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(71) Applicants:
• **China Technology Co., Ltd.
Changhua City (TW)**
• **Fu An Industrial Co., Ltd.
An Ping Ind. District
Tainan Taiwan (TW)**

(72) Inventors:
• **Tsai, Chih Ming
Taichung City (TW)**
• **Lee, Jihn-Shiun
Tainan (TW)**
• **Wang, Jen-Mao
Changhua City (TW)**

(74) Representative: **Viering, Jentschura & Partner
Steinsdorfstrasse 6
80538 München (DE)**

(54) **High beam and low beam switching apparatus**

(57) A light beam and low beam switching apparatus includes an anchor plate (11) with a mask plate (30) hinged on one side against a notch (13) which is formed on a upper end of the anchor plate (11) corresponding to a lighting element (72) and a drawing plate (50) coupling with a lower end of the mask plate (30) on one side directing towards a light penetrating cover (80) that has a coupling slot (52) in the middle portion to couple with a stem (24) of a solenoid valve (20). The mask plate (30) is pivotally coupled on hinge docks (15) located on the anchor plate (11) through an elastic latch member (40). Thereby the solenoid valve (20) can drive the drawing plate (50) to synchronously sway the mask plate (30) to change the size of the light source area. Switching operation is steadier and smoother, and loading of the elements can be reduced to enhance durability.

EP 1 701 088 A1

Description

[0001] The invention relates to a light beam and low beam switching apparatus.

[0002] High beam and low beam switching apparatus are known in the art.

For instance, German patent No. DE 202004020183.6 discloses "An improved High beam and low beam switching apparatus" which includes (referring to its Claim 1) an anchor plate and a mask interposed between a lamp socket of a lighting element and a light penetrating cover; the anchor plate is positioned transversely and has a notch on a upper end corresponding to the lighting element and a lower end fastened to a solenoid valve; the mask plate is driven by the solenoid valve. It characterized in: the mask having a lower end hinged on one side of the notch of the anchor plate and a push plate extended and bent from the lower end towards the light source that has a driving hole to be coupled with a stem of the solenoid valve; the stem being extendable to sway the mask thereby to change light projecting area to switch the high beam and low beam.

[0003] The push plate of the mask with the elongated driving hole set forth above has to be bent to mate the stem (referring to its Claim 3), and the distal end has be formed two annular grooves by fabrication to be wedged by C-shaped clips. Fabrication process is complex. This is the first disadvantage.

[0004] Moreover, the stem runs through the longitudinal and elongated driving hole and is confined by two C-shaped clips. Between the drawing bar of mask and the anchor plate, a return spring is added to aid pulling (referring to its Claim 4). The structure is complicated. Fabrication and assembly are more difficult, and production time is longer. This is the second disadvantage.

[0005] Furthermore, the stem runs through the longitudinal and elongated driving hole and is confined by two C-shaped clips on the front and rear distal ends. While the mask is driven and swayed, the two C-shaped clips slide on two sides of the elongated driving hole and generate friction. This affects operation smoothness and steadiness. This is the third disadvantage.

[0006] Finally, the stem has a bent section to generate friction with the elongated driving hole during operation. As a result, loading and wearing occur to the related elements, and service life is shortened. This is the fourth disadvantage.

[0007] In view of the aforesaid disadvantages occurred to the conventional switching apparatus, such as complex structure that results in difficult fabrication and assembly, friction resistance that impacts operation smoothness, and increased loading that shortens service life, the present invention aims to provide improvements to overcome those problems.

[0008] The primary object of the invention is to provide a high beam and low beam switching apparatus that has a lower moving friction force to make swaying smoother and steadier during switching operation.

[0009] Another object of the invention to provide a high beam and low beam switching apparatus that can reduce loading of the solenoid valve so that operation load is lower and durability increases. The life span of the solenoid valve also is longer.

[0010] Yet another object of the invention is to provide a high beam and low beam switching apparatus that has simplified elements, thus is easier to fabricate and assemble, and can reduce production cost and improve economic effectiveness.

[0011] In order to achieve the foregoing objects, the invention includes a transverse anchor plate located between a lamp socket of a lighting element and a light penetrating cover. The anchor plate has a notch on a upper end corresponding to the lighting element and a lower end coupling with a solenoid valve which drives a mask plate. The invention has the following features: the anchor plate has two jutting hinge docks on two sides below the notch on one side facing the solenoid valve; the mask plate has two pivotal plates extended from a lower end each has two pivotal holes formed thereon in a spaced manner; the mask plate and the anchor plate are pivotally coupled through two ends of an elastic latch member which is engaged with the solenoid valve; and a drawing plate is provided which has two ends running through the pivotal holes of the pivotal plates of the mask plate and a coupling slot in the middle to latch on a upper portion of a stem of the solenoid valve to compress a upper end of a returning element.

[0012] The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

Brief description of the drawings

[0013]

FIG. 1 is an exploded view of the invention.

FIG. 2 is a perspective view of the invention.

FIG. 3 is an exploded view of an embodiment of the invention to be coupled with a lamp set.

FIG. 4 is a sectional view of an embodiment of the invention for a high beam condition.

FIG. 5 is a sectional view of an embodiment of the invention for a low beam condition.

Detailed description

[0014] Referring to FIGS. 1 and 2, the switching apparatus 10 according to the invention includes a semi-circular anchor plate 11, a solenoid valve 20, a mask plate 30, a drawing plate 50 and a T-shaped padding blade 60. The anchor plate 11 is substantially directing downwards and has two anchor arms 12 extended outwards from two sides to be fastened to a lamp socket, a notch 13 on an upper end, and spaced fastening holes 14 in the middle portion and two hinge docks 15 on two sides of the notch 13. The solenoid valve 20 is fastened to the anchor plate 11 by coupling screws 21 with the fastening holes 14 and includes a stem 24 which has a neck 22 on a distal end with an annular groove formed thereon and is coupled with a returning element 23. The mask plate 30 has two pivotal plates 32 on two ends directing upwards in an inclined manner each has an upper pivot hole 31 and a lower pivot hole 31' that is coupled with two ends of an elastic latch member 40 of the solenoid valve 20 to be hinged on the hinge docks 15 of the anchor plate 11. The drawing plate 50 has two ends running through the upper pivot hole 31 of the mask plate 30 for anchoring and an extension plate 51 in the middle portion with a coupling slot 52 formed thereon. The coupling slot 52 is wedged in the neck 22 of the stem 24 of the solenoid valve 20 to confine the returning element 23. The hinge docks 15 can be directly formed from the anchor plate 11 by stamping. The T-shaped padding blade 60 is fastened to the solenoid valve 20 by screwing through the anchor plate 11 to cover the opening adjacent to the hinge docks 15 that are formed while the hinge docks 15 are bent.

[0015] For assembly, align the lower pivot holes 31' of the pivotal plate 32 of the mask plate 30 with the hinge docks 15 of the anchor plate 11; hinge two ends of the elastic latch member 40 through the lower pivot holes 31' and the hinge docks 15; insert two ends of the drawing plate 50 through the upper pivot holes 31 of the pivotal plate 32 and wedge the slot 52 in the neck 22 of the stem 24 to hold the returning element 23 on the stem 24 to complete the assembly of the switching apparatus 10. By means of the construction set forth above, the stem 24 of the solenoid valve 20 can move the drawing plate 50 up and down linearly to sway the mask plate 30. Thus operation is smoother and steadier. Friction resistance among the elements can be reduced and the loading on the solenoid valve 20 decreases. As a result, the durability of the solenoid valve 20 increases and the life span is longer.

[0016] Refer to FIGS. 3 and 4 for an embodiment of the invention in use conditions. The switching apparatus 10 is installed on a lamp socket 70 which has a refraction reflective trough 71. The refraction reflective trough 71 holds a lighting element 72 in the middle. The lamp socket 70 and a light penetrating cover 80 of a convex lens 81 at the front end are interposed by a coupling frame 90 to fasten the anchor plate 11 in a transverse manner. Thus the solenoid valve 20 can be held securely to drive the mask plate 30.

[0017] Refer to FIG. 4 for an embodiment of the invention in use for a high beam condition. The anchor plate 11 is fastened to one end of the refraction reflective trough 71 of the lamp socket 70. The notch 13 on the upper side of the anchor plate 11 is aligned with a refractive high beam light source on the lower side of the lighting element 72 in the lamp socket 70. As the solenoid valve 20 is fastened to the middle of a lower side of the anchor plate 11, and the neck 22 of the stem 24 is coupled with the drawing plate 50, the solenoid valve 20 can move the mask plate 30 synchronously to sway a desired angle in the notch 13 on the upper side of the anchor plate 11. Hence when the solenoid valve 20 is activated, the stem 24 moves the drawing plate 50 downwards to sway the mask plate 30 outwards, and the notch 13 on the upper side of the anchor plate 11 is opened; the high beam projected and refracted from the lighting element 72 is not blocked, thus can project outwards through the notch 13 to form a high beam.

[0018] Refer to FIG. 5 for an embodiment of the invention in use for a low beam condition. When the power supply to the solenoid valve 20 is turned off, the stem 24 is pushed by the returning element 23 to its original position. The drawing plate 50 is moved upwards to sway the mask plate 30 upwards in contact with the anchor plate 11 and block the notch 13. As a result, the high beam refracted from the lighting element 72 is blocked without projecting outwards, and only the low beam is projected.

[0019] The high beam and low beam switching apparatus of the invention set forth above has a simple structure and can be fabricated and assembled easily. It has a lower friction among the moving elements, thus can operate smoother and steadier. The loading and wearing of the elements are reduced, and durability is enhanced.

[0020] While the preferred embodiment of the invention has been set forth for the purpose of disclosure, modifications of the disclosed embodiment of the invention as well as other embodiment thereof may occur to those skilled in the art.

Claims

1. A high beam and low beam switching apparatus (10) comprising an anchor plate (11) which is transversely fastened

to a lamp socket (70) and has a notch (13) on a upper end corresponding to a lighting element (72), a mask plate (30) pivotally coupled with the anchor plate (11) below the notch (13) and a solenoid valve (20) fastened to a lower end of the anchor plate (11) through screws (21) to sway the mask plate (30), **characterized in:** the anchor plate (11) having two jutting hinge docks (15) on two sides of the notch (13), the solenoid valve (20) having a stem (24) extending towards the notch (13) and being coupled with a returning element (23), the mask plate (30) having two pivotal plates (32) extended upwards in an inclined manner from two sides of a lower end thereof that have respectively a upper pivotal hole (31) and a lower pivotal hole (31'), the lower pivotal hole (31') being pivotally coupled with the hinge dock (15) through two ends of an elastic latch member (40) such that the mask plate (30) is close to the notch (13), a drawing plate (50) being provided that has a middle portion engaged with the stem (24) to compress a upper end of the returning element (23) and two ends inserting into the upper pivotal hole (31), thereby the stem (24) of the solenoid valve (20) is extendable to pull the drawing plate (50) to sway the mask plate (30) so that moving friction resistance is reduced to facilitate steady and smooth operation of the high beam and low beam switching apparatus.

2. The high beam and low beam switching apparatus of claim 1, wherein the elastic latch member (40) has a middle portion formed in a U-shape to couple with the solenoid valve (20).
3. The high beam and low beam switching apparatus of claim 1, wherein the stem (24) of the solenoid valve (20) has an indented neck (22) on a distal end, the drawing plate (50) having an extension plate (51) in a middle portion that has a slot (52) to wedge in the neck (22).
4. The high beam and low beam switching apparatus of claim 1, wherein hinge docks (15) are formed by stamping the anchor plate (11), the anchor plate (11) being screwed to the solenoid valve (20) through a padding blade (60) which covers openings formed during bending of the hinge docks (15).

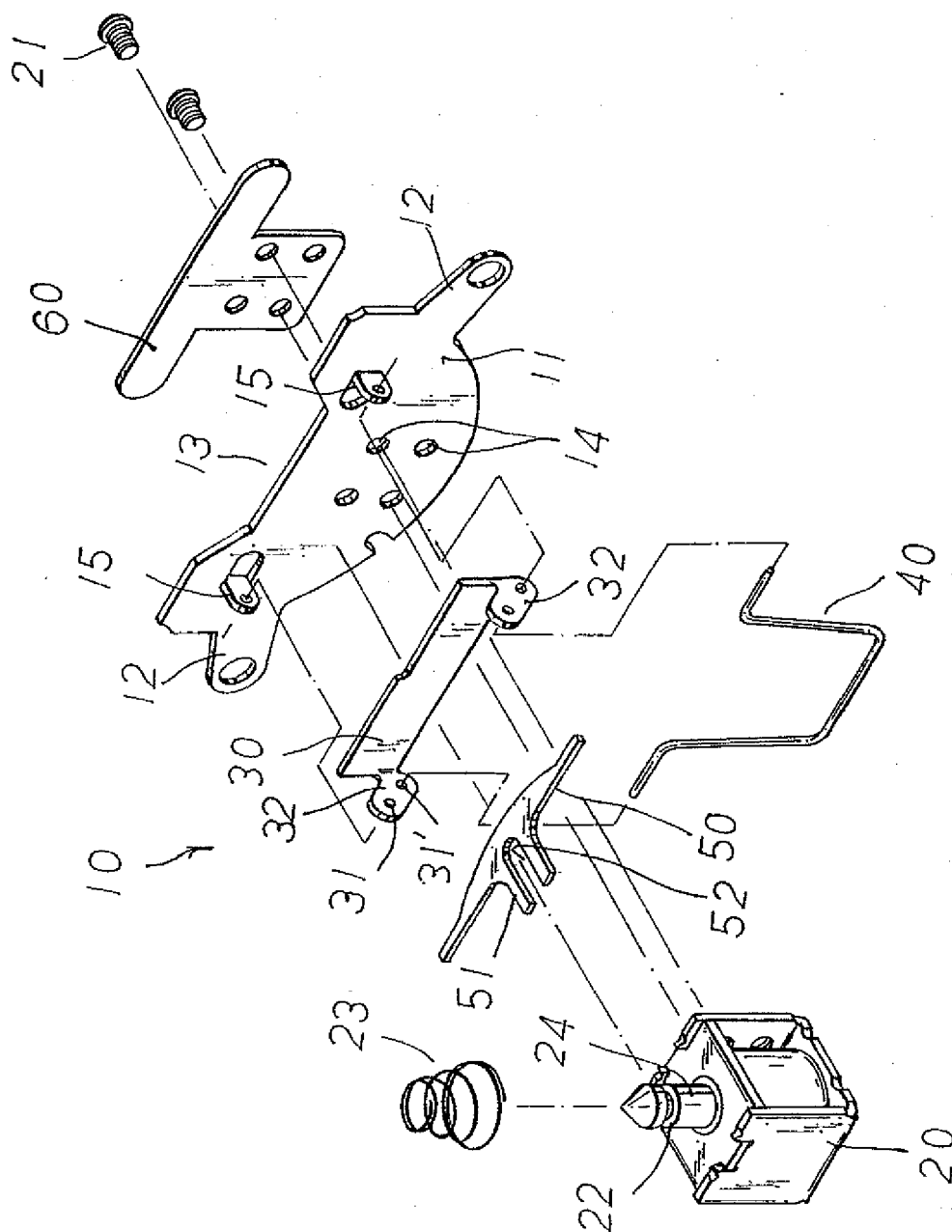


FIG.1

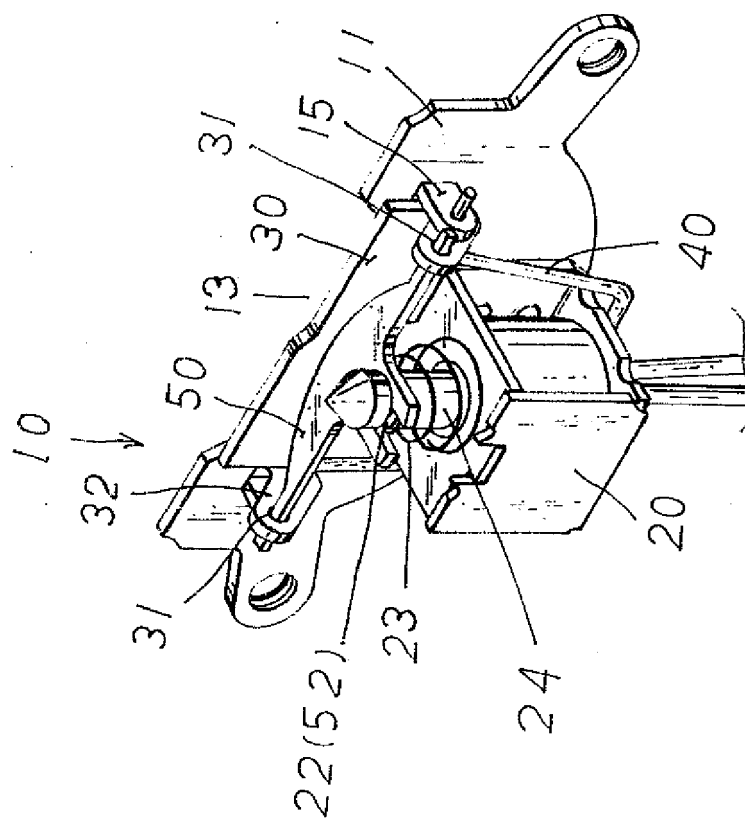


FIG. 2

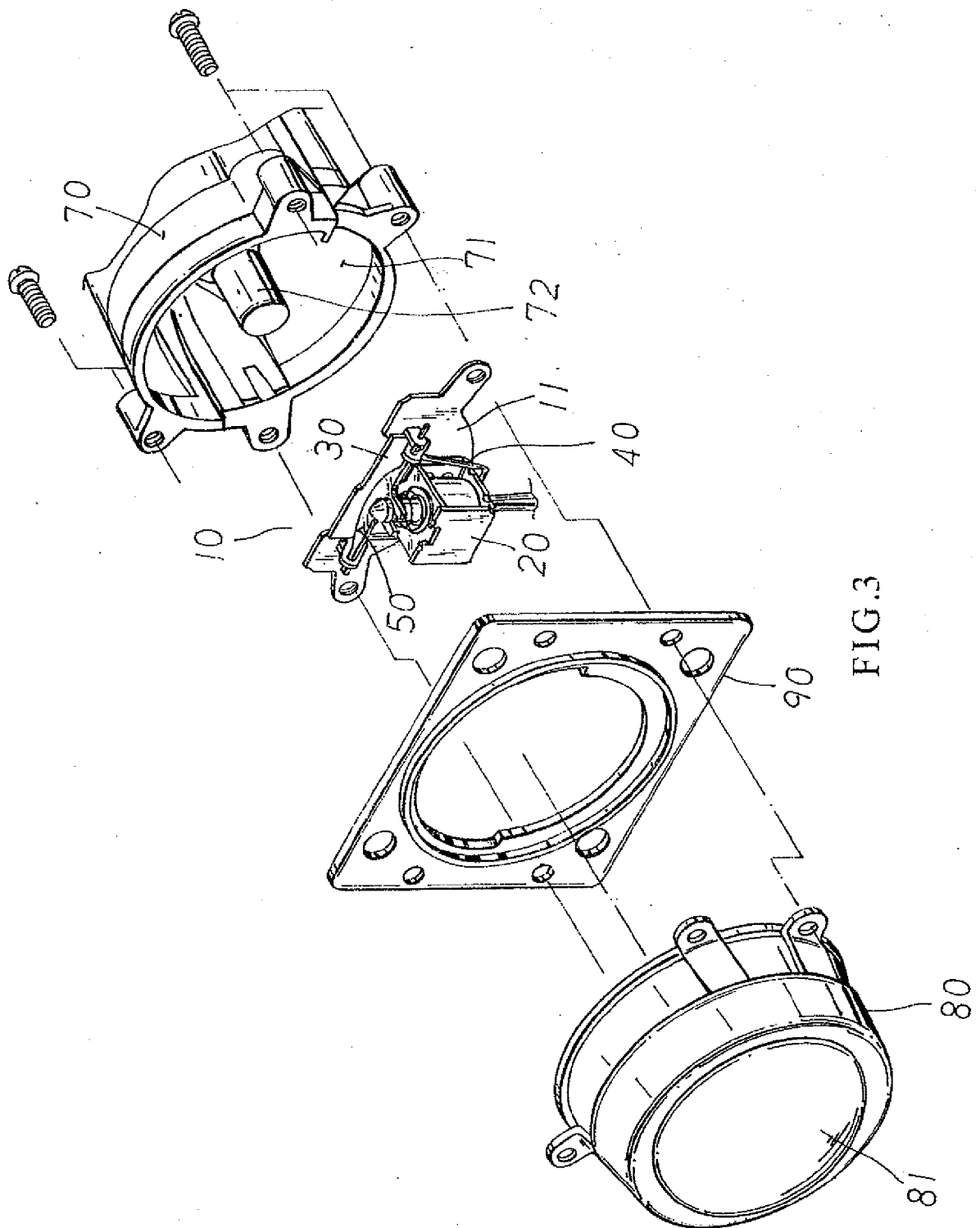


FIG.3

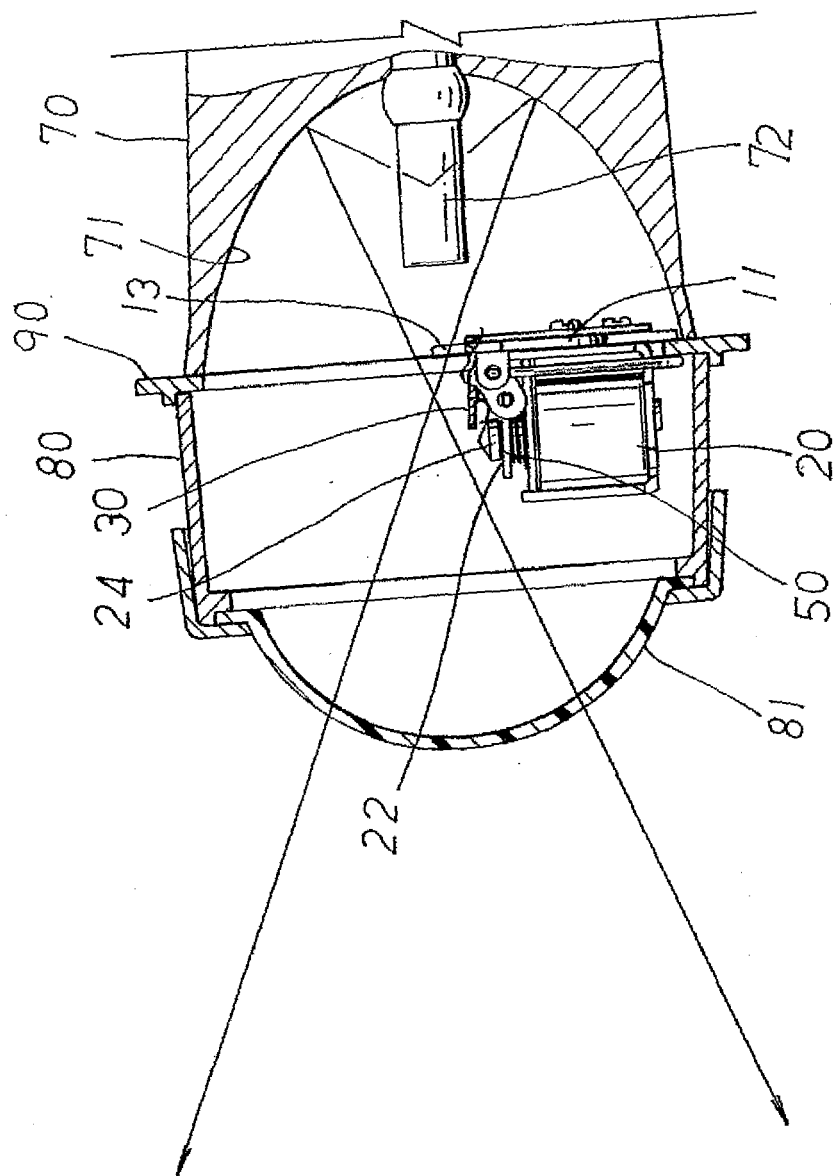


FIG.4

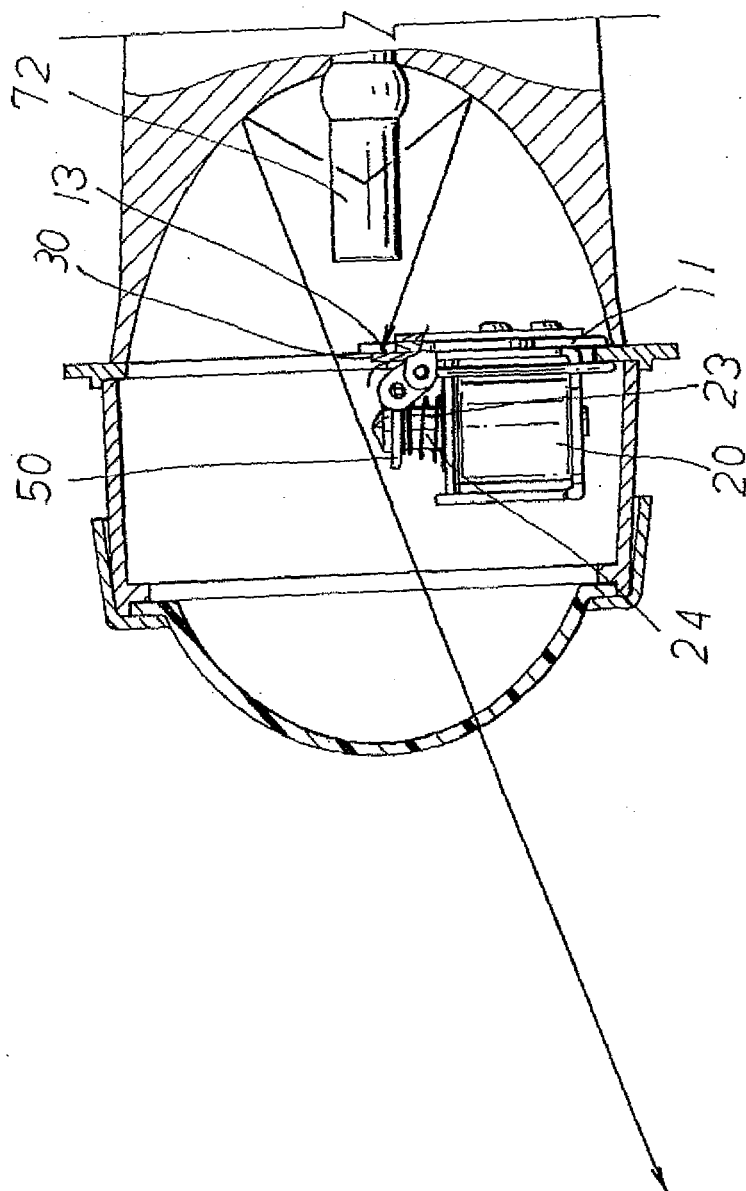


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 06 10 1134

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	DE 20 2004 020183 U1 (WANG, JEN-MAO; LEE, JIHN-SHIUN) 24 March 2005 (2005-03-24) * paragraph [0018] - paragraph [0024]; figures 1-5 *	1-4	INV. F21V14/08 B60Q1/14
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A	----- DE 198 43 287 A1 (VALEO VISION, BOBIGNY, FR) 1 April 1999 (1999-04-01) * column 2, line 19 - column 4, line 15; figures 1-4 *	1-4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		21 April 2006	Arboreanu, A
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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EP 06 10 1134

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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21-04-2006

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