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(54) **A LIQUID MOTION LAMP WITH ISOLATED HEATING DEVICE**

(57) A liquid motion lamp with isolated heating device has an isolated heating device (40) disposed inside a mounting seat (20), including a cement resistor (43) connecting to AC power supply (14) and a constant current driver (41). The cement resistor (43) would produce heat after being electrified and cause the flowing of the liquids (31) in the liquid motion lamp (30). The constant current driver (41) would convert the AC power into DC power for a LED bulb (44) to project lights on the liquid motion lamp (30). With the isolated circuits of lights and heat as a combined composite module (42A), the liquid motion lamp (30) has great efficiency by distributing the sources of lights and heat, saving the energy and prolonging the durability of the LED bulb (44).

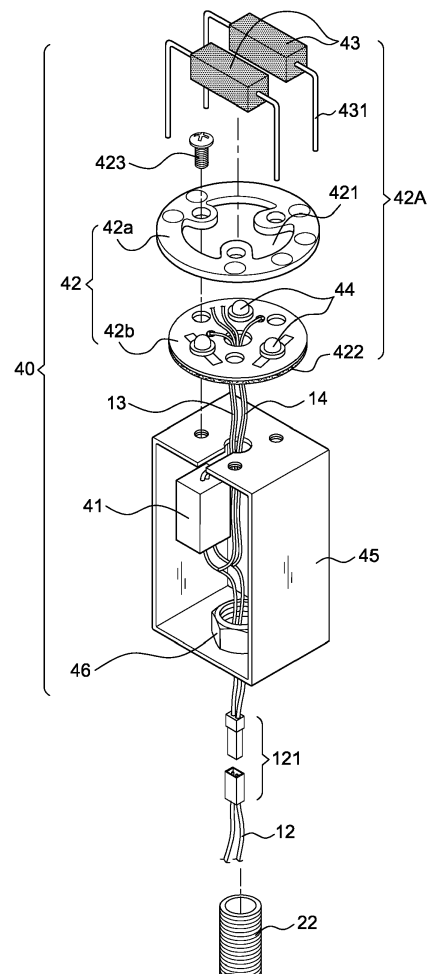


FIG.3

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] The present invention relates to a liquid motion lamp, particularly to one that has a LED bulb projecting lights and an isolated cement resistor to produce heat, forming the structure of a liquid motion lamp with isolated heating device.

2. Description of the Related Art:

[0002] Liquid motion lamps can cause the flowing of a first liquid substance inside by the heat produced by bulbs thereof; a second substance in the first liquid substance is therefore flowing as well. Besides, the random flowing and the lights projected from the bulbs create a splendid and magnificent visual effect. A liquid motion lamp has at least one bulb to provide the heat energy for the liquid and substances inside to flow around. However, the temperature of the bulb would rise increasingly with long-term usage. This may cause serious damages and harm to the users, and there is a problem of expenditure of bulbs as well. Such structure has been disclosed in US patent no. 3,570,156.

[0003] Liquid motion lamps have been a favorite choice for decorative fittings. Recently, operators started to put light bulbs on the lamps to expand a lighting function, and such application has grown favorable among the consumers. Nevertheless, the heat energy produced by the LED bulb is not enough to cause the flowing of the liquids in the liquid motion lamp. On the other hand, nowadays there are glitters put inside the liquid motion lamp together with the liquids to increase the visual effects. However, the glitters are prone to fade due to long-term soaking in high temperature and collision in the liquids; the ultraviolet lights emitted from a conventional light bulb would also cause the fading of the glitters and the visual effects lacks of richness either.

[0004] Therefore, the inventor has strived to achieve vivid visual effects with longer durability of the LED bulb in a liquid motion lamp. Moreover, a liquid motion lamp combined with lighting function would be a major breakthrough in the industry as well

SUMMARY OF THE INVENTION

[0005] A primary object of the present invention is to provide a liquid motion lamp with isolated heating device that has an isolated structure of a cement resistor from a light-projecting LED bulb thereof, in order to achieve great efficiency by separating the sources of lights and heat, featuring the present invention as energy-saving and prolonging the durability of the LED bulb thereof.

[0006] Another object of the present invention is to provide a liquid motion lamp with isolated heating device

that has isolated circuits arranged in a pre-determined distance to provide lights and heat energy separately in a single unit, prolonging the durability of the LED bulb thereof.

5 [0007] To achieve the objects mentioned above, the present invention is a liquid motion lamp with isolated heating device, comprising:

10 a base frame having an AC supply cord arranged through;
a mounting seat with a hollow section arranged therein disposed on the base frame;
a transparent bottle disposed on the mounting seat as a liquid motion lamp with liquids and a plurality of
15 glitters therein;
an isolated heating device disposed in the mounting seat, comprising a constant current driver, at least one substrate, a cement resistor, and a LED bulb;
20 the constant current driver including a rectifying circuit and a driving circuit with the front end thereof connected to the AC supply cord for converting AC power into DC power; the cement resistor being disposed on the substrate and connected to the AC power to produce heat for the liquid motion lamp; the
25 LED bulb being disposed on the substrate and connected to the constant current driver to obtain DC power and become the light source for the liquid motion lamp; the cement resistor being arranged in a pre-determined distance from the LED bulb so as to form an isolated heating device with an isolated circuit to be combined with a lighting circuit as a composite module;
30 whereby the cement resistor would produce heat when the AC supply cord is electrified, causing the flowing of the liquids in the liquid motion lamp, and the LED bulb would project lights when receiving the DC power and create a vivid visual effect when the lights are reflected by the plurality of glitters in the liquid motion lamp.

40 [0008] The substrate may further include a first substrate and a second substrate as the first substrate with a space in the middle being electrically connected to the AC power and having the cement resistor connected from above with a pair of connecting pins, and the second substrate having the LED bulb connected thereon and exposed in the space of the first substrate by combining from below, forming isolated circuits of lights and heat as a combined composite module with the cement resistor being arranged above the LED bulb in a pre-determined distance.

50 [0009] In addition, the present invention may further include a heat dissipating rack disposed in the mounting seat, and the composite module with isolated circuits is disposed on the heat dissipating rack; and the bottom of the composite module can be fixed on the heat dissipating rack with conducting adhesive.

[0010] Furthermore, the heat dissipating rack may be

a hollow case for the constant current driver to be disposed therein, and may further have a fixing tube connecting the bottom thereof with the lower end of the fixing tube fixedly penetrating through the base frame; the AC supply cord may be connected to the constant current driver and the first substrate by passing through the fixing tube from the base frame to the heat dissipating rack.

[0011] With structures disclosed above, the present invention has isolated circuits providing lights and heat energy - the cement resistor producing heat and the LED bulb providing lights; and the circuits are arranged separately in a pre-determined distance in one single unit, achieving features of space-saving and energy-saving with longer durability of the LED bulb and greater efficiency overall.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

FIG. 1 is an exploded view of the present invention in an applicable embodiment;

FIG. 2 is a perspective view of the present invention in an applicable embodiment;

FIG. 2A is a practical application view of the present invention in another applicable embodiment;

FIG. 3 is an exploded view of the isolated heating device of the present invention;

FIG. 4 is a perspective view of the isolated heating device thereof;

FIG. 5 is a partially enlarged sectional view of the present invention in a preferred embodiment; and

FIG. 6 is a circuit diagram of the constant current driver thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Referring to FIGS. 1-6, the structure of the present invention mainly comprises a base frame **10**, a mounting seat **20**, a liquid motion lamp **30** and an isolated heating device **40**.

[0014] The base frame **10** has an AC supply cord **12** arranged through. The mounting seat **20** is disposed on the base frame **10** with a hollow section **21** arranged therein and at least one heat dissipating hole **211** arranged on the periphery thereof. The liquid motion lamp **30** is a transparent bottle disposed on the mounting seat **20** with liquids **31** and a plurality of glitters **32** therein. The isolated heating device **40** is disposed in the hollow section **21** of the mounting seat **20** and comprises a constant current driver **41**, at least one substrate **42**, a ce-

ment resistor **43**, a LED bulb **44** and a heat dissipating rack **45**. The constant current driver **41** is connected to an AC power supply cord **12** for converting AC power into DC power supply **13**.

[0015] In this embodiment, the substrate **42** may include a first substrate **42a** and a second substrate **42b**. The first substrate **42a** is electrically connected to an AC power supply **14** and has a space **421** in the middle; the cement resistor **43** is connected to the first substrate **42a** with a pair of connecting pins **431** from above. The LED bulb **44** is disposed on the second substrate **42b** which combines with the first substrate **42a** from below, exposing itself in the space of the first substrate **42a**, thus forming a combined composite module **42A** with isolated circuits of lights and heat as the cement resistor **43**, the source of heat energy, being arranged above the LED bulb **44**, the source of lights, in a pre-determined distance.

[0016] In this embodiment, the heat dissipating rack **45** is disposed in the mounting seat **20** with the composite module **42A** with isolated circuits disposed thereon; and the bottom of the composite module **42A** can be fixed on the heat dissipating rack **45** with conducting adhesive **422**.

[0017] Furthermore, the heat dissipating rack **45** is a hollow case for the constant current driver **41** to be disposed therein, and the bottom thereof has a nut **46** connecting a fixing tube **22** with the lower end of the fixing tube **22** penetrating through the base frame **10** and being fixed on the base frame **10** by a nut **47**. The AC supply cord **12** is separately connected to the constant current driver **41** and the first substrate **42a** by passing through the fixing tube **22** from the base frame **10** to the heat dissipating rack **45**; and the first and second substrate **42a**, **42b** are fixed on the heat dissipating rack **45** by a screw **423**.

[0018] In an applicable embodiment, the present invention may include an assembling element **23** which has a hollow space **24** therein and an engaging section **25** at the lower end thereof, to fixedly engage in the hollow section **21** of the mounting seat **20** so that the assembling element **23** would be fixedly engaging the mounting seat **20**; and the liquid motion lamp **30** has an inserting section **33** to be inserted into the hollow space **24** in the assembling element **23** to fix the liquid motion lamp **30** on the assembling element **23**.

[0019] In an applicable embodiment illustrated in FIGS. 1 and 2, the present invention may further include a hollow supporting bracket **51** connecting the base frame **10** with the mounting seat **20** as the upper end thereof having an upper fixing seat **52** that has an engaging space **53** therein and is arranged in the same axis Y-Y of the mounting seat **20**, perpendicularly to the base frame **10**, for the inserting section **33** of the liquid motion lamp **30** to be inserted into the assembling element **23** and the top end **34** of the liquid motion lamp **30** to be perpendicularly fixed in the engaging space **53** of the upper fixing seat **52**. The liquid motion lamp **30** is there-

fore located vertically along the axis Y-Y. Since the upper fixing seat 52 has the engaging space 53 and the assembling element 23 has the engaging section 25, the liquid motion lamp 30 is able to displace together with the assembling element 23, making it easily engaged and disengaged. The present invention further includes a bulb holder 54 disposed on the upper fixing seat 52 connecting to the AC supply cord 12 through the hollow supporting bracket 51. FIG. 2 illustrates the present invention in an applicable embodiment, including a bulb 55 disposed in the bulb holder 54 and a lampshade 56 disposed above the bulb holder 54, so as to form a device combining the liquid motion lamp and a lighting bulb. Also, the present invention can be applied to pedant lamps as shown in FIG. 2A.

[0020] Further referring to FIGS. 3-5, the constant current driver 41 of the present invention has the front end thereof connected to the AC supply cord 12 with a connector 121, and the rear end thereof would output constant DC power supply 13 after conversion of the constant current driver 41. In this embodiment, there are two cement resistors 43. The connecting pins 431 are arranged in certain length, about 10 to 25 mm; when they are welded on the first substrate 42a and electrified by connection with the AC power supply 14, the cement resistors 43 would produce heat at high degree of temperature and become the heat source for the liquid motion lamp 30 due to the arrangement of the cement resistors 43 being disposed under the transparent bottle of the liquid motion lamp 30 in a short distance G for a few millimeters. With the distance from the first substrate 42a to the cement resistors 43, the first substrate 42a would not be affected by the heat. The LED bulb 44 is disposed on the second substrate 42b, fixed on the heat dissipating rack 45 by conducting adhesive 422 and connected to the constant current driver 41 providing constant DC power supply 13. When being electrified, the LED bulb 44 would project lights to the liquid motion lamp 30 and the heat produced by the LED bulb 44 would be dissipated by the heat dissipating rack 45. Thus, the structure of separated sources of lights and heat is completed.

[0021] Whereby the cement resistor 43 would produce heat when the AC supply cord 12 is electrified, causing the flowing of the liquids 31 in the liquid motion lamp 30, and the LED bulb 44 would project lights when receiving the DC power from the constant current driver 41 and create a vivid visual effect when the lights are reflected by the plurality of glitters 32 in the liquid motion lamp.

[0022] FIG. 6 is a circuit diagram of the constant current driver 41. The constant current driver 41 comprises a rectifying circuit 411 and a driving circuit 412. The rectifying circuit 411 has the AC supply cord 12 with 100-240V at the input terminal, rectifies the AC power and produces DC power, then convert the DC power into constant DC current by the driving circuit 412. The forward bias and the current of the DC power are in relation of index numbers; therefore, a small change in the voltages would hugely affect the currents and thus the lighting of the LED

bulb 44 that obtains power from the DC power. The LED bulb 44 may be permanently damaged with serious effects. The function of the driving circuit 412 is to convert the power supply into a specific voltages and ampere of currents for the LED bulb 44; consequently the output terminal of the driving circuit 412 is a constant current supply that can adjust the voltages with the LED bulb 44. The DC power supply 13 in the figure is the constant current supply for the LED bulb 44 to emit lights and project the lights to the liquid motion lamp 30.

[0023] Also, in this preferred embodiment, the present invention has the cement resistors 43 to produce heat. A cement resistor is formed by having a wire-wound resistor put inside a square case and filled with special cement with non-flammability and heat resistance. Such resistor has larger resistance that requires higher currents to pass through; therefore, as shown in the figure, the AC power supply 14 is directly connected to the AC supply cord 12. The rectifying circuit 411 includes a bridge rectifier D1 and related electrical components, and the driving circuit 412 includes a LED constant current IC U1 connected to related components. The LED constant current IC U1 has protection circuits for overload and over heat with a small volume, and therefore is suitable for the present invention. Such device is commonly seen in the markets and therefore is not the primary patented object.

[0024] The present invention applied the structure of separated circuits to the liquid motion lamp 30, avoiding the LED bulb 44 from the effects of the heat energy produced by the cement resistors 43 and ensuring longer durability of the LED bulb 44. Additionally, the present invention further has the engaging section 25 of the assembling element 23 and the engaging space 53 of the upper fixing seat 52 to make the transparent bottle of the liquid motion lamp 30 to be easily engaged and disengaged. Also, the liquid motion lamp 30 has the function of lighting as well with the combination with the bulb 55. Furthermore, the LED bulb 44 only needs a few watts to emit lights, and it does not emit ultraviolet lights, prolonging the fading of the glitters 32 in the transparent bottle; the LED bulb 44 can also change the color of the lights, providing a magnificent visual effects with the reflection in different colors.

[0025] With the structures disclosed above, the present invention has isolated circuits providing lights and heat energy - the cement resistor 43 producing heat and the LED bulb 44 providing lights; and the circuits are arranged separately in a pre-determined distance in one single unit, achieving features of space-saving and energy-saving with longer durability of the LED bulb 44 and greater efficiency overall.

[0026] Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A liquid motion lamp with isolated heating device, comprising:

a base frame (10) having an AC supply cord (12) arranged through;
 a mounting seat (20) with a hollow section (21) arranged therein disposed on the base frame (10);
 a transparent bottle disposed on the mounting seat (20) as a liquid motion lamp (30) with liquids (31) and a plurality of glitters (32) therein;
 an isolated heating device (40) disposed in the mounting seat (20), comprising a constant current driver (41), at least one substrate (42), a cement resistor (43), and a LED bulb (44); the constant current driver (41) including a rectifying circuit (411) and a driving circuit (412) with the front end thereof connected to the AC supply cord (12) for converting AC power into DC power; the cement resistor (43) being disposed on the substrate (42) and connected to the AC power to produce heat for the liquid motion lamp (30); the LED bulb (44) being disposed on the substrate (42) and connected to the constant current driver (41) to obtain DC power and become the light source for the liquid motion lamp (30); the cement resistor (43) being arranged in a pre-determined distance from the LED bulb (44) so as to form an isolated heating device (40) with an isolated circuit to be combined with a lighting circuit as a composite module (42A); whereby the cement resistor (43) would produce heat when the AC supply cord (12) is electrified, causing the flowing of the liquids (31) in the liquid motion lamp (30), and the LED bulb (44) would project lights when receiving the DC power and create a vivid visual effect when the lights are reflected by the plurality of glitters (32) in the liquid motion lamp (30).

2. The liquid motion lamp with isolated heating device as claimed in claim 1, wherein the substrate (42) includes a first substrate (42a) and a second substrate (42b) as the first substrate (42a) with a space (421) in the middle being electrically connected to the AC power and having the cement resistor (43) connected from above with a pair of connecting pins (431), and the second substrate (42b) having the LED bulb (44) connected thereon and exposed in the space (421) of the first substrate (42a) by combining from below, forming isolated circuits of lights and heat as a combined composite module (42A) with the cement resistor (43) being arranged above the LED bulb (44) in a pre-determined distance.

3. The liquid motion lamp with isolated heating device

as claimed in claim 2, wherein the present invention further includes a heat dissipating rack (45) disposed in the mounting seat (20), and the composite module (42A) with isolated circuits is disposed on the heat dissipating rack (45).

4. The liquid motion lamp with isolated heating device as claimed in claim 3, wherein the bottom of the composite module (42A) with isolated circuits has conducting adhesive (422) to be fixed on the heat dissipating rack (45).

5. The liquid motion lamp with isolated heating device as claimed in claim 4, wherein the heat dissipating rack (45) is a hollow case for the constant current driver (41) to be disposed therein.

6. The liquid motion lamp with isolated heating device as claimed in claim 5, wherein the heat dissipating rack (45) further has a fixing tube (22) connecting the bottom thereof with the lower end of the fixing tube (22) fixedly penetrating through the base frame (10).

7. The liquid motion lamp with isolated heating device as claimed in claim 6, wherein the AC supply cord (12) is connected to the constant current driver (41) and the first substrate (42a) by passing through the fixing tube (22) from the base frame (10) to the heat dissipating rack (45).

8. The liquid motion lamp with isolated heating device as claimed in claim 1, wherein the present invention further includes an assembling element (23) engaging between the liquid motion lamp (30) and the mounting seat (20) which has a hollow space (24) therein and an engaging section (25) at the lower end thereof to fixedly engage on the mounting seat (20) so that the assembling element (23) would be fixedly engaging the mounting seat (20); and the liquid motion lamp (30) has an inserting section (33) to be inserted into the hollow space (24) in the assembling element (23) to fix the liquid motion lamp (30) on the assembling element (23).

9. The liquid motion lamp with isolated heating device as claimed in claim 1, wherein the present invention further includes a hollow supporting bracket (51) connecting the base frame (10) with the mounting seat (20) as the upper end thereof having an upper fixing seat (52) that has an engaging space (53) therein and is arranged in the same axis of the mounting seat (20), perpendicularly to the base frame (10), for the top end of the liquid motion lamp (30) to be perpendicularly fixed in the engaging space (53) of the fixing seat (52).

10. The liquid motion lamp with isolated heating device

as claimed in claim 9, wherein the present invention further includes a bulb holder (54) disposed on the upper fixing seat (52) connecting to the AC supply cord (12) through the hollow supporting bracket (51).

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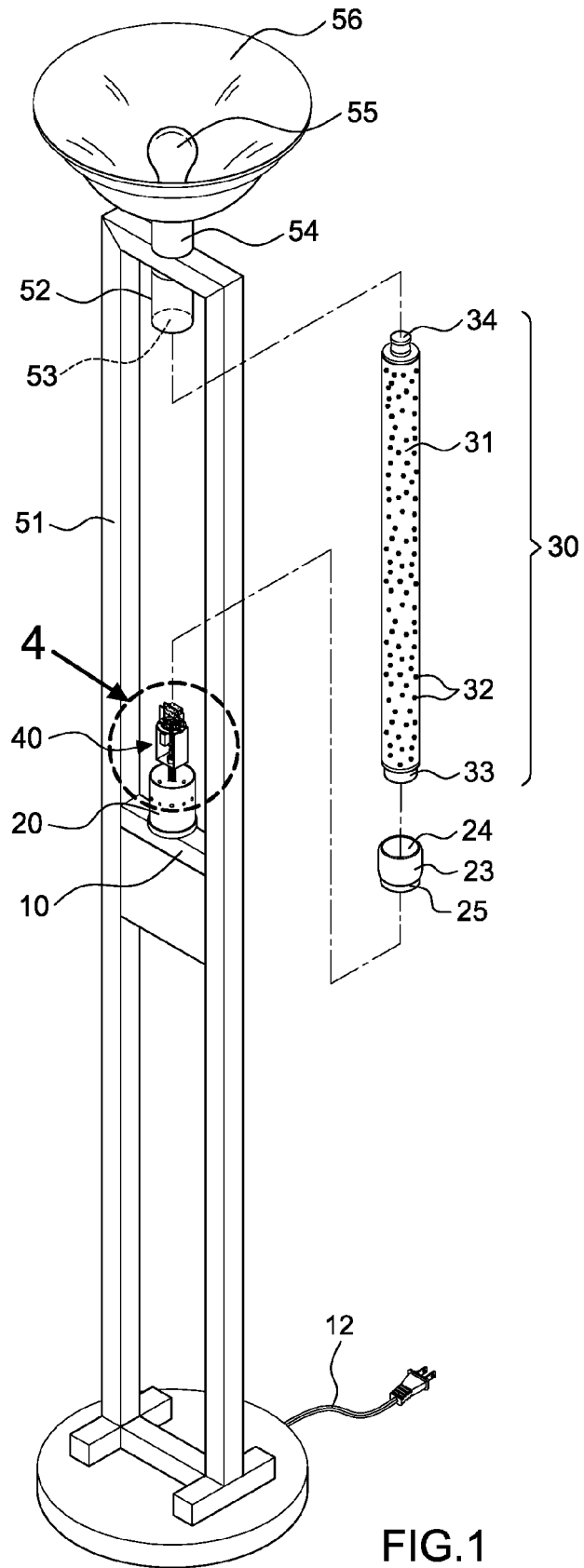
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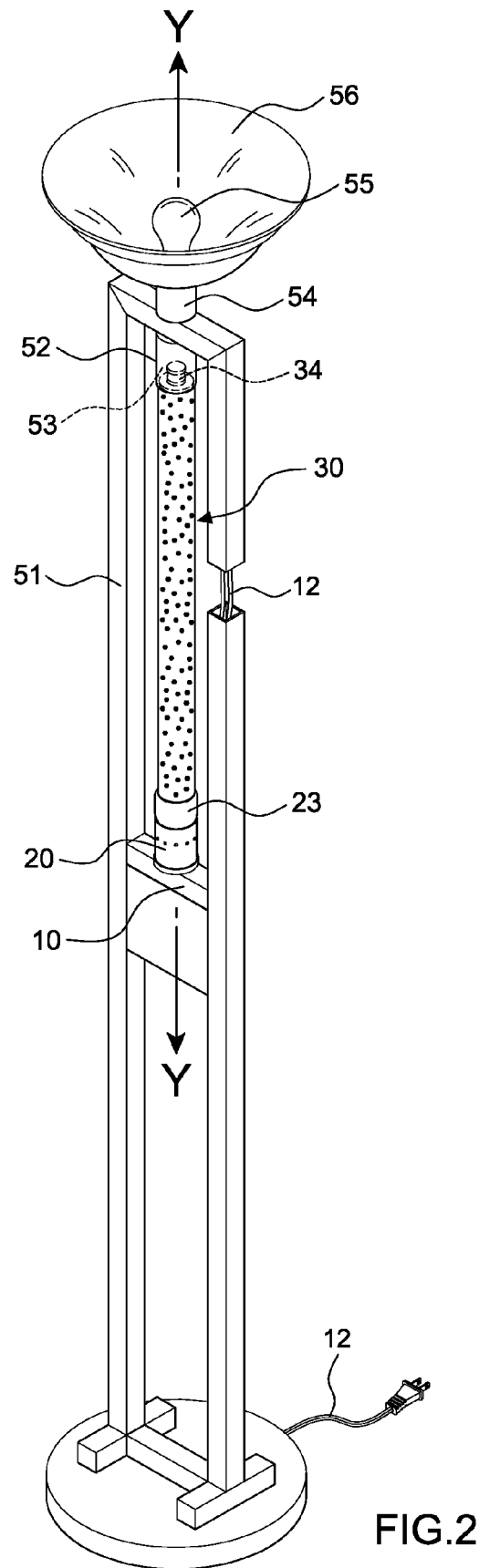
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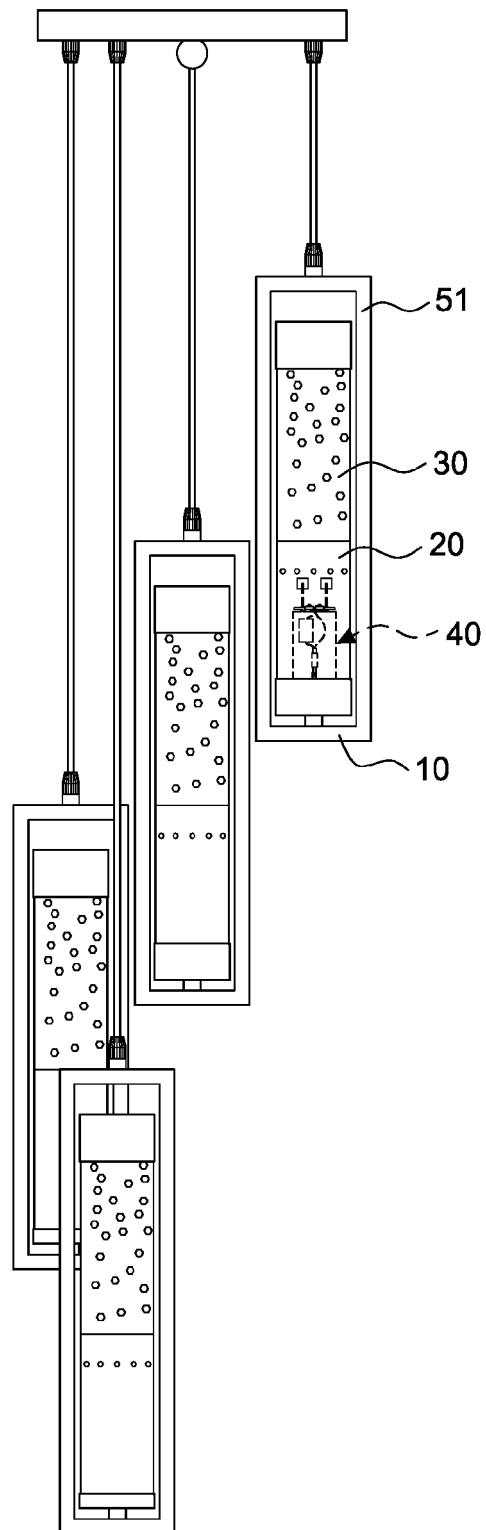


FIG.2A

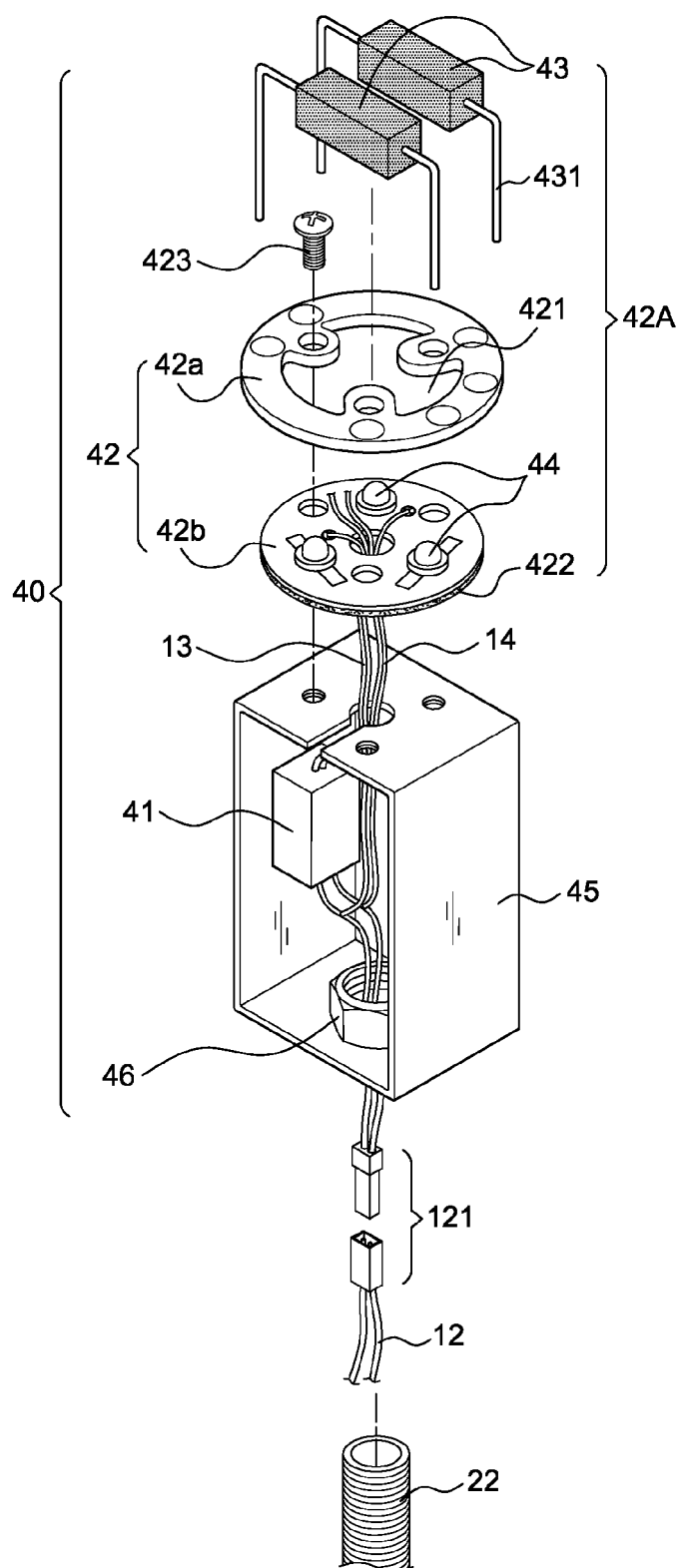


FIG.3

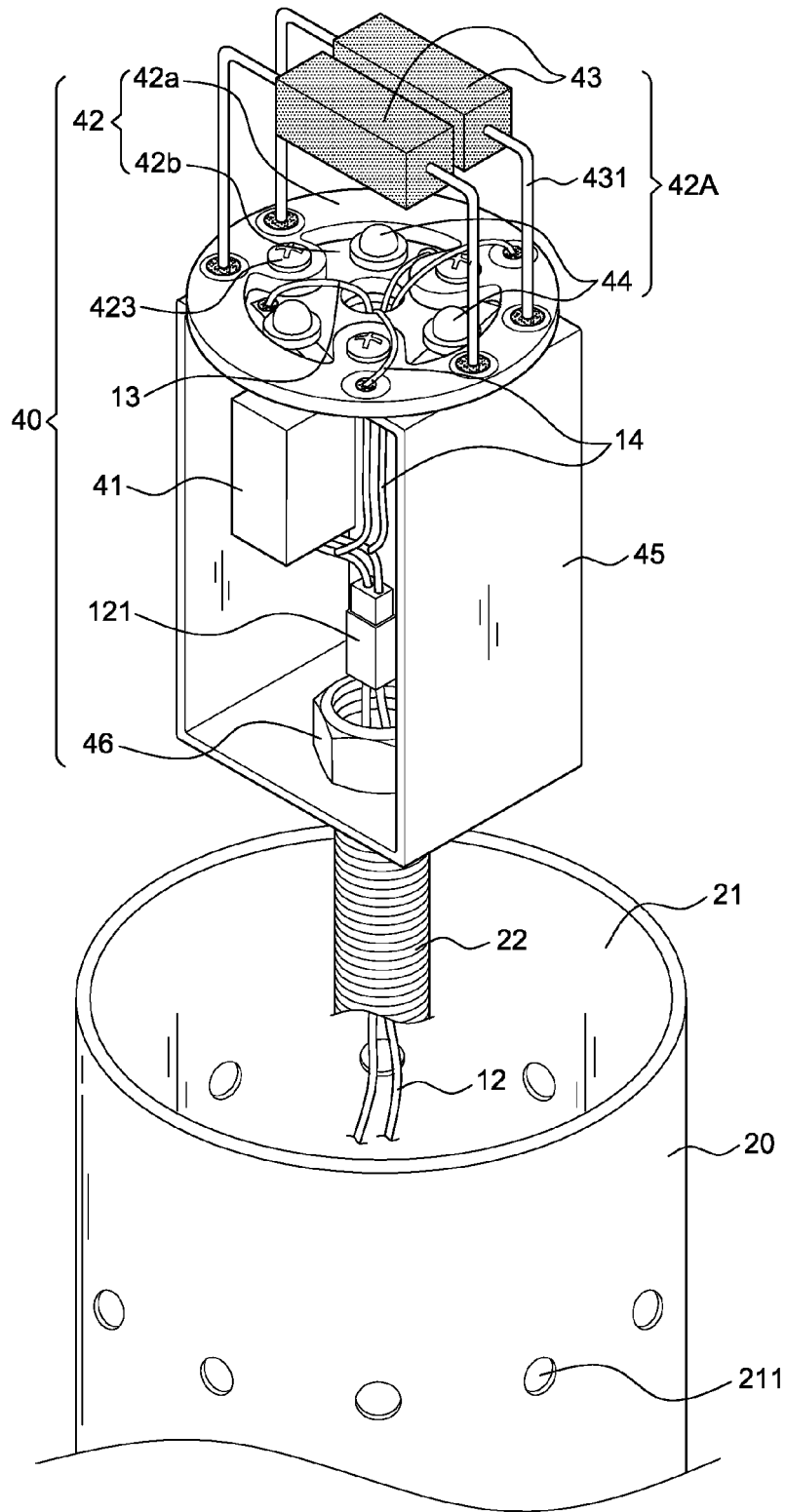


FIG.4

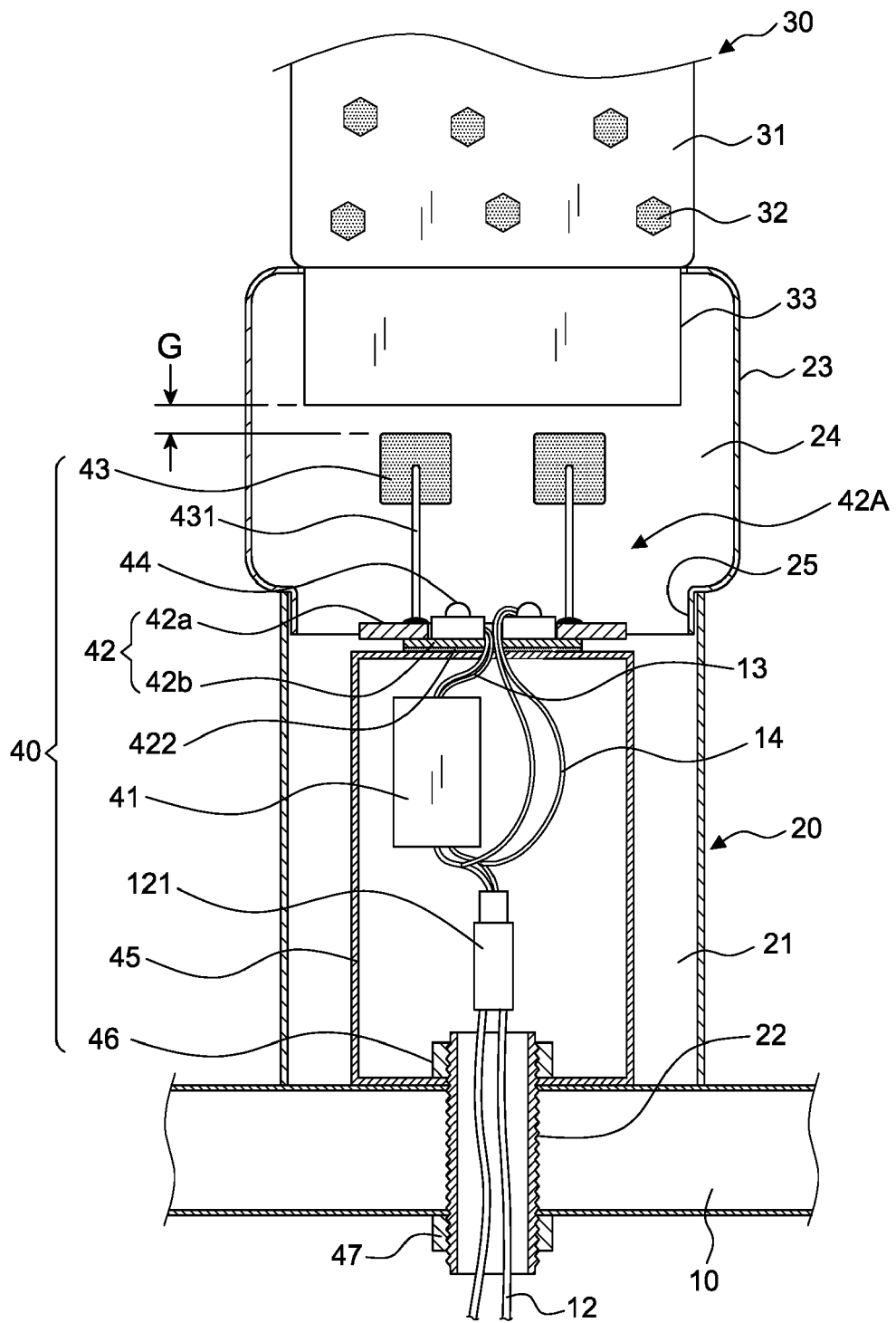


FIG.5

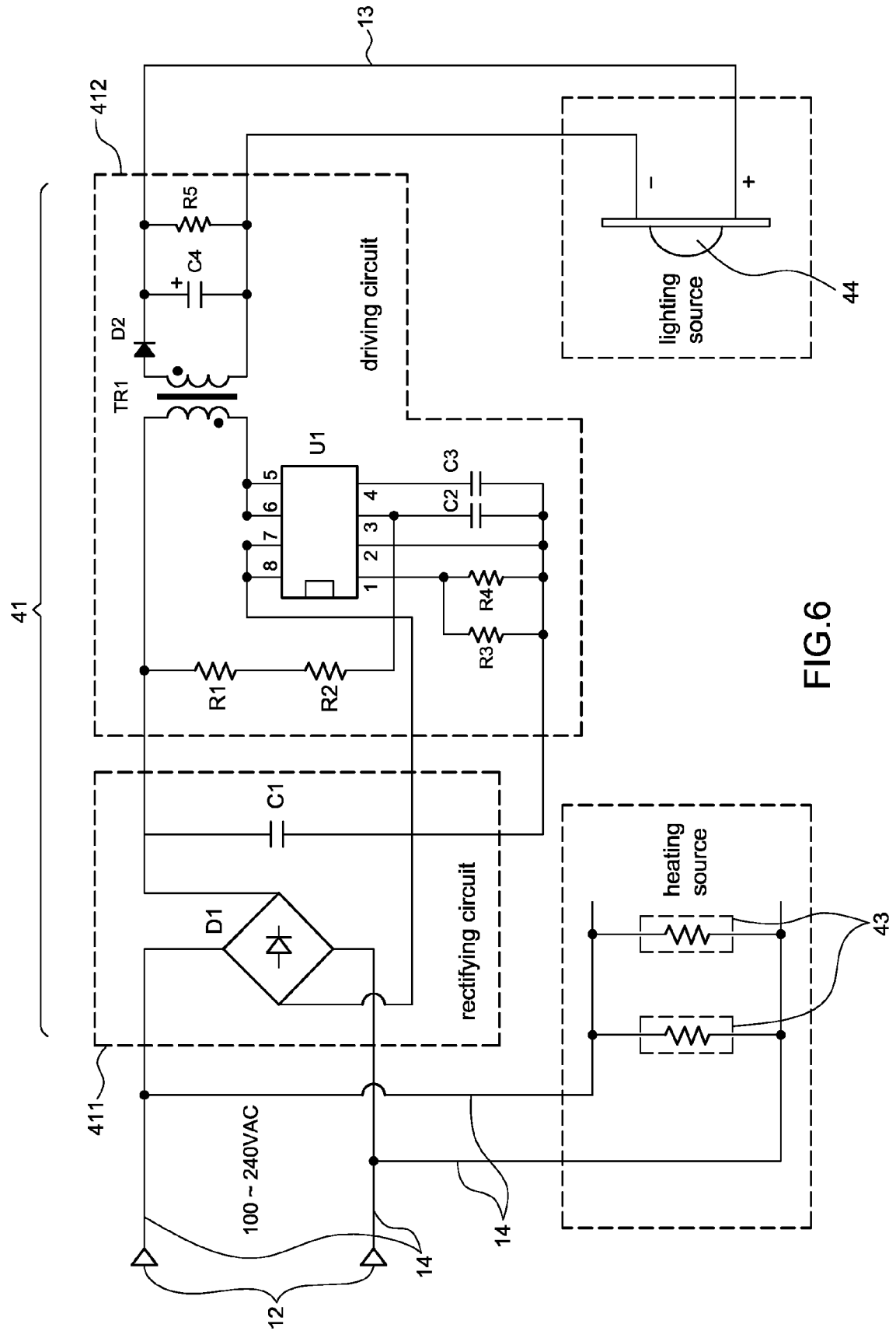


FIG.6



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 0272

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 399 446 A (HERBERT MARTIN [GB]) 15 September 2004 (2004-09-15) * figures 1,3 * * page 4, line 10 - line 15 * * page 6, line 6 - line 19 * * page 7, line 4 - line 18 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search The Hague		Date of completion of the search 24 March 2016	Examiner Dinkla, Remko
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 17 0272

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The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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