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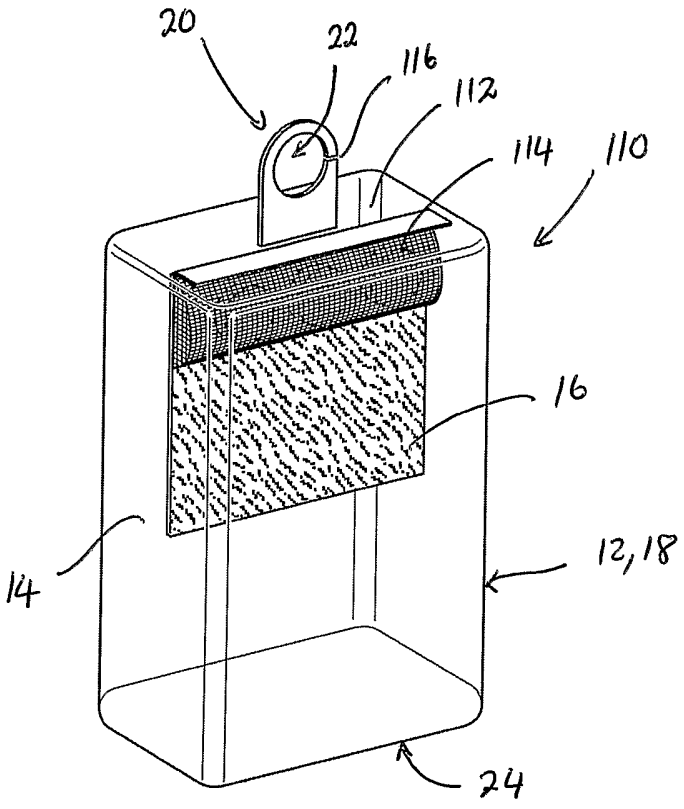
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(54) Title: PEST CONTROL DEVICE



(57) Abstract: The invention relates to a pest control device for us in controlling fruit flies which device includes an attractant carrier for carrying a liquid pest attractant composition by dry absorption of the attractant composition, an attractant composition carried by the attractant carrier for attracting fruit flies and a insect killing means for killing the fruit flies which come in the proximity of the attractant carrier.

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BACKGROUND TO THE INVENTION

[001] The need to control pests, especially with respect to products which are exported, has always been an important feature in the fruit growing industry.

[002] One such pest, belonging to the Tephritidae family, is known as a fruit fly. Various types of fruit flies exist. For example, the Natal fruit fly, *Ceratitis rosa*, the Mediteranean fruit fly, *Ceratitis capitata,* and the Marula fruit fly, *Ceratitis cosyra* is well-known species which attacks fruits such as mangoes etc.

[003] A female fruit fly, which has a life expectancy of approximately 40 days, normally lays her eggs in the flesh of fruits and dies. The maggots (larvae) developing out of such eggs feed on the flesh of the fruit and subsequently causes it to rot.

[004] This is a major problem, especially with respect to exporting, as the maggots (larvae) may only emerge from the eggs later. Consequently, upon exporting the fruits may appear to be of good quality but go "bad" after a couple of days.

[005] Various methods exist in an attempt to control these types of fruit flies. Such methods include the spraying of pesticides and various fly traps. The pesticides normally utilised are extremely poisonous and in liquid form.

[006] A problem generally associated with this method is that the pesticides utilised needs to be transported to various application points, which in turn cause a health

risk to the user thereof and various types of animals due to the possibility of spillages.

[007] Further problems are that liquid pesticides evaporate quickly and consequently become ineffective soon after its application. Also, pesticides which are applied directly to the surface of the fruit, requires the fruits to be washed before exporting it which in turn is cost ineffective and time consuming.

[008] The present invention relates to a pest control device, particularly to a device for controlling fruit flies. The invention extends to a carrier unit for use with such pest control device, and to a tool for removing the carrier unit from the pest control device. The invention further extends to a method of pest control.

[009] In this specification the words "dry absorption" means that an attractant carrier will absorb a liquid based composition without yielding the absorbed composition when mild pressure is applied to the attractant carrier, for instance when it is squeezed. Such dry absorption of a liquid based composition permits handling and transport of the attractant carrier without the risk of spillage of the composition or exposure of users to the composition. This dry absorption has to be distinguished from absorption of a liquid in a sponge-type matrix, in which pressure to the matrix causes the yielding or discharge of liquid from the matrix.

SUMMARY OF THE INVENTION

[0010] The invention provides a pest control device for use in the control of flying insects, such as fruit flies, which device includes an attractant carrier for carrying a liquid pest attractant composition by dry absorption of the attractant composition; an attractant composition carried by the attractant carrier for attracting fruit flies, the

attractant composition including a protein containing component, and an insect killing means for killing fruit flies which come into the proximity of the attractant carrier.

[0011] In one embodiment of the invention, the attractant carrier is provided by a sheet of an absorbent paper, for instance being a sheet of blotting paper or ultra high absorbent paper.

[0012] The sheet of absorbent paper will typically have a surface area of 30-100 cm^2, preferably having a surface area of 40-60 cm^2, and most preferably having a surface area of about 50 cm^2.

[0013] The attractant carrier may carry 1-4 millilitres of attractant composition, preferably carrying about 2 millilitres of attractant composition.

[0014] The attractant composition may include ammonia. Preferably, the attractant composition may be as described in South African Patent No. 99/0690, the contents of which are incorporated herein by reference.

[0015] The protein containing component may thus be selected from a protein hydrolysate, a liver extract, a spleen extract, a gastric mucosa extract and combinations of any two or more thereof. The protein hydrolysate may, for example, be HYMLURE (trade name) from Robbertson spices or BUMINOL (trade name) from Bayer. These products on the industrial equivalence of household products such as MARMITE (trade name) and BOVRIL (trade name).

[0016] The attractant composition may include one or more amino acids. The amino acids may be selected from alanine, arginine, aspartic acid, glumatic acid, glycine,

histidine, isoleucine, leucine, lysine, methionine, phenylalanine, praline, threonine, tryptophan, tyrosine, valine, cysteine, and combinations of any two or more thereof.

[0017] The attractant composition may include one or more vitamins. The vitamin or vitamins may be selected from Vitamin B1, Vitamin B2, Vitamin B6, Vitamin B12, nicotinamide and combinations of any two or more thereof.

[0018] The attractant composition may include paprika, preferably in a powder form.

[0019] The attracting composition will typically include a liquid base, such as glycerine. The attractant composition may further include salt and/or water.

[0020] The insect killing means may include a pesticide, which may conveniently be carried by the attractant carrier. The pesticide may optionally be provided by a pesticidal component forming part of the attractant composition.

[0021] The pesticidal component may be selected from any suitable Chlorinate Hydrocarbon, Organic Phosphate, Pyrethriod or Derivetes from plants and any combination of two or more thereof. Preferably the Chlorinate Hydrocarbon may be Methomyl or Trichlorfon and the Organic Phosphate may be Mevinphos or Dichlorphos. Naturally, other pesticidal agents may also be used.

[0022] The device may typically include a housing and a holding formation connected to the housing for holding the attractant carrier. The holding formation may typically be a holding member which is removably connected to the housing.

[0023] In a preferred embodiment of the invention, the insect killing means is a gas released arrangement for releasing insecticidal gasses in the vicinity of the holding

formation, so that insects which are, in use, attracted to the attractant carrier held by the holding formation is exposed to the insecticidal gasses. The gas release arrangement may be in the form of a gas, solid or liquid but preferably include a slow release gas action tablet or capsule located in the housing.

[0024] In such case, the housing defines a trap chamber having an entrance or mouth which is directed downwardly when the housing is in an operative orientation, the housing being substantially closed, so that a gas cloud forms in the upper region of the trap chamber, in use.

[0025] Conveniently, the trap chamber is bound by peripheral walls, at least some of which are transparent. It will be appreciated that the walls of the housing will be gas impermeable, to trap gas released by the gas released arrangement in the trap chamber, the walls typically being of a polymeric plastics material. The housing will further typically be constructed to prevent the ingress of water into the trap chamber while the housing is in its operative orientation.

[0026] The housing will preferably be provided with a suspension formation for suspending the device from an elevated support, such as a tree branch, so that the housing hangs from the suspension formation, the entrance to the trap chamber being directed downwardly.

[0027] The housing may thus include the holding formation for locating the attractant carrier in the trap chamber, and a tablet holder for holding the gas released tablet adjacent the holding formation.

[0028] The housing may be of composite construction, having a removable part for facilitating access to the holding formation and/or the tablet holder thereof. In a

particular embodiment, the housing comprises an inverted dish-shaped top and a skirt which is removably connected to the top, the skirt depending peripherally from the top to define the trap chamber.

[0029] In an alternative embodiment, the tablet holder and the holding formation are provided by a carrier unit which is removably and replaceably insertable in the trap chamber provided by the housing.

[0030] In such case, the carrier unit may be mountable in the housing by resilient deformation of mounting formations, the mounting formations optionally being provided by a plurality of resiliently flexible limbs projecting radially from a body of the carrier unit, the housing defining a constriction having a diameter smaller than that of the limbs. In use, the limbs are thus deformed to permit passage of the carrier unit through the constriction, resilient radial expansion of the limbs after passage through the constriction, holding the carrier unit captive in the trap chamber.

[0031] In a particular embodiment, the carrier unit's holding formation is provided by a radially outer surface of the carrier unit body, so that the attractant carrier, in use, extends circumferentially around the carrier unit. The device may include retaining means for retaining the attractant carrier on the carrier unit, for instance an elastic band which extends circumferentially about the body of the attractant carrier.

[0032] The tablet holder may be provided by a tablet well or a cup in the upper end of the carrier unit, the tablet well and the housing being constructed such that when the carrier unit is located in the trap chamber, the tablet well is in gas flow communication with the trap chamber.

[0033] To this end, the tablet well may have a series of operatively upwardly projecting spacers for abutting against an inside of the housing, the spacers defining between them gas flow apertures for placing the tablet well in gas flow communication with the trap chamber. Instead, an operatively upper end of the inside of the housing may have an undulating shape, to form a series of gas flow openings when a rim of the tablet well is brought into contact with the upper end of the housing.

[0034] In another embodiment of the invention, the carrier unit's limbs are arranged to exert a clamping force against the radially inner surface of a side wall of the gas chamber, the attractant carrier, in use, being clamped to the side wall of the limbs of the carrier unit.

[0035] The invention extends to a carrier unit for use with a pest control device, which carrier unit includes: a tablet holder for holding a gas action pesticide tablet; and a mounting means for removably and replaceably, mounting the tablet holder in a housing of a pest control device.

[0036] Preferably, the carrier unit is constructed for use with a pest control device as defined above, the mounting means preferably being in the form of a plurality of resiliently deformable limbs fast within the tablet holder, the limbs being intended for resilient radial retraction upon forced movement of the carrier unit through a constriction in the housing of the pest control device, and for automatic resilient dilation or expansion after passage through the constriction, to hold the carrier unit captive in the housing of the pest control device.

[0037] The carrier unit preferably includes an attractant carrier holding formation for holding an attractant carrier as defined above with reference to a pest control device in accordance with the invention.

[0038] The tablet holder may be sealed by a removable and dispensable closure member.

[0039] The invention extends further to a tool for removing a carrier unit as defined above, from a pest control device, the tool including a plurality of prongs which are provided with engagement formations for engaging corresponding limbs of the attractant carrier, to permit the transmission of a tensile force from the tool to the tablet holder via the limbs.

[0040] The invention extends to a pest control method which includes: storing an attractant composition in an attractant carrier by dry absorption of the composition by the attractant carrier, the attractant composition being for attracting insects, such as fruit flies, and the attractant composition having a protein containing component; and placing the attractant carrier adjacent and insect killing means for killing insects attracted to the attractant carrier.

[0041] The method may include housing the attractant carrier in a pest control device as defined above.

[0042] The method may include inserting a gas action pesticide tablet in the tablet holder of a carrier unit as defined above, and closing off the tablet holder such that the tablet is hermetically sealed, the tablet holder preferably being sealed by a removable closure member. The closure member may be intended for disposal after use.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] The invention is further described by way of examples with reference to the accompanying drawings wherein

Figure 1 is a perspective view of a pest control device in accordance with the invention;

Figure 2 is a perspective view of an alternative embodiment of the pest control device;

Figure 3 is a plan view of a further embodiment of a pest control device;

Figure 4 is a plan view of a yet further embodiment of the invention;

Figure 5 is a plan view of an alternative embodiment of the invention;

Figure 6 is a plan view of a yet further embodiment of the invention;

Figure 7 is perspective view of an attractant carrier unit forming part of the pest control device according to Figure 6;

Figure 8 is a plan view of the attractant carrier unit as illustrated in Figure 7;

Figure 9 is a perspective view of a removing tool for use with the pest control device according to Figure 6;

Figure 10 is a sectional plan view of a yet further embodiment of the invention;

Figure 11 is a sectional plan view of a further embodiment of the invention;

Figure 12 is a perspective view of a further embodiment on the invention; and

Figure 13 is a perspective view of a pest control monitoring device according to the invention.

[0044] In the drawings, like reference numerals indicate like parts, unless indicated otherwise.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0045] Figure 1 of the accompanying drawings illustrates a pest control device 10 in accordance with the invention. The device 10 includes a housing 12 which defines a hollow interior forming a trap chamber 14; an attractant carrier 16; and an insect killing means being located in the trap chamber 14.

[0046] In this example, the housing 12 has a circular cylindrical peripheral wall 18 which has an operatively upright orientation, the cylindrical wall 18 being closed off at an upper end thereof. A suspension formation in the form of a lug 20 with an eye 22 projects outwardly from the closed end of the housing 12. A lower end of the housing 10 is open, defining a mouth or entrance 24 to the trap chamber 14.

[0047] The attractant carrier 16 is in the form of a sheet of blotting paper also referred to as ultra high absorbent paper, in which is absorbed and attractant composition for attracting flying insects, particularly fruit flies.

[0048] The attractant composition is formed as described below and in accordance with South African Patent No. 99/0690.

[0049] Thus, in a batch process, a protein hydrolysate in the form of HYMLURE (trade name) from Robertson's Spices (500g) was admixed with liver extract (6.2g), spleen extract (2g), gastric mucosa extract (1.1g), Vitamin B1 (6g), Vitamin B2 (0.08g), Vitamin B6 (0.07g), nicotinamide (0.8g), Vitamin B12 (0,2g) alanine (0.2g), arginine (0.3g), aspartic acid (0.09g), glutamic acid (0.41g), glycine (0.11g), histidine (0.35g), isoleucine (0.15g), leucine (0.61g), lysine (0.39g), methionine (0.15g), phenylalanine (0.31g), proline (0.03g), threonine (0.37g), trytophan (0.17g), tyrosine (0.30g), valine (0.20g) and parika powder (100g).

[0050] The resulting mixture was mixed by circulating it through a pump for about five minutes. Ammonia (24% solution, 50 g) was then added and mixing by

circulation was continued for a further five minutes. The resulting mixture was set aside for about eight hours. During this time the mixture became warm and the pH rose and then fell again to below a pH 7. The mixture was then pumped over a series of weirs to aerate the mixture and remove ammonia.

[0051] Sodium chloride (100g), glycerine (100g) and water (34.1g) were then added and the resulting composition was mixed by circulation as before for a further five minutes.

[0052] In this example, the dimensions of the sheet 16 of blotting paper 105 mm by 49.5 mm, thus providing a surface area of approximately 52 cm^2. 2ml of the attractant composition was absorbed in the attractant carrier 16 by dripping the attractant composition on the sheet 16.

[0053] The sheet 16 is held in annular shape against the radially inner surface of the peripheral wall 18 of the housing 12, at the upper end to lure fruit flies into the trap chamber 14.

[0054] As mentioned above, the device 10 includes an insect killing means for killing fruit flies which are attracted to the attractant carrier 16. In this example, the killing means is in the form of a slow-release gas action tablet 26 of DDVP, the tablet 26 being held in the proximity of the attractant carrier 16, at the upper end of the housing 12. The tablet 26 can also be a DECITAB, tablet or capsule containing Deltametrien.

[0055] In use, the device 10 is suspended by the lug 20 from an elevated support such as a tree branch or the slat of a trellis so that the housing 12 hangs from the support, the open entrance 24 of the housing 12 facing downwardly. A strap is typically passed through the eye 22 of the lug 20 and around the branch or trellis slat.

[0056] The release of gas by the tablet 26 causes a cloud of insecticidal gas to form in the upper region of the trap chamber 14, the gas being held captive in the trap chamber 14 because the housing 12 is substantially enclosed, apart from the entrance 24. Fruit flies which are attracted by the attractant composition held in the attractant carrier 16 thus entered the trap chamber 14 and approach the attractant carrier 16. The flies are overwhelmed and then killed by the insecticidal gases and fall from the housing 12 through the entrance 24.

[0057] Although not shown in Figure 1, the device 10 includes a holding formation fast with the housing 12 for holding the attractant carrier 16 in position, and has a tablet holder forming part of the housing 12 for holding the tablet 26.

[0058] It is an advantage of the device 10 of Figure 1 that the liquid based attractant composition is absorbed by the attractant carrier 16 in a dry fashion. In other words, the absorbent paper absorbs the attractant composition, but does not readily yield the absorbed liquid on pressure. This is to be distinguished from a sponge or sponge-like matrix as is used in some prior art devices. These sponges yielded liquid absorbed when they are compressed.

[0059] Less attractant composition is necessary when the composition is carried by a dry absorbent matrix than is the case when a sponge-like matrix is used. As a result, the device 10 is more cost-effective than the prior art devices. It will be appreciated that any suitable dry absorbent material can be used instead of absorbent paper. The attractant carrier 16 can thus, for instance, be provided by a gel or water retention matrix such as is used in baby diapers or for soil improvement.

[0060] Because the attractant carrier 16 is thus relatively light, the housing 12 can be of less sturdy construction than that of the prior art devices where a relatively heavy sponge has to be held in the housing 12.

[0061] It is envisaged that production and distribution of the devices 10 can be manufactured cheaply enough to promote the device 10 to be viewed as a disposable article.

[0062] In contrast with some prior art devices, fruit flies need not feed on the attractant composition in order for the trap to function effectively, and it is thus not necessary for the carrier 16 to be soaked. As the composition is essentially dry when absorbed by the carrier 16, fungal growth is less of a problem than when the composition remains wet.

[0063] Furthermore, in embodiments of the invention where no insecticidal component is present in the composition which is carried by the attractant carrier 16, the effect of the lifetime of the insecticidal is not adversely affected by it being in contact with the attractant composition, as is often the case in the prior art.

[0064] Manufacturing, transport and maintenance of the device 10 are less hazardous and therefore easier to use than prior art devices in which an attractant and insecticidal composition are carried in a sponge. Factory or farm workers who handled the attractant carrier 16 are not exposed to contact with any insecticide or the attractant composition, so that the device 10 will not fall foul of strict legal requirements concerning the handling of pesticides.

[0065] Is also an advantage that the absorbent paper attractant carrier 16 does not leak during transportation, even when exposed to air pressure differences typically experienced during air travel. In fact users can easily apply the attractant composition to the absorbent paper at the point of use. It is thus not necessary to refrigerate the devices 10 during transportation, but only to refrigerate the attractant composition, which may be carried in separate containers.

[0066] In Figure 2 of the drawings, the embodiment of a pest control device 30 is illustrated. The device 30 corresponds largely to the device 10 of Figure 1, apart from the construction of the housing 12.

[0067] The housing 12 of the device 30 is foldable, being constructed from a wax impregnated paper instead of a plastics material. The device 30 can thus be folded flat for transportation purposes, being unfolded at a point of use.

[0068] A further embodiment of the pest control device 40 is illustrated in Figure 3. The device 40 is similar in its general functioning to the devices 10 and 30 of Figures 1 and 2.

[0069] A distinction of the device 40 is that the housing 12 is of composite, two-part construction, having a shallow conical cover or hood 36, and a frusto-conical skirt 34 which depends from the hood 36, to define the trap chamber 14 and the entrance 24 to the hollow interior of the housing 12. The two conical members 36 and 34 have opposite orientations so that when the device 40 is in its operative orientation, the hood 36 provides a downwardly sloping cover surface, and the skirt 34 narrows towards the entrance 24.

[0070] In this example, the skirt 34 is of a transparent plastics material, so that the interior of the trap chamber 14 is visible to a user.

[0071] The device 40 includes a holding formation in the form of a support structure 38 for holding the sheet of absorbent paper 16 in position against the underside of the hood 36. Naturally, the attractant carrier 16 is in this instance, a sheet of blotting paper which is arranged in conical shape. The support structure 38 is replaceably and removably secured to the hood 36 by a securing arrangement having two upright pins 42 which are receivable by snap fit engagement in complementary sockets provided in a shroud 44 forming part of the housing 12.

[0072] The support structure 38 is constructed for supporting the carrier 16 such that the carrier 16 lies on the structure 38 and is exposed to air in the trap chamber 14, so that chemicals which attract fruit flies to the carrier are released to the atmosphere.

[0073] The shroud 44 is conical and is integrally formed with the lug 20 so that the shroud 44 covers the apex of the hood 36. Although not shown in Figure 3, the device 40 also has a tablet holder secured to the housing 12 for holding the tablet 26 adjacent to the attractant carrier 16.

[0074] It is an advantage of the device 40 of Figure 3 that the readily removable and replaceable support structure 38 facilitates easy removal and replacement of the attractant carrier 16.

[0075] Figure 4 of the drawings illustrates an alternative embodiment of a pest control device 50 in accordance with the invention. The device 50 is similar to the device 40 as described in Figure 3.

[0076] The housing 12 of the device 50 comprises a lid 52 which has the shape of an inverted saucer, and a skirt 48 which is removable connected to the lid 52 to depend therefrom. Again, the skirt 48 is of a translucent material, both the lid 52 and the skirt 48 being of a polymeric plastics material and being arranged for snap-fit engagement.

[0077] The holding formation is in this case in the form of a holding member provided by a support grid 38 which provides a planar, operatively horizontal bed on which the carrier 16 lies. The grid 38 is perforated, to ensure proper exposure of the carrier 16 to the atmosphere. As is the case with the device 40 of Figure 3, the grid 38 is removable and replaceable, the grid 38 and the lid 52 having co-operating

connection formations 46 for snap-fit engagement to secure the grid 38 to the inside of the lid 52. The lug 20 is integrally formed with the lid 52.

[0078] Figure 5 illustrates yet another embodiment of the invention. The pest control device 60 is almost identical to the device 50 of Figure 4. A major distinction between the device 60 and the device 50 of Figure 4 is that the device 60 has a support formation in the form of a resilient hook 54 such as that described in South African Patent No. 99/0690. The need for a strap to mount the device 60 is thus obviated.

[0079] Figure 5 also illustrates a peripherally extending connection formation in the form of a groove-and-lip arrangement for removably securing the skirt 48 to the lid 52.

[0080] An alternative embodiment of a pest control device 70 is more clearly illustrated in Figure 6. The main distinction between the device 70 and the devices 10, 30, 40, 50 and 60 of the previous drawings is that the gas release tablet 26 and the attractant carrier 16 held by a carrier unit 64 which is removably inserted in the housing 12.

[0081] As can best be seen in Figures 7 and 8 of the accompanying drawings, the carrier unit 64 has a body 66 which consists primarily of a circular cylindrical tube, a floor member 82 being provided in the hollow interior of the tube, transverse to the tube, to serve as a floor for a tablet well 76 at the upper end of the body 66. The tablet well 76 is thus a shallow cavity adjacent to the upper end of the tube 66 for holding a gas release tablet 26. An upper rim of the body 66 is provided with a circumferentially extending series of axially projecting pins or spacers 78 serving to space the rim from an inside of the housing 12 to ensure exposure of the tablet 26 to air in the trap chamber 14.

[0082] A radially outwardly directed cylindrical wall of the body member 66 provides the holding formation for holding the attractant carrier 16. The sheet of absorbent paper 16 thus extends circumferentially about the body member, in use, girding the carrier unit 64, and a circumferentially extending ridge or lip 72 which projects radially outwardly from the lower end of the body member 66. The lip 72 anchors the sheet 16 against slipping downwardly from the carrier unit 64 under gravity.

[0083] In other embodiments of the invention, the radially outer surface of the body member 66 can be provided with axially extending ribs, to increase the exposed surface area of the attractant carrier 16.

[0084] The carrier unit further has a number of mounting formations for mounting the body member 66 in the trap chamber 14 such that it is selectively removable and replaceable. In this example, the mounting formations are in the form of three resiliently deformable limbs 68 which projects radially outwardly from the body member 66 at the lower end of the body member 66. The limbs 68 are downwardly inclined relative to the lengthwise direction of the body member 66. The limbs 68 are inherently resilient, being made from a suitable plastics material.

[0085] The housing 12 is in the form of a bell shaped cowl 58 of transparent plastics material. The cowl 58 has a circular cross-section of varying diameter, forming a constriction 62 adjacent to the entrance 24 to the trap chamber. The constriction 62 is of a diameter which is smaller than that of the free ends of the limbs 68 relative to the longitudinal axis 71 of the carrier unit 64.

[0086] In use, the carrier unit 64 is inserted into the cowl 58 through the entrance 24, the tablet well 76 leading. During such insertion, the limbs 68 bear against the inside of the cowl 58 at the constriction 62. If sufficient force is applied to the carrier unit 64 in an axial direction, the limbs 68 are deformed to retract radially inwardly, permitting passage of the carrier unit 64 into the trap chamber 14. Once the limbs 68 have passed through the constriction 62, they expand radially outwardly due to their inherent resilience, so that the carrier unit 64 effectively dilates to be held captive in the trap chamber 14. The orientation of the limbs 68 are such that the carrier unit 64 cannot be withdrawn from the cowl 58 simply by gripping and pulling the body member 66 towards the mouth 24. The limbs 68 also serve to centre the carrier unit 64 in the housing 12.

[0087] To this end, the device 70 forms part of a kit which includes a tool 80, Figure 9, for use in removing the carrier unit 64 from the cowl 58. The tool 80 comprises a handle 84 attached to three hooked prongs 86 which are roughly longitudinally aligned with the handle 84. Each prong 86 has a hook 88 at its free end, the hooks 88 being positioned and oriented simultaneously to engage the limbs 68 of the carrier unit 64. As can best be seen in Figure 6, each limb 68 has a barb or spur 73 which faces operatively upwardly for hooking cooperation was one of the prongs 86.

[0088] To remove the carrier unit 64 from the cowl 58, the prongs 86 of the tool 80 is inserted into the trap chamber 14, so that each hook 88 engages one of the limbs 68. A user then pulls downwardly forcibly, which results in radially inward contraction of the limbs 68 due to the orientation of the prongs 86. The limbs 68 are thus anchored to the tool 80 by engagement of the prongs with the respective spurs 73.

[0089] It is an advantage of the device 70 of Figure 6 that it facilitates maintenance of the device 70, as the gas tablet 26 and the carrier 16 can be replaced on the carrier unit 64 when it is separated from the cowl 58. Furthermore, the carrier unit 64, and thus the gas tablet 26 and the attractant carrier 16 are securely located in the trap chamber 14. Not only is it highly unlikely that the carrier unit 64 will fall out of the cowl 58 accidentally, but the construction of the limbs 68, frustrates unauthorised removal of the carrier unit 64, for instance by children, without the necessary tool 80.

[0090] In the examples of Figures 1 to 5, gas action tablets 26 will typically be distributed separately in a hermetically sealed sachet for point of use insertion. In the example of Figures 6 to 11, however, the tablets 26 can be inserted in the tablet holder 76 during manufacturing, being sealed in the tablet well 76 by a removable and dispensable lid or cover. In such case the carrier unit 64 can be disposed of after use, being distributed as a unit for recharging the device 70.

[0091] Figure 10 illustrates a further embodiment of the pest control device 90 according to the invention. The device 90 is largely similar to the device 70 of Figure 6, a major distinction being the construction of the upper end of the carrier unit 64.

[0092] The carrier unit 64 of the device 90 does not have a series of pins 78 to space the upper end of the unit 64 from the peripheral wall provided by the cowl 58. Instead, the inner periphery of the cowl 58 adjacent to the upper end of the carrier unit 64 is undulating, having three circumferentially spaced dimples 98 so that spaces between the dimples 98 serve as airflow passages for placing the tablet well 92 in gas flow communication with the remainder of the trap chamber 14, and centre the carrier unit 64.

[0093] Figure 11 illustrates yet another embodiment of a pest control device 100 according to the invention. The device 100 corresponds to the device 90 of Figure 10, but the carrier unit 64 is constructed differently.

[0094] The attractant carrier 16 is not supported on the body 66 of the carrier unit 64, but is instead clamped to the radially inwardly directed peripheral wall of the cowl 58. The attractant carrier 16 thus extends circumferentially about the cowl 58, being pressed against the cowl 58 and being held in position by inherent resilient mounting legs 96 which are fast with a tubular cup 94 which defines the tablet holder 76.

[0095] It will be appreciated that the legs 96 are dimensioned such that they exert a radially outwardly directed clamping force due to their inherent resilience, when the carrier unit 64 is located in the cowl 58. The legs 96 thus serve the duel function of locating the tablet holder 76 in the trap chamber 14 by resisting passage of the carrier unit 64, through the entrance 24, and of retaining the attractant carrier 16 in position against the inner surface of the cowl 58.

[0096] Figure 11 also illustrates a strap 104 by which the device 100 is suspended from a twig 102.

[0097] Figure 12 illustrates a yet further embodiment of the pest control device 110. The device 110 is similar to the device 10 as illustrated in Figure 1 but includes a rectangular housing 12 in cross-section. The housing 12 also defines a hollow interior forming a trap chamber 14.

[0098] The housing 12 is closed of at one end 112 thereof and has an opening 24 at the opposite free end. An attractant carrier 16 is secured to and depends from the inner surface of the operatively upper end 112 of the housing 12 so that the attractant carrier 16 is located inside the trap chamber 14.

[0099] An insect killing means 114 is secured adjacent to the attractant carrier 16 near the operatively upper end 112 of the housing 12.

[00100] The insect killing means 114 includes a perforated pouch having at least one slow release gas tablet enclosed therein. The perforated openings provide gas flow communication between the pouch and the trap chamber 14 to facilitate gas flow from the slow release gas tablets into the trap chamber 14.

[00101] The gas so released from the slow release gas tablets accumulates in a cloud around the attractant carrier 16 in the operatively upper region of the trap chamber 14.

[00102] A fruit fly approaching the attractant carrier 16 by entering the housing 12 through the opening 24 is overwhelmed by the cloud of poisonous gas and dies. The body of the fruit fly will then fall to the ground through the opening 24.

[00103] The device 110 also includes a suspension formation in the form of a lug 20 having an eye 22 and which projects outwardly away from the closed end 112 of the housing 110.

[00104] The eye 22 is open at one end 116 thereof to facilitate easy suspension of the device 110 from an elevated support without the need of a strap. The side walls 18 of the housing 12 are further translucent.

[00105] Figure 13 illustrates a further embodiment of the pest control device 120 utilised for monitoring the threshold of a fruit fly population within a specified are, which device includes a housing 12 having a plurality of side walls 18 which defines a hollow interior forming a trap chamber 14. The housing 12 is closed off at one end 112 thereof, having a lug 20, similar to that which has been described in Figure 12, extending outwardly away from the end 112.

[00106] Each sidewall 18 of the housing 12 tapers inwardly to define a measuring chamber 113 which ends in an opening 115. A plurality of further openings 122 is provided in the side walls 18, above the measuring chamber 113 which serves to place the trap chamber 14 in airflow communication with the atmosphere.

[00107] An attractant carrier 16 is secured to and depends from the operatively upper inner surface of the closed off end 112. An insect killing means 114 is secured to and adjacent the attractant carrier 16. The insect killing means 114 is of similar construction than that which has been described in Figure 12.

[00108] The opening 115 is closed of with a cap 126. In use, a fruit fly will enter the trap chamber 14 through the openings 122. The poisonous cloud of gas forming in the upper region of the trap chamber 14, as a result of gases released from the slow

release gas tablets (as described in Figure 12), will overwhelmed the fruit fly and killed it.

[00109] However in this example, the body of the fruit fly will not fall to the ground where it could be eaten by other insects such as ants, but instead will falls into the measuring chamber 113. This enables a user to determine the threshold of the fruit fly population within a specified area.

[00110] In all of the above described examples, the killing means is in the form of a slow release gas action tablet 26. It will be appreciated that other methods of killing insects lured into the trap chamber 14 can be used. For example, an insecticidal component may optionally be included in the attractant composition held by the attractant carrier 16. In such case a fungicide may also be necessary.

CLAIMS

1. A pest control device for use in the control of flying insects, such as fruit flies, which device includes an attractant carrier for carrying a liquid pest attractant composition by dry absorption of the attractant composition; and attractant composition carried by the attractant carrier for attracting fruit flies, and the attractant composition including a protein containing component, and an insect killing means for killing fruit flies which come into the proximity of the attractant carrier.

2. A pest control device as claimed in claim 1 wherein the attractant carrier is provided by a sheet of an absorbent paper.

3. A pest control device as claimed in claim 2 wherein the sheet is a blotting paper.

4. A pest control device as claimed in anyone of claims 2 to 3 wherein the sheet is an ultra high absorbent paper.

5. A pest control device as claimed in anyone claims 1 to 4 wherein the absorbent paper has a surface area of 30-100 cm^2.

6. A pest control device as claimed in claim 5 wherein the absorbent paper has a surface area of 40-60 cm^2.

7. A pest control device as claimed in anyone of claims 5 to 6 wherein the absorbent paper has a surface area of 50 cm^2.

8. A pest control device as claimed in anyone of claims 1 to 7 wherein the attractant carrier carries between 1-4 millilitres of attractant composition.

9. A pest control device as claimed in claim 8 wherein the attractant carrier carries 2 millilitres of attractant composition.

10. A pest control device as claimed in anyone of claims 1 to 9 wherein the attractant composition includes ammonia.

11. A pest control device as claimed in anyone of claims 1 to 10 wherein the attractant composition is as described in South African Patent No. 99/0690.

12. A pest control device as claimed in anyone of claims 1 to 11 wherein the protein component is protein hydrolysate.

13. A pest control device as claimed in claim 12 and wherein the protein component is a liver extract.

14. A pest control device as claimed in anyone of claims 12 to 13 wherein the protein component is a spleen extract.

15. A pest control device as claimed in anyone of claims 12 to 14 wherein the protein component is a gastric mucosa extract.

16. A pest control device as claimed in anyone of claims 12 to 15 wherein the protein component is any combination of a protein hydrolysate, liver extract, spleen extract or gastric mucosa extract.

17. A pest control device as claimed in anyone of claims 1 to 16 wherein the protein hydrolysate is HYMLURE (trade name).

18. A pest control device as claimed claim 17 wherein the protein hydrolysate is BUMINOL (trade name).

19. A pest control device as claimed in anyone of claims 1 to 18 wherein the attractant composition includes one or more amino acids.

20. A pest control device as claimed in claim 19 wherein the amino acid is alanine.

21. A pest control device as claimed in anyone of claims 19 or 20 wherein the amino acid is argine.

22. A pest control device as claimed in anyone of claims 19 to 21 wherein the amino acid is aspartic acid.

23. A pest control device as claimed in anyone of claims 19 to 22 wherein the amino acid is glumatic acid.

24. A pest control device as claimed in anyone of claims 19 to 23 wherein the amino acid is glycine.

25. A pest control device as claimed in anyone of claims 19 to 24 wherein the amino acid is histidine.

26. A pest control device as claimed in anyone of claims 19 to 25 wherein the amino acid is isoluecine.

27. A pest control device as claimed in anyone of claims 19 to 26 wherein the amino acid is leucine.

28. A pest control device as claimed in anyone of claims 19 to 27 wherein the amino acid is lysine.

29. A pest control device as claimed in anyone of claims 19 to 28 wherein the amino acid is methionine.

30. A pest control device as claimed in anyone of claims 19 into 29 wherein the amino acid is phenylalanine.

31. A pest control device as claimed in anyone of claims 19 to 30 wherein the amino acid is praline.

32. A pest control device as claimed in anyone of claims 19 to 31 wherein the amino acid is threonine.

33. A pest control device as claimed in anyone of claims 19 to 32 wherein the amino acid is tryptohan.

34. A pest control device as claimed in anyone of claims 19 to 33 wherein the amino acid is tyrosine.

35. A pest control device as claimed in anyone of claims 19 to 34 wherein the amino acid is valine.

36. A pest control device as claimed in anyone of claims 19 to 35 wherein the amino acid is cysteine.

37. A pest control device as claimed in anyone of claims 19 to 36 wherein the amino acid is any combination of any two or more of alanine, arginine, aspartic acid, glumatic acid, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, praline, threonine, tryptophan, tyrosine, valine or cysteine.

38. A pest control device as claimed in anyone of claims 1 to 37 wherein the attractant composition includes at least one vitamin.

39. A pest control device as claimed in claim 38 wherein the vitamin is Vitamin B1.

40. A pest control device as claimed in anyone of claims 38 to 39 wherein the vitamin is Vitamin B2.

41. A pest control device as claimed in anyone of claims 38 to 40 wherein the vitamin is Vitamin B6.

42. A pest control device as claimed in anyone of claims 38 to 41 wherein the vitamin is Vitamin B12.

43. A pest control device as claimed in anyone of claims 38 to 42 wherein the vitamin is nicotinamide.

44. A pest control device as claimed in anyone of claims 38 to 43 wherein the vitamin is any combination of one or more of Vitamin B1, Vitamin B2, Vitamin B6, Vitamin B12 or nicotinamide.

45. A pest control device as claimed in anyone of claims 1 to 44 wherein the attractant composition includes paprika.

46. A pest control device as claimed in claim 45 wherein the paprika is in powder form.

47. A pest control device as claimed in anyone of claims 1 to 46 wherein the attractant composition includes a liquid base.

48. A pest control device as claimed in claim 47 wherein the liquid base is glycerine.

49. A pest control device as claimed in anyone of claims 1 to 48 wherein the attractant composition includes salt.

50. A pest control device as claimed in anyone of claims 1 to 49 wherein the attractant composition includes water.

51. A pest control device as claimed in anyone of claimed 1 to 50 wherein the insect killing means includes a pesticide.

52. A pest control device as claimed in claim 51 wherein the pesticide is carried by the attractant carrier.

53. A pest control device as claimed in anyone of claims 1 to 52 wherein the pesticide is provided by a pesticidal component forming part of the attractant composition.

54. A pest control device as claimed in claim 53 wherein the pesticidal component is any suitable Chlorinate Hydrocarbon.

55. A pest control device as claimed in anyone of claims 53 or 54 wherein the pesticidal component is any suitable Organic Phosphate.

56. A pest control device as claimed in anyone of claims 53 to 55 wherein the pesticidal component is any suitable Pyrethriod.

57. A pest control device as claimed in any one of claims 53 to 56 wherein the pesticidal component is any suitable Derivetes from plants.

58. A pest control device as claimed in anyone of claims 53 to 57 wherein the pesticidal component is any combination of one or more of any suitable Chlorinate Hydrocarbon, Organic Phosphate, Pyrethriod or Derivetes from plants.

59. A pest control device as claimed in claim 58 wherein the Chlorinate Hydrocarbon is Thrichlorfon.

60. A pest control device as claimed in any one of claims 58 or 59 wherein the Chlorinate Hydrocarbon is Methomyl.

61. A pest control device as claimed in any one of claims 58 to 60 wherein the Organic Phosphate is Mevinphos.

62. A pest control device as claimed in any one of claims 58 to 61 wherein the Organic Phosphate is Dichlorphos.

63. A pest control device as claimed in anyone of claims 1 to 62 wherein the device includes a housing and a holding formation connected to the housing for holding the attractant carrier.

64. A pest control device as claimed in claim 63 wherein the holding formation is a holding member which is removably connected to the housing.

65. A pest control device as claimed in anyone of claims 1 to 64 wherein the insect killing means is gas release arrangement for releasing insecticidal gases in the vicinity of the holding formation.

66. A pest control device as claimed in claim 65 wherein the gas release arrangement includes a gas.

67. A pest control device as claimed in any one of claims 65 or 66 wherein the gas release arrangement includes a solid.

68. A pest control device as claimed in any one of claims 65 to 67 wherein the gas release arrangement includes a liquid.

69. A pest control device as claimed in any of one of claims 65 to 68 wherein the gas release arrangement is a slow-release gas action tablet.

70. A pest control device as claimed in anyone of claims 65 to 69 wherein the gas release arrangement includes a slow-release gas capsule.

71. A pest control device as claimed in anyone of claims 65 to 70 wherein the tablet or capsule is located in the housing.

72. A pest control device as claimed in anyone of claims 63 to 71 wherein the housing defines a trap chamber.

73. A pest control device as claimed in anyone of claims and 63 to 72 wherein the trap chamber has an entrance or mouth which is directed downwardly when the housing is in an operative orientation.

74. A pest control device as claimed in anyone of claims 63 to 73 wherein the housing is substantially closed so that, in use, a gas cloud forms in the upper region of the trap chamber.

75. A pest control device as claimed in anyone of claims 63 to 74 wherein the trap chamber is bound by peripheral walls.

76. A pest control device as claimed in claim 75 wherein the peripheral walls is transparent.

77. A pest control device as claimed in anyone of claims 75 or 76 wherein the peripheral walls is gas impermeable to trap gas released by the gas release arrangement in the trap chamber.

78. A pest control device as claimed in anyone of claims 75 to 777 wherein the peripheral walls consists of a polymeric plastics material.

79. A pest control device as claimed in anyone of claims 63 to 78 wherein the housing is constructed to prevent the ingress of water into the trap chamber while the housing is in its operative orientation.

80. A pest control device as claimed in anyone of claims 63 to 79 wherein the housing includes a suspension formation for suspending the device from an elevated support.

81. A pest control device as claimed in anyone of claims 63 to 80 wherein the housing includes a tablet holder for holding the gas release tablet adjacent to the holding formation.

82. A pest control device as claimed in anyone of claims 63 to 81 wherein the housing is of composite construction having a removable part for facilitating access to the holding formation and/or the tablet holder.

83. A pest control device as claimed in claim 82 wherein the housing comprises an inverted dish-shaped top and a skirt which is removably connected to the top, the skirt depending peripherally from the top to define the trap chamber.

84. A pest control device as claimed in anyone of claims 81 to 83 wherein the tablet holder and the holding formation are provided by a carrier unit which is removably and replaceably insertable in the trap chamber.

85. A pest control device as claimed in claim 84 wherein the carrier unit is mountable in the housing by resilient deformation of mounting formations.

86. A pest control device as claimed in any one of claims 81 or 85 wherein the mounting formations are provided by a plurality of resiliently flexible limbs projecting radially from a body of the carrier unit, the housing defining a constriction having a diameter smaller than that of the limbs.

87. A pest control device as claimed in anyone of claims 84 to 86 wherein the carrier unit's holding formation is provided by a radially outer surface of the carrier unit body so that the attractant carrier, in use, extends circumferentially around the carrier unit.

88. A pest control device as claimed in claim 87 wherein the attractant carrier includes a retaining means for retaining the attractant carrier on the carrier unit.

89. A pest control device as claimed in anyone of claims 87 or 88 wherein the retaining means is an elastic band which extends circumferentially about the body of the attractant carrier.

90. A pest control device as claimed in anyone of claims 81 to 89 wherein the tablet holder is provided by a tablet well or a cup in the upper end of the carrier unit.

91. A pest control device as claimed in claim 90 wherein the tablet well and the housing is being constructed such that when the carrier unit is located in the trap chamber, the tablet well is in a gas flow communication with the trap chamber.

92. A pest control device as claimed in anyone of claims 90 or 91 wherein the tablet well includes a series of operatively upwardly projecting spacers for abutting against an inside of the housing, the spacers, defining between then gas flow apertures for placing the tablet well in gas flow communication with the trap chamber.

93. A pest control device as claimed in anyone of claims 63 to 92 wherein the operatively upper end of the inside of the housing has an undulating shape, to form a series of gas flow openings when a rim of the tablet well is brought into contact with the upper end of the housing.

94. A pest control device as claimed in anyone of claims 86 to 93 wherein the carrier unit's limbs are arranged to exert a clamping force against the radially inner surface of a side wall of the trap chamber.

95. A carrier unit for use with a pest control device as claimed in anyone of claims 1 to 94 which carrier unit includes a tablet holder for holding a gas action pesticide tablet and a mounting means for removably and replaceably mounting the tablet holder in a housing of the pest control device.

96. A carrier unit as claimed in claim 95 wherein the mounting means is in the form of a plurality of resiliently deformable limbs fast with the tablet holder, the limbs being intended for resilient radial retraction upon force movement of the carrier unit through a constriction in the housing of the pest control device and

for automatic resilient dilation or expansion after passage through the constriction, to hold the carrier unit captive in the housing of the pest control device.

97. A carrier unit as claimed in anyone of claims 95 or 96 which includes an attractant carrier holding formation for holding and attractant carrier.

98. A carrier unit as claimed in anyone of claims 95 to 97 wherein the tablet holder is sealed by a removable and dispensable closure member.

99. A tool for removing a carrier unit from a pest control device as claimed in anyone of claims 95 to 98, the tool including a plurality of prongs which are provided with engagement formations for engaging corresponding limbs of the attractant carrier, to promote the transmission of a tensile force from the tool to the tablet holder via the limbs.

100. A pest control method which includes the steps of storing an attractant composition in an attractant carrier by dry absorption of the composition by the attractant carrier, the attractant composition being for attracting insects, such as fruit flies, and the attractant composition having a protein containing component; and placing the attractant carrier adjacent an insect killing means for killing insects attracted to the attractant carrier.

101. A method as claimed in claim 100 wherein the attractant carrier is housed in a pest control device as claimed in anyone of claims 1 to 98.

102. A method as claimed in anyone of claims 100 or 101 which includes the steps of inserting a gas action pesticide tablet in a tablet holder of a carrier unit, closing off the tablet holder such that the tablet is hermetically sealed, the tablet holder, being sealed by a removable closure member.

103. A method as claimed in claim 102 wherein the closure member is intended for disposal after use.

104. A pest control device substantially as hereinbefore described with reference to anyone of Figures 1 to 6 or 10 to 13.

105. A carrier unit substantially as hereinbefore described with reference to anyone of Figures 6 to 8.

106. A tool substantially as hereinbefore described with reference to Figure 9.

107. A pest control method substantially as hereinbefore described.

DATED THIS 20 DAY OF OCTOBER 2005

FOR THE APPLICANT
BEZUIDENHOUTS DU RANDT INC

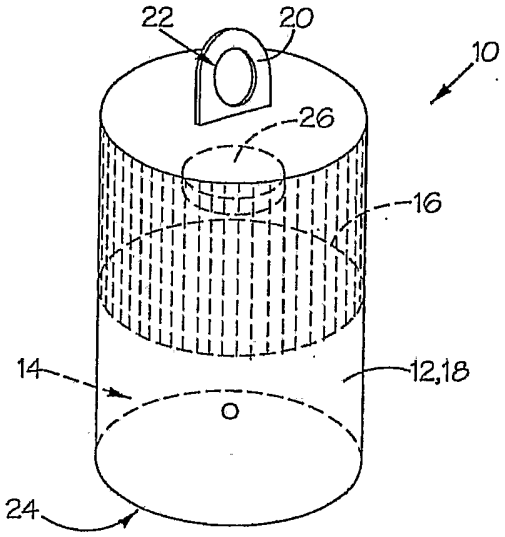


FIG 1

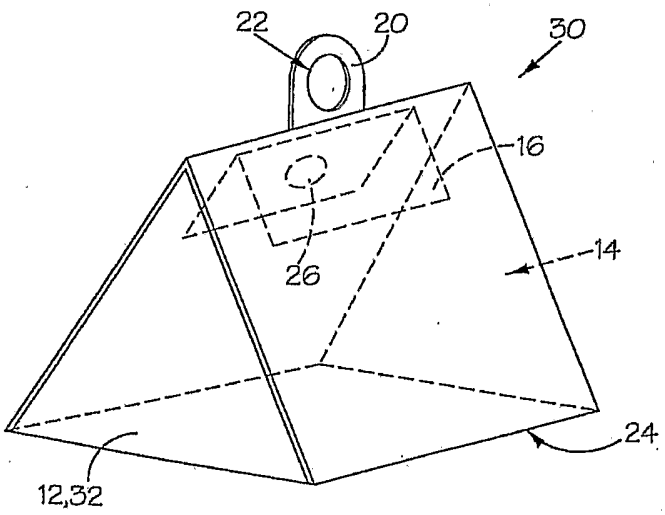


FIG 2

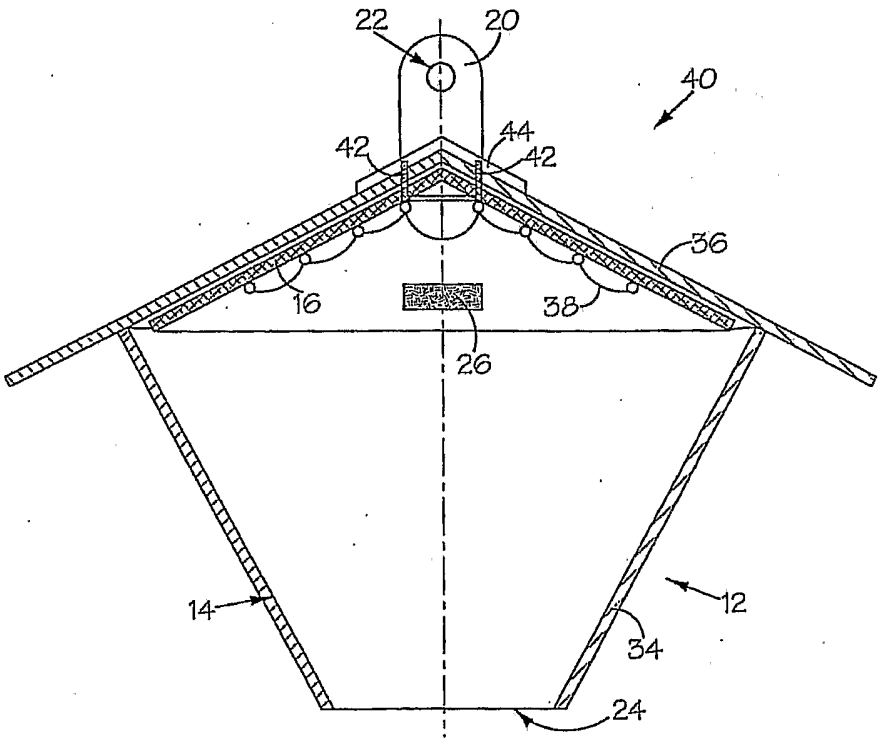


FIG 3

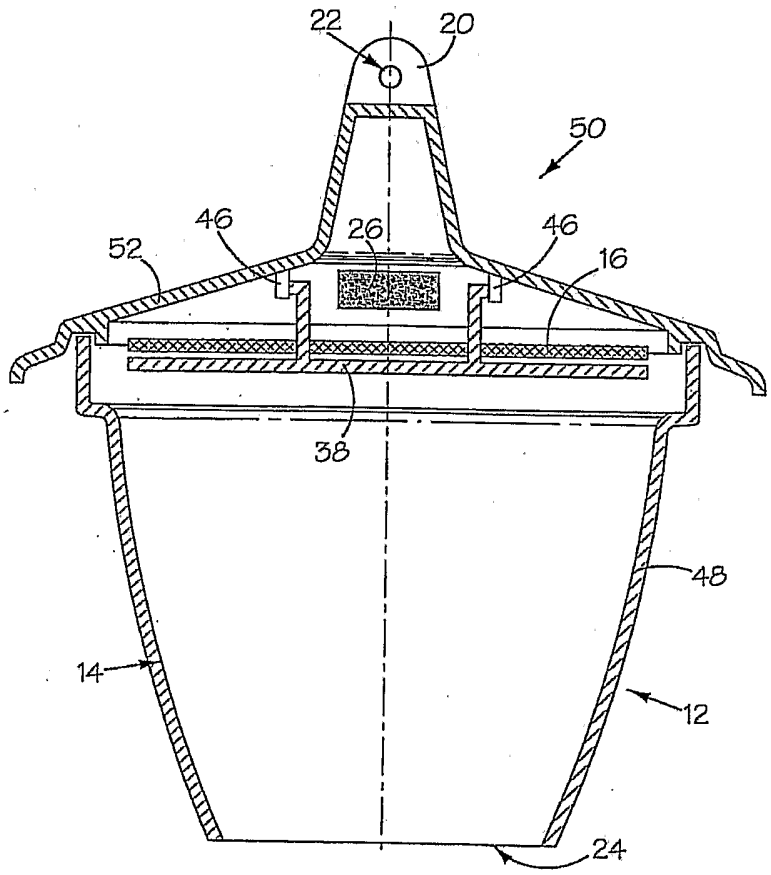


FIG 4

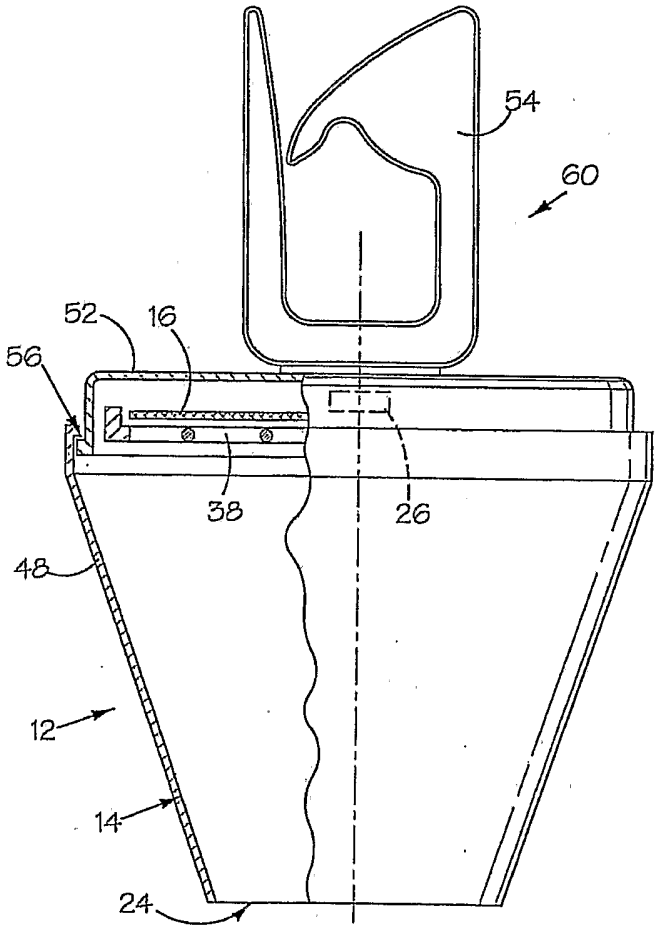


FIG 5

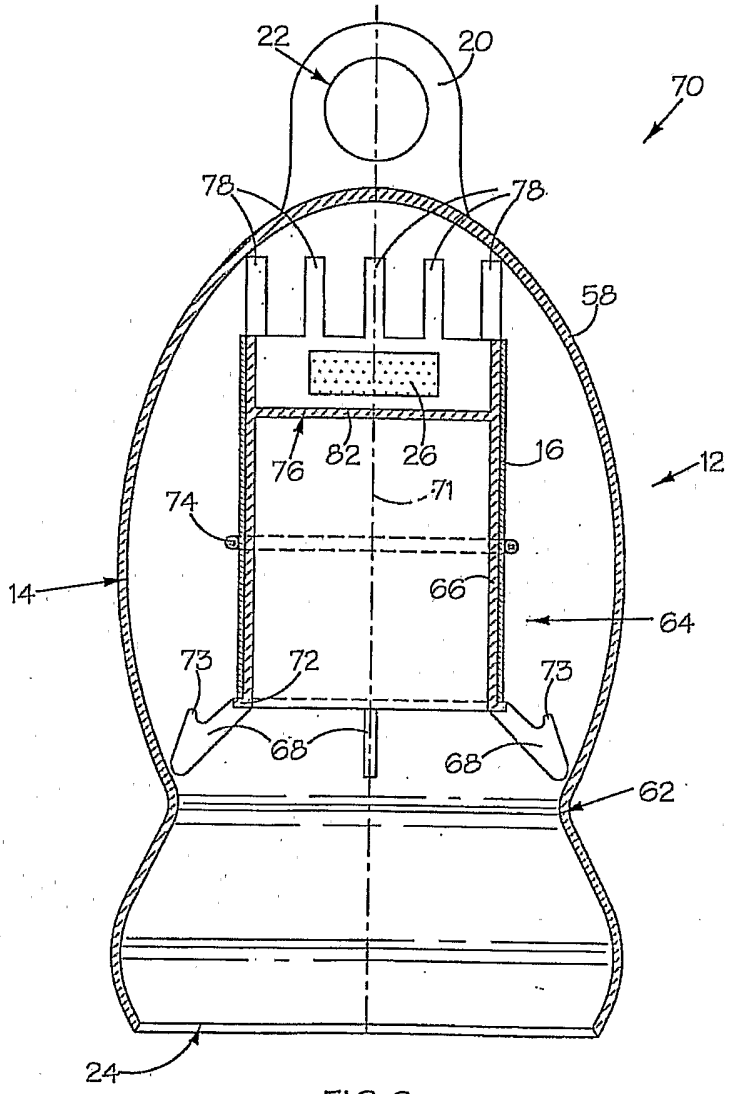


FIG 6

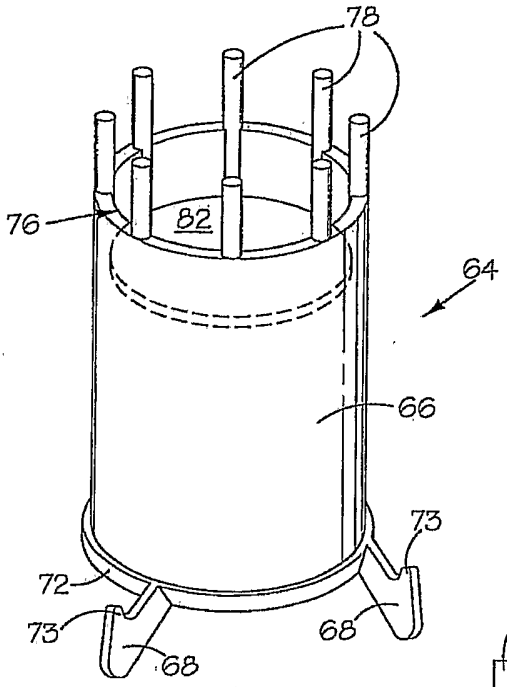


FIG 7

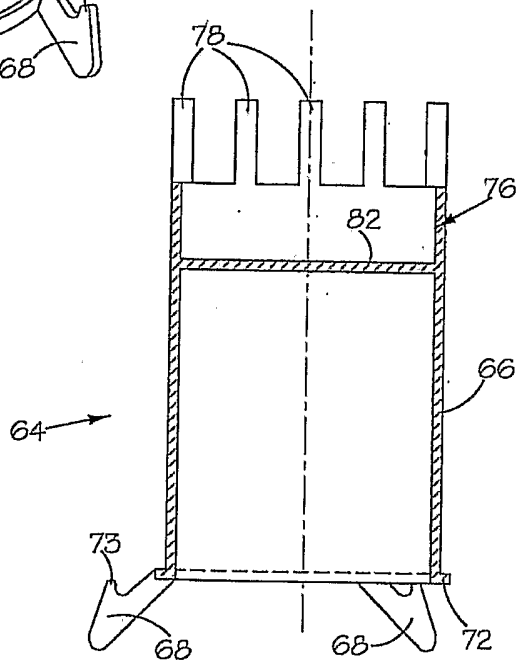


FIG 8

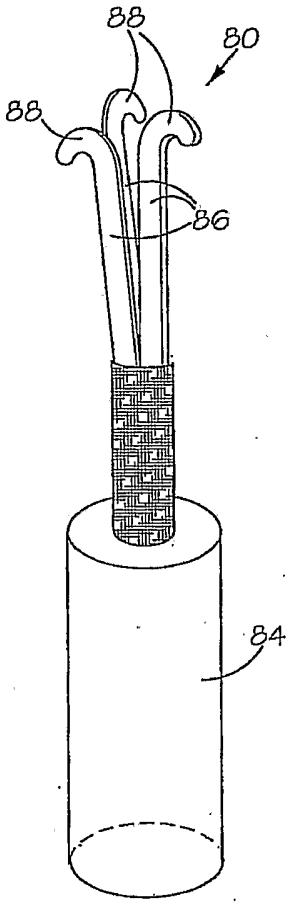


FIG 9

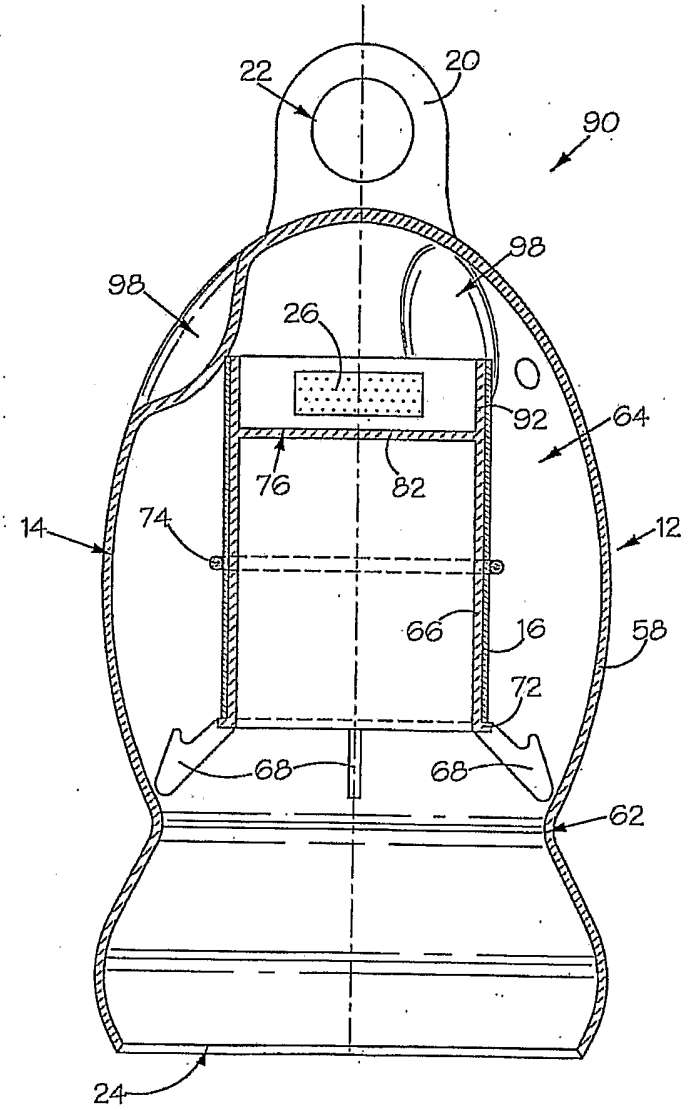


FIG 10

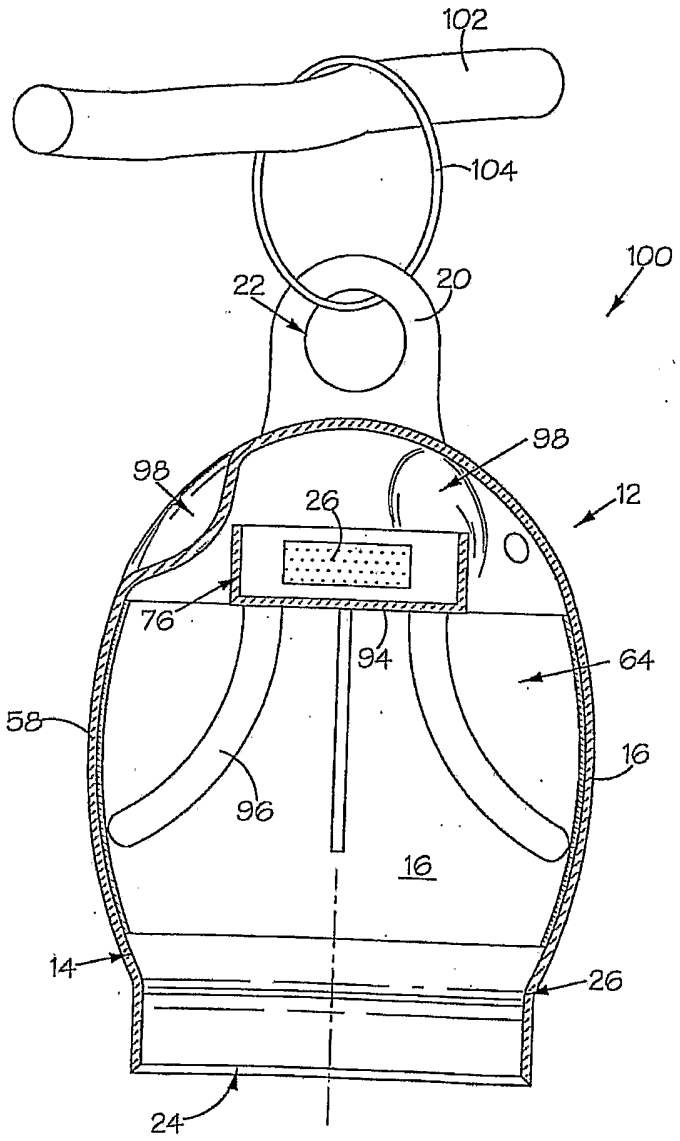


FIG 11

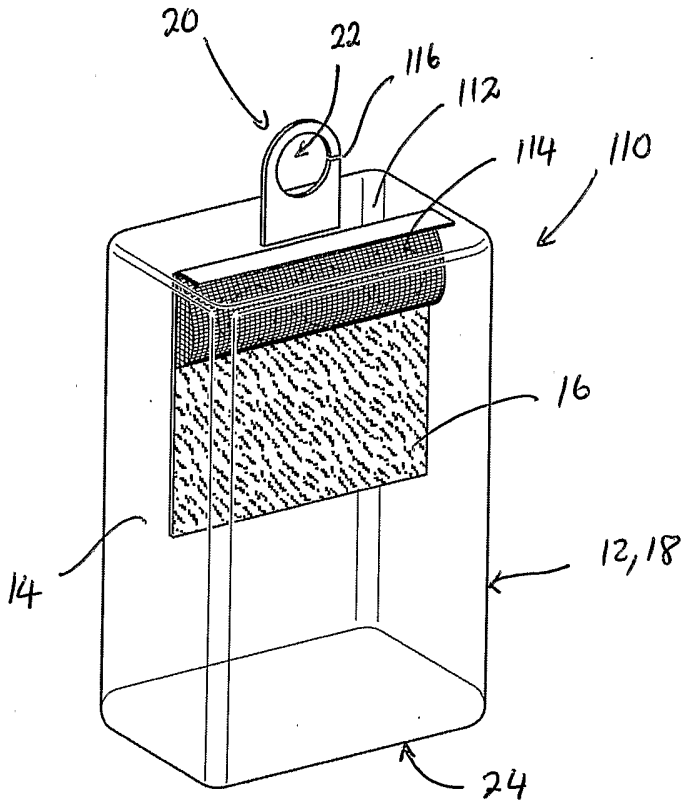


FIG 12

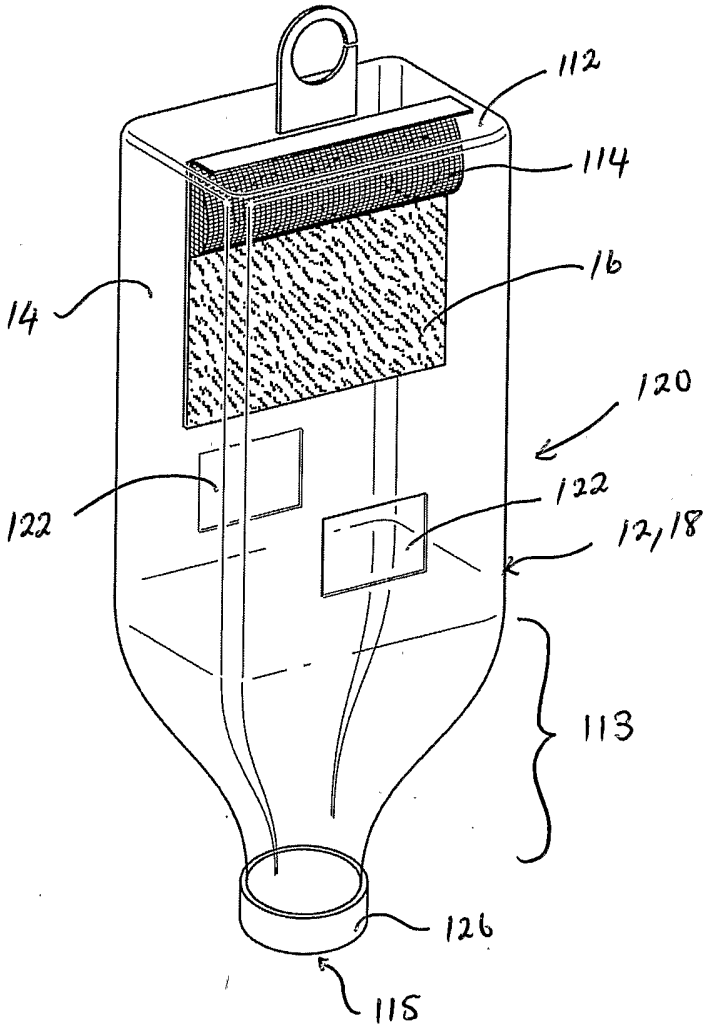


FIG 13