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(71) Applicant: **Gruppo Rostirolla S.r.l.**
31038 Padernello di Paese (TV) (IT)

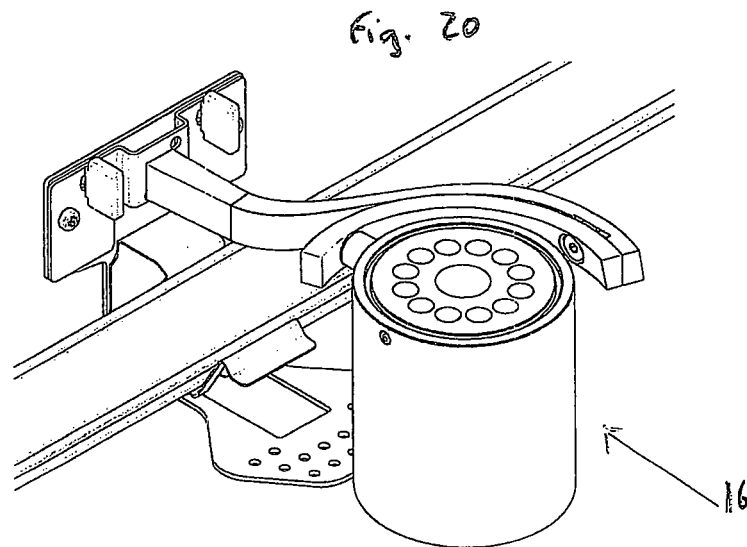
(72) Inventor: **Rostirolla, Raffaella**
31100 Treviso (IT)

(74) Representative: **Massa, Patrizia**
Studio Legale Massa
Rivale Filodrammatici, 1/A
31100 Treviso (IT)

(54) **RECESSED FLEXIBLE LIGHTING SYSTEM**

(57) This invention consists of a flexible recessed system integrated into the architecture, with direct and indirect asymmetrical diffused homogeneous lighting, which is particularly suitable for, and not limited to, indoor

environments, consisting of a double extruded silicone profile and a co-extruded profile that houses a LED lighting strip.



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Description

[0001] The object of this invention is a flexible recessed system for diffused, indirect, asymmetrical and direct, homogeneous lighting.

Field of application and state of the art

[0002] The field of application of this invention is the range of the technique of flexible lighting systems, preferably with LED.

[0003] Recessed lighting systems that can be installed in false ceilings, walls and wall linings, also for creative light decorations.

[0004] The LED or diode, which is well known in the electronic fixtures industry, currently has multiple applications also in the lighting sector.

[0005] The LED applied to the light is an innovative technology being developed to improve the light beam, efficiency and chromatic performance.

[0006] LED diffusion is mainly due to taking advantage of the principle of spontaneous emission of light (photons) of certain semi-conductors that avoid overheating materials such as metal and their alloys, which represents a pending problem in the field of application of the known technique of reference.

[0007] Still within the field of application of flexible lighting systems, there are also other well-known and different lighting systems. However, they are undoubtedly more elaborate and expensive, such as but not limited to, set-up and structured in bent and machined neon tubes (luminous signs) or, even less effective, silicone tubes with incandescent glow lights inside.

[0008] Compared to the latter lighting systems, there are multiple advantages with the optoelectronic device or LED or diode due to the variety of colour, lifespan, high energy efficiency of the source, with significant energy savings and, last but not least, more flexibility and adaptability to the architectural requirements of the user.

[0009] The popular uses of LEDs in the field of application of this innovation are in fact, many and the strip version in particular, which are light strips that integrate into the architecture, adapting to decorations of outdoor and indoor environments.

[0010] Besides the LED strips, LED recessed bars are also well-known in the state-of-the-art of reference, which, having a minimum aluminium thickness can be installed and embedded in the thickness of plasterboard and/or false ceiling.

[0011] The LED strips differ from bars for the type of support, which is made of flexible plastic in order to make the strips round and adaptable to surfaces where bars cannot be installed.

[0012] In fact, since LED strips have smaller sections, usually approximately 10 mm wide by maximum 3-4mm high, they are usually, and not limited to, applied in lighting coves, in indoor and outdoor decorations along the perimeter lines of steps and stairs.

[0013] Installing the LED strip in the said lighting cove or according to decoration requirements of the environment, even if installed professionally, has the disadvantage of not adapting to some shapes in particular, but not exclusively limited to radius and round curves.

[0014] Correct positioning of the LED strip eludes separation, albeit partially, of certain components or light sources, thus resulting in decreased intensity.

Disadvantages and problems regarding the known technique

[0015] In the technical industry of flexible lighting systems, in particular LED, the current state-of-the-art has a number of disadvantages and technical problems that the current patent intends to solve.

[0016] One of the main technical problems is represented by the fact that a person having special lighting requirements in architectural environments characterised by geometric and/or irregular and/or curved shapes makes it impossible to use LED strips and bars, thus having to resort to other lighting systems that are more expensive and much less durable than the energy efficiency of optoelectronic devices.

[0017] The greatest disadvantage in the state-of-the-art of reference of lighting strips or other lighting systems such as LED bars is their non-adaptability to certain geometric and irregular shapes, thus not allowing flexibility that is able to follow its perimeter lines.

[0018] Another problem with regard to the state-of-the-art of reference is that the structure of the LED strip and bar, meaning the alignment of the different optoelectronic components and/or devices along the line produces an effect of dotted light emission and, therefore, nonhomogeneous and not adequately diffused.

[0019] Another disadvantage of LED lighting systems made up of strips is that the user is unable to place other different light sources along the same line as the LED strip or bar since the relative supports are not suitable to house them.

[0020] Another pending problem is the impossibility to thoroughly clean the LED strip and bar lighting system, which results in subsequent deposits of atmospheric dusts and agents, which, overheating and burning result in deterioration of lighting efficiency on the line and their components and/or diodes.

[0021] An additional problem with regard to the state-of-the-art is undoubtedly the difficulty of installing and integrating the LED strips and bars in architectural lines, which require the user to use the utmost care and skill to prevent components from deterioration, reduction in lifespan, and decrease in light emission with inevitable aesthetic problems and energy consumption.

[0022] Lastly, another disadvantage with regard to the state-of-the-art of reference regarding this invention is the impossibility set by the application limits of LED strips and/or bars to design creative lighting designs.

Abstract of the invention

[0023] This invention consists of a flexible recessed system integrated into the architecture, with direct and indirect asymmetrical diffused homogeneous lighting, which is particularly suitable for, and not limited to, indoor environments, consisting of a double extruded silicone profile and a co-extruded profile that houses a LED lighting strip.

Purposes of the invention

[0024] The initial purpose of this invention was to provide a flexible system that could adapt and integrate into any architectural environment without any application limitations, in particular and not limited to a curved and round shape.

[0025] The purpose of this invention is to take advantage of the silicone's properties of being especially flexible, resistant to temperature and a perfect electrical isolator to prevent untimely faults and deterioration of the light beam of the LED strip.

[0026] An additional objective of this invention was to provide a particularly flexible LED lighting system that would, in addition to flexibility, offer indirect, asymmetrical diffused light that is not dotted like typical LED strips.

[0027] Another objective of this invention was to create a flexible LED lighting system that would enable additional direct light sources along the lighting line, even after installing the lighting system.

[0028] Furthermore, the objective of this invention is the position of the said direct light emitting projectors whose light intensity distribution enables most of the light beam to be directly on the interested area so that the lighting system has a higher coefficient of use, thus resulting in energy saving with no dispersion and meeting the user's needs.

[0029] As a result of its high IP protection degree, an additional objective of this invention was to create a flexible lighting system that would enable use in especially humid environments with vapours and aromas.

[0030] An additional objective of this invention was to create a flexible recessed lighting system that would prevent untimely deterioration of the light beam as a result of deposits of atmospheric dust that would alter lighting performance caused by the said dust burning on the surfaces.

[0031] Lastly, an objective of this invention was to facilitate integration of the lighting system into architectural shapes with quick coupling of brackets equipped with strip springs that host the extruded silicone component.

Drawings

[0032] The following drawings are shown for illustrative purposes, including but not limited to:

- figure 1, 2, 3 and 4: side and front layout views of a

shaped design of extruded silicone profiles of the flexible recessed lighting system for patent purposes;

- figure 5, 6, 7 and 8: side and front layout views of a shaped design of the recessed fastening system by means of spring brackets of the lighting system for patent purposes;
- figure 9, 10, 11, and 12: side and front layout views of a shaped design of brackets equipped with strip springs to secure the flexible recessed lighting system for patent purposes;
- figure 13, 14, 15, and 16: front and side layout view of the brackets to insert and position projectors along the lighting system line for patent purposes;
- figure 17, 18, 19 and 20: side and front layout view of a shaped design of the lighting system with insertion and positioning of projectors.

Description of the favourite design shapes

[0033] With special reference to all the figures included but not limited thereto, this patent concerns a flexible lighting system, preferably but not limited to, indoor environments with recessed application for quick coupling of bracket type installation equipped with a spring that is easily installed and removed by the user.

[0034] The invention has a double extruded silicone profile (fig. 1) and a co-extruded profile (fig. 2) where the LED lighting strip is housed (fig. 3).

[0035] A first extruded silicone profile and/or silicone compound with high IP protection (Fig. 1) with excellent resistance to high temperatures and humidity, preferably but not limited to, metallic grey suitable for housing a second opal silicone extruded profile as a result of the internal mould in its section (Fig. 4) to house a transparent co-extruded silicone profile onto which the LED strip is installed (Fig. 3) and is tilted by 30° to enable homogeneous, diffused lighting.

[0036] As a result of the special tilt of the opal silicone extruded profile, the lighting system of this invention enables indirect, diffused, homogeneous and asymmetrical lighting, which, with quick coupling of a recessed system (fig. 5) with brackets (fig. 6) equipped with strip springs (fig. 7) encase and host the silicone profile (fig. 8) by means of traction compression, thus locking it into the desired position and integrating with the architectural shape.

[0037] The flexible lighting system is equipped with brackets provided with strip springs (fig. 7) that facilitate recessed assembly, thus enabling it to adapt to any architectural shape, even if irregular, curved radius or round.

[0038] Another design shape of the lighting system provides, in addition to the fastening brackets (fig. 9, 10, 11 and 12), brackets for locking (fig. 13, 14, 15 and 16) and/or fastening as well as positioning along the line of indirect asymmetrical diffused light of extruded silicone profiles of one or more projectors (fig. 17, 18, 19 and 20)

with direct light that is easily positioned and removed by the user by means of the said brackets (fig. 13, 14, 15 and 16).

[0039] The lighting system of this invention enables positioning of projectors (Fig. 20) with direct light emission by means of dedicated brackets (Figures 13, 14, 15 and 16), which are easily positioned (fig 19) by the user (fig. 18), even after installing the lighting system in order to meet the environmental lighting requirements (Fig. 17).

[0040] The flexible recessed lighting system of this patent can be considered as a decorative element since it can take on irregular and non shapes without architectural application limits, it can be installed on the walls to create original decorative lighting fixtures.

[0041] The lighting system of this patent can be of any shape, even linear, or L-shaped, it can have mobile sections of flexible silicone, which obviously integrate into a single, totally movable body in order to have a circular or square or rectangular or even irregular shape and include, or otherwise, various direct light projectors.

[0042] The patent lighting system is designed according to what is described in the declaration of responsibility from no. 1 to no. 9.

7. Flexible recessed lighting system according to the above declarations and **characterised by** the fact that it enables positioning (14) of projectors (15) for direct light (16).

8. Flexible recessed lighting system with 30° tilting according to the above declarations and **characterised by** the fact that the quick couplings (17) enable homogeneous diffused lighting (18) as a result of the inclination.

9. Flexible recessed lighting system according to declarations 1, 2, 3, 4, 5, 6, 7 and 8 and **characterised by** the fact that it enables positioning of additional projectors (15) by means of locking brackets (19) along the flexible lighting line (20), even after installation.

Claims

1. A flexible recessed lighting system integrated in the architecture and comprising a double extruded silicone profile (1), **characterised by** the fact that it is embedded in the false ceiling with quick coupling devices (2) with brackets (3) equipped with strip springs (4) that contain it.
2. A flexible recessed lighting system according to declaration 1 comprising a first extruded silicone profile (5) **characterised by** the flexibility and adaptability of quick coupling (6) to architectural shapes.
3. Flexible lighting system according to declarations 1 and 2 comprising an extruded profile (7), preferably but not limited to metallic grey **characterised by** having a moulded section (8) (9) housing (10) a second extruded opal silicone profile (11).
4. Flexible recessed lighting system according to declarations 1, 2 and 3 comprising an opal silicone profile (11) for diffused and homogeneous light.
5. Flexible recessed lighting system according to declarations 1, 2, 3 and 4 comprising an opal silicone profile (11) **characterised by** the fact that it houses a transparent co-extruded silicone profile (12).
6. Flexible recessed lighting system according to the above declarations and **characterised by** the fact that it houses a light strip and/or LED strip (13).

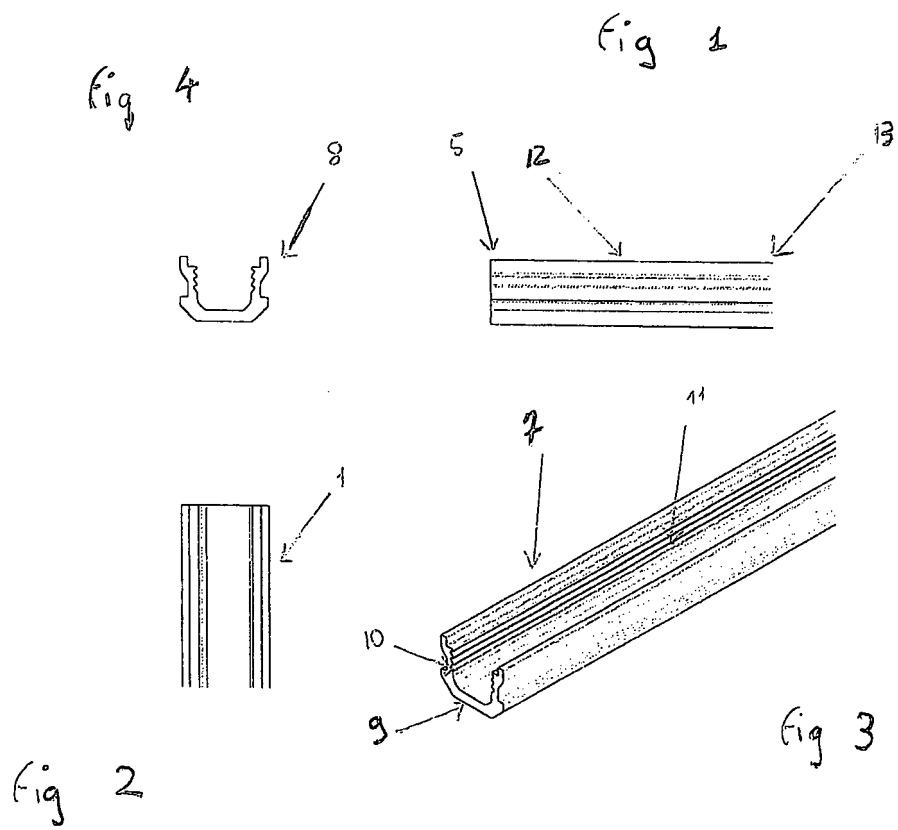


Fig 5

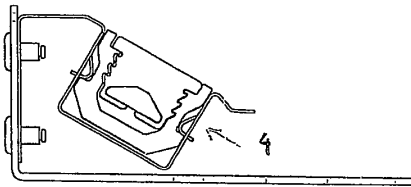


Fig 6

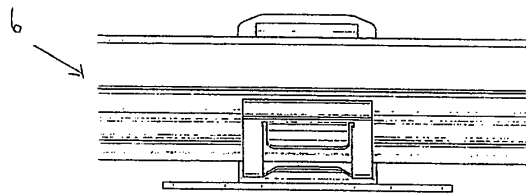


Fig 7

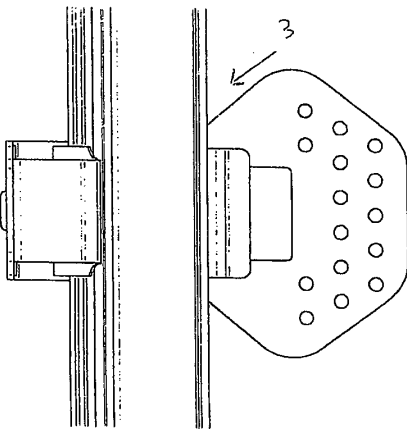


Fig 8

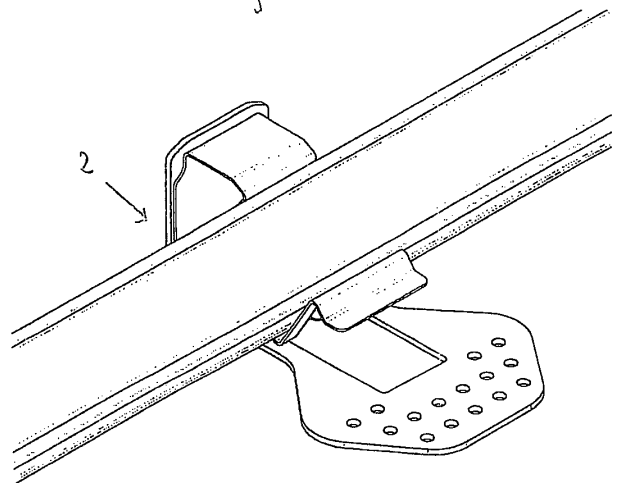


Fig. 9

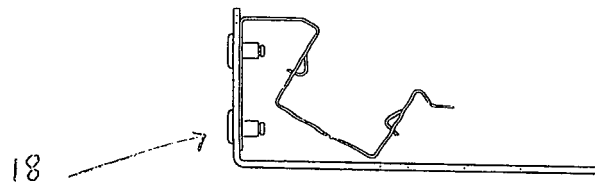


Fig. 10

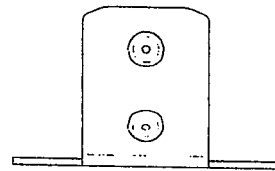


Fig. 11

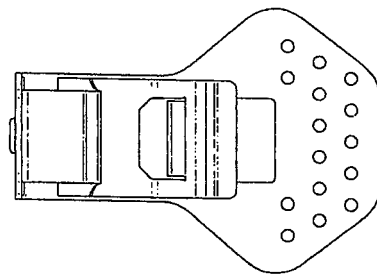


Fig. 12

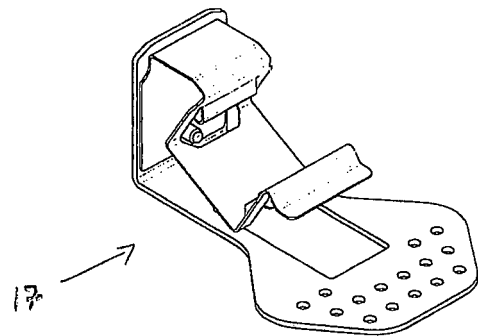


Fig. 13

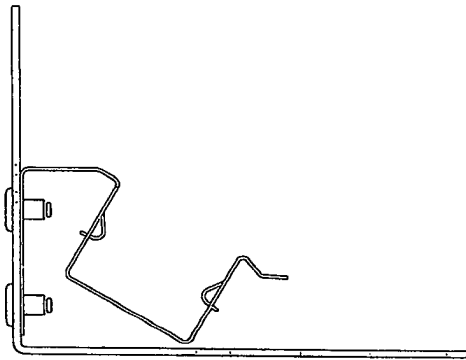


Fig. 14

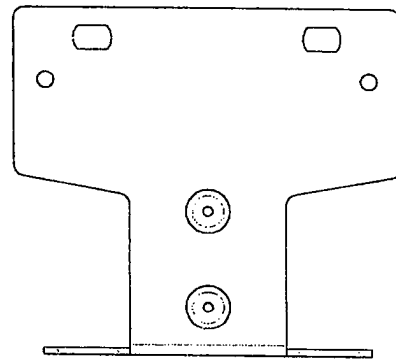


Fig. 15

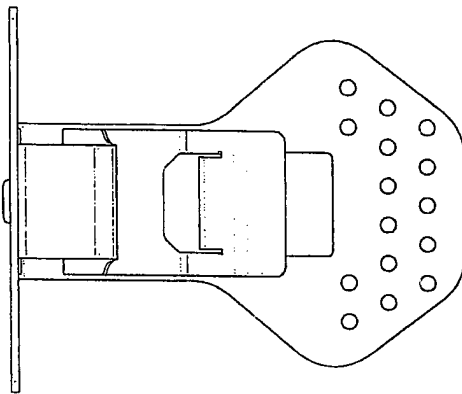


Fig. 16

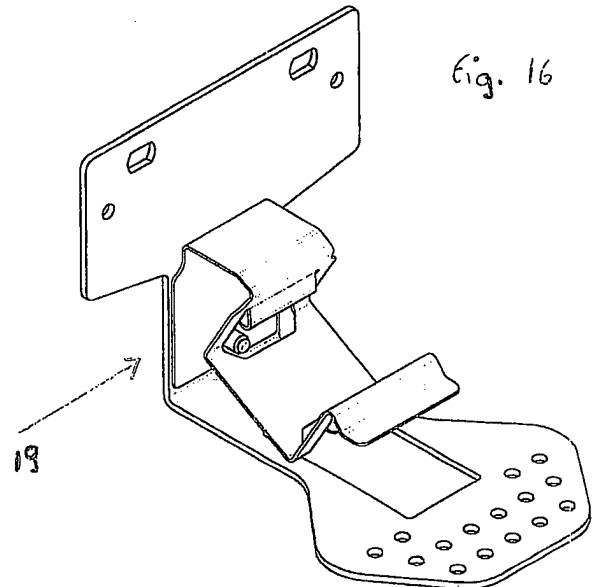


Fig. 17

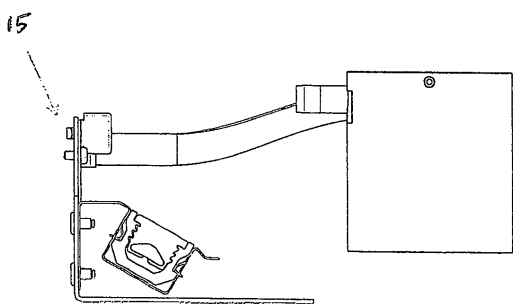


Fig. 18

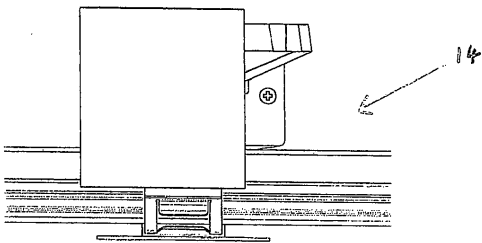


Fig. 19

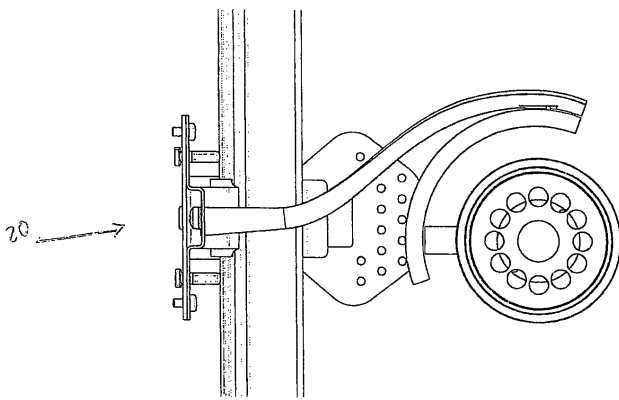
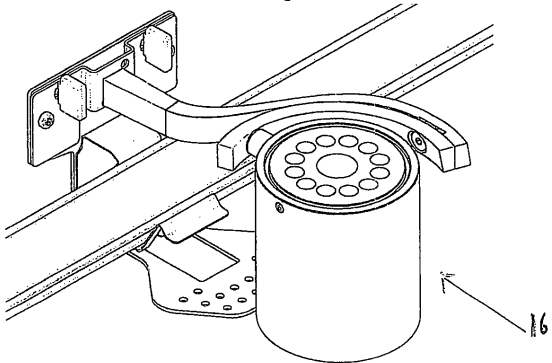


Fig. 20





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 Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 July 2017	Examiner Vida, Gyorgy
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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