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(54) **STARTING AID FOR FLUORESCENT LAMPS**

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AUXILIAIRE DE DEMARRAGE POUR LAMPES A FLUORESCENCE

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Description

FIELD OF THE INVENTION

5 **[0001]** This invention relates to a starting aid for fluorescent lamps and, and more particularly, to a structure and electrical connection of the starting aid suitable for reducing the starting voltage of the lamp.

BACKGROUND OF THE INVENTION

10 **[0002]** Fluorescent lamps, especially compact fluorescent lamps of higher wattage, e.g. 26W or above this wattage, require high starting voltage. This problem arises primarily at amalgam dosed lamps operated at room temperature, but also occurs in the event of pure mercury dosed lamps operated at lower ambient temperature. The high starting voltage causes compatibility issues even in the field of an increasing number of ballasts and applications. The problem is also related to the fact that an increasing number of luminaries have plastic reflectors rather than metallic ones and the plastic reflector cannot serve as a starting aid. It is difficult to meet the starting voltage requirements specified by the standards without sacrificing lumen output, lumen maintenance and lifetime in the wattage range mentioned.

15 **[0003]** U.S. Patent No. 4,523,126 describes a starting aid for shaped discharge lamps. The starting aid is a metal band secured to the discharge tube. The starting voltage reduction sharply depends on the location of the starting bands. This feature implies an accurate positioning of the starting bands relative to cathode location. Experiments were conducted in order to prove the effectiveness of the solution described in the above-cited patent when applied at compact fluorescent lamps, but no significant starting voltage reduction could be accomplished. It is believed that the negative result is due to the different lamp geometry and the different filling gas. A further disadvantage of the starting aid according to the cited patent is a loss in light output due to the shielding action of the starting band. Calculating with the preferred width of starting bands, the lumen loss expected is in the range of 2-4 percent. A further drawback is that a conductive part is placed on a touchable portion of the lamp. When the hot cathode hits the wall of the glass tube at the end of the life of the lamp the wall may crack and a current path may be formed to the metallic starting band. The user of the lamp may be exposed to electrical shock.

25 **[0004]** A similar design is described in U.S. Patent No. 4,701,667 in which a ring shape starting aid is applied to fluorescent lamps. This starting aid may cause dangerous electric shock and decreases the light output.

30 **[0005]** Thus there is a particular need to provide a starting aid which reduces the starting voltage of the fluorescent lamp significantly without decreasing the light output of the lamp and ensures safety against electric shock at the end of the life of the lamp.

SUMMARY OF THE INVENTION

35 **[0006]** According to one aspect of this invention, a fluorescent lamp having a starting aid is provided. The lamp comprises a glass discharge tube which includes a discharge path and is convoluted to have a plurality of discharge tube legs. These legs extend into and are secured in place in a plastic housing. First and second lamp electrodes are located at respective end points of a discharge path and disposed in some of the discharge tube legs. The lamp electrodes are connected to means suitable for electrically connecting to a socket. The starting aid comprises an electrical connector disposed in the plastic housing of the fluorescent lamp. The starting aid has a first end and a second end. The first end is connected to the means suitable for electrically connecting to the socket. The second end is secured to an end portion of an electrodeless discharge tube leg. At least a part of the electrical connector is formed as a spring.

40 **[0007]** The lamp may comprise a ballast unit which controls electrical power received from an external power source. The electrodes may be connected electrically to the ballast unit and disposed in adjacent tube legs of the sealed lamp unit. A first electrical connector may be connected with one end to the first lamp electrode. Its other end may be secured at least to one of the tube legs located along the discharge path consecutively next to the tube leg in which the second electrode is disposed. A second electrical connector may be connected with one end to the second lamp electrode. Its other end may be secured at least to one of the tube legs located along the discharge path consecutively next to the tube leg in which the first electrode is disposed.

45 **[0008]** This structure and electrical connection of the starting aid has a number advantages over the prior art. One advantage is that the starting voltage of the lamp is reduced significantly due to the structure and electrical cross connection of the two electrical connectors of the starting aid. Another advantage is that dangerous electrical shocks are avoided since the starting aid is located in the plastic housing of the lamp and there is no additional metal component part on the surface of the lamp which can be touched by the user. A further advantage is that the lumen output of the lamp is not decreased by the starting aid since the structure according to the present invention is not applied to a light-emitting surface of the lamp.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Fig. 1 shows an electrical connection of a starting aid with two electrical connectors schematically;
 Fig. 2 shows another possible connection of the starting aid;
 Fig. 3 shows a further possible connection of the starting aid;
 Fig. 4 is a perspective view in partial axial-section of a shell portion of a lamp housing with starting aid;
 Fig. 5 is a top view of the shell portion including the elements of a starting aid with bent wire spring;
 Fig. 6 is a side view in axial-section of the shell portion according to Fig. 5;
 Fig. 7 is a perspective view partly in axial-section of the shell portion according to Fig. 5;
 Fig. 8 is an axial-section view of the shell portion with a discharge tube of a compact fluorescent lamp and a plastic support plate mounted with leaf springs;
 Fig. 9 is a top view of the compact fluorescent lamp according to Fig 8;
 Fig. 10 is a perspective view in partial axial-section of the lamp according to Fig. 8;
 Fig. 11 is a side view of the plastic support plate including the elements of a starting aid with the leaf spring;
 Fig. 12 is a top view of the plastic support plate according to Fig 11;
 Fig. 13 is a perspective view of the plastic support plate with the leaf springs.

[0010] DETAILED DESCRIPTION OF THE INVENTION

Figs. 1 - 3 illustrate the electrical connection of the starting aid. Each of the figures is a bottom view of a compact fluorescent lamp, showing the layout of the discharge tube. The discharge tube includes of U-shape sections having tube legs, which are connected to each other by bridges establishing a continuous discharge path. The discharge path starts from the tube end with a first electrode 40, goes through electrodeless tube legs 54, 56, 58, 48, 46, 44 and terminates at a tube leg with a second electrode 42. The ends of some electrodeless tube legs 44, 46, 54, 56 are metallized, the metallized tube ends are indicated by hatching in the figures. First and second electrical connectors 36, 38 are cross-connected, i.e. the first electrode 40 is coupled with at least one of the ends of the electrodeless discharge tube legs located along the discharge path consecutively next to the tube leg in which the second electrode 42 is disposed. The second electrode 42 is in turn coupled with at least one of the ends of the electrodeless discharge tube legs located along the discharge path consecutively next to the tube leg in which the first electrode 40 is disposed. Due to this cross-connection, a capacitive current comes into being and makes the lamp start at a reduced voltage applied to the electrodes.

[0011] Referring now to Fig. 1, the first and second electrodes 40, 42 are located at respective end points of the discharge path. The first electrical connector 36 is connected with one end to the first lamp electrode 40 and its other end is secured to the second tube leg 46 located along the discharge path next to the tube leg in which the second electrode 42 is disposed. The second electrical connector 38 is connected with one end to the second lamp electrode 42 and its other end is secured to the second tube legs 56 located along the discharge path next to the tube leg in which the first lamp electrode 40 is disposed.

[0012] As Fig. 2 shows, while one end of the electrical connectors 36, 38 is connected to the electrodes similarly to the connection in Fig. 1, the other end of the first electrical connector 36 is secured to the first electrodeless tube leg 44 located next to the tube leg in which the second electrode 42 is disposed. The other end of the second electrical connector 38 is secured to the first electrodeless tube leg 54 next to the tube leg in which the first electrode 40 is disposed.

[0013] As Fig. 3 illustrates, while one end of the electrical connectors 36, 38 is connected to the electrodes 40, 42 similarly to the connection of Fig. 1 and 2, the other end of the first electrical connector 36 is secured to two consecutive electrodeless tube legs 44, 46 located next to the tube leg in which the second electrode 42 is disposed. The other end of the second electrical connector 38 is secured to two consecutive electrodeless tube legs 54, 56 located next to the tube leg in which the first electrode 40 is disposed.

[0014] Figs. 4 - 13 illustrate structural embodiments of the starting aid. Referring now to Fig. 4, it shows a shell portion 20 which is one part of the plastic housing of a compact fluorescent lamp. The other part of the housing is a cap portion which will be described in the forthcoming figures. Additionally, a socket (not shown) belongs to the lamp system generally including a ballast unit in the event of compact fluorescent lamps of plug-in type. The mechanical attach to the socket is established by a support plug 30 protruding from the bottom of the shell portion 20, while four contact pins 8 are provided for electrical connection towards the ballast unit. In the figure, an electrical connector of the starting aid is represented by a contact wire 24 made of chrome-steel material. Its first end is attached to a contact pin 8, and its second end is formed as a helical spring 10 embedded in a nest 12 of a protrusion 14 extending from the bottom wall of the shell portion 20. A middle part of the contact wire 24 is led through plastic guides 26 from the contact pin 8 up to the protrusion 14. Only one contact wire 24 is shown in the figure, however a second one can also be disposed within the shell portion 20. During the assembly of the lamp, the first end of the contact wire 24 together with a lead-in wire of an

electrode will be crimped in a contact pin 8 connecting the electrical connector of the starting aid to the electrode of the lamp. The free end of the helical spring 10 will resiliently lean against one of the metallized electrodeless tube ends thereby pressing the second end of the contact wire 24 to an end portion of the electrodeless discharge tube. An effective capacitive coupling comes into being between the electrical connector of the starting aid and the discharge path point at the electrodeless tube end. Due to the effective capacitive coupling, an additional electrical potential is formed along the discharge path between the electrodes which modifies the breakdown path of the electrical field and reduces the starting voltage.

[0015] In Figs. 5 - 7, another embodiment of the starting aid is shown. The first end of the electrical connector is connected to the contact pin 8 and the second end is simply bent to form a wire spring 28. The middle portion is a contact wire 24 and is led through plastic guides 26 similarly to the previous embodiment. The wire spring 28 is nested in a plastic deflector 34 protruding from the bottom of the shell portion 20. During the lamp-making process, when the cap portion 22 is fixed to the shell portion 20, the free end of the wire spring 28 will resiliently lean against one of the metallized electrodeless tube ends, while the first end of the contact wire 24 together with a lead-in wire of an electrode will be crimped in a contact pin 8 similarly to the embodiment according to Fig. 4. The metallization of the tube ends can be made by a dabber print process or by sprinkling a paint containing a metal in a few microns of thickness. In Fig. 5, two contact wires 24 with wire springs 28 are shown secured in place in the shell portion 20.

[0016] Another embodiment of the starting aid is shown in Figs. 8 - 10. The discharge tube 2 is fixed in the cap portion 22 by the ends of the tube legs. The first and second electrode 40, 42 are inserted into two adjacent tube legs, the others are electrodeless tube legs 44, 46, 48, 54, 56, 58. The end portions of two electrodeless tube legs 46, 56 are metallized. A plastic support plate 18 including two leaf springs 16 is attached to the cap portion 22. The free ends of the leaf springs 16 lean resiliently against the ends of the metallized electrodeless discharge tube legs 46, 56 establishing an electrical connection with them. The other end thereof is pressed into the plastic support plate 18 and welded to a conductive wire which is connected to the electrodes and the contact pin of the shell portion illustrated in Fig. 4 during the lamp assembly process.

[0017] Figs. 11 - 13 show a detailed structure of the plastic support plate 18 with the leaf spring 16. The plastic support plate 18 is secured in the cap portion of the lamp by ribs 32 protruding substantially parallel to a longitudinal axis of the lamp at an edge portion of the plastic support plate. The leaf springs 16 are inserted into the plastic support plate 18 by snapping one of their ends into the plastic support plate 18. The leaf springs 16 are made of resilient steel and serve as the second ends of the electrical connectors, the first ends of which correspond to the first ends of the conductive wires mentioned above. Insulators 6 protrude from the side of the plastic support plate 18 opposite to the tube ends in order to promote the insulation of the conducting elements mounted in the housing of the lamp.

[0018] In further embodiments, the spring portion of the electrical connector can be made of conductive sponge or rubber.

[0019] Experiments were conducted in order to prove the effectiveness of the starting aid according to the embodiments of the invention. The starting aids were built in the plastic housing of compact fluorescent lamps of types 42W HEX and 42W OCT. The starting voltages at different ambient temperatures were investigated. The results of the test are shown in Table 1.

Table 1

Starting voltage [Vrms]					
	42W HEX			42W OCT	
Temp	without aid	with aid, no metallization	with aid, metallization	without aid	with aid
25 °C	523	515	359	633	530
10 °C	536	n/a	396	647	524
-15 °C	584	n/a	454	660	575

[0020] Another test was made for different types of starting aids, the result of which is shown in Table 2.

Table 2

Type of starting aid	It is seen in	Starting voltage [Vrms]
Starting aid connected to the tube end second from the electrodes, cross connection	Fig. 1	555

(continued)

Type of starting aid	It is seen in	Starting voltage [Vrms]
Starting aid connected to the tube end first from the electrodes, cross connection	Fig. 2	513
Starting aid connected to the tube ends first and second from the electrodes, cross connection	Fig. 3	533

[0021] As it is seen in the table, the most significant reduction can be accomplished by the starting aid described with reference to Fig 2.

[0022] The starting aid structure and the electrical cross-connection of its two electrical conductors according to the invention reduce the starting voltage of the fluorescent lamp significantly without decreasing the light output of the lamp and ensure safety against electric shock at the end of the life of the lamp. The two electrical conductors of the starting aid provide additional two discharge path points between the electrodes of the lamp. The voltage potential applied to the lamp electrodes is also applied to these additional discharge path points thereby modifying the breakdown path of the electrical field significantly. The springy structure of the electrical conductors of the starting aid ensures a firm capacitive coupling towards the discharge path thereby increasing the effectiveness of the additional discharge path points. An even more effective coupling is accomplished by the metallized end portion of the tube legs to which the electrical conductors are secured. Since the starting aid of the present invention is disposed in the plastic housing, it cannot cause dangerous electric shock and does not decrease the lumen output of the lamp.

Claims

1. A fluorescent lamp having a starting aid, the fluorescent lamp comprising a glass discharge tube (2) having a discharge path and convoluted to have a plurality of discharge tube legs extending into and secured in place in a plastic housing, first and second lamp electrodes located at respective end points of a discharge path, the lamp electrodes being connected to means suitable for electrically connecting to a socket, **characterized by** a starting aid comprising an electrical connector disposed in the plastic housing and having a first end and a second end, the first end being connected to the means suitable for electrically connecting to one of the lamp electrodes, and the second end being secured to an end portion of an electrodeless discharge tube leg (4, 44, 46, 48, 54, 56, 58), and at least a part of the electrical connector being formed as a spring.
2. The lamp of claim 1 in which the end portion of the electrodeless discharge tube leg (4, 44, 46, 48, 54, 56, 58) to which the second end of the electrical connector is secured is metallized.
3. The lamp of claim 1 in which the means suitable for electrically connecting to a socket is a contact pin (8).
4. The lamp of claim 1 in which the electrical connector is a wire coiled to form a helical spring (10) at the second end thereof for pressing said second end to the end portion of the electrodeless discharge tube leg (4, 44, 46, 48, 54, 56, 58).
5. The lamp of claim 4 in which the helical spring (10) is located in a nest (12) formed in a protrusion (14) of the plastic housing.
6. The lamp of claim 3 in which the first end of the electrical connector is crimped to the contact pin (8).
7. The lamp of claim 1 in which the electrical connector is a wire connected to a leaf spring (16) forming the second end of said electrical connector for pressing said second end to the end portion of the electrodeless discharge tube leg (4, 44, 46, 48, 54, 56, 58).
8. The lamp of claim 7 in which one end of the leaf spring (16) is fixed to a plastic support plate (18) being disposed in the plastic housing.
9. The lamp of claim 1 in which the plastic housing comprises a shell portion (20) and a cap portion (22) fixed to each other, and the discharge tube legs are secured to the cap portion (22) and the means suitable for electrically

connecting to a socket is fixed in the shell portion (20).

10. A lamp of any one of the preceding claims, further comprising
a ballast unit controlling electrical power received from an external power source,
the electrodes (40, 42) being connected electrically to the ballast unit and disposed in adjacent tube legs of the
sealed lamp unit, and
the electrical connector having:

a first electrical connector (36) having an end connected to the first lamp electrode (40) and an other end secured
at least to one of the tube legs (46) located along the discharge path consecutively next to the tube leg in which
the second electrode (42) is disposed,
a second electrical connector (38) having an end connected to the second lamp electrode (42) and an other
end secured at least to one of the tube legs (56) located along the discharge path consecutively next to the
tube leg in which the first electrode is disposed.

11. The lamp of claim 10 in which
the other end of the first electrical connector (36) is secured at least to one of the tube legs (44, 46, 48) located
along approximately one-half of the discharge path consecutively next to the tube leg in which the second electrode
(42) is disposed, and
the other end of the second electrical connector (38) is secured at least to one of the tube legs (54, 56, 58) located
along approximately one-half of the discharge path consecutively next to the tube leg in which the first electrode
(40) is disposed.

12. The lamp of claim 11 in which
the other end of the first electrical connector (36) is secured to the first tube leg (44) located along approximately
one-half of the discharge path next to the tube leg in which the second electrode (46) is disposed, and
the other end of the second electrical connector (38) is secured to the first tube leg (54) located along approximately
one-half of the discharge path next to the tube leg in which the first electrode (40) is disposed.

Patentansprüche

1. Leuchtstofflampe mit Zündhilfe, wobei die Leuchtstofflampe eine Entladungsröhre (2) aus Glas umfasst, die einen
Entladungsweg aufweist und gebogen ist, um eine Vielzahl von Entladungsröhrenarmen aufzuweisen, die sich in
ein Plastikgehäuse erstrecken und dort fest angebracht sind; ferner eine erste und zweite Lampenelektrode, die
sich an den jeweiligen Endpunkten eines Entladungswegs befinden, und wobei die Lampenelektroden mit Einrich-
tungen verbunden sind, die zur elektrischen Verbindung mit einer Fassung geeignet sind, **gekennzeichnet durch**
eine Zündhilfe, umfassend
einen in dem Plastikgehäuse angeordneten elektrischen Verbinder mit einem ersten und einem zweiten Ende, wobei
das erste Ende mit der Einrichtung verbunden ist, die für die elektrische Verbindung mit einer der Lampenelektroden
geeignet ist, und das zweite Ende an einem Endteil eines elektrodenlosen Entladungsröhrenarms (4, 44, 46, 48,
54, 56, 58) befestigt ist, und
zumindest ein Teil des elektrischen Verbinders als eine Feder ausgebildet ist.
2. Lampe nach Anspruch 1, wobei das Endteil des elektrodenlosen Entladungsröhrenarms (4, 44, 46, 48, 54, 56, 58),
an dem das zweite Ende des elektrischen Verbinders befestigt ist, metallisiert ist.
3. Lampe nach Anspruch 1, wobei die für die elektrische Verbindung mit einer Fassung geeignete Einrichtung ein
Kontaktstift (8) ist.
4. Lampe nach Anspruch 1, wobei der elektrische Verbinder ein Draht ist, der an seinem zweiten Ende gewunden ist,
um eine spiralförmige Feder (10) zu bilden, um das genannte zweite Ende gegen das Endteil des elektrodenlosen
Entladungsröhrenarms (4, 44, 46, 48, 54, 56, 58) zu pressen.
5. Lampe nach Anspruch 4, wobei die spiralförmige Feder (10) sich in einer Hülle (12) befindet, die in einem Vorsprung
(14) des Plastikgehäuses ausgebildet ist.
6. Lampe nach Anspruch 3, wobei das erste Ende des elektrischen Verbinders an den Kontaktstift (8) angequetscht ist.

7. Lampe nach Anspruch 1, wobei der elektrische Verbinder ein Draht ist, der mit einer Blattfeder (16) verbunden ist, die das zweite Ende des elektrischen Verbinders bildet, um das zweite Ende gegen das Endteil des elektrodenlosen Entladungsröhrenarms (4, 44, 46, 48, 54, 56, 58) zu pressen.

8. Lampe nach Anspruch 7, wobei ein Ende der Blattfeder (16) an einer in dem Plastikgehäuse angeordneten Trägerplatte (18) befestigt ist.

9. Lampe nach Anspruch 1, wobei das Plastikgehäuse ein Schalenteil (20) und ein Kappenteil (22) umfasst, die aneinander befestigt sind, und wobei die Entladungsröhrenarme an dem Kappenteil (22) befestigt sind und die für die elektrische Verbindung mit einer Fassung geeignete Einrichtung in dem Schalenteil (20) befestigt ist.

10. Lampe nach einem der vorhergehenden Ansprüche, ferner ein Vorschaltgerät umfassend, das den von einer externen Energiequelle empfangenen elektrischen Strom steuert, wobei die Elektroden (40, 42) elektrisch mit dem Vorschaltgerät verbunden und in benachbarten Röhrenarmen der abgedichteten Lampeneinheit angeordnet sind und der elektrische Verbinder aufweist:

einen ersten elektrischen Verbinder (36), der an einem Ende mit der ersten Lampenelektrode (40) verbunden und an einem anderen Ende zumindest an einem der Röhrenarme (46) befestigt ist, wobei dieser Röhrenarm auf dem Entladungsweg dem Röhrenarm, in dem die zweite Elektrode (42) angeordnet ist, in der Reihenfolge am nächsten liegt;

einen zweiten elektrischen Verbinder (38), der an einem Ende mit der zweiten Lampenelektrode (42) verbunden und an einem anderen Ende zumindest an einem der Röhrenarme (56) befestigt ist, wobei dieser Röhrenarm auf dem Entladungsweg dem Röhrenarm, in dem die erste Elektrode (40) angeordnet ist, in der Reihenfolge am nächsten liegt.

11. Lampe nach Anspruch 10, wobei das andere Ende des ersten elektrischen Verbinders (36) zumindest an einem der Röhrenarme (44, 46, 48) befestigt ist, und wobei dieser Röhrenarm sich auf circa der Hälfte des Entladungswegs befindet und dem Röhrenarm, in dem die zweite Elektrode (42) angeordnet ist, in der Reihenfolge am nächsten liegt, und

wobei das andere Ende des zweiten elektrischen Verbinders (38) zumindest an einem der Röhrenarme (54, 56, 58) befestigt ist, und wobei dieser Röhrenarm sich auf circa der Hälfte des Entladungswegs befindet und dem Röhrenarm, in dem die erste Elektrode (40) angeordnet ist, in der Reihenfolge am nächsten liegt.

12. Lampe nach Anspruch 11, wobei das andere Ende des ersten elektrischen Verbinders (36) an dem ersten Röhrenarm (44) befestigt ist, der auf circa der Hälfte des Entladungswegs dem Röhrenarm, in dem die zweite Elektrode (42) angeordnet ist, in der Reihenfolge am nächsten liegt, und

wobei das andere Ende des zweiten elektrischen Verbinders (38) an dem ersten Röhrenarm (54) befestigt ist, der auf circa der Hälfte des Entladungswegs dem Röhrenarm, in dem die erste Elektrode (40) angeordnet ist, in der Reihenfolge am nächsten liegt.

Revendications

1. Lampe fluorescente comportant un dispositif d'aide à l'allumage, la lampe fluorescente comprenant un tube de décharge en verre (2) comportant un circuit de décharge et présentant des convolutions afin de former une pluralité de branches de tube de décharge s'étendant dans un logement en matière plastique et fixé en place sur ce dernier, des première et deuxième électrodes de lampe situées aux points extrêmes respectifs d'un circuit de décharge, les électrodes de lampe étant raccordées à des moyens appropriés afin d'assurer le raccordement électrique à une douille, **caractérisée par** un dispositif d'aide à l'allumage comportant :

un connecteur électrique disposé dans le logement en matière plastique et présentant une première extrémité et une deuxième extrémité,

la première extrémité étant raccordée aux moyens appropriés afin d'assurer le raccordement électrique à l'une des électrodes de lampe et la deuxième extrémité étant fixée à une partie d'extrémité d'une branche de tube de décharge sans électrode (4, 44, 46, 48, 54, 56, 58), et

au moins une partie du connecteur électrique étant formé comme un ressort.

2. Lampe selon la revendication 1, dans laquelle la partie d'extrémité de la branche de tube de décharge sans électrode

(4, 44, 46, 48, 54, 56, 58) sur laquelle est fixée la deuxième extrémité du connecteur électrique est métallisée.

3. Lampe selon la revendication 1, dans laquelle le moyen approprié afin d'assurer le raccordement électrique à une douille est une borne de contact (8).

4. Lampe selon la revendication 1, dans laquelle le connecteur électrique est un fil enroulé afin de former un ressort hélicoïdal (10) au niveau de la deuxième extrémité de celui-ci afin de presser la deuxième extrémité sur la partie d'extrémité de la branche de tube de décharge sans électrode (4, 44, 46, 48, 54, 56, 58).

5. Lampe selon la revendication 4, dans laquelle le ressort hélicoïdal (10) est placé dans une cavité (12) formée sur une saillie (14) du logement en matière plastique.

6. Lampe selon la revendication 3, dans laquelle la première extrémité du connecteur électrique est sertie sur la borne de contact (8).

7. Lampe selon la revendication 1, dans laquelle le connecteur électrique est un fil raccordé à un ressort à lame (16) formant la deuxième extrémité dudit connecteur électrique afin de presser la deuxième extrémité sur la partie d'extrémité de la branche de tube de décharge sans électrode (4, 44, 46, 48, 54, 56, 58).

8. Lampe selon la revendication 7, dans laquelle une extrémité du ressort à lame (16) est fixée sur une plaque support en matière plastique (18) qui est disposée dans le logement en matière plastique.

9. Lampe selon la revendication 1, dans laquelle le logement en matière plastique comprend une partie d'enveloppe (20) et une partie de couvercle (22) fixées l'une sur l'autre, et les branches de tube de décharge sont fixées sur la partie de couvercle (22) et le moyen approprié afin d'assurer le raccordement électrique à une douille est fixé sur la partie d'enveloppe (20).

10. Lampe selon l'une quelconque des revendications précédentes, comportant, en outre, une unité formant ballast commandant le courant électrique reçu à partir d'une source d'énergie externe, les électrodes (40, 42) étant raccordées électriquement à l'unité formant ballast et disposées dans des branches de tube adjacentes de l'unité formant lampe scellée, et le connecteur électrique comportant :

un premier connecteur électrique (36) présentant une extrémité raccordée à la première électrode de lampe (40) et une autre extrémité fixée sur au moins l'une des branches de tube (46) située le long du circuit de décharge consécutivement à proximité de la branche de tube dans laquelle est disposée la deuxième électrode (42),

un deuxième connecteur électrique (38) présentant une extrémité raccordée à la deuxième électrode de lampe (42) et une autre extrémité fixée sur au moins l'une des branches de tube (56) située le long du circuit de décharge consécutivement à proximité de la branche de tube dans laquelle est disposée la première électrode.

11. Lampe selon la revendication 10, dans laquelle l'autre extrémité du premier connecteur électrique (36) est fixée sur au moins l'une des branches de tube (44, 46, 48) située approximativement le long d'une moitié du circuit de décharge consécutivement à proximité de la branche de tube dans laquelle est disposée la deuxième électrode (42), et l'autre extrémité du deuxième connecteur électrique (38) est fixée sur au moins l'une des branches de tube (54, 56, 58) située approximativement le long d'une moitié du circuit de décharge consécutivement à proximité de la branche de tube dans laquelle est disposée la première électrode (40).

12. Lampe selon la revendication 11, dans laquelle l'autre extrémité du premier connecteur électrique (36) est fixée sur la première branche de tube (44) située approximativement le long d'une moitié du circuit de décharge à proximité de la branche de tube dans laquelle est disposée la deuxième électrode (46), et l'autre extrémité du deuxième connecteur électrique (38) est fixée sur la première branche de tube (54) située approximativement le long d'une moitié du circuit de décharge à proximité de la branche de tube dans laquelle est disposée la première électrode (40).

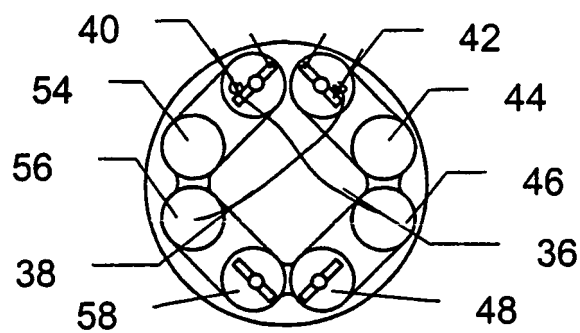


Fig. 1

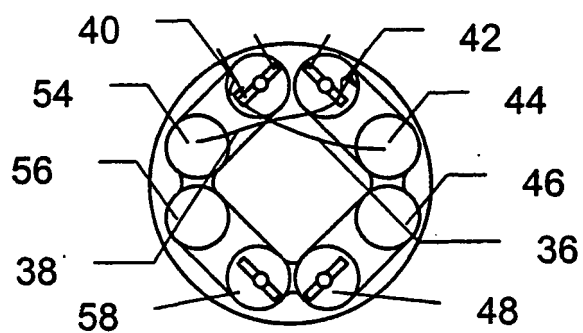


Fig. 2

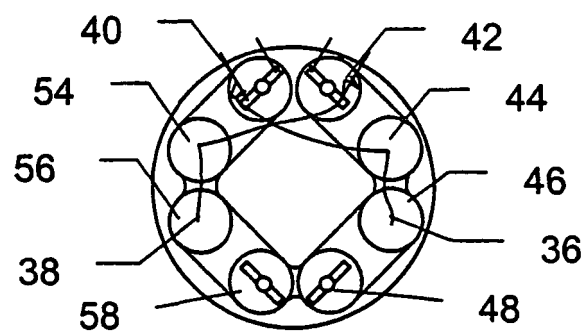


Fig. 3

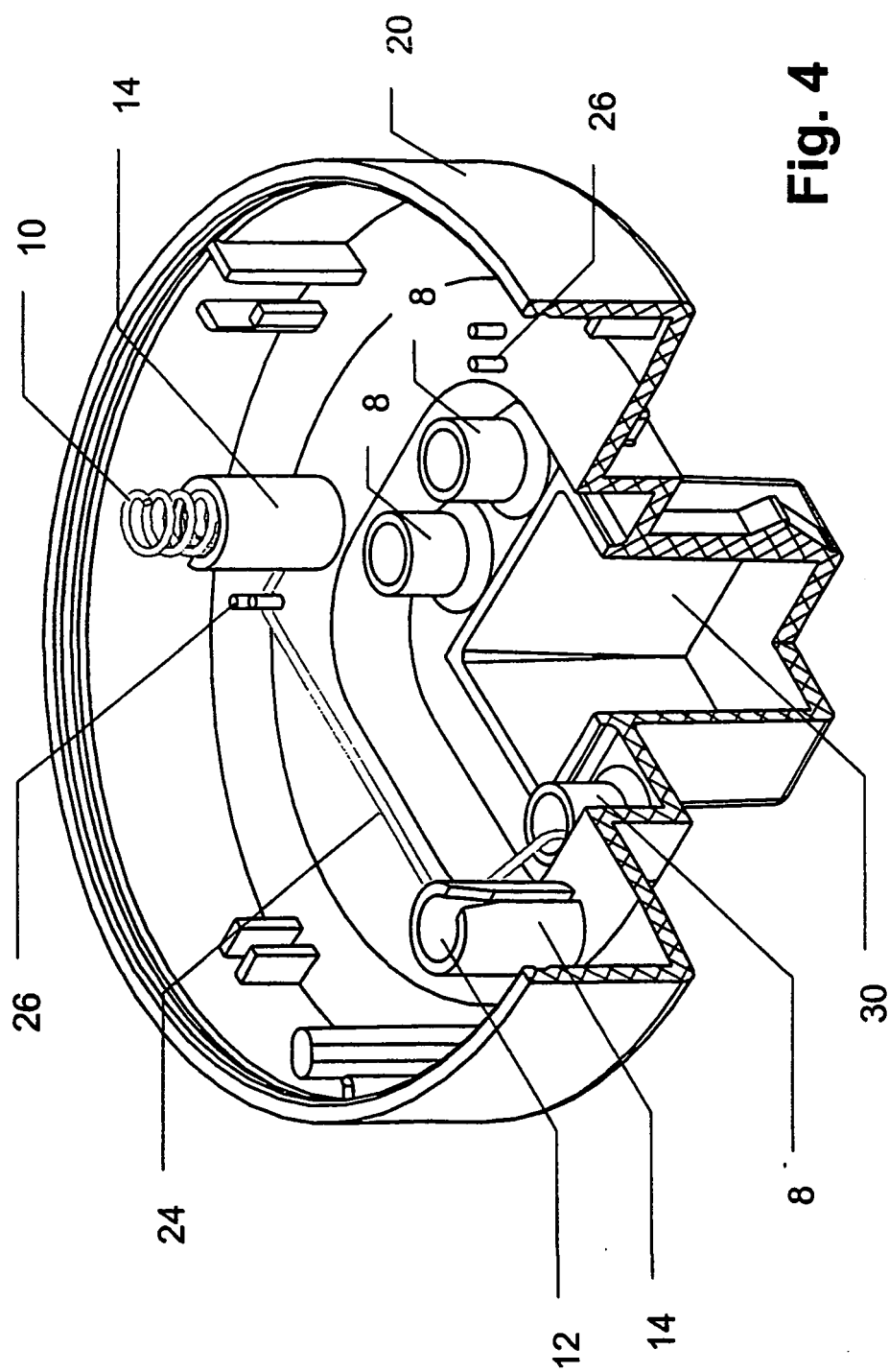


Fig. 4

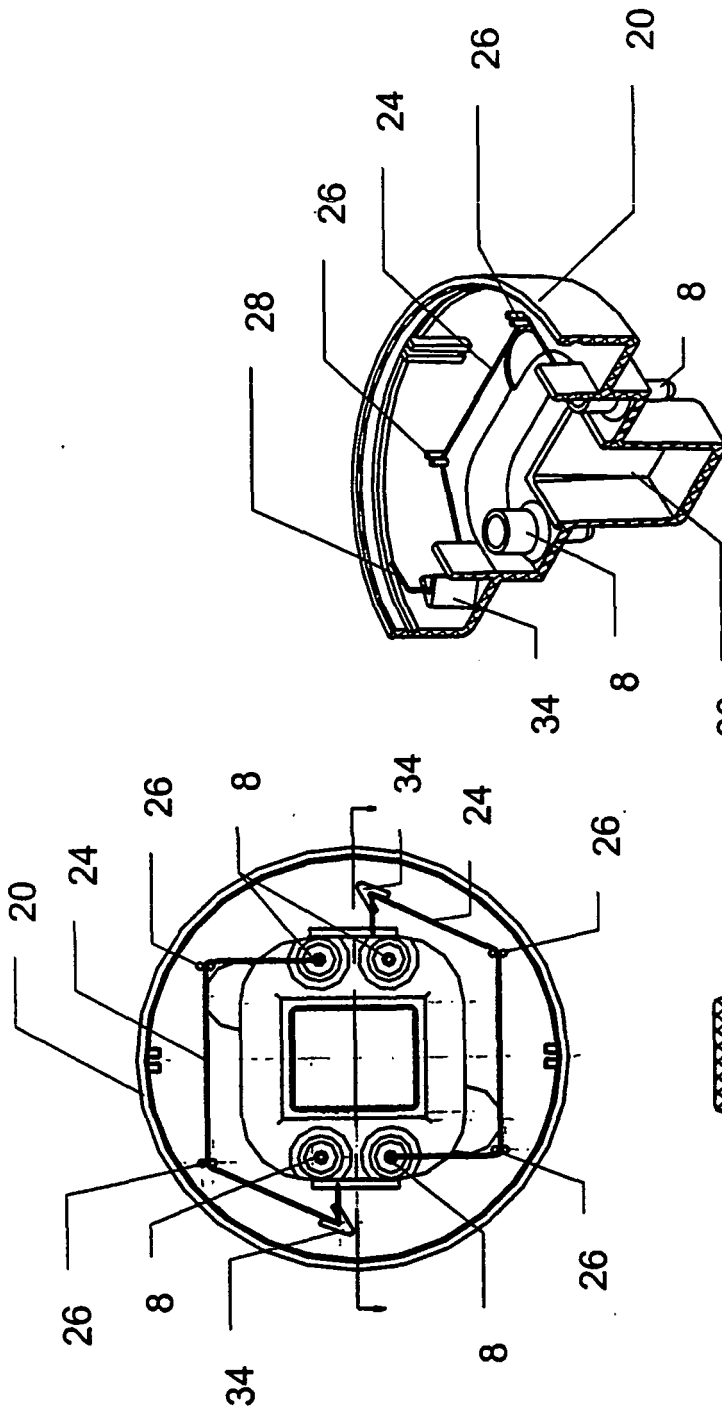


Fig. 5

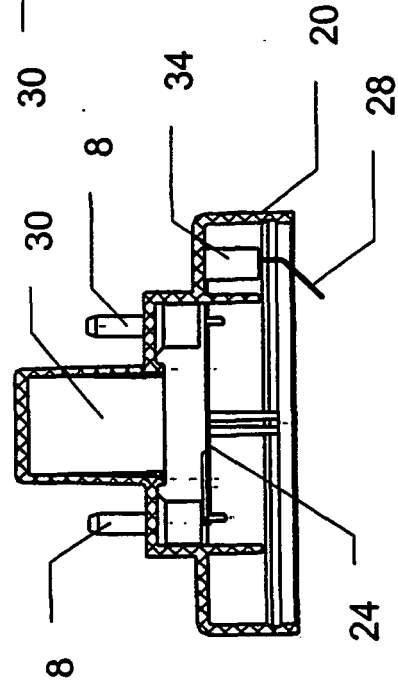


Fig. 6

Fig. 7

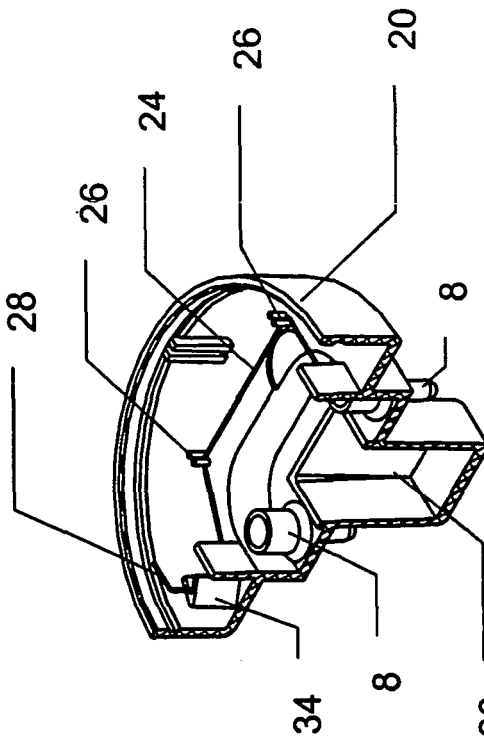


Fig. 8

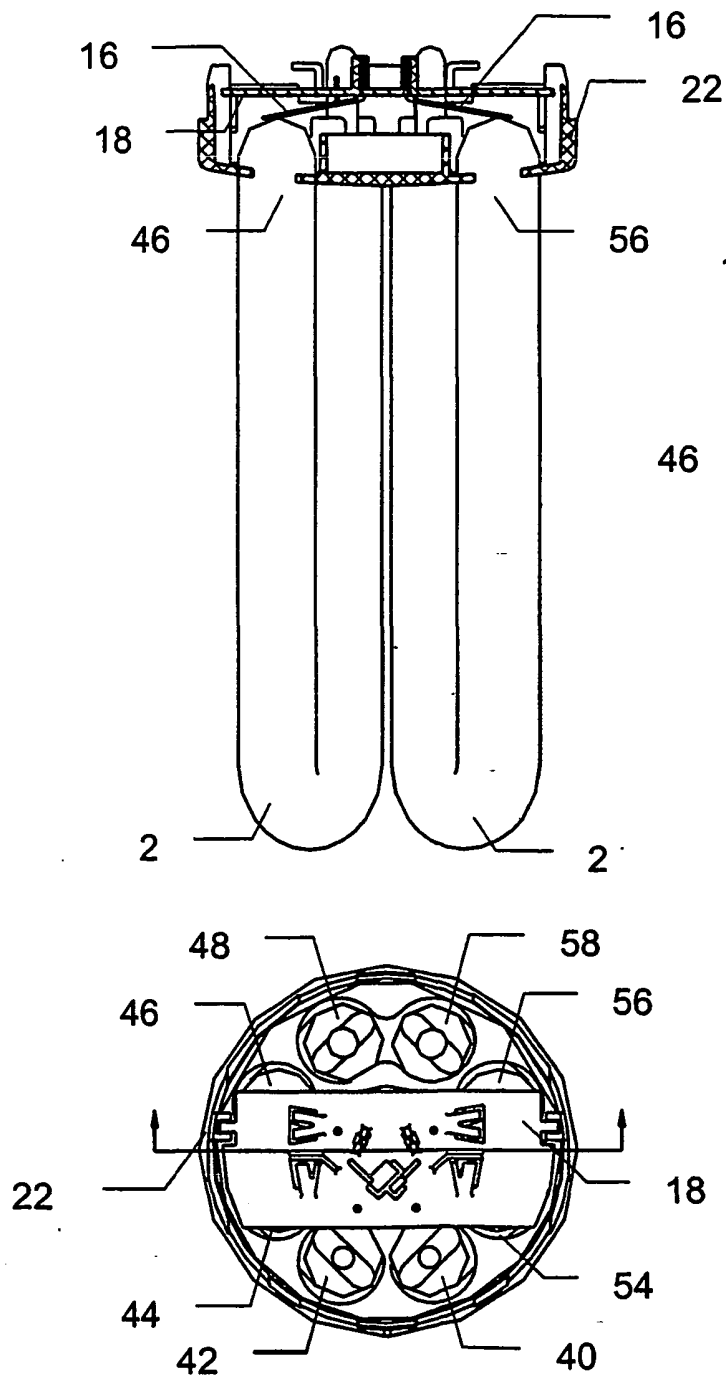


Fig. 9

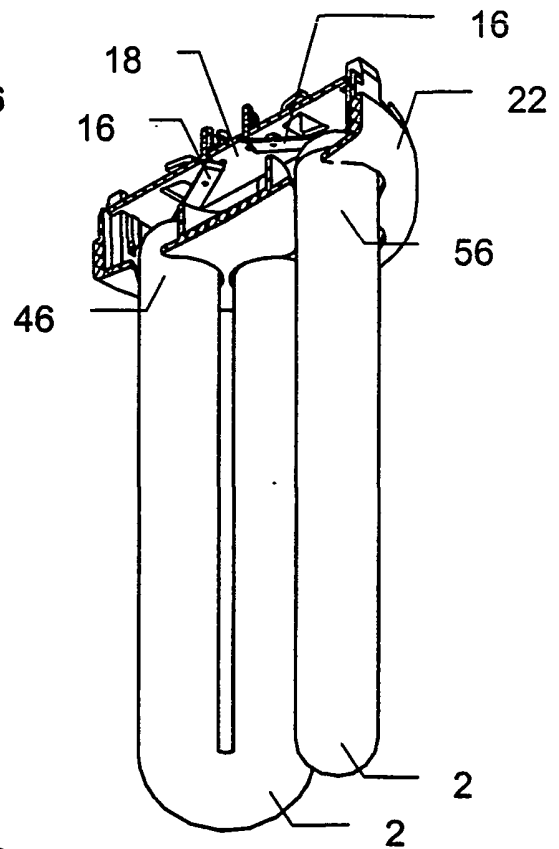
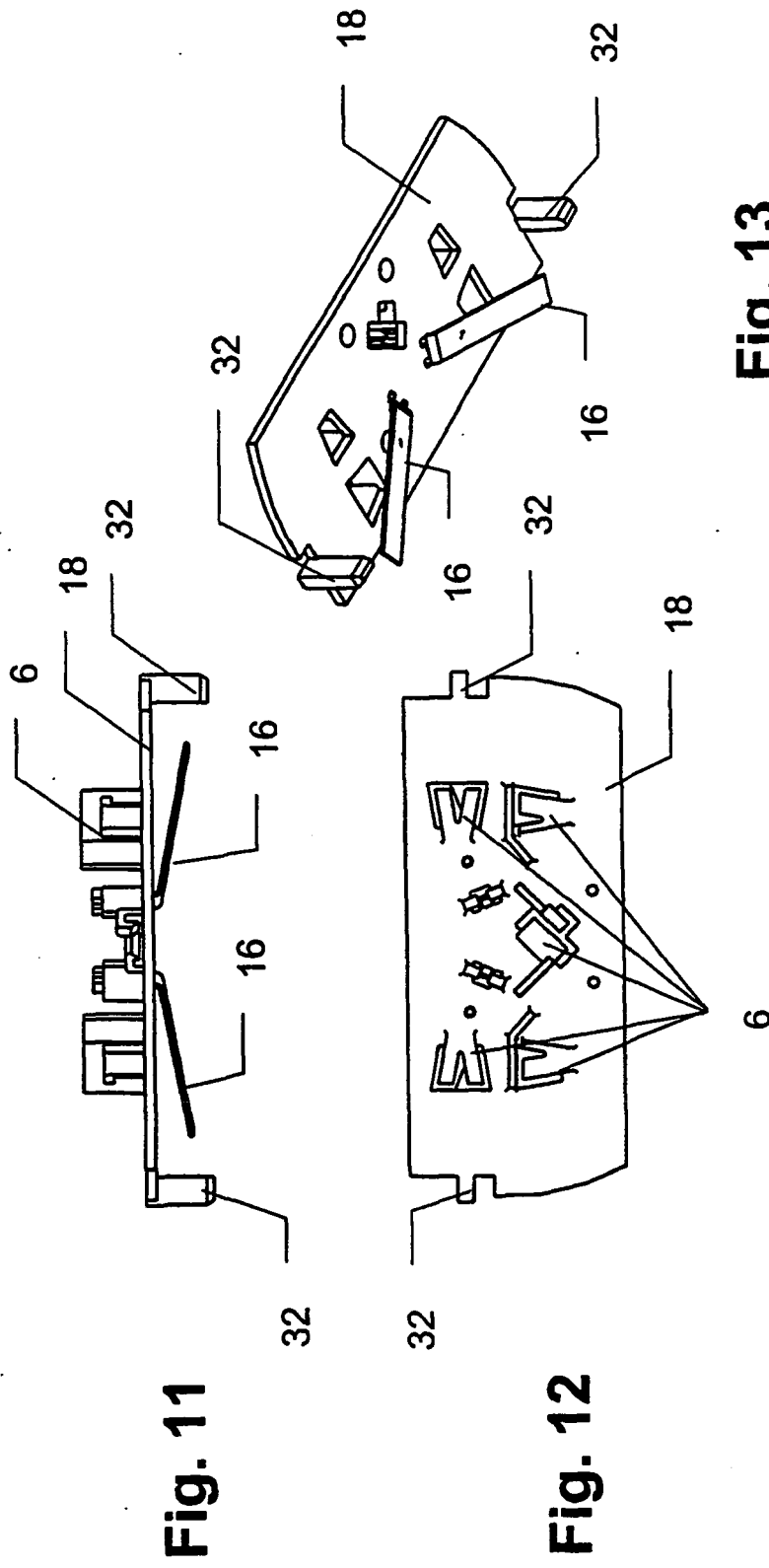


Fig. 10



REFERENCES CITED IN THE DESCRIPTION

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