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(54) Laser unit for emitting a beam of light, suitable to produce light effects

(57) A laser unit (1) for emitting a light beam suitable to provide light effects, which comprises a laser generator (9), a mirror (11) arranged along a direction in which the beam is emitted by the generator (9), and a station (13) for the controlled deflection of the beam, all three components being rigidly mounted on a movable motorized base that allows to orientate the beam emitted by the generator (9); the station (13) comprises two elements for reflecting the light beam, which can move with respect to the base and can rotate about respective rotation axes.

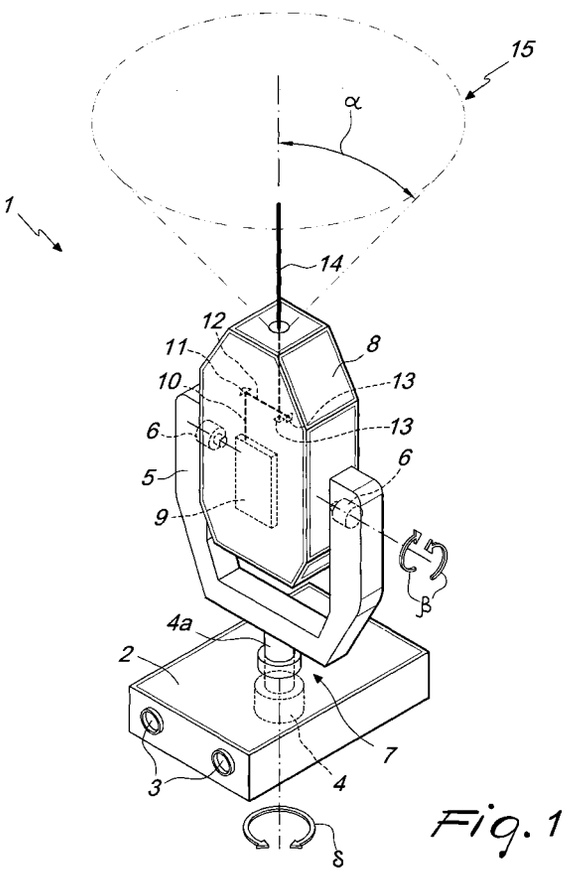

Fig. 1

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Description

[0001] The present invention relates to a laser unit for emitting a beam-of light, suitable to produce light effects.

[0002] During concerts, in discotheques and in other events of various kinds it is customary to use light effects, in association with music or not, in order to make the event more spectacular.

[0003] The use of laser generators has become widespread in combination with the use of various kinds of light source; these generators allow to obtain particularly attractive stage effects due to the intensity of the emitted beam and to the possibility to give it various shapes.

[0004] The first laser units had large generators, from which the beam was conveyed, by way of fiber-optic guides, to a reflecting element, by means of which it was possible to produce particular geometries of the emitted beam.

[0005] Component miniaturization has currently allowed to produce compact laser generators, allowing their installation in movable units provided with actuation elements and eliminating the need for fiber-optic guides.

[0006] The mobility of the unit leads to the possibility to direct the emitted beam at will, allowing to arrange and move in space the particular geometries given to the beam by the reflecting element.

[0007] The generator emits the light beam, which is reflected, by means of a fixed mirror, toward the reflecting element, which can deflect it since it can be orientated within a certain rotation angle with respect to the inactive position.

[0008] If the speed with which the light beam is diverted is sufficiently high, the resulting optical effect is no longer that of a single beam projected by the unit into the environment but that of a continuous plane which is the locus of the points successively and repeatedly occupied by the beam.

[0009] The limitation of this type of constructive configuration is linked to the impossibility to provide solid images with the emitted light beam which, while varying its dimensions and orientations, can at the most project two-dimensional images.

[0010] The aim of the present invention is to obviate the above-mentioned drawbacks and meet the cited needs, by providing a laser unit for emitting a light beam that is suitable to provide light effects having a three-dimensional effect, i.e., capable of projecting solid figures in the environment in which it is installed.

[0011] Within this aim, an object of the present invention is to provide a laser unit that is simple, relatively easy to provide in practice, safe in use, effective in operation, and has a relatively low cost.

[0012] This aim and this and other objects that will become better apparent hereinafter are achieved by the present laser unit for emitting a light beam suitable to provide light effects, comprising a laser generator, a mirror arranged along the direction in which the beam is emitted by said generator, and a station for the controlled deflection of the beam, all three components being rigidly mounted on a movable motorized base that allows to orientate the beam emitted by the generator, characterized in that said station comprises two elements for reflecting the light beam, which can move with respect to said base and can rotate about respective rotation axes.

[0013] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a laser unit for emitting a light beam suitable to provide light effects, according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein the sole Figure is a perspective view of a unit according to the invention.

[0014] With reference to the figure, the reference numeral 1 generally designates a laser unit for emitting a light beam suitable to provide light effects.

[0015] A footing 2 is rigidly coupled to, or rested on, a fixed surface, supports the entire unit 1 and is provided with sockets 3 for connection to a control unit, not shown in the figure; the footing 2 contains a servomotor 4, and a U-shaped support 5 is mounted on the shaft 4a of said servomotor, which can rotate about an axis that is _perpendicular to the resting plane of the footing 2.

[0016] Two coaxial servomotors 6 are arranged inside the upper ends of the support 5, have a horizontal axis and are directed so that their protruding shafts face each other. The support 5 and the footing 2 constitute the base 7 of the unit 1.

[0017] A box-like body 8 is suspended between the shafts of the servomotor 6 so that it can rotate rigidly with the shafts, and a laser generator 9 is provided inside the box-like body 8.

[0018] The beam emitted by the generator 9 travels along a first portion 10 in a straight line, at the end of which it is deflected by 90° by a fixed mirror 11. The beam travels along a second portion 12, reaching two reflective elements 13, usually of the galvanometric type, which have a respective mirror-finished surface that is suspended on a respective orientable axis. The orientable axes of the two elements 13 are mutually perpendicular, and the rotations that can be imparted to the mirror-finished surface are such as to always keep the reflected laser beam within the mirror-finished surface.

[0019] Geometrically, each element 13 is allowed to rotate through 45°, both clockwise and counterclockwise, about its own axis with respect to an initial configuration that corresponds to no rotation.

[0020] The beam 14 projected into the environment is therefore comprised within a conical boundary surface 15 that has a semiaperture α of 45°, with an axis of symmetry that is perpendicular to the direction of the beam in the portion 12.

[0021] The presence of the servomotors 6 allows to orientate the box-like body 8, and therefore also the boundary surface 15, by turning it through an angle β of

up to 240°. The servomotor 4 instead allows to turn the support 5, about its axis of symmetry, through an angle δ of up to 360°.

[0022] The unit 1, supplied with power by the control unit through the connection sockets 3, projects a beam 14, which is comprised within a boundary surface 15, which is suitable to form even solid shapes having dimensions that can vary in discrete steps or continuously; the beam 14 can be orientated in space by way of the rotations that correspond to an angle β of the box-like body 8 with respect to the support 5 and to an angle δ of the support 5 with respect to the footing 2, both rotations being controlled by respective servomotors 6 and 4.

[0023] It has thus been shown that the invention achieves the intended aim and object.

[0024] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0025] All the details may further be replaced with other technically equivalent ones.

[0026] In the described embodiments, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other embodiments.

[0027] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0028] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0029] The disclosures in Italian Utility Model Application No. B02003U000052 from which this application claims priority are incorporated herein by reference.

[0030] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A laser unit for emitting a light beam suitable to provide light effects, comprising a laser generator (9), a mirror (11) arranged along a direction in which the beam is emitted by said generator (9), and a station (13) for the controlled deflection of the beam, all three components being rigidly mounted on a movable motorized base that allows to orientate the beam emitted by the generator (9), **characterized in that** said station (13) comprises two elements for reflecting the light beam, which can move with respect to said base and can rotate about respective rotation axes.

2. The unit according to claim 1, **characterized in that** said reflective elements comprised within said controlled deflection station (13) are reflection mirrors of respective galvanometers.

3. The unit according to claim 1, **characterized in that** said rotation axes are oblique and the projection of one of said rotation axes on the plane that contains the reflective element pivoted on the second axis is perpendicular to said second axis.

4. The unit according to claim 1 and as an alternative to claim 3, **characterized in that** said rotation axes are co-planar and perpendicular.

5. The unit according to one or more of the preceding claims, **characterized in that** said reflective elements can rotate about perpendicular directions between mutual boundary configurations of maximum positive or negative rotation.

6. The unit according to one or more of the preceding claims, **characterized in that** said rotation elements, with respect to the inactive position, have a positive boundary configuration that corresponds to a clockwise rotation of 45° and a negative boundary configuration that corresponds to a counterclockwise rotation through 45°.

7. The unit according to one or more of the preceding claims, **characterized in that** said light beam, with respect to said base, is comprised within a cone whose vertex lies at the exit point of the beam from said base, with a semiaperture of 45°.

8. The unit according to one or more of the preceding claims, **characterized in that** said base comprises a supporting footing (2), which is provided with a servomotor (4) on the shaft (4a) of which, arranged at right angles to the installation surface of said footing (2), a U-shaped support (5) is mounted and actuated so that it can rotate; a box-like body (8) is in turn mounted and rotatably actuated between the upper ends of said support (5), which contain respective servomotors (6), said box-like body (8) being suitable to contain said generator (9), said mirror (11) and said reflective elements (13).

9. The unit according to claim 7, **characterized in that** said U-shaped support (5) can rotate, by way of the action of the servomotor (4) contained in the footing (2), with a maximum rotation of 360°.

10. The unit according to claim 7, **characterized in that** said box-like body (8) can rotate, by way of the action of the respective servomotors (6) contained in

the upper ends of the U-shaped support (5), with a maximum rotation of 240°.

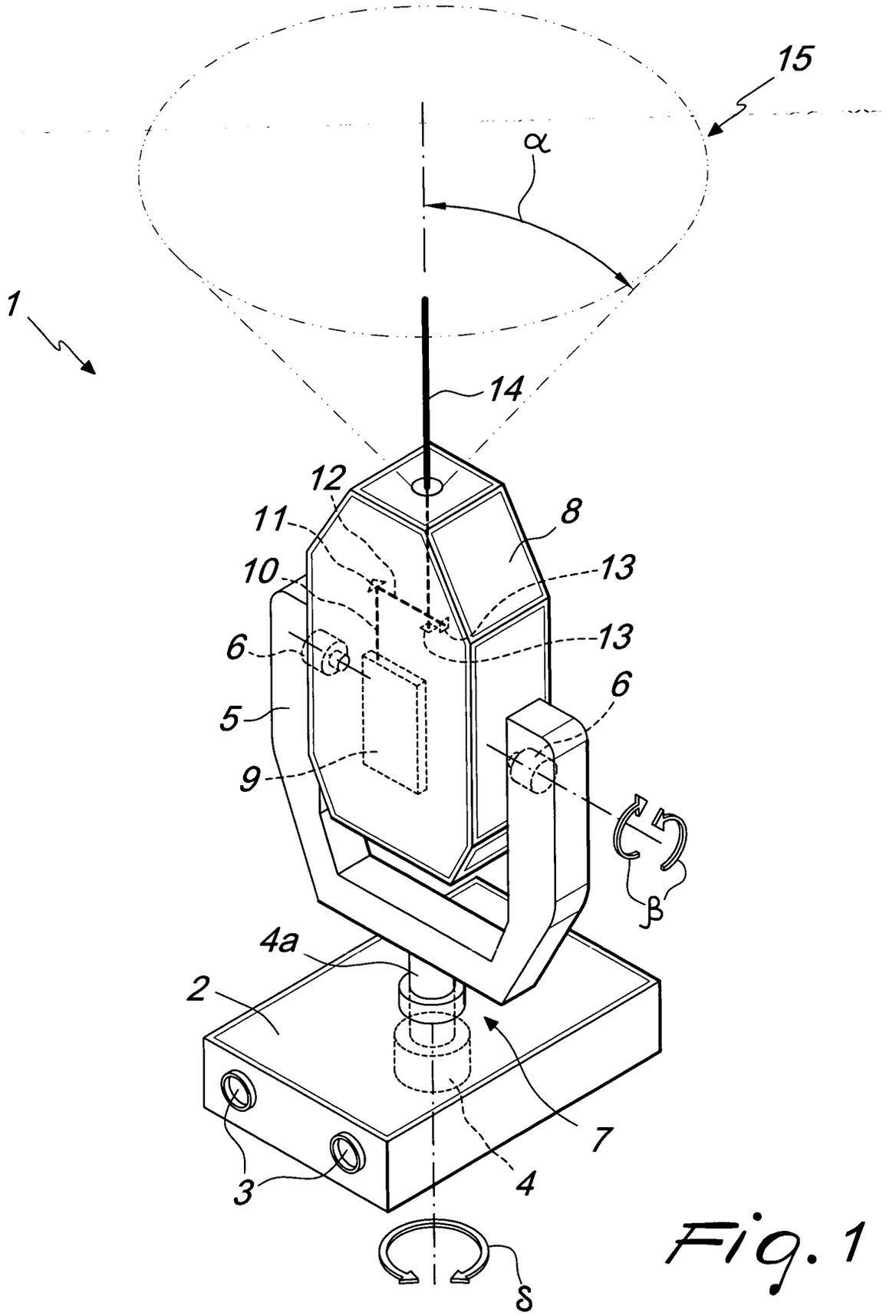

Fig. 1