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(54) **Lighting device and lighting system using such device**

Beleuchtungseinrichtung und Beleuchtungssystem mit einer solchen Einrichtung

Dispositif d'éclairage et système d'éclairage avec un tel dispositif

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(73) Proprietor: **Morfino, Giuseppe**
10025 Pino Torinese (IT)

(72) Inventor: **Morfino, Giuseppe**
10025 Pino Torinese (IT)

(74) Representative: **Garavelli, Paolo**
A.BRE.MAR. S.R.L.,
Via Servais 27
10146 Torino (IT)

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DE-A- 3 830 087	GB-A- 888 810
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US-A- 4 851 738	US-A- 5 207 504

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Description

[0001] The present invention refers to a lighting device, particularly for gardens and open places, and to a lighting system using such device.

[0002] Lighting devices, in the form of different configurations and types, have been known in the art from years. In particular, in the fields of open place lighting, such as public or private gardens, lighting devices are known that are directly placed on the ground and that light up particularly interesting areas for users. Electric energy and lighting power of such devices, however, are in a way "wasted", since even areas that are not interesting are lighted up, such as, for example, open sky or the like. No lighting devices are commercially available that are suitable to selectively and controllably light up particularly interesting areas.

- US-A-3 371 201 (the closest prior art), GB-A-888 810, DE-A-32 33 000 and US-A-2 574 886 disclose lighting devices with a plurality of lamps and reflecting walls;
- US-A-4 851 738 discloses a lighting system having a photosensing timing switch circuit;
- DE-A-38 30 087 discloses a rotating desk-lamp;
- AU-A-43872 79 discloses a linking reflector for use in linking two emitters or collectors of radiant energy; and
- US-A-5 207 504 discloses a method and an apparatus for tuning strip fluorescent light fixtures.

[0003] The primary object of the present invention is therefore solving the above prior-art problems, by providing a lighting device that can be selectively supplied and can selectively light up particular areas therearound, excluding lighting of other surrounding areas.

[0004] A further object of the present invention is providing a lighting device that is simple to realize, has low costs and that allows saving energy by exploiting the supply energy only to light up well-defined areas.

[0005] A further object of the present invention is providing an automated system that uses one or more lighting devices for the selective and timed lighting of well-defined areas according to suitable signals transmitted when user-interesting events occur.

[0006] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by a lighting device and lighting systems as those respectively claimed in Claims 1, and 8. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent Claims.

[0007] The present invention will be better described by some preferred embodiments thereof, given as a non-limiting example, with reference to the enclosed drawings, in which:

Figure 1 is a perspective view of a preferred em-

bodiment of the lighting device of the present invention;

Figure 2 is a top sectional view of the lighting device in Fig. 1 in the configuration providing three lighting means inserted therein;

Figure 3 is a top sectional view of a variation of the lighting device in Fig. 1 in a configuration providing four lighting means inserted therein; and

Figure 4 is a schematic perspective view of a possible embodiment of the lighting system of the present invention.

[0008] With particular reference to Figs. 1 to 3, a preferred embodiment of the lighting device of the present invention is shown. As can already deduced from these three Figures, in which the device of the invention is shown according to two possible embodiment variations, many other constructive modification are possible that will be apparent to ordinary people skilled in the art, and that, all recalling the inventive idea of the invention, all fall within the scope of the present invention as defined in the enclosed Claims.

[0009] According to Figs. 1 to 3, the lighting device 1 of the present invention substantially comprises a support structure 3 usually composed of a central body 3' made of transparent material, of the glass, plexiglass type and the like, adapted to make light pass there-through to light surrounding areas. The central body 3', as shown in Fig. 1, rests on a support base 3" (that can be placed for example on the ground) and is covered by a cover 4 adapted to guard its interior against atmospheric agents, in case the device 1 is placed outside. In the embodiment shown, the device 1 is of a cylindrical shape, but obviously different geometric shapes are possible, according to applications of the device 1 and manufacturer or user tastes.

[0010] The device 1 further comprises a plurality of lighting means 5 arranged inside the support structure 3: the lighting means 5 are common lamps in different types, for example neon, alogen, filament lamps, etc., and are electrically powered each one independently from the others. This power supply can be realized both by connecting the lighting means 5 through switching means (not shown) from time to time to a common supply (not shown), and by providing separate supply means (not shown) for each one of the lighting means 5. Moreover, the lighting means 5 can be activated and deactivated separately one from the other, in a way known in the art, for example by using again the above switching means. In the embodiments shown in Figs. 2 and 3, the lighting means 5 are respectively equal to three and four, placed at the same distance one to the other (and therefore respectively at 120° and 90°) but various arrangements and configurations are possible for such means 5, starting from two and more. Being it possible to keep some lighting means 5 turned on and other ones turned off, and being it possible to provide different types of lamps with greater or lower power con-

sumption, it is immediately apparent that the device of the invention realizes very high energy savings, being it activable and activated only when it is useful to do so.

[0011] The lighting device 1 further comprises a separator and reflecting member 7, that is contained inside the support structure 3 and is adapted both to mutually separate the lighting means 5, and to selectively reflect outside of the device 1 the light coming from the lighting means 5. To realize the above properties, the separator member is usually composed of at least one, and preferably a plurality of walls 9 made of reflecting material, that can be at a height that is equal to or less than the one of section 3', and that can be realized with different colours: this arrangement with different walls 9 in different colours, together with the chance of eventually provide lighting means 5 with different colours, allows a design flexibility also from the aesthetic and light colorings points of view.

[0012] The separator and reflecting member 7, according to the number of lighting means 5 being present in the device 1 and according to their spatial position and mutual distance, gets a configuration that can be regular or irregular: in the top sectional views in Figs. 2 and 3, the configuration is respectively of the star-type with three and four walls 9 at the same distance one to the other, but obviously the configuration can change according to designs. Moreover, both the height of each one of the walls 9, and their rectilinear longitudinal shape can change (for example, the walls 9 could be provided in a longitudinally concave or convex shape, to obtain a different reflective power).

[0013] The constructive flexibility of the lighting device 1 of the invention allows for example to provide the base 3" as revolving (not shown), that allow orienting the lighting device 1 at will according to the area to be lighted up. This rotation can be carried out manually or automatically through motored control means (not shown) that are locally or remotely controlled.

[0014] The lighting device 1 of the present invention can be realized in a local configuration, and then as a series of devices 1 that can be placed at will and can be operated individually or together according to different manual modes (switches, push-buttons, etc.).

[0015] The lighting device 1 of the invention can also be realized by arranging at least one of the lighting means 5 controlled by a photocell of the crepuscular type (not shown). This photocell will automatically turn on and off (according to suitable parameters to be set) such lighting means 5 according to the external light intensity that it detects, in order to light up environments or outside places only when it is necessary.

[0016] According to another possible example, the device 1 can be part of a real lighting system, being it of the automated or semi-automated type. This system, in addition to a series of devices 1, can include control means (not shown) coupled to lighting devices 1, which control means selectively activate and deactivate the supply to each one of the lighting means 5. The control

means can be composed of a power unit placed inside the lighting device 1, that is controlled by an electromagnetic-wave telecontrol (not shown).

[0017] According to another further possible embodiment, a system to which the lighting device 1 can be applied, is schematically shown in Fig. 4 and includes passage detecting means 12, which means 12 are adapted to generate a signal when a passage is detected. For example, the means 12 can be a pair of photo-electric cells placed at the entry to a gate on a parkway 14, and they detect the passage of a motor vehicle or a person and switch the downstream system on.

[0018] For this purpose, the system further comprises transmitting means (not shown) to transmit the signal generated by the event detection means 12; and receiving means (not shown) to receive the signal transmitted by the transmitting means. Finally, the system includes control means (not shown) coupled to receiving means 18 and to lighting devices 1: the control means selectively activate and deactivate the supply to each of the lighting means 5 according to the type of signal received by the receiving means.

[0019] As regards a possible operation of the above-described system, the signal generated by detecting means 12 controls the activation of the lighting means 5 of the lighting device 1 when the passage detecting means 12 detect the passage of a person or an object; after a predetermined period of time has elapsed from this event, then, the passage detecting means 12 send a deactivation signal for lighting means 5 to the lighting device 1. The lighting means 5 could also not be completely deactivated, and rather could go on lighting up some chosen parts of the garden, like a fence 16, with a reduced-power light.

Claims

1. Lighting device (1) comprising:

- a support structure (3) at least partially composed of material adapted to make light pass therethrough, said support structure (3) being composed of a base (3"), a central body (3') made of transparent material and a cover (4) for protecting from atmospheric agents;
- at least two lighting means (5) arranged inside said support structure (3); and
- a separator and reflecting member (7), said member (7) being contained inside said support structure (3) and being adapted to mutually separate said lighting means (5), said member (7) being further adapted to selectively reflect to the outside of the device (1) the light coming from said lighting means (5).

characterized in that:

said lighting means (5) are electrically supplied

each one independently from the other ones, said lighting means (5) being able to be mutually separately activated and deactivated

- said base (3'') is rotatable and allows orienting said lighting device (1) according to the area to be lighted; and
- said base (3'') is rotatingly controlled by motored control means contained therein and able to be locally or remotely controlled.

2. Lighting device (1) according to Claim 1, **characterized in that** said support structure (3) is shaped as a cylinder and is adapted to be placed in contact with the ground to light up open places, such as gardens.

3. Lighting device (1) according to Claim 2, **characterized in that** said lighting means (5) are three and said separator and reflecting member (7) divides the space inside said support structure (3) into three sectors, each one subtending a 120° arc of circle, said member (7) selectively reflecting the light emitted by said three lighting means (5) along said arcs of circle.

4. Lighting device (1) according to Claim 2, **characterized in that** said lighting means (5) are four and said separator and reflecting member (7) divides the space inside said support structure (3) into four sectors, each one subtending a 90° arc of circle, said member (7) selectively reflecting the light emitted by said four lighting means (5) along said arcs of circle.

5. Lighting device (1) according to any of the previous Claims, **characterized in that** said lighting means (5) are composed of lamps, said lamps having an energetic consumption and a lighting power that are independent one from the other.

6. Lighting device (1) according to any of the previous Claims, **characterized in that** said separator and reflecting member (7) is composed of a plurality of coloured reflecting walls (9), each one of said walls (9) being independently coloured with respect to the other ones and being adapted to colouredly reflect the light from the one of said lighting means (5) that is coupled therewith.

7. Lighting device (1) according to any of the previous Claims, **characterized in that** at least one of said lighting means (5) is controlled by a photocell of the crepuscular type adapted to turn on and off said at least one lighting means (5) according to the outside light intensity.

8. Lighting system **characterized in that** it comprises:

- at least one lighting device (1) according to any of Claims 1 to 7;
- passage-detecting means (12), said means (12) being adapted to generate a signal when a passage of an object or a person is detected;
- transmitting means to transmit said signal generated by said passage-detecting means (12);
- receiving means to receive said signal transmitted by said transmitting means;
- control means coupled to said receiving means and said lighting devices (1), said control means selectively activating and deactivating the power supply to each one of said lighting means (5) when a signal is received by said receiving means and said photocell of the crepuscular type of said lighting device (1) allows to turn on said at least one lighting means (5) according to the outside light intensity, said control means being further adapted to rotate said lighting device (1) in order to follow a movement of said detected object or person.

9. Lighting system according to Claim 8, **characterized in that** said signal controls the activation of said lighting means (5) of said lighting device (1) when said passage-detecting means (12) detect the passage of an object or a person, said passage-detecting means (12) sending a deactivation signal for said lighting means (5) of said lighting device (1) after a predetermined period of time has elapsed from the transmission of said activation signal.

Patentansprüche

1. Beleuchtungsvorrichtung (1) einschliesslich:

- einer Halterungsstruktur (3), bestehend zumindest teilweise aus einem lichtdurchlässigen Material, diese Halterungsstruktur (3) besteht aus einer Base (3''), einem mittleren Körper (3') aus lichtdurchlässigem Material und einem Deckel (4) als Schutz gegen Witterungseinflüsse;
- wenigstens zwei Beleuchtungsmitteln (5) im Inneren dieser Halterungsstruktur (3); und
- einem Trenn- und Reflektierelement (7), wobei sich dieses Element (7) innerhalb der obigen Halterungsstruktur (3) befindet und die obigen Beleuchtungsmittel (5) von einander trennt, dieses Element (7) reflektiert weiterhin selektiv das von den obigen Beleuchtungsmitteln (5) kommende Licht ausserhalb der Vorrichtung (1);

wobei:

- diese Beleuchtungsmittel (5) unabhängig von

einander elektrisch versorgt werden und getrennt von einander aktiviert und deaktiviert werden können;

- diese Base (3'') drehbar ist und die Ausrichtung der Beleuchtungsanordnung (1) je nach zu beleuchtendem Bereich ermöglicht; und
- diese drehbare Base (3'') von den in ihr enthaltenen, motorisierten Steuerungsmitteln mit lokaler Bedienung oder Fernbedienung gesteuert werden kann.

2. Beleuchtungsanordnung (1) nach Patentanspruch 1, jedoch mit dem Merkmal, dass die genannte Halterungsstruktur (3) zylindrischer Form ist und für die Beleuchtung im Freien, wie zum Beispiel von Gärten, auf dem Boden installiert wird.

3. Beleuchtungsanordnung (1) nach Patentanspruch 2, jedoch mit dem Merkmal, dass es sich um drei Trenn- und Reflektierelement (7) den Innenraum dieser Halterungsstruktur (3) in drei Sektoren mit jeweils einem Kreisbogen von 120° aufteilt. Dieses Element (7) reflektiert selektiv das von den drei Beleuchtungsmitteln (5) abgegebene Licht längs den Kreisbögen.

4. Beleuchtungsanordnung (1) gemäß Patentanspruch 2, mit dem Merkmal, dass es sich um vier Beleuchtungsmittel (5) handelt und das genannte Trenn- und Reflektierelement (7) den Innenraum dieser Halterungsstruktur (3) in vier Sektoren mit jeweils einem Kreisbogen von 90° aufteilt. Dieses Element (7) reflektiert selektiv das von den vier Beleuchtungsmitteln (5) abgegebene Licht längs den Kreisbögen.

5. Beleuchtungsanordnung (1) gemäß einem beliebigen, vorherigen Patentanspruch mit dem Merkmal, dass die genannten Beleuchtungsmittel (5) aus Lampen bestehen, die jeweils unterschiedliche Stromverbräuche und Beleuchtungsstärken haben.

6. Beleuchtungsanordnung (1) gemäß einem beliebigen, vorherigen Patentanspruch mit dem Merkmal, dass die genannten Trenn- und Reflektierelemente (7) aus mehreren, farbigen Reflektierwänden (9) bestehen, wobei eine jede dieser Wand (9) anders als die anderen gefärbt sein kann und das von dem ihr beigeordneten Beleuchtungsmittel (5) abgegebene Licht farbig reflektiert.

7. Beleuchtungsanordnung (1) gemäß einem beliebigen, vorherigen Patentanspruch mit dem Merkmal, dass wenigstens eines der Beleuchtungsmittel (5) von einer Dämmerungs-Fotozelle gesteuert wird, die wenigstens ein Beleuchtungsmittel (5) je nach

Stärke des Aussenlichtes ein- bzw. ausschaltet.

8. Beleuchtungssystem:

- das wenigstens eine Beleuchtungsanordnung (1) gemäß einem beliebigen Patentanspruch 1 bis 7 umfasst, sowie;
- Durchgangsmessmittel (12), wobei diese ein Signal bei Durchgang eines Gegenstandes oder Person erzeugen;
- Übertragungsmittel für das von den Durchgangsmessmitteln (12) erzeugte Signal;
- Empfangsmittel für den Empfang des von den Übertragungsmitteln gesendeten Signals;
- den Empfangsmitteln der Beleuchtungsanordnungen (1) beigeordnete Steuerungsmittel, wobei diese Steuerungsmittel selektiv die Einspeisung eines jeden Beleuchtungsmittel (5) aktivieren oder deaktivieren, wenn ein Signal von den obigen Empfangsmitteln erhalten wird und die obige Dämmerungs-Fotozelle der obigen Beleuchtungsanordnung (1) die Einschaltung wenigstens eines Beleuchtungsmittel (5) je nach Stärke des Aussenlichtes bestätigt. Diese Steuerungsmittel drehen weiterhin die Beleuchtungsanordnung (1) mit dem Zweck, die Bewegung des erfassten Gegenstandes oder Person zu verfolgen.

9. Beleuchtungsmittel gemäß Patentanspruch 8 mit dem Merkmal, dass das obige Signal die Aktivierung der genannten Beleuchtungsmittel (5) der Beleuchtungsanordnung (1) auslöst, wenn die Durchgangsmessmittel (12) den Durchgang eines Gegenstandes oder Person erfassen. Diese Durchgangsmessmittel (12) senden nach Ablauf einer bestimmten Zeitspanne nach Versand des Aktivierungssignals ein Deaktivierungssignal für die genannten Beleuchtungsmittel (5) an die Beleuchtungsanordnung (1).

Revendications

1. Dispositif d'éclairage (1) comprenant:

- une structure de support (3) constituée au moins en partie d'un matériau, capable de faire passer la lumière à travers, ladite structure de support (3) étant constituée d'une base (3''), d'un corps central (3') en matériau transparent et d'un couvercle (4) de protection contre les agents atmosphériques;
- au moins deux éléments d'éclairage (5) placés à l'intérieur de ladite structure de support (3); et
- un élément séparateur et réfléchissant (7), ledit élément (7) étant logé à l'intérieur de ladite structure de support (3) et étant capable de sé-

parer les éléments d'éclairage (5) entre eux, ledit élément (7) étant de même capable de réfléchir en mode sélectif la lumière provenant desdits éléments d'éclairage (5) vers l'extérieur du dispositif (1);

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caractérisé en ce que:

- lesdits éléments d'éclairage (5) sont alimentés électriquement, chacun sous forme individuelle par rapport aux autres, les éléments d'éclairage (5) étant individuellement activables et désactivables;
- ladite base (3") est pivotante et permet d'orienter le dispositif d'éclairage (1) selon la zone à éclairer; et
- ladite base (3") est commandée en mode giratoire par les moyens de commande motorisés contenus dans ladite base et en mesure d'être commandés localement ou à distance.

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2. Dispositif d'éclairage (1) suivant la revendication 1, **caractérisé en ce que** ladite structure de support (3) est de forme cylindrique et peut être installée en contact avec le terrain pour l'éclairage d'espaces en plein air, comme des jardins.

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3. Dispositif d'éclairage (1) suivant la revendication 2, **caractérisé en ce que** lesdits éléments d'éclairage (5) sont au nombre de trois et ledit élément séparateur et réfléchissant (7) divise l'espace interne de ladite structure de support (3) en trois secteurs, chacun sous-tendant un arc de cercle de 120°, ledit élément (7) réfléchissant en mode sélectif la lumière émise par les éléments d'éclairage (5) le long des arcs de cercle.

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4. Dispositif d'éclairage (1) suivant la revendication 2, **caractérisé en ce que** lesdits éléments d'éclairage (5) sont au nombre de quatre et ledit élément séparateur et réfléchissant (7) divise l'espace à l'intérieur de ladite structure de support (3) en quatre secteurs, chacun sous-tendant un arc de cercle de 90°, ledit élément (7) réfléchissant en mode sélectif la lumière émise par les quatre éléments d'éclairage (5) le long des arcs de cercle.

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5. Dispositif d'éclairage (1) selon une quelconque des revendications précédentes, **caractérisé en ce que** lesdits éléments d'éclairage (5) sont constitués de lampes, lesdites lampes ayant une consommation énergétique et un pouvoir éclairant indépendant l'une de l'autre.

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6. Dispositif d'éclairage (1) selon une quelconque des revendications précédentes, **caractérisé en ce que** ledit élément séparateur et réfléchissant (7) est constitué d'une pluralité de parois réfléchissantes

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colorées (9), chacune de ces parois (9) étant colorée individuellement par rapport aux autres et étant capable de réfléchir en mode coloré la lumière desdits éléments d'éclairage (5) qui lui sont accouplés.

7. Dispositif d'éclairage (1) suivant une quelconque des revendications précédentes, **caractérisé en ce qu'**au moins un desdits éléments d'éclairage (5) est commandé par une photocellule du type crépusculaire capable d'allumer et d'éteindre au moins un élément d'éclairage (5) suivant l'intensité de la lumière extérieure.

8. Système d'éclairage **caractérisé en ce qu'**il comprend:

- au moins un dispositif d'éclairage (1) suivant une quelconque des revendications de 1 à 7;
- des moyens (12) de détection de passages, ces moyens (12) étant capables de générer un signal quand il détecte le passage d'un objet ou d'une personne;
- des moyens émetteurs pour émettre ledit signal généré par les moyens (12) de détection de passages;
- des moyens récepteurs pour recevoir ledit signal émis par lesdits moyens émetteurs;
- des moyens de commande accouplés aux moyens récepteurs et aux dispositifs d'éclairage (1), lesdits moyens de commande activant et désactivant sélectivement l'alimentation à chaque élément d'éclairage (5) quand celui-ci reçoit un signal provenant des moyens récepteurs et de la photocellule du type crépusculaire du dispositif d'éclairage (1) et permettent l'allumage d'au moins un élément d'éclairage (5) suivant l'intensité de la lumière extérieure, lesdits moyens de commande étant également capables de faire pivoter le dispositif d'éclairage (1) dans le but de suivre le mouvement de l'objet ou de la personne détectée.

9. Système d'éclairage suivant la revendication 8, **caractérisé en ce que** ledit signal commande l'activation desdits éléments d'éclairage (5) du dispositif d'éclairage (1) quand les moyens de détection des passages (12) relèvent le passage d'un objet ou d'une personne, les moyens de détection de passages (12) envoyant alors un signal de désactivation aux éléments d'éclairage (5) dudit dispositif d'éclairage (1) après un intervalle de temps prédéterminé écoulé après l'envoi dudit signal d'activation.

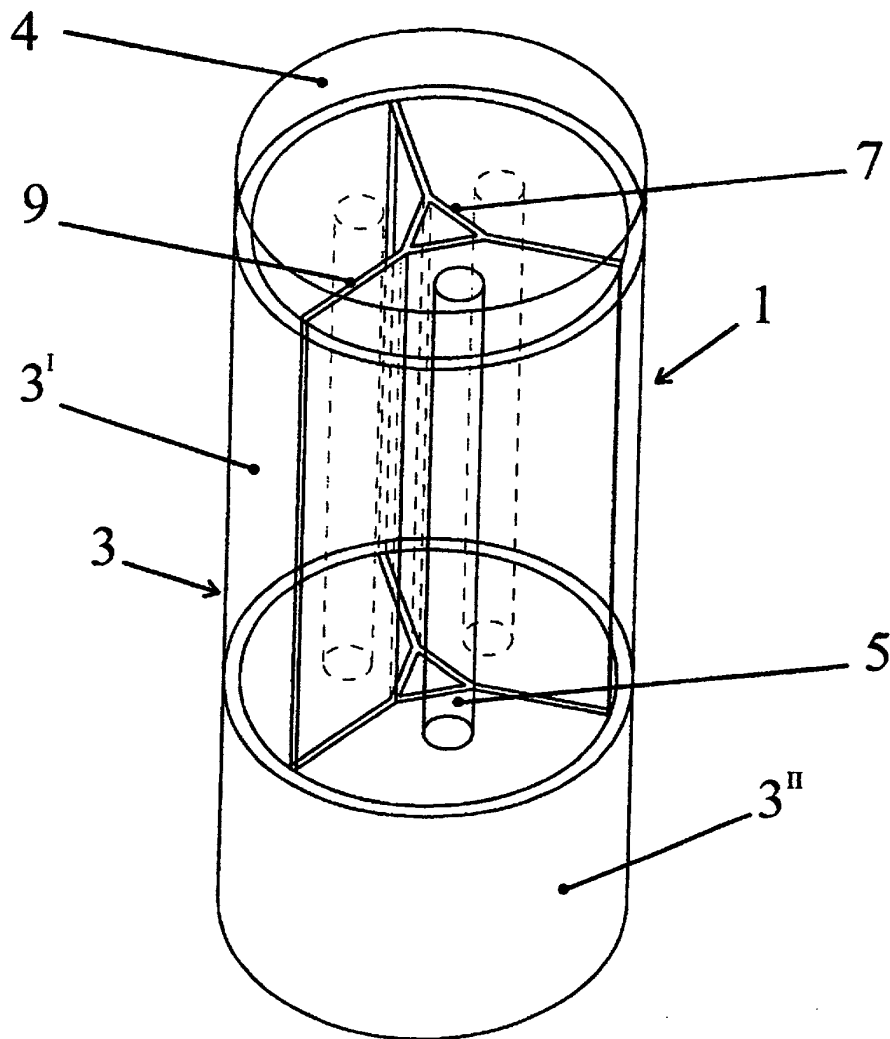


Fig. 1

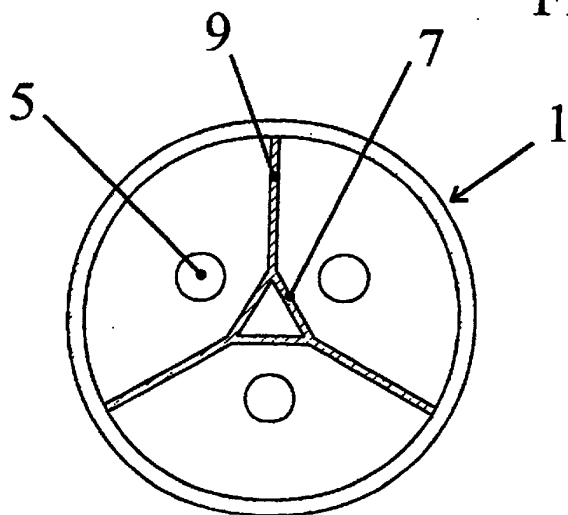


Fig. 2

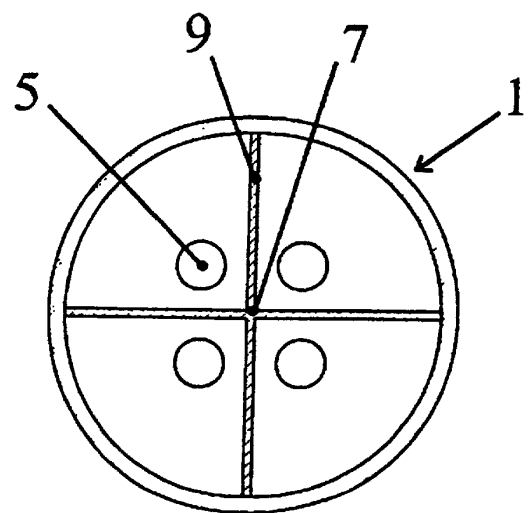


Fig. 3

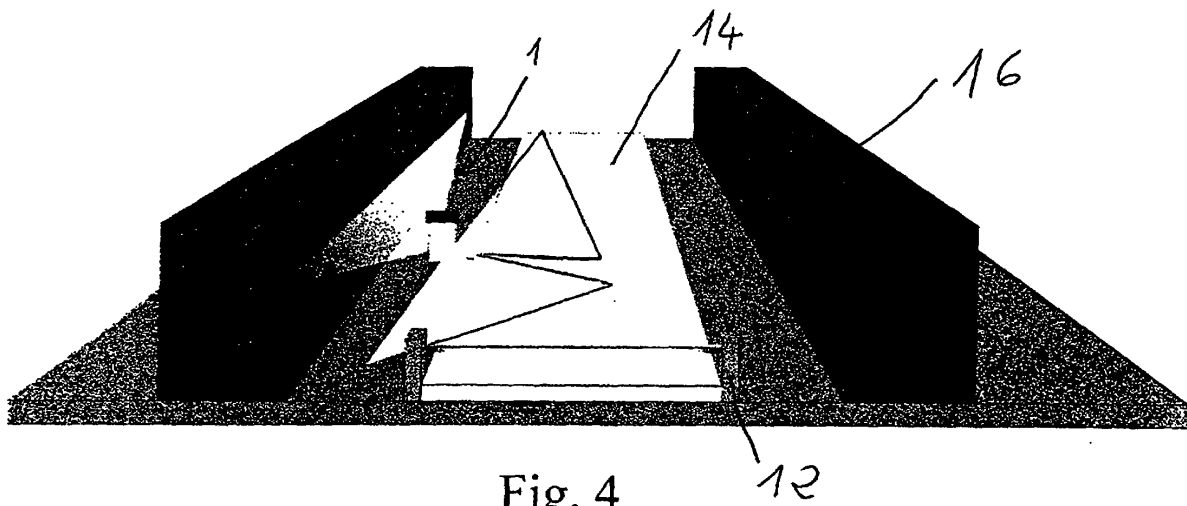


Fig. 4