

AN INSECT TRAP

TECHNICAL FIELD

The present invention relates to an insect trap and more particularly to an insect trap which has been designed to additionally provide protection against pathogens.

BACKGROUND OF THE INVENTION

Insect traps of various types are well known. A particularly common trap type, particularly for flying insects, comprises an insect attractant means, such as, for example a UV light source and an insect trapping means, such as, for example an adhesive board or paper contained in a housing. The flying insects are attracted to the trap, enter the housing through openings and get caught on the trapping means.

The traps are often fitted in areas where food is handled, such as kitchens and restaurants. Unfortunately, the captured insects die and decompose and thus can become a source of odour and can potentially spread germs.

Two Japanese patent publications disclose insect traps which address the issue of air sterilisation.

JP11155455 discloses a UV insecticidal tool enabling easy disposal of the dead bodies and remains of insects. It discloses the use of a sterilising lamp that is attached to the lower part of the insecticidal tool under the insect capturing lamp.

JP10146146 is considered the most pertinent prior art and it discloses a method and apparatus for insecticidal and bactericidal operation in which insects are killed by bringing them into contact with high voltage electrodes and bactericidal rays sterilise bacteria floating in the air. The device of embodiment 1 is cuboidal

and utilises a pair of bactericidal lamps (4) to treat air passing from illuminating lamps which are disposed in the outer upper area of the high voltage electrodes (2). Barrier plates (8) limit irradiation of the air passing through air passage gaps (6) at the top of the device. In a second embodiment (diagrams 3 and 4) circular lamps are employed.

It is an object of the present invention to provide one or more traps which facilitate the destruction of micro-organisms thereby countering odours and mitigating against the spread of germs in traps employing insect capturing means.

In this regard the configuration and positioning of the insect attracting lights and UV lamp(s) relative to the insect capture means and the manner in which air is caused to circulate aids effective operation.

PRESENT INVENTION

According to the present invention there is provided a trap (10) for catching insects comprising

- a. a housing (12);
- b. a cover (14);
- c. one or a plurality of insect attracting lights (16); and
- d. an insect catching means (18);

characterised in that said trap further comprises a means (20) capable of destroying air-borne pathogens which is positioned towards the top (28) of the trap and wherein at least one insect attracting light is disposed at the bottom of the trap such that an air flow is generated from the bottom towards the means (20) capable of destroying air-borne pathogens where the air is treated or sterilized to destroy airborne pathogens picked up in the convecting air stream.

Preferably the means capable of destroying air-borne pathogens is one which generates UVC radiation although other means such as filters may be used.

Preferably, the source of the UVC radiation is one or a plurality of UVC lamps. To meet health and safety requirements such lamps are fitted with a UVC protective screen.

The UVC lamp(s) is / are positioned within the trap such that air circulating through the trap passes across it. In one embodiment a single lamp is positioned laterally across substantially a full width of the insect catching means so as to ensure that substantially all of the air circulating, as a result of convection, is exposed to radiation from the UVC lamp(s). Alternatively they may be disposed vertically to ensure a longer contact time with the air as it flows along the full length of the lamp.

In a first embodiment a single UVC lamp is positioned towards the top of the trap such that it acts upon air which has passed across or over the majority of the insect catching means.

The trap may comprise one or a plurality of glue boards. In a preferred embodiment the trap comprises a first glue board, positioned on the back housing behind the insect attractant lights, and a second glue board positioned underneath, to catch falling insects.

In a preferred embodiment the cover comprises a plurality of openings allowing insects to enter the trap. These are most preferably elongate openings which traverse the cover laterally. Such a configuration, optionally with angled blades, helps to facilitate circulation of air across the insect capture means.

The trap may additionally comprise a sized opening at the top to allow heat generated by the lamps to escape. It can also be used to help control the air flow.

Preferably the cover is made of a translucent or opaque material.

Preferably the trap comprises light reflectors behind the lamps.

Like in PCT/GB2009/001097, the trap may benefit from the features disclosed therein, such as, a fluorescent high frequency electronic ballast and shields, which sealably protect the electrics from water ingress where the lights connect to associated electrical fittings.

Supporting the lights on a separate perimeter frame, which can be swung away from a back housing, allows easier access to both the lights and the insect catching means. In particular, it avoids a requirement when mounting the trap to provide sufficient clearance above the trap to allow for fitting of the insect catching means. The perimeter frame comprises ducting or channels which communicate with the back housing in a manner which prevents water ingress. It is through these channels that the electric wiring is ducted and the channels are then appropriately sealed.

Preferably, the back housing is shaped so that it can also receive fluorescent high frequency electronic ballast. Such ballast is carbon friendly, provides for flicker free start of the lights, offers higher UV output and avoids the need for a starter.

The back housing is designed to comprise or allow for the fitting of one or more of, for example, an electrical IEC socket, a heat sink, mounting means, air vents and cable stowage.

Preferably the cover is translucent and comprises an innermost surface which helps maximise UV emission from the trap as claimed in EP1457111.

More preferably it is adapted to ensure the lights are not readily visible through the cover as claimed in EP0947134. To this end, in a particularly favoured embodiment the cover comprises openings angled to prevent the lights being visible when viewed substantially perpendicularly to a plane of the back housing. A more favoured arrangement is one in which the openings are paired about a

centre point to provide a downward and upward inflexion respectively. Such an arrangement helps to draw air in at the bottom of the trap.

The various aspects of the invention will be described further, by way of example, with reference to the following figures in which:

Fig 1 is perspective view of an insect trap according to the invention with the cover removed and the UVC shield displaced;

Fig 2 is perspective view of an insect trap according to the invention with the cover shown displaced from the housing and the UVC lamp and cover removed;

Fig 3 is perspective view of the insect trap with the housing hinged open to show the insect catching means;

Fig 4 is a graph showing the levels of *A. niger* present in the atmosphere over time with an insect trap with and without a UV lamp fitted; and

Fig 5 is a graph showing the levels of *B. circulans* present in the atmosphere over time with an insect trap with and without a UV lamp fitted.

DETAILED DESCRIPTION

Referring to the Figs an insect trap (10) according to the invention comprises five basic components:

- a housing (12);
- a cover (14)
- one or a plurality of insect attracting lights (16a,b,c)
- an insect catching means (18a,b); and
- a means (20) for destroying air-borne pathogens.

In the exemplifying embodiment the frame (12) comprises a perimeter frame (12') which is hinged to a back frame (12''). Such a frame allows the insect attracting lights to be carried in a manner allowing ease of access as disclosed in PCT/GB2009/001097. The perimeter frame (12') is best illustrated in Fig 3 and comprises upper (12a) and lower (12b) frame members and two side members (12c; 12d). The perimeter frame (12') is swing, swivel or hinge mounted to the back frame (12'') via a swing mechanism (22).

A plurality of 15W or 25W UV lights (16), three are illustrated in the example, are connected to paired electrical fittings and wiring which runs in channels or conduits which are sealed by rubber or silicon gaskets and enclosed by fascia plates such that they provide rigidity to the moulded plastics frame in a manner disclosed in PCT/GB2009/001097.

Behind each light (16a, b, c) there is provided a reflector (24a, b, c) which is held in place by stops which enable the reflectors to be sprung mounted thereby facilitating ease of removal for cleaning. An insect capturing means (18a, b), in the form of a back glue board (18a) and a base glue board (18b) can be easily fitted between the back frame (12'') and the perimeter housing (12').

The cover (14) is made of a translucent material and has an innermost surface which is shaped or roughened to maximise the transmission of UV light as set out in EP1457111. The openings (26) which allow insects in maybe simple apertures as illustrated or louvered or angled to prevent the lights (16) being visible when viewed substantially perpendicularly to the normal plane of the back housing (12a). The general principle of maintaining a pleasant appearance of trap is set out in EP0947134 but the use of louvers is a further improvement in this regard. In particular, the louver openings (26) are paired about a centre axis (x-x) to provide a downward and upward inflexion respectively of between 30 and 60°. The apertures whether planar or louvered help facilitate air flow in the trap and air moves upwards by convection as it is heated by the lights (16). Thus, an air flow is created from the bottom, over base glue board (18b) and across back

glue board (18a) towards the UVC lamp (20) where it is treated or sterilized to destroy airborne pathogens picked up in the convecting air stream. The UVC lamp has associated with it a safety screen (32) which is fitted in front thereof. In Fig 1 it is shown displaced for clarity.

At the top (28) of the trap there is a sized opening (30) which allows hot air to escape. This assists in ensuring the air flows across the UVC lamp (20) for a period sufficient to destroy airborne pathogens. The skilled person will appreciate that to increase the contact time between the air and the UVC lamp, the lamp (or lamps) can be orientated in different directions, for example longitudinally (from top to bottom) as opposed to transverse (across), thereby increasing contact time as the air flows across the lamp from the bottom of the trap to the top.

As described in PCT/GB2009/001097 the trap has many of the features and benefits described therein and which are not therefore disclosed in detail herein. Thus, the trap is suited to jet washing (to IP65 requirements) and shields (34) are fitted around of the light where it connects to electrical fittings. In this manner two single shields (34) can be removed to access a plurality of lights. A similar shield may be used about the UVC lamp.

EXAMPLES

In order to test the efficacy of the trap arrangement, the trap described with reference to figs 1 – 3 was subjected to a trial as described below, in order to determine if any microorganisms derived from fly corpses were prevented from contaminating the atmosphere of a room by the incorporation of a UV lamp into the trap.

Two microbial sources were employed. In a first trial, a fungal lawn of *Aspergillus niger* was grown on agar plates which were placed at the bottom of the trap. It was anticipated that this would provide a consistent and abundant

source of airborne spores. A second trial involved the location of 300 dead house flies which had been sprayed with a *Bacillus circulans* (Bacterial) culture at the bottom of the trap.

Each trial involved measuring the level of fungal or bacterial contamination in a 25 m² vented space over a 48 hour sampling period at 4 hour intervals. A control trap had a white light source, whilst the active trap utilised a UV source.

RESULTS

The results of the respective experiments are given in Table 1 and Table 2 and these are shown graphically in Figs 4 and 5.

CONCLUSIONS

The results shown in the tables and graphs indicate that UV dosing reduced fungal emissions by 95 % (Table 1 and Fig 4) and bacterial emissions by 65 % (Table 2 and Fig 5).

Table 1 : Atmospheric levels of *Aspergillus niger* detected during operation of Orbit devices fitted with a UV lamp or White light lamp
(Internal device challenge with an *Aspergillus niger* lawn)

Treatment	Hours											
	4	8	12	16	20	24	28	32	36	40	44	48
UV	17	40	90	110	70	300	340	200	130	110	200	390
Control	9	36	103	940	460	4300	3100	2300	9200	7200	6300	8300
MEAN												3342

Mean Percent Difference reduction due to UV treatment over 48 hours : 95

All data Colony forming units per Litre of atmosphere

Table 2 : Atmospheric levels of TOTAL VIABLE COUNT detected during operation of Orbit devices fitted with a UV lamp or White light lamp
(Internal device 300 House flies spiked with *Bacillus circulans*)

Treatment	Hours											
	4	8	12	16	20	24	28	32	36	40	44	48
UV			90	50	70	30	50	90	110	60	90	80
Control		50	20	90	40	180	300	260	310	460	340	200
MEAN												173

Mean Percent Difference reduction due to UV treatment over 48 hours : 68

All data Colony forming units per Litre of atmosphere

CLAIMS

1. A trap (10) for catching insects comprising
 - a. a housing (12);
 - b. a cover (14);
 - c. one or a plurality of insect attracting lights (16);
 - d. an insect catching means (18); and
 - e. one or a plurality of UVC lamps (20) capable of destroying air-borne pathogens which is / are positioned towards the top (28) of the trap;

characterised in that the insect catching means (18) comprises a glue board (18a), positioned within the housing (12), and at least one insect attracting light is disposed at the bottom of the trap such that an airflow is generated from the bottom towards the one or a plurality of UVC lamps (20) which are positioned laterally across substantially a full width of the insect catching means (18) so as to ensure that substantially all of the air circulating as a result of convection is exposed to radiation from the UVC lamp(s) so as to sterilize or destroy air-borne pathogens picked up in a convecting air stream.

2. A trap (10) for catching insects as claimed in claim 1 further comprising a UVC protective screen (32) to shield the lamps from view.
3. A trap (10) for catching insects as claimed in any of the proceeding claims wherein the cover comprises a plurality of openings (26) allowing insects to enter the trap and facilitate circulation of air across the insect catching means (18).
4. A trap (10) for catching insects as claimed in claim 3 wherein the openings are elongate openings which traverse the cover laterally and comprise angled blades.

5. A trap (10) for catching insects as claimed in any of the proceeding claims further comprising an opening (30) at the top (28) of the trap for facilitating a controlled flow of air.
6. A trap (10) for catching insects as claimed in any of the proceeding claims wherein the cover is made of a translucent or opaque material.
7. A trap (10) for catching insects as claimed in any of the proceeding claims further comprising light reflectors (24).
8. A trap (10) for catching insects as claimed in any of the proceeding claims further comprising a fluorescent high frequency electronic ballast.
9. A trap (10) for catching insects as claimed in any of the proceeding claims further comprising one or more of: a perimeter frame (12'), supporting the insect attracting lights (16), which is hinged (22) to a back frame (12''); and shields (34), each of which sealably protect the lights and their electrical fittings from water ingress.