Nov. 21, 1961 H. GÜNTHER ET AL 3,010,013

OPERATING ROOM LAMP

Filed April 18, 1958 2 Sheets-Sheet 1

Fig.5

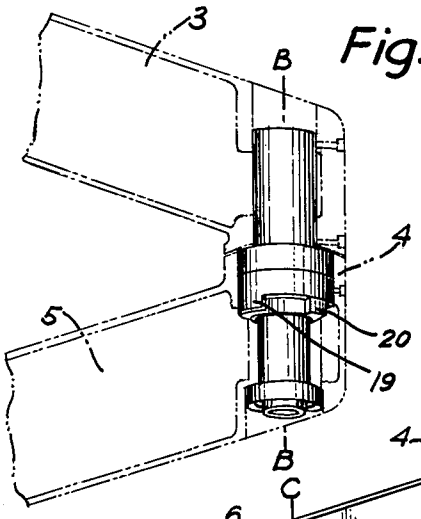


Fig.1

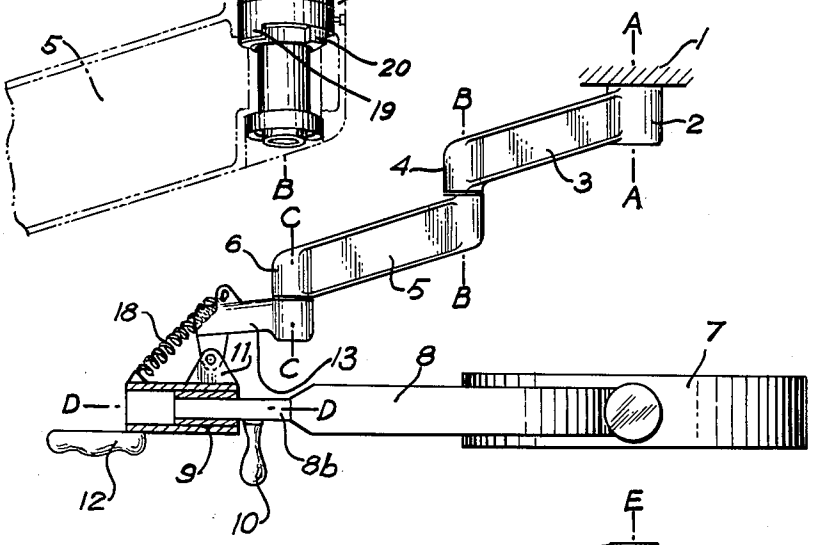
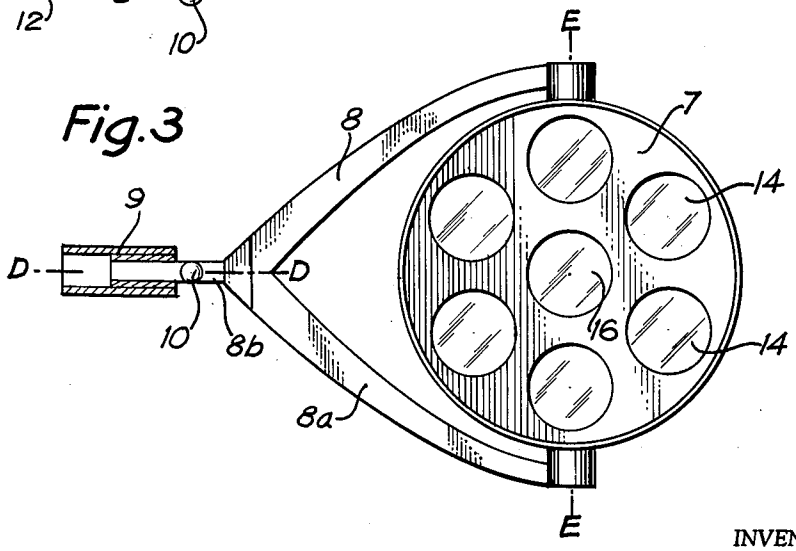


Fig.3



INVENTORS

HERMANN GUNTHER

RUDOLF STAEGER

BY Toulmin & Toulmin

ATTORNEYS

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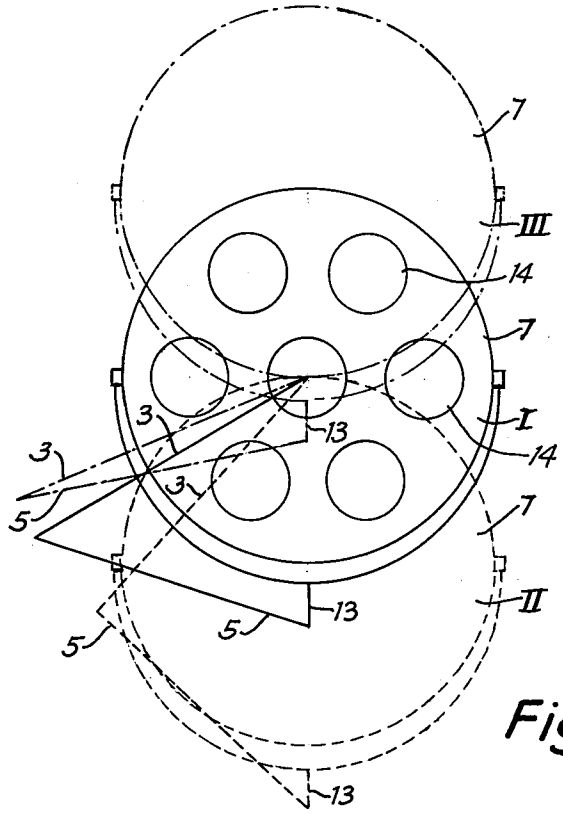


Fig.2

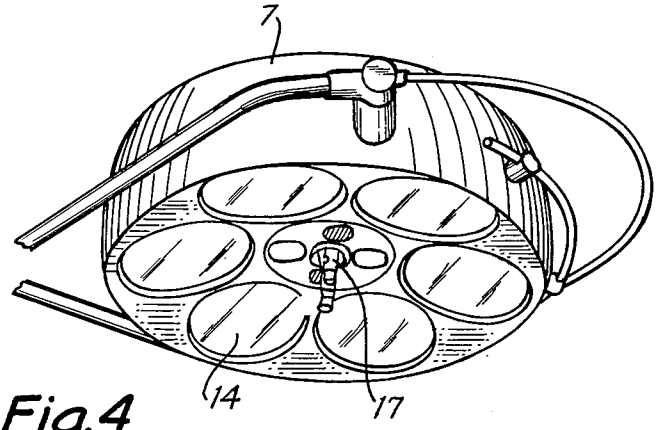


Fig.4

INVENTORS
HERMANN GUNTHER
RUDOLF STAEGER

BY Toulmin & Toulmin

ATTORNEYS

United States Patent Office

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OPERATING ROOM LAMP

Hermann Günther, Hanau, and Rudolf Staeger, Frankfurt, Germany, assignors to Quarzlampen-Gesellschaft m.b.H., Hanau (Main), Germany

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The present invention relates to an operating room lamp. More in particular, the present invention relates to an operating room lamp construction of the type in which the lamp casing is attached to the ceiling fixture by means of a rotary arm.

It is known in the art to provide operating room lamps with a hinged arm permitting the lamp to be moved into various positions. These lamp constructions suffer from the disadvantage that the lamp cannot be moved into the desired position by performing a straight, rectilinear motion. If the lamp has to be brought into a position by performing a motion which would lead through the center of the rotary ceiling fixture attaching the lamp to the ceiling of the operating room, the lamp must be displaced laterally in order to avoid this dead center.

It is also known in the art to provide a lamp casing having a flat box shaped configuration and to position the casing rotatably between the two arms of a supporting frame with the axis of the rotary movement being positioned parallel to the flat lower surface of the lamp casing. It is also known to position the shaft of this support frame rotatably about an axis which is horizontally disposed and vertical relative to the shaft of the supporting frame.

This construction requires a comparatively long distance to be covered by a compensating spring compensating the weight of the lamp.

It is an object of the present invention to provide an operating room lamp construction, which makes it possible to move the lamp from any position to any other position above the area where the operation is being performed, by one straight, rectilinear motion of the lamp casing.

It is another object of the present invention to provide an operating room lamp construction, which requires a comparatively small tilting angle when lifting the lamp casing and in which a compensating spring has to cover only a comparatively small distance.

It is a further object of the present invention to provide an operating room lamp construction, which can easily be equipped with a photographic or television camera without impairing the easy manoeuvrability and the lighting effect of the lamp.

It is yet another object of the present invention to provide an operating room lamp construction, in which the individual spot lights are so disposed in the lamp casing that a photographic or television camera can be easily disposed on the side of the lamp casing provided with the individual spot light.

These objects are achieved by the operating room lamp construction of the present invention, comprising a pair of horizontal, slightly tilted articulated arms disposed between the lamp casing and the rotary ceiling fixture, and three hinges connecting the two articulated arms with each other, and with the ceiling fixture and the lamp casing, respectively.

According to a further feature of the present invention,

the hinge connecting the two articulated arms with each other is provided with stop members preventing the two arms from forming an angle greater than 120°. The range of operation of the lamp casing is also determined by the two articulated arms and it can be extended by making the arms sufficiently long. Usually, the range of displacement will be about 2.5 times the length of the articulated arms, if they are prevented from forming an angle exceeding 120°.

According to another embodiment of the present invention, the hinge in which there is horizontally and rotatably positioned the two-armed support frame is mounted upon an extended arm in such a manner that the distance of this hinge from the center of the lamp casing is at least 1.2 times the distance of the nearest hinge with a vertical axis of rotation from the center of the lamp casing.

Furthermore, according to the invention, the individual spot lights are disposed on the lower surface of the lamp casing in a circle with an additional spot light in the center of this circle, which additional spot light can be removed and replaced by a photographic or television camera, without impairing substantially the excellent lighting effect of the camera.

The invention will be more fully understood upon the following description of the accompanying drawings, wherein

FIGURE 1 is a side elevational view of the operating room lamp construction of the invention;

FIGURE 2 is a top view of the operating room lamp construction of the invention shown in a central position and two further positions;

FIGURE 3 is a plan view from below showing somewhat schematically the lamp casing with the circularly disposed individual spot lights and an additional individual spot light in the center;

FIGURE 4 is a perspective view of the lamp casing in the operating room lamp of the present invention showing the circularly disposed individual spot lights and wherein the central spot light has been replaced by a television camera;

FIG. 5 shows stop members provided in the hinge between the two uppermost arms of the operating room lamp as shown in FIG. 1.

The lamp is attached to the ceiling **1** by means of a ceiling fixture comprising a rotary hinge **2** having an axis A—A. A first articulated arm can be swivelled about this axis A—A and bears at its lower end a second hinge **4** also having a vertical axis B—B. A second articulated arm **5** is connected to the second hinge **4** and bears at its lower end a third hinge **6**, having a vertical axis C—C.

As illustrated in the drawing, the first arm is arranged within the space bounded on the top by the ceiling and below by a horizontal plane which is spaced from the ceiling, whereas the second arm is arranged below this plane so that the first and second arms may pivot relative to each other without interfering with each other.

The hinge **4** intermediate the two articulated arms **3** and **5** can be provided with stop members **19** and **20** (FIG. 5) limiting the swivelling range of the two arms preventing them from being displaced relative to each other beyond a range determined by an angle which is substantially inferior to 180° and preferably less than 140°.

The lamp casing 7 has a flat box shaped configuration and is provided at its lower surface 6 with a plurality of circularly disposed individual spot lights 14. An additional spot light 15 is positioned in the center of the lower surface of the lamp casing. The lamp casing 7 is positioned between the arms 8 and 8*a* of a supporting frame and can be tilted about a horizontal axis E—E.

An extension 8*b* of the shaft of the supporting frame having the two arms 8 and 8*a* is rotatably positioned in a sleeve 9 and can be moved by means of a handle 10. The movement about axis E—E passing through the ends of the arms 8 and 8*a* and the movement about the axis D—D cooperate to achieve any desired tilted position of the lamp casing 7.

The height of the lamp casing can be adjusted by means of a horizontally disposed hinge 11, by operating the handle 10 and a further handle 12.

An extension arm 13 is disposed between the hinges 6 nd 11. This extension arm 13 is to remove the hinge 11 from the axis C—C in the direction away from the lamp casing 7, so that a comparatively small angle of rotation of the axis of the supporting frame with the arms 8 and 8*a* is required for lifting the lamp casing. The extension arm can be, for example, so constructed that the distance of hinge 11 from the center of lamp casing 7 is 1.3 times the distance of the closest vertical rotary hinge (i.e. hinge 6) from the center of lamp casing 7. A compensating spring 18 is provided in the extension arm 13. This spring acts upon a prolongation of the sleeve 9 and compensates the torque of the lamp casing 7.

The extension arm can, of course, also be employed with advantage in lamp constructions having only one articulated arm.

The individual spot lights are preferably disposed in the lamp casing in the manner illustrated in FIGURE 3. There are provided a plurality of individual spot lights, for example six spot lights arranged in a circle, and an additional spot light 16 in the center. As shown in FIGURE 4, this central spot light 16 can be replaced by a camera, e.g. a television camera 17, without substantially impairing the excellent lighting effect of the lamp.

The frame with the two articulated arms 3 and 5 operates in the manner illustrated in FIGURE 2. The bold lines indicate the central position I of the lamp casing in which the two articulated arms form an angle of 60°. In position II, the two arms 3 and 5 form an angle of approximately 120° and the lamp casing now assumes one of its two end positions. In position III, the two arms 3 and 5 form a small angle. Of course, the lamp casing can be moved further beyond position III until the articulated arm 5 is situated to the left of arm 3. In position I of the example illustrated in FIGURE 2 the center of the lamp casing is positioned exactly below the rotary hinge 2, with the axis A—A passing exactly both through the center of the rotary hinge 2 and through the center of the lamp casing 7. The positions II and III are symmetrically disposed to the center of the rotary hinge 2. By positioning the rotary hinge 2 at a predetermined location relative to the operating table the range of movement of the lamp can be so chosen that the lamp can be moved to any location above the operating table. If the rotary hinge 2 is located above the lower portion of the operating table the lamp can be sufficiently removed away from the operating table so that excellent lighting conditions are obtained for gynecologic operations.

As the operating handles are disposed close to the hinge 11 the lamp can be moved by an operating person without reaching into the sterilized region where the operation is being performed. According to the invention, the lamp can assume any position by a parallel displacement of the lamp casing short of a lateral displacement of the lamp casing and the operator does not have to leave his place of operation. This advantage can be further enhanced by transmission means consisting of ropes or Cardan joints disposed in the hollow arms 8 and 8*a* moving the lamp casing 7 about the horizontal axis A—A passing through the ends of the arms 8 and 8*a*. The movement can be effected by axially turning the handle 10.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. A ceiling-suspended rectilinearly adjustable lighting arrangement, comprising, in combination: a first arm having opposite ends one of which is attached to the ceiling for pivotal movement relative thereto about a first vertical pivot axis, said first arm being arranged within the space bounded on the top by the ceiling and below by a horizontal plane which is spaced from the ceiling; a second arm having opposite ends one of which is attached to the other end of said first arm for pivotal movement relative thereto about a second vertical pivot axis, said second arm being arranged below said plane so that said first and second arms may pivot relative to each other without interfering with each other; and lighting means attached to the other end of said second arm for rectilinear pivotal movement relative thereto about a third vertical pivot axis, said lighting means including: a downwardly inclined, weight-equalizing extension arm having opposite ends one of which is attached to said other end of said second arm for pivotal movement relative thereto about said third vertical axis thus constituting the attachment between said second arm and said lighting means, a carrier having opposite ends one of which is attached to the other end of said extension arm for pivotal movement relative thereto about a horizontal pivot axis, said carrier extending back toward said third vertical pivot axis, and a lighting device carried by said carrier at the other of its ends, the distance between the center of said lighting device and said horizontal pivot axis being greater than the distance between said center and said third vertical pivot axis.

2. A ceiling-suspended rectilinearly adjustable operating room lamp arrangement, comprising, in combination: a first arm having opposite ends one of which is attached to the ceiling for pivotal movement relative thereto about a first vertical pivot axis, said first arm being arranged within the space bounded on the top by the ceiling and below by a horizontal plane which is spaced from the ceiling; a second arm having opposite ends one of which is attached to the other end of said first arm for pivotal movement relative thereto about a second vertical pivot axis, said second arm being arranged below said plane and at least one of said arms being downwardly inclined so that said arms may pivot relative to each other without interfering with each other; abutment means for preventing said first and second arms from forming with each other an angle greater than 140° thereby avoiding dead center position; lighting means attached to the other end of said second arm for pivotal movement relative thereto about a third vertical pivot axis, said lighting means including: a downwardly inclined extension arm having opposite ends one of which is attached to said other end of said second arm for pivotal movement relative thereto about said third vertical axis thus constituting the attachment between said second arm and said lighting means, a carrier having opposite ends one of which is attached to the other end of said extension arm for pivotal movement relative thereto about a horizontal pivot axis, said carrier extending back toward said third vertical axis, whereby said lighting means may be moved rectilinearly from any point within its range to any other point within its range, and a lighting device carried by said carrier at the other of its ends.

3. A lamp arrangement as defined in claim 2 wherein the distance between the center of said lighting device and said horizontal pivot axis is 1.3 times the distance between said center and said third vertical pivot axis.

4. A lamp arrangement as defined in claim 2 further comprising a counterbalance spring provided intermediate said extension arm and said carrier whereby the torque caused by the weight of said lighting device is compensated.

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