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(54) **Lamp**

Lampe

Lampe

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to a lamp and, more particularly, to a lamp folded from a sheet.

Description of the Related Art

[0002] A structure of a general lamp or an operation interface thereof may fail to facilitate operation by users. Though the general lamp does not often need to be moved, if the lamp needs to be moved, the lamp may be inconvenient to be moved due to the large volume. Further, it is also inconvenient for the users to provide the storage space for the lamp when the lamp does not need to be used for a time and needs to be stored.

[0003] In another aspect, a plurality of lamps can adjust light brightness. However, the conventional lamp defines options of light strength adjustment in a value mode instead of setting light strength in an intuitive mode. For example, by demonstrating how to set illumination strength in a first or a second level, the users fail to directly and intuitively understand the relation of the different levels.

[0004] Otherwise, a general lamp usually provides a knob switch or a section switch to adjust the brightness. When the users operate the lamp and need to adjust the brightness, they need to adjust a voltage regulator via the knob or section switch. However, the above method is not intuitive for the users during operation. Since the users fail to understand how the difference of specific set values of the switch corresponds to the brightness, and the adjustment of the brightness is not equal to that of the illumination range, the users need to additionally adjust the position and angle of a lampshade to achieve a proper set of the light and angle.

In United States Patent No. 5483431, a lighting fixture which is shippable in a flat condition and can be rapidly assembled by the user is disclosed. A housing element of the lighting fixture consists of a single sheet of paper, cardboard, plastic or similar material having marked or bending lines so that it is capable of being folded into a flat condition and into a non-flat condition.

[0005] According to the above, the general lamp is inconvenient for storage due to the volume, and the functional strength set provided by the lamp is not intuitive for the users during operation.

BRIEF SUMMARY OF THE INVENTION

[0006] This invention provides a lamp giving consideration to both space storage and intuitive operation to improve the prior art.

[0007] This invention provides a lamp including a main body, a light source, and a sensing element. The main

body is folded from a sheet, and the sheet includes a lamp holder portion, a lamp pole portion, and a lampshade portion. One end of the lamp pole portion is connected with the lamp holder portion. The lampshade portion includes a plurality of creases. The lampshade portion surrounds and is connected with the other end of the lamp pole portion, and lampshade portion changes between a folded state and an unfolded state along the creases. The light source is contained in the lampshade portion. The sensing element senses a change between the folded state and the unfolded state of the lampshade portion to control the light source.

[0008] In one embodiment of the invention, the lamp may further include a supporting assembly attached to the lamp pole portion and extending to an inner wall of the lampshade portion along the lamp pole portion. The supporting assembly may support the lampshade portion to allow the lampshade portion to be fixed in one intermediate state between the folded state and the unfolded state.

[0009] In one embodiment of the invention, the supporting assembly may include a first supporting element and a second supporting element pivotally connected with the first supporting element. The first supporting element may be attached to the lamp pole portion, and the second supporting element may be attached to the inner wall of the lampshade portion.

[0010] In one embodiment of the invention, the supporting assembly may further include a pivot assembly disposed at the lamp pole portion, and the second supporting element may be connected with the first supporting element via the pivot assembly.

[0011] In one embodiment of the invention, the second supporting element may include a first supporting frame and a second supporting frame. The first supporting frame and the second supporting frame may be pivotally connected with two opposite sides of the first supporting element to approach to or away from the first supporting element, respectively.

[0012] In one embodiment of the invention, the supporting assembly may further include two pivots disposed at the lamp pole portion. The first supporting frame and the second supporting frame may be pivotally connected with the first supporting element via the two pivots, respectively.

[0013] In one embodiment of the invention, the supporting assembly may further include two gears connected with the pivots, respectively, and the gears may be engaged with each other to allow the first supporting frame and the second supporting frame to symmetrically move relative to the first supporting element further to allow the lampshade portion to be symmetrically unfolded.

[0014] In one embodiment of the invention, the sensing element may control brightness of the light source according to the folded state, the unfolded state, or the intermediate state between the folded state and the unfolded state of the lampshade portion.

[0015] In one embodiment of the invention, the sheet may be selected from the group consisting of paper, a plastic material, an adhering material, and a fiber material.

[0016] In one embodiment of the invention, the supporting assembly may be a metal sheet.

[0017] In one embodiment of the invention, the sensing element may be a pressure sensing element, a displacement sensing element, a motion sensing element, a position sensing element, or a bend sensing element.

[0018] These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. 1A is a plane front view showing a main body of a lamp according to a first preferred embodiment of the invention;

[0020] FIG. 1B is a three-dimensional schematic diagram showing a lampshade portion of the lamp in a folded state according to the first preferred embodiment of the invention;

[0021] FIG. 1C is a three-dimensional schematic diagram showing the lampshade portion of the lamp in an unfolded state according to the first preferred embodiment of the invention;

[0022] FIG. 2A is a top view showing a supporting assembly according to one preferred embodiment of the invention;

[0023] FIG. 2B is a three-dimensional schematic diagram showing a supporting assembly according to one preferred embodiment of the invention; and

[0024] FIG. 2C and FIG. 2D are side views showing a supporting assembly according to one preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0025] To improve a lamp which fails to be conveniently stored and intuitively operated, this invention provides a lamp capable of being stored conveniently by a sheet made of a material such as paper, a plastic material, an adhering material, or a fiber material and so on. The lamp folded from the sheet cooperates with a supporting assembly further to be easily operated.

[0026] First, this invention provides a main body of a lamp folded from a sheet. The main body of the lamp is designed to be folded to a plane and unfolded to a three-dimensional object, and the main body is connected with a sensing element. Once the sensing element senses that the main body of the lamp is folded or unfolded, the sensing element can transmit a corresponding control signal to a light source to change brightness of the light source.

[0027] In the invention, the lamp can be conveniently stored when it is not used, thereby achieving a conven-

iently stored function. Furthermore, a user just needs to exert external force on a lampshade portion of the lamp in an intuitive mode, and then a state change of the lampshade portion between a folded state and an unfolded state will trigger a sensing element connected with the lampshade portion to transmit a corresponding signal to a light source contained in the lampshade portion.

[0028] FIG. 1A is a plane front view showing a main body of a lamp according to a preferred embodiment of the invention. In FIG. 1A, a main body 10 of a lamp 1 is folded from a sheet. That is, the lamp 1 in the embodiment is integrally formed. The main body 10 includes a lamp holder portion 107, a lamp pole portion 101, 105, and a lampshade portion 103. The sheet has a plurality of creases, and the three-dimensional structure of the lamp 1 is formed by folding along the creases.

[0029] In the preferred embodiment of the invention, one end of the lamp pole portion 101, 105 is connected with the lamp holder portion 107. The lampshade portion 103 includes a plurality of creases 103a and the lampshade portion 103 surrounds and is connected with the other end of the lamp pole portion 101. The lampshade portion 103 can change between a folded state and an unfolded state along the creases 103a.

[0030] In addition, in the embodiment, the lamp 1 includes a light source (not shown) and a sensing element (not shown). The light source (not shown) is contained in the lampshade portion 103. The sensing element is disposed at the lampshade portion 103. However, the invention is not limited thereto. When a user is to adjust the lampshade portion 103, the sensing element senses operation of the user to drive a state of the lampshade portion 103 to change between the folded state and the unfolded state further to output a control signal to control the light source.

[0031] Then, FIG. 1B and FIG. 1C are three-dimensional schematic diagrams showing the lampshade portion of the lamp in the folded state and in the unfolded state according to the preferred embodiment of the invention, respectively. In FIG. 1B, the lampshade portion 103 is folded to be stored to a plane state when the lampshade portion 103 of the lamp 1 is in the folded state, and the light source of the lamp 1 is in an off state in the meanwhile.

[0032] In addition, in FIG. 1C, the lampshade portion 103 is unfolded when the lampshade portion 103 is in the unfolded state, and the sensing element can sense that the state of the lampshade portion 103 is changed from the folded state to the unfolded state to transmit the control signal to the light source further to turn on the light source. In the preferred embodiment of the invention, the brightness of the light source of the lamp 1 is adjusted to the greatest when the lampshade portion 103 is unfolded to the greatest.

[0033] In addition, in FIG. 1B and FIG. 1C, the lampshade portion 103 of the lamp 1 can further include a pulling element 109 for pulling up the lampshade portion 103 by a user. However, the invention is not limited there-

to. The user can also directly pull up edges of the lampshade portion 103 to unfold the lampshade portion 103.

[0034] In addition, the lamp 1 can further cooperate with a supporting assembly to allow the lampshade portion 103 to be fixed in one intermediate state between the folded state and the unfolded state. The supporting assembly is attached to the lamp pole portion 101 and extends to an inner wall of the lampshade portion 103 along the lamp pole portion 101.

[0035] FIG. 2A to FIG. 2D are schematic diagrams showing a supporting assembly of a lamp according to one preferred embodiment of the invention. FIG. 2A is a top view, FIG. 2B is a three-dimensional schematic diagram, and FIG. 2C and FIG. 2D are side views. The supporting assembly 20 includes a first supporting element 201, a second supporting element 203, a gear assembly 205, and a pivot assembly 207. The first supporting element 201 is attached to the lamp pole portion 101, and the second supporting element 203 is attached to an inner wall of the lampshade portion 103. The second supporting element 203 further includes a first supporting frame 2031 and a second supporting frame 2032. The first supporting frame 2031 and the second supporting frame 2032 are pivotally connected with two opposite sides of the first supporting element 201, respectively. According to one preferred embodiment, the supporting assembly 20 is a metal sheet such as an aluminum sheet or an iron sheet.

[0036] The pivot assembly 207 includes two pivots 2071, 2072 disposed at the lamp pole portion 101. The first supporting frame 2031 and the second supporting frame 2032 are connected with the first supporting element 201 via the two pivots 2071, 2072, respectively. That is, the first supporting frame 2031 and the second supporting frame 2032 can approach to or away from the first supporting element 201 via the pivots 2071, 2072, respectively.

[0037] The gear assembly 205 is used to control an angle of the first supporting frame 2031 and the second supporting frame 2032 relative to the first supporting element 201. The gear assembly 205 includes two gears 2051, 2052. The gears 2051, 2052 are connected with the pivots 2071, 2072, respectively, and the gears 2051, 2052 are engaged with each other and cooperate with the first supporting frame 2031 and the second supporting frame 2032 to symmetrically move relative to the first supporting element 201 further to allow the lampshade portion 103 to be symmetrically unfolded.

[0038] Therefore, when the user adjusts an unfolded angle of the first supporting frame 2031, the pivot 2071 can drive the gear 2051, and then the gear 2051 can further drive the gear 2052 thus to drive the pivot 2072 to allow the unfolded angle of the second supporting frame 2032 relative to the first supporting element 201 to be the same as that of the first supporting frame 2031 relative to the first supporting element 201. On the other hand, the user can first adjust the second supporting frame 2032. The subsequent operation of driving the first

supporting frame 2031 is the same as the above. Therefore, it is not described for a concise purpose.

[0039] According to the operation mode of the supporting assembly 20, because the second supporting element 203 attached to the inner wall of the lampshade portion 103, the lampshade portion 103 is still symmetrically unfolded, although one side of the lampshade portion 103 is pulled when the user exerts force to pull the lampshade portion 103. At the same time, the lampshade portion 103 of the lamp 1 can be stopped at the time of stopping pulling and can be also fixed to the unfolded size via the engagement between the gears 2051, 2052. The sensing element further senses the unfolded size of the lampshade portion 103. That is, the sensing element senses the folded state, the unfolded state, or the intermediate state between the folded state and the unfolded state of the lampshade portion 103, and it transmits the control signal to the light source according to the sensing result thus to control the brightness of the light source.

[0040] According to the design in the embodiment of the invention, the user can operate the lamp in a more intuitive mode. In the change between the folded state and the unfolded state, only via foldable characteristic of the lamp and cooperation of the sensing element, such as a pressure sensing element, a displacement sensing element, a motion sensing element, a position sensing element, or a bend sensing element, the light source, and the supporting assembly, the users can control an electronic device in the intuitive mode.

[0041] In addition, another effect of the invention is that via the lamp folded from the sheet, the lamp is convenient to be folded to a plane structure, thereby achieving an additional effect that the lamp can be conveniently stored. Thus, the users can easily carry or store the electronic device. Further, as far as manufacturers are considered, the storage and transportation cost can be greatly reduced.

Claims

1. A lamp (1) comprising:

a light source;
a main body (10) folded from a sheet, **characterized by** the sheet including:

a lamp holder portion (107);
a lamp pole portion (101, 105) with one end connected with the lamp holder portion (107); and
a lampshade portion (103) containing the light source and including a plurality of creases (103a), the lampshade portion (103) surrounding and being connected with the other end of the lamp pole portion (101), wherein the lampshade portion (103) changes between a folded state and an un-

- folded state along the creases (103a);
- and
a sensing element sensing a change between the folded state and the unfolded state of the lampshade portion (103) to control the light source.
2. The lamp (1) according to claim 1, **characterized in that** the lamp further comprises a supporting assembly (20) attached to the lamp pole portion (101) and extending to an inner wall of the lampshade portion (103) along the lamp pole portion (101), the supporting assembly (20) supporting the lampshade portion (103) to allow the lampshade portion (103) to be fixed in one intermediate state between the folded state and the unfolded state.
3. The lamp (1) according to claim 2, **characterized in that** the supporting assembly (20) comprises a first supporting element (201) and a second supporting element (203) pivotally connected with the first supporting element (201), the first supporting element (201) is attached to the lamp pole portion (101), and the second supporting element (203) is attached to the inner wall of the lampshade portion (103).
4. The lamp (1) according to claim 3, **characterized in that** the supporting assembly (20) further comprises:
a pivot assembly (207) disposed at the lamp pole portion (101), the second supporting element (203) being connected with the first supporting element (201) via the pivot assembly (207).
5. The lamp (1) according to claim 3 or 4, **characterized in that** the second supporting element (203) comprises a first supporting frame (2031) and a second supporting frame (2032), and the first supporting frame (2031) and the second supporting frame (2032) are pivotally connected with two opposite sides of the first supporting element (201) to approach to or away from the first supporting element (201).
6. The lamp (1) according to claim 5, **characterized in that** the supporting assembly (20) further comprises:
two pivots (2071, 2072) disposed at the lamp pole portion (101), the first supporting frame (2031) and the second supporting frame (2032) being pivotally connected with the first supporting element (201) via the two pivots (2071, 2072), respectively.
7. The lamp (1) according to claim 6, **characterized in that** the supporting assembly (20) further comprises:
two gears (2051, 2052) connected with the two pivots (2071, 2072), respectively, the two gears (2051, 2052) being engaged with each other to allow the first supporting frame (2031) and the second supporting frame (2032) to symmetrically move relative to the first supporting element (201) further to allow the lampshade portion (103) to be symmetrically unfolded.
8. The lamp (1) according to any one of claims 2 to 7, **characterized in that** the sensing element controls brightness of the light source according to the folded state, the unfolded state, or the intermediate state between the folded state and the unfolded state of the lampshade portion (103).
9. The lamp (1) according to any one of claims 2 to 8, **characterized in that** the supporting assembly (20) is a metal sheet.
10. The lamp (1) according to any one of claims 1 to 9, **characterized in that** the sheet is selected from the group consisting of paper, a plastic material, an adhering material, and a fiber material.
11. The lamp (1) according to any one of claims 1 to 10, **characterized in that** the sensing element is a pressure sensing element, a displacement sensing element, a motion sensing element, a position sensing element, or a bend sensing element.

Patentansprüche

1. Lampe, umfassend:
- eine Lichtquelle;
 - einen Hauptkörper (10), der aus einem Bogen/einer Platte gefaltet ist, **dadurch gekennzeichnet, dass** der Bogen/die Platte umfasst:
 - einen Lampenträgerbereich (107);
 - einen Lampenstabbereich (101, 105), der mit einem Ende mit dem Lampenträgerbereich (107) verbunden ist; und
 - einen Lampenschirmbereich (103), der die Lichtquelle beinhaltet und eine Mehrzahl von Falten (103a) aufweist, wobei der Lampenschirmbereich (103) das andere Ende des Lampenstabbereichs (101) umgibt und mit diesem verbunden ist, wobei der Lampenschirmbereich (103) sich längs der Falten (103a) zwischen einem gefalteten Zustand und einem aufgefalteten Zustand verändert; und
 - ein Sensorelement, das einen Wechsel zwischen dem gefalteten Zustand und dem aufge-

- falteten Zustand des Lampenschirmbereichs (103) erkennt, um die Lichtquelle zu steuern.
2. Lampe (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Lampe ferner eine Abstützanordnung (20) aufweist, die am Lampenstabbereich (101) befestigt ist und sich längs des Lampenstabbereichs (101) zu einer Innenwand des Lampenschirmbereichs (103) erstreckt, wobei die Abstützanordnung (20) den Lampenschirmbereich (103) abstützt, damit der Lampenschirmbereich (103) in einem Zwischenstadium zwischen dem gefalteten Zustand und dem aufgefalteten Zustand fixiert ist.
 3. Lampe (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die Abstützanordnung (20) ein erstes Abstützelement (201) und ein zweites Abstützelement (203) aufweist, das mit dem ersten Abstützelement (201) schwenkbar verbunden ist, wobei das erste Abstützelement (201) am Lampenstabbereich (101) angebracht ist und das zweite Abstützelement (203) an der Innenwand des Lampenschirmbereichs (103) angebracht ist.
 4. Lampe (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** die Abstützanordnung (20) ferner aufweist:

eine Schwenkanordnung (207), die am Lampenstabbereich (101) angeordnet ist, wobei das zweite Abstützelement (203) über die Schwenkanordnung (207) mit dem ersten Abstützelement (201) verbunden ist.
 5. Lampe (1) nach Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** das zweite Abstützelement (203) einen ersten Stützrahmen (2031) und einen zweiten Stützrahmen (2032) aufweist, wobei der erste Stützrahmen (2031) und der zweite Stützrahmen (2032) mit zwei gegenüberliegenden Seiten des ersten Abstützelements (201) schwenkbar verbunden sind, um sich zum ersten Abstützelement (201) hin oder von diesem weg zu schwenken.
 6. Lampe (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** die Abstützanordnung (20) ferner aufweist:

zwei Gelenkverbindungen (2071, 2072), die jeweils am Lampenstabbereich (101) angeordnet sind, wobei der erste Stützrahmen (2031) und der zweite Stützrahmen (2032) mit dem ersten Abstützelement (201) über die beiden Gelenkverbindungen (2071, 2072) schwenkbar verbunden sind.
 7. Lampe (1) nach Anspruch 6, **dadurch gekennzeichnet, dass** die Abstützanordnung (20) ferner aufweist:

zwei Zahnräder (2051, 2052), die jeweils mit den beiden Gelenkverbindungen (2071, 2072) verbunden sind, wobei die beiden Zahnräder (2051, 2052) miteinander im Eingriff stehen, um eine symmetrische Bewegung des ersten Stützrahmens (2031) und des zweiten Stützrahmens (2032) relativ zum ersten Abstützelement (201) zu ermöglichen, damit der Lampenschirmbereich (103) symmetrisch aufgefaltet werden kann.
 8. Lampe (1) nach einem der Ansprüche 2 bis 7, **dadurch gekennzeichnet, dass** das Sensorelement eine Helligkeit der Lichtquelle entsprechend dem gefalteten Zustand, dem aufgefalteten Zustand oder dem Zwischenstadium zwischen dem gefalteten Zustand und dem aufgefalteten Zustand des Lampenschirmbereichs (103) steuert.
 9. Lampe (1) nach einem der Ansprüche 2 bis 8, **dadurch gekennzeichnet, dass** die Abstützanordnung (20) ein Blech ist.
 10. Lampe (1) nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** der Bogen/die Platte aus einer Gruppe bestehend aus Papier, einem Kunststoffmaterial, einem Klebmaterial und einem Faserstoff ausgewählt ist.
 11. Lampe (1) nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** das Sensorelement ein Drucksensorelement, ein Abstandssensorelement, ein Bewegungssensorelement, ein Positionssensorelement oder ein Biegungssensorelement ist.
- ### Revendications
1. Lampe (1) comprenant :

une source de lumière ;
un corps principal (10) plié à partir d'une feuille, **caractérisée en ce que** la feuille comprend :

une partie porte-lampe (107) ;
une partie mât de lampe (101, 105) avec une extrémité reliée à la partie porte-lampe (107) ; et
une partie abat-jour (103) contenant la source de lumière et comprenant une pluralité de plis (103a), la partie abat-jour (103) entourant et étant reliée à l'autre extrémité de la partie mât de lampe (101), dans laquelle la partie abat-jour (103) change entre un état plié et un état déplié le long des plis (103a) ;

- et
un élément de détection détectant le changement entre l'état plié et l'état déplié de la partie abat-jour (103) pour commander la source de lumière.
- 5
2. Lampe (1) selon la revendication 1, **caractérisée en ce que** la lampe comprend en outre un ensemble de support (20) attaché à la partie mât de lampe (101) et s'étendant jusqu'à une paroi interne de la partie abat-jour (103) le long de la partie mât de lampe (101), l'ensemble de support (20) soutenant la partie abat-jour (103) pour permettre à la partie abat-jour (103) d'être fixée dans un état intermédiaire entre l'état plié et l'état déplié.
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3. Lampe (1) selon la revendication 2, **caractérisée en ce que** l'ensemble de support (20) comprend un premier élément de support (201) et un second élément de support (203) relié de façon pivotante au premier élément de support (201), le premier élément de support (201) est attaché à la partie mât de lampe (101), et le second élément de support (203) est attaché à la paroi interne de la partie abat-jour (103).
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4. Lampe (1) selon la revendication 3, **caractérisée en ce que** l'ensemble de support (20) comprend en outre :
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- un ensemble pivot (207) disposé sur la partie mât de lampe (101), le second élément de support (203) étant relié au premier élément de support (201) via l'ensemble pivot (207).
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5. Lampe (1) selon la revendication 3 ou 4, **caractérisée en ce que** le second élément de support (203) comprend une première armature de support (2031) et une seconde armature de support (2032), et la première armature de support (2031) et la seconde armature de support (2032) sont reliées de façon pivotante aux deux côtés opposés du premier élément de support (201) pour s'approcher ou s'éloigner du premier élément de support (201).
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6. Lampe (1) selon la revendication 5, **caractérisée en ce que** l'ensemble de support (20) comprend en outre :
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- deux pivots (2071, 2072) disposés sur la partie mât de lampe (101), la première armature de support (2031) et la seconde armature de support (2032) étant reliées de façon pivotante au premier élément de support (201) via les deux pivots (2071, 2072), respectivement.
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7. Lampe (1) selon la revendication 6, **caractérisée en ce que** l'ensemble de support (20) comprend en outre :
- deux engrenages (2051, 2052) reliés aux deux pivots (2071, 2072), respectivement, les deux engrenages (2051, 2052) étant en prise l'un avec l'autre pour permettre à la première armature de support (2031) et à la seconde armature de support (2032) de se déplacer de façon symétrique par rapport au premier élément de support (201) pour permettre en outre à la partie abat-jour (103) d'être dépliée de façon symétrique.
8. Lampe (1) selon l'une quelconque des revendications 2 à 7, **caractérisée en ce que** l'élément de détection commande la luminosité de la source de lumière en fonction de l'état plié, de l'état déplié ou de l'état intermédiaire entre l'état plié et l'état déplié de la partie abat-jour (103).
9. Lampe (1) selon l'une quelconque des revendications 2 à 8, **caractérisée en ce que** l'ensemble de support (20) est une feuille métallique.
10. Lampe (1) selon l'une quelconque des revendications 1 à 9, **caractérisée en ce que** la feuille est choisie dans le groupe constitué d'un papier, d'une matière plastique, d'une matière adhésive et d'une matière fibreuse.
11. Lampe (1) selon l'une quelconque des revendications 1 à 10, **caractérisée en ce que** l'élément de détection est un élément de détection de pression, un élément de détection de déplacement, un élément de détection de mouvement, un élément de détection de position ou un élément de détection de flexion.

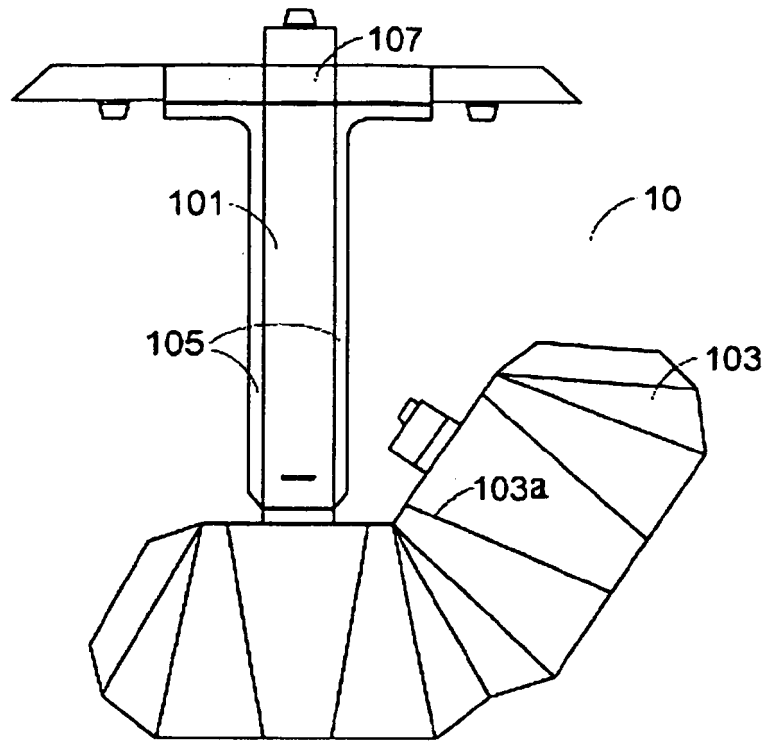


FIG. 1A

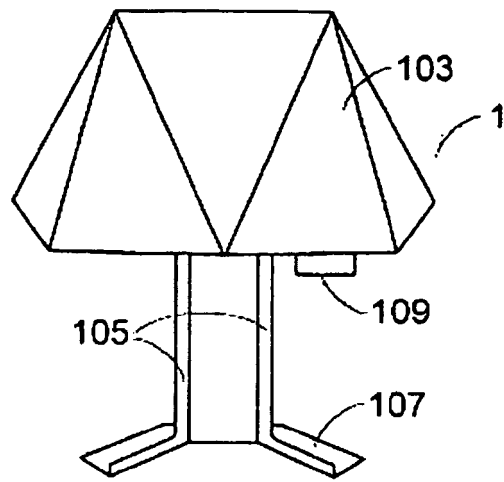


FIG. 1B

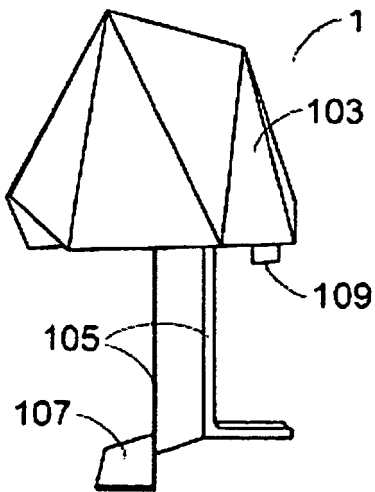


FIG. 1C

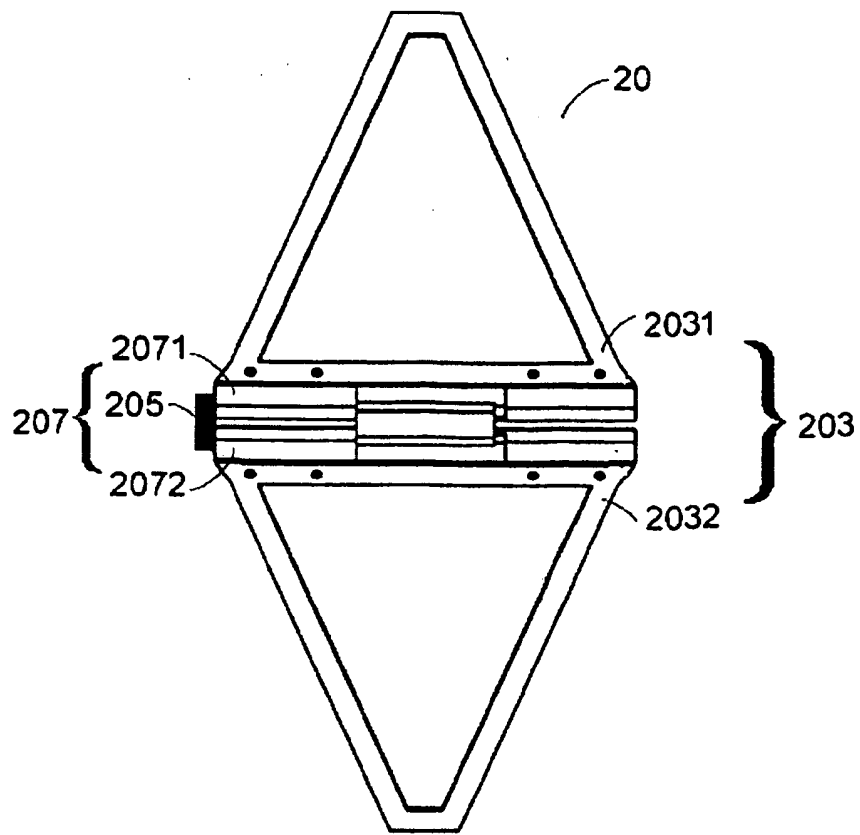


FIG. 2A

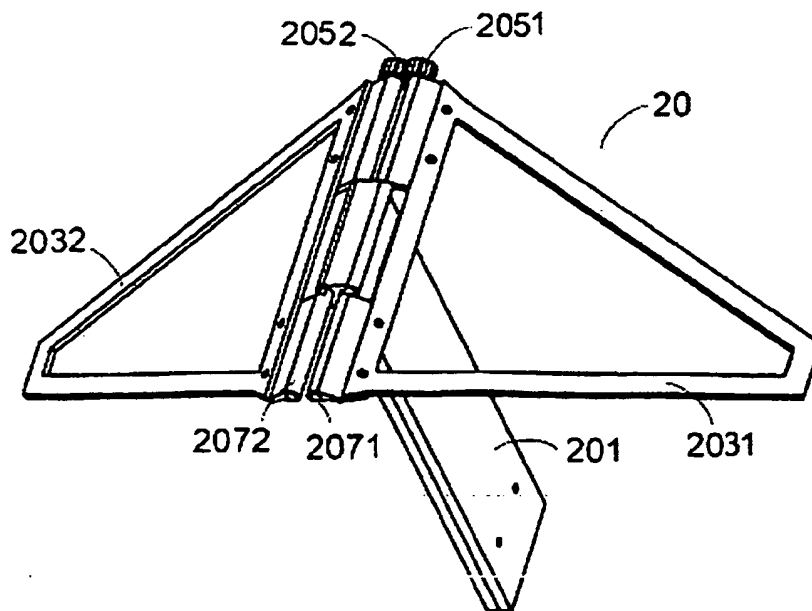


FIG. 2B

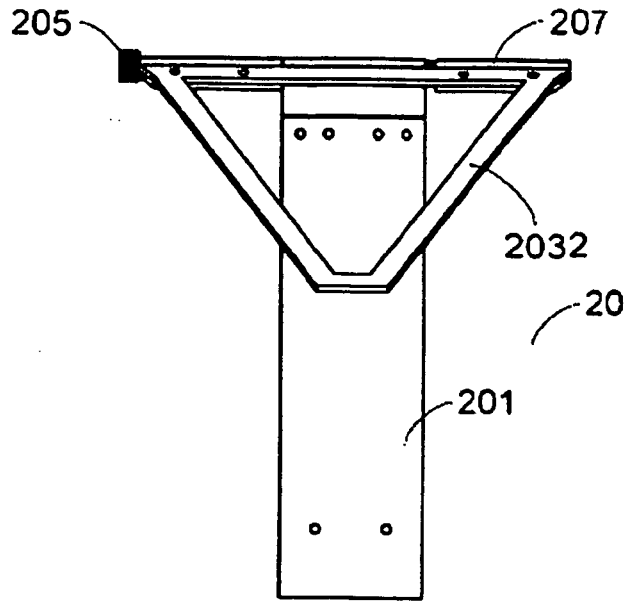


FIG. 2C

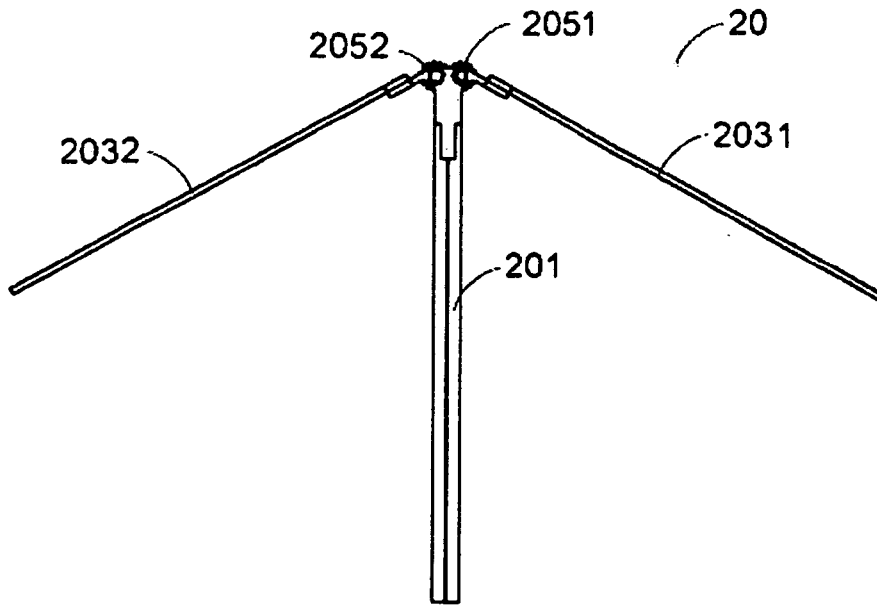


FIG. 2D

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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