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## Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

## Published:

- with international search report (Art. 21(3))

(54) Title: PASSIVE EMANATOR FOR CONTROLLING FLYING INSECTS

(57) Abstract: The invention relates to a passive emanator for controlling flying insects, the emanator comprising: a. a cellulosic based substrate; and b. a vapor active pyrethroid; wherein the cellulosic based substrate: - has a grammage of 200 to 400 gsm; - has a caliper of 50 to 2000 micrometers; and - comprises cellulose fibers having a weighted average fiber length of 0.5 to 10 mm; and wherein the cellulosic based substrate is impregnated with an insecticidally effective amount of the vapor active pyrethroid in a carrier solvent system.



## PASSIVE EMANATOR FOR CONTROLLING FLYING INSECTS

### Field of the invention

The present invention relates to insect control, more particularly to a passive emanator  
5 for controlling flying insects, the emanator comprising a cellulosic based substrate and  
a vapor active pyrethroid.

### Background of the invention

Flying insects such as mosquitoes are generally perceived as unwanted house guests  
10 as they are a nuisance e.g. by disturbing people while they sleep or try to sleep.

Mosquito bites usually result in itching bumps and the bite area can become infected  
when uncontrolled scratching causes further damage to affected area. A more serious  
concern is the risk of transmittance by mosquitoes of diseases like malaria, dengue,  
zika, yellow fever and encephalitis.

15 Mosquito nets offer protection against mosquitoes and other insects but can only do so  
for the space enclosed by the net like for example a net covering a bed. Alternatively  
netting is used to cover openings like windows and doors but will only be effective if  
strict discipline is observed in keeping them closed.

20 Another means of controlling flying insects is the use of articles or devices that  
dispense insecticide vapors into the atmosphere. Such articles or devices generally  
burn or heat a liquid or solid substrate to vaporize the active ingredient. Examples  
include impregnated coils that are burned like e.g. insecticide coils or citronella oil  
25 comprising candles. The heating requirement may be perceived as inconvenient or  
even undesirable because of the fire risk or generation of smoke. Furthermore, these  
measures are of limited duration and ends when the coil or candle is burned up.

There are also insect controlling products that rely on passive evaporation of the  
30 insecticide from a substrate into the environment like e.g. impregnated paper  
substrates. These products have the advantage that they do not require external  
energy such as heat or electricity to release the insecticide into the atmosphere.

Passive emanators preferably have a consistent distribution profile, meaning that the amount of released insecticide remains more or less constant over time and does not decay too quickly and/or too much after first use or alternatively still releases an effective amount of insecticide after a prolonged period as this affects the effective lifetime of such a product. The ability of a passive emanator to control flying insects in a confined space is for e.g. assessed by the longevity of efficacy in relation to the amount of insecticide loaded onto the emanator and/or the volume of the confined space that the emanator can effectively cover, i.e. control insects in. Preferably emanators have good storability, i.e. the time the emanator can be stored without significant loss of efficacy.

EP 0792 581 A1 discloses an insect controller comprising a volatile insecticidal or insect repellent compound used without heating which is carried on a support with at least one through hole. The support can be made of paper, cloths or resin films.

WO 00/074490 discloses an insect control article comprising a non-absorbing substrate composed of a barrier material selected from polymeric film, aluminium and glass.

WO 2005/046332 discloses a cellulosic based substrate or matrix for controlling flying insects wherein the substrate or matrix is impregnated with an insecticidally effective amount of a vapor active pyrethroid in a specific carrier solvent or combination of carrier solvents.

There is a need for alternative and/or improved passive emanators for controlling flying insects.

### **Summary of the invention**

It has been found that a specific combination of substrate, vapor active pyrethroid and carrier solvent allows for a passive emanator that addresses part or all of the aforementioned requirements. Preferably the emanator has a specific spatial configuration as this provides for good release kinetics of the pyrethroid without any active (e.g. heating and/or use of power) means of distribution (e.g. a powered fan to create an airflow).

The present invention provides a passive emanator for controlling flying insects, the emanator comprising:

- a. a cellulosic based substrate; and
- b. a vapor active pyrethroid;

5 wherein the cellulosic based substrate:

- has a grammage of 200 to 400 gsm;
- has a caliper of 50 to 2000 micrometers; and
- comprises cellulose fibers having a weighted average fiber length of 0.5 to 10 mm; and

10 wherein the cellulosic based substrate is impregnated with an insecticidally effective amount of the vapor active pyrethroid in a carrier solvent system.

The invention also provides an emanator according to the present invention wherein the emanator is packaged and comprises packaging material enclosing the emanator  
15 into which material the vapor active pyrethroid does not migrate and/or is not absorbed.

The invention further provides a method of manufacturing a packaged emanator according to the present invention comprising the step of impregnating the cellulosic based substrate with the vapor active pyrethroid in a carrier solvent system followed by  
20 allowing at least part of the solvent to evaporate before packaging the emanator.

### **Brief Description of Drawings**

Fig. 1a and 2a show an emanator in the closed configuration (2D) showing the cut pattern.

25 Fig. 1b & 1c and 2b & 2c show the emanator in the open configuration (3D) with the 3 dimensional shape resulting from the applied cut pattern.

### **Detailed description of the invention**

The emanator of the present invention is a passive emanator meaning the vapor active  
30 pyrethroid is vaporized without heating or use of power. So, the emanator does not require artificially augmented air movement, e.g. by means of an electric fan, or heating, e.g. heating of the emanator by electrical means, for controlling flying insects like e.g. mosquitoes.

“Controlling flying insects” is defined as at least repelling and preferably incapacitating and/or killing flying insects. Preferably the insects are mosquitoes.

Cellulosic based substrate

5 The emanator of the present invention comprises a cellulosic based substrate that has a specific grammage and caliper and comprises cellulose fibers of a certain length. It has been found that such a substrate provides good evaporation characteristics of the vapor active pyrethroid and/or longevity of efficacy.

10 It was found that not all cellulosic based substrates provide the same evaporation characteristics.

Grammage is a well-known term in the paper industry and is defined as the paper density expressed in grams per square meter (gsm). Typical office paper for example  
15 has a grammage of about 80 gsm. The cellulosic based substrate used in the present emanator has a grammage of 200 to 400 grams per square meter (gsm). Preferably the grammage is 250 to 350 gsm and more preferably is 280 to 310 gsm.

Caliper refers to the thickness of the cellulosic based substrate and as such is a well-  
20 known term in the paper industry referring to paper thickness. The caliper of the substrate is 50 to 2000 micrometers. Preferably the caliper is 100 to 1500 micrometer and more preferably 200 to 1000 micrometer. An especially preferred caliper is 300 to 700 micrometers.

25 The cellulosic based substrate comprises cellulose fibers having a weighted average fiber length of 0.5 to 10 mm. The weighted average fiber length is determined using the method described in TAPPI T271 as published by the Technical Association of the Pulp and Paper Industry (TAPPI). Preferably the fiber length is 0.5 to 7 mm, more preferably 1 to 5 mm and even more preferably 1 to 4 mm, like for example about 2 mm.

30 Preferably at least 50% of the fibers in the cellulosic based substrate have the aforementioned fiber length, more preferably at least 80% and preferably the cellulosic based substrate essentially consists of cellulose fibers having the aforementioned fiber length.

An especially preferred cellulosic based substrate for use in the present passive emanator has a grammage of 270 to 310 gsm and a caliper of 300 to 600 micrometers and comprises cellulose fibers having a weighted average fiber length of 1 to 4 mm.

- 5 The cellulosic based substrate can be any suitable material that comprises cellulosic fibers complying with grammage, caliper and fiber length requirements. Preferably the cellulosic based substrate is paper, more preferably bleached paper.

Vapor active pyrethroid

- 10 The passive emanator of the present invention comprises a vapor active pyrethroid. Pyrethroids are insecticides that as such are known in the art. It will be appreciated that vapor active pyrethroids are those that are volatile at ambient temperature without heat or combustion.
- 15 Preferably the vapor active pyrethroid is selected from metofluthrin, transfluthrin, empenethrin, methothrin, tefluthrin, fenfluthrin and mixtures thereof. Preferably the pyrethroid is metofluthrin and/or transfluthrin.

- The emanator is impregnated with an insecticidally effective amount of the vapor active pyrethroid. Preferably the total amount of vapor active pyrethroid comprised in the emanator is 10 to 2000 mg, more preferably 20 to 1500 mg, even more preferably 30 to 1000 mg, still even more preferably 40 to 500 mg and even still more preferably 50 to 250 mg.
- 20

- 25 Preferably the cellulosic based substrate of the emanator is impregnated with a vapor active pyrethroid in an amount of 20 to 400,000 mg/m<sup>2</sup>, preferably 50 to 150,000 mg/m<sup>2</sup>, more preferably 100 to 50,000 mg/m<sup>2</sup> and even more preferably 500 to 6,250 mg/m<sup>2</sup>.

- 30 Preferably the vapor active pyrethroid is emanated into the environment at a rate of at least 0.040 mg/h, more preferably at least 0.075 mg/h, even more preferably at least 0.1 mg/h and still more preferably at least 0.2 mg/h for at least 1 week, more preferably at least 2 weeks, even more preferably at least 3 weeks and even more preferably at

- least 4 weeks after first use and at a temperature in the range of 18 to 40 °C. Like for example at least 0.040 mg/h for at least 1 week at a temperature in the range of 18 to 40 °C or at least 0.040 mg/h for at least 4 weeks at a temperature in the range of 18 to 40 °C. Or for example at least 0.1 mg/h for at least 1 week at a temperature in the range of 18 to 40 °C or at least 0.1 mg/h for at least 4 weeks at a temperature in the range of 18 to 40 °C. Or for example at least 0.2 mg/h for at least 1 week at a temperature in the range of 18 to 40 °C or at least 0.2 mg/h for at least 4 weeks at a temperature in the range of 18 to 40 °C.
- 10 Preferably the emanation rate is at a temperature in the range of 20 to 35 °C.

#### Carrier solvent

- The emanator is impregnated with an insecticidally effective amount of the vapor active pyrethroid in a carrier solvent system meaning that the effective amount of pyrethroid is dissolved in a carrier solvent and the cellulosic based substrate is sub-sequentially impregnated with the resulting mixture. "Impregnated/impregnating" is defined as applying the resulting mixture to the cellulosic based substrate, e.g. by spraying, such that the vapor active pyrethroid is distributed, preferably evenly, throughout the cellulosic based substrate.

20

Part or all of the carrier solvent will evaporate leaving the vapor active pyrethroid behind and the emanator according to the present invention ready for use.

- Preferably the carrier solvent system is selected from one or combination of solvents having an evaporation rate according to ASTM D3539-87 of less than 1.0 and a Snyder polarity index of 0.0 to 4.0.

- Preferably the carrier solvent system is selected from one or a combination of dipropylene glycol dimethyl ether, propylene carbonate, ethanol, isopropyl alcohol, acetone, 2-butanone, ethyl acetate, cyclohexane, hexane and heptane. Dipropylene glycol dimethyl ether and propylene carbonate are especially preferred. Dipropylene glycol dimethyl ether can be obtained as Proglyde™ from the Dow Chemical Company.

### Spatial configuration

Preferably the shape of the cellulosic based substrate forming the emanator is such that it forms an essentially continuous sheet when it is in a 2 dimensional shape (Fig. 1a and 2a), the sheet comprising one or more cuts such that when it is in a 3 dimensional shape the plane of the substrate is essentially perpendicular to a rising or falling air flow such that it allows the emanator to spin around its axis, the axis being in the direction of the airflow (Fig. 1b, 1c, 2b, 2c).

It can thus be appreciated that the emanator can be in a collapsed state (i.e. 'closed configuration') resulting in an essentially continuous flat sheet that when expanded by pulling it open (i.e. 'open configuration') opens up into a 3 dimensional shape. The closed configuration can be used to store and/or distribute the emanator requiring less space and effectively evaporating less vapor active pyrethroid. When in use the open configuration is used as this allows a rising or falling air flow to make the emanator spin around its axis.

The emanator can suitably be constructed from two sheets of cellulosic based substrate like for example paper attached to one another at one or more continuous or discrete areas using for example adhesive and/or mechanical means like staples, see Fig. 1a and 2a. One or more cuts are then applied that allow the two sheets to be pulled open and form a 3 dimensional shape with the plane of the substrate being essentially perpendicular to a rising or falling air flow such that it allows the emanator to spin around its axis, the axis being in the direction of the airflow, see Fig. 1b, 1c, 2b and 2c.

### Total surface area

"Total surface area" is defined as the total geometric or two-dimensional surface area of the cellulosic based substrate being exposed to the surrounding air when in the 3 dimensional shape. For example, a 10x10 cm flat sheet of paper has a total surface area of 200 cm<sup>2</sup>. It will be appreciated that the total surface area of an emanator constructed from two sheets of paper each measuring 10x10 cm and the two sheets being attached to one another at 10 cm<sup>2</sup> has to be calculated as follows: (2x2x10x10) minus (2x10).

Preferably the cellulosic based substrate has a total surface area of 50 to 5000 cm<sup>2</sup>, more preferably 100 to 4000 cm<sup>2</sup>, even more preferably 200 to 3000 cm<sup>2</sup>, still even more preferably 300 to 2000 cm<sup>2</sup> and even still more preferably 400 to 1000 cm<sup>2</sup>.

5    Packaged emanator

The invention also provides for an emanator according to the invention wherein the emanator is packaged and comprises packaging material enclosing the emanator into which material the vapor active pyrethroid does not migrate and/or is not absorbed.

10   The packaging material prevents the vapor active pyrethroid to evaporate into the environment and allows for storage and/or distribution without the emanator losing its efficacy. It is preferred that the emanator is in its collapsed state (i.e. 'closed configuration') when it is comprised in the packaging material.

15   The packaging material can be any suitable material into which material the vapor active pyrethroid does not migrate and/or is not absorbed, like for example plastic, metal foil or laminates although the latter is less preferred because of difficulty with recycling.

20   Method of manufacturing

The invention further provides a method of manufacturing the packaged emanator according to the present invention comprising the step of impregnating the cellulosic based substrate with the vapor active pyrethroid in a carrier solvent system followed by allowing at least part of the solvent to evaporate before packaging the emanator.

25

As mentioned above the emanator is impregnated with an insecticidally effective amount of the vapor active pyrethroid in a carrier solvent system meaning that the effective amount of pyrethroid is dissolved in a carrier solvent and the cellulosic based substrate is sub-sequentially impregnated with the resulting mixture.

30

The amount of vapor active pyrethroid and carrier solvent system used can vary and e.g. may take into account the desired amount of vapor active pyrethroid to be present

in the emanator and/or the total surface area of the emanator that needs to be sprayed with the mixture of vapor active pyrethroid and carrier solvent system.

Preferably the weight ratio of vapor active pyrethroid to carrier solvent system is 0.01 to 0.9, preferably 0.02 to 0.5 and more preferably 0.04 to 0.4. For example a mixture of 70 mg of transfluthrin and 1600 mg of dipropylene glycol dimethyl ether will have a weight ratio of vapor active pyrethroid to carrier solvent system of 0.044 (i.e. 70/1600).

The invention will now be illustrated by means of the following non limiting examples.

10

### **Examples**

#### Emanator structure

The passive emanator used in the examples below is based on paper having a flat structure according to Fig. 1a that could be pulled open using the central 'butterfly' to give a spherical shaped lantern structure according to Fig. 1b and 1c.

The paper used had a grammage of about 290 gsm, caliper of 438 micrometer and fiber length of about 2 mm.

20

The exposed surface area includes both sides of both halves of the lantern with the exception of the glued outer rim where only one side of each half are exposed to air.

The surface area of the cellulosic structure in Fig. 1 is as follows:

The total surface area of one side is 168 cm<sup>2</sup>.

25 The area of the central circular cut region is 95 cm<sup>2</sup>, so for 4 sides this results in 380 cm<sup>2</sup> of exposed surface for evaporation.

The area of one side of the outer rim is 73 cm<sup>2</sup> (168-95) and 146 cm<sup>2</sup> for two sides.

The overall total surface area for evaporation is thus 526 cm<sup>2</sup>.

#### 30 Examples 1 to 2: Evaporation rate

A study involving the emanator as described above with different amounts of transfluthrin was conducted. Two structures were dosed with transfluthrin (250, 70 mg) using 500 mg Proglyde™ DMM solvent (Dow Chemicals) as the carrier solvent system

by pipetting the mixture onto one side. Products were packed in polyethylene wrap. Structures were then aged in a chamber at 31 °C, 58% relative humidity and the evaporation rates were determined as shown in the Table 1 below.

5 Table 1

| Example | Transfluthrin level<br>(mg) | Average evaporation rate (mg/hr) |        |        |
|---------|-----------------------------|----------------------------------|--------|--------|
|         |                             | Week 1                           | Week 2 | Week 3 |
| 1       | 250                         | 0.38                             | 0.39   | 0.37   |
| 2       | 70                          | 0.26                             | -      | -      |

### Example 3: Efficacy data

The effects of the emanator as described above but now loaded with 205 mg transfluthrin was evaluated against 3-4 days old female *Aedes aegypti* and *Culex quinquefasciatus* mosquitoes in 30 m<sup>3</sup> test units at a temperature of 27 - 31 °C and relative humidity of 60 - 75 %. The knock down was measured after the product had been aged under the same conditions as the test for different lengths of time up to 4 weeks. The results for both mosquitoes show >100% KD up to 28 days.

15    Examples 4 to 7 and comparatives A and B: efficacy comparison against a coil

The effects of the emanator described above (amount of transfluthrin (TFT) is given in Table 2 and 3) was evaluated against 3-4 days old female *Aedes aegypti* and *Culex quinquefasciatus* mosquitoes in an 8 m<sup>3</sup> test unit at a temperature of 27 - 31 °C and relative humidity of 60 - 64 %. The knock down was measured over a 24hr period and data are shown in tables 2 and 3 below.

Table 2

[illegible]

Table 3

[illegible]

**Claims**

1. Passive emanator for controlling flying insects, the emanator comprising:
  - a. a cellulosic based substrate; and
  - b. a vapor active pyrethroid;wherein the cellulosic based substrate:
  - has a grammage of 200 to 400 gsm;
  - has a caliper of 50 to 2000 micrometers; and
  - comprises cellulose fibers having a weighted average fiber length of 0.5 to 10 mm; andwherein the cellulosic based substrate is impregnated with an insecticidally effective amount of the vapor active pyrethroid in a carrier solvent system.
2. Emanator according to claim 1 wherein the shape of the cellulosic based substrate forming the emanator is such that it forms an essentially continuous sheet when it is in a 2 dimensional shape, the sheet comprising one or more cuts such that when it is in a 3 dimensional shape the plane of the substrate is essentially perpendicular to a rising or falling air flow such that it allows the emanator to spin around its axis, the axis being in the direction of the airflow.
3. Emanator according to claim 1 or 2 wherein the vapor active pyrethroid is selected from metofluthrin, transfluthrin, empenethrin, methothrin, tefluthrin, fenfluthrin and mixtures thereof.
4. Emanator according to any one of claims 1 to 3 wherein the grammage is 250 to 350 gsm and more preferably 280 to 310 gsm.
5. Emanator according to any one of claims 1 to 4 wherein the caliper is 100 to 1500 micrometers, preferably 200 to 1000 micrometers and more preferably 300 to 700 micrometers.

6. Emanator according to any of claims 1 to 5 wherein the cellulose fibers have a weighted average fiber length of 0.5 to 7 mm, preferably 1 to 5 and more preferably 1 to 4 mm.
7. Emanator according to any one of claims 1 to 6 wherein the carrier solvent system is selected from one or combination of solvents having an evaporation rate according to ASTM D3539-87 of less than 1.0 and a Snyder polarity index of 0.0 to 4.0.
8. Emanator according to any one of claims 1 to 7 wherein the carrier solvent system is selected from one or a combination of dipropylene glycol dimethyl ether, propylene carbonate, ethanol, isopropyl alcohol, acetone, 2-butanone, ethyl acetate, cyclohexane, hexane and heptane.
9. Emanator according to any one of claims 1 to 8 wherein the cellulosic based substrate has a total surface area of 50 to 5000 cm<sup>2</sup>, preferably 100 to 4000, more preferably 200 to 3000, even more preferably 300 to 2000 and still even more preferably 400 to 1000.
10. Emanator according to any one of claims 1 to 9 wherein the total amount of vapor active pyrethroid is 10 to 2000 mg, preferably 20 to 1500, more preferably 30 to 1000, even more preferably 40 to 500 and still even more preferably 50 to 250.
11. Emanator according to any one of claims 1 to 10 wherein the emanator is packaged and comprises packaging material enclosing the emanator into which material the vapor active pyrethroid does not migrate and/or is not absorbed.
12. Method of manufacturing an emanator according to claim 11 comprising the step of impregnating the cellulosic based substrate with the vapor active pyrethroid in a carrier solvent system followed by allowing at least part of the solvent to evaporate before packaging the emanator.

13. Method according to claim 12 wherein the weight ratio of vapor active pyrethroid to carrier solvent system is 0.01 to 0.9, preferably 0.02 to 0.5 and more preferably 0.04 to 0.4.

1/2

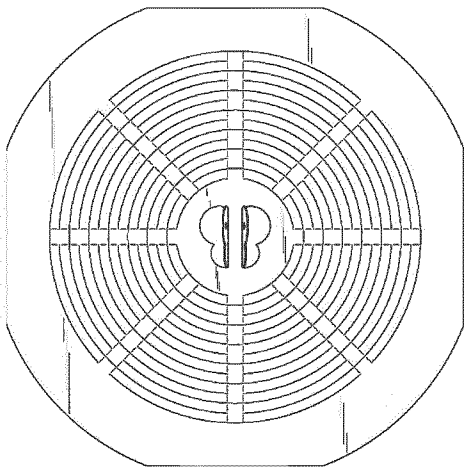


Fig. 1a

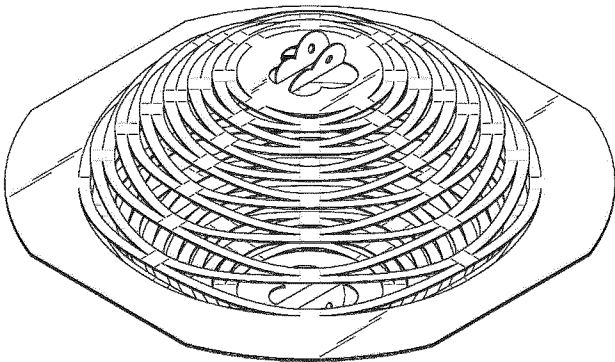


Fig. 1b

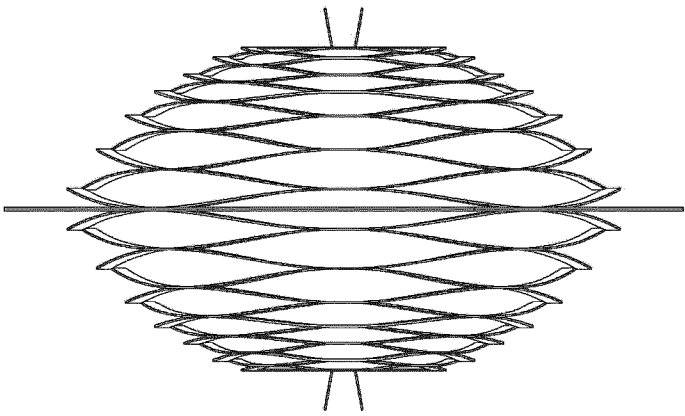


Fig. 1c

2/2

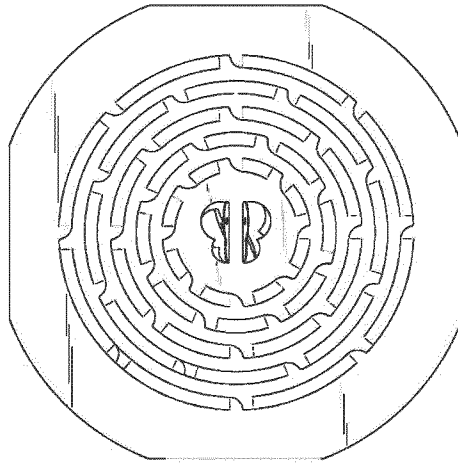


Fig. 2a

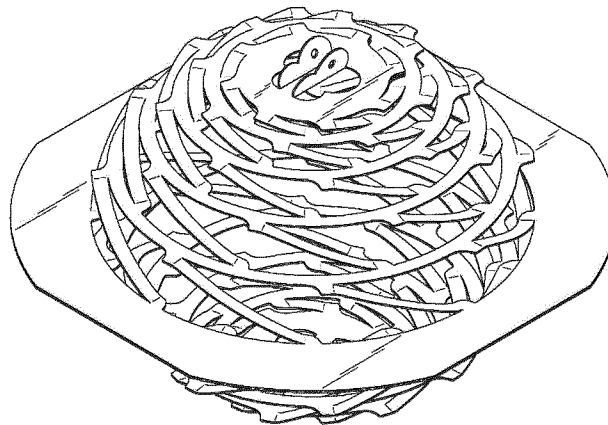


Fig. 2b

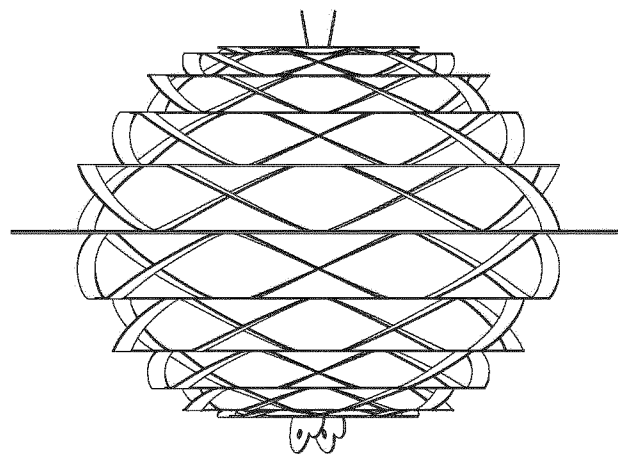


Fig. 2c

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2018/050420

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A01M1/16 A01M1/20  
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
A01M A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Relevant to claim No. |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A         | <p>WO 2005/046332 A1 (RECKITT BENCKISER AU PTY LTD [AU]; BALAKRISHNAN KRISHANTHI [AU]; BOWMA) 26 May 2005 (2005-05-26) cited in the application</p> <p>In a first aspect, the present invention is directed to a cellulosic based substrate or matrix for controlling flying insects, the cellulosic based substrate or matrix impregnated and/or dosed with a vapour active pyrethroid in a carrier solvent, wherein the cellulosic based substrate or matrix has a surface area in the range of 50 5000 cm<sup>2</sup> and the vapour active pyrethroid is present in an amount of approximately 2.0-3000 mg/m<sup>2</sup> such that the vapour active pyrethroid is emanated into an environment with non-augmented air movement at a rate of at least approximately 0.040 mg/h at a temperature</p> <p>-/--</p> | 1-13                  |



Further documents are listed in the continuation of Box C.



See patent family annex.

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## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2018/050420

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Relevant to claim No. |
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| A         | <p>in the range of approximately 18-40 C.</p> <p>-----</p> <p>WO 2005/053390 A1 (RECKITT BENCKISER AU PTY LTD [AU]; BALAKRISHNAN KRISHANTHI [AU]; BOWMA) 16 June 2005 (2005-06-16) claims 1,2,12-23</p> <p>-----</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1-13                  |
| A         | <p>WO 2006/134353 A1 (RECKITT BENCKISER AU PTY LTD [AU]; RECKITT BENCKISER UK LTD [GB]; BOWM) 21 December 2006 (2006-12-21)</p> <p>Generally, monofilament polyesters or polyamides do not wet easily and are therefore unsuitable for use in this invention, particularly when using a dosing technique that relies on the distribution of the vapour active solution throughout the substrate by capillary action. Another associated advantage with multifilament polyester or polyamide substrates is that vapour active substances such as pyrethroids will vapourise to a point where there is no residual substance remaining on the substrate. When multifilament polyester or polyamide substrates are dosed with, for example, vapour active pyrethroids in a carrier solvent, they evaporate to completion. This is contrary to what is observed with cellulosic based substrates whereby a small amount of the pyrethroid remains absorbed to the substrate and is unavailable for release under ambient conditions.</p> <p>-----</p> | 1-13                  |
| A         | <p>CN 106 231 898 A (JOHNSON &amp; SON INC S C) 14 December 2016 (2016-12-14) paragraphs [0041], [0043]</p> <p>-----</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1-13                  |

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Information on patent family members

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