

Description

The present invention relates to a light diverting and switching device as disclosed in the generic clause of claim 1.

It has already been proposed in various ways that solar rays or artificial rays are focussed by a lens or the like and guided into an optical conductor and then are transmitted through the optical conductor on to an optional desired place for use in illumination or for other purposes.

On that occasion, however, if the light energy transmitted through the optical conductor, as mentioned above, can be diverted and picked up from the optical conductor on the outside thereof, the utilization efficiency of the light energy may be much improved.

From DE-A-24 27 182 it is known to divert and pick up light travelling through an optical conductor along a longitudinal axis thereof. The elements used for diverting out parts of the light are fixed between parts of the optical conductor so that there is no possibility to change the amount of light to be diverted out.

It is the object of the invention to provide a light diverting and switching device capable of effectively and adjustably diverting and picking up outside of the optical conductor a part of said light energy transmitted through it.

This task is solved in a light diverting and switching device according to the generic clause of claim 1 and by the features of the characterizing clause of same.

Preferred embodiments of the invention are disclosed in further depending claims.

The invention will now be disclosed under reference to the accompanying drawings.

Fig. 1 is a cross-sectional view showing an embodiment of a light diverting and switching device according to the present invention;

Fig. 2 is an outline view for explaining an example of how to make the first cylindrical member;

Fig. 3 is an outline view for explaining an example of how to make the second cylindrical member;

Fig. 4 is a perspective view for explaining how to make the third cylindrical member;

Fig. 5 is an outline view showing a construction of the connecting surfaces of the first and second cylindrical members;

Fig. 6 is an outline view showing an example of the spacer; and

Fig. 7 is a cross-sectional view showing the functions of a light diverting and switching device when being used to illuminate the different floor-levels of a building.

Description of the preferred embodiments

Fig. 1 is a cross-sectional view showing an embodiment of a light diverting and switching device according to the present invention. In Fig. 1, 1 is a cylindrical optical conductor at the light source side, 5 is another cylindrical optical

conductor at the light emission side, and 10 is a light diverting and switching device.

The light diverting and switching device 10 is comprised of a first transparent cylindrical member 11 having one surface A formed on a horizontal plane so as to be connected with the optical conductor 1 at the light source side and another surface B formed on an inclined plane, a second transparent cylindrical member 12 having one surface C formed on an inclined plane to be connected with the inclined surface B of the first cylindrical member 11 and another surface D formed on a horizontal plane to be connected with the optical conductor 5 at the light emission side and further provided with a circular hole 12' elongated in a horizontal direction toward the inclined surface C (in a perpendicular direction toward the cylindrical member), a third transparent cylindrical member 13 for diverting and switching the light (adjusting the diverted light) which is installed so as to move reciprocatedly back and forth in the (circular) hole 12' of the second cylindrical member 12 and has an edge surface E formed on an inclined plane the same as the inclined surfaces B and C, and a fourth transparent cylindrical member 14 for use in the diverted light which is connected with the first cylindrical member 11 and has a connecting surface F opposed to the third cylindrical member 13, and the inclined surfaces of the first cylindrical member 11 and the second cylindrical member 12 are connected with each other by use of an optical paste, an optical gel, or an optical matching oil.

Therefore, when the third cylindrical member 13 for use in light emission switching is inserted into the hole 12' of the second cylindrical member 12 and, as a result the inclined edge surface E of the third cylindrical member 13 coincides with the inclined surface B of the first cylindrical member 11, all of the light energies transmitted through the first cylindrical member 11 are transmitted to the second cylindrical member 12. However, when the third cylindrical member 13 is retrenched and moves backward so that the inclined surface E thereof turns out to be apart from the inclined surface B of the first cylindrical member 11, a gap formed by the afore-mentioned hole 12' exists between the inclined surface B of the first cylindrical member 11 and the inclined edge surface E of the third cylindrical member 11. Consequently, a part of the light energies transmitted through the first cylindrical member 11 is reflected on the inclined surface B on the opposite side of the gap and it is guided into the fourth cylindrical member 14 and further transmitted onto an optional desired place.

Furthermore, an air hole 13' connected to the inclined surface E is bored in the third cylindrical member 13. The hole 13' prevents the gap from becoming a vacuum by supplying air therein when the third cylindrical member 13 is

removed and moves backward. On the contrary, when the third cylindrical member 13 is inserted into the hole 12' of the second cylindrical member 12, air contained in the gap is forced out. As a result the third cylindrical member can be moved. The air hole 13' doesn't always need to be bored into the third cylindrical member 13. It seems to be easily understood that the air hole 13' is bored in the first or second cylindrical members, 11 or 12, in order to attain the same performance as that of the third cylindrical member 13.

Fig. 2 is an outline view for illustrating how to make the first cylindrical member 11. The cylindrical member 11 can be made by cutting a single transparent cylinder along the dotted line B' equivalent to the inclined surface B of the first cylindrical member 11 as shown in Fig. 2. In such a manner, two cylindrical members 11 can be made at the same time.

Fig. 3 is an outline view for explaining how to make the second cylindrical member 12. The cylindrical member 12 can be made by first boring a hole 12' through a single transparent cylinder as shown in Fig. 3 and secondly by cutting the cylindrical member 12 along the dotted line C' equivalent to the inclined surface C of the second cylindrical member 12. In such a manner two cylindrical members 12 can be made at the same time.

Fig. 4 is a perspective view for showing how to make the third cylindrical member 13. The cylindrical member 13 can be made by cutting a single transparent cylinder along the dotted line E' equivalent to the inclined surface E of the cylindrical member 13 as shown in the case of the cylindrical members mentioned before. On this occasion two cylindrical members can also be made at the same time and in the same manner as mentioned before.

Fig. 5 is an outline view showing a modified embodiment of the inclined connecting surfaces of the first cylindrical member 11 and the second cylindrical member 12. In this modified embodiment, the first and second cylindrical members 11 and 12 have uneven (concave-convex) portion P and/or Q on the inclined surfaces thereof. In such a manner, the adjustments for having the first cylindrical member 11 match with the second cylindrical member 12 concentrically can be successful.

The embodiment of the present invention is described heretofore. In the embodiment, the first through fourth cylindrical members (11 through 14) are constructed in a naked condition. Therefore, dust or the like is attached to the surface thereof so that the light energy make likely leak out therefrom.

In Fig. 1, 20 is a protective member which is mounted for the purpose of avoiding such problems as mentioned before. The protective member 20 is mounted on a predetermined place apart from the other cylindrical members by use of spacers 21. However, since the third cylindrical member 13 is capable of moving in a direction shown by the arrow in Fig. 1 in the hole 12' of the

second cylindrical member 12, no spacer is used for the third cylindrical member 13. Since a cladd layer 1' and another cladd layer 5' are formed, respectively, on the outer peripheral surfaces of the optical conductor 1 at the light source side and the optical conductor 5 at the light emission side, a gap between the cylindrical member and the protective member can be produced via the thickness of those cladd layers. Consequently it may be much easier to connect the optical conductor with the light diverting and switching device according to the manner proposed in the present invention.

Fig. 6 is an outline view showing an example of the spacer 21. A groove 22 formed in the shape of letter V is engraved in the spacer 21 at the edge portion thereof, that is, at the side thereof coming into contact with the cylindrical member as shown in Fig. 6. The cylindrical member is supported on both line-portions 22a of the groove 22 formed in the shape of V. Therefore the contact area of the spacer and the cylindrical member is very small and the light scarcely leaks out from the contact area.

Furthermore, in the case of constructing the device so as to protect the respective cylindrical members by use of protective members, it may be impossible to insert the cylindrical member into the protective member. On that occasion, for example, two of the half-shaped products having a section as shown in Fig. 6 will be able to be made and later unitarily combined into one by use of an adhesive.

Fig. 7 is a cross-section showing the construction of a plurality of light diverting and switching devices as mentioned above which are connected in cascade and installed on the optional desired place. In Fig. 7, 10₁, 10₂, 10₃, and 10₄ are the light diverting and switching devices as mentioned above. Fig. 7 shows an example of connecting four light diverting and switching devices in cascade for use to illuminate the different floor-levels of a building.

In the case of connecting the devices in such a manner, if the light energy is diverted at the upstream thereof, the density of the light energy decreases at the downstream thereof so that the intensity of the diverted light is considerably less.

In order to avoid such a problem, the cross-sectional square measure of the cylindrical member 13 for diverting and switching the light is gradually increased in the direction of the downstream side. When four light diverting and switching devices are needed as shown in Fig. 7, the cross-sectional square measure of the first cylindrical member 13, at the highest upstream side is determined by one fourth ($\frac{1}{4}$) of the cross-sectional square measure of the first optical conductor 11, that of the second cylindrical member 13₂ by one third ($\frac{1}{3}$) thereof, and that of the third cylindrical member 13₃ by one half ($\frac{1}{2}$) thereof. In general, supposing that the number of divergence is n , the cross-sectional square measure of the first cylindrical member for diverting and switching the light is determined to $1/n$, that of the

second cylindrical member to $1/(n-1)$, that of the third cylindrical member to $1/(n-2)$, and thus that of the following cylindrical members is increased in proportion and in such a manner. Finally, if the cross-sectional square measure of the last n -th cylindrical member is determined by $1/n - (n-1) = 1$, the light of the approximate uniform intensity from all of the diverting portions in the case of employing all of the light diverting and switching devices.

Furthermore, in Fig. 7, L_1 through L_4 are the lights used for communication, for instance, the laser beam lights. Utilizing the light diverting and switching device, according to the present invention, information is transmitted back and forth between the light source side and the respective diverted light sides (the terminal sides). For instance, in Fig. 7, when the edge portion of the optical conductor 1, not shown in the drawing, is connected with the solar ray collecting device placed on the rooftop of a building, and the light diverting and switching device 10, is used for illuminating the fourth floor therein, 10_2 for illuminating the third floor therein, 10_3 for illuminating the second floor, and 10_4 for illuminating the first floor, communication between the rooftop and the fourth floor can be performed by the light beam L_1 , and communication between the rooftop and the third floor can be performed by the light beam L_2 . In such a manner, communication between the rooftop and the other floors can be accomplished.

As is apparent from the foregoing description, it may be possible to provide a light diverting and switching device through which light energy can be effectively diverted and which can easily be manufactured according to the present invention.

Claims

1. A light diverting and switching device (10) connected in cascade between a transparent cylindrical optical conductor (1) at a light source side and another transparent cylindrical optical conductor (5) at a light emission side for diverting and picking up a part of the light transmitted through said optical conductor, said light diverting and switching device and said optical conductor having a common longitudinal axis, said light diverting and switching device further comprising a first transparent cylindrical member (11) having one surface (A) perpendicular to said longitudinal axis so as to be connected with said optical conductor (1) at the light source side, and another surface (B) being inclined to said longitudinal axis characterised by a second transparent cylindrical member (12) having one surface (C), said surface being inclined to said longitudinal axis to be connected with said inclined surface (B) of said first cylindrical member (11) and an upper surface (D) perpendicular to said longitudinal axis to be connected with said optical conductor (5) at the light emission side, and further provided with a cylindrical hole (12') having a circular cross-section and extending perpendicularly to said

longitudinal axis through said second cylindrical member towards said inclined surface (C), a third transparent cylindrical member (13) for adjusting the diverted light which is installed so as to move reciprocally back and forth in said hole (12') of said second cylindrical member (12) and having an edge surface (E), said edge surface being inclined to the longitudinal axis with the same angle of inclination as the inclined surface of said second cylindrical member, and a fourth transparent cylindrical member (14) for receiving the diverted light, said member being connected with said first cylindrical member (11) and extending perpendicularly to said longitudinal axis and having a surface (F) connecting said fourth member (14) with a side wall of said first cylindrical member such that the fourth and the third cylindrical members have a common longitudinal axis.

2. A light diverting and switching device as defined in claim 1, characterized in that a vent hole (13') is bored for creating a space between said inclined surface (E) of said third cylindrical member (13) and that of said first cylindrical member (11).

3. A light diverting and switching device as defined in claims 1 or 2, characterized in that an optical matching oil is enclosed between said inclined surface (E) of said third cylindrical member (13) and that of said first cylindrical member (11).

4. A light diverting and switching device as defined in either one of claims 1 to 3, characterized in that said first and second cylindrical members (11, 12) are connected with each other at said inclined surfaces (B, C) by use of an optical paste, an optical gel, or an optical matching oil.

5. A light diverting and switching device as defined in either one of claims 1—4 characterized in that said first and second cylindrical members (11, 12) have uneven surfaces (P, Q) on said inclined surfaces (B, C) respectively, both of which are engaged with each other supplementarily.

6. A light diverting and switching device in accordance with any one of the foregoing claims, characterized by a protective member (20) mounted by spacers (21), said protective member surrounding and protecting said first through fourth cylindrical members (11, 12, 13, 14).

7. A light diverting and switching device in accordance with any one of the foregoing claims, characterized in that a plurality of such light diverting and switching portions are arranged along a longitudinal axis, and the active cross-section of the third cylindrical members (13₁, 13₂, 13₃, 13₄) being gradually increased in the direction in which the light propagates.

8. A light diverting and switching device as defined in claim 7, characterized in that the active cross-section of said third cylindrical members (13₁, 13₂, 13₃, 13₄) is so selected that each diverted light transmitted from each of said light diverting and switching portions becomes approximately equal in intensity when all of said light diverting

second cylindrical member to $1/(n-1)$, that of the third cylindrical member to $1/(n-2)$, and thus that of the following cylindrical members is increased and in such a manner. Finally, if the cross-sectional square measure of the last n -th cylindrical member is determined by $1/n - (n-1) = 1$, the light of the approximate uniform intensity from all of the diverting portions in the case of employing all of the light diverting and switching devices.

Furthermore, in Fig. 7, L_1 through L_4 are the lights used for communication, for instance, the laser beam lights. Utilizing the light diverting and switching device, according to the present invention, information is transmitted back and forth between the light source side and the respective diverted light sides (the terminal sides). For instance, in Fig. 7, when the edge portion of the optical conductor 1, not shown in the drawing, is connected with the solar ray collecting device placed on the rooftop of a building, and the light diverting and switching device 10₁ is used for illuminating the fourth floor therein, 10₂ for illuminating the third floor therein, 10₃ for illuminating the second floor, and 10₄ for illuminating the first floor, communication between the rooftop and the fourth floor can be performed by the light beam L_1 , and communication between the rooftop and the third floor can be performed by the light beam L_2 . In such a manner, communication between the rooftop and the other floors can be accomplished.

As is apparent from the foregoing description, it may be possible to provide a light diverting and switching device through which light energy can be effectively diverted and which can easily be manufactured according to the present invention.

Claims

1. A light diverting and switching device (10) connected in cascade between a transparent cylindrical optical conductor (1) at a light source side and another transparent cylindrical optical conductor (5) at a light emission side for diverting and picking up a part of the light transmitted through said optical conductor, said light diverting and switching device and said optical conductor having a common longitudinal axis, said light diverting and switching device further comprising a first transparent cylindrical member (11) having one surface (A) perpendicular to said longitudinal axis so as to be connected with said optical conductor (1) at the light source side, and another surface (B) being inclined to said longitudinal axis characterized by a second transparent cylindrical member (12) having one surface (C), said surface being inclined to said longitudinal axis to be connected with said inclined surface (B) of said first cylindrical member (11) and an upper surface (D) perpendicular to said longitudinal axis to be connected with said optical conductor (5) at the light emission side, and further provided with a cylindrical hole (12') having a circular cross-section and extending perpendicularly to said

longitudinal axis through said second cylindrical member towards said inclined surface (C), a third transparent cylindrical member (13) for adjusting the diverted light which is installed so as to move reciprocally back and forth in said hole (12') of said second cylindrical member (12) and having an edge surface (E), said edge surface being inclined to the longitudinal axis with the same angle of inclination as the inclined surface of said second cylindrical member, and a fourth transparent cylindrical member (14) for receiving the diverted light, said member being connected with said first cylindrical member (11) and extending perpendicularly to said longitudinal axis and having a surface (F) connecting said fourth member (14) with a side wall of said first cylindrical member such that the fourth and the third cylindrical members have a common longitudinal axis.

2. A light diverting and switching device as defined in claim 1, characterized in that a vent hole (13') is bored for creating a space between said inclined surface (E) of said third cylindrical member (13) and that of said first cylindrical member (11).

3. A light diverting and switching device as defined in claims 1 or 2, characterized in that an optical matching oil is enclosed between said inclined surface (E) of said third cylindrical member (13) and that of said first cylindrical member (11).

4. A light diverting and switching device as defined in either one of claims 1 to 3, characterized in that said first and second cylindrical members (11, 12) are connected with each other at said inclined surfaces (B, C) by use of an optical paste, an optical gel, or an optical matching oil.

5. A light diverting and switching device as defined in either one of claims 1—4 characterized in that said first and second cylindrical members (11, 12) have uneven surfaces (P, Q) on said inclined surfaces (B, C) respectively, both of which are engaged with each other supplementarily.

6. A light diverting and switching device in accordance with any one of the foregoing claims, characterized by a protective member (20) mounted by spacers (21), said protective member surrounding and protecting said first through fourth cylindrical members (11, 12, 13, 14).

7. A light diverting and switching device in accordance with any one of the foregoing claims, characterized in that a plurality of such light diverting and switching portions are arranged along a longitudinal axis, and the active cross-section of the third cylindrical members (13₁, 13₂, 13₃, 13₄) being gradually increased in the direction in which the light propagates.

8. A light diverting and switching device as defined in claim 7, characterized in that the active cross-section of said third cylindrical members (13₁, 13₂, 13₃, 13₄) is so selected that each diverted light transmitted from each of said light diverting and switching portions becomes approximately equal in intensity when all of said light diverting



and switching portions divert the transmitted light (L_1 , L_2 , L_3 , L_4).

Patentansprüche

1. Vorrichtung zum Verteilen und Schalten von Licht (10), die als Kaskade zwischen einem transparenten, zylindrischen, optischen Leiter (1) auf der Seite einer Lichtquelle und einem anderen, transparenten, zylindrischen, optischen Leiter (5) auf einer Lichtausstrahlungsseite zum Verteilen und Aufnehmen eines Teils des durch den genannten optischen Leiter übertragenen Lichts verbunden ist, wobei die Vorrichtung zum Verteilen und Umschalten von Licht und der genannte optische Leiter eine gemeinsame Längsachse aufweisen, die genannte Vorrichtung zum Verteilen und Umschalten von Licht ferner ein erstes, transparentes, zylindrisches Element (11) mit einer zu der genannten Längsachse senkrechten Oberfläche (A), die mit dem genannten optischen Leiter (1) auf der Seite der Lichtquelle zu verbinden ist, und einer anderen Oberfläche (B) aufweist, welche zu der genannten Längsachse geneigt ist, gekennzeichnet durch ein zweites, transparentes, zylindrisches Element (12) mit einer Oberfläche (C), die zu der genannten Längsachse geneigt ist und mit der genannten geneigten Oberfläche (B) des ersten, zylindrischen Elements (11) zu verbinden ist, und einer oberen, zu der genannten Längsachse senkrechten Oberfläche (D), die mit dem genannten optischen Leiter (5) auf der Lichtausstrahlungsseite zu verbinden ist und ferner mit einem zylindrischen Loch (12'), welches einen zylindrischen Querschnitt aufweist und sich senkrecht zu der genannten Längsachse durch das genannte zweite, zylindrische Element in Richtung zu der genannten geneigten Oberfläche (C) erstreckt, durch ein drittes, transparentes, zylindrisches Element (13) zum Einstellen des verteilten Lichts, welches so angeordnet ist, daß es in dem genannten Loch (12') des genannten zweiten, zylindrischen Elements (12) vorwärts und rückwärts hin- und herbewegbar ist und eine Randoberfläche (E) aufweist, wobei die genannte Randoberfläche zu der Längsachse unter dem gleichen Neigungswinkel wie die geneigte Oberfläche des genannten zweiten, zylindrischen Elements geneigt ist, und durch ein viertes, transparentes, zylindrisches Element (14) zur Aufnahme von verteiltem Licht, wobei das genannte Element mit dem genannten ersten, zylindrischen Element (11) verbunden ist und sich senkrecht zu der genannten Längsachse erstreckt und eine Oberfläche (F) aufweist, die das genannte vierte Element (14) mit einer Seitenwand des genannten ersten, zylindrischen Elements derart verbindet, daß das vierte und das dritte, zylindrische Element eine gemeinsame Längsachse aufweisen.

2. Vorrichtung zum Verteilen und Schalten von Licht nach Anspruch 1, dadurch gekennzeichnet, daß ein Belüftungsloch (13') gebohrt ist, um einen Raum zwischen der genannten geneigten

Oberfläche (E) des genannten dritten, zylindrischen Elements (13) und der des ersten, zylindrischen Elements (11) zu schaffen.

3. Vorrichtung zum Verteilen und Schalten von Licht nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß ein optisches Anpassungsöl zwischen der genannten geneigten Oberfläche (E) des genannten dritten, zylindrischen Elements (13) und derjenigen des genannten ersten, zylindrischen Elements (11) eingeschlossen ist.

4. Vorrichtung zum Verteilen und Schalten von Licht nach irgendeinem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß das genannte erste und zweite zylindrische Element (11, 12) miteinander an den genannten geneigten Oberflächen (B, C) unter Verwendung einer optischen Paste, eines optischen Gels oder eines optischen Anpassungsöls verbunden sind.

5. Vorrichtung zum Verteilen und Schalten von Licht nach irgendeinem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß das erste und zweite, zylindrische Element (11, 12) nichtebene Oberflächen (P, Q) auf den genannten geneigten Oberflächen (B, C) aufweisen, die sich einander ergänzend aneinander eingreifen.

6. Vorrichtung zum Verteilen und Schalten von Licht nach irgendeinem der vorhergehenden Ansprüche, gekennzeichnet durch ein mittels Abstandsstücken (21) angebrachtes Schutzelement (20), wobei das genannte Schutzelement das erste bis vierte, zylindrische Element (11, 12, 13, 14) umgibt und schützt.

7. Vorrichtung zum Verteilen und Schalten von Licht gemäß irgendeinem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß eine Vielzahl solcher Vorrichtungen zum Verteilen und Schalten von Licht längs einer Längsachse angeordnet sind und der aktive Querschnitt des dritten, zylindrischen Elements (13₁, 13₂, 13₃, 13₄) nach und nach in der Lichtfortpflanzungsrichtung größer gemacht wird.

8. Vorrichtung zum Verteilen und Schalten von Licht nach Anspruch 7, dadurch gekennzeichnet, daß der aktive Querschnitt des genannten dritten, zylindrischen Elements (13₁, 13₂, 13₃, 13₄) so ausgewählt ist, daß jedes verteilte Licht, welches von jedem der genannten Abschnitte zum Verteilen und Schalten von Licht übertragen wird, ungefähr die gleiche Intensität erhält, wenn alle genannten Abschnitte zum Verteilen und Schalten von Licht das übertragene Licht (L_1 , L_2 , L_3 , L_4) übertragen.

Revendications

1. Un dispositif de dérivation et commutation de lumière (10), relié en cascade entre un conducteur optique cylindrique transparent (1) d'un côté d'une source lumineuse et un autre conducteur optique cylindrique transparent (5) d'un côté d'émission de lumière pour dériver et capter une partie de la lumière transmise par l'intermédiaire dudit conducteur optique, ledit dispositif de dérivation et commutation de lumière et ledit conducteur optique ayant un axe



longitudinal commun, ledit dispositif de dérivation et commutation de lumière comprenant en outre un premier élément cylindrique transparent (11) comportant une surface (A) perpendiculaire

axe longitudinal de façon à être relié audit conducteur optique (1) du côté de la source lumineuse et une autre surface (B) inclinée par rapport audit axe longitudinal, caractérisé par un second élément cylindrique (12) comportant une surface (C), ladite surface étant inclinée par rapport audit axe longitudinal de façon à être reliée à ladite surface inclinée (B) dudit premier élément cylindrique (11) ainsi qu'une surface supérieure (D) perpendiculaire audit axe longitudinal de façon à être reliée audit conducteur optique (5) du côté d'émission de lumière, et en outre pourvu d'un trou cylindrique (12') ayant une section circulaire et s'étendant perpendiculairement audit axe longitudinal au travers dudit second élément cylindrique et en direction de ladite surface inclinée (C), un troisième élément cylindrique transparent (13) servant à régler la lumière dérivée et qui est installé de façon à être déplacé alternativement vers l'avant et vers l'arrière dans ledit trou (12') dudit second élément cylindrique (12) et qui comporte une surface marginale (E), ladite surface marginale étant inclinée par rapport à l'axe longitudinal du même angle d'inclinaison que la surface inclinée dudit second élément cylindrique, et un quatrième élément cylindrique transparent (14) pour recevoir la lumière dérivée, ledit élément étant relié audit premier élément cylindrique (11) s'étendant perpendiculairement audit axe longitudinal, en comportant une surface (F) reliant ledit quatrième élément (14) avec une paroi latérale dudit premier élément cylindrique de telle sorte que la quatrième et le troisième élément cylindrique aient un axe longitudinal commun.

2. Un dispositif de dérivation et commutation de lumière tel que défini dans la revendication 1, caractérisé en ce qu'un trou d'évent (13') est percé pour créer un espace entre ladite surface inclinée (E) dudit troisième élément cylindrique (13) et celle dudit premier élément cylindrique (11).

3. Un dispositif de dérivation et commutation de lumière tel que défini dans les revendications 1

ou 2, caractérisé en ce qu'une huile d'adaptation optique est enfermée entre ladite surface inclinée (E) dudit troisième élément cylindrique (13) et celle dudit premier élément cylindrique (11).

4. Un dispositif de dérivation et commutation de lumière tel que défini dans une quelconque des revendications 1 à 3, caractérisé en ce que lesdits premier et second éléments cylindriques (11, 12) sont reliés entre eux sur lesdites surfaces inclinées (B, C) par utilisation d'une pâte optique, d'un gel optique ou d'une huile d'adaptation optique.

5. Un dispositif de dérivation et commutation de lumière tel que défini dans une quelconque des revendications 1 à 4, caractérisé en ce que lesdits premier et second éléments cylindriques (11, 12) comportent des surfaces intégrales (P, Q) placées respectivement sur lesdites surfaces inclinées (B, C) et qui sont toutes deux mises en contact l'une avec l'autre de façon supplémentaire.

6. Un dispositif de dérivation et commutation de lumière selon une quelconque des revendications précédentes, caractérisé par un élément protecteur (20), monté au moyen d'organes d'espacement (21), ledit élément protecteur entourant et protégeant lesdits premier, second, troisième, quatrième éléments cylindriques (11, 12, 13, 14).

7. Un dispositif de dérivation et commutation de lumière selon une quelconque des revendications précédentes, caractérisé en ce qu'une pluralité desdites parties de dérivation et commutation de lumière sont disposées le long d'un axe longitudinal et la section active des troisièmes éléments cylindriques (13₁, 13₂, 13₃, 13₄) ayant graduellement augmentée dans la direction de propagation de la lumière.

8. Un dispositif de dérivation et commutation de lumière tel que défini dans la revendication 7, caractérisé en ce que la section active desdits troisièmes éléments cylindriques (13₁, 13₂, 13₃, 13₄) est sélectionnée de telle sorte que chaque lumière dérivée qui est transmise à partir de chacune desdites parties de dérivation et commutation de lumière devienne approximativement égale en intensité lorsque toutes lesdites parties de dérivation et commutation de lumière dérivent la lumière transmise (L₁, L₂, L₃), L₄).

