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(54) Multi-function lighting device

(57) A multi-function lighting device includes a barrel (10), a lamp (14) mounted on one end of the barrel (10), a tubular coupling member (20) secured around one end of the barrel (10), a tubular sleeve member (30) made of a light transmittable material and sleeved slidably on the coupling member (20), and a head cap (40) secured to one end of the sleeve member (30) and provided with a reflector (41) therein. The sleeve member

(30) is shiftable with respect to the coupling member (20) between a first position, wherein the lamp (14) extends into the reflector (41) so that light may be directed axially, and a second position, wherein the lamp (14) is located in the sleeve member (30) so that light can pass transversely through the sleeve member (30).

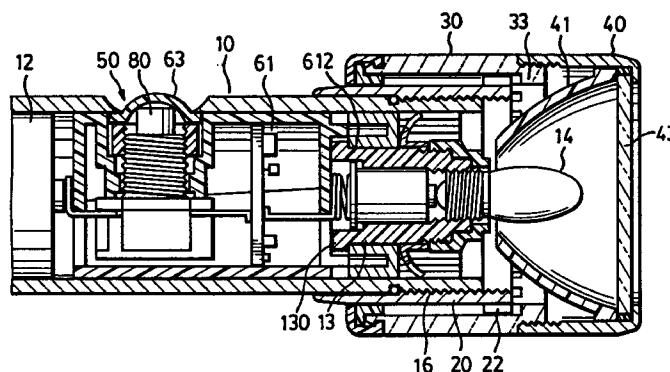


FIG. 1

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Description

The invention relates to a lighting device, more particularly to a multi-function lighting device which can be operated as a flashlight and as a signaling baton, and which is capable of providing a blinking light output.

A conventional variable focusing flashlight disclosed in U.S. Patent No. 5,213,408 comprises a conductive barrel for housing a battery therein, a tail cap mounted on one end of the barrel and provided with a compression spring for urging the battery towards the other end of the barrel, a lamp base for mounting a lamp adjacent to the other end of the barrel, and a head assembly mounted rotatably on the other end of the barrel and provided with a planar lens and a parabolic reflector with an open tail end to receive the lamp. The lamp base includes a stationary receptacle mounted in the other end of the barrel, first and second conductors mounted in the stationary receptacle and connected electrically and respectively to lamp terminals of the lamp, and a movable receptacle extending through the stationary receptacle and having a first end abutting against the battery and a second end abutting against the open tail end of the reflector. The first conductor has one end extending radially along the bottom side of the stationary receptacle within the barrel. The second conductor couples electrically the lamp and the barrel.

The head assembly is mounted threadedly to the barrel so as to be controllably translatable therealong when rotated with respect to the barrel, thereby resulting in a variable focusing effect. Rotation of the head assembly in a direction to result in movement toward the barrel eventually causes the reflector to push the movable receptacle and the battery and move the battery away from the first conductor, thereby breaking electrical connection between the lamp and the battery.

In the aforementioned conventional flashlight, rotation of the head assembly is performed to activate and vary focusing of the flashlight. Since the light output of the conventional flashlight is directed only through the head assembly, the flashlight is not ideal for use as a lantern or as a signaling baton.

A conventional multi-function lighting device disclosed in U.S. Patent No. 5,412,548 comprises a head section and an elongate handle. The head section includes a slidable coupling which is sleeved on the elongate handle so as to be longitudinally shiftable over the latter, an axially extending elongate sleeve which is secured to and shiftable with the coupling and which is made of a transparent or translucent material so as to permit transmission of light therethrough, and an end cap which is secured to the elongate sleeve and which has a reflector provided therein. A light source is mounted on one end of the elongate handle. By shifting the head section over the elongate handle, the light source may be made to project into the reflector in the same manner as an ordinary flashlight, or may be located within the elongate sleeve to permit use of the lighting device as a signaling baton.

Although the head section is longitudinally shiftable over the elongate handle, the head section cannot be maintained at a desired position relative to the elongate handle. Thus, the conventional lighting device cannot maintain a desired focusing effect.

Another conventional flashlight disclosed in U.S. Patent No. 5,282,116 comprises a barrel for housing a battery therein, and a switch assembly having a switch casing fitted in the barrel adjacent to one end of the latter, and a switching element disposed within the switch casing and connected electrically to the battery via a conductor. A lamp socket assembly is disposed in the barrel and includes a conductive lamp holder which retains a lamp at a front end thereof and which is mounted on one end of the switch casing at a rear end thereof, a tubular insulator which extends into the rear end of the lamp holder, and a conductive compression spring which extends into the insulator and which connects electrically the switching element and the lamp. A conductive coupling unit is disposed inside the barrel around the lamp holder to connect electrically the barrel and the lamp holder. A head assembly is mounted threadedly on a front end of the barrel so as to be controllably translatable therealong to achieve a variable focusing effect. The switching element has a button unit which extends out of a radial opening formed in the barrel and which is operable so as to selectively activate of the flashlight.

Like the conventional flashlight described beforehand, this conventional flashlight is also not ideal for use as a lantern or as a signaling baton.

A signaling baton which can provide a blinking light output is known in the art. However, the known signaling baton cannot function as a flashlight. In addition, a conventional flashlight which can provide a blinking light output is also known in the art. However, the known flashlight requires two switch units, one to control activation of the flashlight and the other to control blinking operation of the same, thereby resulting in a larger and more complicated construction.

Therefore, the object of the present invention is to provide a multi-function lighting device which can be operated as a flashlight and as a signaling baton and which is capable of providing a blinking light output.

Accordingly, the multi-function lighting device of the present invention includes a barrel, a lamp mounted on one end of the barrel, a tubular coupling member secured around one end of the barrel, a tubular sleeve member made of a light transmittable material and sleeved slidably on the coupling member, and a head cap secured to one end of the sleeve member and provided with a reflector therein. The sleeve member is shiftable with respect to the coupling member between a first position, wherein the lamp extends into the reflector so that light may be directed axially, and a second position, wherein the lamp is located in the sleeve member so that light can pass transversely through the sleeve member. The barrel houses a battery therein, and a switch assembly is mounted in the barrel and is

connected electrically to the battery and the lamp. The switch assembly is operable so as to interconnect electrically and selectively the battery and the lamp and so as to cause the lamp to generate one of a constant light output and a blinking light output. The switch assembly comprises: an insulated hollow seat member mounted to the barrel and having angularly spaced first, second and third electrical contacts mounted thereon, the first electrical contact being connected electrically to the battery, the second electrical contact being connected electrically to the lamp; a pulse generating circuit having an input terminal connected electrically to the third electrical contact and an output terminal connected electrically to the lamp; and a conductive connector disposed rotatably in the seat member and formed with a pair of conductive contacts, the connector being manually operable to rotate relative to the seat member among a switch-off position, wherein the conductive contacts of the connector are not in contact with the electrical contacts on the seat member so as to turn off the lamp, a first switch-on position, wherein the conductive contacts of the connector are in contact with the first and second electrical contacts on the seat member so as to control the lamp to generate the constant light output, and a second switch-on position, wherein the conductive contacts of the connector are in contact with the first and third electrical contacts on the seat member so as to control the lamp to generate the blinking light output.

Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

Figure 1 is a fragmentary sectional view of the preferred embodiment of a multi-function lighting device according to the present invention;

Figure 2 is an exploded perspective view of a head assembly of the preferred embodiment;

Figure 3 is an exploded perspective view illustrating a switch assembly and a lamp socket assembly of the preferred embodiment;

Figure 4 is an exploded perspective view of a seat member and a button unit of the switch assembly of the preferred embodiment;

Figure 5 is a fragmentary enlarged view in which an annular inner wall of a cylindrical head of the seat member is translated onto a plane;

Figure 6 is a schematic electrical circuit diagram of a pulse generating circuit of the preferred embodiment;

Figure 7 is a sectional view of the switching element of the preferred embodiment;

Figure 8 is a sectional view of the preferred embodiment when operated in a flashlight mode;

Figure 9 is a sectional view of the preferred embodiment when operated as a signaling baton;

Figure 10 is a bottom view illustrating a conductive connector and electrical contacts on the seat member when the connector is in a switch-off position;

Figure 11 is a bottom view illustrating the conductive connector and the electrical contacts on the seat member when the connector is in a first switch-on position;

Figure 12 is a bottom view illustrating the conductive connector and the electrical contacts on the seat member when the connector is moved from the first switch-on position to a second switch-on position; and

Figure 13 is a view in which the annular inner wall of the cylindrical head of the seat member is translated onto a plane to illustrate operation of the switch assembly.

Referring to Figure 1, the preferred embodiment of a multi-function lighting device according to the present invention is shown to comprise a barrel 10, a head assembly including a coupling member 20, a sleeve member 30 and a head cap 40, and a switch assembly 50.

The barrel 10 houses a battery 12 therein. The switch assembly 50 is mounted in the barrel 10 adjacent to a front end of the latter. A conductive lamp socket 13 is mounted in the front end of the barrel 10 and has a lamp 14 retained thereon. The front end of the barrel 10 is formed with an external screw thread 16.

Referring to Figures 1 and 2, the coupling member 20 is formed as a cylindrical tube and has an outer wall surface 21 formed with at least one locking projection 22, and an inner wall surface 23 formed with a screw thread 24 for engaging threadedly the screw thread 16 on the front end of the barrel 10. A seal ring 25 is disposed around the coupling member 20.

The sleeve member 30 is formed as an elongate cylindrical tube that is made of a transparent or translucent material so as to permit the transmission of light therethrough. Preferably, the sleeve member 30 is made of a colored, light transmittable material. The sleeve member 30 has a front end portion 300 formed with a screw thread 31 at an outer wall surface and a plurality of angularly spaced splines 33 at an inner wall surface 32. Adjacent splines 33 define a spline groove 330 therebetween for engaging removably the locking projection 22 on the coupling member 20. The sleeve member 30 further has a rear end portion formed with an annular retaining groove 35 for engaging an annular cap 36.

The head cap 40 is provided with a planar lens 43 and a parabolic reflector 41 with an open tail end to receive the lamp 14. The head cap 40 has an inner wall surface provided with a screw thread 42 for engaging threadedly the screw thread 31 on the sleeve member 30.

When installing the head assembly, the annular cap 36 and the seal ring 25 are initially removed from the sleeve member 30 and the coupling member 20, respectively. The coupling member 20 is then inserted through the sleeve member 30 via the rear end portion of the latter. Afterwards, the seal ring 25 is disposed around one end of the coupling member 20 opposite to

the locking projection 22, and the sealing cap 36 is engaged within the retaining groove 35 of the sleeve member 30. Thereafter, the coupling member 20 is mounted on the barrel 10 by virtue of engagement between the screw threads 16, 24, and the head cap 40 is mounted on the sleeve member 30 by virtue of engagement between the screw threads 31, 42.

When the preferred embodiment is operated in a flashlight mode, the head assembly is pulled toward the barrel 10 so that the lamp 14 extends into the reflector 41 in order to direct light axially. Light is unable to pass through the sleeve member 30 at this time. It is noted that direct rotation of the coupling member 20 relative to the barrel 10 is not possible when it is desired to vary the focusing of the preferred embodiment since the coupling member 20 is concealed within the sleeve member 30. However, in view of the engagement between the locking projection 22 on the coupling member 20 and the splines 33 on the sleeve member 30, rotation of the sleeve member 30 will cause the coupling member 20 to rotate therewith, as shown in Figure 8. Since the screw threads 16, 24 mount adjustably the coupling member 20 on the barrel 10, the desired focusing can be maintained when the preferred embodiment is in use.

When operating the preferred embodiment as a signaling baton, the head assembly is pulled away from the barrel 10 so as to shift the sleeve member 30 with respect to the coupling member 20 such that the coupling member 20 ceases to be concealed within the sleeve member 30, as shown in Figure 9. The locking projection 22 on the coupling member 20 ceases to engage the splines 33 on the sleeve member 30, and thus, rotation of the sleeve member 30 will not result in corresponding rotation of the coupling member 20. The seal ring 25 abuts against the locking projection 22 to limit movement of the sleeve member 30 relative to the coupling member 20, and the annular cap 36 prevents removal of the seal ring 25. At this time, the lamp 14 is located in the sleeve member 30 so that light can pass transversely through the sleeve member 30.

Aside from providing a waterproofing effect, the seal ring 25, which is disposed around the coupling member 20, is in tight frictional contact with the coupling member 20 and the sleeve member 30 to provide resistance to sliding movement of the sleeve member 30 relative to the coupling member 20. Thus, when the preferred embodiment is placed uprightly and face down on a flat surface, such as a table top, the sleeve member 30 can be retained at a desired position with respect to the coupling member 20 to permit operation of the preferred embodiment as a lantern.

Referring to Figures 1, 3 and 4, the switch assembly 50 is connected electrically to the battery 12 in the barrel 10 and to the lamp 14 via the lamp socket 13. The switch assembly 50 comprises a switch casing 60 and a switching element which is mounted inside the switch casing 60 and which includes a seat member 70, a button unit 80 and a pulse generating circuit 90.

As shown in Figure 3, the switch casing 60 includes

first and second casing parts 61, 64, a locking unit 62, and a cover plate 63. The first casing part 61 is in the shape of a segmented cylinder while the second casing part 64 is in the shape of a complementary segmented cylinder. The first and second casing parts 61, 64 have abutting surfaces which comprise sloping planes that incline longitudinally relative to an axis of the switch casing 60 and that have a conforming sloping relationship so that the first and second casing parts 61, 64 sealingly engage each other when the switch casing 60 is fitted in the barrel 10. The first casing part 61 is formed with a radial button retaining passage 611. The first casing part 61 further has a connecting end 612 which is adapted to engage a corresponding connecting end 130 of the lamp socket 13.

As shown in Figure 4, the seat member 70 includes a hollow cylindrical base 72 and a hollow cylindrical head 71 that extends from the cylindrical base 72. The cylindrical base 72 and the cylindrical head 71 respectively confine first and second chambers 73, 74. The cylindrical head 71 has an outer wall surface formed with a screw thread 711 which engages the locking unit 62 to retain the seat member 70 in the switch casing 60 (see Figure 3). As shown in Figure 5, the first chamber 73 is confined by an annular inner wall surface which is formed with a plurality of angularly spaced and vertically extending ribs 7311 that define a plurality of slide grooves 7313. Each rib 7311 has an inclined lowermost end surface 7312 which slopes from one adjacent slide groove 7313 to another adjacent slide groove 7313. In the present embodiment, the switch assembly 50 is provided with eight ribs 7311. Referring again to Figure 4, the cylindrical base 72 is formed with three angularly spaced and axially extending slits 741, 742, 743, and three downwardly projecting positioning pins 744, 745, 746 disposed adjacent to the slits 741, 742, 743, respectively, as shown in Figure 7. The seat member 70 is made of an insulator material and has first, second and third electrical contacts 75, 78, 77 mounted thereon. In this embodiment, the electrical contacts 75, 78, 77 extend radially into the cylindrical base 72 via the slits 741, 742, 743 and are secured respectively to the positioning pins 744, 745, 746. The first electrical contact 75 is formed with a downwardly extending contact plate portion 750 and is to be connected electrically to the battery 12. The second electrical contact 78 is to be connected electrically to the lamp 14. A bottom cover 76 is secured to the cylindrical base 72 to close the bottom end of the latter. The bottom cover 76 is formed with three angularly spaced and upwardly extending wall segments 761, 762, 763 which extend respectively into the slits 741, 742, 743 of the cylindrical base 72 for supporting the electrical contacts 75, 78, 77 on the positioning pins 744, 745, 746.

Referring once more to Figure 4, the button unit 80 includes a tubular push rod 81, a tubular rotatable rod 82, a conductive connector 83 and a coil spring 84.

The rotatable rod 82 has a closed upper end portion and an open lower end portion. The lower end por-

tion is formed with an outwardly extending radial flange 821. The radial flange 821 has a plurality of angularly spaced protrusions 822 which project outwardly and radially therefrom. In this embodiment, the radial flange 821 is formed with four protrusions 822. Each of the protrusions 822 has an inclined uppermost end surface which complements the inclined lowermost end surface 7312 of the ribs 7311. The protrusions 822 extend movably and respectively into the slide grooves 7313. The radial flange 821 further has an upper end surface formed with a plurality of angularly arranged teeth 823. The rotatable rod 82 further has two diametrically opposite connecting pins 824 which extend downwardly. The rotatable rod 82 is to be disposed movably and rotatably in the cylindrical head 71 of the seat member 70, as shown in Figure 7.

The push rod 81 is disposed movably in the cylindrical head 71 and is sleeved on the rotatable rod 82. The push rod 81 has a closed upper end portion and an open lower end portion formed with a plurality of angularly arranged teeth 811 and a plurality of angularly spaced projections 812. In this embodiment, the push rod 81 is formed with four projections 812. The projections 812 project outwardly and radially from the lower end portion of the push rod 81 and respectively have an inclined lowermost end 8121. Like the protrusions 822, the projections 812 also extend movably and respectively into the slide grooves 7313.

The conductive connector 83 includes a conductive base plate 831 and a tubular shaft 830 which extends upwardly from the base plate 831. The tubular shaft 830 confines an axial through-hole 832 therethrough. The base plate 831 has a periphery formed with a pair of diametrically opposite retaining notches 833 and a pair of diametrically opposite and outwardly extending conductive contacts 834. The rotatable rod 82 is sleeved on the tubular shaft 830 such that the connecting pins 824 extend through the retaining notches 833, thereby enabling the conductive connector 83 to rotate with the rotatable rod 82, as shown in Figure 7. Rotation of the conductive connector 83 causes the conductive contacts 834 to make or break electrical connection with the electrical contacts 75, 78, 77 on the seat member 70.

The coil spring 84 has an upper section 840 and a lower section 841 which is wider than the upper section 840. The conductive connector 83 is sleeved on the coil spring 84 such that the upper section 840 of the latter extends through the through-hole 832 in the tubular shaft 830 to abut against the upper end portion of the rotatable rod 82 in order to maintain a clearance between the lower end portion of the rotatable rod 82 and the base plate 831 of the conductive connector 83, and such that the base plate 831 is supported on the lower section 841 of the coil spring 84 to bias the base plate 831 upwardly in order to achieve proper contact with the electrical contacts 75, 78, 77. The lower section 841 of the coil spring 84 is then retained on a spring guide 764 that is formed on a base plate 760 of the bottom cover 76.

Referring now to Figure 6, the pulse generating circuit 90 used in the preferred embodiment is configured as a charge-discharge circuit and has an input terminal 92 which is connected electrically to the third electrical contact 77 on the seat member 70, and an output terminal 93 which is connected electrically to the lamp 14. A pulse train signal is generated at the output terminal 93 whenever the input terminal 92 is connected to the battery 12 via the conductive connector 83 and the first electrical contact 75.

Referring to Figure 7, the switch assembly 50 is assembled as follows: The push rod 81 is extended into the seat member 70 such that the projections 812 on the push rod 81 extend into the slide grooves 7313 between the ribs 7311 in the cylindrical head 71 of the seat member 70 and such that the push rod 81 extends out of the cylindrical head 71. The rotatable rod 82 is then extended into the push rod 81 via the open lower end portion of the latter. At this time, the protrusions 822 on the rotatable rod 82 also extend into the slide grooves 7313 of the seat member 70. The conductive connector 83 and the coil spring 84 are installed afterward. As mentioned beforehand, the upper section 840 of the coil spring 84 extends through the through-hole 832 in the tubular shaft 830 of the conductive connector 83 to abut against the upper end portion of the rotatable rod 82 in order to maintain a clearance between the lower end portion of the rotatable rod 82 and the base plate 831 of the conductive connector 83. The bottom cover 76 is then installed on the cylindrical base 72 of the seat member 70 to close the second chamber 74. The lower section 841 of the coil spring 84 is retained on the spring guide 764 of the bottom cover 76 at this time. The seat member 70 is mounted in the button retaining passage 611 of the switch casing 61 by the locking unit 62 (see Figure 3). Prior to fitting of the switch casing 61 in the barrel 10, the cover plate 63 is installed in the barrel 10 adjacent to a radial opening in the latter such that a flexible dome-shaped portion of the same extends out of the radial opening, as shown in Figure 1. When the switch casing 61 is installed in the barrel 10, the button unit 80 extends through the radial opening and is covered by the cover plate 63. The button unit 80 can be operated at this time.

The lamp 14 can be controlled to operate in a deactivated state, in a constant light output state, or in a blinking light output state by applying pressure on the push rod 81. Referring to Figures 4, 7 and 13, the teeth 811 of the push rod 81 of the button unit 80 are initially misaligned with the teeth 821 of the rotatable rod 82. When pressure is applied on the upper end portion of the push rod 81, the push rod 81 moves axially downward relative to the seat member 70 to cause corresponding movement of the rotatable rod 82 and compression of the coil spring 84 so as to move the protrusions 822 of the rotatable rod 82 away from the slide grooves 7313 and so as to cause the teeth 811 of the push rod 81 of the button unit 80 to engage completely the teeth 821 of the rotatable rod 82, thereby rotating

the rotatable rod 82 in order to misalign the protrusions 822 of the rotatable rod 82 with the slide grooves 7313 and cause the uppermost end surfaces of the protrusions 822 to abut against the lowermost end surface 7312 of the ribs 7311. When the applied pressure on the push rod 81 is removed, the coil spring 84 expands to bias the rotatable rod 82 toward the push rod 81, thereby causing the protrusions 822 of the rotatable rod 82 to move past the lowermost end surface 7312 of the ribs 7311 so as to extend once more into the slide grooves 7313 in order to rotate the rotatable rod 82.

It has thus been shown that application of pressure on the push rod 81 will cause the rotatable rod 82 to rotate by a predetermined angle. Since the base plate 831 of the conductive connector 83 is connected to the rotatable rod 82 via the connecting pins 824 and the notches 833, rotation of the rotatable rod 82 results in corresponding rotation of the conductive connector 83 to enable the latter to make or break electrical connection with the electrical contacts 75, 78, 77 on the seat member 70.

When the push rod 81 is operated so that the base plate 831 is in the position shown in Figure 10, the conductive contacts 834 on the conductive connector 83 are not in contact with any of the electrical contacts 75, 78, 77, thereby deactivating the lamp 14. The conductive connector 83 is in a switch-off position at this time.

When the push rod 81 is operated so that the base plate 831 is in the position shown in Figure 11, the conductive contacts 834 are connected electrically with the first and second electrical contacts 75, 78. Since the first and second electrical contacts 75, 78 are connected respectively to the battery 12 and the lamp 14, the lamp 14 is enabled to generate a constant light output. The conductive connector 83 is in a first switch-on position at this time.

When pressure is applied on the push rod 81 and then removed while the conductive connector 83 is in the first switch-on position, the conductive connector 83 rotates to the position shown in Figure 12. One of the conductive contacts 834 is connected electrically with the first electrical contact 75. The remaining conductive contact 834 is not connected with any of the other electrical contacts 78, 77. Thus, the lamp 14 is deactivated at this time.

When pressure is applied on the push rod 81 and then removed while the conductive connector 83 is in the position shown in Figure 12, the conductive connector 83 rotates such that the conductive contacts 834 are connected electrically with the first and third electrical contacts 75, 77. The pulse generating circuit 90 is connected to the battery 12 and is activated to generate a pulse train signal which is received by the lamp 14, thereby enabling the lamp 14 to generate a blinking light output. The conductive connector 83 is in a second switch-on position at this time.

Further operation of the push rod 81 while the conductive connector 83 is in the second switch-on position will result in movement of the conductive connector 83

to the switch-off position shown in Figure 10.

Claims

1. A multi-function lighting device including a barrel (10) and a lamp (14) mounted on one end of the barrel (10), characterized by a tubular coupling member (20) secured around said one end of the barrel (10), a tubular sleeve member (30) made of a light transmittable material and sleeved slidably on the coupling member (20), and a head cap (40) secured to one end of the sleeve member (30) and provided with a reflector (41) therein, the sleeve member (30) being shiftable with respect to the coupling member (20) between a first position, wherein the lamp (14) extends into the reflector (41) so that light may be directed axially, and a second position, wherein the lamp (14) is located in the sleeve member (30) so that light can pass transversely through the sleeve member (30).
2. The multi-function lighting device as claimed in Claim 1, characterized in that said one end of the barrel (10) is threaded externally and the coupling member (20) is threaded internally to engage threadably the barrel (10).
3. The multi-function lighting device as claimed in Claim 1, characterized in that said one end of the sleeve member (30) is threaded externally and the head cap (40) is threaded internally to engage threadably the sleeve member (30).
4. The multi-function lighting device as claimed in Claim 1, characterized in that said one end of the sleeve member (30) has an inner wall surface formed with a plurality of angularly spaced splines (33) which define a plurality of spline grooves (330), the coupling member (20) being formed with at least one radial locking projection (22) which extends removably into one of the spline grooves (330) to lock non-rotatably the sleeve member (30) onto the coupling member (20) so as to permit rotation of the coupling member (20) with the sleeve member (30) relative to the barrel (10) when the sleeve member (30) is in the first position.
5. The multi-function lighting device as claimed in Claim 4, further characterized in that the coupling member (20) has a seal ring (25) which is disposed therearound and which is in tight frictional contact with the coupling member (20) and the sleeve member (30) to permit retention of the sleeve member (30) at a desired position with respect to the coupling member (20).
6. The multi-function lighting device as claimed in Claim 5, further characterized in that the sleeve member (30) has an opposite end provided with an

annular cap (36) to prevent removal of the seal ring (25).

7. The multi-function lighting device as claimed in Claim 1, further characterized by a switch assembly (50) mounted in the barrel (10) and connected electrically to the lamp (14) and to a battery (12) housed in the barrel (10), the switch assembly (50) being operable so as to interconnect electrically and selectively the battery (12) and the lamp (14).
8. The multi-function lighting device as claimed in Claim 7, characterized by the switch assembly (50) including:

an insulated hollow seat member (70) mounted to the barrel (10) and having angularly spaced first, second and third electrical contacts (75, 78, 77) mounted thereon, the first electrical contact (75) being connected electrically to the battery (12), the second electrical contact (78) being connected electrically to the lamp (14); a pulse generating circuit (90) having an input terminal (92) connected electrically to the third electrical contact (77) and an output terminal (93) connected electrically to the lamp (14); and a conductive connector (83) disposed rotatably in the seat member (70) and formed with a pair of conductive contacts (834), the connector (83) being manually operable to rotate relative to the seat member (70) among a switch-off position, wherein the conductive contacts (834) of the connector (83) are not in contact with the electrical contacts (75, 78, 77) on the seat member (70) so as to turn off the lamp (14), a first switch-on position, wherein the conductive contacts (834) of the connector (83) are in contact with the first and second electrical contacts (75, 78) on the seat member (70) so as to control the lamp (14) to generate a constant light output, and a second switch-on position, wherein the conductive contacts (834) of the connector (83) are in contact with the first and third electrical contacts (75, 77) on the seat member (70) so as to control the lamp (14) to generate a blinking light output.

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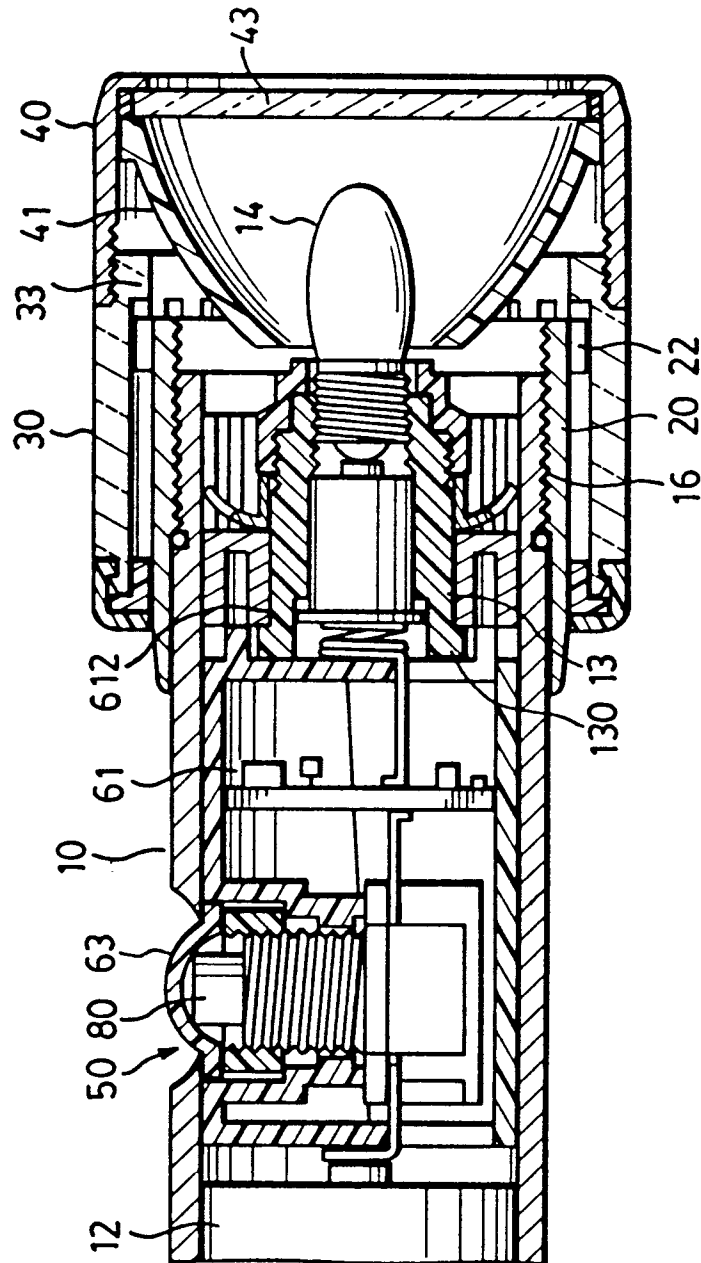


FIG.1

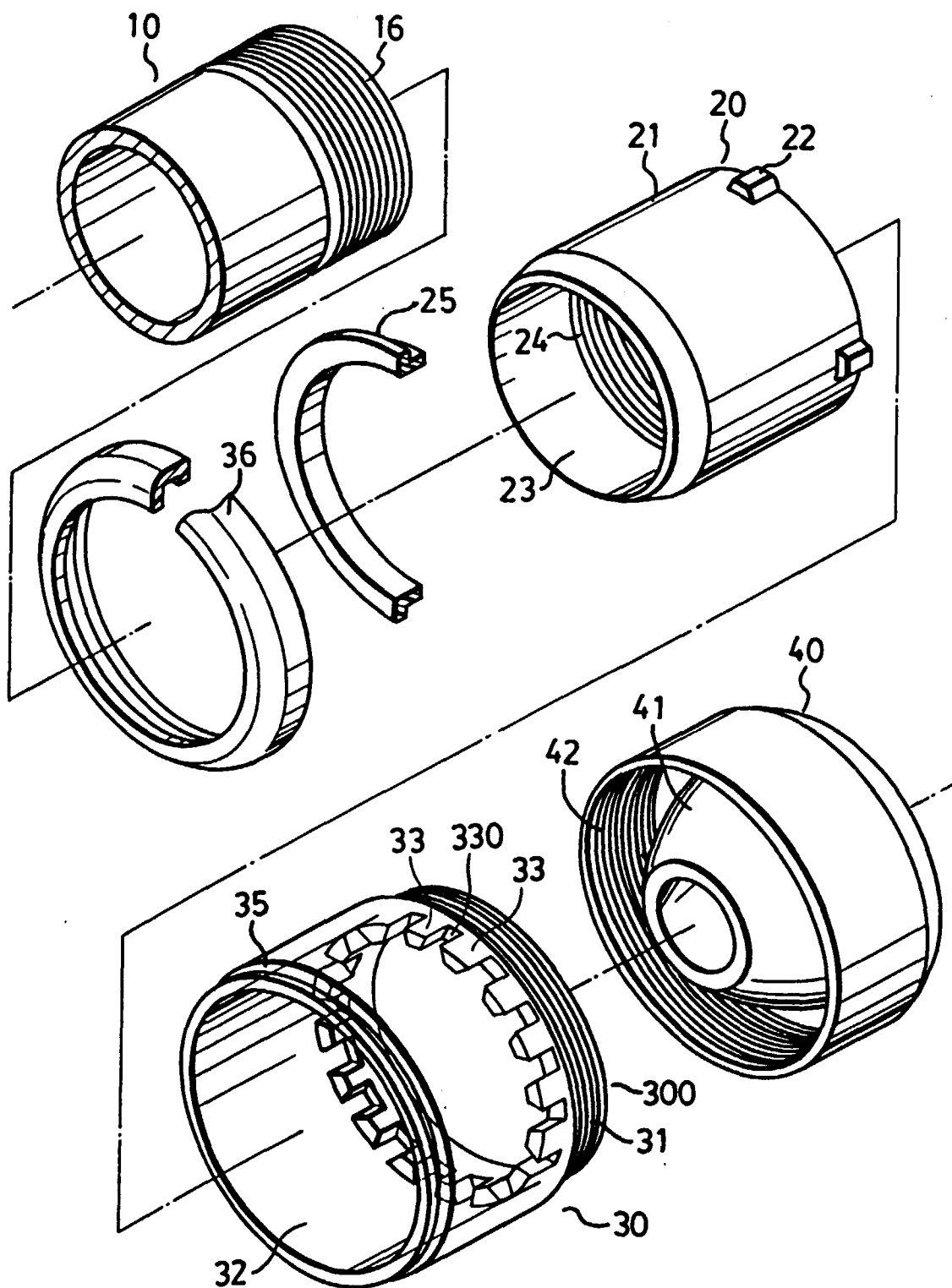


FIG.2

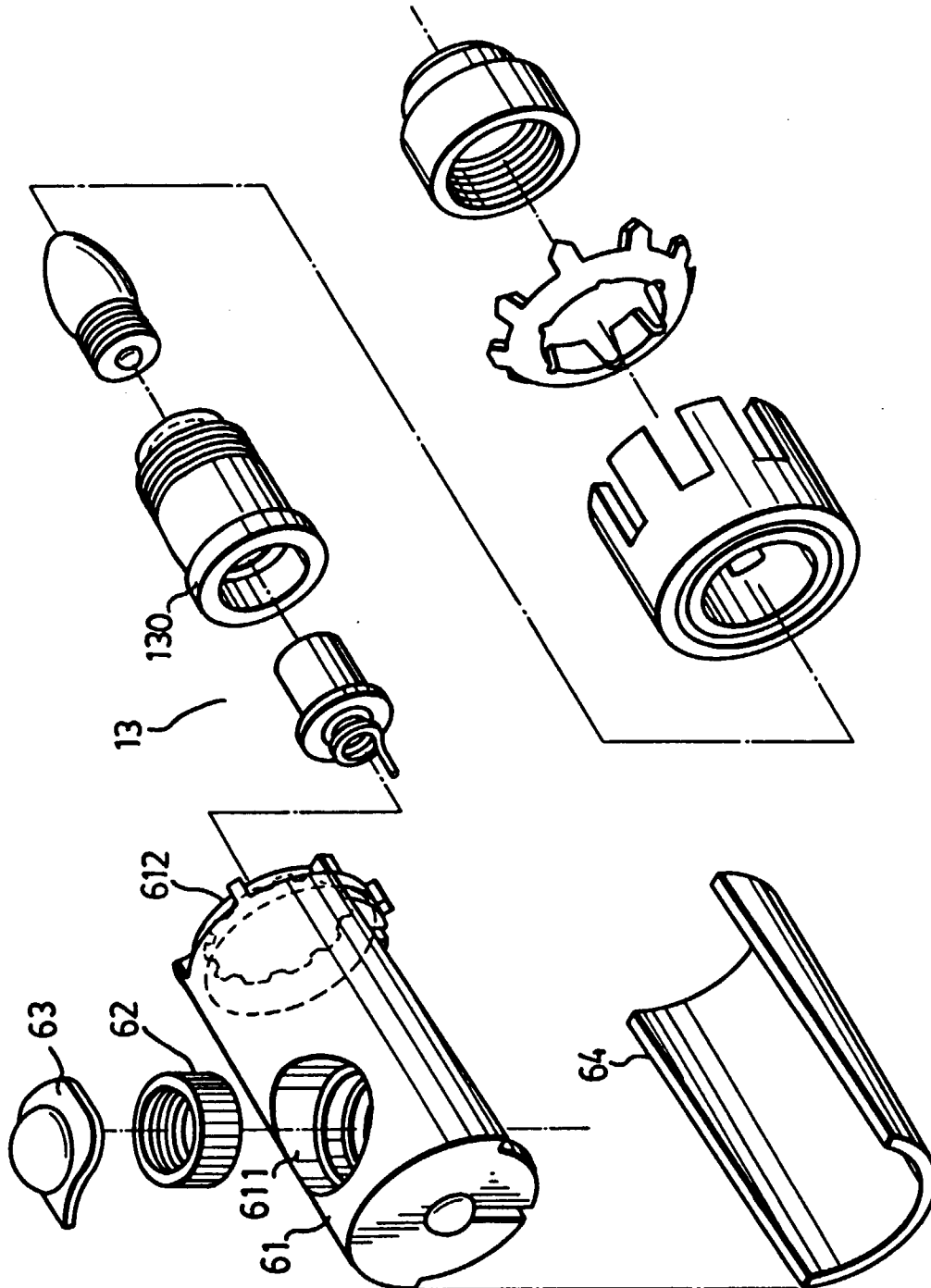


FIG.3

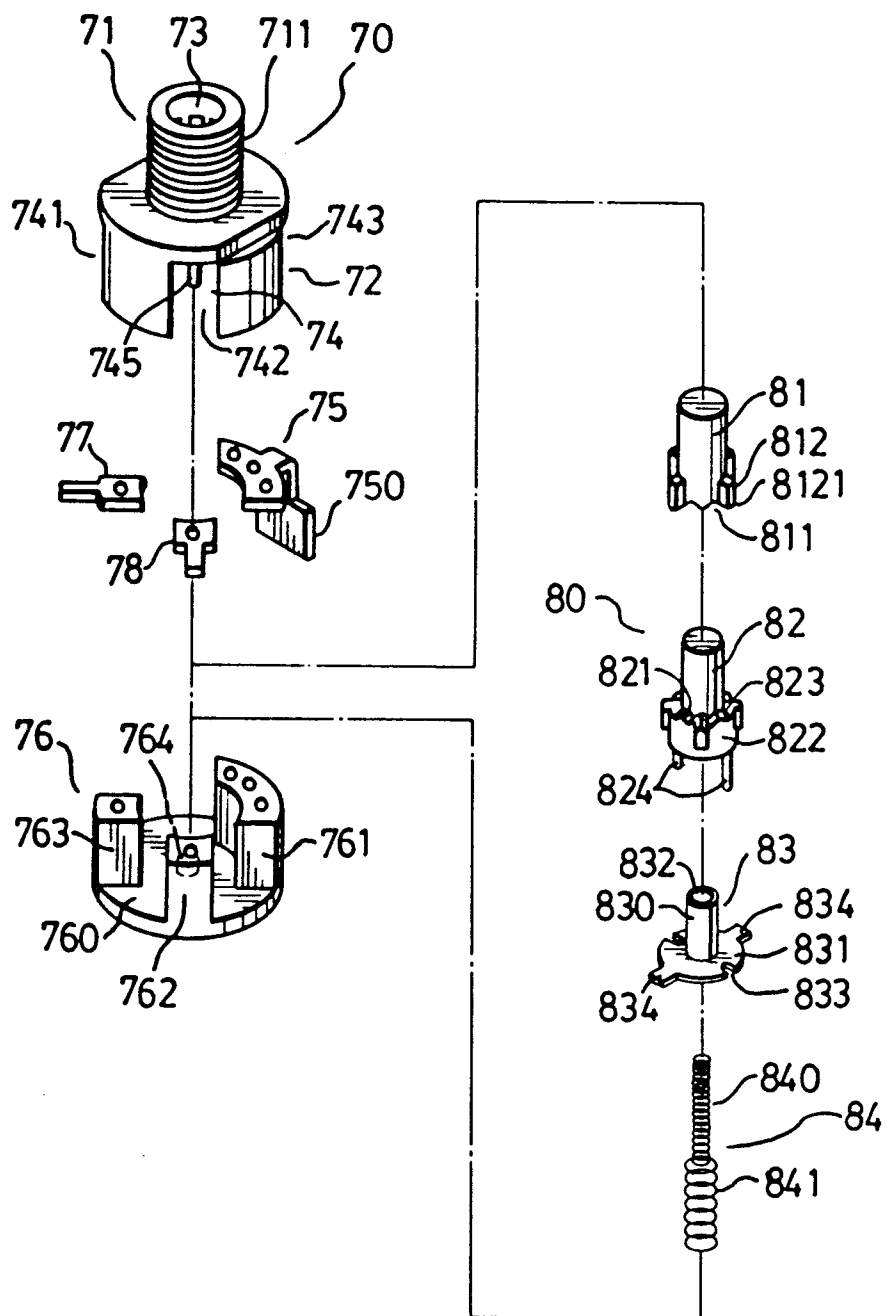


FIG. 4

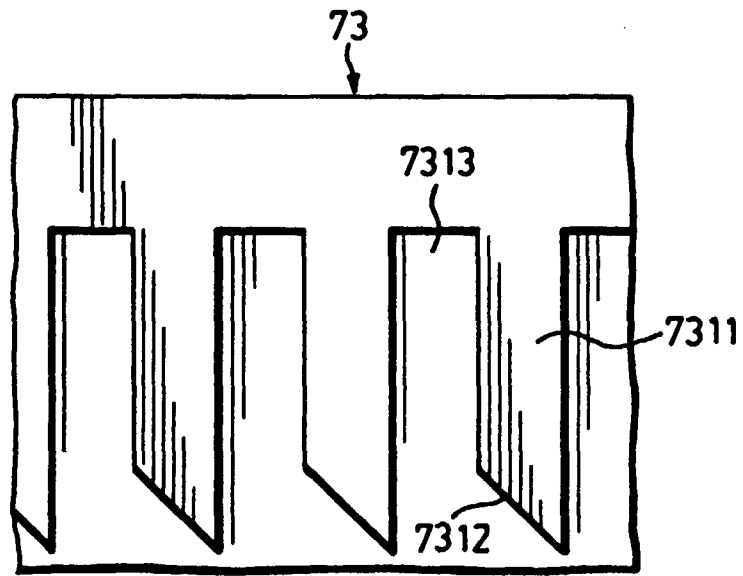


FIG.5

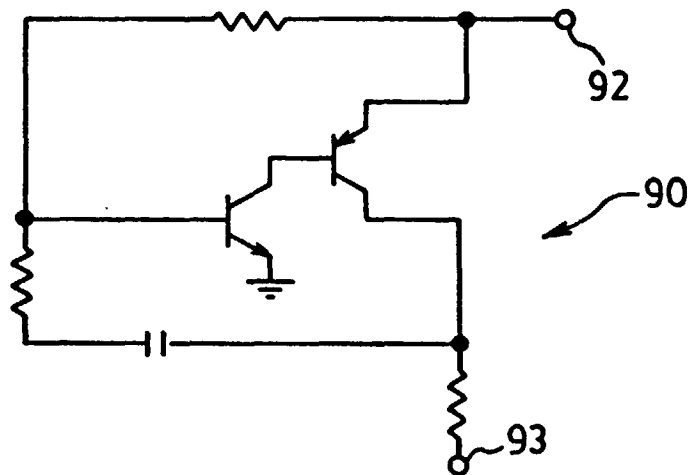


FIG.6

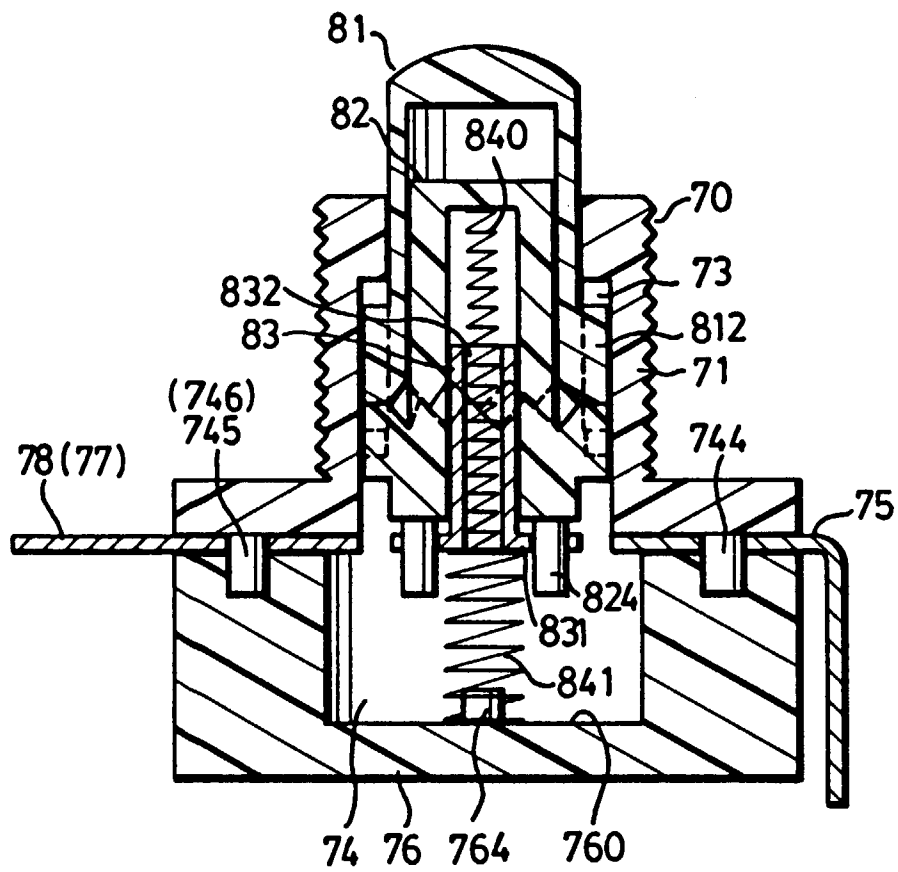


FIG.7

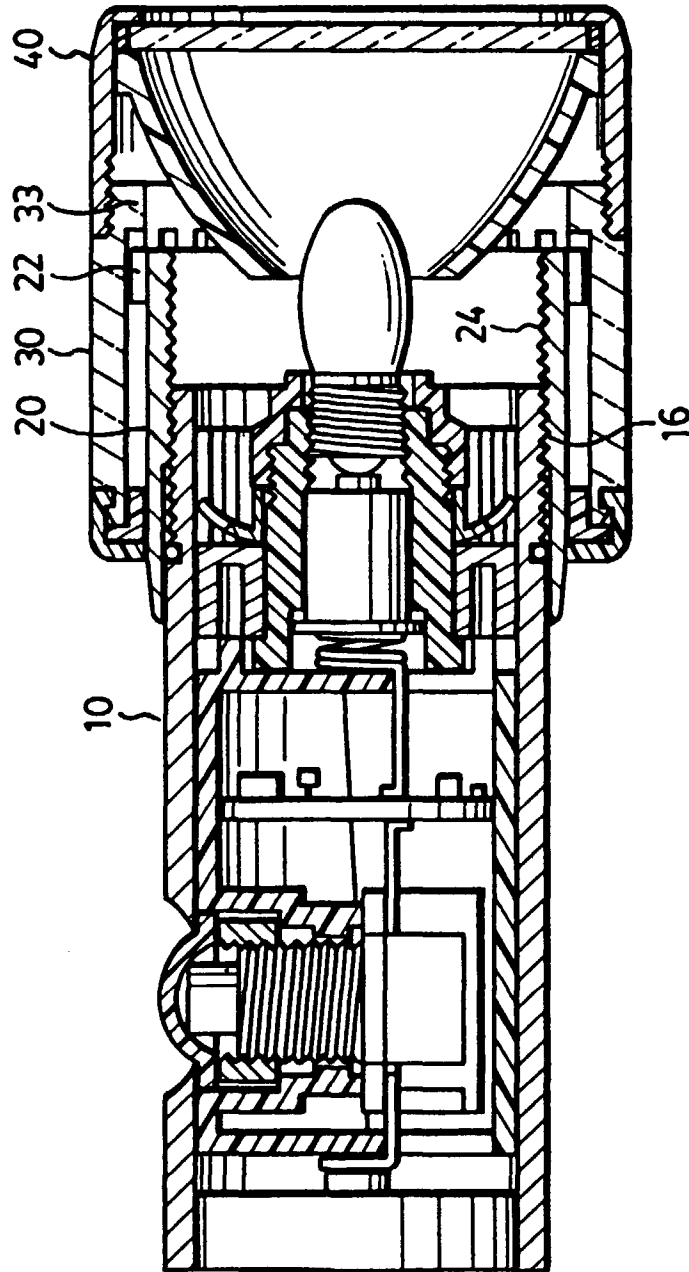


FIG. 8

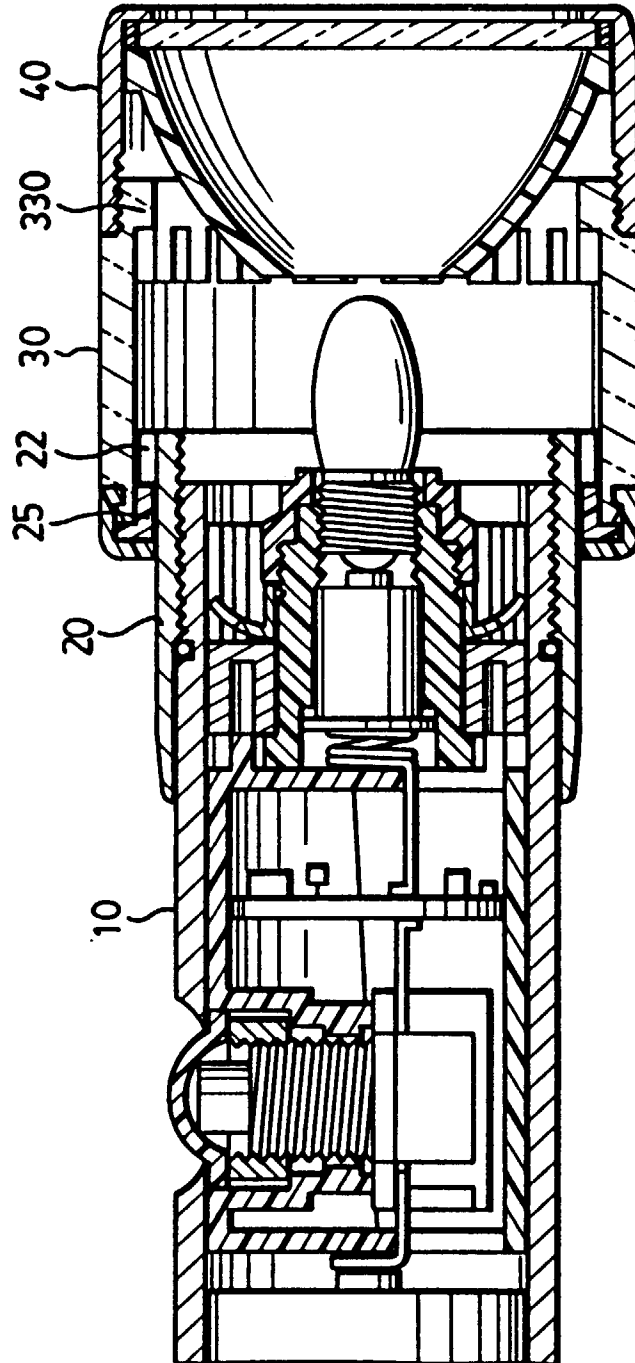


FIG.9

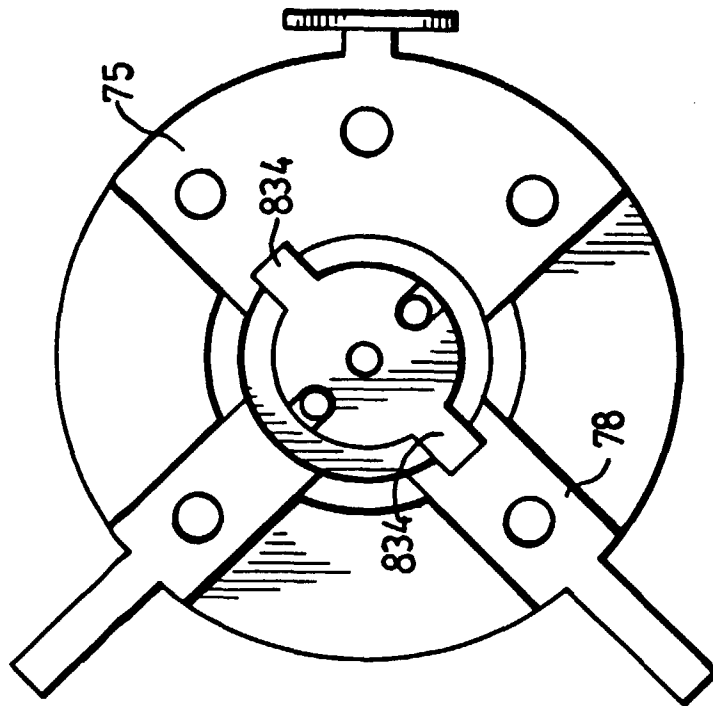


FIG.11

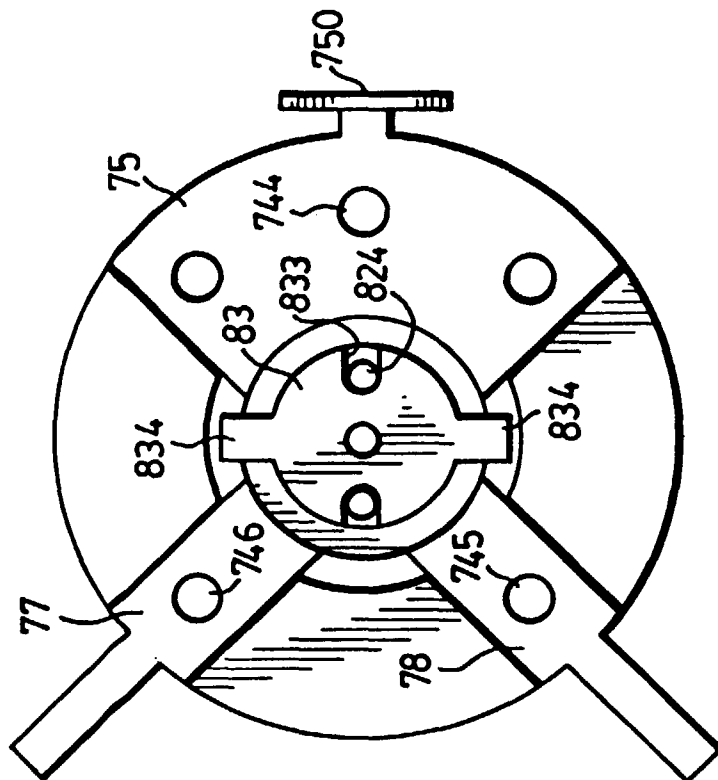


FIG.10

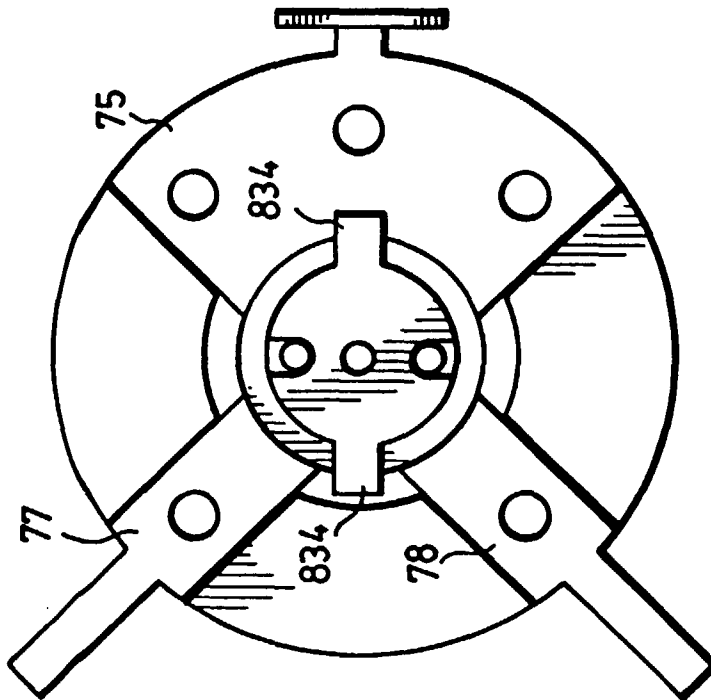


FIG.12

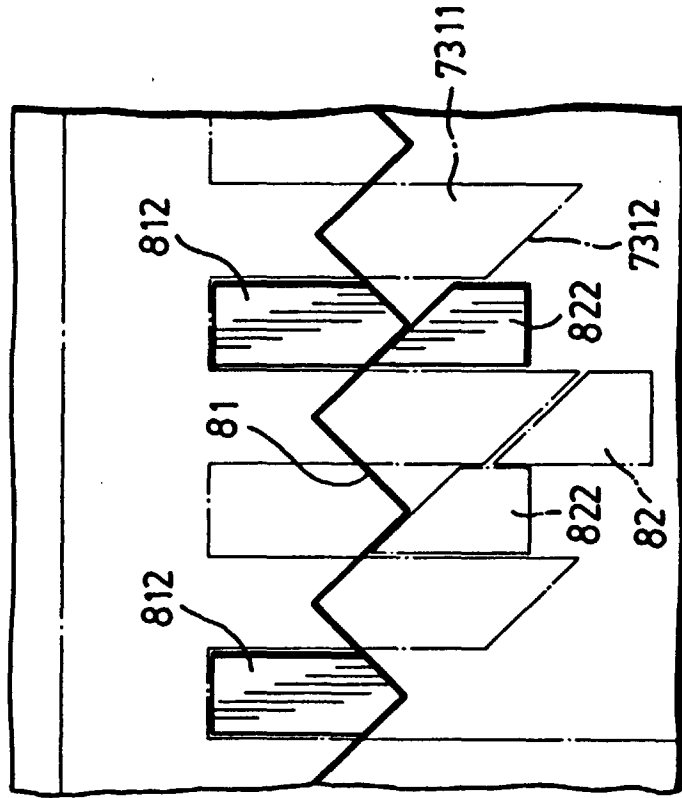


FIG.13



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 9145

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 670 453 (KYOYU CORP)	1,3,4,7,8	F21L15/02
A	* claims 1-6; figures 1-8,12-14 *	6	
Y	GB-A-1 245 899 (LAM LAN FAI) * page 1, line 58 - line 70 * * page 2, line 13 - line 42 * * page 2, line 49 - line 59; figures 1,2 *	1	
Y	US-A-4 967 325 (SHIAU SHOEI-SHUH) * column 2, line 66 - column 3, line 2 * * column 3, line 9 - line 15; figures 1-5 *	1	

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			F21L
Place of search		Date of completion of the search	Examiner
THE HAGUE		13 May 1996	Martin, C
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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