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(71) Anmelder: **BAYER CROPSCIENCE AKTIENGESELLSCHAFT** [DE/DE]; Alfred-Nobel-Str. 50, 40789 Monheim am Rhein (DE).

(72) Erfinder: **GUTSMANN, Volker**; Brunnenstr.54, 40764 Langenfeld (DE). **BYRON, Reid**; 1413 Whittington Drive, Raleigh, NC 27614 (US).

(74) Anwalt: **BIP PATENTS**; Alfred-Nobel-Str. 10, 40789 Monheim am Rhein (DE).

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(54) **Title:** SPRAY DEVICE WITH UNPRESSURISED SPRAY MATERIAL CONTAINERS

(54) **Bezeichnung:** SPRÜHGERÄT MIT DRUCKLOSEN SPRÜHGUTBEHÄLTERN

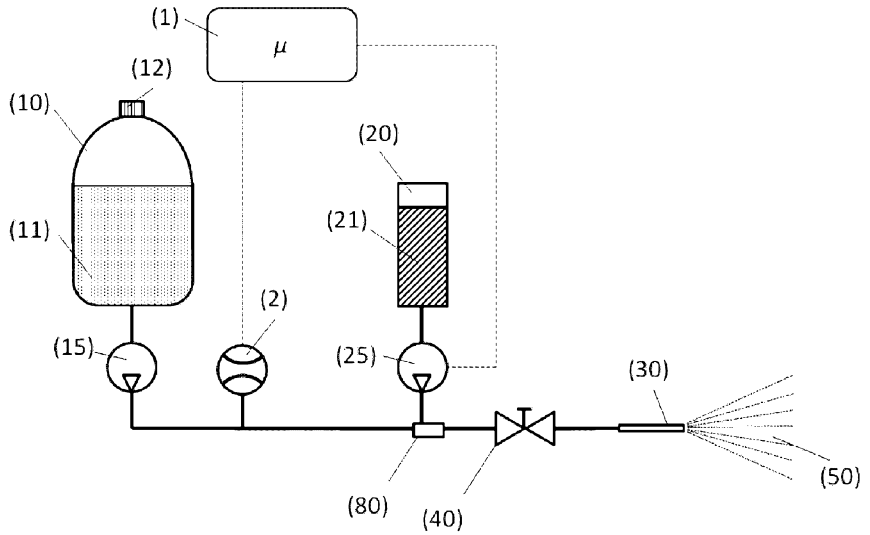

Fig. 1

(57) **Abstract:** The invention relates to the application of liquid active substances with the aid of a portable spray device. The subject matter of the present invention is a portable device for applying active substances, and a method for applying active substances with the aid of a portable spray device.

(57) **Zusammenfassung:** Die vorliegende Erfindung betrifft die Applikation von flüssigen Wirkstoffen mit Hilfe eines tragbaren Sprühgeräts. Gegenstand der vorliegenden Erfindung ist eine tragbare Vorrichtung zur Applikation von Wirkstoffen sowie ein Verfahren zur Applikation von Wirkstoffen mit Hilfe eines tragbaren Sprühgeräts.

[Fortsetzung auf der nächsten Seite]

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Spray device with unpressurised spray material containers

The present invention relates to the application of liquid active substances using a transportable spraying device. The subject matter of the present invention is a transportable device for applying active substances and a method for applying active substances using a transportable spraying device.

Portable spraying devices for applying active substances such as pesticides, insecticides, herbicides and fungicides are known (DE102013109785A1, US2006/0249223A1, US2006/0102245A1, US2006/0261181A1, US2005/0006400A1).

Spraying devices which are referred to as compression sprayers are widespread in this context. They comprise a tank for holding the liquid to be sprayed. An air pressure pump which is usually manually activated and forms part of the tank contains a customary piston rod structure and activation handle for it. This air pressure pump is used to generate an air pressure by means of the liquid to be sprayed. The tank is pressurized by the operator periodically actuating the pump until the desired tank pressure is reached. Owing to the air pressure acting on the spraying liquid, the latter exits through a pipe dipping into the liquid in the tank and then flows through a hose, a spray jet valve at the outer end of the hose, an extension pipe and finally through a spraying nozzle to the selected target region.

A disadvantage of such spraying devices that the expulsion pressure cannot be kept constant by the manually operated air pump. The result is a spraying pattern which changes with the flow rate. Accordingly, the active substance can only be dosed inaccurately.

An electrically operated air pump can remedy this, but for targeted, accurate and uniform application of the active substance it is necessary for the pressure in the tank to be kept at a constant level. In addition, the tank must be pressure-resistant. Such tanks are therefore mostly fabricated from metal or thick-plastic. The tanks are correspondingly heavy and cumbersome.

Pesticides, insecticides, herbicides and fungicides are being increasingly marketed in the form of concentrates nowadays. Concentrates have the advantage of lower transportation

costs. The user has to dilute the active substance before use. The dilution instructions are usually provided on the packaging or on an accompanying leaflet.

However, dilution which is performed by the user is disadvantageous for the following reasons: The user can come into undesired contact with the active substance. It is conceivable that the user will make errors during the calculation of the quantities of concentrate and diluent. A high viscosity of the concentrate can lead to inaccurate volumetric dimensioning of the necessary quantity.

Inaccurate dosing of active substances can result in a series of undesired consequences. The handling of the sprayed object may be ineffective, or overdosage may occur. It is conceivable that official instructions about dispensed quantities are not complied with. It is conceivable that faults occur in the stock monitoring, since the dispensed quantities have been calculated incorrectly.

A further disadvantage of the spraying device described above is that when another active substance is used the tank firstly has to be cleaned. Under certain circumstances, the cleaning liquid has to be disposed of.

Taking the described prior art as a starting point, the object has been to make available a device for applying active substances which is easy to handle and with which no manual dilution of concentrates is necessary, which outputs an accurately definable quantity of active substance and which is convenient to be carried and transported by the user, and with which no costly cleaning is necessary.

According to the invention, this object is achieved by means of the subject matter of independent Claims 1 and 10. Preferred embodiments can be found in the dependent claims and in the present description.

A first subject matter of the present invention is therefore a spraying device for controlling pests, which can be transported by a person without any machine aids, comprising

- a first container with a first liquid,
- a second container with a second liquid,

- a spraying nozzle,
- a first pump for feeding the first liquid from the first container in the direction of the spraying nozzle,
- a second pump for feeding the second liquid from the second container in the direction of the spraying nozzle,
- a flowmeter for measuring the flow of the first liquid from the first container in the direction of the spraying nozzle,
- a mixing chamber with an inlet for the first liquid, an inlet for the second liquid and an outlet for a mixture of the first liquid and second liquid, and
- a control unit which is configured in such a way that it regulates the flow of the second liquid in the direction of the spraying nozzle on the basis of the measured flow of the first liquid.

A further subject matter of the present invention is a method for controlling pests by applying a mixture composed of a first and a second liquid onto a target object by means of a spraying device which can be transported by a person without any machine aids, comprising two containers, a spraying nozzle and a valve, wherein the method comprises the following steps:

- directing the spraying nozzle onto the target object,
- opening the valve, and
- applying the mixture,

wherein, when the valve is opened, the first liquid is fed from the first container in the direction of the spraying nozzle by means of a first pump, the flow of the first liquid is measured by means of a flowmeter, and the measured value is transmitted to a control unit, the control unit actuates a second pump and regulates the flow of the second liquid from the second container in the direction of the spraying nozzle, with the result that the first and second liquids pass through the spraying nozzle with a constant mixing ratio.

According to the invention, the feeding of the first and second liquids from their containers in the direction of a spraying nozzle is carried out by means of two pumps. As a result, in particular, the first container with the first liquid can be operated in an unpressurized fashion. It can be fabricated from more lightweight and flexible material than the pressure tanks of the known compression sprayers.

In addition, the mixture of the first and second liquid is carried out automatically – manual mixing by a user is not necessary. The first and second liquids are stored in separate containers and they are not combined until directly before the application onto the target object. As a result, possible errors by the user during the production of the mixture and inadvertent contamination of the user with the liquids can be avoided.

Both liquids are fed in the direction of the spraying nozzle by the respective pump. They leave the spraying device through the spraying nozzle together as a mixture. The mixing ratio is set automatically on the basis of the flow of the first liquid. To do this, a flowmeter measures the flow of the first liquid from the first container in the direction of the spraying nozzle and transfers it to the control unit. The control unit then regulates the flow of the second liquid in the direction of the spraying nozzle on the basis of this flow of the first liquid. If, for example, the flow of the first liquid drops, the flow of the second liquid is reduced so that the mixing ratio remains constant. If the flow of the first liquid increases, the flow of the second liquid is raised accordingly.

The individual elements which characterize the spraying device according to the invention and the method according to the invention will be explained in more detail below. During this explanation, no differentiation is made between the spraying device and the method. Instead, the following descriptions apply to all the subject matters.

The spraying device according to the invention is transportable. The term "transportable" is intended to mean that the device can be transported by a person from one location to another without machine aids.

In one embodiment, the spraying device is embodied in such a way that during transportation the user carries part of the spraying device, comprising the first container, in one of his hands and another part of the spraying device, comprising the spraying nozzle, in the other.

The spraying device is preferably embodied in such way that the user can carry and transport part of the spraying device, comprising the first liquid container, on his back

(backpack device). Another part, comprising the spraying nozzle, continues to be carried with one hand, but the second hand is now free. For the purpose of carrying the container on the back, it is equipped with corresponding straps.

The spraying device is equipped with a first container for holding a first liquid. The term "liquid" is to be understood here as also comprising solutions, emulsions and suspensions. The first liquid is preferably a diluent. The diluent is used to dilute the second liquid which is located in the second container. In a preferred embodiment, the diluent is water.

The first container preferably has an opening which can be closed with a reclosable closure. The first container can be filled with the first liquid via the opening.

The first container can be composed of any desired material which is compatible with the first liquid. The term "compatible" means that the material is not chemically attacked by the first liquid and that the material is impermeable to the first liquid.

The first container is operated in an unpressurized fashion. The fact that the container does not have to withstand an excess pressure means that it can correspondingly be fabricated from relatively thin-walled and lightweight material. In a preferred embodiment, the container is embodied as a flexible bag. Such a bag preferably has straps so that it can be strapped onto the user's back and carried like a rucksack.

The second container can likewise be operated in an unpressurized fashion. Said container contains the second liquid. Accordingly, the second container must be compatible with the second liquid, i.e. the material of the second container is not chemically attacked by the second liquid, and the material is impermeable to the second liquid.

The second liquid is preferably a concentrate which is to be diluted by means of the diluent. The second liquid is preferably an active agent formulation which preferably comprises a pesticide, insecticide, herbicide or fungicide. In one particularly preferred embodiment, the concentrate is a pesticide concentrate. The pesticide is preferably a means for combatting pests, more preferably an acaricide (for combatting mites/arachnids), an insecticide (for combatting harmful insects) or a rodenticide (for combatting rodents).

The second container is embodied as a replaceable disposable or multiple-use container. It can be reversibly connected to the spraying device. The spraying device and the second container have corresponding connection means for this purpose.

The means for connecting the container can be, for example, a screw connection or a bayonet connection.

In a preferred embodiment, the second container is fabricated at least partially from a plastic. Plastics are known to be chemically inert with respect to many substances. They are also lightweight, can be processed well and can be fashioned to virtually any desired shapes.

In a preferred embodiment, the second container is embodied as a pressurized container. It preferably contains not only the second liquid but also a pressurized propellant which is separate from the second liquid. The second container preferably has a valve. The valve is preferably opened automatically when the second container is connected to the spraying device according to the invention. The pressurized propellant forces the second liquid out of the second container and into the spraying device. A further valve which is located in the spraying device stops the further flow of the second liquid. This further valve preferably opens when a user starts an application process, usually by activating a handle.

The second container, which is embodied as a pressurized container, can be composed, for example, of aluminium or tin plate – materials which are resistant to pressure and are used, for example, in spray cans (e.g. shaving foam).

It is conceivable that the second container contains a bag with the second liquid, wherein the bag is connected to the valve (valve bag system). The propellant surrounds the bag which is filled with the second liquid and exerts the necessary pressure for the second fluid to be forced out of the second container (see e.g. DE69820260T2, US5505039, EP0718213A).

It is also conceivable that the propellant and second liquid are separated from one another by a plunger (see e.g. DE3934237A1). The propellant exerts a pressure on the plunger. If the valve is opened, the second liquid is forced out of the second container by the plunger. It is conceivable, for example, to use a ZIMA plunger.

In a preferred embodiment of the present invention, the second container has means which permit communication with the control unit of the spraying device. In a preferred embodiment, these means permit the control unit to determine a mixing ratio. It is conceivable, for example, that the means for joining the second container to the spraying device have electrical contacts which, when the second container is joined, form a contact between the spraying device and the control unit, via which contact electronic communication is made possible between the control unit and the second container. The second container can comprise, for example, an electronic memory which can be read by the control unit via the contact which is set up. Information about the second liquid present in the second container can be stored in this memory. In particular, a mixing ratio, i.e. information about the ratio in which the first and second liquids are to be mixed with one another can be stored in said memory.

If the second liquid is a concentrate which has to be diluted with a diluent before the application, the degree of dilution which is to be set must be noted and/or stored in or on the container. In the preferred embodiment described, the degree of dilution which is to be set is stored in a form in which it can be determined by the control unit. This can be carried out, as described, using electronic communication. In addition to the described, contact-based communication, contactless based communication, i.e. using electromagnetic waves (Bluetooth, close-range communication, inter alia), is, of course, also possible.

Furthermore, the spraying device according to the invention has a spraying nozzle. A mixture composed of the first and second liquids is dispensed onto a target object via the spraying nozzle. A desired spatial distribution of the applied mixture can be achieved using the spraying nozzle. The spraying nozzle usually converts the liquid passing through it into droplets with a specific droplet size distribution which depends, inter alia, on the pressure of the liquid, on the flow rate of the liquid and on the geometry of the spraying nozzle.

The spraying nozzle is preferably replaceable, with the result that a user can select a spraying nozzle which is adapted to the application and to the target object and which has a desired droplet size distribution and spatial distribution of the sprayed material.

The spraying nozzle can be, for example, in the form of a lance or pistol or in some other form. The spraying nozzle is preferably embodied in such a way that it is held with one hand by the user and can be directed onto the target object.

The spraying nozzle usually has a handle which is activated by the user in order to start a spraying process. A valve is usually opened by activating the handle, with the result that first and second liquids are fed from their respective containers in the direction of the spraying nozzle and through the spraying nozzle onto the target object.

In a preferred embodiment, the replaceable spraying nozzle and the control unit have means which permit the control unit to detect the presence of a spraying nozzle and/or the type of the spraying nozzle which is present. It is conceivable, for example, that the control unit initiates the feeding of the liquids from its containers in the direction of the spraying nozzle only when a spraying nozzle is connected. If no spraying nozzle is connected, no feeding occurs, for example for safety reasons. Furthermore, it is conceivable that the control unit adapts the parameters for feeding the liquids to the type of spraying nozzle which is present, in order to permit an optimum spraying result. It is conceivable that a spraying nozzle requires a minimum pressure of the incoming liquid in order to generate a desired spatial distribution of the spraying liquid. This minimum pressure could be encoded at the spraying nozzle in a way that the control unit can read, with the result that the user does not have to set such parameters manually.

A valve is preferably mounted upstream of the spraying nozzle. This valve can preferably be activated manually, with the result that the user can direct the spraying nozzle onto the target object and start the spraying process by manually opening the valve.

It is also conceivable that the valve is opened automatically. It is conceivable, for example, that the spraying device has a sensor which detects the position of the spraying nozzle in space and automatically opens or closes the valve in a specific position. It is conceivable,

for example, that the valve is closed if the spraying nozzle is directed toward the floor and is opened when the spraying nozzle is raised into the horizontal position.

It is also conceivable that the valve is opened automatically when the spraying nozzle approaches the target object. This can be done, for example, by means of sensors or GPS (Global Positioning System) assistance.

The spraying device according to the invention has two pumps, a first pump for feeding the first liquid from the first container in the direction of the spraying nozzle, and a second pump for feeding the second liquid from the second container in the direction of the spraying nozzle.

In a preferred embodiment, a stepping-motor metering pump is used as second pump for feeding the second liquid (see e.g. DE102004047584, WO 2012048976, DE102009006203). Even small amounts of the second liquid can be added with a high level of accuracy to the first liquid by means of the stepping motor drive.

The spraying device according to the invention has a flowmeter for measuring the flow of the first liquid from the first container in the direction the spraying nozzle. The quantity of liquid flowing per unit of time in the direction of the spraying nozzle is registered with such a flowmeter. The term "quantity of liquid" is understood to mean, depending on the measurement method used, the volume or the mass.

The flowmeter is preferably one which is usually used in closed pipelines such as, for example, a magneto-inductive flowmeter, a float-type flowmeter, an ultrasonic flowmeter, a Coriolis mass flowmeter, a calorimetric flowmeter or a vortex flowmeter. However, it is also conceivable to use a measuring orifice or a dynamic pressure probe.

In a preferred embodiment, the flow measurement is carried out using a differential pressure sensor.

In a further preferred embodiment, an impeller wheel sensor is used for measuring the flow rate. The measuring principle is based on the fact that an impeller wheel assumes a

rotational speed in proportion to the flow rate of a fluid by which the impeller wheel is driven. In order to measure the rotational speed, a permanent magnet can be attached to the impeller wheel, which permanent magnet moves along with the impeller wheel. A Hall sensor, past which the permanent magnet moves, can be used as a pulse counter. The number of pulses measured per unit of time is proportional to the rotational speed of the impeller wheel and therefore to the flow rate of the fluid.
Details on the flow measurement can be found, for example, in the following manual: K.W. Bonfig: Technische Durchflussmessung, (technical flow measurement) Vulkan-Verlag Essen, 3rd edition, 2002, ISBN 3-8027-2190-X.

On the basis of the quantity of first liquid flowing in the direction of the spraying nozzle, the control unit regulates the flow of the second liquid from the second container in the direction of the spraying nozzle.

The first and second liquids exit the spraying device together as a mixture through the spraying nozzle.

It is conceivable that the first liquid and the second liquid are combined, via corresponding feed lines in the spraying nozzle. However, it has been shown that in this case the first liquid and second liquid are not mixed thoroughly enough when they reach the target object. Therefore, there is preferably a mixing chamber upstream of the spraying nozzle into which the first liquid and the second liquid are fed via two separate feed lines. The first liquid and the second liquid are then thoroughly mixed in the mixing chamber, before the mixture enters the spraying nozzle.

The mixing chamber correspondingly has an inlet for the first liquid, an inlet for the second liquid and an outlet for a mixture of the first and second liquid. The mixing chamber can also be a section of the feed line for the first liquid to the spraying nozzle into which a line for the second liquid opens.

The thorough mixing can be promoted by means of suitable measures, for example by means of static mixing elements.

The lines between the second container and the mixing chamber are preferably embodied in such a way that they have a low volume. After an application process, residual quantities of (non-diluted) second liquid remain in the lines between the second container and mixing chamber. Under certain circumstances, these residual quantities have to be removed; under certain circumstances the lines have to be cleaned when the second container is changed. The lower the volume, the smaller the residual quantities which have to be removed and the smaller the volume which has to be cleaned. The volume which the second liquid can assume on its path in the direction of the mixing chamber between the second container and the mixing chamber is preferably less than 50 mL, and more preferably less than 30 mL, and even more preferably less than 10 mL.

The second liquid is preferably added to the first liquid transversally with respect to the direction of flow thereof. The term "transversally" means at an angle in the range from 20° to 160°, preferably 50° to 130°, more preferably 70° to 110°, and most preferably 80° to 100°.

In a preferred embodiment, the second liquid is dosed into the first liquid by a flow divider. In a further preferred embodiment, the second liquid is dosed into the first liquid and both liquids pass through a flow divider together. A flow divider is a static element which divides a flow of a liquid into a multiplicity of component flows. The flow divider is preferably embodied in the form of a sieve, i.e. the liquid/liquids is/are pressed in the direction of flow through a sieve which divides the flow into component flows. Such a sieve divides, in particular, droplets of the second liquid, which pass into the first liquid, into a multiplicity of small droplets. Turbulence downstream of the sieve gives rise to a dispersion of the small droplets in the first liquid. It has surprisingly been found that such a sieve is sufficient as a static mixing element for achieving sufficient thorough mixing of the first and second liquids at the spraying nozzle. If a sieve is not used, it is possible to observe that individual droplets of the second liquid are retained over the line path from the mixing chamber to the spraying nozzle and therefore a non-homogeneous mixture exits at the spraying nozzle. More extensive static mixing elements than a sieve are surprisingly not necessary to bring about sufficiently thorough mixing at the spraying nozzle. A sieve also has the advantage of significantly lower pressure loss over a classic static mixer which alternately divides the fluid flow, twists it and recombines it. Upstream of the spraying

nozzle there should be a pressure which is in a defined range so that the spraying nozzle can achieve a desired spatial distribution of the liquid. This pressure is made available by the feeding means of the spraying device. The pressure which is made available by the feeding means must, however, be higher than the pressure which is desired upstream of the spraying nozzle in order to compensate for the pressure loss across the feed lines, the mixing chamber, the mixing elements etc. which are present. However, a higher pressure loss also means a greater application of energy to compensate the pressure loss, which results in a larger load when using battery-operated pumps. The sieve is preferably embodied as a mesh with a mesh width of 10 µm to 500 µm, more preferably 50 µm to 250 µm and most preferably 80 µm to 120 µm. The webs between the meshes usually have a width which is less than the mesh width in order to keep the flow resistance and therefore the pressure loss as low as possible.

The spraying device according to the invention also has a control unit. This control unit performs regulation of the quantity of second liquid from the second container in the direction of the spraying nozzle. This regulation is carried out according to the invention on the basis of the flow of the first liquid, measured by means of the flowmeter, from the first container in the direction of the spraying nozzle. A further parameter which influences the regulation is the mixing ratio which is to be set. The latter can be predefined by the user, by the user inputting the mixing ratio into the control unit, for example. However, it is also possible that the control unit registers the mixing ratio by communication with a memory unit in the second container.

As described above, in a preferred embodiment of the present invention the control unit is connected to the replaceable second container in such a way that the control unit can receive, from the replaceable second container, a degree of dilution to be set for the concentrate contained in the replaceable second container.

The control unit receives the measured values of the flowmeter relating to the flow of the first liquid and regulates the flow of the second liquid with the result that the first and the second liquids exit the spraying device via the spraying nozzle as a mixture with a constant mixing ratio. The term "constant mixing ratio" is understood to mean that the mixing ratio is within a predefined range over the spraying period.

In a further preferred embodiment, the control unit registers the quantity of applied second liquid and stores this value and transmits this value, for example, to an external computer system at a time which can be defined by the user. In this way, the quantity of applied second liquid can be maintained.

In a preferred embodiment, the position (which can be determined by means of GPS assistance) of the application is also registered for the quantity of respectively applied second liquid.

In a further preferred embodiment, the residual quantity of second liquid in the second container is determined on the basis of the applied quantity of second liquid. The value for this residual quantity is preferably stored in a memory unit in the spraying device and/or on the second container.

In a preferred embodiment, the spraying device according to the invention has a pressure sensor which measures the pressure in the feed line to the spraying nozzle.

If the first and second liquids are fed in the direction of the spraying nozzle, in pressure builds up upstream of the spraying nozzle. In order to generate a constant spraying pattern, it is necessary for this pressure to remain constant during the spraying process. In order to ensure this, the pressure sensor is connected to the control unit which regulates the flow of the first and second liquids in such a way that the measured pressure remains constant.

The invention will be explained in more detail below with reference to exemplary embodiments without, however, wishing to restrict the invention to these examples.

Figure 1 shows a schematic view of an embodiment of the spraying device according to the invention. The spraying device comprises a first container (10) with a first liquid (11), a second container (20) with a second liquid (21), a spraying nozzle (30), a valve (40), a first pump (15) for feeding the first liquid (11) from the first container (10) in the direction of the spraying nozzle (30), a second pump (25) for feeding the second liquid (21) from the second container (20) in the direction of the spraying nozzle (30), a mixing chamber (80), a

flowmeter (2) for measuring the flow of the first liquid (11) from the first container (10) in the direction of the spraying nozzle (30) and a control unit (1).

The first container (10) is embodied as a flexible bag which comprises an opening for filling in the first liquid (11), wherein the opening can be reversibly closed by means of a closure (12).

The second liquid (21) comes into contact with the first liquid (11) in the mixing chamber (80).

When the valve (40) is opened, the first liquid (11) is fed in the direction of the spraying nozzle (30) by means of the first pump (15). The flow of the first liquid is measured by means of a flowmeter (2). The flowmeter (2) is communicatively connected to the control unit (1) (illustrated by the dashed line). The flow measured by the flowmeter (2) is transmitted to the control unit (1). The control unit (1) is communicatively connected to the second pump (25) (illustrated by the dashed line). The control unit (1) regulates the flow of the second liquid (21) in the direction of the spraying nozzle, with the result that the first liquid and the second liquid exit the spraying nozzle in the form of a mixture (50) with a constant mixing ratio.

Figure 2 shows a schematic view of a preferred embodiment of the spraying device according to the invention.

The spraying device comprises a control unit (1), a flowmeter (2), a pressure sensor (3), a first container (10) with a first liquid (11), a second container (20) with a second liquid (21), a first pump (15), a second pump (25), a spraying nozzle (30) , a mixing chamber (80) and a valve (40).

The first container (10) is embodied as a flexible bag which comprises an opening for filling in the first liquid (11), wherein the opening can be reversibly closed by means of a closure (12).

The second container (20) is embodied as a replaceable cartridge. The cartridge is connected to the spraying device via connection means (22a) for joining the cartridge to the spraying device. The spraying device has connection means (22b) which are compatible with the connection means (22a) of the cartridge.

The control unit (1) is communicatively connected (illustrated by dashed lines) to the flowmeter (2), the pressure sensor (3), the first pump (15) and the second pump (25). The pumps (15, 25) are operated electrically.

When the valve (40) is opened, the first liquid (11) is fed from the first container (10) in the direction of the spraying nozzle (30) by means of the first pump (15). This flow of the first liquid (11) is measured by means of the flowmeter (2). The measured value is transmitted to the control unit (1). At the same time, the pressure in the feed line leading to the spraying nozzle (30) is measured by means of the pressure sensor (3). This measured value is also transferred to the control unit (1). The control unit (1) regulates the flow of the first liquid (11) and of the second liquid (21) in the direction of the spraying nozzle (30) using the first pump (15) and using the second pump (25), with the result that the exiting mixture (50) has a constant mixing ratio of the first and second liquids, and with the result that the pressure in the feed line upstream of the spraying nozzle is within a predefined range.

Patent Claims

1. Spraying device for controlling pests, which can be transported by a person without any machine aids, comprising

- a first container with a first liquid,
- a second container with a second liquid,
- a spraying nozzle,
- a first pump for feeding the first liquid from the first container in the direction of the spraying nozzle,
- a second pump for feeding the second liquid from the second container in the direction of the spraying nozzle,
- a flowmeter for measuring the flow of the first liquid from the first container in the direction of the spraying nozzle,
- a mixing chamber with an inlet for the first liquid, an inlet for the second liquid and an outlet for a mixture of the first liquid and second liquid, and
- a control unit which is configured in such a way that it regulates the flow of the second liquid in the direction of the spraying nozzle on the basis of the measured flow of the first liquid.

2. Spraying device according to Claim 1, characterized in that the second liquid is a concentrate, preferably an active substance concentrate, and the first liquid is a diluent for the concentrate, preferably water.

3. Spraying device according to one of Claims 1 or 2, characterized in that the first container is embodied as a flexible bag.

4. Spraying device according to one of Claims 1 to 3, characterized in that the first container has straps so that it can be transported on the users back.

5. Spraying device according to one of Claims 1 to 4, characterized in that the second container is embodied as a replaceable disposable or multiple-use container.

6. Spraying device according to one of Claims 1 to 5, comprising a pressure sensor which measures the pressure in a feed line leading to the spraying nozzle.

7. Spraying device according to Claim 6, characterized in that the control unit is connected to the pressure sensor in order to keep the pressure upstream of the spraying nozzle in a constant range.

8. Spraying device according to one of Claims 1 to 7, characterized in that the second container comprises a memory unit in which a mixing ratio is stored, which mixing ratio indicates the ratio with which the first and second liquids have to be mixed in order to achieve a desired spraying result.

9. Spraying device according to Claim 8, characterized in that the control unit is configured in such a way that it can read out the mixing ratio from the control unit.

10. Method for controlling pests by applying a mixture composed of a first and a second liquid onto a target object by means of a spraying device which can be transported by a person without any machine aids, comprising two containers, a spraying nozzle and a valve, wherein the method comprises the following steps:

- directing the spraying nozzle onto the target object,
- opening the valve, and
- applying the mixture,

wherein, when the valve is opened, the first liquid is fed from the first container in the direction of the spraying nozzle by means of a first pump, the flow of the first liquid is measured by means of a flowmeter, and the measured value is transmitted to a control unit, the control unit actuates a second pump and regulates the flow of the second liquid from the second container in the direction of the spraying nozzle, with the result that the first and second liquids pass through the spraying nozzle with a constant mixing ratio.

11. Method according to Claim 10, characterized in that during the method a user carries part of the spraying device, comprising the first container, on his back, and holds a second part of the spraying device, comprising the spraying nozzle, in one of his hands.

12. Spraying device according to one of Claims 10 or 11, characterized in that the second liquid is a concentrate, preferably an active substance concentrate, and the first liquid is a diluent for the concentrate, preferably water.

13. Method according to one of Claims 10 to 12, characterized in that the second container comprises a memory unit in which a mixing ratio is stored, and the control unit reads out this mixing ratio from the memory unit and sets the flow of the first and/or second liquid correspondingly.

14. Method according to one of Claims 10 to 13, characterized in that the quantity of applied second liquid is registered and stored.

15. Method according to one of Claims 10 to 14, characterized in that the residual quantity of second liquid remaining in the second container is registered and stored.

Figures

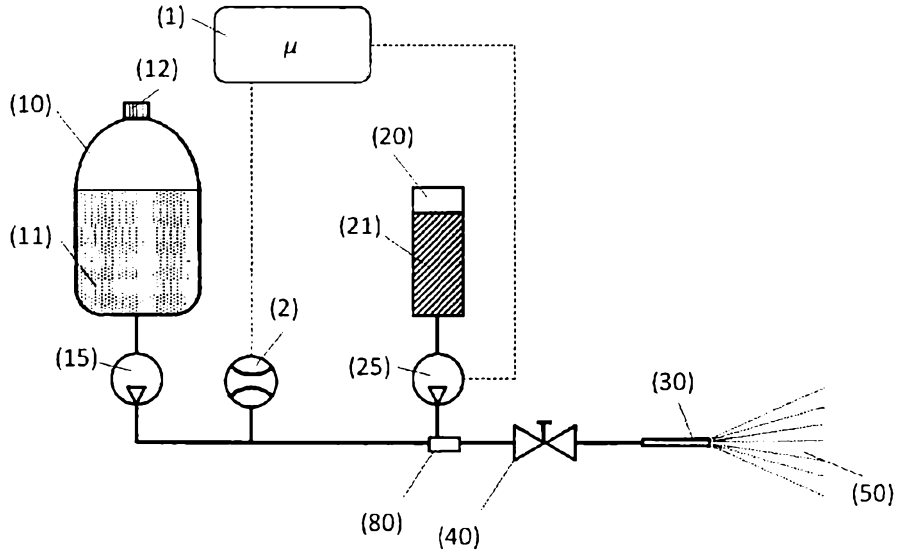

Fig. 1

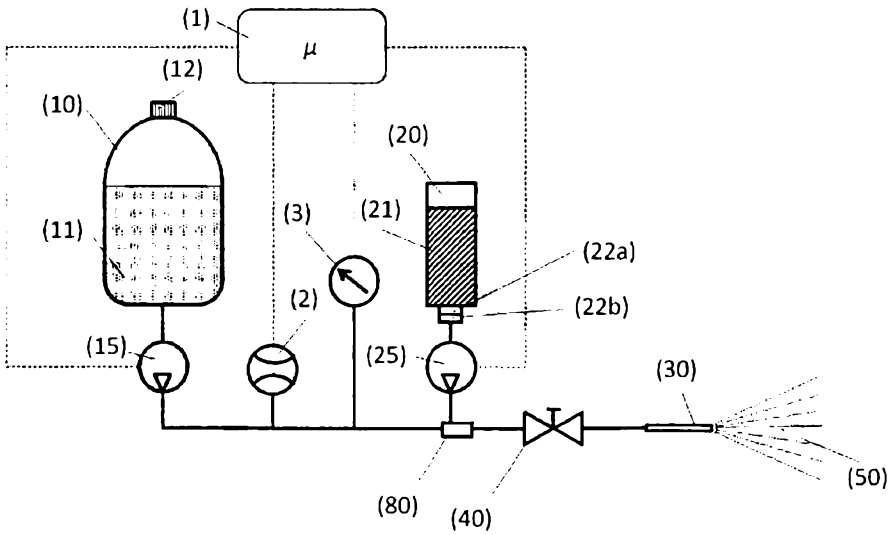

Fig. 2