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(54) **APPARATUS AND METHOD FOR MONITORING TERMITE ACTIVITY**  
(76) Inventor: **Michael J. Masterson**, 19601 Covina Hills Rd., Covina, CA (US) 91724

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See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

1,982,974 A \* 12/1934 Aiken ..... 43/132.1  
1,982,975 A \* 12/1934 Aiken ..... 43/124  
2,738,754 A \* 3/1956 Bierer ..... 116/212

(Continued)

**FOREIGN PATENT DOCUMENTS**

EP 1563730 A1 \* 8/2005  
JP 07023684 A \* 1/1995  
JP 07255344 A \* 10/1995  
JP 07274792 A \* 10/1995  
JP 09098701 A \* 4/1997  
JP 09168359 A \* 6/1997  
JP 09172934 A \* 7/1997  
JP 09224540 A \* 9/1997  
JP 09294521 A \* 11/1997  
JP 10004850 A \* 1/1998

JP 10084834 A \* 4/1998  
JP 10248467 A \* 9/1998  
JP 11089500 A \* 4/1999  
JP 2000217492 A \* 8/2000  
JP 2000217493 A \* 8/2000  
JP 2003144029 A \* 5/2003  
JP 2006034207 A \* 2/2006  
JP 2007244243 A \* 9/2007  
WO WO 3020022 A1 \* 3/2003  
WO WO 3082002 A1 \* 10/2003  
WO WO 2004016085 A1 \* 2/2004

**OTHER PUBLICATIONS**

Su et al., *A System for Eliminating of Subterranean Termite Colonies*, [http://flrec.ifas.ifl.edu/entomo/Structural\\_Entomology/Termite97/Termite97.htm](http://flrec.ifas.ifl.edu/entomo/Structural_Entomology/Termite97/Termite97.htm), visited Feb. 23, 2005.

“Systematic Termite Control™” brochure; FMC Corporation; Jul. 1999; 2 pp.

“Termtrol Pro” brochure; Sector Diagnostics, LLC; no date; 2 pp.

“Quarterra Extended Inspection Interval Station” brochure; Ensystem; no date; 2 pp.

U.S. Appl. Ser. No. 10/407,253 which is a reissue application of Pat. No. 6,2166,918.

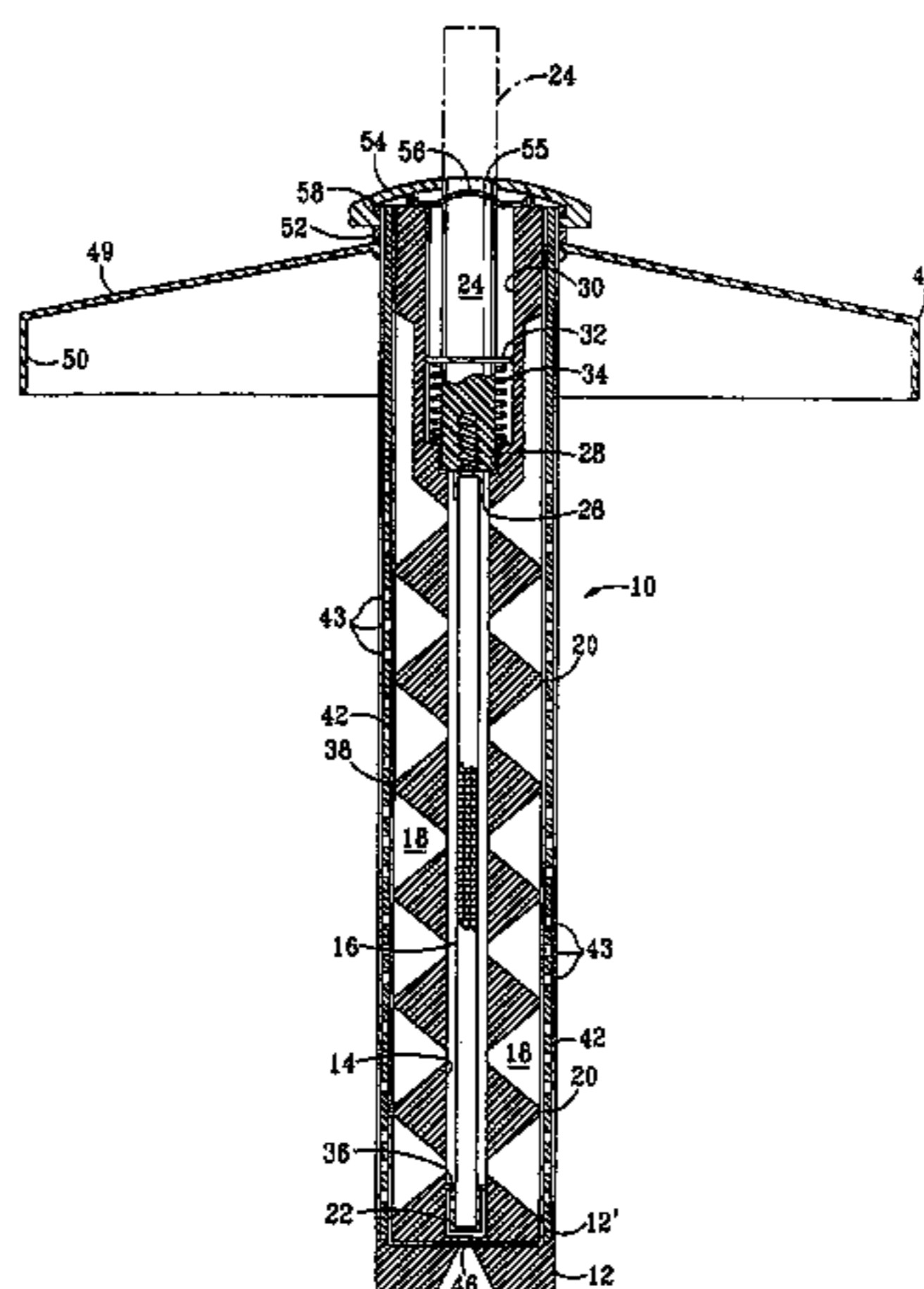
*Primary Examiner*—Darren W Ark

(74) *Attorney, Agent, or Firm*—Stoel Rives LLP

(57) **ABSTRACT**

Apparatus, for detecting the presence and eating activity of organisms such as termites that damage structures, includes a body; a wooden bait element controllably exposed to the organisms within a cavity of the body, and having an applied bait substance; a side wall of the body having a vertically spaced plurality of smoothly converging entrance passages for admitting the organisms, a consumable porous barrier covering each of the entrance passages. Spring tension is applied to an upper end of the bait element, an opposite end being anchored to the body. A flag member that is connected to the upper end of the bait element projects from the body when the bait element is weakened to the predetermined amount by the organisms.

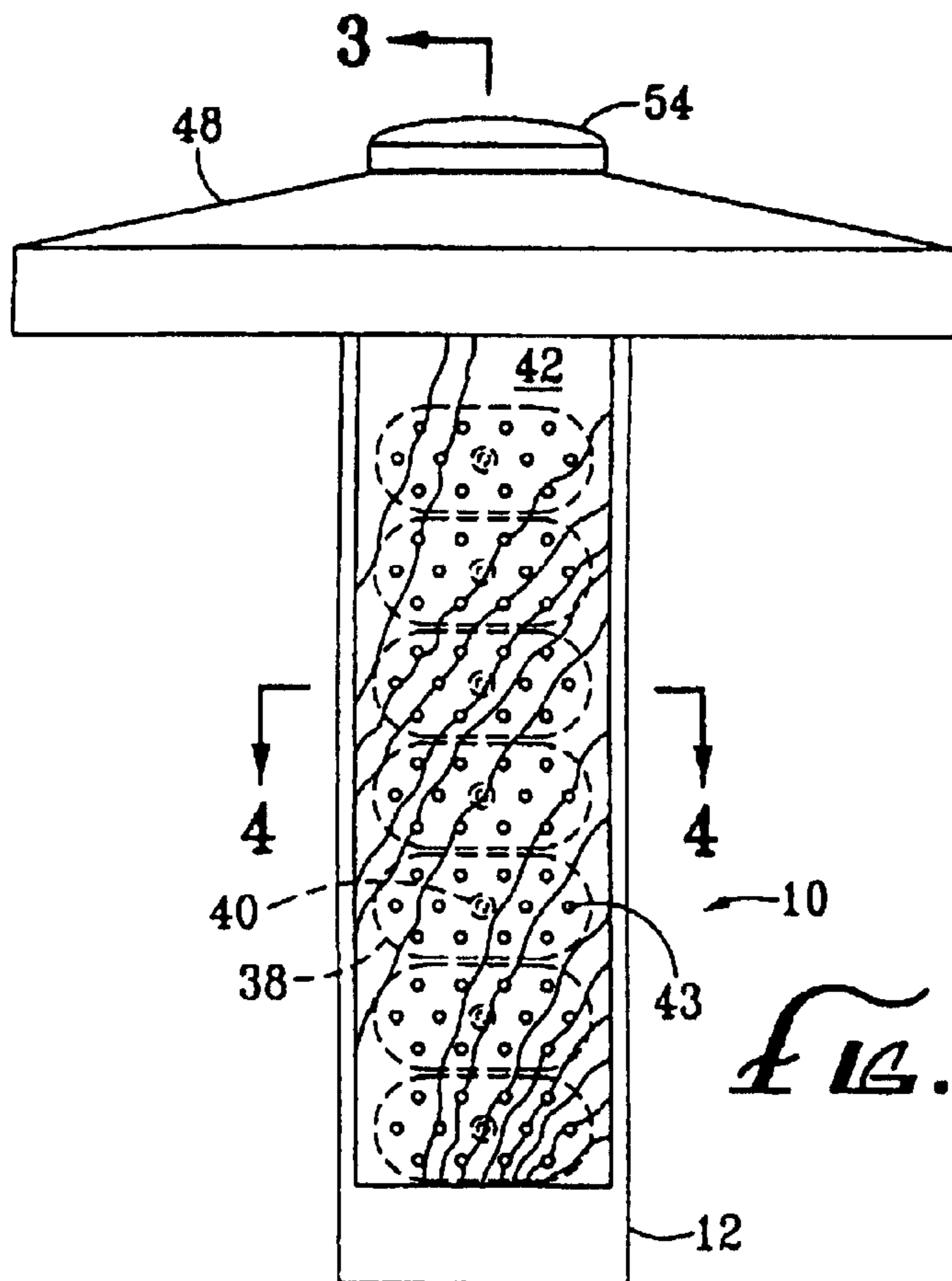
**76 Claims, 2 Drawing Sheets**



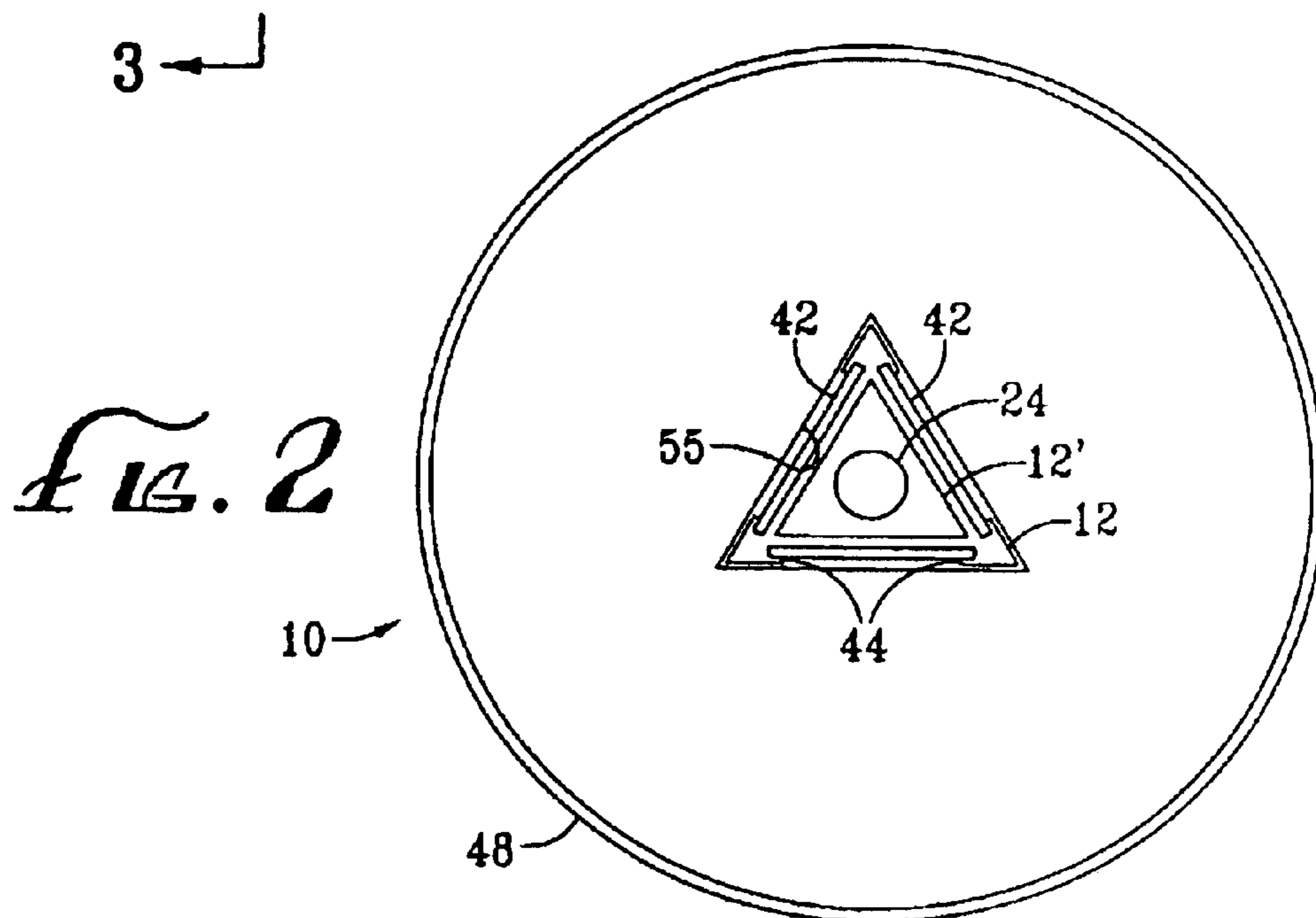
U.S. PATENT DOCUMENTS

2,923,039	A *	2/1960	Imus	43/131	6,071,529	A *	6/2000	Ballard et al.	434/408
2,970,348	A *	2/1961	Imus	43/131	6,079,151	A *	6/2000	Bishoff et al.	43/132.1
3,280,629	A *	10/1966	Kliewer	116/218	6,100,805	A *	8/2000	Lake	43/132.1
3,548,780	A *	12/1970	Kliewer	116/218	6,150,944	A *	11/2000	Martin et al.	43/124
3,559,615	A *	2/1971	Kliewer	116/218	6,158,166	A *	12/2000	Snell et al.	43/132.1
3,564,750	A *	2/1971	Burgess	43/132.1	6,164,010	A *	12/2000	Snell et al.	43/132.1
3,587,405	A *	6/1971	Holmes	116/201	6,178,834	B1 *	1/2001	Cates	43/132.1
3,602,186	A *	8/1971	Popenoe	116/212	6,187,328	B1 *	2/2001	Ballard et al.	43/131
3,621,810	A *	11/1971	Zuck, Jr.	116/283	6,189,393	B1 *	2/2001	Cates	73/865.8
3,624,953	A *	12/1971	Crosby	43/131	6,195,934	B1 *	3/2001	Megargle et al.	43/132.1
3,656,452	A *	4/1972	Kliewer	116/218	6,205,701	B1 *	3/2001	Nimocks, III	43/132.1
3,693,579	A *	9/1972	Kliewer	116/218	6,219,960	B1 *	4/2001	Contadini et al.	43/132.1
3,759,103	A *	9/1973	Volk	116/218	6,235,301	B1 *	5/2001	Ballard et al.	424/405
3,811,402	A *	5/1974	Keeley et al.	116/218	6,243,014	B1 *	6/2001	Lake et al.	340/573.1
3,908,508	A *	9/1975	Payne	116/212	6,255,959	B1 *	7/2001	Lake et al.	43/132.1
3,940,875	A *	3/1976	Basile	43/132.1	6,266,918	B1 *	7/2001	Henderson et al.	43/132.1
4,058,079	A *	11/1977	Taylor et al.	116/283	6,281,799	B1 *	8/2001	Lake et al.	43/132.1
4,082,000	A *	4/1978	Volk	116/202	6,302,054	B1 *	10/2001	Mayer, III	116/281
4,356,790	A *	11/1982	Gee	116/218	6,304,185	B1 *	10/2001	Tuttle et al.	43/132.1
4,421,053	A *	12/1983	Volk	116/218	6,313,748	B1 *	11/2001	Lake	43/132.1
4,709,654	A *	12/1987	Smith	116/283	6,323,772	B1 *	11/2001	Lake	43/132.1
4,748,931	A *	6/1988	Volk	116/218	6,370,811	B1 *	4/2002	Masterson	43/132.1
5,024,832	A *	6/1991	Omata et al.	424/84	6,370,812	B1 *	4/2002	Burns et al.	43/132.1
5,271,639	A *	12/1993	Nishizawa	116/283	6,373,391	B1 *	4/2002	Lake et al.	43/132.1
5,285,688	A *	2/1994	Robbins et al.	73/587	6,374,536	B1 *	4/2002	Washburn	43/132.1
5,323,730	A *	6/1994	Ou-Yang	116/218	6,389,741	B2 *	5/2002	Nimocks, III	43/132.1
5,329,726	A *	7/1994	Thorne et al.	43/124	6,392,545	B2 *	5/2002	Lake et al.	43/132.1
5,487,352	A *	1/1996	Williams et al.	116/218	6,397,516	B1 *	6/2002	Su	43/132.1
5,524,824	A *	6/1996	Frimmer	116/283	6,404,210	B1 *	6/2002	Su	324/692
5,537,950	A *	7/1996	Ou-Yang	116/283	6,439,069	B1 *	8/2002	Cates	73/865.8
5,555,672	A *	9/1996	Thorne et al.	43/124	6,515,591	B2 *	2/2003	Lake et al.	43/132.1
5,571,967	A *	11/1996	Tanaka et al.	73/587	6,526,692	B2 *	3/2003	Clark	43/107
5,575,105	A *	11/1996	Otomo	43/132.1	6,532,838	B1 *	3/2003	Cates	73/865.8
5,592,774	A *	1/1997	Galyon	43/124	6,546,892	B2 *	4/2003	Kelly, Jr. et al.	116/217
5,603,282	A *	2/1997	Tsipris	116/281	6,659,037	B2 *	12/2003	Hagopian	116/281
5,695,776	A *	12/1997	Ballard et al.	424/405	6,668,669	B2 *	12/2003	Cates	73/865.8
5,799,606	A *	9/1998	Volk et al.	116/218	6,724,312	B1 *	4/2004	Barber et al.	43/132.1
5,815,090	A *	9/1998	Su	43/132.1	6,772,557	B2 *	8/2004	Laskey et al.	43/124
5,832,658	A *	11/1998	Randon	43/132.1	6,834,611	B2 *	12/2004	Berthold et al.	43/132.1
5,877,422	A *	3/1999	Otomo	43/132.1	6,914,529	B2 *	7/2005	Barber et al.	43/124
5,899,018	A *	5/1999	Gordon et al.	43/132.1	7,204,199	B2 *	4/2007	Ribi et al.	116/218
5,901,496	A *	5/1999	Woodruff	43/124	7,212,112	B2 *	5/2007	Barber et al.	43/132.1
5,921,018	A *	7/1999	Hirose et al.	43/132.1	7,212,129	B2 *	5/2007	Barber et al.	43/132.1
5,927,001	A *	7/1999	Ballard et al.	43/132.1	7,233,251	B2 *	6/2007	Lewis	43/132.1
5,937,571	A *	8/1999	Megargle et al.	43/132.1	7,262,702	B2 *	8/2007	Barber et al.	43/132.1
5,950,356	A *	9/1999	Nimocks	43/132.1	7,348,890	B2 *	3/2008	Barber et al.	43/132.1
5,953,855	A *	9/1999	Edwards	43/132.1	7,475,511	B2 *	1/2009	Mediate	43/132.1
5,988,102	A *	11/1999	Volk et al.	116/218	7,497,047	B1 *	3/2009	Aesch, Jr.	43/132.1
6,003,266	A *	12/1999	Woodruff	43/124	2003/0103553	A1 *	6/2003	Shahinpoor	116/216
6,016,625	A *	1/2000	Bishoff et al.	43/132.1	2004/0237380	A1 *	12/2004	Carpenter	43/132.1
6,052,066	A *	4/2000	Su	43/132.1	2006/0162236	A1 *	7/2006	French	43/132.1
6,058,646	A *	5/2000	Bishoff et al.	43/132.1	2007/0209271	A1 *	9/2007	Mediate	43/132.1
6,065,241	A *	5/2000	Woodruff	43/132.1	2008/0092801	A1 *	4/2008	Cloutier et al.	116/212

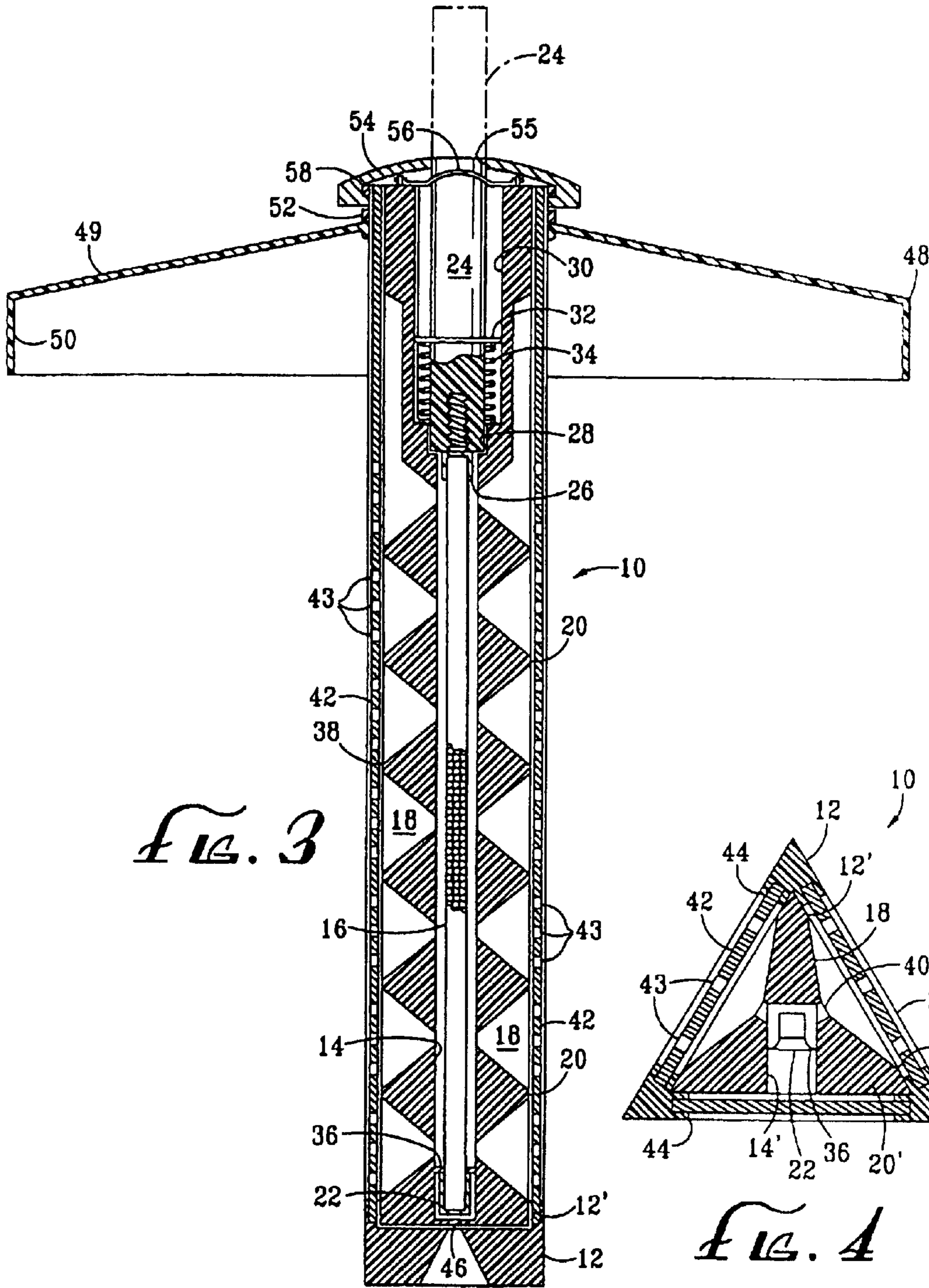
\* cited by examiner



*FIG. 1*



*FIG. 2*



## APPARATUS AND METHOD FOR MONITORING TERMITE ACTIVITY

**Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.**

### BACKGROUND

The present invention relates to pest control, and more particularly to monitoring termite activity proximate and especially under building structures.

Termite infestation and damage is a continuing problem in buildings having wood structure. Traditionally, the structures are inspected only infrequently, such as in connection with a sale, at which time considerable damage may have been done, with expensive repairs being required. Termite infestation and damage is generally not readily apparent, and partial dismantling of building structures in order to locate possible infestation has to be weighed against the damage done by such dismantling and the cost of restoration. Even professional inspections are not always effective with respect to inaccessible structure.

Accordingly, various non-invasive devices have been developed for detecting termite activity, such devices being implanted in the ground around and/or under homes or other building structures. For example, U.S. Pat. No. 5,329,726 to Thorne et al. and U.S. Pat. No. 5,901,496 to Woodruff disclose ground-implantable devices for detecting termite activity, the devices having a perforate outer housing for permanent ground implantation, and a removable perforate cartridge having bait therein. The cartridge is removed and visually inspected for detection of termite activity. These devices of the prior art exhibit a number of disadvantages; for example:

1. They are ineffective in that active termite infestations may be ignored because:
  - a. the unit does not get proper inspections;
  - b. the original placement of the unit is difficult to determine;
  - c. an aggressive termite colony was not identified early; and
2. They are difficult to install and monitor, especially when implanted in crawl space under structures.

Thus there is a need for a device that facilitates detection and monitoring of infestation of soil environments of building structures by destructive organisms, that is both effective and easy to use, and that is inexpensive to provide.

### SUMMARY

The present invention meets this need by providing a monitoring device having a direct indication of a predetermined amount of cumulative destructive activity of invasive organisms such as termites. In one aspect of the invention, an apparatus for signaling a cumulative amount of weakening of a test material resulting from exposure to a hazardous environment includes a body; a test element supported relative to the body and comprising the test material; means for controllably exposing the test element to the hazardous environment; means for applying a load force to the test element, the load force being effective for displacing a portion of the test element when there is a predetermined amount of weakening of the test element; a flag member movably supported relative to the body and coupled to the test element for movement in projecting relation to the body when the test element is weakened to the predetermined amount. The means for controllably exposing can include the body having a cavity for enclosing the test element, a side wall of the

body having an opening therein for communicating with the hazardous environment. As used herein "hazardous environment" means an environment that may be deleterious to the strength of a structural material.

In another aspect of the invention, an apparatus for detecting the presence and eating activity of organisms that damage structures by consuming portions thereof includes the body; a bait element supported relative to the body and comprising a consumable structural material; means for controllably exposing the bait element to the organisms; means for applying a load force to the bait element, the load force being effective for displacing a portion of the bait element when there is a predetermined amount of weakening of the bait element; a flag member movably supported relative to the body and coupled to the bait element for movement in projecting relation to the body when the bait element is weakened to the predetermined amount by the organisms.

The exposing means can include the body having a cavity for enclosing the bait element, a side wall of the body having an entrance passage formed therein for admitting the organisms. Preferably the exposing means further includes a barrier member covering the entrance passage and being formed of a sheet of consumable porous material for excluding foreign material from the entrance passage. The consumable material of the barrier member is preferably perforated for enhanced communication of bait odor out of and of the organisms into the entrance passage. The barrier member can also act as an attractant, being selected, for example, from the group consisting of balsa wood, pine, and cardboard. Preferably the body has an outer portion to which the sheet of consumable porous material is connected and a telescopically separable core portion that supports the bait element and the flag member for facilitating removal and inspection of the bait element without disturbing the outer body and the sheet of porous material.

The entrance passage can extend between a first opening in an outside surface of the side wall and a second opening in an inside surface of the side wall, the first opening having a first area, the second opening having a second area being preferably less than the first area, the passage smoothly tapering between the first area and the second area for concentrating eating activity at a specific location along the bait element. The body can form an elongate housing having respective bottom and top extremities, the entrance passage being preferably one of a vertically spaced plurality of entrance passages for exposure to organisms at plural depths within the hazardous environment, a consumable porous barrier member covering each of the entrance passages. The entrance passages and the barrier member can be on a first face of the body, the body preferably including a second face having counterparts of the entrance passages and the barrier member for exposing the bait element to organisms approaching from different directions.

The means for applying a load force can include a first coupling for anchoring one end to the bait element to the body, a second coupling for connecting an opposite end of the bait element, and a spring for applying tensile load to the bait element through the second coupling. The flag member can be connected to the second coupling. The bait element can be a wood member having a bait substance applied thereto.

In a further aspect of the invention, a method for monitoring a predetermined cumulative eating activity of organisms on a bait member includes:

- (a) providing a housing body having an elongate cavity and a side wall passage;
- (b) anchoring one end of the bait member to the body with the bait member extending within the cavity;
- (c) connecting a flag member to an opposite end of the bait member with the flag member extending to proximate a flag opening of the body;

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- (d) connecting a spring member between the flag member and the housing body for tensioning the bait member;
- (e) placing the housing body in a medium subject to infestation by the organisms with the side wall passage being accessible by the organisms and the flag opening being located outside the medium; and
- (f) periodically observing the housing body for display to the flag member in an extended position thereof.

The method can further include interposing a consumable porous barrier between the medium and the side wall passage for preventing the medium from contacting the bait member.

## DRAWING

These and other features, aspects, and advantages of the present invention will become better understood with reference to the following description, appended claims, and accompanying drawings, where:

FIG. 1 is a side view of a termite monitoring apparatus according to the present invention;

FIG. 2 is a top view of the apparatus of FIG. 1;

FIG. 3 is a lateral sectional view on line 3—3 of FIG. 1; and

FIG. 4 is a plan sectional view on line 4—4 of FIG. 1.

## DESCRIPTION

The present invention is directed to a device and method for detecting and monitoring the activity of invasive destructive organisms such as termites. With reference to FIGS. 1—4 of the drawings, a monitoring apparatus 10 includes a generally cylindrical housing body 12 having an elongate main cavity 14 for receiving a test element 16, a plurality of entrance passages 18 being formed in one or more side walls 20 of the body 12 for admitting the organisms (not shown). The test element 16 is typically in the form of a cardboard strip or rod, wooden rod or dowel, which can be impregnated or coated with a suitable attractant such as pheromone, the element 16 thus also being sometimes referred to herein as a bait element. A stop member 22 is attached at a bottom extremity of the bait element 16 for anchoring engagement proximate a lower extremity of the main cavity 14. Also, a flag member 24 is connected to a top extremity of the bait element 16 by a flag fitting 26, the flag member 24 being axially movable from a first position as shown by solid lines to a second position as shown by broken lines in FIG. 3. The flag member 24 extends within a flag cavity 28 that forms an enlargement of the main cavity 14, the cavity 28 extending to the top of the housing body 12. An upper portion of the flag cavity 28 is enlarged, forming a spring cavity 30 for accommodating a stop ring 32 that projects laterally from the flag member, and a compression spring 34 that is interposed between the stop ring and a bottom extremity of the spring cavity 30 for biasing the flag member toward the second position thereof, the stop ring 32 abutting a main cap 54 (further described below) that forms an upper extremity of the spring cavity 30 in the second position of the flag member 24. Thus, when a predetermined amount of weakening of the test element 16 occurs, the element fractures in tension, whereupon the flag member 24 snaps to the second position thereof in projecting relation to the housing body 12, being viewable from a distance as a direct indication of the corresponding cumulative consumption of the element 16.

The stop member 22 and the flag fitting 26 can be attached to the test element 16 by any suitable means, such as by an adhesive, and/or by a coupling pin (not shown) that projects

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laterally through the element 16 and opposite walls of the stop member (and the flag fitting). As shown in FIG. 3, the stop member 22 is retained against upward movement by an anchor ledge 36 that projects inwardly within the main cavity 14 of the body 12.

A preferred configuration of the entrance passages 18 has each passage formed with a large outwardly facing first opening 38 and a much smaller second opening 40 into the main cavity 14, the passage 18 being smoothly inwardly tapered from a first area corresponding to the first opening 38 to a second area corresponding to the second opening 40 for focusing invasive activity at a particular location along the test element 16.

A principal feature of the present invention is that each entrance passage 18 is covered by a porous barrier member 42 that is easily consumed by invasive organisms seeking access to the bait element 16 after the apparatus 10 is imbedded in soil that may contain the organisms. Thus the first openings 38 of the entrance passages 18 can be quite large without being blocked by pebbles or clods of the soil. More particularly, it is expected that the invading organisms will not entirely consume the portions of the barrier member 42 that cover the first openings 38, the barrier member being at least partially effective in excluding the soil particles from the entrance passages 18. Further, the soil particles that do get in the passages are likely to fall below the second openings 40 without blocking them. Moreover, the enhanced area of the first openings 38 serves to enable the passage of gaseous attractant matter through the porous barrier member 42 at a rate at least as great as that permitted by the smaller area of the second openings 40. As shown in FIG. 1, each of the first openings 38 can have a rounded rectangular or other non-circular shape for more fully utilizing the area of the side walls 20 of the body 12. Further, the barrier members are preferably perforated as indicated at 43 for enhanced communication of gaseous attractant into the soil, and for facilitating entry of termites or other invasive organisms. As best shown in FIG. 4, the barrier members 42 are retained in respective side walls 20 of the body 12 by pairs of flange portions 44, the barrier members being inserted (or removed for replacement) from the top of the body 12.

A drain opening 46 is provided at the bottom of the main cavity 14 as shown in FIG. 3 for draining moisture that might otherwise accumulate therein, the opening 46 being recessed above a bottom extremity of the housing body 12 for spacing soil therefrom when the apparatus 10 is in use. Moisture released into the soil from the opening 46 creates an environment that is attractive to termites. As shown in FIG. 4, at least a lower portion of the main cavity [12] 14 optionally extends laterally as indicated at [12'] 14' by a sufficient distance from the anchor ledge 36 for allowing the test element having the stop member 22 thereon to be lowered through the flag cavity 28 into the main cavity 14, and moved laterally into engagement with the anchor ledge 36, the anchor ledge 36 being open toward the enlarged cavity portion [12'] 14'.

Preferably the second openings 40 of the entrance passages 18 in respective side walls 20 of the body 12 are at corresponding locations along the test element 16 for further concentrating invasive activity at those locations, thereby further accelerating fracture of the test element 16 to more effectively and repeatably indicate a degree of infestation as the predetermined weakening of the test element 16.

The apparatus 10 also includes a skirt member 48 for facilitating imbedded placement of the housing body 12 vertically oriented and at a desired depth in soil. The skirt mem-

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ber also collects condensation, which typically occurs between the soil and the skirt-member. The skirt member 48 is generally circular, having an outwardly and downwardly extending main portion 49 for directing the condensation away from the housing body 12, and a downwardly projecting flange portion 50 for imparting stiffness to the skirt member, which is also formed with a central opening for passage of an upper portion of the housing body 12. The outwardly directed condensation advantageously creates an enlarged moisture barrier around the housing 12, thereby enhancing the attraction of termite activity to the monitor apparatus 10.

The body 12 is formed with an outwardly projecting skirt lip 52 which rests on the skirt member 48, the skirt member resting on the ground and being retained on the body 12 against the lip 52 by the weight of the body 12 and the other components of the apparatus 10. A main cap 54 covers the top of the body 12 and the barrier members 42 for shedding moisture that might fall on the apparatus 10, the main cap 54 having a central opening 55 for exposing the flag cavity 28, the flag member 24 extending partway through the opening 55 in the first position thereof. The main cap is upwardly convex for enhancing the shedding of moisture, and for smoothly deflecting passing objects such as lawnmowers and the like that may be used in the vicinity of the apparatus 10. The flag member 24 is exposed by extending through the main opening 55 in the second position thereof, upward movement of the flag member being limited by the stop ring 32 contacting the underside of the main cap 55. In the exemplary configuration of the apparatus 10 as shown in the drawings, the housing body 12 is generally triangular in cross-section. Of course, there can be other numbers of the side walls 20, with square and other polygonal cross-sectional shapes being contemplated.

Preferably the housing body 12 is separable, including a core portion 12' that holds the test element 16 together with the flag member 24 and its associated hardware, the designation 12 pertaining to an outer body portion having the flange portions 44 and the lip 52 formed thereon. As shown in FIGS. 3 and 4, the first openings 38 are formed in the core portion 12'. Also, a bail member 56 is pivotally connected at the top of the core portion 12' for facilitating removal thereof axially from the top of the body 12 when the main cap 54 is removed, the cap 54 having snap-engagement with a cap lip 58 that is spaced above the skirt lip 52 on the outer body 12. Thus the core portion 12' can be removed from the main body portion 12 and inspected without disturbing either the body 12 or the barrier members 42 that are retained thereby. As further shown in FIG. 4, the enlarged cavity portion 14' can extend through a side wall 20' of the core portion 12', the side wall 20' not having the vertically spaced entrance passages 18 formed therein. However, the main body portion 12 is provided with counterparts of the flange portions 44 and the barrier member 42 facing the side wall 20'. In the alternative of the housing body 12 having the core portion 12' being integrally formed, the enlarged cavity portion 14' can be open to the outside, being covered by one of the barrier members 42.

Although the present invention has been described in considerable detail with reference to certain preferred versions thereof, other versions are possible. For example, The housing body 12 can have a generally circular cross-section, a single tubular member being substituted for the barrier members 42. Also, the stop member 22 can be configured for snap-engagement with the anchor ledge 36, the body 12 being formed without the enlarged cavity portion 14'. Therefore, the spirit and scope of the appended claims

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should not necessarily be limited to the description of the preferred versions contained herein.

What is claimed is:

1. Apparatus for signaling a cumulative amount of weakening of a test material resulting from exposure to a hazardous environment *in the ground containing material-consuming organisms*, comprising:

- (a) [a] *an elongated* body;
- (b) a test element supported relative to the body and comprising the test material;
- (c) [means] *openings extending through the body, the openings being transverse to a longitudinal axis of the body, the openings being operative for controllably exposing the test element to the hazardous environment containing the material-consuming organisms and for providing passage for the organisms through the body to the test material;*
- (d) means for applying a load force to the test element, the load force being effective for displacing a portion of the test element when there is a predetermined amount of weakening of the test element *caused by consumption thereof by the organisms;*
- (e) a flag member movably supported relative to the body and coupled to the test element for movement in projecting relation to the body when the test element is weakened to the predetermined amount, *with at least a portion of the flag member being movable from a first position enclosed within the body to a second position upward and out of the body beyond the hazardous environment.*

2. The apparatus of claim 1, wherein [the means for controllably exposing comprises] the body having a cavity for enclosing the test element[, a side wall of the body having an opening therein for communicating with the hazardous environment].

3. Apparatus for detecting the presence and eating activity or organisms that damage structures by consuming portions thereof, the apparatus comprising:

- (a) [a] *an elongated* body;
- (b) a bait element supported relative to the body and comprising a consumable structural material;
- (c) [means] *openings extending through the body, the openings being transverse to a longitudinal axis of the body, the openings being operative for controllably exposing the bait element to the organisms and for providing entrance passages for the organisms through the body to the bait element;*
- (d) means for applying a load force to the bait element, the load force being effective for displacing a portion of the bait element when there is a predetermined amount of weakening of the bait element *caused by consumption thereof by the organisms;*
- (e) a flag member movably supported relative to the body and coupled to the bait element for movement in projecting relation to the body when the bait element is weakened to the predetermined amount by the organisms, *with at least a portion of the flag member being movable from a first position enclosed within the body to a second position upward and out of the body beyond the hazardous environment.*

4. The apparatus of claim 3, wherein [the exposing means comprises] the body [having] *has* a cavity for enclosing the bait element, *wherein the openings are in* a side wall of the body [having an entrance passage formed therein for admitting the organisms].

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5. The apparatus of claim 4, wherein the exposing means further comprises a barrier member covering the entrance [passage] passages, the barrier member being formed of a sheet of consumable porous material.

6. The apparatus of claim 5, wherein the sheet of consumable porous material is perforated for enhancing communication with the entrance [passage] passages.

7. The apparatus of claim 5, wherein the consumable material of the barrier member is selected from the group consisting of balsa wood, pine, and cardboard.

8. The apparatus of claim 5, wherein the body comprises an outer portion and a telescopically separable core portion, the bait element and the flag member being supported within the core portion, the sheet of consumable porous material being connected to the outer portion.

9. The apparatus of claim 4, wherein the entrance [passage] passages [extends between a first opening in an outwardly facing surface of] extend through the side wall [and a second opening in an inwardly facing surface of the side wall, the first opening having a first area, the second opening having a second area being less than the first area], the entrance [passage] passages smoothly tapering [between the first area and the second area] from a first larger diameter distal to the bait element to a smaller diameter proximate the bait element.

10. The apparatus of claim 4, wherein the body forms an elongate housing having respective bottom and top extremities, the entrance [passage] passages being [one of a] vertically spaced [plurality of entrance passages], and a consumable porous barrier member covering each of the entrance passages.

11. The apparatus of claim 10, wherein the entrance passages and the barrier member are on a first face of the body, the body also including a second face having counterparts of the entrance passages and the barrier member.

12. The apparatus of claim 3, wherein the means for applying a load force comprises: a spring, a first coupling for anchoring one end [to] of the bait element to the body, a second coupling for connecting an opposite end of the bait element to the spring, [and a] the spring [for] applying tensile load to the bait element through the second coupling.

13. The apparatus of claim 12, wherein the flag member is connected to the second coupling.

14. The apparatus of claim 3, wherein the bait element has a bait substance applied thereto.

15. The apparatus of claim 3, wherein the bait element is a wood member.

16. The apparatus of claim 3, wherein the bait element is a cardboard member.

17. A method for monitoring a predetermined cumulative eating activity of organisms on a bait member, comprising:

(a) providing a housing body having an elongate cavity and a side wall passage that extends through the housing body in a direction that is transverse to a longitudinal axis of the housing body;

(b) anchoring one end of the bait member to the body with the bait member extending within the cavity;

(c) connecting a flag member to an opposite end of the bait member with the flag member extending to a position proximate a flag opening of the body;

(d) connecting a spring member between the flag member and the housing body for tensioning the bait member, wherein upon consumption by eating activity of the organisms, the bait member is sufficiently weakened and fractures whereupon the flag member is moved via action of the spring member from a first position enclosed within the housing body to a second position upward and out of the housing body;

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(e) placing the housing body in a medium subject to infestation by the organisms with the side wall passage being accessible by the organisms and the flag opening being located outside the medium; and

(f) periodically observing the housing body for display [to] of the flag member in [an extended] the second position thereof.

18. The method of claim 17, further comprising interposing a consumable porous barrier between the medium and the side wall passage for preventing the medium from contacting the bait member.

19. Apparatus for detecting the presence and eating activity of organisms that damage structures by consuming portions thereof, the apparatus comprising:

(a) a body forming an elongate housing having respective bottom and top extremities;

(b) a bait element supported relative to the body and comprising a wood member having a bait substance applied thereto;

(c) means for controllably exposing the bait element to the organisms, comprising the body having a cavity for enclosing the bait element, a side wall of the body having a vertically spaced plurality of entrance passages formed therein for admitting the organisms, each of the entrance passages extending between a first opening in an outside surface of the side wall and a second opening in an inside surface of the side wall, the first opening having a first area, the second opening having a second area being less than the first area, the passages smoothly tapering between the first area and the second area, a consumable porous barrier member covering each of the entrance passages, the entrance passages and the barrier member being on a first face of the body, the body also including a second face having counterparts of the entrance passages and the barrier member;

(d) means for applying a load force to the bait element, comprising a first coupling for anchoring one end [to] of the bait element to the body, a second coupling for connecting an opposite end of the bait element, and a spring for applying tensile load to the bait element through the second coupling, the load force being effective for displacing a portion of the bait element when there is a predetermined amount of weakening of the bait element;

(e) a flag member movably supported relative to the body and connected to the second coupling for movement in projecting relation to the body when the bait element is weakened to the predetermined amount by the organisms, with at least a portion of the flag member being movable from a first position enclosed within the body to a second position upward and out of the body.

[20. The apparatus of claim 19, wherein the bait element has a bait substance applied thereto.]

[21. The apparatus of claim 19, wherein the bait element is a wood member.]

22. The apparatus of claim 19, wherein the [bait element is a cardboard] wood member is selected from the group consisting of balsa wood or pine.

23. A method for monitoring structural weakening of a material, the weakening resulting from exposure to subterranean organisms, the method comprising:

placing a tubular-shaped body, with a longitudinal axis in a vertical orientation, at least partially in soil, the material being entirely disposed within the body;

applying a force to the material, the force being effective to cause a displacement of at least a portion of the material when there is a weakening of the material;



providing a passageway through at least a portion of the body from the soil toward the material, the passageway being transverse to the longitudinal axis of the body, wherein the passageway is enclosed by one or more sidewalls, the passageway having a diameter being dimensioned to permit travel of the subterranean organisms from the soil toward the material and being tapered from a wide diameter end proximate to the soil to a narrow diameter end proximate to the material, whereby the passageway directs the subterranean organisms toward a specific portion of the material where the subterranean organisms can cause a weakening of the material; and

in response to the displacement, signaling the weakening of the material resulting from its exposure to the subterranean organisms, the signal comprising an exterior projection of a signaling member from the body.

24. The method of claim 23, further comprising:  
limiting exposure of the material to the soil while permitting exposure of the material to the subterranean organisms.

25. The method of claim 23, wherein the passageway is tapered substantially linearly.

26. The method of claim 23, wherein the signaling member comprises a flag and the signaling step comprises:  
ejecting at least a portion of the flag from the body.

27. The method of claim 23, further comprising:  
providing an annular-shaped skirt around the body near an end of the body distal from the soil, the skirt covering the ground in an area around the body, whereby the skirt provides a moisture barrier around the body and thereby enhances the attractiveness of the material to the subterranean organisms.

28. The method of claim 23, further comprising:  
providing an outer housing around the body, the outer housing having an opening for permitting access of the subterranean organisms to the passageway.

29. The method of claim 23, wherein the body has an elongate shape.

30. A device for signaling the presence of a material-consuming organism, the device comprising:  
a body having an outer wall;  
a material consumable by the organism, the material being entirely disposed within the body;  
an opening through the wall, the opening being transverse to a longitudinal axis of the body, the opening having a diameter dimensioned to permit the organism to fit through the opening;  
a passage in the body extending at least partially between the opening and the material, the passage having a sidewall enclosing the passage, the passage dimensioned to permit the organism to travel through the passage to reach the material, wherein the sidewall of the passage is tapered from a wide diameter end distal to the material to a narrow diameter end proximate to the material, whereby the tapered sidewall of the passage directs the organism to a specific portion of the material where the organism can consume the material and thereby cause a structural weakening of the material; and  
a spring in tension with the material so as to apply a force to the material, the force being sufficient to cause a displacement of at least a portion of the material when there is a structural weakening of the material, the displacement effectuating an exterior projection of a sig-

naling member from the body indicating the presence of the organism in the device.

31. The device of claim 30, wherein the sidewall is tapered substantially linearly.

32. The device of claim 30, further comprising:  
a barrier disposed between the outer wall and the material, the barrier being at least partly effective in excluding soil particles from entering the passage but not excluding the organism from entering the passage.

33. The device of claim 32, wherein the barrier comprises perforations.

34. The device of claim 33, wherein the material consumable by the organism emits an odor attractive to the organism, the perforations enhancing communication of the odor out of the device.

35. The device of claim 32, wherein the barrier is porous.

36. The device of claim 30, wherein the device is positionable in soil where the material-consuming organism may be present and the signaling member comprises a flag, wherein the flag is coupled to the material for movement in projecting relation to the body in a direction away from the soil in response to the displacement.

37. The device of 30, further comprising:  
an annulus-shaped skirt disposed around the body near a top of the body for placement above ground.

38. A device for signaling the presence of a material-consuming organism, the device comprising:  
a body housing having an outer wall defining an inner cavity;  
a body core, separable from the body housing, disposed within the inner cavity in a removably telescopic orientation;  
a material consumable by the organism, the material being disposed within the body core;  
an opening through the outer wall of the body housing, the opening dimensioned so that the organism can fit through the opening and reach the material, whereby the organism can consume the material and thereby cause a structural weakening of the material; and  
a spring in tension with the material so as to apply a force to the material, the force being sufficient to cause a displacement of at least a portion of the material upon structural weakening of the material, the displacement effectuating a signaling member moving from a first position enclosed within the body to a second position upward and out of the body for indicating the presence of the organism in the device.

39. The device of claim 38, further comprising:  
a barrier disposed outside the body core, the barrier being substantially impervious to soil but not impervious to the organism.

40. The device of claim 39, wherein the barrier comprises perforations.

41. The device of claim 40 wherein the material consumable by the organism emits an odor attractive to the organism, the perforations enhancing communication of the odor out of the device.

42. The device of claim 39, wherein the barrier is porous.

43. The device of claim 39, wherein the barrier is separable from the body housing and the body core and is removably insertable therebetween.

44. The device of claim 39, wherein the barrier is consumable by the organism.

45. The device of claim 38, further comprising:  
a passage formed on the body core and extending at least partially between the opening and the material con-

sumable by the organism when the body core is engaged within the body housing, the passage having a sidewall, the passage dimensioned to permit the organism to travel through the passage toward the material.

46. The device of claim 45, wherein the sidewall of the passage is tapered from a wide end distal to the material consumable by the organism to a narrow end proximate to the material consumable by the organism, whereby the tapered sidewall of the passage directs the organism to a specific location on the material for consumption.

47. The device of claim 46, wherein the sidewall is tapered substantially linearly.

48. The device of claim 38, wherein the signaling member comprises a flag coupled to the material for movement in projecting relation to the body core in response to the displacement.

49. The device of claim 38, further comprising:

an annulus-shaped skirt disposed around the body housing near a top end of the body housing.

50. A device for signaling the presence of a material-consuming organism, the device comprising:

a body housing having an outer wall defining an inner cavity, the outer wall comprising an opening dimensioned so that the organism can fit through the opening;

a body core within the body housing, the body core substantially filling the cavity, the body core comprising a radial passage, a front face of the radial passage overlapping the opening, the passage dimensioned so that the organism can fit through the passage;

a material consumable by the organism within the body core, the material extending most of a length of the body housing, whereby the organism can reach the material by traveling through the opening and the passage, and whereby the organism can consume the material and thereby cause a structural weakening of the material; and

a spring in tension with the material so as to apply a force to the material, the force being sufficient to cause a displacement of at least a portion of the material when there is a structural weakening of the material, the displacement effectuating an indication of the presence of the organism in the device comprised of a flag member moving from a first position enclosed within the body housing to a second position upward and out of the body housing.

51. The device of claim 50, wherein the outer wall is approximately cylindrical in shape.

52. The device of claim 50, wherein the material and the spring are approximately centered about a central vertical axis of the device.

53. The device of claim 50, further comprising:

a barrier disposed outside the body core, the barrier being substantially impervious to soil but not impervious to the organism.

54. The device of claim 53, wherein the barrier comprises perforations.

55. The device of claim 54 wherein the material consumable by the organism emits an odor attractive to the organism, the perforations enhancing communication of the odor out of the device.

56. The device of claim 53, wherein the barrier is porous.

57. The device of claim 53, wherein the barrier is consumable by the organism.

58. The device of claim 50, wherein the passage has a sidewall that is tapered from a wide diameter end distal to the material consumable by the organism to a narrow diam-

eter end proximate to the material consumable by the organism, for directing the organism to a specific location on the material for consumption.

59. The device of claim 58, wherein the sidewall is tapered substantially linearly.

60. The device of claim 50, wherein the flag member is coupled to the material for movement in projecting relation to the body core in response to the displacement with at least a portion of the flag member extending externally from the body housing and being viewable from a distance indicating presence of material-consuming organisms in the device.

61. The device of claim 60, further comprising:

an annulus-shaped skirt disposed around the body housing near a top end of the body housing.

62. A device for signaling the presence of material-weakening organisms, the device comprising:

a body having an exterior wall;

a plurality of transverse outer openings in the exterior wall of the body, dimensioned to permit the organisms to fit through;

a cavity within the body, the cavity having an interior wall, the cavity being substantially smaller than the body;

a plurality of transverse inner openings in the interior wall of the cavity, dimensioned to permit the organisms to fit through;

a material disposed within the cavity; wherein the organisms, when in contact with the material, cause a structural weakening of the material;

a spring in tension with the material so as to apply a force to the material, the force being sufficient to cause a displacement of at least a portion of the material when there is a structural weakening of the material, the displacement effectuating an exterior projection of a signaling member moving from a first position enclosed within the body to a second position upward and out of the body for indicating the presence of the organisms in the device.

63. The device of claim 62, wherein the inner openings in the interior wall of the cavity are smaller than the outer openings in the exterior wall of the body.

64. The device of claim 62, further comprising:

a barrier disposed outside of the openings in the interior wall of the cavity.

65. The device of claim 64, wherein the barrier comprises perforations.

66. The device of claim 65, wherein the material disposed within the cavity emits an odor attractive to the organisms, and the perforations enhance communication of the odor out of the device.

67. The device of claim 62, wherein the signaling member comprises a flag coupled to the spring, the flag moving in projecting relation to the body in response to the displacement.

68. The device of claim 62, further comprising:

an annulus-shaped skirt disposed around the body near an end of the body.

69. A device for signaling the presence of subterranean material-weakening organisms in soil, the device comprising:

a body, having an exterior wall, for at least partial submersion in soil leading with a bottom end of the body, the body having a top end opposite from the bottom end;

a plurality of transverse openings in the exterior wall of the body, dimensioned to permit the organisms to fit through;

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a material disposed within the body, wherein the organisms, when in contact with the material, cause a structural weakening of the material;

a cavity within the body, the cavity being substantially smaller than the body, the cavity being near the top end of the body;

a spring disposed within the cavity, the spring being held in tension by the material such that a structural weakening of the material causes an end of the spring to undergo a displacement, the displacement effectuating an exterior projection of a signaling member moving from a first position enclosed within the body to a second position upward and out of the body for indicating the presence of the organisms in the device.

70. The device of claim 69, wherein the body is generally elongate in shape from the top end to the bottom end.

71. The device of claim 69, further comprising:

a second cavity within the body, the second cavity being substantially smaller than the body, the second cavity containing the material, the second cavity having an interior wall, the interior wall having an opening dimensioned to permit the organisms to fit through.

72. The device of claim 69, further comprising:

a barrier disposed outside of the material.

73. The device of claim 72, wherein the barrier comprises perforations.

74. The device of claim 73, wherein the material disposed within the cavity emits an odor attractive to the organisms, and the perforations enhance communication of the odor out of the device.

75. The device of claim 69, wherein the signaling member comprises a flag coupled to the spring, the flag moving in projecting relation to the body in response to the displacement.

76. The device of claim 69, further comprising:

an annulus-shaped skirt disposed around the body near the top end of the body.

77. A device for monitoring structural weakening of a material disposed within a body to be placed at least partially in soil, the weakening resulting from exposure to subterranean organisms, the device comprising:

means for applying a force to the material, the force being effective to cause a displacement of at least a portion of the material when there is a weakening of the material;

a tubular-shaped body housing the material, the material being entirely disposed within the body, the body being placed in the soil and having a passageway disposed

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through at least a portion of the body from the soil toward the material, the passageway being transverse to a longitudinal axis of the body, wherein the passageway is enclosed by one or more sidewalls, the passageway being dimensioned to permit travel of the subterranean organisms from the soil toward the material and being tapered from a wide diameter end proximate to the soil to a narrow diameter end proximate to the material, whereby the passageway directs the subterranean organisms toward a specific portion of the material where the subterranean organisms can cause a weakening of the material; and

means for signaling the weakening of the material, in response to the displacement, resulting from the material's exposure to the subterranean organisms, the means for signaling comprising a signaling member, with at least a portion of the signaling member being movable from a first position enclosed within the body to a second position out of the body.

78. A device for monitoring structural weakening of a material disposed within a body to be placed at least partially in soil, the weakening resulting from exposure to subterranean organisms, the device comprising:

a spring mechanism that applies a force to the material, the force being effective to cause a displacement of at least a portion of the material when there is a weakening of the material;

a tubular-shaped body housing the material, the material being entirely disposed within the body, the body being placed in the soil and having a passageway disposed through at least a portion of the body from the soil toward the material, the passageway being transverse to a longitudinal axis of the body, wherein the passageway being dimensioned to permit travel of the subterranean organisms from the soil toward the material, the passageway having a larger diameter opening proximate to the soil relative to a narrower diameter opening proximate to the material, whereby the passageway directs the subterranean organisms toward a specific portion of the material where the subterranean organisms can cause a concentrated weakening of the material; and

means for signaling the weakening of the material, in response to the displacement, as a result of the material's exposure to the subterranean organisms.

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