United States Patent

Burton

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[54] SURGICAL LIGHT

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[51] **Int. Cl.** **A61b 1/06**

[58] **Field of Search** ..... 128/23, DIG. 15; 350/96 B

[56] **References Cited**

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[57] **ABSTRACT**

A surgical light of a type adapted to be worn on the head of a user, including a harness element, a fiber optic light carrier element, and a light projecting element carried by said harness element, said harness element having frictional retaining means thereon engaging said light carrier element at a plurality of points therealong, said light projecting element forming a socket, a free end of said light carrier element being maintained in tensionless condition within said socket in the absence of other retaining means, whereby said light carrier element may be conveniently detached for use with other equipment, or for purposes of sterilization.

1 Claims, 5 Drawing Figures

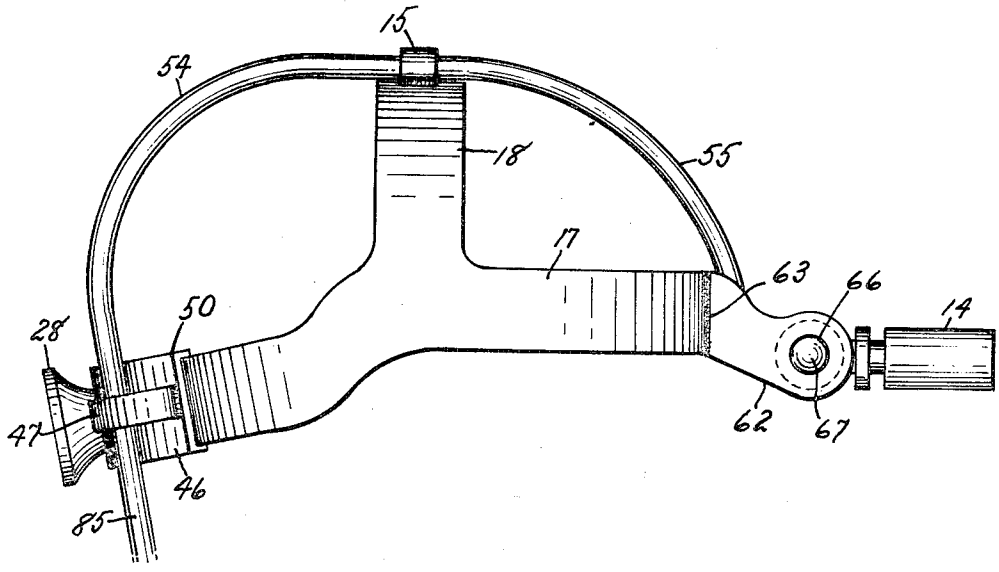


Fig. 1

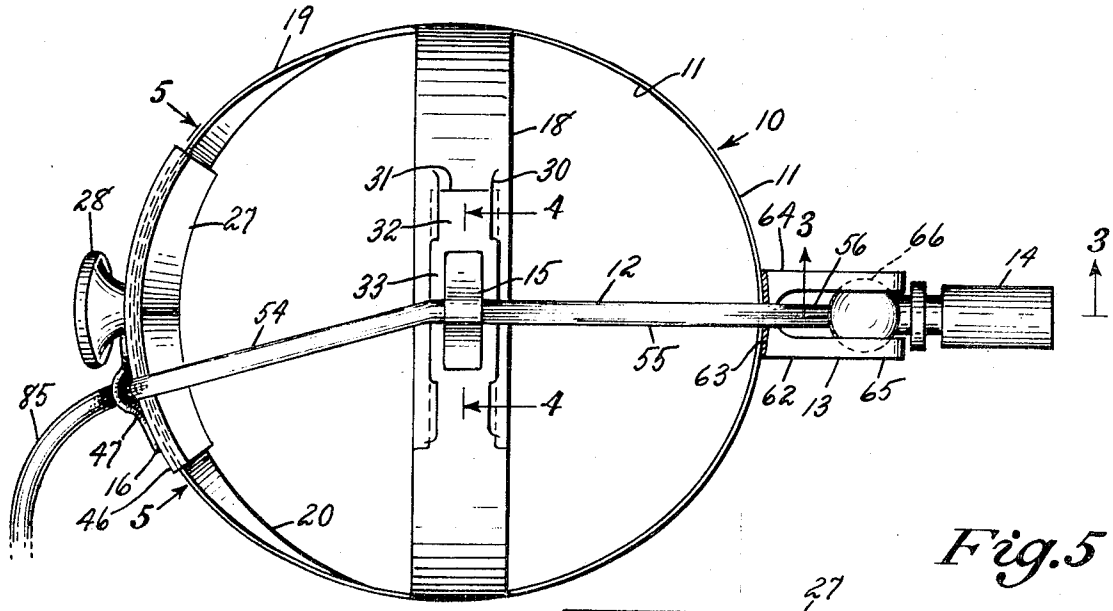
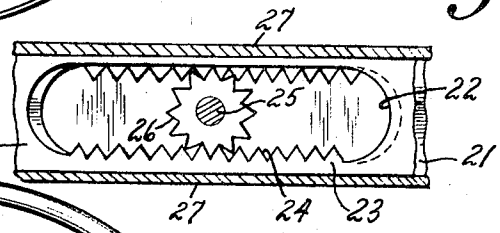


Fig. 5



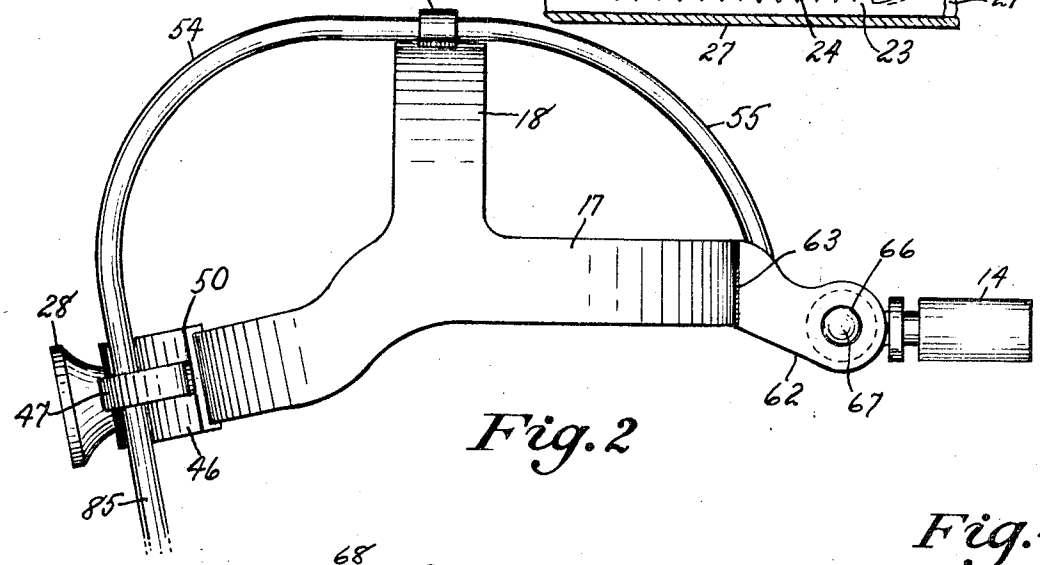
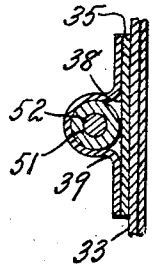


Fig. 2

Fig. 4



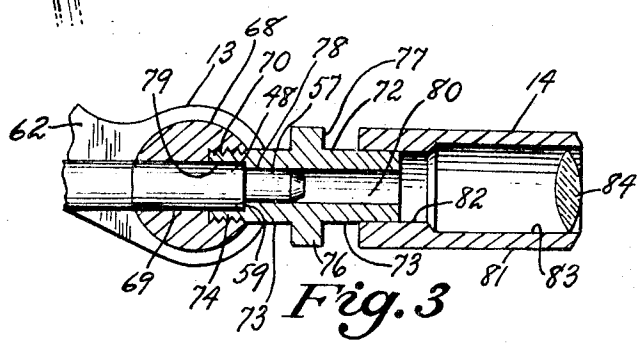


Fig. 3

SURGICAL LIGHT

This invention relates generally to the field of surgical or medical lights of the type adapted to be worn upon the head of a user, and particularly suited for use in the operating room.

Lights of this type present a number of design problems which are not normally present in the construction of head-supported lights used for other purposes. Surgical lights must be usable in the presence of inflammable or explosive anesthesia gases, and must be so constructed as to render all of the components thereof conveniently sterilizable. During the time the lamp is used, owing to the necessity of the surgeon maintaining himself in a sterile condition, he cannot normally adjust the lamp from an existing setting. Where the light emanates from a source other than the vicinity adjacent the head of the wearer, there is present a power conducting or light conducting cord which can be easily tangled to interfere with the motions of the user. Recent constructions of this type have utilized a fiber optic light conducting cable which passes over the head of the wearer, so that a free end may communicate with a light projecting element. The high cost of manufacture of this cable has made it desirable that the same be readily detachable for use with other equipment, and with a minimum of wear and/or damage to the same during assembly and disassembly.

It is therefore among the principal objects of the present invention to provide an improved form of surgical head light having a minimum number of operative parts, all of which may be conveniently disassembled for convenience in rendering the same sterile.

Another object of the invention lies in the provision of an improved light of the class described in which the fiber optic light transmitting cable is devoid of bushings or other fittings which must be mechanically coupled to other parts of the device.

A further object of the invention lies in the provision of an improved surgical head lamp in which the light conductive cable element thereof is frictionally retained in position at a plurality of points along its length, so that the end thereof communicating with the light projecting element may be seated within a socket in the latter in the absence of any tension, so that the same will remain in operative position without resort to any mechanical interconnecting structure.

A further object of the invention lies in the provision of an improved surgical lamp which will remain in relatively cool condition during use, with a minimum of discomfort to the wearer, owing to relatively light weight of the entire device.

These objects, as well as other incidental ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claims.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIG. 1 is a fragmentary plan view of an embodiment of the invention.

FIG. 2 is a fragmentary side elevational view thereof.

FIG. 3 is an enlarged longitudinal sectional view corresponding to the right-hand portion of FIG. 2, and showing the interconnection of the fiber optic light conducting element with a light projecting element.

FIG. 4 is a fragmentary enlarged transverse sectional view as seen from the plane 4—4 in FIG. 1.

FIG. 5 is a fragmentary enlarged sectional view as seen from the curved plane 5—5 in FIG. 1.

In accordance with the invention, the device, generally indicated by reference character **10**, comprises broadly: a harness element **11**, a fiber optic light carrier element **12**, ball joint socket means **13**, a light projecting element **14**, and first and second carrier element supporting means **15** and **16**, respectively.

The harness element **11** is preferably formed from synthetic resinous materials capable of withstanding gas sterilization methods known in the art. It includes an annular band member **17** generally horizontally disposed, an upper band member **18**, and rear band members **19** and **20**, the end portions **21** of which are each provided with elongated openings **22**, one side **23** of each having teeth **24** forming a rack. The end portions are disposed within a curved sleeve member **27** having a corresponding elongated opening (not shown) penetrated by a shaft **25** mounting a pinion **26** meshing with the teeth **24**. An externally positioned knob **28** is rotatable to result in increasing or decreasing the effective periphery of the front and rear band members whereby adjustment to the size of the head of the wearer is accomplished.

The two-piece upper band **18** is provided with slots **30** in one piece engageable with a free end **31** in another piece **32**. Surmounting the upper surface **33** is a first carrier supporting means **15**. This means (best seen in FIG. 4 in the drawing) includes a first member **35** cemented to said surface **33**, the upper surface **38** of the same being provided with synthetic resinous hooks which cooperate with the inner surface of a flexible pile member **39**. The members **35** and **39** are of a type commercially sold under the trademark "Velcro" and are brought into operative connection by pressure exerted thereupon, whereby the hooks of one member engage the pile of the other, and conveniently separated by merely pulling the same apart.

The second light carrier element supporting means **16** is generally similar, and is secured to an outer surface **46** of the sleeve member **27**. A pile member **47** cooperates with a hook member **50** in similar manner.

The fiber optic light carrier element **12** is of a type known in the art, including a main body **51** and a rubber sheath **52** surrounding the same. A first end (not shown) connects with a light source, and first and second curved portions **54** and **55**, respectively lead to a bend portion **56** adjacent a terminal **57**. The end portion **48** of the sheath is shortened to form a shoulder **59** for positioning purposes with respect to the light projector element **14**.

The ball joint socket means **13** is preferably of nonmetallic construction, and includes a nylon socket member **62**, the base **63** of which is cemented with an epoxy adhesive to the band member **17**. First and second arms **64** and **65**, respectively, each form a recess **66** for reception of a ball member **67** for relative motion therebetween.

The ball member **67** is bounded by a spherical outer surface **68**, and includes a through bore **69** of diameter corresponding to the light carrier element **12**. A threaded counterbore **70** communicates with the bore **69**, and provides means for mounting the light projecting element **14**.

The element **14** includes a fixed barrel element **72** partially bounded by an outer surface **73** an end **74** of which is threaded for engagement within the counterbore **70**. A nut portion **76** forms a shoulder on a surface **77** thereof. A centrally disposed bore **78** forms a shoulder **79** with a narrow counterbore **80** defining a light conducting passage.

Mounted on the fixed barrel element **72** is a movable barrel element **81** having a first bore **82** slidable over the surface **73**, and a second bore **83** mounting a lens **84**. Movement of the barrel element **81** with respect to the barrel element **72** provides a focusing function, and serves to vary the size of the projected spot image upon the object being viewed.

During assembly of the device, it is necessary only to disengage the first and second light carrier element supporting means **15** and **16**, by separating the hook and pile components thereof. The light carrier element is then bent to the position shown on the drawing, and the free end thereof is inserted into the bore **78** in the fixed barrel element **72**, and manually supported there while the means **15** and **16** are engaged about the outer surface of the element **12**. When this has been accomplished, tension exerted on the rearward part of the element **12** will be absorbed by the means **15–16**, and will not be transmitted to the free end. Movement of the head of the wearer, during use, will be transmitted by the second means **16** to the portion **85** of the element **12**, but the element will otherwise remain undisturbed, with no tendency to dislodge the end of the same from the light projecting element **14**.

When the device **10** has been doffed, and is to be disassembled, it is necessary only to release the means **15** and **16**, following which the carrier element **12** may be completely removed for subsequent use or sterilization. Since there are no bushings or couplings on the element **12**, and the only engagement thereof is a frictional with the outer covering thereof, the likelihood of damage to the same is materially reduced. Kinking of the element **12** is all but impossible, and the useful life of the element **12** is accordingly extended.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. A surgical light of a type supported by the head of a wearer comprising: a harness element having a generally annular band member, and an upper band member having first and second ends interconnected with said annular band member; an elongated flexible fiber optic light carrier member

having a tubular resilient covering thereon; a light projecting element, a synthetic resinous ball joint member secured to said light projecting element, a pair of synthetic resinous arms forming a first socket attached to an outer surface of said annular band member, extending radially thereof and frictionally engaging said ball joint member, said light projecting element having a cylindrical socket therein; a first light carrier retaining member positioned on said outer surface of said annular band member in spaced relationship to the point of attachment of said socket arms, a second light carrier retaining member positioned on an outer surface of the upper band member, said first and second retaining members surrounding said light carrier member, and frictionally engaging said resilient covering; whereby said light carrier member is maintained upon said harness element with an absence of tension upon a forward end thereof, said forward end being disposed within said last-mentioned socket.

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