herein by reference.

FIELD OF THE INVENTION

This invention relates to apparatus for milking animals and more particularly the
present invention relates to an apparatus for milking animals, at any location, that can
10 be carried by the apparatus operator in a bag such as a hand bag, side bag or a
backpack.

BACKGROUND AND PRIOR ART

Teat-cup carriers are known for use with movable feed platforms, the
15 platforms being wheeled and either motorized or towed. Prior art systems are heavy
and cannot be hand carried by a single person. Example prior art devices of this type
are known from U.S. Patent No. 4,508,058, and US Patent No. 6981467, US Patent No.
7231886, German Patent No. 20318152U, Brazilian Patent No. 8500325U and French
Patent No. 2649858.

20 When an animal gives birth, colostrums milk must be drawn from the animal
in the first two day after parturition, to feed the new born. Often the milking has to be
done away from the shed, where it is difficult to access with a heavy milking unit. In
other cases, when an animal is sick, for example with of udder mastitis, the animal
must be milked separately to prevent the spreading of the contagious illness. Often, the
25 animal is milked to the ground, as illustrated in Figure 1.

There is therefore a need for and it would be advantageous to have a portable
apparatus for milking animals that is in small form that can be carried by a person to
any location, preferably in a bag such as a backpack.

SUMMARY OF THE INVENTION

According to the teachings of the present invention there is provided a portable apparatus for milking animals, that is in small form and that can be carried by a person to any location, preferably in a bag such as a hand bag, side bag or backpack. The portable apparatus can be used to milk animals at any location including sites accessible only by foot. The portable apparatus can be used to milk colostrums after parturition, and to milk animals having infected udder/teat.

The portable apparatus includes a carrying device, a vacuum pipeline, a milk pipeline and a milking claw unit, having one or more teat-cups. The vacuum pipeline includes a power unit having a vacuum pump and a power source, and a pulsator. The vacuum pipeline provides suction force to the teat-cups that operatively draw milk from the animal udder. The milk pipeline includes a milk reservoir, operatively connected to the teat-cups with a flexible pipe.

The vacuum pipeline operatively connects the vacuum pump to the teat-cups. The pulsator operatively regulates the suction force created by the vacuum pump, and operatively draws milk from the animal through the teat-cups being respectively attached to the teats of the animal. Vacuum force further creates partial vacuum in the milk reservoir, and along with gravity the drawn milk flows to the milk reservoir.

In embodiments of the present invention, the power unit further includes a milk pump, connected to the teat-cups by a flexible milk pipe. Thereby, the drawn milk is directed by the milk pump from each of the teat-cups to the milk reservoir.

In variations of the present invention, the milk pump is connected to the milk reservoir by a one-way valve, disposed between the milk reservoir and the milk pump, thereby preventing return of milk from the milk reservoir to the milk pump.

In embodiments of the present invention, the power unit further includes a regulator and a vacuum level gage. The regulator, assisted by the vacuum level gage, enables the person operating the portable apparatus of the present invention, to adjust milking related parameters, such as suction force, adaptive to the type of the animal and to the health condition of the udder/teat of the animal. The health condition includes animals suffering from an illness in the udder/teat, such as udder mastitis, and animals after parturition and thereby providing colostrums milk.

In embodiments of the present invention, the power unit further includes an intermediate vacuum container, wherein the intermediate vacuum container is disposed on the vacuum pipeline proximal to the vacuum pump, thereby stabilizing the vacuum force.

5 In embodiments of the present invention, the power unit further includes an intermediate vacuum milk container disposed between the milk pump and each of the one or more teat-cups, wherein a second flexible vacuum pipe operatively connects the vacuum pump and the intermediate vacuum milk container, thereby creating partial vacuum in the intermediate vacuum milk container. Each of the teat-cups is connected
10 to the intermediate vacuum milk container by the flexible milk pipe. Thereby, the drawn milk is directed, through the flexible milk pipe, by gravity and by the partial vacuum from each teat-cup to the milk intermediate vacuum milk container. The milk pump then transfers the drawn milk from the intermediate vacuum milk container to the milk reservoir. In variations of the present invention, the intermediate vacuum milk
15 container includes a one-way valve, thereby milk from the intermediate vacuum milk container does not return to the vacuum pump.

In embodiments of the present invention, the power source is an electric power source, preferably a DC power source selected from the group of electric power sources consisting of: a battery, a rechargeable battery, an external DC electric source and an
20 external AC electric source coupled with a DC converting device such as a transformer.

In embodiments of the present invention, the flexible milk pipe includes a cup regulator disposed proximal to the corresponding teat-cup, wherein the cup regulator closes the flexible milk pipe by sensing when the one or more of the teat-cups is not attached to the respective one or more teats.

25 Preferably, the milk reservoir and/or the intermediate vacuum milk container are made of clear materials, to enable the person operating the portable apparatus of the present invention, to inspect the drawn milk.

The milk reservoir is selected from a group of containers a disposable plastic bag, a bottle, a conventional milk container, or any other container.

30 The carrying device is selected from a group of carriers including: a bag, a side bag, a hand bag or a backpack. The bag may include one or more carrying straps.

An aspect of the present invention is to provide a portable milking apparatus for milking animals selected from the group of mammals including: a cow, a horse, a sheep, a goat, a camel, a bos grunniens, a llama, an alpaca and others.

5 An aspect of the present invention is to provide a portable milking apparatus that reduces the reoccurrences of illnesses, such as udder mastitis, and prevent to the contagious illness from spreading.

An aspect of the present invention is to provide a portable milking apparatus that enables a fast access to milk Colostrums from animals after parturition, at any location.

10 An aspect of the present invention is to provide a portable milking apparatus that provides easy access to animals that need to be milked, when in grazing sites that have terrain which is difficult for prior art portable prior art to reach.

BRIEF DESCRIPTION OF THE DRAWINGS

15 The present invention will become fully understood from the detailed description given herein below and the accompanying drawings, which are given by way of illustrations and examples only and thus not limitative of the present invention, and wherein:

FIG. 1 (prior art) illustrates milking an ill animal;

20 FIG. 2 illustrates milking an ill animal with a portable apparatus for milking animals, according to embodiments of the present invention;

FIG. 3 illustrates milking an animal with a portable apparatus for milking animals, according to embodiments of the present invention, on location at a grazing site with limited accessibility;

25 FIG. 4 is schematic illustration of a portable apparatus for milking animals, according to embodiments of the present invention;

FIG. 5 is schematic illustration of a portable apparatus for milking animals, according to other embodiments of the present invention, having an intermediate vacuum container and an intermediate vacuum milk container; and

30 FIG. 6 is schematic illustration a portable apparatus for milking animals, according to embodiments of the present invention, performing sterilization of the milking claw unit.

DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The methods and examples provided herein are illustrative only and not intended to be limiting.

By way of introduction, the principal intentions of the present invention include providing portable apparatus for milking animals that are in small form and that can be carried by a person to any location, including grazing areas that are only accessible by foot, where only manual milking is available. The portable milking apparatus of the present invention is preferably carried in a bag such as a hand bag, a side bag or a backpack. The portable milking apparatus enables a fast access to milk colostrums from animals in the first two days after parturition, at any location. The portable milking apparatus also reduces the reoccurrences of illnesses, such as udder mastitis, and prevent to the contagious illness from spreading, by providing a solution for milking such ill animals. The portable milking apparatus is adaptable to any kind of milk rendering mammal animals, selected from the group including cows, female camels, sheep, bos grunniens, horses, goats, llamas, alpacas and other mammals.

Figure 2 illustrates milking ill animal **10** with portable apparatus **100** for milking animals, according to embodiments of the present invention. Portable milking apparatus **100** further provides easy access to animals **10** that need to be milked, when in grazing sites that have terrain which is difficult for prior art portable prior art to reach. Figure 3 illustrates milking animal **10** with a portable apparatus for milking animals **100**, according to embodiments of the present invention, on location at a grazing site by a single person **50**.

Reference is now made to Figure 4, which schematically illustrates portable apparatus for milking animals **100**, according to embodiments of the present invention. Portable milking apparatus **100** includes power unit **150**, milk reservoir **140** and milking claw unit **110**, having one or more teat-cups **112**. Portable milking apparatus **100** further includes carrying device **120** such as a bag or a backpack, wherein power unit **150**, milk reservoir **140** and/or milking claw unit **110** are either attached or detached to carrying device **120**.

Power unit **150** includes motor **152**, vacuum pump **154**, pulsator **160**, power source **190**, and preferably vacuum level gage **180** and regulator **170**. Power source **190** is preferably a DC power source such as battery **192**. Preferably, battery **192** includes one or more rechargeable batteries. Optionally, power source **190** can also be any external electric source **194**, including an AC power source coupled with an AC to DC converting device such as a transformer. In variations of the present invention, motor **152**, vacuum pump **154** are integrated into a single unit.

Milking claw unit **110** has two type of pipelines lead to and from each teat-cup **112**: a vacuum pipeline and a milk pipeline. Each teat-cup **112** has two flexible pipes operatively attached to: first vacuum pipe **116a** is connected to pulsator **160**, both being on the vacuum pipeline; and milk pipe **118** is connected to milk reservoir **140**, both forming the milk pipeline. On the line milk pipeline, proximal to teat-cup **112**, cup regulator **114** is disposed to sense when teat-cup **112** is attached to a teat to perform milking by the vacuum force. When cup regulator **114** senses that teat-cup **112** is not attached to a teat, cup regulator **114** closes the milk pipeline, and thereby prevents unwanted suction of milk from milk reservoir **140**.

Milk reservoir **140**, can be any type of container, including a disposable plastic bag, a bottle, a conventional milk container, or any other container. The disposable plastic bags are needed in particular, for milking Colostrums from animals **10** after parturition. Milk reservoir **140** is preferably made of clear materials, to enable operator **50** to monitor and inspect the quality of the drawn milk, for example, detecting blood in the milk.

Second flexible vacuum pipe **117** operatively connects vacuum pump **154** and milk reservoir **140**, thereby creating partial vacuum inside milk reservoir **140**. Teat-cups **112** are connected to milk reservoir **140** by milk pipe **118**. Thereby, the drawn

milk is directed, by gravity and by the partial vacuum inside milk reservoir **140**, from teat-cups **112** to milk reservoir **140**.

Vacuum pump **154**, operatively coupled with motor **152**, generates the suction force needed to draw milk from the udder of animal **10** being milked. Pulsator **160** regulates the suction of milk from the teat of animal **10**, to which teat-cup **112** is attached. For example, pulsator **160** creates suction pulses that mimic the suction a baby animal. Regulator **170** enables adjustment of milking related parameters, such as suction force level, adaptive to the type of animal **10** being milked and/or to the health condition of the udder/teat of the animal. For example, often, animal **10** suffers from an udder/teat illness, such as udder mastitis or any other infection/illness. Milking such an udder/teat infected animal **10** with portable apparatus **100**, accelerates the healing of animal **10**. Vacuum level gage **180** monitors the suction force, enabling operator **50** to adjust the suction force according to the size and health condition of animal **10**.

Reference is now made to Figure 5, which schematically illustrates portable apparatus for milking animals **102**, according to other embodiments of the present invention. Portable milking apparatus **102** includes power unit **150**, milk reservoir **140** and milking claw unit **110**, having one or more teat-cups **112**. Portable milking apparatus **102** further includes carrying device **120** such as a bag or a backpack, wherein power unit **150**, milk reservoir **140** and/or milking claw unit **110** are either attached or detached to carrying device **120**.

Power unit **150** includes motor **152**, vacuum pump **154**, intermediate vacuum container **156**, intermediate vacuum milk container **130**, milk pump **132**, pulsator **160**, power source **190**, and preferably vacuum level gage **180** and regulator **170**. Power source **190** is preferably a DC power source such as battery **192**. Preferably, battery **192** includes one or more rechargeable batteries. Optionally, power source **190** can also be any external electric source **194**, including an AC power source coupled with an AC to DC converting device such as a transformer.

As in portable apparatus **100**, Milking claw unit **110** has two type of pipelines lead to and from each teat-cup **112**: a vacuum pipeline and a milk pipeline. Each teat-cup **112** has two flexible pipes operatively attached to: first vacuum pipe **116a** is connected to pulsator **160**, both being on the vacuum pipeline; and milk pipe segment **118a** is connected to intermediate vacuum milk container **130**. To complete the milk

pipeline milk pipe segment **118b** connects intermediate vacuum milk container **130** to milk reservoir **140**. Intermediate vacuum milk container **130** is preferably made of clear materials, to enable operator **50** to monitor and inspect the quality of the milk, for example, detecting blood in the milk.

5 Milk reservoir **140**, can be any type of container, including a disposable plastic bag, a bottle, a conventional milk container, or any other container. The disposable plastic bags are needed in particular, for milking Colostrums from animals **10** after parturition. Optionally, to ensure that milk from reservoir **140** does not return to milk container **130**, one-way valve **136** is preferably disposed between reservoir **140** and
10 milk container **130**. Milk reservoir **140** is preferably made of clear materials, to enable operator **50** to monitor and inspect the quality of the drawn milk, for example, detecting blood in the milk.

Second flexible vacuum pipe **117** operatively connects intermediate vacuum container **156** and milk reservoir **140**, thereby creating partial vacuum inside milk
15 reservoir **140**. Teat-cups **112** are connected to milk reservoir **140** by milk pipe **118**. Thereby, the drawn milk is directed, by gravity and by the partial vacuum inside milk reservoir **140**, from teat-cups **112** to milk reservoir **140**.

Vacuum pump **154**, operatively coupled with motor **152**, generates the suction force needed to draw milk from the udder of animal **10** being milked. Pulsator **160**
20 regulates the suction of milk from the teat of animal **10**, to which teat-cup **112** is attached. For example, pulsator **160** creates suction pulses that mimic the suction a baby animal. Regulator **170** enables adjustment of milking related parameters, such as suction force level, adaptive to the type of animal **10** being milked and/or to the health condition of the udder/teat of the animal. To ensure operational stability of the suction
25 force, intermediate vacuum container **156** is disposed on the vacuum pipeline, proximal to vacuum pump **154**. Furthermore, to ensure that milk from intermediate vacuum milk container **130** does not return to vacuum pump **154**, intermediate vacuum container **156** includes one-way valve **157**, such as a float valve. Vacuum level gage **180** monitors the suction force, enabling operator **50** to adjust the suction force according to the size and
30 health condition of animal **10**.

Milk pump **132** is operatively connected to intermediate vacuum milk container **130**, typically to the bottom of intermediate vacuum milk container **130**. Optional sensor **134** is designed to activate milk pump **132**, for example, when the level of the

milk in intermediate vacuum milk container **130** reaches a predefined level. Optionally, milk pump **132** is manually activated by operator **50**. Milk pump **132** is further connected to milk reservoir **140**, directing the acquired milk from intermediate vacuum milk container **130** to milk reservoir **140**. Milk reservoir **140**, can be any type of container, including a disposable plastic bag, a bottle, a conventional milk container, or any other container. The disposable plastic bags are useful, in particular, for milking colostrums from animals **10** after parturition. To ensure that milk from milk reservoir **140** does not return to intermediate vacuum milk container **130**, one-way valve **136** is preferably disposed between milk reservoir **140** and intermediate vacuum milk container **130**.

Carrying device **120** can be any bag such as a side bag, a hand bag or a backpack and can also be placed on the ground. The bag can be designed to hold multiple disposable plastic bags **140**, a single teat-cup **112** and/or a cluster of teat-cups **112**, replaceable battery and/or any other related accessory or any other item. Bag **120** may conveniently include one or more carrying straps **122**.

An aspect of the present invention is to provide cleaning and sterilization method to clean and sterilize portable milking apparatus **100/102**. An example sterilization method is illustrated in Figure 6, showing a container, such as bucket **200**, containing cleaning and sterilization and being used to sterilize portable milking apparatus **104**, wherein portable milking apparatus **104** is according to variations of the present invention. One end of hose **201** is connected to the bottom of milking pump **132** and the other end of hose **201** is disposed inside bucket **200**. Teat-cup **112** is also disposed inside bucket **200**. Intermediate vacuum milking pump **130** then operated whereas teat-cup **112** sucks the sterilization liquid from bucket **200** into intermediate vacuum milking pump **130** and then the sterilization liquid returns to bucket **200** through hose **201**. In another embodiment of the present invention an aerosol spray containing sterilization spray is attached to portable milking apparatus **100/102** and used to sterilize teat-cup(s) **112** and the milk lines of portable milking apparatus **100/102**.

The invention being thus described in terms of several embodiments and examples, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art.

WHAT IS CLAIMED IS:

1. A portable apparatus for milking animals, operatively carryable by a person, comprising:

- a) a carrying device;
- b) a vacuum pipeline comprising:
 - i. a power unit including:
 - A. a motor;
 - B. a vacuum pump; and
 - C. a power source;
 - ii. a pulsator;
- c) a milk pipeline;
 - i. a milk reservoir; and
- d) a milking claw unit, having one or more teat-cups,

wherein said vacuum pump is operatively coupled with said motor;

wherein said vacuum pipeline operatively connects said vacuum pump to said one or more teat-cups;

wherein said milk pipeline operatively connects said one or more teat-cups to said milk reservoir;

wherein said vacuum pump creates a suction force that operatively draws milk from an animal being milked through said one or more teat-cups being respectively attached to one or more teats of said animal;

wherein said pulsator operatively regulates said suction force;

wherein each of said one or more teat-cups is connected to said pulsator by a first flexible vacuum pipe, thereby said regulated vacuum force can be applied to said one or more teats of said animal;

wherein a second flexible vacuum pipe operatively connects said vacuum pump and said milk reservoir, thereby creating partial vacuum in said milk reservoir; and

wherein each of said one or more teat-cups is connected to said milk reservoir by a flexible milk pipe, thereby said drawn milk is directed, through said flexible milk pipe, by gravity and by said partial vacuum from each of said one or more teat-cups to said milk reservoir.

2. The portable apparatus of claim 1, wherein said power unit further comprises:

e) a milk pump,

wherein each of said one or more teat-cups is connected to said milk pump by said flexible milk pipe, thereby said drawn milk is directed by said milk pump from each of said one or more teat-cups to said milk reservoir.

3. The portable apparatus of claim 2, wherein said milk pump is connected to said milk reservoir by a one-way valve, disposed between said milk reservoir and said milk pump, thereby preventing return of milk from said milk reservoir to said milk pump.

4. The portable apparatus of claim 1, wherein said power unit further comprises:

iv. a regulator; and

v. a vacuum level gage,

wherein said regulator, assisted by said vacuum level gage, enables said person to adjust milking related parameters, adaptive to the type of said animal and to the health condition of the udder/teat of said animal.

5. The portable apparatus of claim 4, wherein said milking related parameters includes suction force.

6. The portable apparatus of claim 4, wherein said health condition includes an animal suffering from an illness in said udder/teat of said animal, such as udder mastitis.

7. The portable apparatus of claim 4, wherein said health condition includes an animal after parturition, and thereby providing colostrums milk.

8. The portable apparatus of claim 1, wherein said power unit further comprises:

vii. an intermediate vacuum container,

wherein said intermediate vacuum container is disposed on said vacuum pipeline proximal to said vacuum pump, thereby stabilizing said vacuum force.

9. The portable apparatus of claims 8 and 2, wherein said power unit further comprises:

viii. an intermediate vacuum milk container,

wherein a second flexible vacuum pipe operatively connects said vacuum pump and said intermediate vacuum milk container, thereby creating partial vacuum in said intermediate vacuum milk container;

wherein said intermediate vacuum milk container is disposed between said milk pump and each of said one or more teat-cups;

wherein each of said one or more teat-cups is connected to said intermediate vacuum milk container by said flexible milk pipe, thereby said drawn milk is directed, through said flexible milk pipe, by gravity and by said partial vacuum from each of said one or more teat-cups to said milk intermediate vacuum milk container; and

wherein said milk pump transfers the drawn milk from said intermediate vacuum milk container to said milk reservoir.

10. The portable apparatus of claim 9, wherein said intermediate vacuum milk container comprises a one-way valve, thereby milk from said intermediate vacuum milk container does not return to said vacuum pump.

11. The portable apparatus of claim 1, wherein said power source is an electric power source.

12. The portable apparatus of claim 11, wherein said electric power source is a DC power source selected from the group of electric power sources consisting of: a battery, a rechargeable battery, an external DC electric source and an external AC electric source coupled with a DC converting device such as a transformer.

13. The portable apparatus of claim 1, wherein said animal selected from the group of mammals including: a cow, a horse, a sheep, a goat, a camel, a bos grunniens, a llama and an alpaca.

14. The portable apparatus of claim 1, wherein said flexible milk pipe comprises a cup regulator disposed proximal to corresponding one or more teat-cup, wherein said cup regulator closes said flexible milk pipe by sensing when said one or more of said teat-cups is not attached to said respective one or more teats.

15. The portable apparatus of claim 1, wherein said milk reservoir is made of clear materials, to enable said person to inspect said drawn milk.

16. The portable apparatus of claim 9, wherein said intermediate vacuum milk container is made of clear materials, to enable said person to inspect said drawn milk.

17. The portable apparatus of claim 1, wherein said milk reservoir is selected from a group of containers a disposable plastic bag, a bottle, a conventional milk container, or any other container.
18. The portable apparatus of claim 1, wherein said carrying device is selected from a group of carriers including: a bag, a side bag, a hand bag or a backpack.
19. The portable apparatus of claim 18, wherein said bag includes one or more carrying straps.
20. The portable apparatus of claim 1, wherein said animal is located at a site that is accessible only by foot.

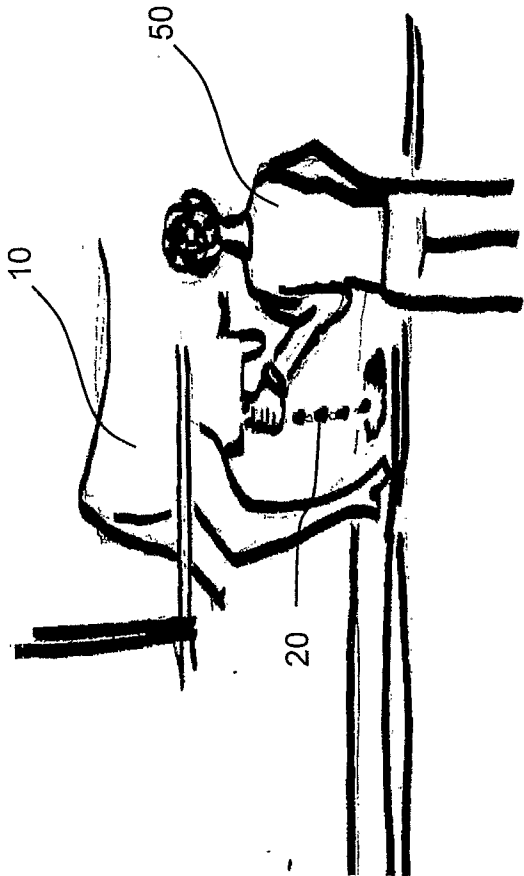


Fig 1
Prior art

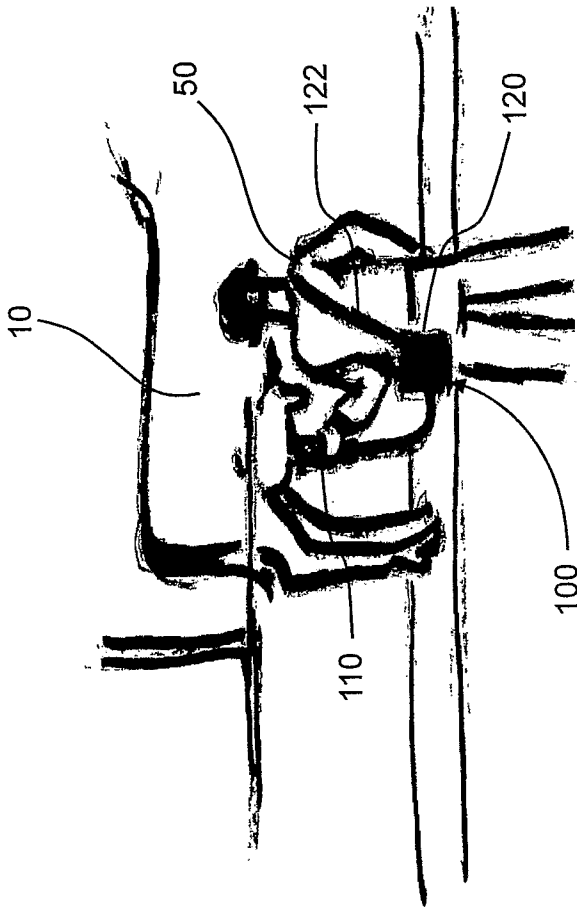


Fig 2

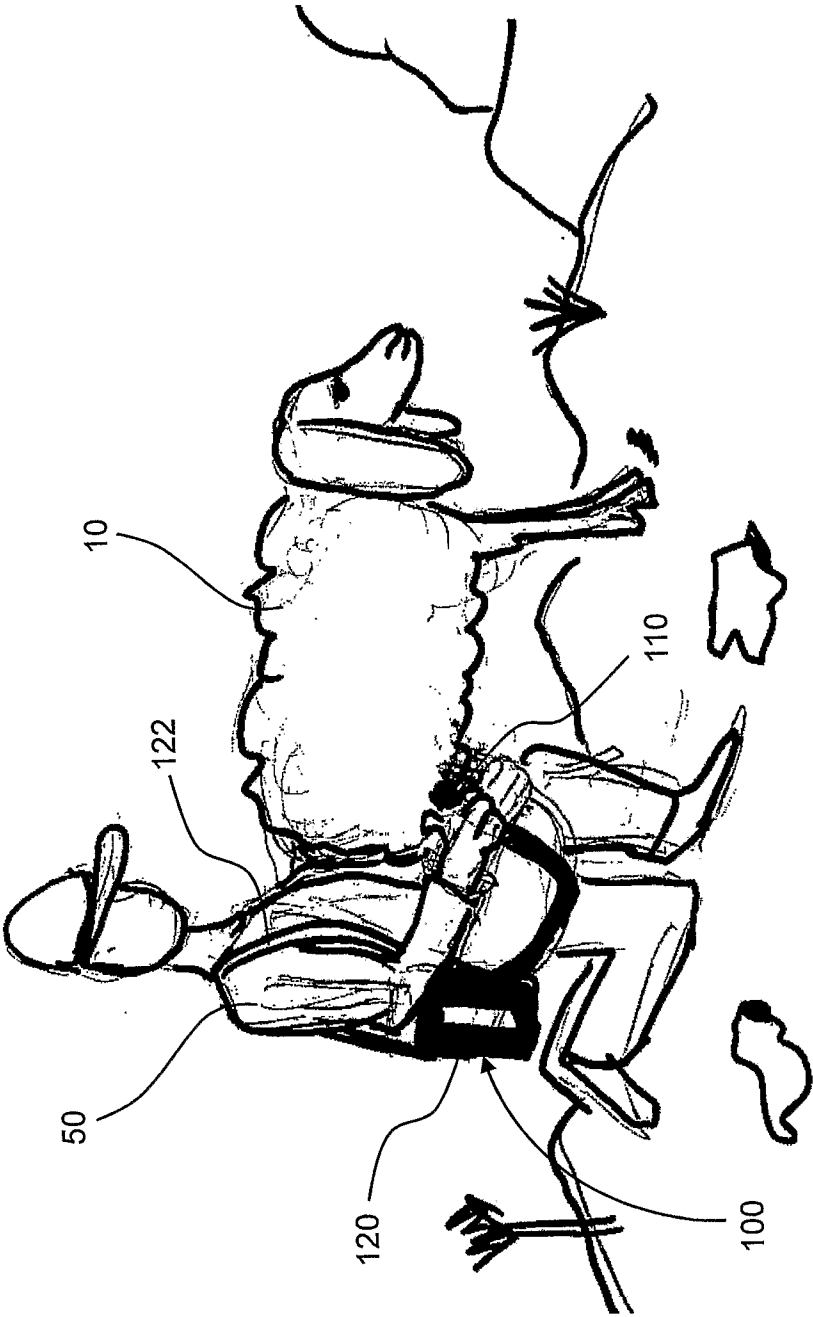


Fig 3

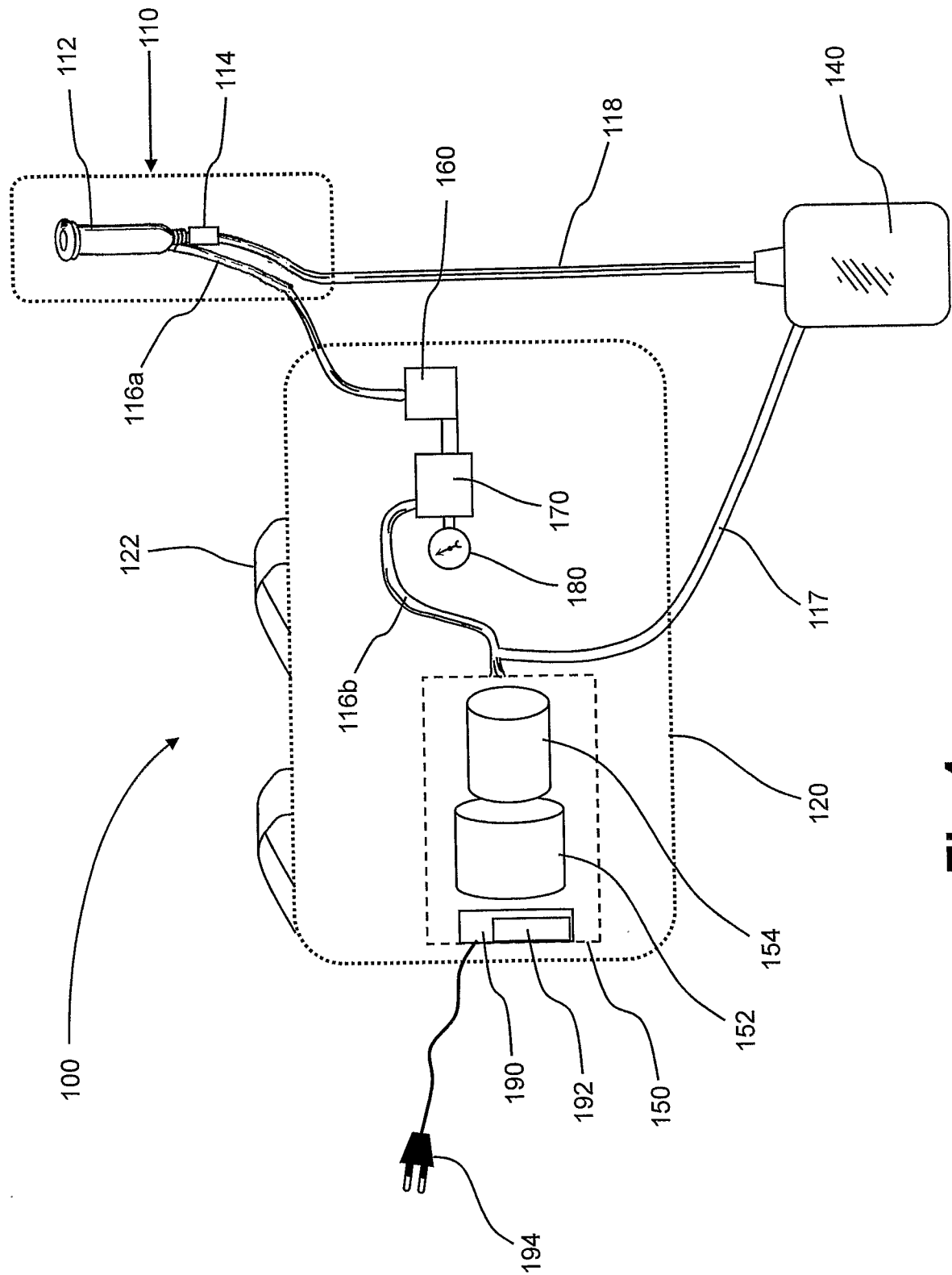


Fig 4

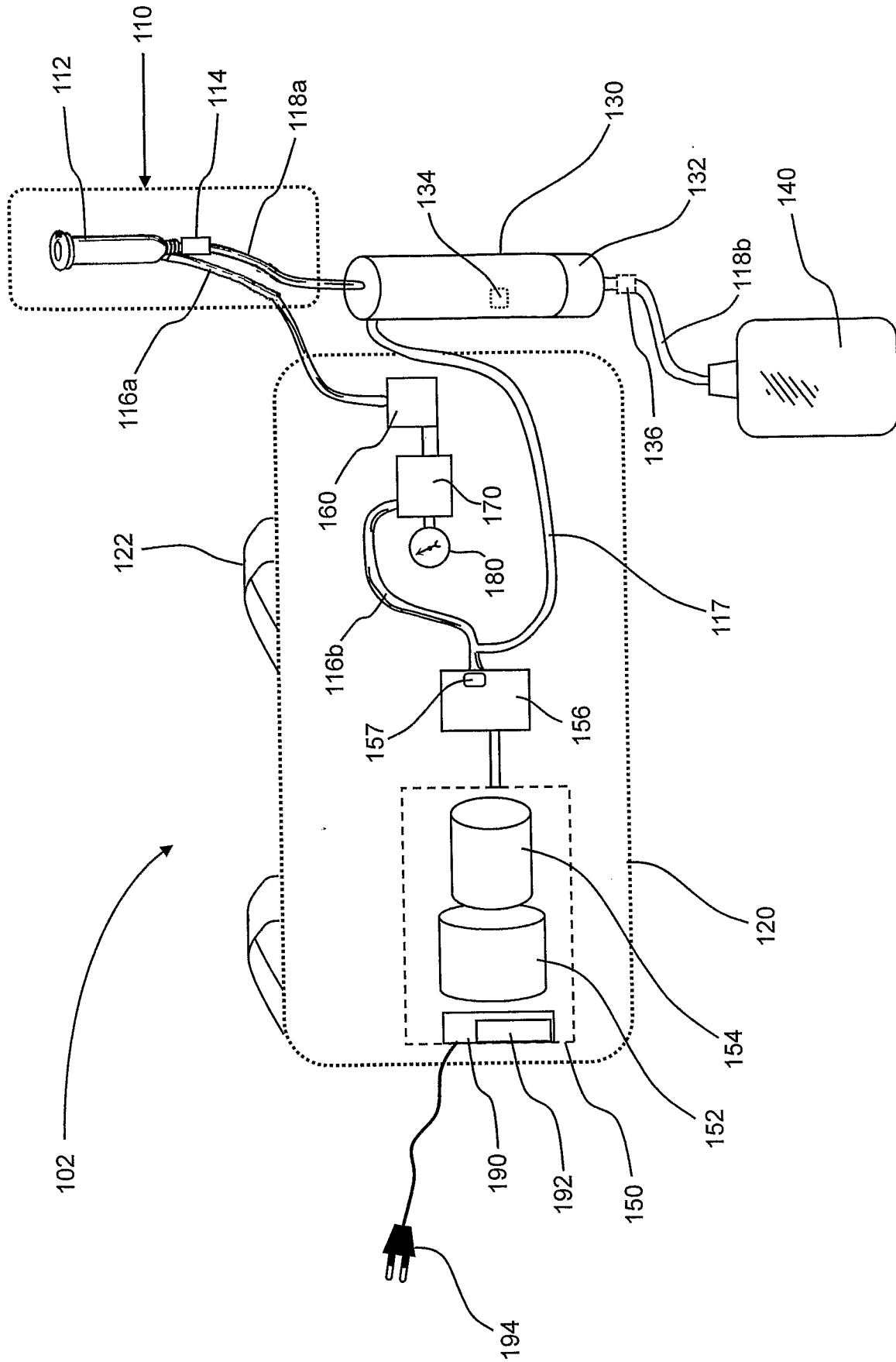


Fig 5

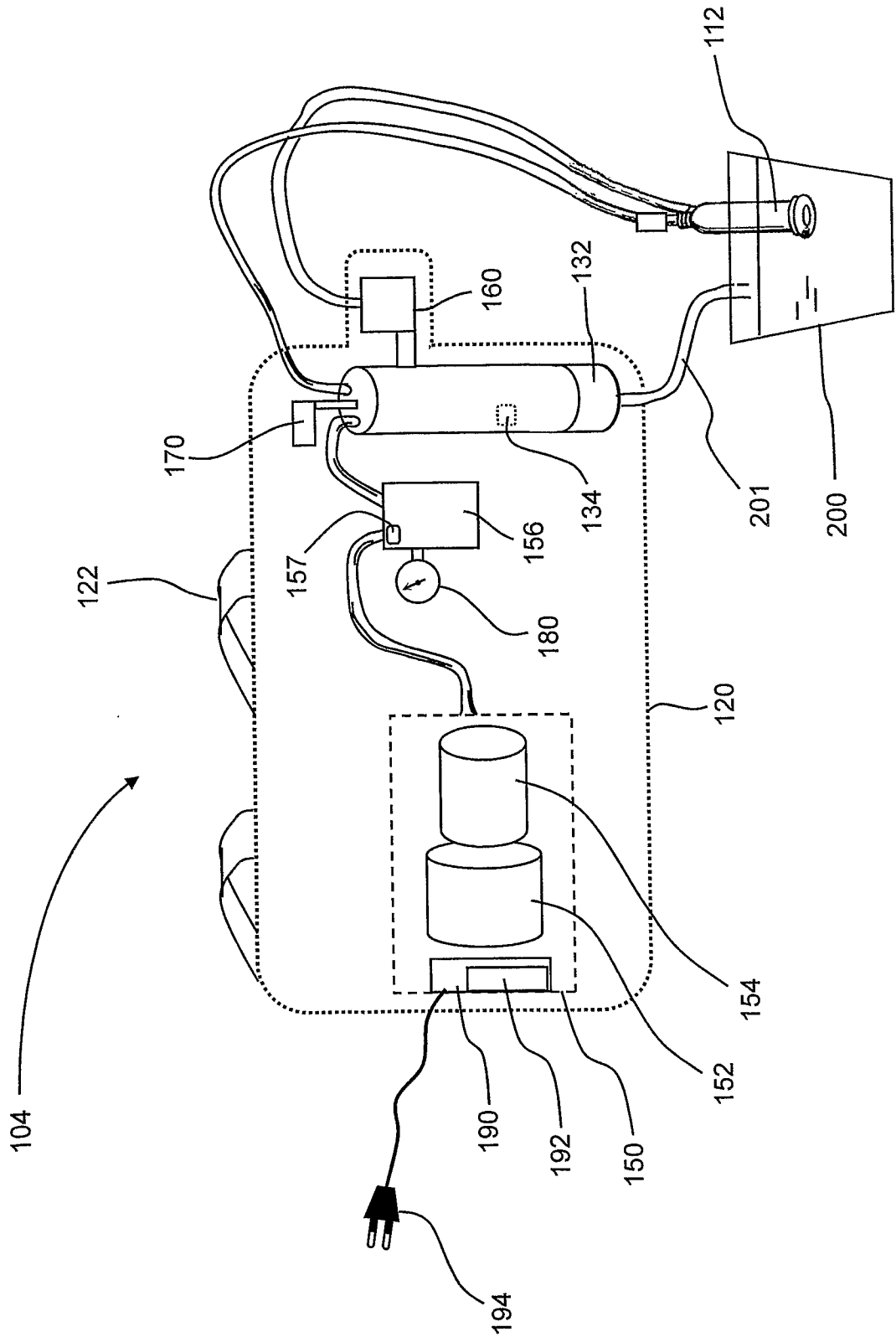


Fig 6