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[11] **3,802,116**

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[54] **DEVICE FOR CAPTURING COCKROACHES**

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Aug. 20, 1971 Japan 46-74314

[52] **U.S. Cl.** **43/121**
[51] **Int. Cl.** **A01m 1/10**
[58] **Field of Search** 43/121

[56] **References Cited**

UNITED STATES PATENTS

1,134,318	4/1915	Deardoff	43/121
1,788,047	1/1931	Brunner	43/121 X

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Assistant Examiner—Daniel J. Leach
Attorney, Agent, or Firm—Armstrong & Wegner

[57] **ABSTRACT**

A device for capturing cockroaches which has an attracting body having a food retainer and a plurality of passages connecting the food retainer to the exterior. A lower shield plate open-able only from the exterior is disposed in each passage, and a capturing body having removable upper shield plates rests on the attracting body and has communication ports opposite to the lower shield plates at the bottom thereof. The upper shield plates are openable only from the attracting body side at the communication ports. The lower shield plates are rotatably supported on the upper portion of the passages by bearing shafts and are inclined toward the food retainer side. Each lower shield plate has a ventilating portion of sawtooth shape at its lower end and preferably a balance weight on the upper end thereof on the other side of the bearing shaft from the ventilating portion.

12 Claims, 13 Drawing Figures

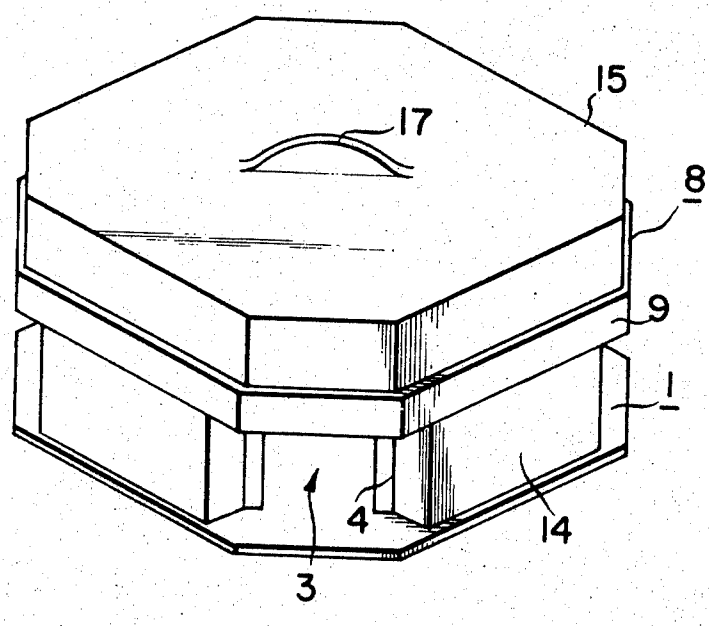


FIG. 1

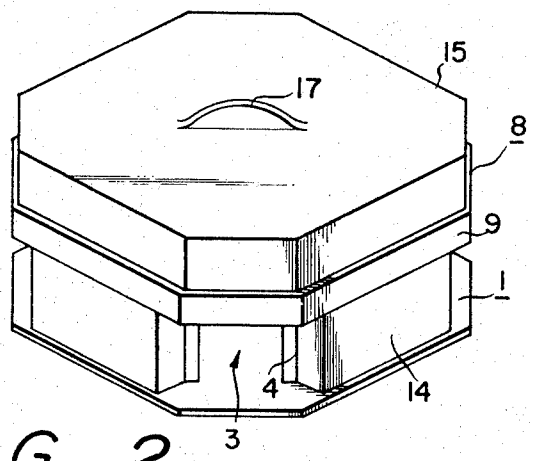


FIG. 2

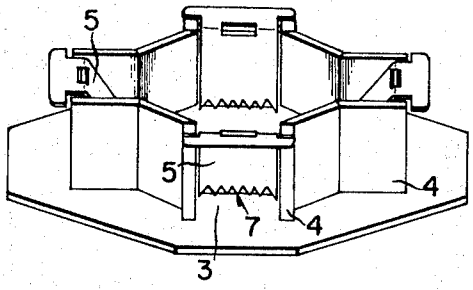


FIG. 3

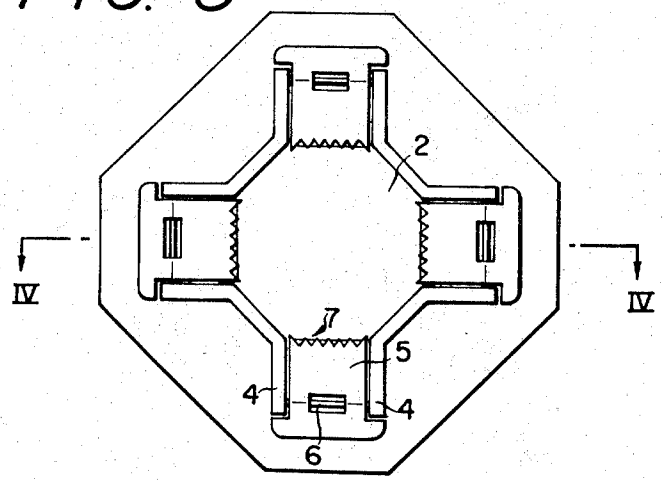


FIG. 4

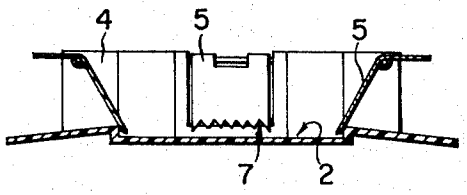


FIG. 5

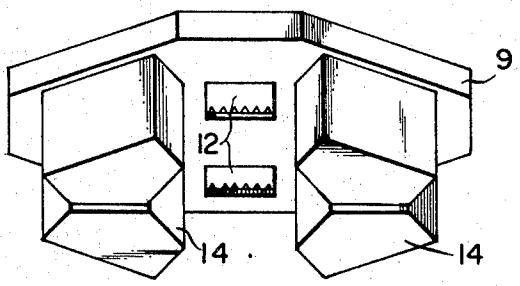


FIG. 6

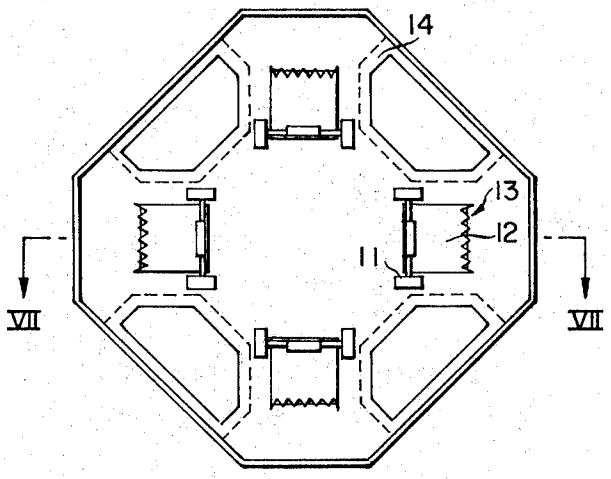


FIG. 7

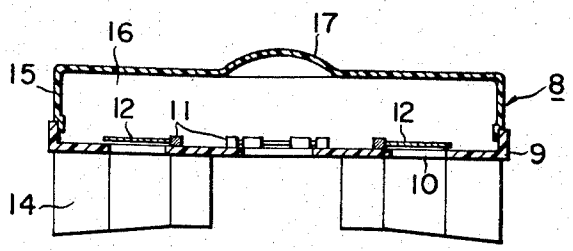


FIG. 8

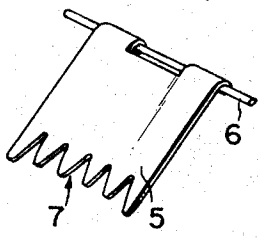


FIG. 9

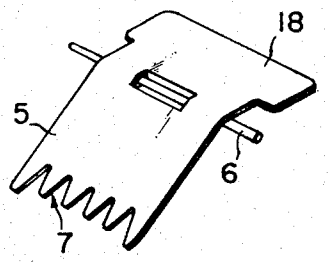


FIG. 10

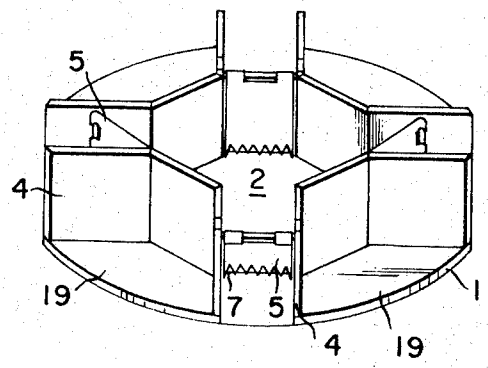


FIG. 11

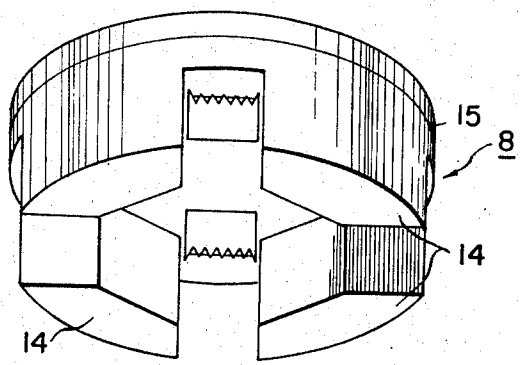


FIG. 12

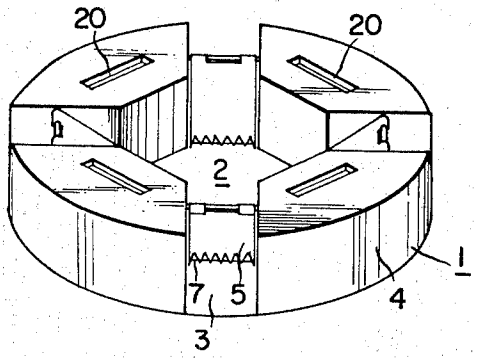
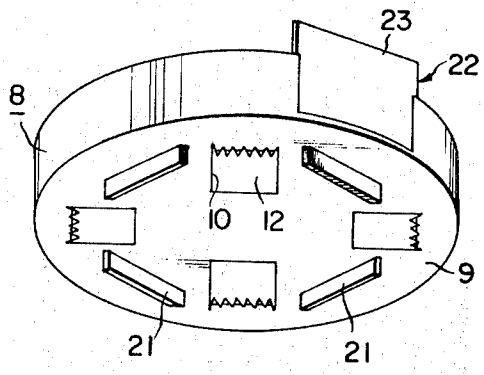


FIG. 13



DEVICE FOR CAPTURING COCKROACHES

This invention relates to a device for capturing cockroaches. Although harmful insects such as cockroaches were originally from the Torrid Zone, their distribution area is increasingly expanded as the human culture progresses and the circumstances of human life is varied with the result that cockroaches have increased all over the world to impart a great deal of defects to the human life. The cockroaches are grotesque and smell peculiarly bad thus giving us an uncomfortable and dirty feeling. Further, they propagate pathogenic bacteria such as dysentery bacillus, colon bacillus, poliovirus, etc. and are thus most harmful insects. These cockroaches live in the residence of human beings, and hide themselves from the human world in the daytime in groups and activate at night so as to obtain food. In addition, they are very harmful polyphagous insects, and feed not only human foods, but paper, being scatophagous, and propagate greatly, and indefinitely develop to live for long periods with the result that it is difficult to eliminate them. In order to eliminate them at present, there exist food poisoning insecticides, residual coating insecticides, etc., but they are relatively ineffective.

It is, therefore, an object of the present invention to provide a novel device for capturing cockroaches.

It is another object of the present invention to provide a device for capturing cockroaches which may exterminate the cockroaches sanitarily, simply, efficiently and positively by utilizing their habits against them.

It is a further object of the present invention to provide a method of capturing cockroaches.

It is still another object of the present invention to provide a device for capturing cockroaches which is adapted for gathering preferably and using attractive foods.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific example, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modification within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

These objects are performed by a device for capturing cockroaches which comprises an attracting body having a food retainer and passages formed from the exterior of the food retainer to both side walls and a lower shield plate openable only from the exterior in the passages, and a capturing body having a removable upper shield plate rested on the attracting body and having communication ports opposite to the lower shield plate at bottom thereof and upper shield plate openable only from the attracting body side at the communication ports to permit removal.

When the device for capturing cockroaches of the present invention is placed where the cockroaches are frequently present, the cockroaches which hide themselves behind the articles at daytime crawl about at night to obtain food, whereupon they gather by the attraction of the smell of food in the capturing device, and migrate through the passages therein to push up the lower shield plate to enter the food retainer thereof, and are prevented from escaping by the lower shield plate. Entry into the capturing chamber occurs by

pushing the upper shield plate in a vertical direction at the bottom of the body of the capturing device through the communication port. The cockroaches thus entered into the capturing chamber cannot escape any further, and will therefore die. In order to treat the captured cockroaches, the capturing body is removed therefrom, and the cockroaches captured therein are taken out.

The invention will be readily understood from the following description, when read together with the drawings, wherein:

FIG. 1 is a perspective view of the device for capturing cockroaches according to the present invention;

FIG. 2 is a perspective view of the attracting body of the device;

FIG. 3 is a plan view of the attracting body;

FIG. 4 is a sectional view of the device taken along the line IV—IV in FIG. 3;

FIG. 5 is a perspective view of the capturing body of the device;

FIG. 6 is a plan view of the bottom of the capturing body;

FIG. 7 is a sectional view of the device taken along the line VII—VII in FIG. 6;

FIG. 8 and 9 are perspective views of the lower shield plate of the device;

FIG. 10 is a perspective view of another embodiment of the attracting body of the device;

FIG. 11 is a perspective view of another embodiment of the capturing body of the device;

FIG. 12 is a perspective view of a further embodiment of the attracting body of the device; and

FIG. 13 is a perspective view of a further embodiment of the capturing body of the device.

Referring now to FIGS. 1 to 4, which show the device for capturing cockroaches which is the subject of the present invention, an attracting body 1 has a food retainer 2 with a recess at the center thereof, and passages 3 radially formed by side walls 4 for communicating the exterior of the device with the food retainer 2 and lower shield plates 5 provided in the passages 3 and mounted rotatably with bearing shafts 6 at both side walls 4 of the passages and at the upper portions of the walls 4 at the upper ends thereof. The lower shield plate 5 is inclined toward the food retainer 2, and has ventilating portion 7 of sawtooth shape formed at the lower end thereof. The lower shield plate 5 has a feather plate which opens by a slight external force but does not open by an internal force as will be hereinafter described. Therefore, the food retainer 2 is normally isolated from the exterior of the device by the side walls 4, lower shield plates 5, and capturing body 8.

On the other hand, as shown in FIGS. 5 to 7, which illustrate the capturing body of the device, the capturing body 8 is so constructed that the portions corresponding to the passages 3 and the lower shield plates 5 in the attracting body are located on the bottom plate 9 and are open. Bearing members 11 are provided at the positions interleaved with the communication ports 10 of these openings, and both sides of one end of each upper shield plate 12 is rotatably supported by the bearing shafts at these bearing members 11. These upper shield plates 12 close the communication ports 10 and the ventilating portions 13 of sawtooth shape are formed at the other end of each the upper shield plates 12. Further, engaging legs 14 are provided such as to correspond to the outside of the side walls 4 of the

food retainer 2 of the attracting body 1. The capturing body 8 has a capturing chamber 16 formed by placing a cover 15 on the bottom plate 9. A knob 17 is provided on the cover 15 for conveniently remove the cover 15. The capturing body 8 thus constructed engages removably with the engaging legs 14 correspondingly to the side walls 4 of the attracting body 1.

The first feature of the capturing device of the present invention resides in the structure of the lower shield plates 5 provided at the inlet passages 3 as the first barrier for attracting to capture the cockroaches. As shown in FIGS. 8 and 9, which illustrates the lower shield plate of the capturing device, the lower shield plate 5 has a bearing shaft 6 at the upper end thereof, which shaft 6 is rotatably supported at both side walls 4 forming passages 3 and at the upper portion of the walls 4, and inclined toward the food retainer 2. Therefore, the lower shield plates 5 thus inclined toward the food retainer 2 opens when pushed from the exterior, but since the lower end of the plates 5 reach the bottom, even if they are pushed from the interior, they do not open at all. Since these shield plates 5 are inclined, they are adapted so that the cockroaches which have entered into the attracting portion head toward the capturing chamber 16 as will be hereinafter described. As shown in FIG. 8, the lower shield plates 5 may be of mere plate, but in order to enhance the capturing effect, using light material to enable pushing with extremely slight force, and as shown in FIG. 9, a balance weight 18 is provided at the opposite end of the lower shield plate 5 and extending from the bearing shaft 6 provided at the upper end thereof as the pivoting center of the lower shield plate 5 so as to enable opening to occur with extremely slight force with the result that the cockroaches may initially enter easily into the interior of the capturing device. As is clear from the results of the above first and second embodiments, as to the shield plate of balance type and single plate type, the force for pushing the shield plate may be smaller in the balance type than the other and result in more captured cockroaches than the other.

This balancing may be varied in any rate according to the weight of the lower shield plate 5 extended to the opposite side from the bearing shaft 6, but if the balance weight is greater, it is anticipated that the cockroaches which have entered into the interior may raise the lower shield plate 5 to escape, and accordingly the preferable weight of the lower shield plate is from 0.02 to 0.2 g. It is also preferable that the proper size of cut-out of sawtooth shape is provided at the lower end of the lower shield plate 5 so that it is feasible that the smell of the attracting food in the interior of the device will emanate outwardly, and so that the food can be seen from the exterior, and may be contacted directly from the exterior, and the ventilating portion 7 is provided thereat, which is very preferred at the viewpoint of the habits due to the activity of the cockroaches in searching for food. As is clear from the third embodiment, there exists considerable difference depending upon the presence or absence of the ventilating portion 7 at the lower end of the lower shield plate.

The second feature of the capturing device of the present invention resides in the separate provision of the attracting portion and the capturing portion in such a manner that the capturing portion is removably provided at the upper body of the attracting portion. This results from the detailed studies of the habit of the cockroaches, such that the cockroaches move freely on the flat surface and inclined surface in their normal traveling activities, but when they have entered into the closed box, they abruptly move quickly to look for escaping route, in which case they look for a first upward escaping port, and if no such escaping port is found thereat, they look for other places. Therefore, the device for capturing cockroaches which is the subject matter of the present invention first attracts the cockroaches to the attracting portion, and then encourages them upwardly, and when they have entered into the capturing chamber 16, they cannot escape at all.

For such purposes, the capturing body 8 has communication ports 10 opposite to the passages 3 on the bottom plate 9, and upper shield plates 12 are provided at the communication ports 10. Ventilating portion 13 of sawtooth shape is formed normally on the upper shield plate 12. Therefore, the cockroaches which have entered into the attracting portion of the device lose their escape route by the lower shield plates 5, and advance along the upper shield plate 12 to push up the upper shield plate 12 from the communication port 10 provided at the bottom plate 9 of the capturing body 8 according to their habits so as to enter the capturing chamber 16. Since the upper shield plate 12 is rotatably supported at body sides by the bearing member 11 provided on the bottom plate 9 by the bearing shaft provided at one end of the shield plate 12, it may open if pushed from the lower portion, but since the other end thereof is supported by the bottom plate 9, it may not open even if pushed from the upper portion. Accordingly, the cockroaches entered into the capturing chamber 16 completely lose any method of escape and die.

Thus, since the capturing device of this invention has a separate attracting portion and the capturing portion, the cockroaches which have entered into the attracting portion move toward the capturing portion according to their habit before feeding upon the food thus being economical in saving the food. Further, since the capturing portion of the device is so provided as to be easily removable in a free fashion the capturing body 8 is removed from the attracting body 1 when a sufficient number of cockroaches have entered thereinto, so as to treat the captured cockroaches by any means such as immersing in water, etc. Thus, only the food is saved, but the device may always be rendered clean with only a cleaning of the capturing body 8 without cleaning the entire device frequently. Since the device is thus constructed, the food retainer 2 of the attracting portion may always be maintained vacant, and accordingly it does not affect the cockroaches entered thereafter, but the following cockroaches may enter continuously to capture of a great deal of cockroaches with extreme efficiency. In addition, if the engaging legs 14 are formed in box communication with the capturing chamber 16, the cockroaches which entered into the capturing chamber 16 fall therein to be contained, and therefore a great deal of cockroaches are captured in a compact manner thus rendering the device most advantageous.

If the food retainer is so constructed as to also function as the capturing portion, the larva of small cockroaches may escape from the ventilating portion 7 at the lower end of the lower shield plates 5, but in the capturing device of the present invention, the larva move toward the capturing chamber 16 according to their

habit, and if the cutouts of the ventilating portion **13** of the upper shield plate **12** are lessened, small larva may easily be captured. As shown by the fourth embodiment, this does not affect greatly capturing of large type of black cockroaches, but clearly affects the capturing of small type brown feather cockroaches, and particularly their larva. If the cover is made of transparent plastic, the interior of the device is easily seen so as to immediately investigate the captured state cockroaches, and accordingly is very convenient. As the device for capturing the cockroaches of the present invention may be of any circular, elliptical, rectangular, square, polygonal shape, etc., and the inlet may not only be in one direction, but in a multi-direction. The place of use may be optional depending upon the capturing effect.

Reference is now made to FIGS. **10** and **11**, which show another embodiment of the device for capturing the cockroaches of this invention, and will now be described as follows:

This embodiment is similar to the previous embodiment, but the shape of the device is circular. The engaging legs **14** are constructed so that the capturing chamber of the capturing body **8** is simultaneously engaged with the cutout recess portion **19** of the attracting body **1**. Therefore, the cockroaches which have entered into the capturing chamber **16** fall in the interior of the engaging legs **14** of box shape to be contained, and the upper portion of the capturing chamber **16** is opened to become a removing port, at which point a cover **17** is removably placed thereon.

Referring now to FIGS. **12** and **13**, which show a further embodiment of the device of this invention for capturing the cockroaches this further embodiment of the device of this invention will now be described.

This embodiment is similar to the previous embodiments, but the food retainer **2** and the passages **3** are formed by recessed walls **4**, and engaging grooves **20** are formed on the upper surface of the recessed walls **4**. On the other hand, a corresponding number of projections **21** to the number of the engaging grooves **20** are projected for removable engagement with the engaging grooves **20** and are located on the lower surface of the bottom plate **9** of the capturing body **8**. One side of the periphery of the capturing body **8** is opened, and grooves are formed at both side edges to form port **22** in such a manner that both sides of the closing plate **23** are engaged with the grooves for closing the port **22**.

The attracting food used in the device for capturing cockroaches is most preferably selected for conditions resulting in a great attracting effect. Therefore, sugar, wheat flour, barley flour, oatmeal, bean powder, cheese, potato, honey, rice bran, sesame, or their mixture, which are treated at high temperature, pulverized or crushed so as to expand the surface area to provide good efficiency of emanating of the odor thereof are particularly good attracting foods.

Since the cockroaches captured using the attracting food live for a while so that it takes a long time to treat them it presents a problem and, in order to overcome this problem, it is preferable to obtain a mixture of food by blending insecticides thereto, such as lindane, 0, 0-dimethyl 0-2,2-dichlorovinylphosphate(DDVP), 0, 0-dimethyl 0-(3-methyl-4-nitrophenyl) thionophosphate(Phenitrothion), 0,0-diethyl 0-2-isopropyl-4-methyl-pyrimidyl-16)-thionophosphate (Diazinon), 5-Benzyl-3-furylmethyl chrysanthemate (Resmethrin), boric acid, etc. The insecticides are blended therewith as they are so as to produce an expected effect. However the insecticides have slightly repelling properties for the cockroaches, it is accordingly advantageous if they are blended thereto after they are absorbed in an absorptive substance such as active carbon, white carbon, etc., thus will be provided a blend having a superior attracting effect without any repelling drawbacks.

EXAMPLE 1

In the device for capturing cockroaches shown in FIGS. **1** to **7**, the differences of the forces required for pushing up the lower shield plate **5** provided in the passages **3** due to their structural difference were measured. The measurement was conducted as to the device of the single feather plate type shown in FIG. **8** and as to the device of the balance spring plate type shown in FIG. **9** in such a manner that the thickness of the feather or shield plate **5** was made constant and the force required for raising the end of the shield plate **5** at the bearing shaft **6** as a fulcrum was measured by weight and expressed by the ratio with respect to that of the balance type. When the force of the device of balance type was 1, that of and single feather type was 2.1. The feather plate of the balance type used here had the ratio by weight of the front and rear portions of the bearing shaft of 6 to 4:3.

EXAMPLE 2

The hiding place of the cockroaches was made at the center of a wooden box of 100cm×50cm×200cm, and 50 imagos of black cockroaches were released, and after the place was held in natural living smell, the device for capturing the cockroaches shown in FIGS. **1** to **7** was introduced with 5 g. for sugar as the food of the cockroaches and was placed in the corner of the box. Then, the number of captured cockroaches were observed after one day. As the lower shield plate, the plate of single feather plate type shown in FIG. **8** and the plate of balanced feather plate type shown in FIG. **9** were used in such a manner that both feather or shield plates were provided with cutouts at the end as the ventilating portion **7**. Similar experiments were conducted as to the larva of black cockroaches, imagos of brown feather cockroaches and larva thereof. The capturing effect due to the difference of the structure of the lower shield plate were examined. The results were as in Table 1:

TABLE 1

Type of Shield Plate	No. of Experiments	Number of Captured Cockroaches: Black Cockroaches Imagos	Black Cockroaches Larvas	Brown Feather Cockroaches Imagos	Brown Feather Cockroaches Larvas
Balance type	1	3	6	4	4
	2	6	8	7	11
	3	2	12	8	10
	4	5	8	10	7
	Mean	4.0	8.5	7.2	8.0
Single feather type	1	1	3	7	6
	2	2	1	2	3
	3	2	3	5	2
	4	4	3	2	5
	Mean	2.2	2.5	4.0	4.0

EXAMPLE 3

In the method of the Example 2, the capturing effects of the cockroaches were examined as to the device having the lower shield plate having sawtooth cutouts as ventilating portion and the device having the lower shield plate having no ventilating portion, and the results shown in Table 2 were obtained. The lower shield plate was of feather balance type.

TABLE 2

Type of Shield Plate	No. of Experiments	Number of Captured Cockroaches: Black Cockroaches Imagos	Black Cockroaches Larvas	Brown Feather Cockroaches Imagos	Brown Feather Cockroaches Larvas
With ventilating portion	1	2	6	8	3
	2	1	4	10	9
	3	5	3	14	6
	4	4	7	12	13
	Mean	3.0	5.0	11.0	7.7
Without ventilating portion	1	0	0	1	2
	2	0	0	0	3
	3	0	0	1	0
	4	0	0	0	1
	Mean	0	0	0.5	1.5

EXAMPLE 4

In the method of the Example 2, the capturing effects of the cockroaches were examined as to the device having separate attracting portion and capturing portion as the present invention, and the device having the attracting portion functioning as the capturing portion in structure, and the results shown in Table 3 were obtained. The lower shield plate was of balance type having ventilating portion at the end shown in FIG. 9 for both devices.

TABLE 3

Type of Devices	No. of Experiments	Number of Captured Cockroaches: Black Cockroaches Imagos	Black Cockroaches Larvas	Brown Feather Cockroaches Imagos	Brown Feather Cockroaches Larvas
Separate Type	1	3	5	7	13
	2	1	5	15	19
	3	5	8	8	6
	4	2	9	10	12
	Mean	2.7	6.7	10.0	10.0
Integral Type	1	1	2	3	1
	2	3	2	8	0
	3	0	4	4	0
	4	4	2	7	1
	Mean	2.0	2.5	5.5	0.5

What is claimed is:

1. A device for capturing cockroaches comprising an attracting body having a food retainer, passages formed by vertical side walls and connecting said retainer with the exterior of the device, a lower shield plate adapted for opening only from the exterior and located in each of the passages, a capturing body having a removable bottom plate adapted for resting on said attracting body and having communication ports opposite to and connecting with said passages, an upper shield plate covering said communication ports and openable only from said attracting body side.

2. A device as set forth in claim **1**, wherein each lower shield plate is rotatably supported on the upper portions of the side walls by a bearing shaft located at the upper end of said plate and each lower shield plate is inclined in such a manner that the lower end thereof is relatively close to the food retainer area.

3. A device as set forth in claim **1**, wherein each lower shield plate has a ventilating portion of sawtooth shape at the lower end thereof.

4. A device as set forth in claim **2**, wherein each lower shield plate has a balance weight at the opposite side around the bearing shaft of the upper end thereof.

5. A device as set forth in claim **2**, wherein each lower shield plate has a balance weight at the upper end and around the bearing shaft, and also has a ventilating portion of sawtooth shape at the lower end thereof.

6. A device as set forth in claim **1**, wherein each upper shield plate is supported by a bearing member provided at one end thereof and on the bottom plate of said capturing body.

7. A device as set forth in claim **6**, wherein each upper shield plate has a ventilating portion of sawtooth shape at the end opposite the bearing member.

8. A device as set forth in claim **2**, wherein said capturing body is removable from the attracting body and a capturing chamber is formed by a cover which encloses the bottom plate.

9. A device as set forth in claim **8**, wherein said capturing body has engaging legs adapted for engagement with the outside of the side walls of said attracting body in a complementary and adjacent manner.

10. A device as set forth in claim **9**, wherein said engaging legs are of box shape to form capturing chambers.

11. A device as set forth in claim **2**, wherein said capturing body has a removing port at a periphery thereof, at which port a closing plate is engaged with sliding grooves provided at the edges of said port.

12. A device as set forth in claim **1**, wherein said attracting body has a plurality of grooves, and said capturing body has a plurality of projections removably engaging within the said grooves, said projections being located on the lower surface of the bottom plate thereof.

* * * * *