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PROVISIONAL SPECIFICATION

Improvements in or relating to Vaporising and Disseminating Pest Combating Compounds

We, JOHN GILLIES, of 120, Argyle Road, Saltcoats, Ayrshire, Scotland, WILLIAM THOMAS CUNNINGHAM of "The Haining", 81, High Road, Saltcoats, Ayrshire, Scotland, both British Subjects, and IMPERIAL CHEMICAL INDUSTRIES LIMITED of Imperial Chemical House, Millbank, London, S.W.1, a British Company, do hereby declare the nature of this invention to be as follows:—

The present invention relates to the art of vaporising and disseminating pest combating compounds, and is applicable to thermally vaporisable liquid compounds lethal or repellant to animal, vegetable, bacterial, fungoid or virus, the animal pests including for instance, insects, spiders, beetles and the like.

Recently there have been introduced fumigating compositions consisting essentially of mixtures of a thermally vaporisable pesticidal compound with a suitable solid composition capable of undergoing a self-sustained gas-evolving exothermic non-detonating decomposition when a portion of mass of the composition is heated, the heat and gases from which serve to vaporise and disseminate the pesticide. Hitherto, however, it has only been practicable to employ in this way pesticidal compounds that are solid at ordinary atmospheric temperatures, since in the case of normally liquid compounds of this nature in general only a very small proportion can be retained by the solids capable of said self-sustaining decomposition, without exuding from them. It will be understood that if only a small percentage of a vaporisable compound is present in association with the solid ingredients adapted to undergo self-sustaining exothermic gas evolving non-detonating decomposition, the amount of latent heat absorbed in vaporising the vaporisable compound will be correspondingly small; and that except in the case of compositions based on ingredients capable of undergoing such exothermic decompositions at exceptionally low temperatures, the vaporisable compound may accordingly undergo severe thermal decompositions. Thus the presence of a substantial percentage of a vaporisable organic compound in the composition may be necessary to reduce the reaction temperature sufficiently to prevent the compound being largely decomposed into useless products, quite apart from the obvious consideration that it is desirable on economic grounds that the proportion of the vaporisable compound in the composition should be as high as can efficiently be vaporised from it.

According to the present invention a composition for vaporising and disseminating a thermally vaporisable liquid compound of pest combating characteristics comprises a solid compound or mixture of solid compounds capable of undergoing self-sustained gas-evolving exothermic non-detonating decomposition when locally heated, and a liquid thermally vaporisable compound of pest combating characteristics absorbed in a solid carrier, this carrier being present in amount sufficient to prevent its exudation therefrom.

According to one form of the invention the solid carrier may be a solid inorganic or organic material of porous structure on which the liquid has no solvent effect, for instance kieselguhr, low density wood flour, charcoal, silica gel or the like.

According to another form of the invention the solid absorbent may be an organic colloid on which the liquid has an unlimited solvent effect, so that the colloidal absorbent can hold a substantial quantity of liquid without forming a composition so fluid as to flow under small stresses. According to this form of invention the solid compound or compounds capable of self-sustaining exothermic decomposition may conveniently be distributed through the resulting plasticised colloid by mechanical working

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provided that the latter becomes workable at a temperature substantially below that at which the decomposition of the ingredients of the said solid compound or compounds can be initiated. Alternatively, the distribution of the said compound or compounds may be accomplished with the aid of a solvent for the colloid that is volatile at ordinary temperatures, which is subsequently evaporated off. Compositions in accordance with this form of the invention may be fashioned into rods or the like by extrusion. Organic colloids for the purpose may include for instance cellulose esters, cellulose ethers, polymerised unsaturated compounds, proteins, gums and the like depending on the nature of the liquid pest control compound.

As the compound or mixture of compounds are capable of self-sustaining exothermic decomposition it is preferred to use compositions yielding little ash and capable in the undiluted state of yielding decomposition products at temperatures not exceeding about 1000° C.

Compositions based on mixtures of ammonium nitrate and a chromium compound capable of sensitising the self-sustaining exothermic gas-evolving non-detonating decomposition of ammonium nitrate are specially suitable, since their decomposition is flameless and is easily initiated, while the temperatures produced by the decomposition of these mixtures are very moderate; but compositions based on compounds or mixtures producing somewhat higher temperatures, preferably without the appearance of a flame, may also be used, for instance compositions based on the decomposition of ammonium dichromate; or based on the decomposition of guanidine nitrate or nitroguanidine mixtures with various solid decomposition sensitising agents as proposed in Specification No. 620,600 (Application No. 24123/46).

The invention is further illustrated by the following examples in which the parts are parts by weight.

EXAMPLE 1.

This example illustrates the employment of liquid insecticide known as "Thanite", which to the extent of about 85% is isobornyl-thiocyano-acetate.

Balsa wood flour - -	33%
"Thanite" - - -	17
Ammonium nitrate - -	25
Ammonium dichromate -	18.3
Potassium dichromate -	2.5
Cuprous chloride - -	4.2

The solid ingredients were all fine enough to pass a 25 mesh B.S.S. screen.

The "Thanite" was first absorbed into the Balsa wood flour, and the resulting loose product and the rest of the ingredients were mixed mechanically together and pressed into the form of a cake at a pressure of about 2 tons per sq. inch. and wrapped in waxed paper composition. The resulting product, which in cake form was somewhat friable, volatilised and dispersed the insecticide in a stream of steam, nitrogen and other gases without flame when the decomposition was initiated by local heating with the flame of a match for about 15 seconds. The fumes generated by the cake were effective against flies.

EXAMPLE 2.

Kieselguhr - - -	16%
"Thanite" - - -	16
Ammonium nitrate - -	47
Potassium chromate - -	5
Gamma isomer of benzene hexachloride - -	16

The "Thanite" was first absorbed into the kieselguhr and the resulting product and the rest of the ingredients, which were all solids, were mixed together and pressed into cake form in the fashion of the preceding example. The fumes generated by the decomposition of the cake disseminated both the "Thanite" and the Gamma isomer of benzene hydrochloride, of which the latter deposits a very thin solid coating on exposed surfaces that lasts for a long time and is lethal to flies crawling over said surfaces, but does not act upon them so rapidly as the "Thanite", which effects an immediate kill.

EXAMPLE 3.

Kieselguhr - - -	29.5%
"Thanite" - - -	20
Ammonium nitrate -	25
Ammonium dichromate -	18.3
Potassium dichromate -	2.5
Cuprous chloride - -	4.2
Asbestos - - -	0.5

The product was mixed, pressed and packed in the manner indicated in the preceding Examples.

EXAMPLE 4.

Nitrocellulose of 12% nitrogen content and viscosity 100-200 poises as measured at 20° C. in a concentration of 4 gm. per 100 c.c. aqueous acetone of 95% acetone content by volume - - - -	2.7%
"Thanite" - - -	17.7%
Ammonium nitrate - -	63.7
Potassium chromate -	15.9

The nitrocellulose and the "Thanite" were worked together and the ammonium nitrate and potassium chromate were

worked into resulting plastic at a temperature of about 60° C., and the resulting composition was then extruded under pressure into rod form. The decomposition of the rod could be initiated in the usual manner by the flame of a match.

EXAMPLE 5.

This example illustrates the employment of the liquid ortho-dichloro-benzene providing a composition in compressed form that may be used for fumigating wood to protect it from the ravages of wood boring beetles.

Ortho-dichlorobenzene -	20%
Kieselguhr - - -	25
Ammonium nitrate - -	49.5
Potassium chromate - -	5.5

The ortho-dichlorobenzene was absorbed into the kieselguhr and the resulting product mixed with the ammonium nitrate and potassium chromate and the mixture was pressed and packed as described in Example 1.

EXAMPLE 6.

This example illustrates the use of tetrachloroethane a liquid useful in combating wood lice. The composition contained:—

Tetrachloroethane - -	20%
Kieselguhr - - -	20
Ammonium nitrate - -	54
Potassium chromate - -	6

The procedure in making, pressing and packing the composition was similar to that described in Example 1.

EXAMPLE 7.

This example illustrates the employment of the liquid insecticide hexaethyl tetraphosphate, useful for protecting apple trees from the attack of the Apple Blossom Weevil.

Hexaethyl tetraphosphate -	25%
Kieselguhr - - -	30
Ammonium nitrate - -	22.3
Ammonium dichromate -	16.3
Potassium dichromate -	2.1
Cuprous chloride - -	4.3

This procedure in making, pressing and packing the composition is similar to that described in Example 1.

EXAMPLE 8.

This example illustrates another method for using hexethyl tetraphosphate, which is a solvent for nitrocellulose.

Nitrocellulose as used in Example 4 - - -	4%
Hexaethyl tetraphosphate	20
Ammonium nitrate - -	37.6
Ammonium dichromate -	27.6
Potassium dichromate -	3.6
Cuprous chloride - -	7.3

The manner in which the composition was made and converted into rod form was similar to that described in Example 4, and the decomposition of the rod could be initiated in the usual way.

EXAMPLE 9.

A rod suitable for generating and disseminating the vapour of an insect repellent that can deposit in thin liquid film form on the walls bounding the space where the vapour is generated is made by substituting dimethylphthalate for the hexaethyl tetraphosphate in Example 8, the procedure being otherwise identical.

Dated this 18th day of July, 1947.

J. W. RIDSDALE,
Solicitor for the Applicants.

COMPLETE SPECIFICATION

Improvements in or relating to Vaporising and Disseminating Pest Combating Compounds

We, JOHN GILLIES, of 120, Argyle Road, Saltcoats, Ayrshire, a British Subject, and WILLIAM THOMAS CUNNINGHAM, of "The Haining", 81, High Road, Saltcoats, Ayrshire, a British Subject, and IMPERIAL CHEMICAL INDUSTRIES LIMITED, of Imperial Chemical House, Millbank, London, S.W.1, a British company, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to compositions for vaporising and disseminating pest combating compounds, and is particularly concerned with the provision of such compositions which include thermally vaporisable liquid compounds lethal or repellant to animal, vegetable, bacterial, fungoid or virus, the animal pests including for instance, insects, spiders, beetles and the like.

Recently there have been introduced fumigating compositions consisting essentially of mixtures of a thermally vaporisable pesticidal compound with a suitable solid composition capable of undergoing a self-sustained gas-evolving exothermic non-detonating decomposition when a portion of mass of the composition is heated, the heat and gases from which serve to vaporise and disseminate the pesticide. Hitherto, however, it has only

been practicable to employ in this way pesticidal compounds that are solid at ordinary atmospheric temperatures, since in the case of normally liquid compounds of this nature in general only a very small proportion can be retained by the solids capable of said self-sustaining decomposition, without exuding from them. It will be understood that if only a small percentage of a vaporisable compound is present in association with the solid ingredients adapted to undergo self-sustaining exothermic gas evolving non-detonating decomposition, the amount of latent heat absorbed in vaporising the vaporisable compound will be correspondingly small; and that except in the case of compositions based on ingredients capable of undergoing such exothermic decompositions at exceptionally low temperatures, the vaporisable compound may accordingly undergo severe thermal decompositions. Thus the presence of a substantial percentage of a vaporisable organic compound in the composition may be necessary to reduce the reaction temperature sufficiently to prevent the compound being largely decomposed into useless products, quite apart from the obvious consideration that it is desirable on economic grounds that the proportion of the vaporisable compound in the composition should be as high as can efficiently be vaporised from it.

According to the present invention a composition for vaporising and disseminating a thermally vaporisable liquid compound of pest combating characteristics consists of a mixture comprising a solid material capable of gas-evolving exothermic non-detonating decomposition in self-sustained fashion at ordinary atmospheric pressures when initiated by local heating, a liquid thermally vaporisable compound of pest combating characteristics and a solid carrier for said liquid.

The composition may consist of a mixture comprising at least one solid compound capable of gas-evolving exothermic non-detonating decomposition, a sensitiser capable of rendering decomposition of said compound self-sustaining at ordinary atmospheric pressures when initiated by local heating a liquid thermally vaporisable compound of pest combating characteristics and a solid carrier for said liquid compound, the composition containing a sufficient quantity of such sensitiser to render its decomposition self-sustaining under these conditions.

It is to be understood that the said solid carrier is present at least in amount sufficient to prevent any exudation of the liquid from the composition.

In accordance with one form of the invention the solid carrier is a solid inorganic or organic material of porous structure on which the liquid has no solvent effect, for instance kieselguhr, low density wood flour, charcoal, or silica gel. The resulting compositions may be packaged in loose powder form or may be compressed into cakes, which may be wrapped in waxed paper.

In accordance with another form of the invention the solid carrier is an organic colloid on which the liquid has a solvent effect, and which in relatively small quantities can thicken the liquid to such a degree that the colloid can hold a substantial quantity of liquid without forming a composition so fluid as to flow under small stresses. In accordance with this form of the invention the solid material capable of self-sustaining exothermic decomposition or its ingredients may conveniently be distributed through the resulting plasticised colloid by mechanical working provided that the latter becomes workable at a temperature substantially below that at which the decomposition of the said solid material can be initiated. Alternatively, the distribution of the said solid material or its ingredients may be accomplished with the aid of a solvent for the colloid volatile at ordinary temperatures, which is subsequently evaporated off. Compositions in accordance with the form of the invention in which the solid carrier is an organic colloid on which the liquid has a solvent effect may be fashioned into rods or the like by extrusion. Organic colloids for the purpose may include for instance cellulose esters, cellulose ethers, polymerised unsaturated compounds, proteins, or gums, depending on the nature of the liquid pest control compound.

In the case of a solid compound that is capable of propagating throughout itself at ordinary atmospheric pressures a self-sustained gas-evolving exothermic non-detonating decomposition when initiated by local heating but only when a sensitiser is present, it is preferred that the mixture of the solid compound and the sensitiser should be one capable of yielding little ash and capable in the undiluted state of yielding decomposition products at temperatures not exceeding 1000° C.

Compositions based on mixtures of ammonium nitrate and a chromium compond capable of sensitising the self-sustaining exothermic gas-evolving non-detonating decomposition of ammonium nitrate are specially suitable, since their decomposition is flameless and is easily initiated, while the temperatures produced by the decomposition of these mixtures

are very moderate; but compositions based on compounds or mixtures producing somewhat higher temperatures, preferably without the appearance of a flame, may also be used, for instance compositions based on the decomposition of ammonium dichromate; or based on the decomposition of guanidine nitrate and/or nitroguanidine mixtures with various solid decomposition sensitising agents as proposed in Specification No. 620,600 (British Application No. 24123/46).

Examples of liquid thermally vaporisable compounds of pest combating characteristics are: "Thanite", ortho-dichlorobenzene, hexaethyl tetraphosphate, " E605 ", dimethylphthalate. The chemical compositions of " Thanite " and of " E605 " are given respectively in Examples 1 and X hereunder.

Compositions according to the invention and the process for their production are further illustrated by the following examples in which the parts are parts by weight.

EXAMPLE I.

This composition includes a liquid insecticide known as " Thanite ", which to the extent of about 85% is isobornyl-thiocyano-acetate.

Balsa wood flour - -	33%
" Thanite " - - -	17
Ammonium nitrate - -	25
Ammonium dichromate -	18.3
Potassium dichromate -	2.5
Cuprous chloride - -	4.2

The solid ingredients are all fine enough to pass a 25 mesh B.S.S. screen.

The " Thanite " is first absorbed into the Balsa wood flour, and the resulting loose product and the rest of the ingredients are mixed mechanically together and pressed into the form of a cake at a pressure of about 2 tons per sq. inch and wrapped in waxed paper composition. The resulting product, which in cake form is somewhat friable, volatilises and disperses the insecticide in a stream of steam, nitrogen and other gases without flame when the decomposition is initiated by local heating with the flame of a match for about 15 seconds. The fumes generated by the cake are effective against flies.

EXAMPLE II.

This composition includes both " Thanite " and the Gamma isomer of hexachlorocyclohexane.

Kieselguhr - - -	16%
" Thanite " - - -	16
Ammonium nitrate - -	47
Potassium chromate - -	5
Gamma isomer of hexachlorocyclohexane - -	16

The " Thanite " is first absorbed into the kieselguhr and the resulting product and the rest of the ingredients, which are all solids, are mixed together and pressed into cake form in the fashion of the preceding example. The fumes generated by the decomposition of the cake disseminate both the " Thanite " and the Gamma isomer of hexachlorocyclohexane. The " Thanite " has " knock-down " properties and is quicker in its action as a pesticide than the Gamma isomer of hexachlorocyclohexane. On the other hand the toxicity of the " Thanite " in a deposit from these fumes is soon lost whereas the toxicity of the Gamma isomer of hexachlorocyclohexane in such a deposit lasts for a long time.

EXAMPLE III.

Kieselguhr - - -	29.5%
" Thanite " - - -	20
Ammonium nitrate -	25
Ammonium dichromate -	18.3
Potassium dichromate -	2.5
Cuprous chloride - -	4.2
Asbestos - - -	0.5

The product is produced, pressed and packed in the manner indicated in the preceding Examples.

EXAMPLE IV.

Nitrocellulose of 12% nitrogen content and viscosity 100-200 poises as measured at 20° C. in a concentration of 4 gm. per 100 c.c. aqueous acetone of 95% acetone content by volume - - - -	2.7%
" Thanite " - - -	17.7%
Ammonium nitrate - -	63.7
Potassium chromate -	15.9

The nitrocellulose and the " Thanite " are worked together and the ammonium nitrate and potassium chromate are worked into resulting plastic at a temperature of about 60° C., and the resulting composition is then extruded under pressure into rod form. The decomposition of the rod can be initiated in the usual manner by the flame of a match.

EXAMPLE V.

This composition includes the liquid ortho-dichlorobenzene and in compressed form may be used for fumigating wood to protect it from the ravages of wood boring beetles.

Ortho-dichlorobenzene -	20%
Kieselguhr - - -	25
Ammonium nitrate - -	49.5
Potassium chromate - -	5.5

The ortho-dichlorobenzene is absorbed into the kieselguhr and the resulting product is mixed with the ammonium nitrate and potassium chromate and the mixture

is pressed and packed as described in Example I.

EXAMPLE VI.

This composition includes tetrachloroethane a liquid useful in combating wood lice.

Tetrachloroethane - -	20%
Kieselguhr - - -	20
Ammonium nitrate - -	54
Potassium chromate - -	6

The procedure in making, pressing and packing the composition is similar to that described in Example I.

EXAMPLE VII.

This composition includes the liquid insecticide hexaethyl tetraphosphate, useful for protecting apple trees from the attack of the Apple Blossom Weevil.

Hexaethyl tetraphosphate -	25%
Kieselguhr - - -	30
Ammonium nitrate - -	22.3
Ammonium dichromate -	16.3
Potassium dichromate -	2.1
Cuprous chloride - -	4.3

The procedure in making, pressing and packing the composition is similar to that described in Example I.

EXAMPLE VIII.

This composition includes hexaethyl tetraphosphate and nitrocellulose, hexaethyl tetraphosphate being a solvent for nitrocellulose.

Nitrocellulose as used in Example IV - - -	4%
Hexaethyl tetraphosphate	20
Ammonium nitrate - -	37.6
Ammonium dichromate -	27.6
Potassium dichromate -	3.6
Cuprous chloride - -	7.2

The manner in which the composition is made and converted into rod form is similar to that described in Example IV, and the decomposition of the rod can be initiated in the usual way by the flame of a match.

EXAMPLE IX.

A rod suitable for generating and disseminating the vapour of an insect repellant that can deposit in thin liquid film form on the walls bounding the space where the vapour is generated is made by substituting dimethylphthalate for the hexaethyl tetraphosphate in Example VIII, the precedure being otherwise identical.

EXAMPLE X.

This composition includes the liquid insecticide known as " E605 ".

Ammonium nitrate - -	77.4%
Potassium chromate - -	8.6%
Kieselguhr - - -	7.0%
E605 - - - -	7.0%

E605 consists to the extent of 75 per cent, of para-nitro-phenyl diethyl thiophosphate, which is claimed to be the toxic compound, but the crude material also contains triethyl thiophosphate, monoethoxy di-para-nitro-phenyl thiophosphate, with para-nitro-phenyl and sodium thiophosphate as impurities.

The composition can be used as a loose powder. The loose powder volatilises and disperses the E605 in a stream of steam, nitrogen and other gases without flame when the decomposition is initiated by local heating with the flame of a match for about 15 seconds.

If such a quantity of loose powder as contains 1 gram of E605 is initiated in a smoke cell of 1000 cubic feet capacity and the deposit collected on glass plates for a period of two hours and Tribolium Castaneum Hbst, and Calandra granaria L are exposed on these plates for 1 hour, 100 per cent, and 92 per cent. kills respectively are obtained.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A composition for vaporising and disseminating a thermally vaporisable liquid compound of pest combating characteristics consisting of a mixture comprising a solid material capable of gas evolving exothermic non-detonating decomposition in self-sustained fashion at ordinary atmospheric pressures when initiated by local heating, a liquid thermally vaporisable compound of pest combating characteristics and a solid carrier for said liquid.

2. A composition as claimed in claim 1 consisting of a mixture comprising at least one solid compound capable of gas-evolving exothermic non-detonating decomposition, a sensitiser capable of rendering the propagation of the decomposition of said compound self-sustaining at ordinary atmospheric pressures when initiated by local heating, a liquid thermally vaporisable compound of pest combating characteristics and a solid carrier for said liquid component, the composition containing a sufficient amount of said sensitiser to render its decomposition self-sustaining under these conditions.

3. A composition as claimed in claims 1 or 2 wherein the solid carrier is inorganic and of porous structure and such that the said liquid has no solvent effect thereon.

4. A composition as claimed in claim 3 wherein the said solid carrier is kieselguhr.

5. A composition as claimed in claim 1 or 2 wherein the solid carrier is organic and of porous structure and such that the said liquid has no solvent effect thereon.

is pressed and packed as described in Example I.

EXAMPLE VI.

This composition includes tetrachloroethane a liquid useful in combating wood lice.

Tetrachloroethane - -	20%
Kieselguhr - - -	20
Ammonium nitrate - -	54
Potassium chromate - -	6

The procedure in making, pressing and packing the composition is similar to that described in Example I.

EXAMPLE VII.

This composition includes the liquid insecticide hexaethyl tetraphosphate, useful for protecting apple trees from the attack of the Apple Blossom Weevil.

Hexaethyl tetraphosphate -	25%
Kieselguhr - - -	30
Ammonium nitrate - -	22.3
Ammonium dichromate -	16.3
Potassium dichromate -	2.1
Cuprous chloride - -	4.3

The procedure in making, pressing and packing the composition is similar to that described in Example I.

EXAMPLE VIII.

This composition includes hexaethyl tetraphosphate and nitrocellulose, hexaethyl tetraphosphate being a solvent for nitrocellulose.

Nitrocellulose as used in Example IV - - -	4%
Hexaethyl tetraphosphate	20
Ammonium nitrate - -	37.6
Ammonium dichromate -	27.6
Potassium dichromate -	3.6
Cuprous chloride - -	7.2

The manner in which the composition is made and converted into rod form is similar to that described in Example IV, and the decomposition of the rod can be initiated in the usual way by the flame of a match.

EXAMPLE IX.

A rod suitable for generating and disseminating the vapour of an insect repellant that can deposit in thin liquid film form on the walls bounding the space where the vapour is generated is made by substituting dimethylphthalate for the hexaethyl tetraphosphate in Example VIII, the precedure being otherwise identical.

EXAMPLE X.

This composition includes the liquid insecticide known as " E605 ".

Ammonium nitrate - -	77.4%
Potassium chromate - -	8.6%
Kieselguhr - - -	7.0%
E605 - - - -	7.0%

E605 consists to the extent of 75 per cent, of para-nitro-phenyl diethyl thiophosphate, which is claimed to be the toxic compound, but the crude material also contains triethyl thiophosphate, monoethoxy di-para-nitro-phenyl thiophosphate, with para-nitro-phenyl and sodium thiophosphate as impurities.

The composition can be used as a loose powder. The loose powder volatilises and disperses the E605 in a stream of steam, nitrogen and other gases without flame when the decomposition is initiated by local heating with the flame of a match for about 15 seconds.

If such a quantity of loose powder as contains 1 gram of E605 is initiated in a smoke cell of 1000 cubic feet capacity and the deposit collected on glass plates for a period of two hours and Tribolium Castaneum Hbst, and Calandra granaria L are exposed on these plates for 1 hour, 100 per cent, and 92 per cent. kills respectively are obtained.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A composition for vaporising and disseminating a thermally vaporisable liquid compound of pest combating characteristics consisting of a mixture comprising a solid material capable of gas evolving exothermic non-detonating decomposition in self-sustained fashion at ordinary atmospheric pressures when initiated by local heating, a liquid thermally vaporisable compound of pest combating characteristics and a solid carrier for said liquid.

2. A composition as claimed in claim 1 consisting of a mixture comprising at least one solid compound capable of gas-evolving exothermic non-detonating decomposition, a sensitiser capable of rendering the propagation of the decomposition of said compound self-sustaining at ordinary atmospheric pressures when initiated by local heating, a liquid thermally vaporisable compound of pest combating characteristics and a solid carrier for said liquid component, the composition containing a sufficient amount of said sensitiser to render its decomposition self-sustaining under these conditions.

3. A composition as claimed in claims 1 or 2 wherein the solid carrier is inorganic and of porous structure and such that the said liquid has no solvent effect thereon.

4. A composition as claimed in claim 3 wherein the said solid carrier is kieselguhr.

5. A composition as claimed in claim 1 or 2 wherein the solid carrier is organic and of porous structure and such that the said liquid has no solvent effect thereon.

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6. A composition as claimed in claim 5 wherein the said solid is low density wood flour.

7. A composition as claimed in claim 1 or 2 wherein the solid carrier is an organic colloid on which the liquid has a solvent effect and which in relatively small quantities can thicken the liquid to such a degree that the colloid can hold a substantial quantity of liquid without forming a composition so fluid as to flow under small stresses.

8. A composition as claimed in any of the claims 2—7 wherein a mixture of the solid compound capable of gas-evolving exothermic non-detonating decomposition and the said sensitiser in the absence of the remaining components of the composition yields decomposition products at temperatures not exceeding 1000° C. with but little ash.

9. A composition as claimed in claim 8 wherein the solid compound capable of gas-evolving exothermic decomposition is ammonium nitrate and the sensitiser is a chromium compound.

10. A composition as claimed in claims 1 or 3 to 7 wherein the solid material capable of propagating throughout itself at ordinary atmospheric pressures a self-sustained gas-evolving exothermic non-detonating decomposition when initiated by local heating is ammonium bichromate.

11. A composition as claimed in any of the claims 2—8 wherein the solid compound capable of gas-evolving non-detonating decomposition is guanidine nitrate.

12. A composition as claimed in any of the claims 2 to 7 wherein the solid compound capable of gas-evolving non-detonating decomposition is nitroguanidine.

13. A composition as claimed in any of the preceding claims wherein the liquid thermally vaporisable compound of pest combating characteristics is " Thanite ".

14. A composition as claimed in claim 13 wherein is included the Gamma isomer of hexachlorocyclohexane.

15. A composition as claimed in any of the claims 1—12 wherein the liquid thermally vaporisable compound of pest-combating characteristics is ortho-dichlorobenzene.

16. A composition as claimed in any of the claims 1—12 wherein the liquid thermally vaporisable compound of pest-combating characteristics is hexaethyl tetraphosphate.

17. A composition as claimed in any of the claims 1—12 wherein the liquid thermally vaporisable compound of pest-combating characteristics is " E605 ".

18. A composition as claimed in any of claims 3 to 6 when pressed into cake form.

19. A package consisting of a cake of a composition as claimed in claim 18 wrapped in waxed paper.

20. Extruded rods of compositions as claimed in claim 7.

21. Packages containing a composition as claimed in any of claims 3 to 6 in loose powder form.

22. Compositions substantially as described and with reference to the foregoing examples.

23. Packages containing compositions as claimed in claim 22.

24. Processes for the production of the compositions claimed in any of the claims 1—17 and 22 substantially as described and with reference to the foregoing examples.

25. A process for the production of rods or the like which comprises extruding a composition as claimed in claim 7.

Dated this 31st day of May, 1948.
J. W. RIDSDALE,
Solicitor for the Applicants.

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