



(51) International Patent Classification:

A01M 1/02 (2006.01)

(21) International Application Number:

PCT/DK2018/050379

(22) International Filing Date:

19 December 2018 (19.12.2018)

(25) Filing Language:

Danish

(26) Publication Language:

English

(30) Priority Data:

PA201771017 22 December 2017 (22.12.2017) DK

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,

CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished
upon receipt of that report (Rule 48.2(g))

(54) Title: AN INSECT TRAP AND AN INSECT CONTROL DEVICE

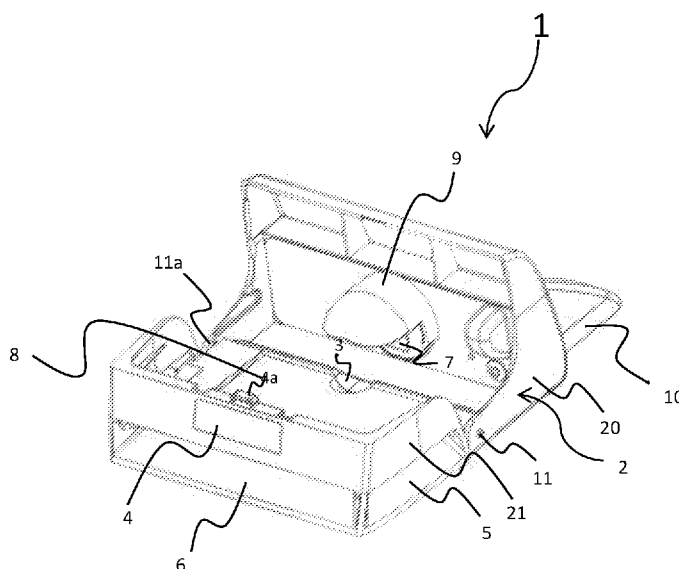


Fig. 1

(57) Abstract: The invention relates to an insect trap comprising: a detector house with sides and openings and a detector, which can detect the presence of insects in the detector house. The detector can send a signal when insects are detected. The insect trap further comprises a bait; a communication unit for transmitting information about the status of the insect trap, including for example catch, presence of insects and/or operating parameters; a control unit that receives a signal or signals from the detector when it detects an insect.



An insect trap and an insect control device

The invention relates to an insect trap comprising: a detector house with sides and openings; a detector that can detect the presence of insects in the detector house and send a signal when these are detected; a bait; a communication unit for transmitting information about the status of the insect trap, including for example catch, presence of insects and/or operating parameters; a control unit that receives a signal or signals from the detector when it detects an insect.

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Insects have for long been considered a nuisance in many respects, including in connection with food, clothes and diseases, but also simply because they can be annoying. Therefore, insect traps have been known since ancient times, and it has been attempted to improve insect traps for centuries. There has especially been a need for developing traps for mosquitoes and flies, but the need for efficient traps is rising even today, as both populations and travelling are parameters on the increase with subsequent higher risk of global spreading of harmful insects. Consequently, new and improved methods for insect control are developed on an ongoing basis, a great deal of which is based on insecticides, pesticides, while other methods use actual traps, containing mechanical and/or electric means for insect control.

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In known traps, light or smells are often utilized as bait, and the traps are often equipped with a killing mechanism in the form of electric current or an adhesive/fluid that retain the insects until they die. Especially the light traps may be the cause of nuisance in the environments where they are used, as they inevitably emit light. Moreover, light-operated traps also require stable power supply, for which reason the traps will either have to be equipped with a battery or provided with cable for connection to the electricity grid. Furthermore, if the traps comprise a killing mechanism that is operated by

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electricity, the requirement for the power supply increases correspondingly, which is particularly a problem with insect traps that comprise an electric killing mechanism. In the known traps, the killed insects amass on the inside of the traps, which primarily is a problem in the traps with electric killing mechanisms as they short-circuit and are either ruined entirely or just stop working. Electrically based traps/killing mechanisms in which insects are killed by a current being passed through them also constitute a serious health hazard, as the insects explode due to the electric impact and thus spread bacteria through the air.

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Known insect traps thus require service, and though this problems is especially pronounced in the case of the electric traps, traps with adhesives or other killing mechanisms also require regular maintenance and emptying.

15 Furthermore, the traps do not prevent the reproduction of insects.

An object of the invention is to eliminate one or more of the problems outlined above. Another object of the invention is to specify an alternative to the known methodologies and/or devices for insect control.

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This is obtained by the detector comprising a heat-dissipating plate and an infra-red sensor, which infra-red sensor can detect changes in the heat radiation from the heat-dissipating plate and send a signal to the control unit, if it detects a deviation in the heat radiation of a given magnitude.

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By providing the trap with a heat-dissipating plate and an infra-red sensor, it is achieved that the insects can be detected when they move across or touch the heat-dissipating plate, and in its simplest form the trap does not contain other baits than heat, but other baits can obviously also be added such as light or smells.

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An insect control device with a plate that can emit fragrances is stated in claim 10. With this device, which dispenses fragrances from the heat-dissipating plate, a device has been achieved that can control insects by dispensing fragrances included in the insects' natural cycle. This can be
5 fragrances that stress, but in this type of trap it can be advantageous to use especially fragrances that form part of the insects' mating. The reason is that certain insects, e.g. moths, use fragrances for finding mates, and by providing the insect control device with a dispenser, which can dispense such fragrances, it is possible to confuse the moths to such an extent that they
10 cannot find mates and thereby prevent reproduction.

Embodiments of the inventions are stated in the dependent claims.

In the following, an embodiment of the invention will be explained with
15 reference to the figures, wherein:

Fig. 1 shows the trap in perspective in an open position;

Fig. 2 shows the trap in perspective in a partially open position;

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Fig. 3 shows the trap in perspective in the configuration, wherein it comprises a lid that allows passage of insects from the outer side and into the trap;

Fig. 4 shows the lid of the trap in perspective;

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Fig. 5 shows the trap in perspective in the concentration, wherein it can catch crawling insects, such as cockroaches.

Fig. 1 shows an insect trap 1, comprising a detector house 2 with sides 20,21
30 and openings 5,6. The trap is equipped with a detector 7,8, which can detect the presence of insects in the detector house 2. In the embodiment shown,

the detector comprises an infra-red sensor 7, which measures the temperature and temperature variations in an area/volume around a plate 8. This area is preferably the surface of the plate 8. The plate 8 itself is in an embodiment a plate, which can be heated by a heat source (not shown in the figures), so that it reaches a temperature above that of the surroundings. Such heat sources are well-known to the skilled person, and it will therefore not be explained in further detail. The heat-dissipating plate 8 is preferably made of a material with a low heat conduction coefficient. By making the plate of such a material and adjust the heat source, a system can be achieved, wherein the plate has a very homogeneous and the same temperature in the extent of the plate, and thereby a sensitive system is obtained, wherein the difference in the temperature between an individual insect, which has the same temperature as the surroundings, and the plate causes a local deviation in the temperature on the plate 8 when the insect lands on it. This deviation in temperature is brief but with correspondingly quick measurements it is possible to IR measure the arrival of individual insects on the heat-dissipating plate 8. As insects are cold-blooded animals, they will normally have a temperature that is the same as that of the surroundings. The trap utilizes this for registering the presence of insects in the trap, as the trap comprises an infra-red sensor (IR sensor) for measuring that insects simply cool the plate when they touch it. By making the heat-dissipating plate of a material with a low specific heat conduction coefficient and/or low specific heat capacity, the presence of the difference in the temperature can be varied and prolonged, thereby obtaining higher measurement certainty. Various organic materials, including rubber, have proved to be advantageous as plate material.

As mentioned above, the plate 8 is heated to a temperature above that of the surroundings, and moreover it is in an embodiment covered by a bait/material that emits one or more substances to attract insects. These substances may be fragrances in the form of pheromones, which are fragrances that

constitute a communication means in the natural life-cycle of insects. Pheromones e.g. are included in the mating of insects to attract mates.

5 The pheromone is in an embodiment of the invention deposited in or added to a slice of paper-like material (not shown in the figures), which is placed on the plate 8. This slice of paper or similar material is normally provided with an adhesive on the side with pheromone, and this adhesive serves to retain insects. The side that is to face the plate 8 can be provided with another adhesive, which is adjusted such that the paper-like material can easily be
10 exchanged/placed on and removed from the plate 8, but normally the plate is retained mechanically. The known traps with adhesive to retain insects require regular inspection, partly to ensure that the trap is not excessively filled with insects on the adhesive plate and partly to inspect whether there is a catch. This is resource-intensive and often the inspection ends with a
15 conclusion that the trap works and does not require further maintenance. By making a trap as indicated, the need for such inspections will be reduced, as it will basically only be necessary to inspect and maintain the trap, when catch of a certain size/volume is registered.

20 At the side of the paper-like material that faces the detector a small section 3 is seen. This section serves to facilitate fitting or removal of the paper-like material.

25 Though the heat from the heating plate/the heat-dissipating plate 8 in itself promotes the release of pheromones from it, it may sometimes be advantageous to add to the release of fragrances by ventilating the heat-dissipating plate with a blower.

30 In an embodiment, the trap is thus equipped with a blower (not shown) that can ventilate the plate 8, so that fragrances from here can be spread to the surroundings of the trap. The blower may be sensor-controlled, so that it is

turned on when insects (activity in the trap) are registered. The blower may also be timer-operated, such that the control unit is only turned on in certain periods, but it may also be remote-controlled, so that a user can activate the blower via wireless communication, and thereby it can, as the rest of the trap,
5 be connected to the Internet, so that a user can control it in terms of time and blower intensity.

As insects extensively use pheromones to find mates, it is possible to confuse mating insects by spreading fragrances (pheromones) from the plate
10 and out into the surroundings of the trap to prevent pairing and mating.

At the same time, however, the blower has the effect that the heating plate is cooled, and that is exactly why it is convenient that the control of the blower (in the control unit) is arranged, so that it only runs in regulated and
15 controlled time intervals. It may also be advantageous to combine heat management depending on the activity of the blower, such that e.g. the spreading of fragrances can be furthered by using both increased heat and increased blowing at the same time.

20 In the embodiment shown, the trap is provided with a detector 7 in the form of an infra-red sensor. The detector 7 is placed, such that it has measurement direction in the direction of the heated plate 8 and so that it can "see" the entire plate 8.

25 In an embodiment of the invention, the detector is equipped with a baffle plate 9. This baffle plate prevents extraneous disturbances. The baffle plate is preferably used in the configuration, wherein the sensor sees parallel with the surface plane of the heating plate (second configuration). In an embodiment of the invention, the baffle plate 9 is provided with a click
30 mechanism, so that it can easily be attached to and removed from the detector.

The detector is normally connected to a control unit (not shown) in the trap, and this control unit is connected to a transmitting unit with antenna 10, so that information about detecting, functionality and catches can be distributed wirelessly to the user. However, the control unit can also be an external unit, and if this is the case, the detector is connected internally to the transmitting unit, which distributes information to the external control unit.

The trap may possibly partake in a mesh network, where several traps communicate with each other, and the traps can normally also report status information about e.g. power consumption, battery life, functionality, temperature and the like to the user. This control and exchange of information, which may take place via bluetooth or WiFi and further via the Internet, is normally carried out in such a manner that the user can also change the parameters of the trap, including e.g. the temperature of the plate, activate the blower or just update the trap's software.

The trap is provided with a hinge mechanism 11, 11a, about which the lid can be turned as shown in Fig. 2.

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Thereby the detector house can be brought from a first position, as shown in Figs. 1 and 3, to a second position, as shown in Fig. 5. In the first configuration/position, where the infra-red sensor "sees" essentially perpendicular to the heating plate, the trap can be used for catching flying insects, while in the second configuration, where the infra-red sensor "sees" essentially parallel with the surface plane of the heating plane, it is particularly suitable for catching crawling insects.

Fig. 2 shows the lower left part of the trap's two openings 5,6 through which crawling insects can enter unobstructed into the fragrance-emitting and heated plate 8 on the inside of the trap, and when the insects step on the

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plate, the detector 7 detects a temperature change and sends a message to the control unit about this. Normally, the trap is provided with four openings distributed with one on each side. In an embodiment of the invention, the control unit comprises software that can identify the characteristic of the temperature variation and thus determine the species of the insect; this applies regardless of whether the trap is used in its first or second configuration.

Another method for identifying the insect species can be, by means of e.g. a microphone in the insect trap, to measure the sound, as the flaps of the wings of flying insects often has a species-characteristic frequency, and this may, as explained above, also be utilized in the control unit (with software).

The openings 5 and 6 are located at the bottom of the trap, and the conceptual background of this is that the trap in its second configuration thus can be used on a floor in environments where there is a risk of crawling insects, e.g. cockroaches. When the trap is placed in its second configuration, insects are lured into the trap via the fragrances that are spread from the plate 8 and further out into the surroundings of the trap via openings 5, 5a and 6. For the insects to also be able to enter the trap, the openings are provided in front of a slanting slit (not shown), which leads up to the heated plate. The detector 7 itself, which is disposed in the lid 20 of the trap, thus also turns, and when the trap enters into the second configuration, as shown in Fig. 5, the detector is positioned right above the heat-dissipating plate (not shown i Fig. 5). The infra-red sensor is arranged such that, regardless of the positioning of the trap's two parts, it can register heat and heat changes on the heating plate 8. Normally, the baffle plate 9 would be removed when the trap is to be used in its second configuration (as floor trap).

Fig. 3 shows the trap with a lid 30 attached, and in this first configuration, the insect trap is preferably to be used to eliminate flying insects that can reach the heat-dissipating plate via openings 32 in the lid.

5 Fig. 4 shows a lid for the trap, and this lid is provided with engagement means 33, 33a, 34, 34a, which are complementary to other engagement means (35, 35a shown in Fig. 2) in the trap house 2. The lid is provided with openings 32 of such a size that they allow easy passage for most flying insects. The number of openings may be varied, and the trap can in theory
10 be used in the first configuration without the lid attached, but in addition to an aesthetic effect, the lid also has a "cage-like" effect, as the insects have difficulty finding their way out, once they are on the backside of the lid (inside the trap). Furthermore, the lid also has a positive effect on the temperature of the heat-dissipating plate, as the lid offers shelter from airflows.

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When the trap is in its first configuration for catching flying insects, it is preferably used above floor lines on house walls or walls or even in attics of the buildings where it is used.

20 The front side 21 of the trap is equipped with a button 4, which serves to release the lid 31 from the trap 1.

In a simple form, the control unit is connected to switches, which are activated depending on whether the trap is in its first or second configuration,
25 and thereby the control unit can let the user know about the catch of crawling or flying insects.

By having traps that can catch insects as stated in claim 1 included in a system of insect control devices, which can dispense fragrances, as stated in
30 claim 10, a system can be obtained, wherein fragrance-emitting traps are only activated when insects have been caught nearby. This is done by having

traps, which can detect and/or catch insects in a system of insect control devices. This system is to comprise a control unit, which can activate the dispensers of the insect control devices close to the insect traps, in which insects have been detected. The control unit can be an external central unit,
5 which can communicate with all units in the system, but it can also be a control unit, that is included in an insect trap or in an insect control device. In an embodiment of the insect control device, this can independently dispense one or more fragrances, e.g. from containers or from the heating plate if it detects the presence of insects.

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By having the insect traps and the insect control devices contain sensors that can monitor parameters such as air temperature, light, humidity and moreover time when insects are registered as well as time when fragrances are emitted, a system has been obtained, which can register the effect of
15 dispensings and furthermore a system has been obtained that can, on an ongoing basis, register whether other parameters such as air humidity, light or temperature have an effect on the occurrence of insects. Even a system that can register whether dispensings or other parameters affect the occurrence of certain insect species.

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By having independent units, which can register the presence of insects included in a system with other independent dispenser units, which can dispense insecticides - when insects have been registered - a system has been achieved, which can limit the dispensing only to take place when and
25 where insects are registered. Furthermore, a system has also been obtained, which can check its own functionality. Moreover, if units in such a system can also monitor other parameters such as light, humidity or temperature, a system has been obtained that can not only monitor its own functionality, but also a system that can monitor whether these other parameters has any
30 influence on the occurrence of insects and their species. Moreover, a system has been obtained that can on an ongoing basis monitor whether these

parameters have any influence on the efficiency (functionality) of the system. Such a system does not have to function by means of heating plates, as the catching or registration may take place in many other ways. Such a system can therefore be subject-matter to an independent patent application.

Claims

1. An insect trap comprising:

- a detector house with sides and openings;
- 5 • a detector that can detect the presence of insects in the detector house and send a signal when these are detected;
- a bait;
- a communication unit for transmitting information about the status of the insect trap, including: catch, presence of insects and/or
- 10 operating parameters;
- a control unit, which receives a signal or signals from the detector when it detects an insect;

characterized in that

- the detector comprising a heat-dissipating plate and an infra-red
- 15 sensor, which infra-red sensor can detect changes in the heat radiation from the heat-dissipating plate and send a signal to the control unit, if it detects a deviation in the heat radiation of a given magnitude.

2. An insect trap according to claim 1, **characterized in that** the detector house can be taken from a first configuration to a second configuration, in

20 which first configuration the insect trap comprises a first number of openings, and in which second configuration the insect trap comprises a number of openings, which differs from the number of openings in the first configuration.

25 3. An insect trap according to claim 2, **characterized in that** the heat-dissipating plate comprises a bait.

4. An insect trap according to claim 2 or 3, **characterized in that** the heat-

30 dissipating plate comprises an adhesive.

5. An insect trap according to claims 2-4, **characterized in that** the insect trap comprises a heat-dissipating plate, which substantially emits heat homogeneously.

5 6. An insect trap according to claims 2-5, **characterized in that** the insect trap comprises a heat-dissipating plate, which contains a heat conductive material in the form of a material with a low specific heat conduction coefficient, e.g. rubber.

10 7. An insect trap according to claims 2-6, **characterized in that** the insect trap comprises a heat-dissipating plate, which contains a material with a specific heat capacity close to or below the specific heat capacity for insects.

15 8. An insect trap according to claims 1-7, **characterized in that** the insect trap comprises an infra-red sensor, which can detect changes in the heat radiation from the heat-dissipating plate and send a signal to the control unit depending on the size and/or extent of this change.

20 9. An insect trap according to claim 8, **characterized in that** the insect trap comprises a control unit, which contains software and a databank, comprising data of insect types and the respective changes in heat release resulting from the presence of specific insects on the heat-dissipating plate, which control unit is programmed such that the control unit can compare data from the databank with actual changes in the heat radiation from the heat-dissipating plate and thereby determine the type of an insect located on the
25 heat-dissipating plate.

30 10. An insect trap according to any one of claims 1-9, **characterized in that** the control unit is an external unit, with which the insect trap with detector communicates via e.g. bluetooth, WiFi, mobile networks and/or the Internet.

11. An insect control device comprising:

- a house with sides and openings;
 - a dispenser, which can dispense an aerosol of an insecticide;
 - a communication unit for transmitting information about the
- 5 status of the insect control device including: about dispenses and/or operating parameters;
- a control unit, which can activate the dispenser so that it emits an insecticide;

characterized in that the dispenser comprises a heat-dissipating plate that

10 can be activated by the control unit, which heat-dissipating plate comprises a fragrance that is placed on the heat-dissipating plate and that the heat-dissipating plate can be heated up and thus emit the fragrance when it is activated by the control unit.

12. An insect control device according to claim 11, **characterized in that** the dispenser comprises a blower, which can be activated by the control unit and ventilate the heat-dissipating plate when it is activated by the control unit.

13. An insect control device according to claim 12 and/or 11, **characterized**

20 **in that** it comprises an infra-red sensor, which infra-red sensor can detect changes in the heat radiation from the heat-dissipating plate and send a signal to the control unit, if it detects a deviation in the heat radiation of a given magnitude, which dispenser comprises one or more containers with insecticide and that the dispenser can dispense the insecticide when the

25 control unit activates the dispenser.

14. An insect control device according to claim 13, **characterized in that** the control unit and the communication unit can activate the dispenser unit in other corresponding insect control devices, which control unit and

30 communication unit can also activate the dispenser unit in the insect control device, if a signal to that effect is received from other control units.

15. An insect control device according to claim 13 or 14, **characterized in that** the control unit is an external unit, with which the insect control device with detector communicates via e.g. bluetooth, WiFi, mobile networks and/or the Internet.
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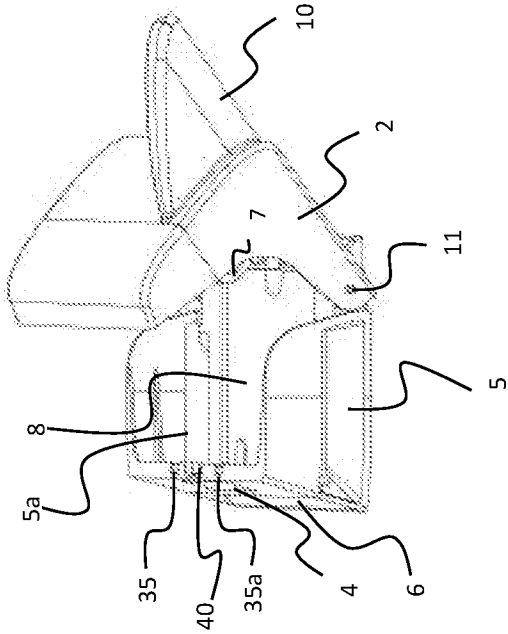


Fig. 2

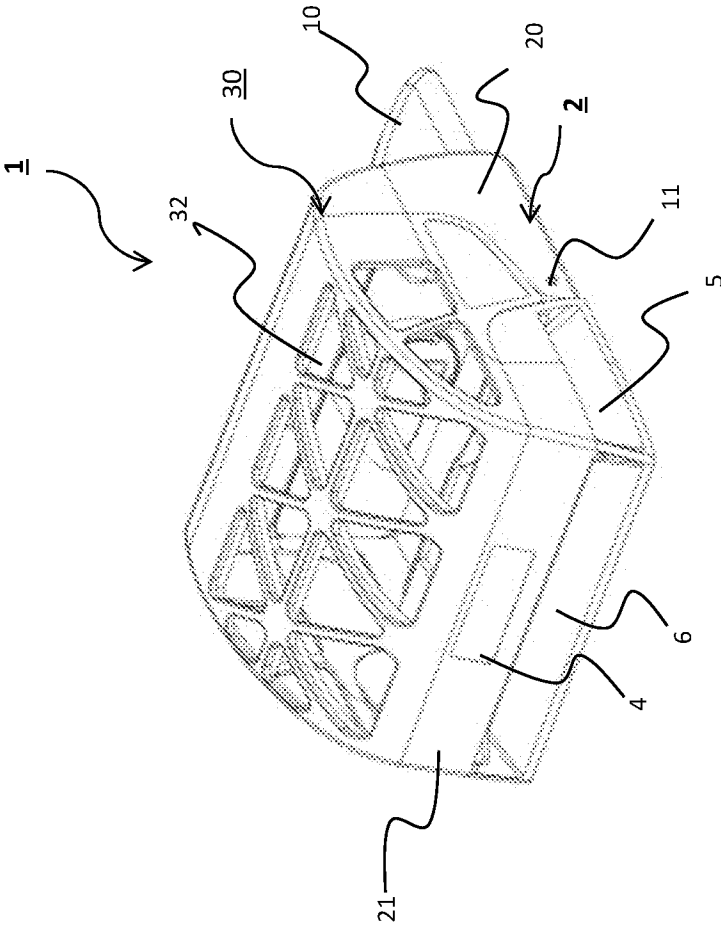


Fig. 3

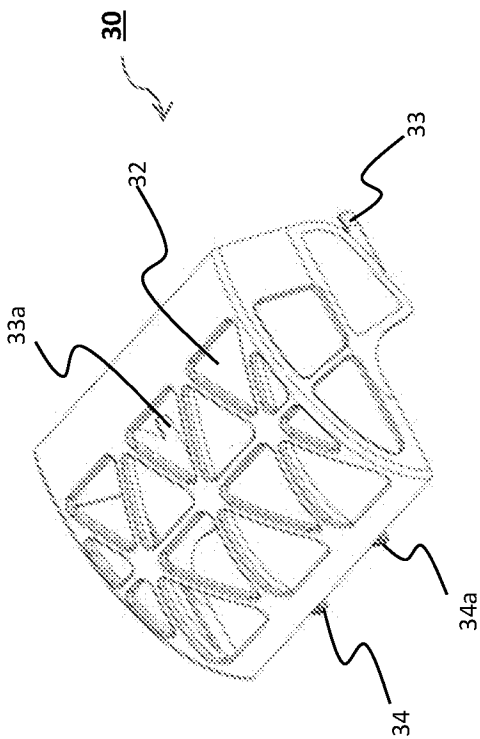


Fig. 4

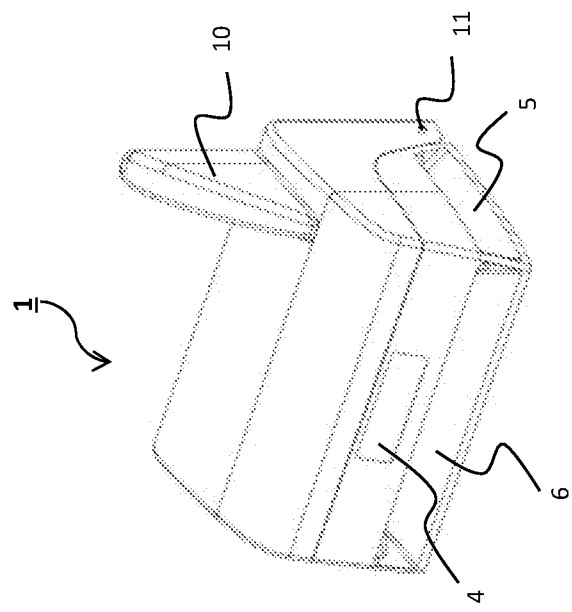


Fig. 5