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(54) Title: REODORIZING ANIMAL REPELLENT PROCESS AND PRODUCT

(57) Abstract

A reodorizing process and product for repelling animals wherein a composition comprising gamma-n-alkyl-gamma-butyrolactone and/or delta-n-alkyl-delta-valerolactone, d'-limonene, at least one other essential oil and a mineral oil diluent are applied to a selected area, dog or cat for purposes of reodorizing and thereby repelling such animals.

UNIQUEMENT A TITRE D'INFORMATION

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REODORIZING ANIMAL REPELLENT PROCESS AND PRODUCT

BACKGROUND OF THE INVENTION

Modern day living is complicated by the presence of animals sharing the same living spaces as man. Particularly in urban areas, where there is a high number of domestic dogs and cats, the problem of uncontrolled animal droppings is a significant hazard to health and safety of the human population. Where it is the custom to allow these animals to relieve themselves on public walkways and on private driveways, lawns, and other areas, the problem becomes more dangerous and actue. Oftentimes, the owner of an animal confined to a specific area wishes to keep his animal away from certain parts of the property, such as flower beds and the like. To control such droppings, there is a continuous need for a safe, yet effective substance to deter an animal from relieving itself at unwanted places and thus causing it to go elsewhere. Such substances are termed "repellents", and this invention deals with a class of improved ones.

Heretofore, it has been common practice to deter an animal by covering the area to be protected with a foul-smelling substance that more often than not is highly objectionable to human beings as well. With no known exception, foul-smelling materials have varying degrees of toxicity and are thus subject to hazard labeling requirements by controlling governmental agencies regulating pesticides and animal repellents. They must be handled with care, often by wearing protective clothing including gloves, and, as economic poisons, they must be kept away from children. Some of the substances presently marketed as animal repellents also are harmful to certain classes of vegetation, and thus they cannot be used to keep animals away from these plants and must be used with caution.

U.S. Patent 3,923,997 surveys the entire field of animal repellents in considerable detail and then describes a class of animal repellents known as lactones which are both safe to the environment and highly effective.

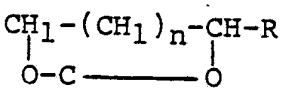
While there is no scientific evidence given in the above cited patent to prove the point, it is believed, first, that a dog, for example, seeks out the scent of droppings left by previous ones as a trigger to relieve itself. Many animals are known to be territorially controlled by the odors of urine and feces left by other animals in the same families and of the same species. The lactones used in the foregoing patent have a prevailing odor of their own which appears to mask or reodorize the smell of earlier deposits and thereby confuses an animal into not finding the trigger scent it seeks. Thus, the animal continues to wander about seeking a true odor of earlier deposits. If an area previously used by animals to relieve themselves has been covered uniformly with these lactones, a dog will leave the

area to perform its natural body functions elsewhere. This act will be accomplished entirely by masking a previous odor with a material almost wholly undetected by humans and with no hazard to the applicators, the animals involved, or to plants and the environment.

The great advantage of the lactones is their safety. Occuring both naturally in fruits and also synthesized by organic chemists, the lactones are classed as essential oils and are approved as food additives by governmental regulatory bodies. Rigorous laboratory tests with various animals have proven their benign nature and their effectivities. It is the purpose of this invention to improve upon the use of these lactones to permit larger areas to be covered than was possible up to now, and for longer periods of time. In this manner, we have been able to deter dogs from relieving themselves on treated areas for up to thirty days with as little as one-tenth the weight of repellent per square food as recommended by the most popular commercial repellent currently being sold in the United States. This competitive product is foul-smelling and toxic to certain classes of vegetation, and the labeling on the commercial product recommends it be applied with gloves and not be stored indoors.

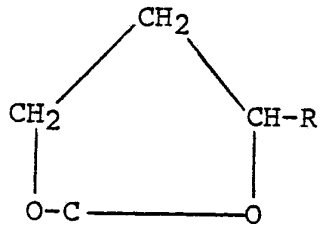
DESCRIPTION OF THE INVENTION

In accordance with this invention, there is provided a product for repelling dogs and cats comprising certain lactones, namely those selected from the group consisting of gamma-n-alkyl-gamma-butyrolactone and delta-n-alkyl-delta-valerolactone having the formula:



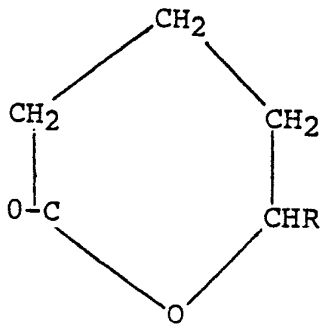
wherein n is a number from 1 to 2, and R is a straight-chain alkyl group having from about 1 to about 8 carbon atoms, said compound being present in an amount sufficient to repel a dog or cat together with d'-limonene in an amount in the range of about 20 to about 50 times by weight of said lactones, at least one essential oil in amount sufficient to control the vapor pressure of the lactones to maximise the effective life of such lactones, and, a mineral oil carrier for the other constituents being present in the range of about 1 to about 6 times the weight of such constituents. When the product is applied to a selected area or to the animals themselves, it will act as an effective long lasting nontoxic repellent.

In the foregoing formula, when n is 1, the compound is a gamma-n-alkyl-gamma-butyrolactone having the formula:



and R is a straight-chain alkyl group having from 2 to 8 carbon atoms.

When n is 2, the compound is a delta-n-alkyl-delta-valerolacetone having the formula:



and R is preferably a straight-chain alkyl group having from 2 to 7 carbon atoms.

The R groups are ethyl, n-propyl-n-butyl, n-amyl, n-hexyl, n-heptyl and n-octyl.

Exemplary compounds which can be employed in accordance with the invention alone or in admixture include gamma-undecalactone(gamma-n-heptyl-gamma-butyrolactone), gamma-n-hexyl-gamma-butyrolactone, gamma-n-octyl-gamma-butyrolactone, gamma-n-amyl-gamma-butyrolactone, gamma-n-butyl-gamma-butyrolactone, gamma-n-propyl-gamma-butyrolactone, gamma-ethyl-gamma-butyrolactone, delta-undecalactone(delta-n-hexyl-delta-valerolactone, delta-n-heptyl-delta-valero-lactone, and delta-n-alkyl-delta-valerolactone.

The odors of the two lactones comprise the primary animal repellents. The d'-limonene is a short-lived essential oil having a distinct odor of lemon and is used as an indicator to the one applying the product that the mixture has been properly applied to the area being protected. After several days, the d'-limonene has fully evaporated and the lemon odor disappears. The remaining oils are used to alter the vapor pressures of the two lactones and their other physical characteristics such that the rate of evaporation of the lactones is controlled as desired. Evaporation of the specific liquid is a function of such things as temperature, pressure and humidity as well as the surface characteristics of the particular carrier

chosen. Mixtures of liquids display different rates of evaporation than their components.

In one embodiment of this invention, the above-listed essential oils, including the two lactones, are diluted with a clear white mineral oil to form a sprayable mixture having improved properties over previously available repellents. For one, the mixture is nonstaining to most fabrics and thus can be used indoors. Also, the effectivity is maintained for periods of a month or more compared to only hours or at the most days for competitive products.

In a preferred form of the invention to enable the product to be broadcast over large surfaces, the composition can also include an inert solid adsorbent carrier present in the range of about 1 to about 6 times the weight of the foregoing described other constituents. Too little liquid adsorbed in the carrier will never come out and too much liquid applied to the carrier will not be fully adsorbed. Such carriers can be selected from the group consisting of kieselguhr, diatomaceous earth, calcium carbonate, kaolin, attapulgite clay, montmorillonite clay, and silica, of which granular attapulgite clay ideally of 16/30 mesh is preferred because of its ease of handling and ability to spread evenly and adsorb a relatively large amount of the other constituents, and its functioning as a controlled site of repellant evaporation.

The composition of this invention can be handled without any undue precautionary steps (other than keeping it away from children) and its has no objectionable odor. When sprinkled over the areas to be covered, the adsorbed essential oils, including the two lactones contained in the formulation, are evaporated and released to the atmosphere in a slow controlled manner so that effectivity is maintained

over long periods of time up to a month or more. The oil ingredients being immiscible in water are unaffected by the moisture caused by rain and hosing, and thus the product is effective despite them.

SPECIFIC EXAMPLES

The following specific examples illustrates the effectiveness of the invention.

EXAMPLE 1

The following essential oil constituents are mixed together:

Constituent	Typical Percent (by weight)
gamma-n-amyl-gamma-butyrolactone	1.00
gamma-n-heptyl-gamma-butyrolactone	0.49
d'-limonene	82.00
Anethole	3.00
Benzaldehyde	5.00
Cinnamic alcohol	2.00
Ethyl benzoate	3.00
Oil of Pennyroyal	2.00
Musk ambrette	0.49
Vanillin	1.00

The above formulation was mixed with a clear white mineral oil to form a mixture wherein the essential oils listed above comprise 17.6% of the total by weight and the mineral oil the remaining 82.4%. The active lactone ingredients in this embodiment together constitute 1.5% of the whole. When sprayed on the ground, this composition was found effective in deterring dogs when applied at amounts ranging from 1 to about 100 grams per 100 square feet of treated area.

EXAMPLE 2

The composition of Example 1, including the mineral oil, was mixed with attapulgite clay having a mesh size of 16/30 to result in a material having the following analysis:

Mixture of essential oils as cited in Example 1	4.896% (by weight)
Clear mineral oil	22.940
Attapulgas clay	72.164

In this embodiment, the essential oils and the mineral oil diluent are mixed with the clay in any conventional mixing machine. The oils are adsorbed into the clay. In the proportions cited, the resulting product is slightly moist to the touch and has a decided odor of lemon. When sprinkled on the surface to be treated at concentrations ranging from one pound for 100 to 1,000 square feet, an effective protection is reached for periods of time ranging up to a month or more. In very hot weather, the effective time is slightly less than that achieved in cooler weather because of accelerated evaporation. Nevertheless, the product remained effective for three weeks when tested on ocean front beach sands at temperatures above 110 degrees F.

Whereas there have been described two embodiments of the invention, it is clear that the essential oils can be used in many different carriers other than the mineral oil for spraying and the clay for dispersing. The oils can be impregnated into paper, cloth or plastic tapes and sheets for repelling animals in the vicinity. Such sheets could be used indoors under seat cushions and furniture to discourage animals from relieving themselves thereabouts. The oils could also be encapsulated within fragile "microspheres" to be

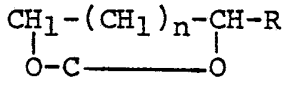
released when the animal crushes the carriers and activates the stored repellent. Such "slow release" techniques are widely used in lawn chemicals and various medications.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description; and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

Claims

1. A process for repelling dogs and cats from a selected area or from each other, which comprises applying to the surface of a selected area, dog or cat to be made repellent a composition comprising:

(a) an amount sufficient to repel said dog or cat of a compound selected from the group consisting of gamma-n-alkyl-gamma-butyrolactone and delta-n-alkyl-delta-valerolactone having the formula:



wherein n is a number from 1 to 2, and R is a straight-chain alkyl group having from about 1 to about 8 carbon atoms;

(b) d'-limonene in an amount at least equal to the amount of constituents (a);

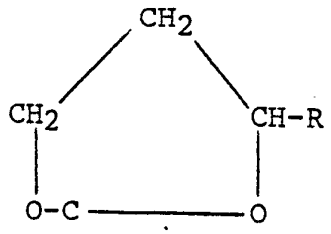
(c) at least one additional essential oil in amount sufficient to control the vapor pressure of constituents (a) to avoid undue evaporation; and,

(d) a mineral oil carrier for constituents (a), (b) and (c), said carrier being present in the range of about 1 to about 6 times the weight of such constituents.

2. A process according to Claim 1, wherein said composition further comprises an inert solid carrier present in the range of about 1 to about 6 times the weight of constituents (a) through (d).

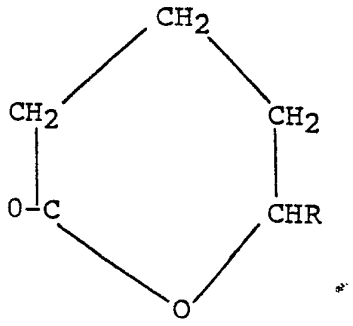
3. A process according to Claim 1, in which R is a straight-chain alkyl group having from about 5 to about 7 carbon atoms.

4. The process according to Claim 1, in which constituent (a) is a gamma-n-alkyl-gamma-butyrolactone having the formula:



and R is a straight-chain alkyl group having from 2 to 8 carbon atoms.

5. The process according to Claim 1, in which the compund is a delta-n-alkyl-delta-valerolactone having the formula:



and R is a straight-chain alkyl group having 2 to 7 carbon atoms.

6. The process according to Claim 1, in which constituent (a) is gamma-n-heptyl-gamma-butyrolactone.

7. The process according to Claim 1, in which constituent (a) is gamma-n-amyl-gamma-butyrolactone.

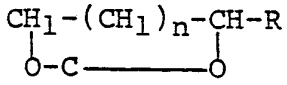
8. The process according to Claim 1, in which constituent (a) is a mixture of gamma-n-heptyl-gamma-butyrolactone and gamma-n-amyl-gamma-butyrolactone.

9. The process according to Claim 2, in which the composition is applied in an amount within the range from about 1 to about 0.1 lb./100 sq.ft. of surface.

10. The process according to Claim 1 in which the essential oil is one or more of the essential oils selected from the group consisting of anethole, benzaldehyde, cinnamic alcohol, ethyl benzoate, oil of pennyroyal, musk ambrette, and vanillin.

11. A product for repelling dogs and cats from a selected area of from each other comprising:

(a) an amount sufficient to repel said dog or cat of a compound selected from the group consisting of gamma-n-alkyl-gamma-butyrolactone and delta-n-alkyl-delta-valerolactone having the formula:



wherein n is a number from 1 to 2, and R is a straight-chain alkyl group having from about 2 to 8 carbon atoms;

(b) d'-limonene in an amount in the range of about 20 to about 50 times by weight of constituent (a);

(c) at least one essential oil in amount sufficient to control the vapor pressure of constituent (a); and

(d) a mineral oil carrier for constituents (a), (b) and (c), said carrier being present in the range of about 1 to about 6 times the weight of such constituents.

12. A product according to Claim 11, wherein said composition further comprises an inert solid carrier present in the range of about 1 to about 6 times the weight of constituents (a) through (d).

13. A product according to Claim 11, in which R is a straight-chain alkyl group having from about 5 to about 7 carbon atoms.

14. The product according to Claim 11, in which constituent (a) is gamma-n-heptyl-gamma-butyrolactone.

15. The product according to Claim 11, in which constituent (a) is gamma-n-amyl-gamma-butyrolactone.

16. The product according to Claim 11, in which constituent (a) is a mixture of gamma-n-heptyl-gamma-butyrolactone and gamma-n-amyl-gamma-butyrolactone.

17. The product according to Claim 12, wherein said inert solid carrier is attapulgite clay.

18. A product according to Claim 11 in which the essential oil is one or more of the essential oils selected from the group consisting of anethole, benzaldehyde, cinnamic alcohol, ethyl benzoate, oil of pennyroyal, musk ambrette, and vanillin.

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 85/01489

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: A 01 N 43/16; A 01 N 43/08 // (A 01 N 43/16, 27:00) (A 01 N 43/08, 27:00)

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	A 01 N

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	US, A, 3923997 (W.C. MEULY) 2 December 1975, see column 3, lines 1-21; column 4, lines 19-41; column 4, line 66 - column 5, line 26; examples 3-5,8,9,12,13,16; claims (cited in the application)	1-18
A	GB, A, 1367842 (WEEDMASTER WESTERN LTD.) 25 September 1974, see page 2, lines 87-94; page 2, line 127 - page 3, line 39; claims 1,7-9	1

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* Special categories of cited documents: [10]

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
7th November 1985	04 DEC. 1985
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	G.L.M. Kruydenberg

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/US 85/01489 (SA 10392)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 25/11/85

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3923997	02/12/75	CA-A- 969471	17/06/75
GB-A- 1367842	25/09/74	CA-A- 978475	25/11/75