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(71) Applicant: **Lumina Italia S.r.l.**
20010 Arluno (MI) (IT)

(72) Inventor: **Cimini, Ettore**
20010 Arluno (MI) (IT)

(74) Representative: **Concone, Emanuele**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

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(54) **Lighting system with flexible self-supporting structure**

(57) A lighting system (1) comprises a plurality of lighting bodies (10) provided with at least one light source (11) and arranged on a structure suitable for supporting and supplying power thereto which consists of a pair of elastically deformable metal strips (2, 3) suitable to form a flexible self-supporting structure, connected at their ends to two end boxes (4, 5) which in turn are pivotally mounted on respective bases (6, 7). Such a lighting sys-

tem retains the structural simplicity of known systems yet dispensing with the numerous supports of cable systems, with the relevant restraints, and without the rigid shape limitations of rail systems, and can be used as desk or floor lamp. In this way, the user can form a lighting system with great freedom of shape, easy mounting and modification, and possibility of complicated paths that can not be obtained with prior art lighting systems.

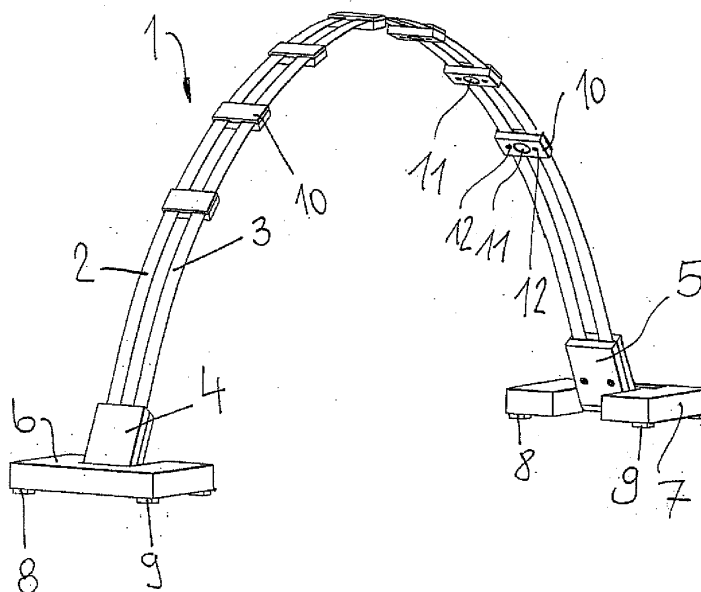


Fig.2

Description

[0001] The present invention relates to lighting systems, and in particular to a lighting system comprising a structure consisting of one or more flexible self-supporting members for the support of and possibly also the power supply to lighting bodies arranged along said structure.

[0002] The state of the art includes lighting systems provided with two metal cables arranged side by side and operatively connected to a device that supplies a low-voltage current, typically a direct current between 12V and 48V. Said metal cables act therefore as conductors that provide both support and power supply to lighting bodies arranged along the cables at positions freely chosen by the user.

[0003] Considering the flexible structure of the conductors used, which are in the form of non-self-supporting metal cables, there are limits to the geometric arrangement in space of the whole lighting system. In fact, the conductors thus made are mounted with the aid of intermediate and end supports, fixed to a ceiling or a wall, which have to support the cables and therefore define and limit their path in space.

[0004] As a consequence, the shapes that such lighting systems can take are in practice only sequences of straight portions between the supports, and their mounting is possible only where a suitable surface for fixing the supports is available. Moreover, it is clear that fixing the supports requires a significant labour and restrains the position of the lighting system that can not be easily changed but rather only within precise limits and with a certain difficulty.

[0005] Similarly, there are known lighting systems that use as conductors rigid and straight rails that, since they can also be cantilever-mounted, require less supports and can be joined through 45°, 90° or 18° connectors. However, due to their rigidity, such systems greatly limit the possibilities of choice by the user and only allow to make lighting systems that consist of sequences of straight portions of preset length. Furthermore, also the rail systems have the same mounting and modification problems of the cable systems, though to a lesser extent since they require less supports.

[0006] Therefore the object of the present invention is to provide a lighting system which overcomes the above-mentioned drawbacks. This object is achieved by means of a lighting system in which the structure for supporting the lighting bodies and supplying power thereto includes one or more elastically deformable members that are suitable to form a self-supporting structure. Other advantageous features of the present lighting system are disclosed in the dependent claims.

[0007] The main advantage of the present lighting system is that of retaining the structural simplicity of known systems yet dispensing with the numerous supports of cable systems, with the relevant restraints, and without the rigid shape limitations of rail systems. In this way, the

user can form a lighting system with great freedom of shape, easy mounting and modification, and possibility of complicated paths (e.g. volutes) that can not be obtained with prior art systems.

[0008] Another significant advantage of this lighting system is that it can easily be made also as desk or floor lamp, possibly converting it from one type to the other (desk, floor, wall, ceiling) according to the user's needs.

[0009] These and other advantages and characteristics of the lighting system according to the present invention will be clear to those skilled in the art from the following detailed description of some embodiments thereof, with reference to the annexed drawings wherein:

Fig.1 is a top perspective view of a lighting system according to the present invention;

Fig.2 is a front perspective view of the lighting system of Fig.1;

Fig.3 is a top plan view of the lighting system of Fig.1;

Fig.4 is a side view of the lighting system of Fig.1;

Fig.5 is a perspective view of an enlarged detail of the lighting system of Fig.1, specifically an end box that houses the power supply groups;

Fig.6 is a diagrammatic view showing how two parallel metal members can provide the supply to the lighting bodies, with the relevant electric wires;

Fig.7 is a front view showing the lighting system used as desk lamp;

Figs.8 and 9 are front views showing the lighting system used as floor lamp;

Figs.10, 11 and 12 are front views showing the lighting system used as ceiling or wall lamp;

Fig.13 is a front view showing a lighting system comprising a support structure for the lighting bodies made up of multiple deformable members that are connected in series; and

Fig.14 is a perspective view showing a lighting system arranged with a volute-shaped path in space.

[0010] As shown in figures 1 to 4, a first embodiment of a lighting system according to the present invention, globally referred to as 1, includes a flexible self-supporting structure consisting of two parallel members 2, 3 that are elastically deformable and are preferably made from a metal suitable to conduct a low-voltage direct current, between 12V and 48V, for example two strips of rolled harmonic steel having a rectangular cross-section of 16÷20 mm x 0,6÷1 mm.

[0011] Specific reference will be made in the following to a pair of strips of rectangular cross-section, yet it is clear that what is being said is applicable to any pair of parallel members having a cross-section of any shape, even different from one member to the other, as long as said members are elastically deformable and suitable to form a self supporting structure.

[0012] Strips 2, 3 are connected at their ends to two end boxes 4, 5 which in turn are pivotally mounted on respective bases 6, 7 as it will be described in greater

detail further on.

[0013] Bases 6, 7 can act as support means on flat surfaces, to use the lighting system as desk and/or floor lamp, or they can act as mounting means on walls and ceilings, possibly through magnetic coupling if the bases contain magnets for the mounting on ferromagnetic surfaces. In case of support on flat surfaces, bases 6, 7 have feet 8, 9 advantageously made from a suitable elastic material,

[0014] Lighting bodies 10 are mounted, preferably in a slidable manner, on the parallel strips 2 and 3, each lighting body 10 comprising at least one light source 11 as well as locking means, preferably screws 12, suitable to perform the locking thereof at the desired position with respect to the parallel strips 2, 3.

[0015] Fig.5 illustrates an end box 4, 5 that houses within the electric means used to supply the low-voltage direct current to strips 2, 3. In order to allow the end box 4, 5 to pivot with respect to base 6 or 7 there is provided a through hole 13, close to the distal end, through which there is passed a pin connecting it to base 6 or 7.

[0016] As diagrammatically shown in Fig.6, inside boxes 4, 5 there are provided electric connection means to supply to strips 2, 3 the low-voltage current coming from transformers, possibly arranged in bases 6, 7 or in the same boxes 4, 5. Said connection means include conductor wires 14 and 15, supplying a direct current indicated by the symbols +/-, electrically connected to strips 2, 3 through end terminals 16, 17 that at the end opposite the supply end are connected through a wire 18 to close the circuit.

[0017] From Figs.7-9 one can see how a lighting system 1 according to the present invention can be used as desk lamp if both bases rest on a desk T (Fig.7), or a floor lamp with one base resting on a floor P and the other base on a desk T, with different shapes depending on the relative position of the ends thereof (Figs.8-9). Obviously the two bases can rest both on floor P, or one base on floor P and the other base on a wall or ceiling, and in any case they can be arranged such that the light sources included in the lighting bodies 10 are oriented towards the concave side or the convex side of the flexible structure.

[0018] Similarly, from Figs.10-12 one can see how a lighting system 1 according to the present invention can be used as ceiling lamp (Fig.10) or wall lamp (Fig.11), possibly mounting it even around a corner (Fig.12) or between a wall and the ceiling. Obviously also in this case the two bases can be arranged such that the light sources included in the lighting bodies 10 are oriented towards the concave side or the convex side of the flexible structure, so as to achieve a direct or indirect lighting.

[0019] From the preceding figures it is clear that thanks to the elasticity of the parallel strips 2, 3 used to form the flexible self-supporting structure of the lighting system 1, the user has the possibility of arranging the strips in space with practically any desired shape or path.

[0020] Fig.13 illustrates a lighting system made up of

a plurality of systems 1, sharing a single pair of bases 6 and 7, which are mechanically and electrically connected at the free ends of strips 2, 3 through intermediate connection boxes 30. It should be noted that in this way there are no limits to the length of the lighting system, and the individual systems 1 making it up can be arranged with the light sources oriented in alternate directions, thus widely increasing the field of use of the resulting lighting system. Finally, Fig.14 shows how strips 2, 3 can extend in space in bends and volutes.

[0021] It is clear that the above-described and illustrated embodiments of the lighting system according to the invention are just examples susceptible of various modifications. In particular, the lighting bodies 10 may have different shapes and be locked along strips 2, 3 through other means different from screws 12 (e.g. clips, cams, etc.), each lighting body 10 may include two or more light sources 11 possibly arranged on multiple sides of body 10, and the connection between the end boxes 4, 5 and bases 6, 7 may be achieved through members more sophisticated than the simple pin passing through hole 13 (e.g. spherical joints) to have greater orientability.

[0022] Other embodiments, not shown in the drawings, may include even a single elastically deformable member, for example only strip 2 or a coil spring, whenever it is sufficient to form a self-supporting structure. In this case the power supply to the lighting bodies 10 can be provided by the single deformable member, if electrically conductive, in combination with an electric wire passing through the lighting bodies 10, or by two electric wires passing through the lighting bodies 10.

[0023] In this latter case, the supporting function is completely separate from the function of supplying power to the lighting bodies 10, whereby the single deformable member may even be made from a non-electrically conductive material, typically a plastic material. It should be noted that this is possible also in the case of two deformable members, when it is preferred to keep separate the supporting and power supplying functions.

[0024] In these embodiments with two electric wires, the latter can even be secured on or integrated into the one or more deformable members, and by using insulated wires it is possible to opt for a 220V AC supply so as to dispense with the transformer.

Claims

1. Lighting system comprising a plurality of lighting bodies (10) provided with at least one light source (11) and arranged on a structure suitable for supporting said lighting bodies (10) and supplying power thereto, **characterized in that** said structure includes one or more elastically deformable members suitable to form a flexible self supporting structure, as well as means for supplying power to the lighting bodies (10).

2. Lighting system according to claim 1, **characterized in that** said one or more elastically deformable members are made from an electrically conductive material and form at least partially said means for supplying power to the lighting bodies (10). 5
3. Lighting system according to claim 1 or 2, **characterized in that** said structure suitable for supporting and supplying power includes two elastically deformable parallel members. 10
4. Lighting system according to claim 3, **characterized in that** said deformable members are two metal strips (2, 3). 15
5. Lighting system according to claim 4, **characterized in that** said metal strips (2, 3) are two strips of rolled harmonic steel, preferably having a rectangular cross-section of $16 \div 20$ mm x $0,6 \div 1$ mm. 20
6. Lighting system according to any of the preceding claims, **characterized in that** said one or more deformable members are connected at their ends to two end boxes (4, 5) which in turn are pivotally mounted on respective bases (6, 7). 25
7. Lighting system according to the preceding claim, **characterized in that** said bases (6, 7) are suitable to act as support means and/or mounting means on walls or ceilings. 30
8. Lighting system according to claim 6 or 7, **characterized in that** the bases (6, 7) include magnets.
9. Lighting system according to one of claims 6 to 8, **characterized in that** at least one of the bases (6, 7) and/or of the end boxes (4, 5) includes electrical connection means to supply a low-voltage direct current to the one or more deformable members. 35 40
10. Lighting system according to the preceding claim, **characterized in that** at least one of the bases (6, 7) and/or of the end boxes (4, 5) includes a transformer suitable to supply a low-voltage direct current. 45
11. Lighting system according to any of the preceding claims, **characterized in that** the lighting bodies (10) are slidable along the deformable members (2, 3) and are provided with means for their locking at the desired position, said locking means being preferably screws (12). 50
12. Lighting system according to any of the preceding claims, **characterized in that** the structure suitable for supporting and supplying power consists of a plurality of deformable members mechanically and possibly also electrically connected in series through intermediate connection boxes (30). 55
13. Lighting system according to any of the preceding claims, **characterized in that** the structure suitable for supporting and supplying power includes one or more electric wires as means for supplying power to the lighting bodies (10).
14. Lighting system according to the preceding claim, **characterized in that** said one or more electric wires are secured on or integrated into the one or more deformable members.
15. Lighting system according to claim 13 or 14, **characterized in that** said electric wires are at least two insulated wires suitable to supply a 220V alternating current.

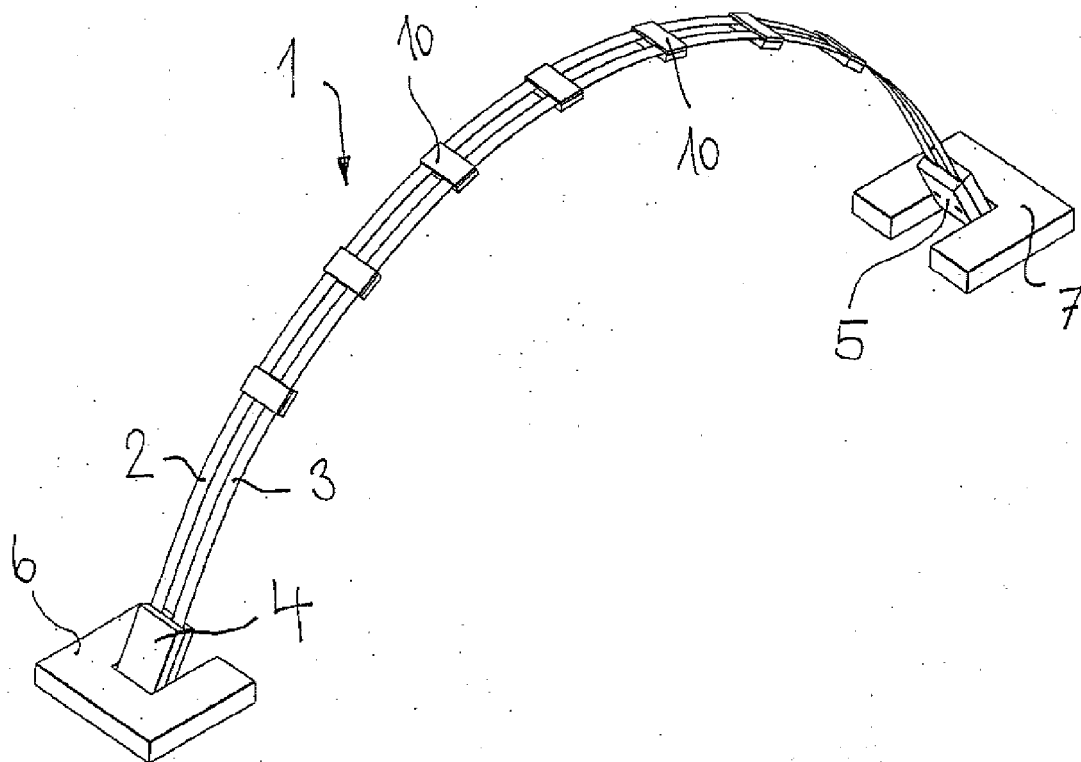


Fig.1

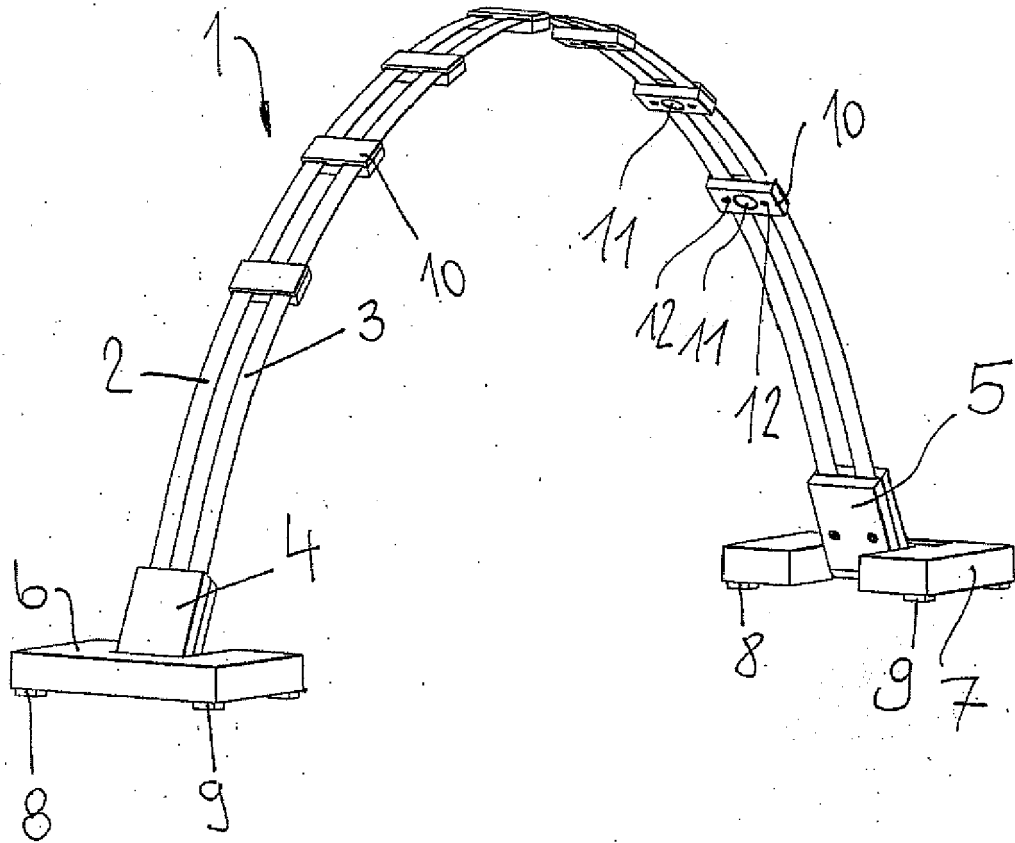


Fig.2

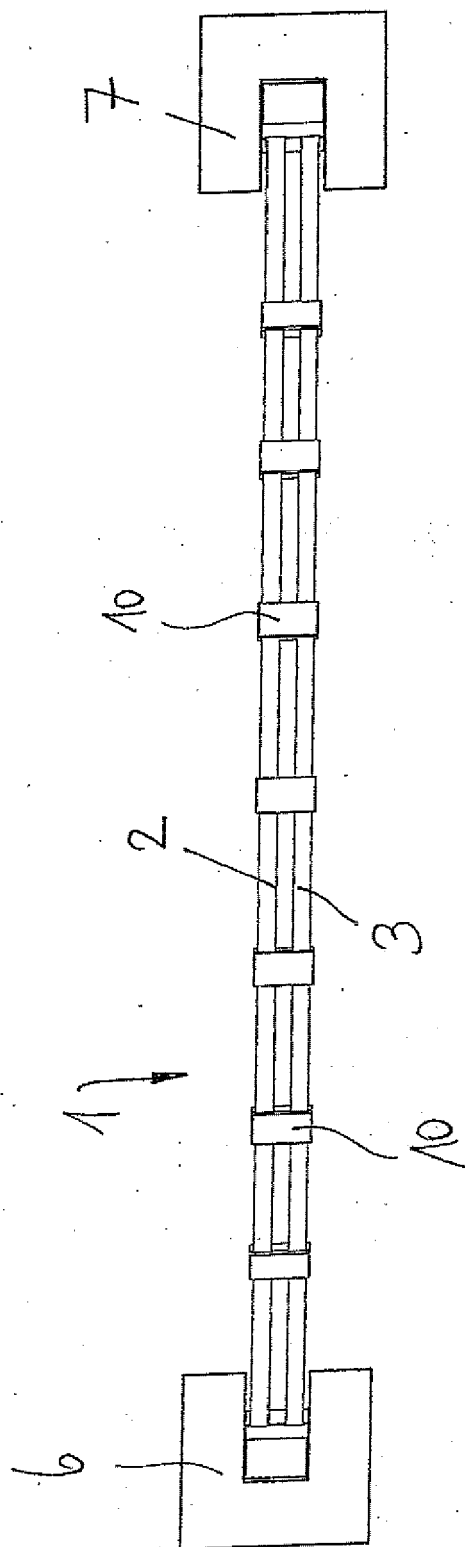


Fig. 3

Fig.4

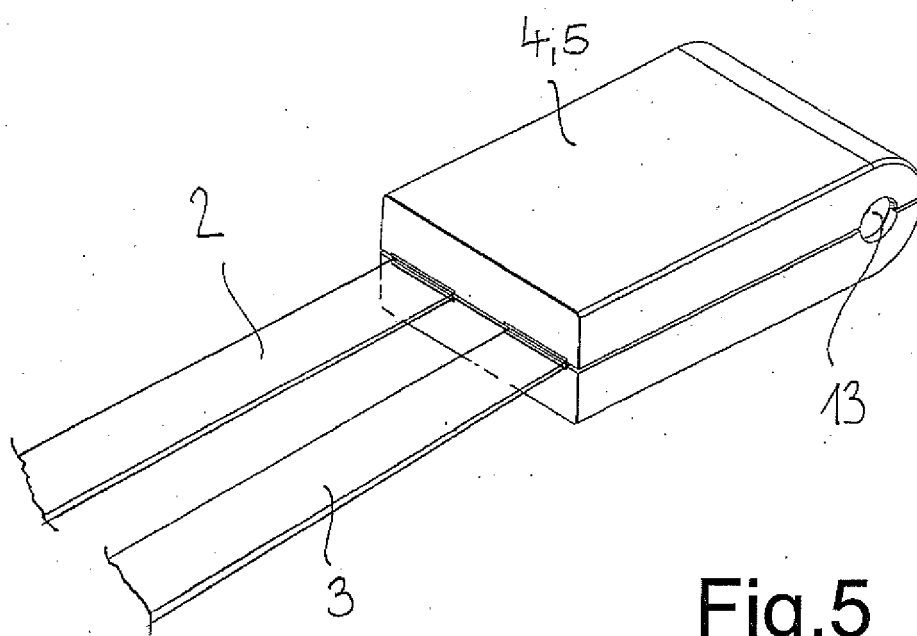
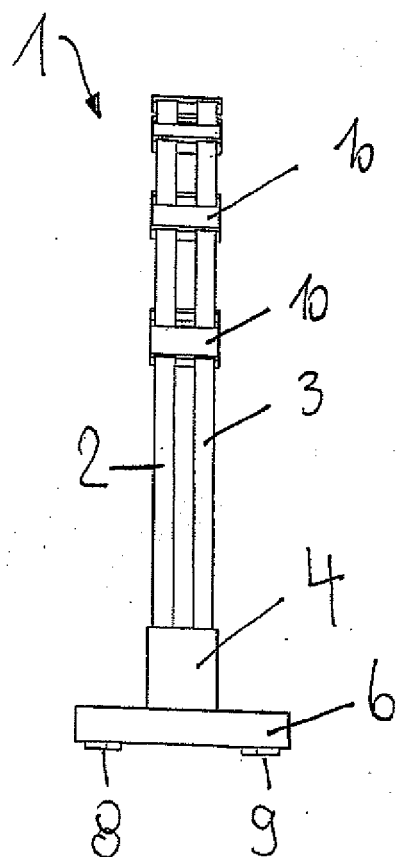


Fig.5

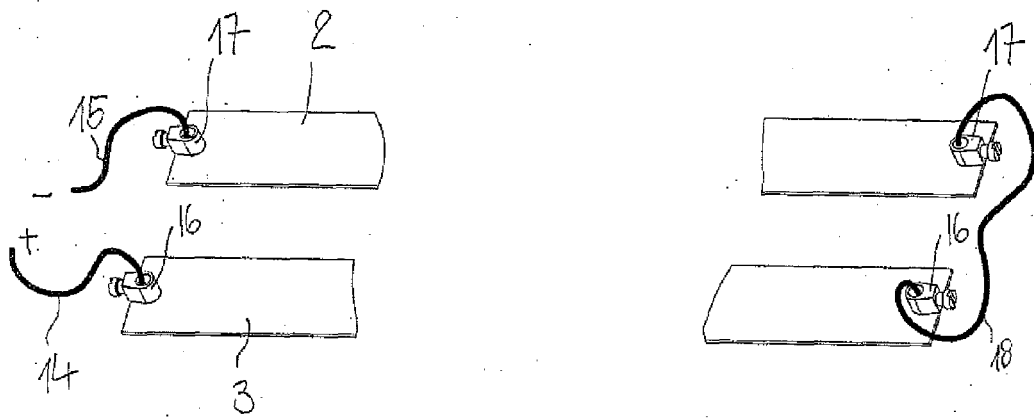


Fig.6

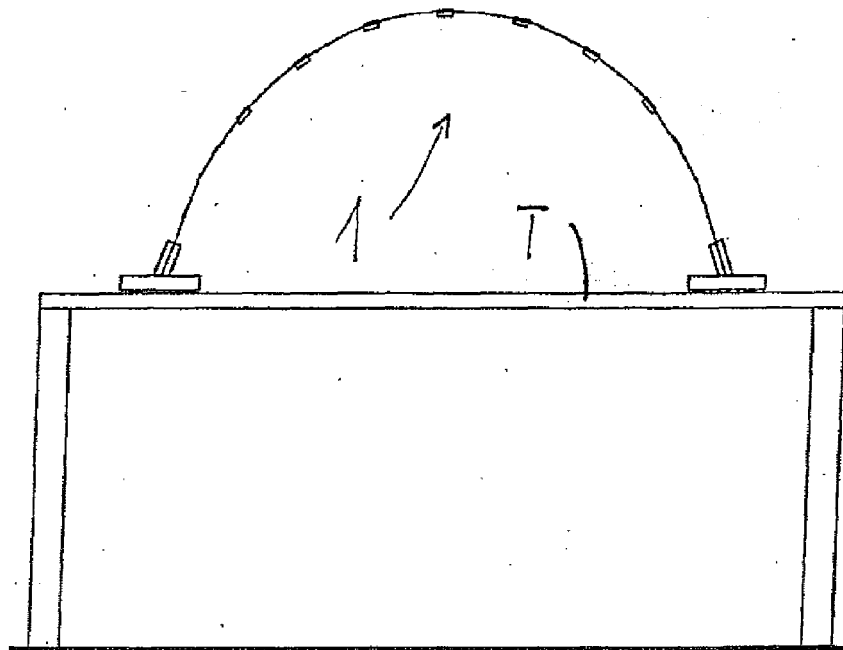


Fig.7

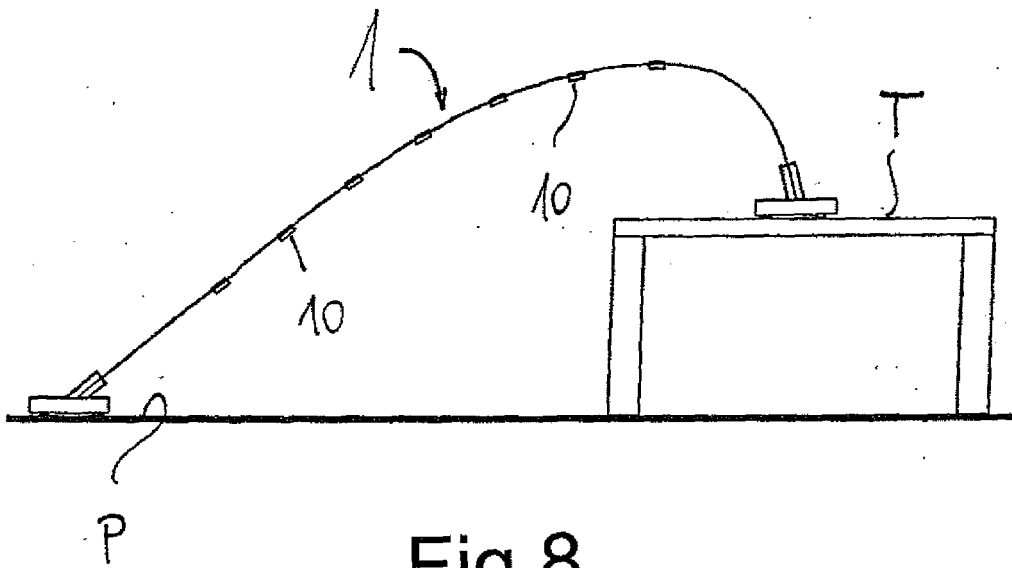


Fig.8

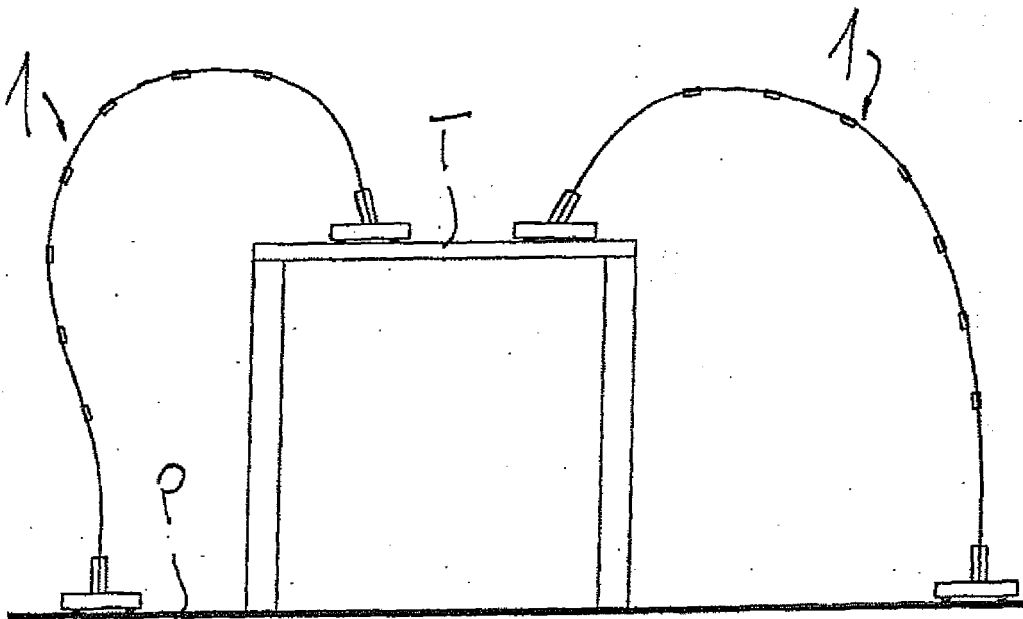


Fig.9

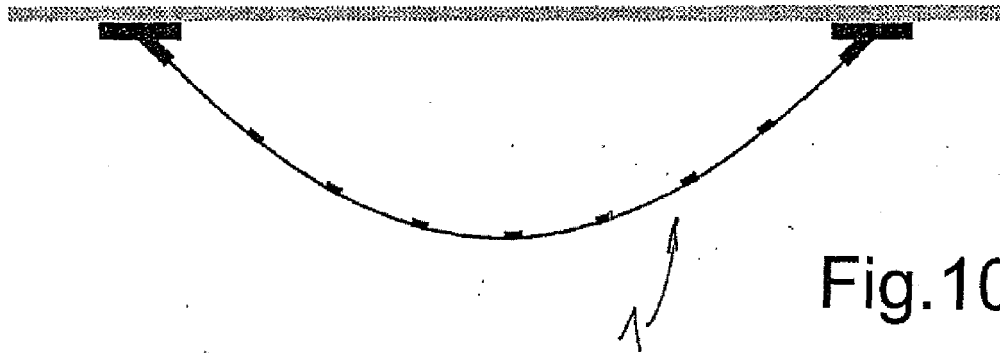


Fig.10

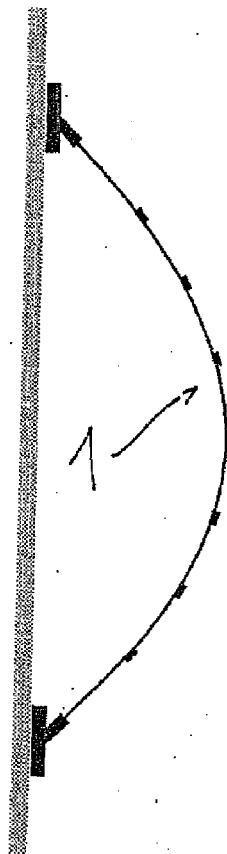


Fig.11

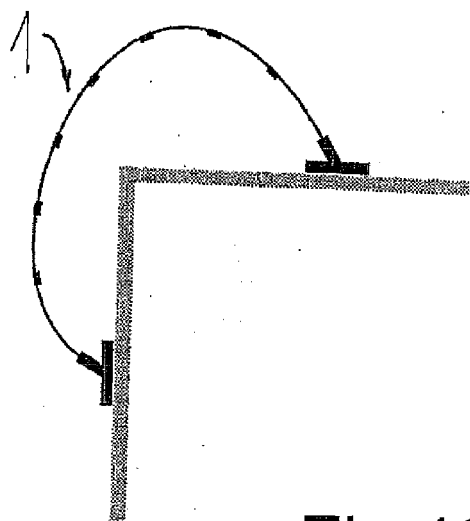


Fig.12

Fig.13

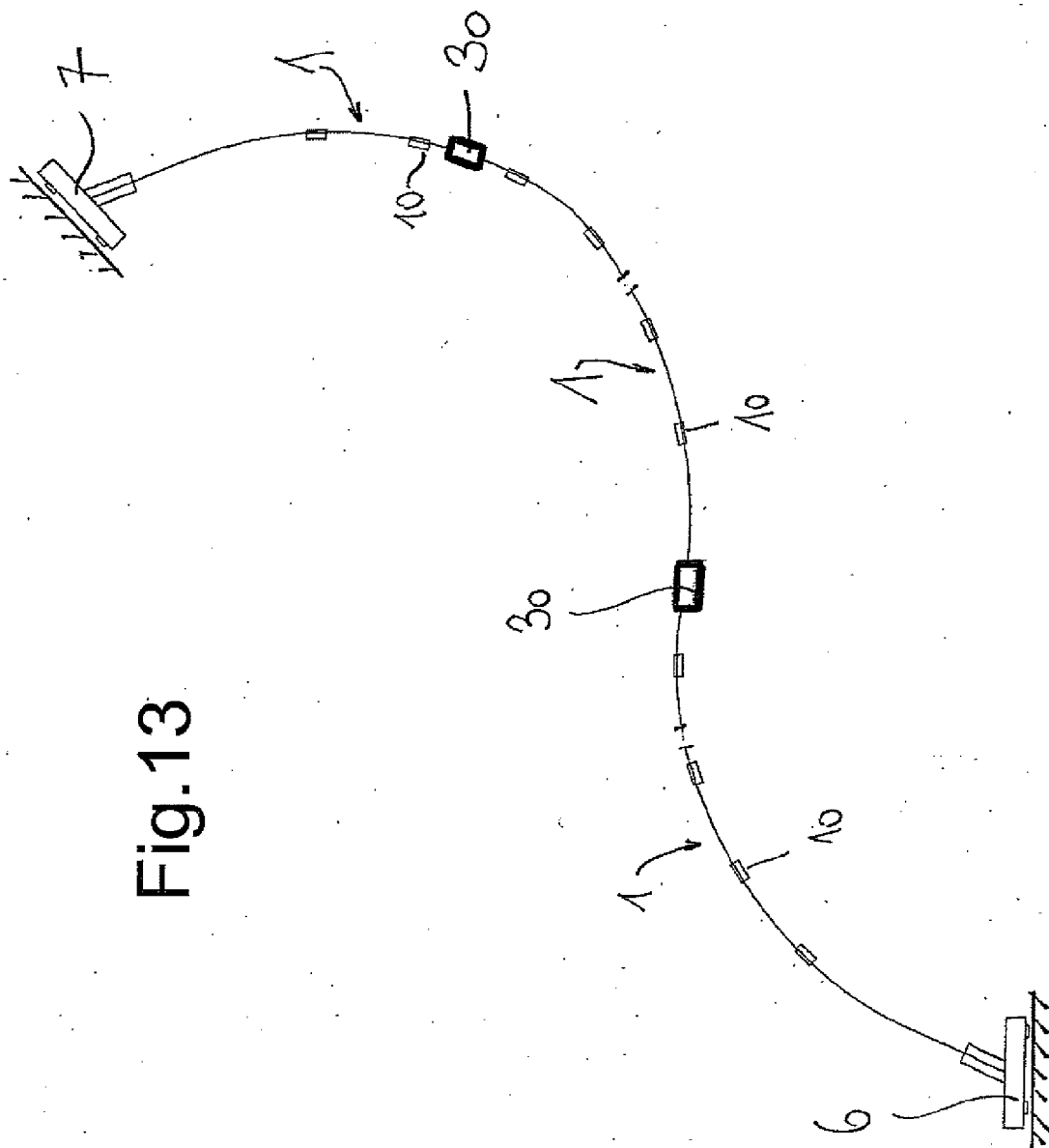


Fig.14

