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PESTICIDES AND OTHER VOLATILE COMPOUNDS

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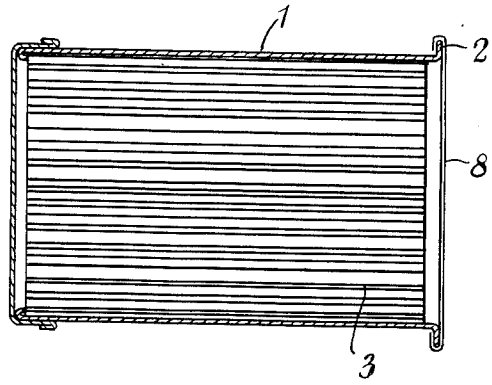


FIG.1.

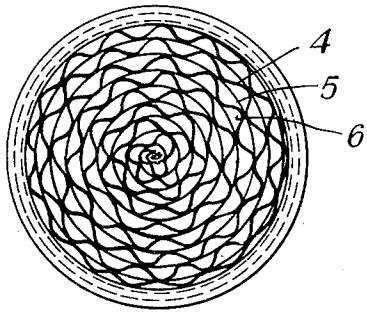


FIG.2.

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# PESTICIDES AND OTHER VOLATILE COMPOUNDS

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1 Claim. (Cl. 43—125)

The present invention relates to pesticides and other materials which are distributed by dissemination into the air either to remain suspended substantially permanently as an aerosol and/or to fall out on to surfaces to form a deposit or coating.

One form in which materials can be disseminated into the air is in solution or in a liquid suspension which is atomised to form a spray. The solvent or other liquid carrier evaporates leaving the particles of pesticide or other material suspended in the air ultimately to fall out onto a surface. This form of preparation of a pesticide or other material is uneconomic because the solvent or other liquid carrier is non-recoverable and also because special means have to be provided for atomising the liquid. Furthermore the method of dissemination is inefficient because the bulk of the material forming the spray is in fact the ineffective solvent or liquid carrier.

Another form in which pesticides and other materials are prepared for dissemination is in solution in a pressurised container, a finger or thumb controlled valve being provided on the container which releases the solution through an atomising valve. This is an even more expensive form of packing a pesticide or other material because in addition to the liquid carrier a pressurised gas also has to be provided which is usually Freon. In addition, the container has to be gas tight and to carry on it a relatively expensive valve and nozzle assembly. The container is only usable once, that is with the contents which are packed in it, and is then discarded. In addition to these disadvantages this form of pack also has the disadvantages of a pesticide or other material when carried in solution or otherwise in a liquid.

A further disadvantage of putting materials up into solution or into a liquid carrier is that by the nature of its desirable properties it must be volatile. This makes is necessary, if long storage is anticipated, for it to be stored in expensive sealed containers. Furthermore because of this characteristic it is not possible to prepare the solution in any way so that it can be used from a simple and inexpensive pack.

An object of the present invention is to provide a form of pack for a material which is to be disseminated into the air which avoids the necessity of any form of liquid or other carrier or diluent for the material and which has an indefinite shelf life.

According to the present invention a pack for a material intended for dissemination into the air or upon a surface comprises a foraminous non volatile solid structure having disposed upon the surfaces of its foramina a material such as an insecticide in the solid form, the material being such that it can be volatilised by passing over it a forced draught of gaseous medium at normal or elevated temperatures, the deposition of the material upon the surfaces being such that the solid structure remains foraminous.

The material forming the foraminous structure need not be such that the structure is rigid and for example it may be formed from glass wool or cotton wool and similar fibrous material which for a given fibre thickness has a relatively large surface area. Alternatively the structure



may be formed from material such as filter paper, creped paper, embossed paper, or corrugated paper, folded or rolled so as to form a foraminous structure through which air or other gaseous medium may be blown.

Alternatively, the foraminous structure may be formed from divided material such as granules of either foraminous or impervious material and for example may comprise vermiculite, glass beads, or the like.

Conveniently the foraminous structure is housed in a container the walls of which are imperforate and which has an inlet and outlet by means of which a draught of air or other gas either at normal or elevated temperatures can be blown through the pack.

It is preferred that the structure be formed from material which is inert to the material being volatilised and resists distortion or disintegration when subjected to the temperatures of the draught passed through the structure. When the pack is used for disseminating pesticides the maximum temperature likely to be used is 200° C. since most of the commonly used pesticides, for example D.D.T. (dichlorodiphenyl-trichloroethane), B.H.C. (benzene hexachloride), dehydroacetic acid, aldrin, dieldrin, undergo partial or complete decomposition above this temperature.

An example of a suitable material for forming the foraminous structure is glass wool or glass fibre matt or a textile woven from glass fibre because glass is substantially inert to all known pesticides and to most other materials which in use are disseminated into the air. Furthermore grades of glass fibre are available which for a given thickness and density have a relatively large surface area of fibre.

Thus glass fibre can be used for most materials to be disseminated. If it is desired to produce substantially identical outputs with similar packs care should be taken to see that the glass wool or matt is packed with uniform density throughout the pack otherwise channelling is produced which produces dead spaces through which the air stream does not pass. This tends to reduce the yield i.e. the total quantity of pesticide which can be vaporised in a given time and also non-uniform results with similar packs.

It has also been found that material such as fine fluted card is suitable for forming the foraminous structure. When this material is used it is rolled into the form of a cylinder with the flutes extending longwise from one end to the other of the cylinder to form elongated passages through the cylinder of substantially constant cross section and of the same internal surface area.

The method by which the pesticide or other material to be volatilised is applied to the surfaces of the foraminous structure depends upon the nature of the material to be volatilised and the nature of the foraminous structure.

Thus where possible the structure can be charged with pesticide by dipping into a bath of molten pesticide and shaking out the excess. An alternative method is to immerse the structure in a solution of the pesticide in a volatile solvent and then driving off the solvent. With this latter method the preferred manner of operation is to dip the structure in a solution of the pesticide or other material and then to blow out the excess with a stream of warm air passing through the structure so that evaporation of the solvent occurs inside the carrier. An alternative method is to dip or immerse the structure into a hot saturated solution of the material to produce precipitation of the pesticide or other material in the passages in the structure by the decreased solubility of the pesticide on the cooling of the solution.

Choice of the particular form of the foraminous structure selected depends very much upon the output required and upon the material being distributed. Thus with the

type of blower referred to in copending British patent application Number 26,634/57, in which a blower is described having an output of approximately 25 litres per minute with zero resistance, a pack in accordance with the present invention formed from a 5 cm. long roll of fine fluted cardboard of 4 cm. diameter produces an output when coated with some 23 grammes of dehydroacetic acid of approximately 23.5 litres per minute and of the 23 grammes of material 17 grammes were dissipated in 30 minutes.

In a further example a foraminous structure formed by a lamination of 100 discs of surfacing gauze formed of fibre glass to give a cylinder 4 cm. diameter and 3 cm. long upon which was deposited approximately 11 grammes of dehydroacetic acid allowed approximately 11 grammes to be dissipated after only 7 minutes with the same apparatus.

One example of a suitable pack in accordance with the present invention is shown in the accompanying drawings in which:

FIGURE 1 shows in longitudinal cross section a form of cartridge in accordance with the present invention; and

FIGURE 2 shows in elevation the discharge end of the cartridge.

Referring to the drawings, a casing **1** which is circular in cross section and is formed of any suitable material, for example aluminium or stout card, has at one end a peripheral flange **2**. The casing **1** contains a foraminous structure **3** composed of fine fluted card in which, as shown in FIGURE 2, corrugated card **4** is interleaved with flat card **5** to provide concentric rings of passages **6** of substantially equal and constant cross sectional area, the passages **6** extending down the length of the casing **1**.

The foraminous structure **3** is charged with a pesticide by any of the methods described above and is then inserted into the cartridge casing **1**. The ends are then sealed, for example by a cap **7**, which fits over the delivery end of the cartridge and by a fracturable diaphragm or membrane **8** which closes the flanged end of the casing **1**. When thus sealed the cartridge has an almost indefinite shelf life irrespective of the volatility of the pesticide charged into the foraminous structure.

When it is required to use the cartridge the membrane **8** is broken and removed and the cartridge applied to the apparatus described in copending British patent application Number 26,634/57. When the apparatus is operated the cap **7** is removed and replaced after use.

If desired the discharge end of the cartridge **1** can be provided with an opening which is adjustable in area, for example an iris diaphragm, and conveniently the cap **7** serving to seal the cartridge at the discharge end whilst on the shelf may be provided with an adjustable shutter so that the area of the outlet can be adjusted from zero to a maximum.

The effect of decreasing the discharge opening would be to diminish the velocity of the air stream and to increase the temperature of the air passing over the pesticide or other material. Whether the output of pesticide is increased or decreased depends on the working temperature and air stream velocity in the absence of any limiting device. If the initial air velocity is high reducing the velocity would result in an increase in output attributable to the temperature increase. At lower air speeds and especially at lower working temperatures the decrease



in nozzle opening would give a decrease in output. For any specified working temperature using a cartridge of fixed impedance there should be a unique air velocity moderate deviations from which would leave the output practically unaffected.

Whilst the invention has been described with more particular reference to a foraminous structure formed from a fibrous material, for example paper or textile, the structure may comprise other forms, for example a plurality of tubular members arranged to occupy the whole cross-sectional area of the cartridge and arranged so that their longitudinal axes lie parallel to the axis of the cartridge and the direction of flow of the air. Alternatively the tubular members may be of a serpentine shape.

Alternatively the foraminous structure may comprise a cellular structure resembling sponge and be formed from an expanded artificial resin or may comprise a sintered material formed for example from a sintered glass plug which may be fused into a glass casing to form the cartridge. The foraminous structure may be rigid, semi-rigid, or flexible but it is preferred that it is self-supporting.

Pesticides and other volatile materials packed in this manner have the advantage that not only is their shelf life substantially indefinite but a substantially constant concentration of output is achieved until all the available material is distributed even after being stored for a considerable period. Where pesticides are stored in a liquid carrier they frequently separate out and even after vigorous shaking do not redistribute themselves homogeneously throughout the carrier with the result that a uniform production of mist is not obtainable.

What we claim is:

A pack for a volatile material intended for dissemination therefrom as an aerosol in response to passage of warm air therethrough comprising a closed tubular container having impervious walls and having impervious ends capable of being removed for the full extent of the cross-sectional area of the tube to enable air to be passed therethrough throughout substantially the complete cross-sectional area of the tube, a foraminous non-volatile permanent structure of a solid material providing a plurality of independent, uninterconnected passages extending axially for the length thereof, said structure being disposed inside and substantially wholly occupying the interior of the tubular container and a volatile pesticidal material deposited in a static state upon the surfaces of the walls of the passages, the amount of said insecticide material being such that the structure remains foraminous, said pesticidal material being volatilized in response to passage of said warm air through said longitudinal passages and being dispensed thereby.

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