July 13, 1965 H. A. SPRINGER 3,194,230

MEDICAL EXAMINATION LAMP PROVIDED WITH VARIABLE FOCUSING MEANS

Filed March 18, 1963 2 Sheets-Sheet 1

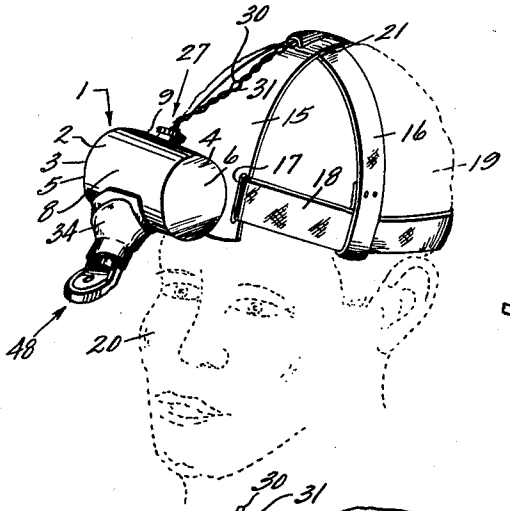
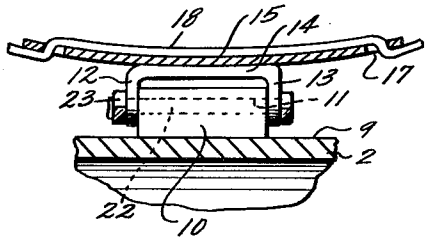


FIG 1

FIG 2



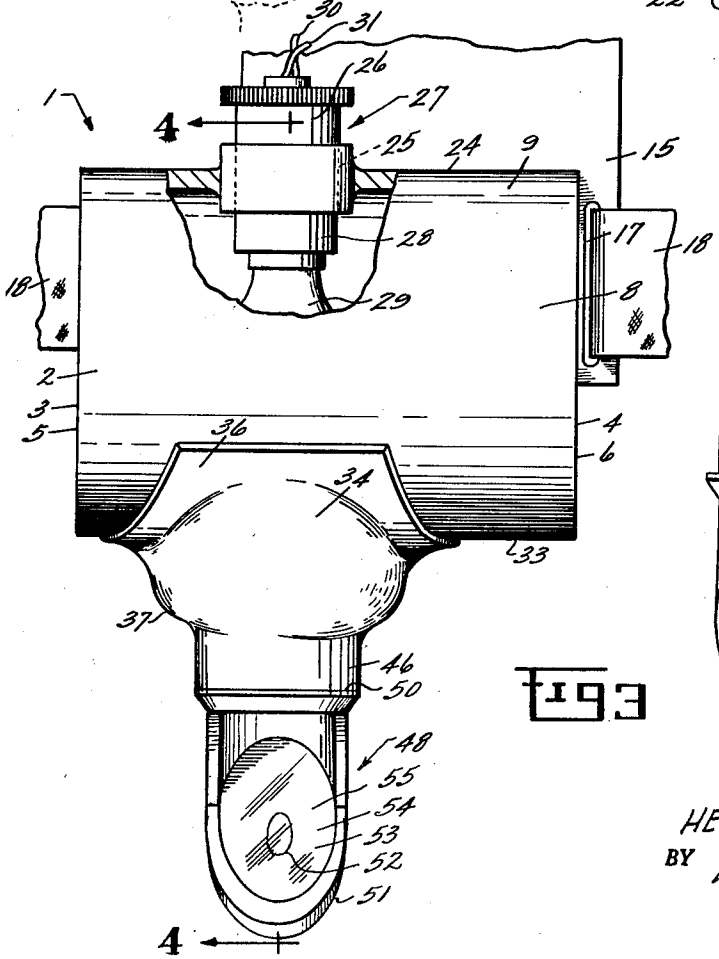
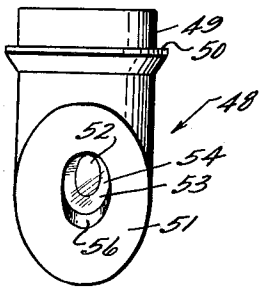


FIG 3

FIG 7



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Fig 4

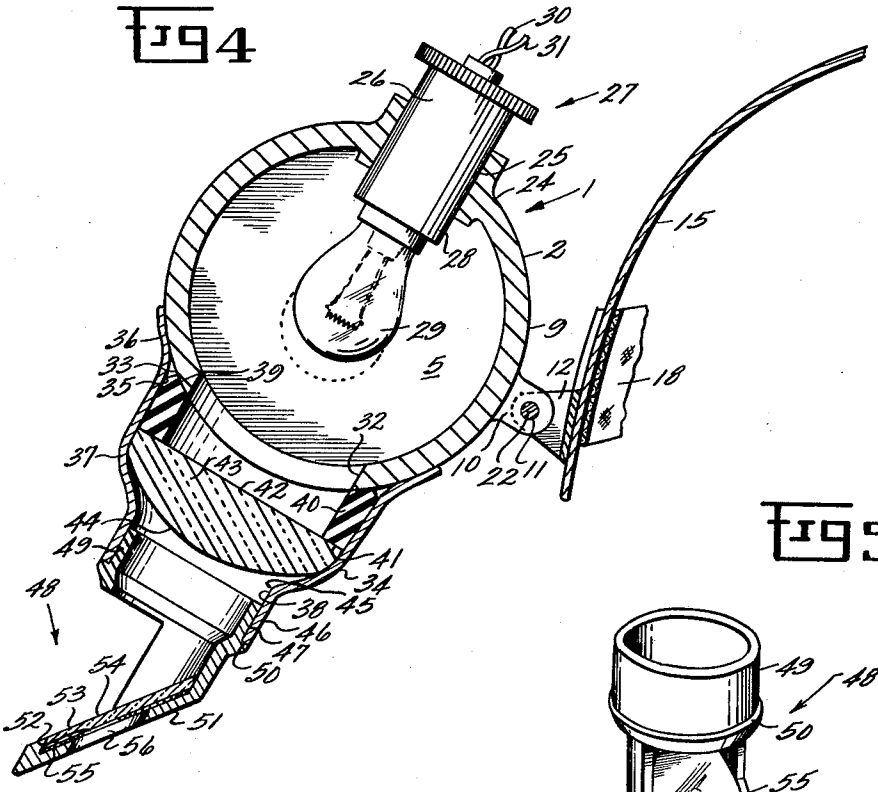


Fig 5

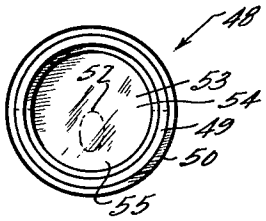


Fig 6

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3,194,230

MEDICAL EXAMINATION LAMP PROVIDED WITH VARIABLE FOCUSING MEANS

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The invention relates to a combination of elements including what may be termed a head lamp or headgear carrying a spotlight particularly adapting a physician or surgeon to retain the spotlight in a predetermined manner upon his forehead to enable him to conveniently and variously direct light rays from his forehead upon a patient, and into cavities and membranes and recesses of said patient's anatomy or body for surgical purposes.

In the past considerable difficulty, inconvenience, expense and trouble has been experienced by physicians, surgeons and the like in the examinations of diseased membranes and tissues in cavities and elsewhere of human beings, animals and other living things, because of insufficient and poor illumination of the parts being examined and inspected. This is particularly so when examination is being made by use of a proctoscope in cavities of the body not accessible for satisfactory illumination by ordinary lights. Also, surgeons have in the past experienced considerable difficulty in seeing efficiently when performing operations on human beings in regions and cavities where normal lighting and illumination is not conveniently accessible. Particularly it is necessary that surgeons exercise a great degree of care when selecting suitable and efficient illumination to enable them to properly see and visualize the parts, membrances, and tissues upon which an operation is being performed, because ether, and vapors therefrom, explode or ignite at a temperature of approximately 212 degrees Fahrenheit, and some anesthetics ignite and explode at even lower temperatures.

An important object of the invention is to provide simple, economical and practical means to efficiently illuminate mucous membranes and other parts, particularly cavities and recesses in the bodies of human beings, animals and other living things with concentrated light rays while a surgical operation is being performed, and during inspection of such membranes, tissues, cavities and recesses.

Other objects of the invention are to provide dependable and efficient means capable of concentrating the rays of light from an electric lamp or bulb to a predetermined area by use of a plano-convex lens; and to provide means to hold a mirror capable of reflecting said light rays into membranes and other parts of a human body and particularly into cavities and recesses in said body, and through a proctoscope; and to provide means to enable a physician, surgeon or other person to see the area in which said light rays are reflected.

Further and other objects and details of the invention will be apparent from a careful study, and consideration of the accompanying specification, claims, and drawings.

The invention consists in the combination of the elements, arrangement of the parts and in the details of the construction, as hereinafter claimed.

In the drawings:

FIG. 1 is a perspective view of the invention connected

with a headgear on the head, of a person, shown in dotted lines;

FIG. 2 is a sectional view showing means connecting the invention with said headgear, with parts partly broken away;

FIG. 3 is a plan elevational view of the invention, with parts broken away;

FIG. 4 is a section taken on line 4—4 in FIG. 3;

FIG. 5 is a perspective view of the mirror accessory; and

FIG. 6 is a plan view of the same, and

FIG. 7 is a front elevational view of the tube and mirror.

In the preferred construction of the invention, I provide the horizontal cylindrical tubular casing 1 comprising the tubular body 2 having its ends 3 and 4 closed by the circular plates 5 and 6 suitably fixed to the ends of the body, as by welding. Fixed or integrally connected with the top side 9 of the casing is the rectangular lug 10 having a channel 11 whose sidewalls extend longitudinally of the lug and the casing 1. Received in contact with the outer ends of the lug 10 are the spaced apart legs 12 and 13 of the U-shape support 14 having suitably fixed to its top the longitudinal plate 15 forming a part of the headgear 16 and having slots 17 in its inner end which receives the strap 18 of the headgear, which passes around the head 19 of the wearer 20. The strap 21 passes over the top of the wearer's head 19 and has its middle portion fixed to the plate 15 and its ends fixed to the strap 21.

In the legs of the U-shape support 14 are perforations or holes whose sidewalls are aligned with the sidewalls of the channel 11, in the lug 10, and the pin 22 is received through the holes in the legs 12 and 13 and through the channel 11 to retain the U-shape support 14 and the plate 15 in predetermined fixed positions when the nut 23, threaded to the pin 22, is manually screwed in close contact with the outer side of the leg 12 of the support 14. When the nut 23 is manually unscrewed from close contact with the leg 12, the legs 12 and 13 are rotatable on the pin 22 whereby when manual force is exerted on the plate 15, or the headgear, the casing 1 may be adjusted to the desired position on the head of the wearer 20.

In the rear side 24 of the body 2 of the casing 1, is the circular opening 25 which slidably receives the cylindrical holder 26, of the focusing unit 27, and the holder closes the opening 25. The holder has in its inner end 28 a socket which receives the usual and conventional electric bulb and light 29, preferably of the 8 volt type. The body contains the usual light producing filament of the bulb which is spaced from the inner surface of the sidewalls of the casing a distance greater than the distance through said body and transversely thereof, as shown in FIG. 4, to facilitate in keeping the inner surface of the walls of the casing at a relative cool or low temperature. The electric conductors 30 and 31, are received through the holder 26 and are suitably connected with terminals (not shown) of the socket to cause illumination of the bulb 29 when suitable outside source of electric current supply has operative connection with the conductors 30 and 31.

The opening 25, in the rear side 24 of the casing, is directly opposite the circular hole 32 in the front side 33 of the casing 1, whereby light rays from the bulb 29 are

adapted to pass through the hole 32. The body 2 of the casing extends transversely of the head 19 of the wearer 20.

Fixed to the outside surface of the front side 33, of the casing 1, is the protuberant circular and hollow boss 34 having an open rear end 35. The boss extends outwardly of the casing 1 and has a flange 36 integral with its inner edge fixed, as by welding, to the outer surface of the front side of the casing. The flange 36 is in sealing contact with the casing 1.

The sides 37 of the boss 34 converge outwardly of the casing and inwardly of the boss thereby forming a circular outlet 38 in the outer end of the boss. The cross sectional area of the outlet 38, between the walls of the outlet, is considerably less than the cross sectional area of the hole 32, between its sidewalls 39.

Fixed to the front side of the casing, as by adhesive, and received inside the boss 34 is the circular ring-type gasket 40 which surrounds the hole 32. In contact with the outer edge 41, of the gasket, is the flat side 42 of the plano-convex lens 43 having its convex side 44 received in contact with and suitably fixed to the inner converging walls of the boss having the outlet 38. The light rays pass from the bulb 29 through the hole 32 in the casing 1, the boss 34, the lens 43, and outlet 38. The gasket is positioned between said boss and said casing, and between said casing and said lens, and in contact with the inner surface of said boss to close the hole 32 to prevent air escaping from the inside of said casing.

The purpose of the plano-convex lens 43 is to concentrate and intensify the light rays after the rays pass through the hole 32 in the casing and pass into the relatively small cross sectional area of the outlet 38.

Integrally connected with the sidewalls of the outlet 38 is the inner end 46 of the tube 47 adapted to receive various and different kinds of medical accessories to assist physicians, surgeons and other persons to see and observe membranes and inner parts of cavities and recesses in the body of a human being. The walls of the outlet 38 are aligned with the walls of the tube 47.

Without connection of the tube 47 with the walls of the outlet 38, or after the tube 47 is fixed to the walls of the outlet, a person, who wears the headgear 16, may direct concentrated rays of light which pass from the bulb 29 through the hole 32, through the lens 43, and through the outlet 38 onto any object, membranes, or part of the body of a human being in order to closely and carefully inspect it.

In the various figures of the drawings is shown a conventional cylindrical mirror reflecting unit 48 comprising the tubular body 49 received into the tube 47 and retained therein by frictional contact with the inner surface of the tube 47, and having a shoulder 50 in contact with the outer end of the tube 47. Integrally connected with the outer end of the body 49, and at a side thereof, is the plate 51 which extends at an angle to the body 49. Formed in the plate 51 is the hole 52, centrally of the plate which supports the mirror 53 comprising a glass plate 54 having thereon a layer 55 of reflecting material, as quick silver. In the center of the layer 55 is the hole 56 centrally disposed of the hole 52. When in practical usage the wearer 20 of the headgear 16 loosens the nut 22 and properly adjusts the casing 1, with respect to his head and then manually tightens the nut 22 to retain the casing in its selected position with respect to the headgear and the head 19 of the wearer 20. Then the wearer manually moves or slides the holder 26 in the hole or opening 25, in the body 2, to properly and efficiently adjust the light rays from the bulb 29 so that the light rays will be concentrated or intensified on the part or spot of the membrane or cavity of the human body which the wearer desires to inspect by looking through the holes 52 and 56 while the mirror reflects the light rays onto the part or spot being inspected. Slidable movement of the holder 26 concentrates the light rays on the spot being inspected

by adjusting the filament of the bulb 29 with respect thereto. The light rays may be utilized to pass through a proctoscope for efficient inspection and observation of spot inside the body of a human being.

By use of the focusing holder 26 the light rays can be adjusted so that the rays are horizontally and vertically in direct line with the wearer's pupil of his eye. In order to prevent reflection of the light rays from the side walls of the proctoscope, the light rays can be sharply focused. The heat from the light bulb is trapped in the closed casing 1 and the heat in the casing is diffused to 120 or 130° F. inside the casing and on the wall of the casing, which considerably is less than 212° F., the temperature at which ether explodes.

I have devised and invented what I believe to be a novel and useful device which embodies the features of advantage above enumerated. And I have shown and described the preferred embodiment of my invention which will give in actual practice satisfactory results for the intended purposes. However, it is to be understood that the herein described invention is susceptible of modifications in various particulars. Hence, the relative size and positions of the parts of the invention may be varied and said parts constructed of any materials deemed convenient and suitable for an article of this character and I wish to emphasize that I desire to include in this application all equivalents and substitutes that may be fairly considered to come within the scope and purview of the invention, as defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, and comprising a cylindrical tubular casing having front and rear sides, an electric light bulb in said casing, said casing having a circular opening in its rear side and having a hole in its front slide, a holder mounted in said circular opening to close said opening and receiving said bulb inside said casing, a hollow boss having sides and having an open rear end fixed to the outside of said casing and surrounding said hole, the sides of said boss converging inwardly of said boss and outwardly of said casing to form an outlet having walls, a plano-convex lens in said boss, a gasket inside said boss and being between said boss and said casing and between said casing and said lens to close said hole to prevent air escaping from inside said casing, light rays received from said bulb being adapted to pass through said hole, open rear end, lens and outlet, a tube integrally connected with an end of said boss and having sides aligned with the walls of said outlet, said tube adapted to receive a medical accessory, the body of said bulb being spaced from said sidewalls of said casing a distance greater than the distance through said body and transversely thereof.

2. In a device of the class described and comprising a casing having front and rear sides and having open ends, and having a hole in its front side, means received in said ends to close said ends, an electrical light bulb in said casing and being spaced from said casing, a hollow protuberant boss having sides and having an open rear end being fixed and sealed to the outside of said casing and surrounding said hole, the sides of said boss converging inwardly of said boss and outwardly of said casing, and converging inwardly and forwardly of said boss to form an outlet in said boss, a tube integral with said boss, a plano-convex lens in said boss, a gasket inside said boss and contacting said boss and said casing and contacting said boss and said lens to close said hole and prevent air heated by said bulb from escaping from inside said casing, and said tube being adapted to receive a medical accessory.

3. A tubular casing having front and rear sides and having closed ends, and having an opening in its rear side slidably receiving illuminating means capable of being focused by manually sliding said means in said open-

ing, a hole in the front side of said casing, a hollow protuberant boss having an open rear end being fixed to the outside of said casing and around said hole and having sides which converge inwardly of said boss and outwardly of said casing thereby forming a circular outlet having less cross sectional area than the cross sectional area of said hole, a convex lens received in said boss and adapted to transmit therethrough and concentrate light rays at and through said outlet, and a tube integrally connected with the side walls of said outlet to receive light rays from said bulb.

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