Sept. 2, 1969 L. GOLDSMITH 3,465,140

DENTAL SPOTLIGHT

Filed Dec. 12, 1967 2 Sheets-Sheet 1

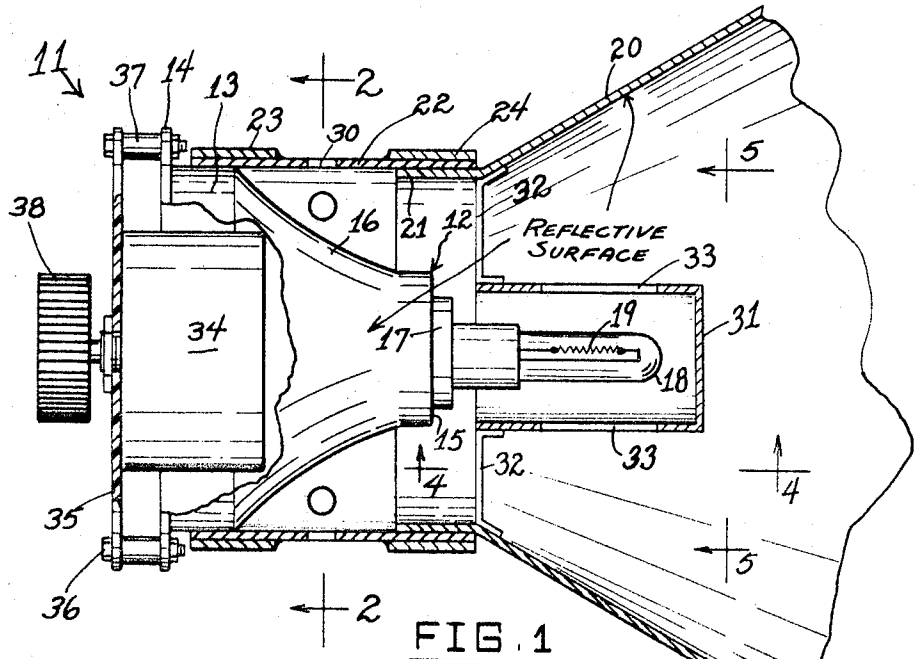


FIG. 1

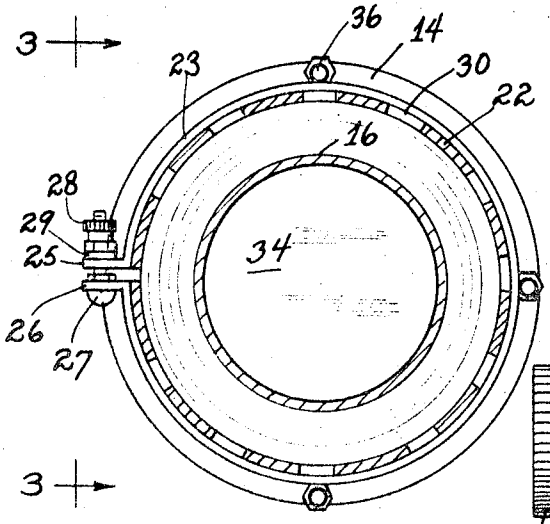


FIG. 2

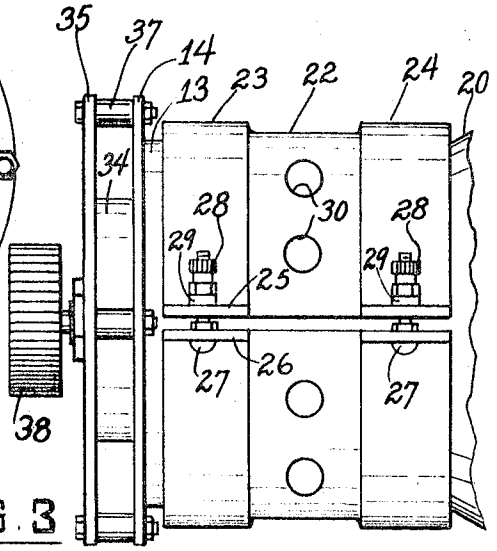


FIG. 3

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DENTAL SPOTLIGHT

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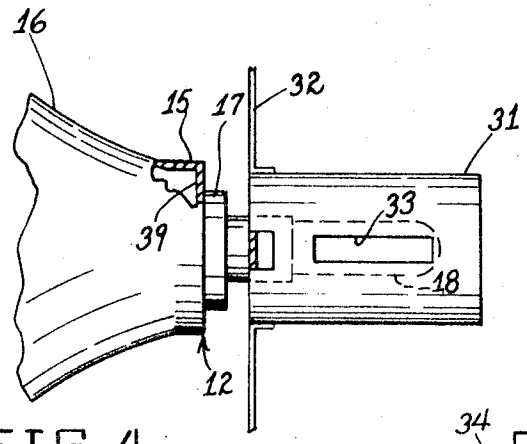


FIG. 4

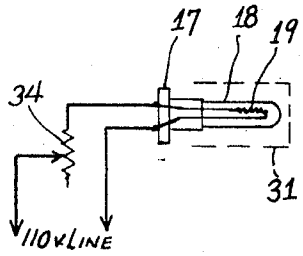


FIG. 6

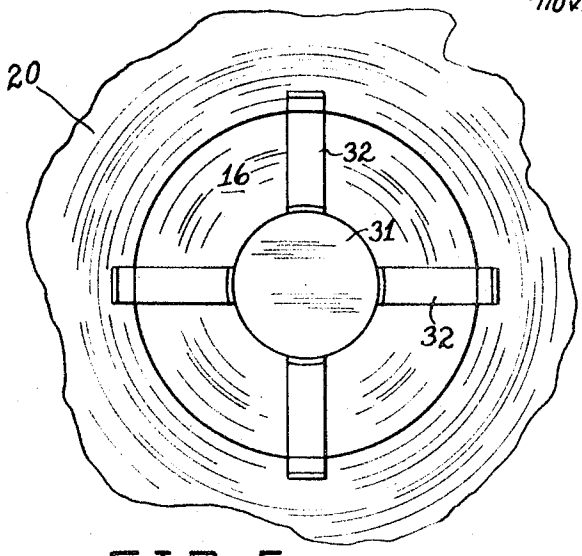


FIG. 5

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DENTAL SPOTLIGHT

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U.S. Cl. 240—41.15 10 Claims

ABSTRACT OF THE DISCLOSURE

A dental spotlight assembly consisting of a hollow convergent main supporting shell with a lamp socket mounted on its apex. A high intensity, linear-filament lamp is mounted in the socket, axially projecting from the apex. A divergent reflector is adjustably secured axially to the supporting shell by means of an apertured clamping collar. The reflector has a lamp housing provided with diametrically opposite longitudinal light-transmission slots. A rear end plate is secured to and spaced from the rear end rim of the supporting shell. A control rheostat is centrally mounted on the end plate, connected in series with the lamp socket and ventilated by the provision of the space between the end plate and the rear rim of the supporting shell.

This invention relates to surgical lamps, and more particularly to a dental spotlight assembly of the adjustable-intensity type.

A main object of the invention is to provide a novel and improved dental spotlight assembly which is simple in construction, which is easy to adjust, and which is not subject to overheating.

A further object of the invention is to provide an improved ventilated adjustable dental spotlight which is inexpensive to manufacture, which is durable in construction, and which can be accurately adjusted and focussed to provide a desired level of illumination at a specified location, namely, in the area of a patient's mouth.

A still further object of the invention is to provide an improved dental spotlight which is relatively compact in size, which includes readily accessible lamp intensity-control means, which is arranged so that said control means is adequately ventilated, and which allows adequate air circulation for the other portions of the assembly so that overheating thereof is completely avoided.

A still further object of the invention is to provide an improved dental spotlight assembly which involves relatively few parts, which is easily dismantled for cleaning so that its reflective surfaces can be maintained free of dust or other foreign material, which is safe to manipulate, and which is relatively free of glare.

Further objects and advantages of the invention will become apparent from the following description and claims and from the accompanying drawings, wherein:

FIGURE 1 is a longitudinal vertical cross-sectional view taken through an improved dental spotlight assembly constructed in accordance with the present invention.

FIGURE 2 is a transverse vertical cross-sectional view taken substantially on the line 2—2 of FIGURE 1.

FIGURE 3 is an elevational view taken substantially on the line 3—3 of FIGURE 2.

FIGURE 4 is an elevational view, partly broken away, taken substantially on the line 4—4 of FIGURE 1.

FIGURE 5 is a fragmentary front end elevational view taken substantially on the line 5—5 of FIGURE 1.

FIGURE 6 is a schematic diagram illustrating the electrical connections of the spotlight assembly of FIGURES 1 to 5.

Referring to the drawings, **11** generally designates an improved dental spotlight assembly according to the present invention. The assembly **11** comprises a main supporting body consisting of a hollow forwardly convergent shell, designated generally at **12**. Said shell comprises a relatively short, large-diameter cylindrical rear end portion **13** having an outwardly projecting annular rim flange **14**, a relatively short, small-diameter cylindrical cup-shaped front end portion **15** having a transverse wall **39**, and a relatively long, forwardly convergent arcuately concavely curved intermediate main body portion **16**. The profile of portion **16** has a relatively long radius of curvature, as will be apparent from FIGURE 1.

The shell **12** may be formed as a metal spinning, preferably of a suitably corrosion-resistant metal such as stainless steel, or the like, so that its surface is relatively non-tarnishing. The outside surface of the shell is preferably highly polished or is coated with a highly reflective plating to give said surface high reflectivity, whereby to minimize absorption of radiant heat by the shell.

Mounted on the transverse wall **39** of cup-shaped front end portion **15** of shell **12** is a conventional lamp socket **17** of suitable refractory material, such as porcelain, or the like, and mounted in the socket is a high-intensity, linear filament lamp bulb **18**, such as a conventional linear-filament quartz-iodine bulb having a rated wattage of 250 watts. The filament **19** of bulb **18** is located substantially on the axis of shell **12**, which is also the axis of the total assembly.

A forwardly divergent reflector **20** is mounted around bulb **18**, with the bulb located in the apex portion of the reflector. Said reflector may be parabolic, conical, or of any other shape designed to project light rays from the bulb in a forward direction, namely, to the right, as viewed in FIGURE 1. The reflector **20** is provided at its apex portion with a short cylindrical neck portion **21** which is substantially equal in outside diameter to shell portion **13**. A perforated resilient metal split clamping sleeve **22** has its end portions engaged respectively on the cylindrical portions **13** and **21**. Said end portions have respective flexible metal clamping bands **23** and **24** secured thereon, as by welding, or the like. The clamping bands are formed with outwardly projecting opposing apertured end lugs **25** and **26**. Respective bolts **27** are secured in the end lugs **26** and extend through the apertures of the end lugs **25**. Knurled clamping nuts **28** are threaded on the bolts **27**, bearing on upstanding collar portions **29** integrally formed on lugs **25** around their apertures. Thus, with the reflector **20** clamped to sleeve **22** by the clamping band **24**, the position of the reflector may be adjusted axially by adjusting the sleeve **22** along the cylindrical rear shell portion **13** and may be secured in adjusted position by tightening the clamping nut **28** associated with clamping band **23**.

The sleeve **22** is provided with evenly spaced ventilating apertures **30** at its intermediate portion, said apertures being located so as to freely vent the space inside the shell adjacent to the forwardly convergent concavely arcuately curved reflector **16**.

An opaque metal cylindrical glare-shielding cup **31** surrounds lamp **18** and is secured to the apex portion of main reflector **20** by a plurality of radial supporting brackets **32**. The cup **31** is formed with pair of diametrically opposed longitudinal light gate slots **33, 33** to allow passage of diametrically opposite quantities of light flux from linear filament **19** to the reflecting surface of main reflector **20**. The longitudinal position of the exit slots **33** relative to the filament is adjusted by the adjustment of the reflector **20** on the cylindrical supporting surface **13** as above described.

A light intensity-control rheostat **34** is substantially housed inside the larger end portion of shell **12**. Rheostat **34** is centrally mounted on a circular supporting plate **35**, preferably of heat-insulating refractory plastic material, such as Bakelite, or the like, located parallel and adjacent to flange **14**. Plate **35** is secured to flange **14** by a plurality of fastening bolts **36**, with respective spacer sleeves **37** mounted on the bolts between plate **35** and flange **14**, said spacer sleeves being of the order of one half inch in length, thereby providing an annular ventilation passage of corresponding width around the rear end of shell **12**.

Rheostat **34** is provided with the external control knob **38** located centrally of rear cover plate **35**.

As shown in FIGURE 6, the rheostat **34** is connected in series with the lamp **18** to the power lines in a manner to control the current supplied to filament **19**, and hence to control the intensity of the lamp. In view of the series connection, the wattage dissipation rating of the rheostat must be rather high, and in a typical installation has a rating of 700 watts. This unit is rather bulky, but can be housed inside shell **12**, provided that (1) adequate ventilation is available, and further, provided that (2) the rheostat is effectively shielded from the heat generated by the high-intensity lamp **18**. For these reasons, (1) the rear ventilation space defined by the spacer sleeves **37** is provided, and (2) the specially designed elongated forwardly tapering reflector surface **16** is employed. The theory involved in connection with the tapering reflector surface **16** is that for a given diameter of supporting sleeve **22**, the projected net radiant-energy-receiving area rearwardly of lamp **18** will be equal to the internal cross-sectional area of the sleeve **22** less the area of the lamp socket **17**. While a substantial amount of the rearwardly directed radiant heat will be reflected from the surface **16** and carried off by air convection through the ventilation apertures **30**, an appreciable amount of radiant heat will still be absorbed by the shell **12**. By employing an elongated generally conical or tapered intermediate section **16**, the total heat absorption area is made very large, whereby the unit area absorption, namely, the heat wattage per square inch absorbed by member **16**, is made relatively low, as compared to the unit area absorption which would occur on a perpendicularly mounted transverse heat shield disc filling the internal cross-section of sleeve **22**. Furthermore, by employing a concave configuration, advantage is taken of the inverse square law, whereby the ray intensity at the rear portion of section **16** is much less than that at its forward portion, and the curvature of the surface can more closely approach perpendicularity to the axis of the assembly at said rear portion without excessive unit area heat absorption.

The absorbed rearward radiant energy from lamp **18** is thus distributed over a relatively large area of metal, with a resultant reduction of working temperature, since with a given total heat dissipation, it is easier to cool a large extended area exposed to a given ventilation flow than a small area containing the same amount of heat to be carried off.

The assembly **11** is mounted in a conventional universally adjustable manner such that the dentist can manipulate the assembly manually to orient it in the best position to illuminate a patient's mouth. Thus, the main reflector may be attached to a conventional adjustable supporting linkage, not shown, and in adjusting the assembly the dentist grasps the rear portion thereof, namely, the portion adjacent plate **35**, and manipulates the knob **38** to obtain the desired intensity. Therefore, for safety in manipulation, as well as for protection of the rheostat **34**, it is highly important that the rear portion of the assembly be adequately cooled.

Also, the rear portion of the assembly must be of small enough cross-sectional size so that it can be easily handled. In the assembly of the present invention the cross-sectional size of said rear portion can be made considerably less than about twice the size of the rheostat **34**.

While a specific embodiment of an improved dental spotlight has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A surgical spotlight assembly comprising a hollow elongate convergent main supporting shell, a lamp socket mounted on the apex portion of the shell adapted to receive a high-intensity lamp, said shell being formed at its larger end with a rearwardly axially extending supporting section of substantially constant cross-sectional shape, a transverse cover plate rearwardly adjacent the end rim of said supporting section, means securing said cover plate to said end rim in spaced parallel relation thereto, defining a peripheral ventilation passage at the rear end of said main supporting shell, a current-dissipating intensity-control device connected in circuit with said socket, means mounting said intensity-control device on said cover plate with the major portion of said intensity-control device received in said main supporting shell, said intensity-control device being provided with external manual control means located externally adjacent said cover plate, a forwardly divergent main reflector surrounding said lamp socket, resilient sleeve means secured to the apex portion of said main reflector and slidably embracing said supporting section, and means to clampingly secure said sleeve means in a selected axially adjusted position on said supporing section, said main reflector being provided with a cup-like glare shield located to surround a lamp mounted in said socket, said glare shield having side apertures to direct light flux from the lamp to the inside surface of said main reflector, whereby the ultimate path of the light flux is dependent on the axial adjustment of said sleeve means relative to said supporting section.

2. The surgical spotlight assembly of claim **1**, and wherein said sleeve means is provided with ventilating apertures distributed around its periphery and being located adjacent the intermediate portion of said hollow elongated convergent supporting shell.

3. The surgical spotlight assembly of claim **2**, and wherein said supporting shell is provided with a forwardly convergent main body portion of outwardly concave profile.

4. The surgical spotlight assembly of claim **3**, and wherein said profile is of arcuate curvature.

5. The surgical spot light assembly of claim **4**, and wherein said forwardly convergent main body portion has a highly reflective surface.

6. The surgical spotlight assembly of claim **5**, and wherein the means securing the cover plate to the end rim of the supporting section comprises an outwardly projecting peripheral flange on said end rim, a plurality of spaced fastening bolts extending through said cover plate and flange, and respective spacer sleeves mounted on the bolts between the cover plate and the flange.

7. The surgical spotlight assembly of claim **6**, and wherein said rearwardly extending supporting section is substantially cylindrical in shape.

8. The surgical spotlight assembly of claim 7, and wherein said cover plate comprises a disc of thermally nonconducting refractory plastic material, said intensity-control device being mounted substantially centrally on said disc.

9. The surgical spotlight assembly of claim 8, and wherein said cup-shaped glare shield is substantially cylindrical in shape and said side apertures comprise a pair of diametrically opposed longitudinal slots in the cylindrical wall of the shield.

10. The surgical spotlight assembly of claim 9, and wherein the apex portion of the main supporting shell comprises a relatively short substantially cylindrical cup, said cup having a transverse wall, said lamp socket being mounted on said transverse wall.

References Cited

UNITED STATES PATENTS

988,824	4/1911	Sagendorph	240—44.1 XR
1,511,412	10/1924	Lyon	240—46.55
2,069,950	2/1937	Greppin	240—1.4
2,215,634	9/1940	Collins et al.	240—1.4

FOREIGN PATENTS

699,270	11/1953	Great Britain.

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U.S. Cl. X.R.

240—41.35, 47