US008562183B2

(12) **United States Patent**
Quadri

(10) **Patent No.: US 8,562,183 B2**
(45) **Date of Patent: Oct. 22, 2013**

(54) **ACTUATING ASSEMBLY FOR STAGE LIGHT FITTING BEAM PROCESSING MEMBERS, AND STAGE LIGHT FITTING COMPRISING SUCH AN ASSEMBLY**

(75) Inventor: **Pasquale Quadri**, Torre de' Roveri (IT)

(73) Assignee: **Clay Paky S.p.A.**, Seriate (IT)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 471 days.

(21) Appl. No.: **12/808,845**

(22) PCT Filed: **Dec. 17, 2008**

(86) PCT No.: **PCT/IB2008/003516**

§ 371 (c)(1),
(2), (4) Date: **Aug. 23, 2010**

(87) PCT Pub. No.: **WO2009/081256**

PCT Pub. Date: **Jul. 2, 2009**

(65) **Prior Publication Data**

US 2010/0309667 A1 Dec. 9, 2010

(30) **Foreign Application Priority Data**

Dec. 18, 2007 (IT) MI2007A2368

(51) **Int. Cl.**
F21V 17/02 (2006.01)

(52) **U.S. Cl.**
USPC **362/324**; 362/319; 362/321

(58) **Field of Classification Search**
USPC 362/319, 321, 324
See application file for complete search history.

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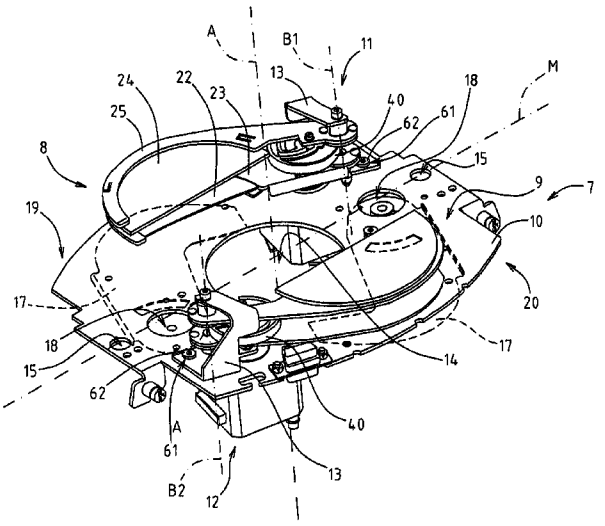
Primary Examiner — Anne Hines
Assistant Examiner — Jose M Diaz
(74) *Attorney, Agent, or Firm* — Leason Ellis, LLP

(57) **ABSTRACT**

An actuating assembly for beam processing members of a stage light fitting for generating a light beam has a frame; at least a first and second beam processing member; a motor with a shaft; and transmission means for transmitting motion to the first and second beam processing member, and which connect the shaft of the motor to the first and second beam processing member to selectively move the first and second beam processing member successively between a first position of non-interference with the beam, and a second position of interference with the beam.

20 Claims, 5 Drawing Sheets



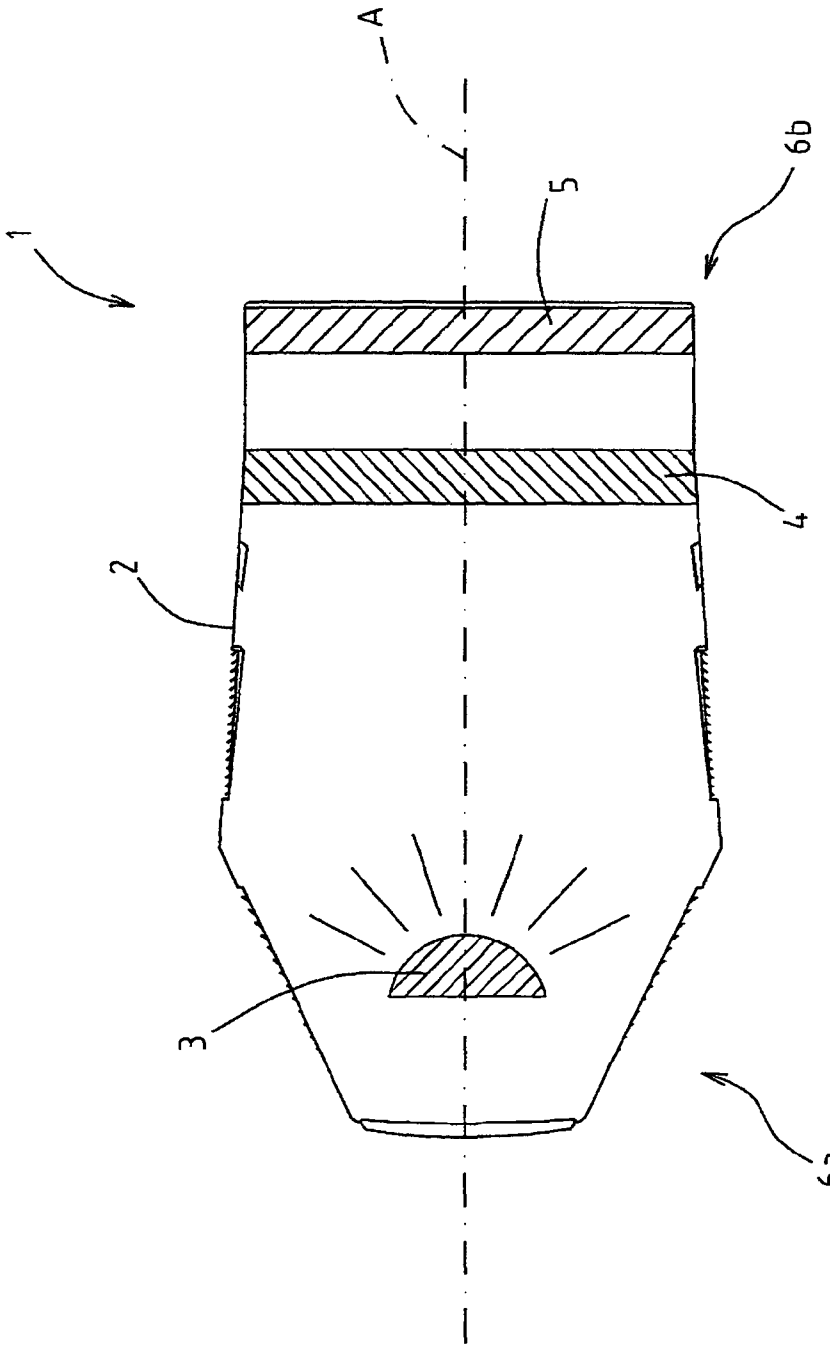
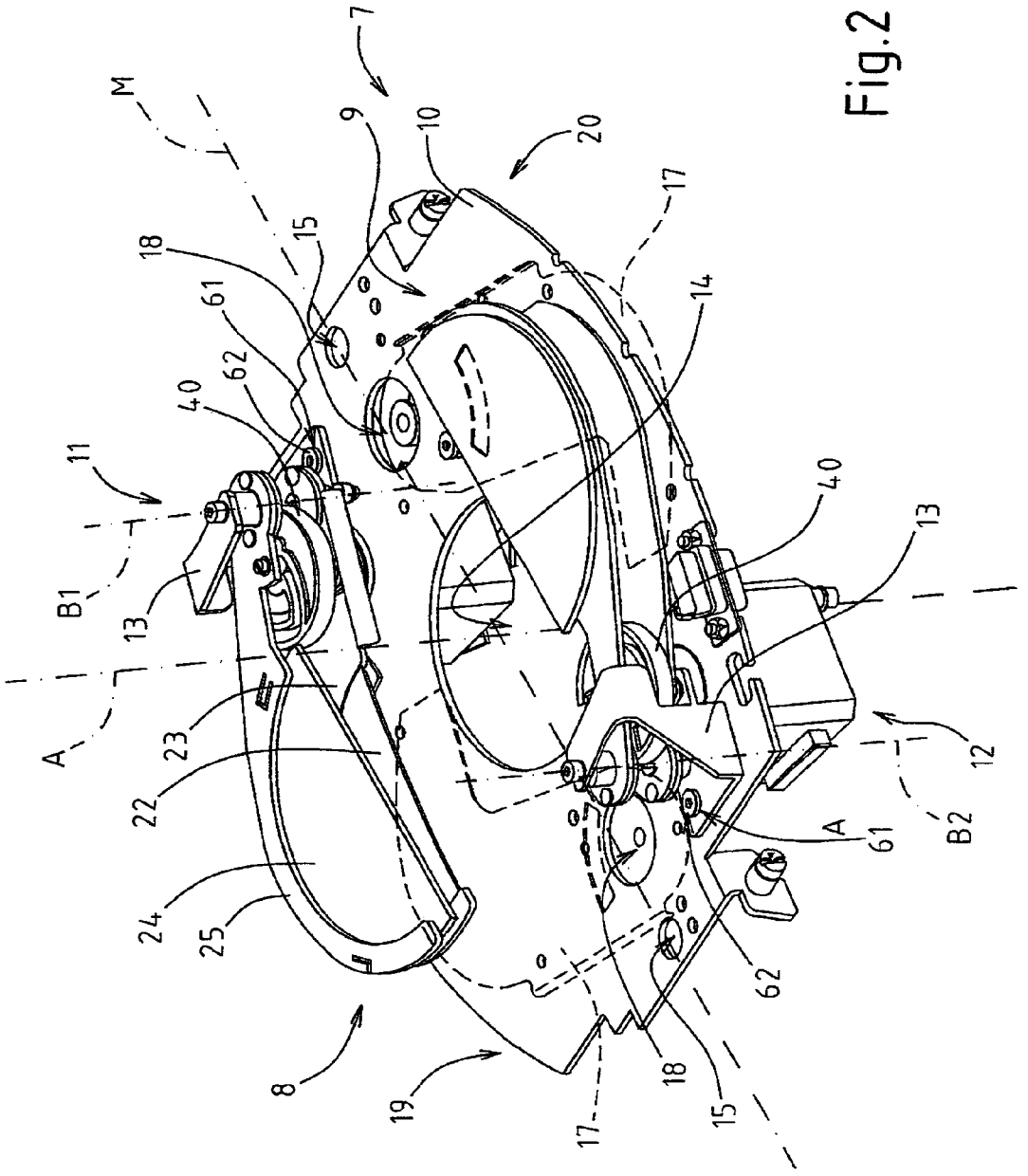


Fig.1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B1
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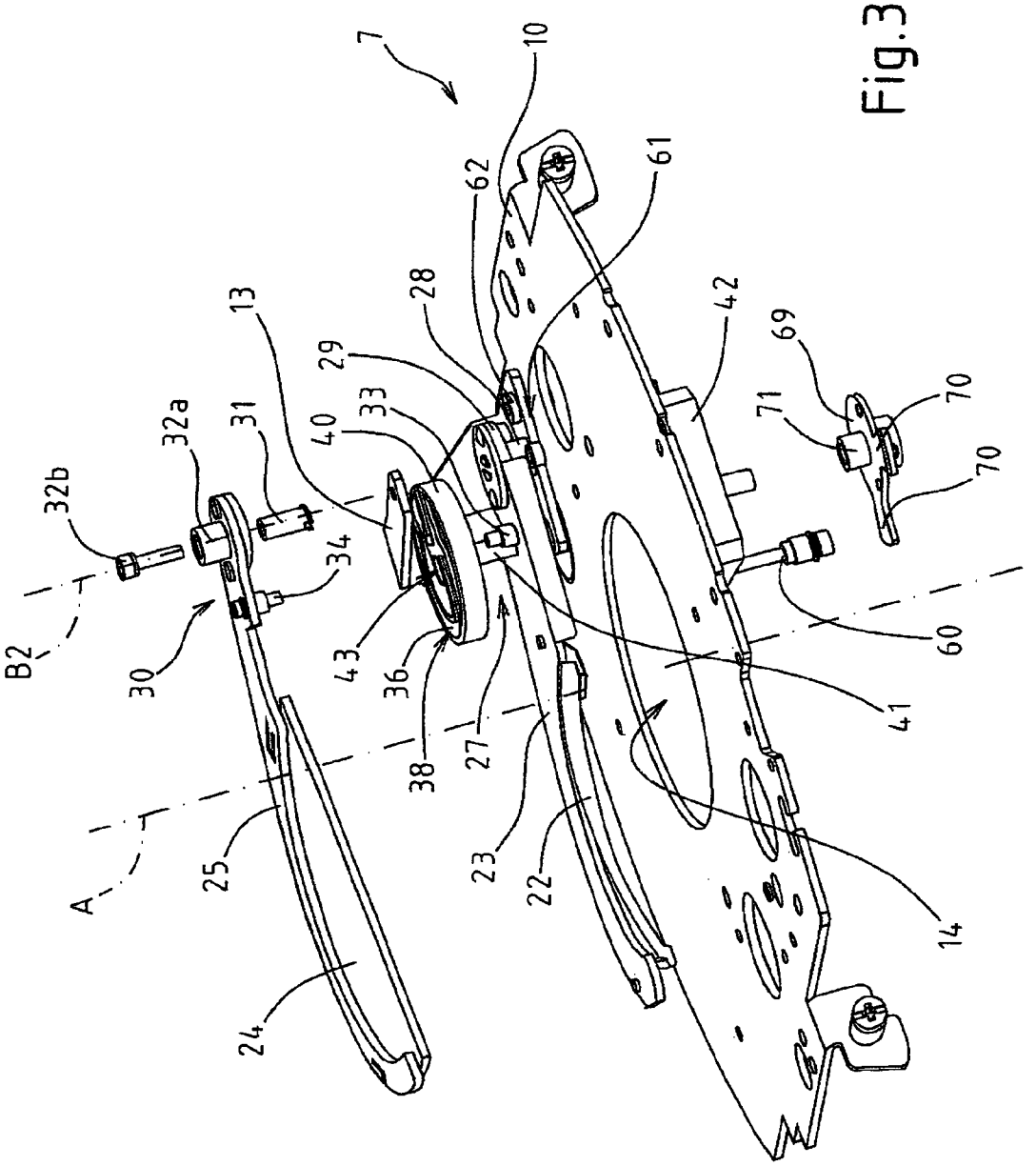
B2
12
13
40

Fig.2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32a
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32b
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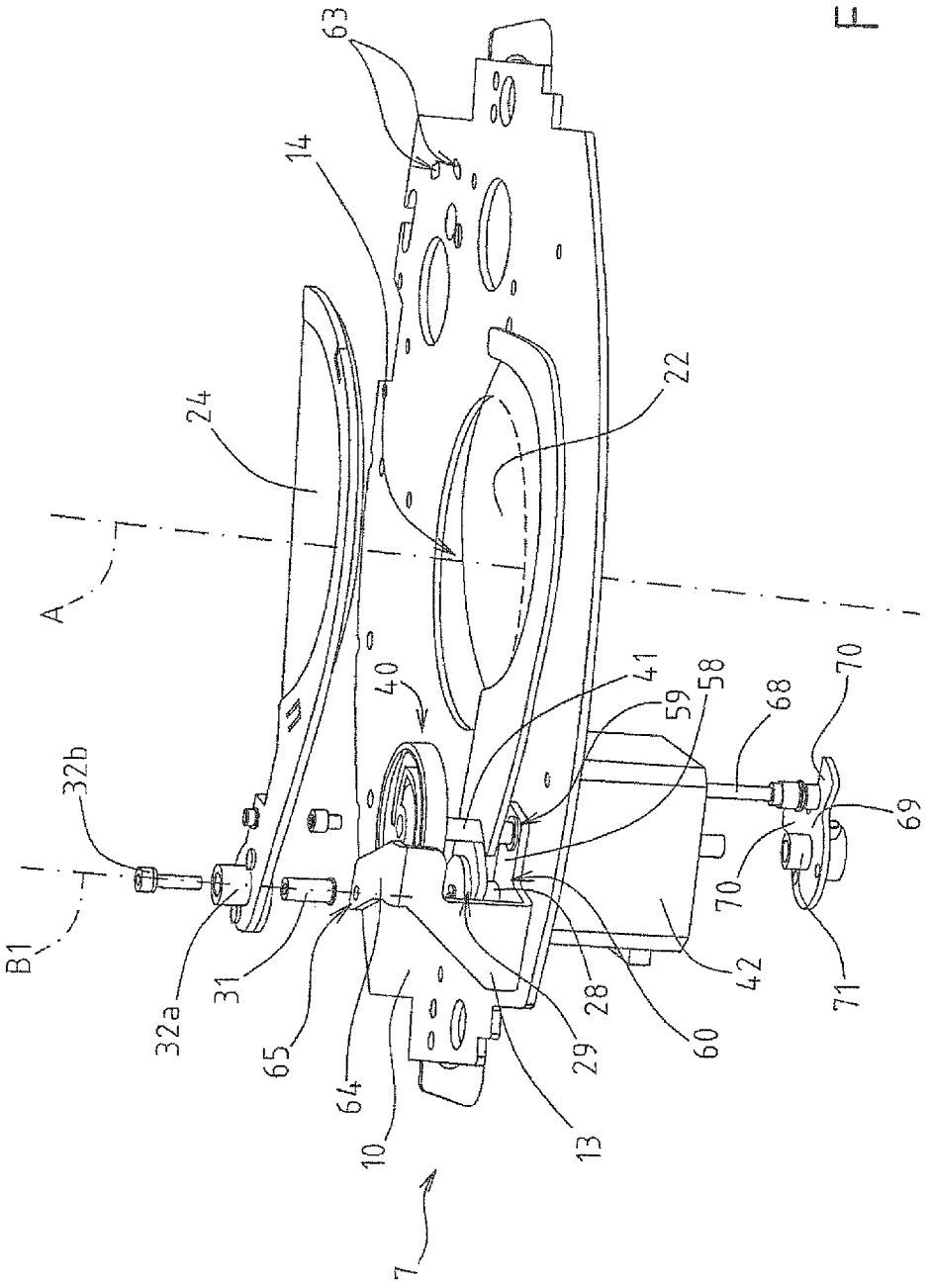
Fig.3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68
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Fig.4

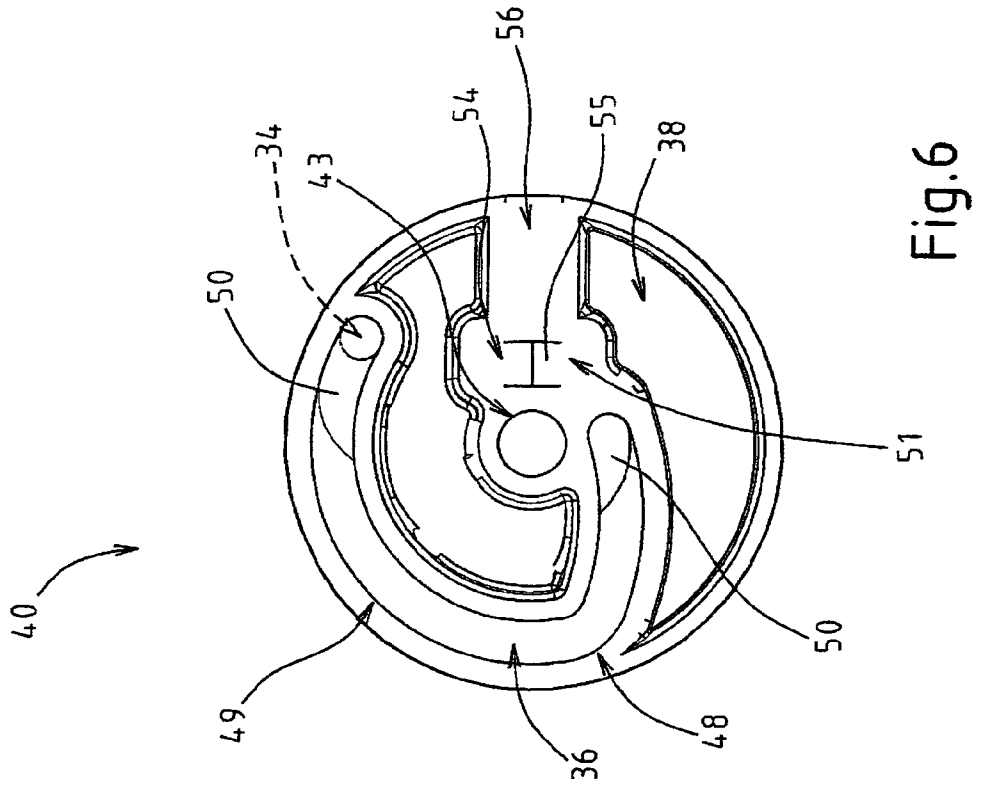
40
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Fig.6

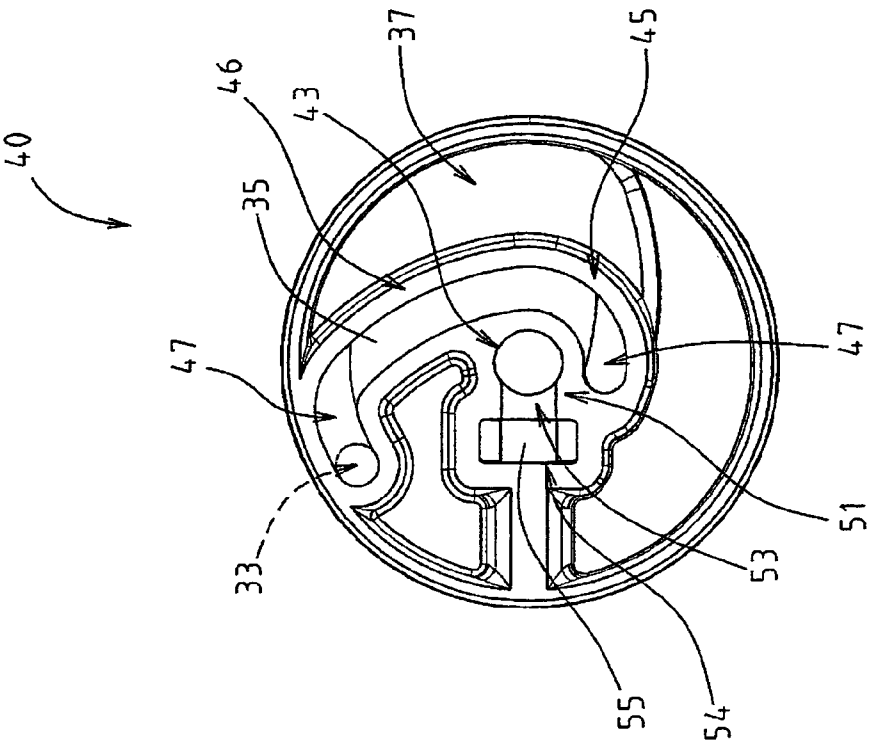
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Fig.5

ACTUATING ASSEMBLY FOR STAGE LIGHT FITTING BEAM PROCESSING MEMBERS, AND STAGE LIGHT FITTING COMPRISING SUCH AN ASSEMBLY

TECHNICAL FIELD

The present invention relates to an actuating assembly for stage light fitting beam processing members, and to a stage light fitting comprising such an assembly.

BACKGROUND ART

A known stage light fitting comprises a casing extending along a longitudinal axis; and a light source housed inside the casing to generate a light beam. The light fitting normally comprises a beam processing member actuating assembly for moving one or more beam processing members between a first position of non-interference with the beam, and a second position interfering with, and normally to spread, the beam emitted by the light fitting.

A known beam processing member actuating assembly comprises a frame with a central hole; four half-disk-shaped beam processing members arranged in a first and second pair diametrically opposite with respect to the axis of the light fitting; four motors; and transmission means for transmitting motion from each motor to the respective beam processing member.

Actuating assemblies of the above type, however, are excessively bulky.

The ever-increasing need for smaller light fittings is reflected in a reduction in the space inside the light fitting casing.

Moreover, beam processing means (gobos, coloured lenses, etc.) for producing special lighting effects often have to be inserted between the light source and the beam processing member actuating assembly, and, being far from negligible in size, further reduce the space available inside the casing for the actuating assembly.

DISCLOSURE OF INVENTION

It is an object of the present invention to provide a beam processing member actuating assembly designed to eliminate the aforementioned drawbacks of the known art, and which in particular is both compact and cheap and easy to produce.

According to the present invention, there is provided an actuating assembly for beam processing members of a stage light fitting for generating a light beam; the actuating assembly comprising a frame, at least a first and second beam processing member, drive means, and transmission means for transmitting motion to the first and second beam processing member to selectively move the first and second beam processing member between a first position of non-interference with the beam, and a second position of interference with the beam; the actuating assembly being characterized in that the drive means comprise a motor having a shaft; and in that the transmission means connect the shaft of the motor to the first and second beam processing member to selectively move the first and second beam processing member successively.

It is also an object of the present invention to provide a compact, efficient stage light fitting.

According to the present invention, there is provided a stage light fitting comprising a casing extending along a longitudinal axis, and a light source housed inside the casing to generate a light beam; the light fitting being characterized by comprising a beam processing member actuating assembly as claimed in any one of claims **1** to **18**.

BRIEF DESCRIPTION OF THE DRAWINGS

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

FIG. **1** shows a schematic section of a light fitting in accordance with the present invention;

FIG. **2** shows a view in perspective of a light fitting beam processing member actuating assembly in accordance with the present invention;

FIG. **3** shows an exploded view in perspective, from a first angle and with parts removed for clarity, of a detail of the beam processing member actuating assembly in FIG. **2**;

FIG. **4** shows an exploded view in perspective, from a second angle and with parts removed for clarity, of the FIG. **3** detail of the beam processing member actuating assembly;

FIG. **5** shows a topside plan view, with parts removed for clarity, of a further detail of the beam processing member actuating assembly in FIG. **2**;

FIG. **6** shows an underside plan view, with parts removed for clarity, of the FIG. **5** detail of the beam processing member actuating assembly.

BEST MODE FOR CARRYING OUT THE INVENTION

Number **1** in FIG. **1** indicates a stage light fitting comprising a casing **2**; a light source **3**; a beam processing member actuating assembly **4**; and a lens **5**.

Casing **2** extends substantially along a longitudinal axis A, and has a rear end **6***a* and a front end **6***b*.

Light source **3** is housed inside casing **2**, close to rear end **6***a*, and emits a light beam substantially parallel to axis A of casing **2**.

Lens **5** is the final lens of light fitting **1**, and is housed inside casing **2**, at front end **6***b*. More specifically, lens **5** is circular and concentric with axis A, and, depending on requirements, may be planoconvex, a zoom, a Fresnel lens, etc.

Actuating assembly **4** is housed inside casing **2**, between light source **3** and lens **5**. More specifically, actuating assembly **4** is substantially perpendicular to axis A, and is located close to front end **6***b* of casing **2**, so beam processing means (not shown), such as gobos, coloured lenses, etc., for producing special lighting effects can be inserted between actuating assembly **4** and light source **3**.

With reference to FIG. **3**, actuating assembly **4** comprises a frame **7**; at least two beam processing members, or, as in the examples shown, a first pair **8** of beam processing members, and a second pair **9** of beam processing members diametrically opposite the first pair with respect to axis A; and at least one beam processing member actuating device, or, as in the examples shown, a first actuating device **11** for the first pair **8** of beam processing members, and a second actuating device **12** for the second pair **9** of beam processing members and located diametrically opposite the first actuating device with respect to axis A.

First and second actuating device **11**, **12** respectively comprise drive means and transmission means, and respectively move the first and second pair **8**, **9** of beam processing members between a first position of non-interference with the beam, and a second position of interference with the beam.

The first and second pair **8**, **9** of beam processing members being substantially identical, and the first and second actuating device **11**, **12** also being substantially identical, only one

of pairs **8**, **9** of beam processing members, and only one of actuating devices **11**, **12** will be described below for the sake of simplicity, and no reference numbers are indicated in the drawings for the component parts of second pair **9** of beam processing members, and second beam processing member actuating device **12**.

Frame **7** comprises a metal plate **10**; and two substantially C-shaped brackets **13**. Being substantially identical, only one of brackets **13** is described below.

Plate **10** is substantially perpendicular to axis A, and has a central hole **14**, substantially coaxial with axis A, for passage of the beam generated by light source **3** of light fitting **1**.

Plate **10** also has lateral holes **15** for assembly to casing **2** of light fitting **1**.

Plate **10** is fitted with two gradual shutters **17** for cutting off the beam through central hole **14**, and each of which is substantially sickle-shaped with one end connected to plate **10**. More specifically, ends of gradual shutters **17** pivot respectively at two holes **18** located alongside central hole **14** and along the centreline M of plate **10** perpendicular to axis A. Each gradual shutter **17** is operated by respective controlled actuating means not shown in the drawings for the sake of simplicity.

Plate **10** comprises a portion **19** and a portion **20**, which are substantially separate, are defined by the centreline M of plate **10** perpendicular to axis A, and are fitted respectively with two counterweights defined by two metal plates (not shown) of given weight, and for compensating the weight of light source **3** and the beam processing means housed inside casing **2**, close to rear end **6***a*.

With reference to FIG. **3**, pair **8** of beam processing members comprises a half-disk-shaped first beam processing member **22** fitted to a first supporting structure **23**; and a half-disk-shaped second beam processing member **24** fitted to a second supporting structure **25**.

First beam processing member **22** is preferably a lens for spreading the beam through it, and is defined by a number of assembled microlenses; and second beam processing member **24** is preferably a lens for spreading the beam through it, and is defined by a number of assembled microlenses larger than the microlenses defining first beam processing member **22**.

The first pair **8** of beam processing members rotates substantially about an axis B**1** substantially perpendicular to plate **10** and substantially parallel to axis A of casing **2**. Axis B**2** in FIG. **2** indicates the axis of rotation of the second pair **9** of beam processing members.

More specifically, first supporting structure **23** and second supporting structure **25** rotate about axis B**1**. One end **27** of first supporting structure **23**, in fact, is connected for rotation to a pin **28** by connecting means, e.g. a bushing **28** and a pin fastening screw (not shown).

Similarly, one end **30** of second supporting structure **25** is connected for rotation to a pin **31** by connecting means, e.g. a bushing **32***a* and a pin fastening screw **32***b*.

Pin **28** and pin **31** are coaxial, extend substantially along axis B**1**, and, as described in detail below, are fixed to frame **7**, so that first supporting structure **23** and second supporting structure **25** are parallel to each other.

At respective ends **27** and **30**, first supporting structure **23** and second supporting structure **25** have respective pins **33** and **34**, which engage respective tracks **35** (FIG. **5**) and **36** (FIG. **6**) on opposite faces **37** (FIG. **5**) and **38** (FIG. **6**) of a positive cam **40**.

Positive cam **40** is substantially a preferably circular disk, and is connected to the drive means, in particular to a shaft **41** of a motor **42**.

Cam **40** has a central hole **43** and is fixed to shaft **41** of motor **42**.

With reference to FIG. **5**, face **37** of cam **40** has track **35**, which is engaged by pin **33** to guide first supporting structure **23** of first beam processing member **22**. Track **35** extends along a path comprising a constant-radius first curved portion **45** and a variable-radius second curved portion **46** longer than first curved portion **45**, and has two through portions **47** at the ends.

With reference to FIG. **6**, face **38** of cam **40** has track **36**, which is engaged by pin **34** to guide second supporting structure **25** of second beam processing member **24**. Track **36** extends along a path comprising a variable-radius first curved portion **48** and a constant-radius second curved portion **49** longer than first curved portion **48**, and has two through portions **50** at the ends.

With reference to FIGS. **5** and **6**, cam **40** has a seat **51** comprising a non-through first portion **53** open on the face **37** side and connected to hole **43** housing shaft **41** (FIG. **5**); a through second portion **54** housing a nut **55** (FIGS. **5** and **6**); and an elongated third portion **56** open on the face **38** side (FIG. **6**) and for housing a screw (not shown) which screws into nut **55** and rests against shaft **41** to fix cam **40** to shaft **41**.

With reference to FIG. **4**, pin **28** and pin **31** are connected to frame **7**, and in particular to a bracket **13** connected to shaft **41** of motor **42**. More specifically, bracket **13** comprises a bottom base **58** having a circular hole **59** for shaft **41**, a circular hole **60** for pin **28**, and two circular holes **61** (shown in FIGS. **2** and **3**) for screws **62** for assembly to plate **10**. More specifically, each screw **62** is connected to a respective slot **63** in plate **10** (shown in FIG. **4**, on the diametrically opposite side of axis A). Adjusting the position of screws **62** in slots **63** provides for adjusting the position of beam processing members **22**, **24** with respect to central hole **14** of plate **10**, so that beam processing members **22**, **24** substantially cover exactly half central hole **14** in the second position of interference with the beam.

Bracket **13** also has a top base **64** with a hole **65** for pin **31**.

Motor **42** is preferably a step motor which rotates shaft **41** anticlockwise to move beam processing members **22**, **24** from the first position of non-interference to the second position of interference with the beam, and clockwise to move beam processing members **22**, **24** from the second position of interference to the first position of non-interference with the beam.

More specifically, given the design of tracks **35** and **36** of positive cam **40**, anticlockwise rotation of shaft **41** first moves first beam processing member **22** and then second beam processing member **24**; while clockwise rotation first moves second beam processing member **24** and then first beam processing member **22**.

Motor **42** preferably performs a predetermined number of clockwise steps and a predetermined number of anticlockwise steps to avoid positioning beam processing members **22** and **24** between the first and second position. Motor **42** may, however, be programmed to also position beam processing members **22**, **24** in one or more intermediate positions between the first and second position.

Motor **42** also has step reset means. More specifically, the step reset means comprise a stop pin **68**; and a disk **69** having two wings **70** and fixed by a bushing **71** to shaft **41** of motor **42**.

When a wing **70** of disk **69** contacts stop pin **68**, motor **42** is in the reset position. In actual use, disk **69** moves integrally with shaft **41**, and produced slip of motor **42** if motor **42** commences the predetermined number of steps from other than the reset position.

In a first variation not shown, the step motor reset means comprise an electronic device.

A second variation not shown employs a direct-current motor.

A third variation not shown of the present invention employs two positive cams connected to the same motor shaft, and each having a track for transmitting movement to a respective beam processing member.

Beam processing member actuating assembly **4** according to the present invention has the advantage of being much more compact than known beam processing member actuating assemblies. Using one motor **42** for driving a pair **8** of beam processing members, in fact, greatly reduces the size of the assembly; and using only one cam **40** for transmitting motion to the pair **8** of beam processing members further reduces the size of actuating assembly **4**.

Above all, actuating assembly **4** according to the present invention is much cheaper to produce, by employing one motor **42**, as opposed to two, to drive a pair **8** of beam processing members.

Clearly, changes may be made to the light fitting and beam processing member actuating assembly as described herein without, however, departing from the scope as defined in the accompanying Claims.

The beam processing members may be lenses, as described, or filters, in particular coloured filters. In a further embodiment, the beam processing members may be a jagged-edged dimming device and a diffusion disk, arranged so that the diffusion disk intercepts the beam before the dimming device to form a dimmer. The dimming devices are superimposed in the final beam intercepting position.

The invention claimed is:

1. An actuating assembly for beam processing members of a stage light fitting for generating a light beam; the actuating assembly (**4**) comprising a frame (**7**), at least a first and second beam processing member (**22**, **24**), drive means, and transmission means for transmitting motion to the first and second beam processing member (**22**, **24**) to selectively move the first and second beam processing member (**22**, **24**) between a first position of non-interference with the beam, and a second position of interference with the beam; the actuating assembly (**4**) being characterized in that-the drive means comprise a motor (**42**) having a shaft (**41**); and in that the transmission means connect the shaft (**41**) of the motor (**42**) to the first and second beam processing member (**22**, **24**) to selectively move the first and second beam processing member (**22**, **24**) successively, wherein the transmission means comprises: a first supporting structure (**23**) supporting the first beam processing member (**22**), which rotates about an axis of rotation (B**1**); a second supporting structure (**25**) supporting the second beam processing member (**24**), which rotates about the axis of rotation (B**1**); and at least one cam (**40**) fixed to the shaft (**41**) of the motor (**42**).

2. An assembly as claimed in claim **1**, characterized in that the transmission means comprise a first supporting structure (**23**) supporting the first beam processing member (**22**), which rotates about an axis of rotation (B**1**).

3. An assembly as claimed in claim **2**, characterized in that the transmission means comprise a second supporting structure (**25**) supporting the second beam processing member (**24**), which rotates about the axis of rotation (B**1**).

4. An assembly as claimed in claim **3**, characterized in that the transmission means comprise at least one cam (**40**) fixed to the shaft (**41**) of the motor (**42**).

5. An assembly as claimed in claim **4**, characterized in that the cam (**40**) is a positive cam having a first face (**37**), and a first track (**35**) along the first face (**37**); the first track (**35**) being engaged by a first pin (**33**) of the first supporting structure (**23**) to guide the first beam processing member (**22**).

6. An assembly as claimed in claim **5**, characterized in that the cam (**40**) has a second face (**38**) opposite the first face (**37**), and a second track (**36**) along the second face (**38**); the second track (**36**) being engaged by a second pin (**34**) of the second supporting structure (**25**) to guide the second beam processing member (**24**).

7. An assembly as claimed in claim **5**, characterized in that the first track (**35**) extends along a path comprising a constant-radius first curved portion (**45**), and a variable-radius second curved portion (**46**) longer than the first curved portion (**45**).

8. An assembly as claimed in claim **6**, characterized in that the second track (**36**) extends along a path comprising a variable-radius third curved portion (**48**), and a constant-radius fourth curved portion (**49**) longer than the third curved portion (**48**).

9. An assembly as claimed in claim **4**, characterized in that the cam (**40**) comprises fastening means for fastening the cam (**40**) to the shaft (**41**).

10. An assembly as claimed in claim **9**, characterized in that the fastening means of the cam (**40**) comprise a seat (**51**); a nut (**55**); and a screw, which screws into the nut (**55**) and is housed in the seat (**51**), resting against the shaft (**41**).

11. An assembly as claimed in claim **1**, characterized in that the motor (**42**) moves the shaft (**41**) in one direction to selectively move the first beam processing member (**22**) and the second beam processing member (**24**) from the first position of non-interference with the beam to the second position of interference with the beam, and in the opposite direction to selectively move the first beam processing member (**22**) and the second beam processing member (**24**) from the second position of interference with the beam to the first position of non-interference with the beam.

12. An assembly as claimed in claim **11**, characterized in that the motor (**42**) is a step motor.

13. An assembly as claimed in claim **12**, characterized in that the motor (**42**) performs a predetermined number of steps in one direction, and a predetermined number of steps in the opposite direction.

14. An assembly as claimed in claim **13**, characterized in that the motor (**42**) comprises step reset means.

15. An assembly as claimed in claim **14**, characterized in that the step reset means comprise a stop pin (**68**); and a disk (**69**) having two wings (**70**) and fixed to the shaft (**41**) of the motor (**42**); the motor (**42**) being in a reset position when a wing (**70**) of the disk (**69**) rests against the stop pin (**68**).

16. An assembly as claimed in claim **1**, characterized by comprising at least a third and a fourth beam processing member; a further motor; and further transmission means connecting the further motor to the third and fourth beam processing member to selectively move the third and fourth beam processing member successively between a first position of non-interference with the beam, and a second position of interference with the beam.

17. An assembly as claimed in claim **16**, characterized in that the first beam processing member (**22**) and third beam processing member are half-disk-shaped and complementary with each other.

18. An assembly as claimed in claim **16**, characterized in that the second beam processing member (**24**) and fourth beam processing member are half-disk-shaped and complementary with each other.

19. A stage light fitting comprising a casing (**2**) extending along a longitudinal axis (A), and a light source (**3**) housed inside the casing (**2**) and for generating a light beam; the light

fitting (**1**) being characterized by comprising a beam processing member actuating assembly (**4**) as claimed in claim **1**.

20. A stage light fitting as claimed in claim **19**, characterized in that the actuating assembly (**4**) is located in front of the light source (**3**) and substantially perpendicular to the axis (A) of the casing (**2**) of the stage light fitting (**1**).

* * * * *