

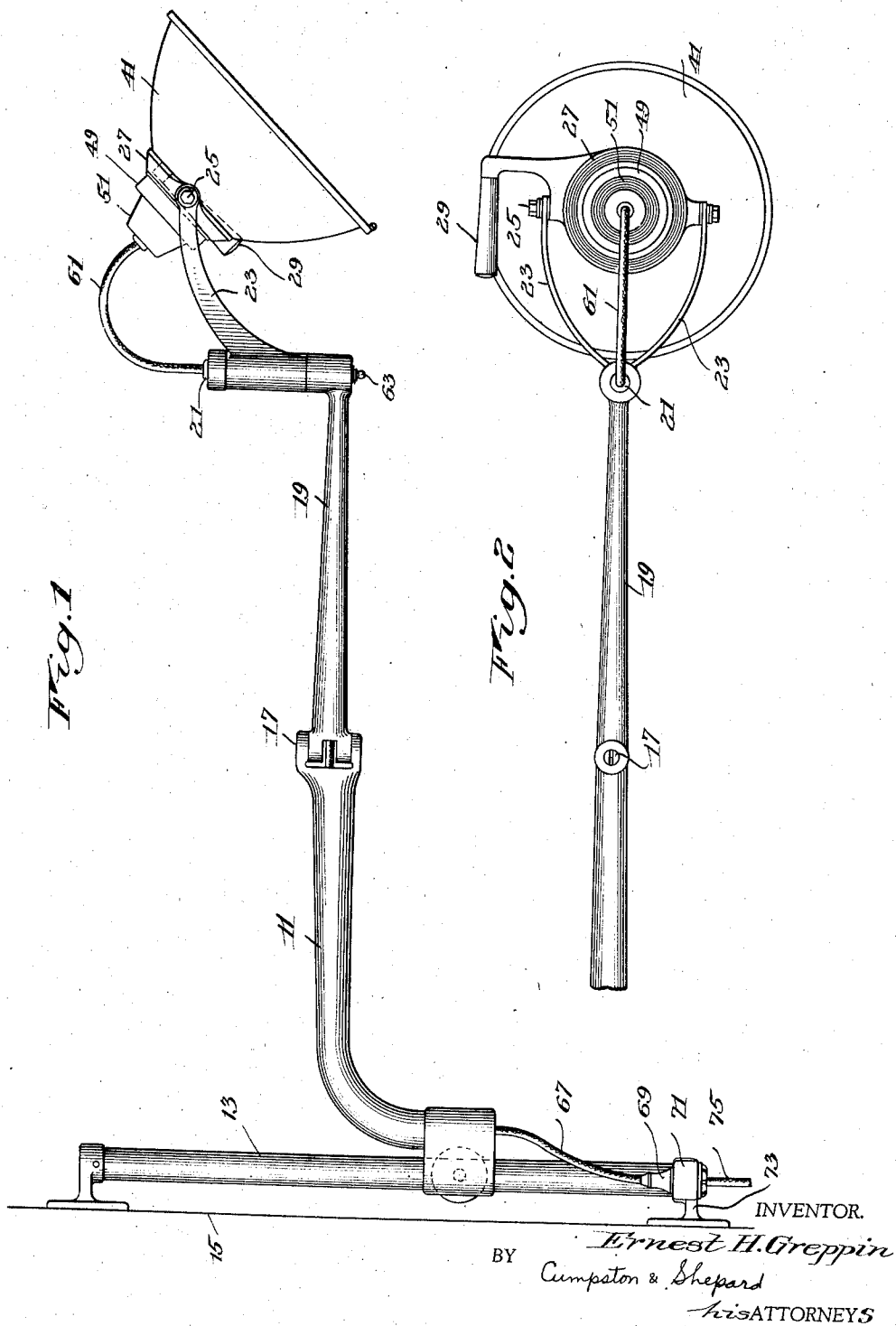
April 21, 1942.

E. H. GREPPIN
DENTAL OPERATING LAMP

2,280,402

Filed Aug. 10, 1939

2 Sheets-Sheet 1



April 21, 1942.

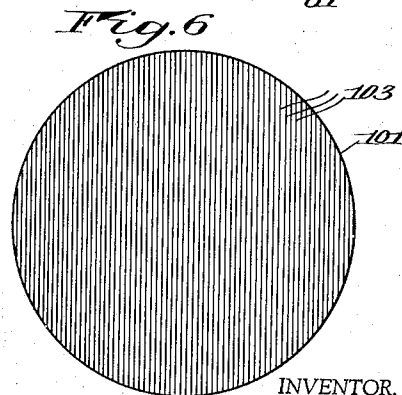
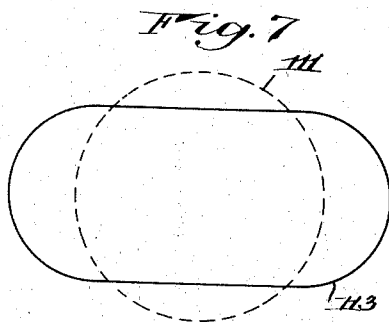
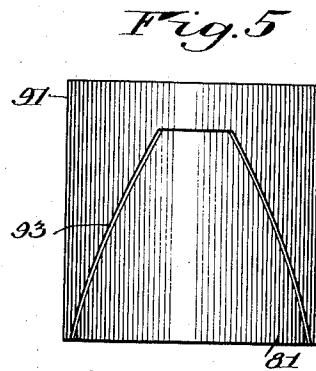
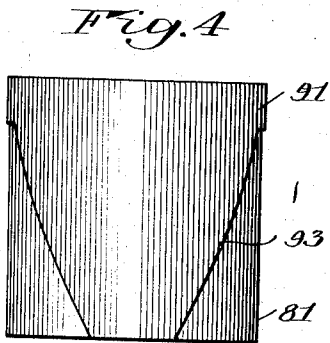
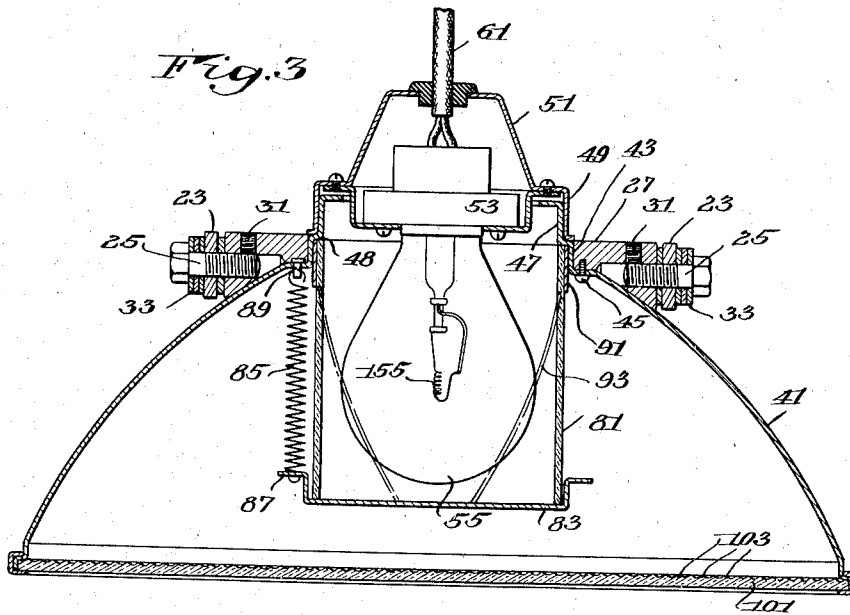
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DENTAL OPERATING LAMP

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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DENTAL OPERATING LAMP

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4 Claims. (Cl. 240—41.15)

This invention has to do with lamps and more particularly with lamps for providing a high intensity of illumination upon limited areas, such lamps being useful particularly for performing surgical operations, dental work, etc. An object of the invention is to provide a generally improved and more satisfactory and efficient lamp of this character.

Another object is the provision of a lamp so designed and constructed that the beam of light projected therefrom will be confined or restricted in one direction, such as a vertical direction when the beam extends horizontally, so that the beam may be made to shine into and provide brilliant illumination within the mouth of a patient, for example, without falling upon the patient's eyes.

Still another object is the provision of such a lamp in which the beam of light, in addition to being vertically confined or restricted, is also horizontally expanded in a lateral direction to provide a relatively wide beam which, without readjustment of the lamp, will enter the mouth of a dental patient even when the patient moves his mouth through a considerable sideways range, as by turning his head.

A further object is the provision of improved color correcting means, especially adapted to an operating lamp but useful also in connection with any other lamp where it is desired to have a color value of higher fidelity than that heretofore readily attainable.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a side elevation of a lamp constructed in accordance with a preferred embodiment of the invention;

Fig. 2 is a fragmentary plan of the same;

Fig. 3 is a central cross section taken axially through the preferred lamp;

Fig. 4 is a side view of the blocking screen and heat absorbing screen, seen from one direction;

Fig. 5 is a similar view of the same, seen from a different direction;

Fig. 6 is a face view of the lens employed in the lamp; and

Fig. 7 is a diagram illustrating schematically the cross sectional shape of the beam produced by the lamp.

The same reference numerals throughout the several views indicate the same parts.

Referring first to Figs. 1 and 2 of the drawings, 55

the lamp is shown mounted on a preferred form of support which includes a first arm 11 mounted to swing horizontally on a substantially vertical axis or shaft 13 which may be mounted on a wall 15 or on any suitable standard or support. The free end of the arm 11 is connected by a substantially vertical pivot 17 to a second arm 19 provided with a vertical pivot 21 on which is rotatably mounted a forked bracket 23. The arms 11 and 19 are preferably hollow, to accommodate electric wiring within them. At the ends of the two arms of the forked bracket 23, horizontal pivots 25 (Fig. 3) extend inwardly into a generally ring-shaped fixture 27 having a handle 29 by which the fixture may be conveniently tilted on the forked arms. The pivot pins 25 preferably are threaded into tapped openings in the ring 27 and are held against rotation relative to the ring by set-screws 31, and when the ring is oscillated relatively to the forked arms 23, the movement is accomplished by the pins 25 turning in the arms 23. Friction washers 33 may be employed between the bolt heads of the pins 25 and the arms 23, to hold the parts frictionally in any position to which they are set.

Mounted on the ring 27 is a lamp reflector of generally concave shape, indicated in general at 41, preferably made of a single piece of metal having formed, integral with the concave reflecting portion thereof, a cylindrical flange or wall 43 seated within the central opening of the ring 27 and held thereto by a series of screws 45. Back of the cylindrical flange 43 is a second cylindrical flange 47 of slightly smaller diameter, joined thereto by a shoulder 48. Around the outside of the flange 47 fits a cylindrical flange 49 on the bulb holder unit, which unit includes a small casing 51 containing a lamp socket 53 in which a suitable incandescent bulb 55 is mounted. The flange 49 of the bulb holder unit may be removably held on the flange 47 of the reflector by any suitable means, such as a bayonet type joint, or by set-screws, or simply by friction. When the bulb holder unit is removed from the lamp, it is moved backwardly relative to the reflector unit, the bulb 55 passing out through a large opening in the back of the reflector unit, within the flange 47, and the parts are quickly and easily brought together again by a reverse movement.

The bulb 55 is supplied with electric current by means of a flexible cord 61 extending from the back of the bulb holder unit 51 into an opening at the top of the pivot 21 and downwardly through the same to a snap switch controlled

by a button 63 mounted on the arm 19 beneath the pivot 21, the cord then extending through the hollow arm 19, through a suitable recess formed at the joint 17, and through the hollow arm 11 until the cord emerges from the bottom end of the arm 11, as shown at 67, and terminates in a prong plug 69 which may be thrust into any suitable socket 71 such as a socket formed in a lateral extension of the lower bracket 73 which holds the pivot 13. The plug socket 71 may be supplied with current from any suitable wiring, such as the wiring 75.

A heat absorbing and light transmitting member of generally cylindrical shape surrounds the bulb 55, as indicated at 81 in Fig. 3. This cylinder may be made of any kind of so-called heat absorbing glass which is commonly available, such, for example, as the ferrous oxybate glass called "Aklo" glass. The cylinder is preferably of such diameter that its rear end is seated on the shoulder 48, within the flange 43, as shown in Fig. 3. An opaque metal plate 83 extends across and closes the front end of the heat absorbing cylinder and is held in place by a series of coiled tensioned springs 85 connected at their forward end to ears 87 on the plate 83 and connected at their rear ends to studs 89 on the reflector unit. These springs 85, constantly tending to pull the heat absorbing cylinder 81 rearwardly, hold it seated firmly against the shoulder 48 of the reflector unit.

Where it is desired to use the lamp for dental work or similar purposes, the lamp is preferably provided with an opaque metal shield or blocking member 91 surrounding the heat absorbing cylinder 81, as shown in Figs. 3, 4, and 5. This shield 91 has the shape best shown in Figs. 4 and 5, which are side views thereof taken from two different directions at right angles to each other. As seen, the shield is in general a cylinder of about the same length as the heat absorbing cylinder 81, on two diametrically opposite sides. On two other diametrically opposite sides at right angles to the long sides, the shield is cut back so as to be of comparatively short axial length, the edges of the cut back portions being oblique or approximately helical, as indicated at 93. The shield is so placed in the reflector that the cut-away sides of the shield lie in a plane passing along the optical axis of the unit and also passing through the pivot pins 25, while the long or full-length sides of the shield extend along those sides which would be cut by another axial plane at right angles to the pivot pins 25. Described another way, if the reflector unit is turned on its pivot on the forked arms 23 until the optical axis of the reflector unit is horizontal, then the cut-away sides of the blocking member 91 are at the lateral sides of the heat absorbing cylinder 81 while the long or full-length sides of the blocking member are at top and bottom of the heat absorbing cylinder, which cylinder now extends horizontally.

With this arrangement (again assuming for convenience of description that the lamp is turned so that its optical axis extends horizontally), the light which would otherwise pass from the filament to the upper and lower parts of the reflector 41, and which would be projected as the upper and lower parts of the reflected beam, is blocked off by the long or full-length upper and lower walls of the metal shield or blocking member 91. The light which passes laterally from the filament, however, goes through the cut-away side walls of the shield 91, and is not in-

tercepted thereby, but falls on the lateral side portions of the reflecting surface and is projected as a beam which, considered in cross section, is compressed or confined in a vertical direction (that is, in height) or flattened at top and bottom, due to the blocking effect of the member 91, but which is not compressed or flattened in a lateral or horizontal direction.

The purpose of blocking off the beam of light at both top and bottom, instead of at the top alone, is to provide a projected beam which is of the desired flattened form at its top, regardless of the distance from the reflector to the patient. At some distance from the reflector, the light rays cross each other, and from that point onwardly, the rays forming the top half of the beam are those reflected from the bottom half of the reflector. By blocking off or flattening the beam both at top and bottom at the outset, it follows that the top of the beam falling upon the patient's face will be flattened, regardless of whether he is placed in the path of the rays before they cross or after they cross each other.

The front of the reflector unit is closed by a lens 101 extending across the front, and according to the preferred construction this lens 101 is formed with a multiplicity of diffusing ribs, approximately parallel to each other as indicated in the face view, Fig. 6, the direction of the ribs being in the direction of a plane passing longitudinally along the optical axis of the lamp and perpendicular to the pivotal axis defined by the pivot pins 25. In other words, these diffusing ribs will be arranged vertically when the lamp is so tilted on its pivots that its optical axis extends horizontally. Whenever the lamp is swung on its pivots, the diffusing ribs will still remain in vertical planes passing along or parallel to the optical axis and perpendicular to the pivot pins 25. These diffusing ribs may, within the scope of this invention, be of various sizes, although it is usually preferred to employ a great number of small ribs.

These diffusing ribs cause the beam of light passing through the lens 101 to be diffused or spread in a lateral direction perpendicular to the length of the ribs; that is, in a direction horizontally lateral with respect to the optical axis, when the lamp is placed with its optical axis horizontal. Thus the beam of light is widened in a lateral direction by the use of these diffusing ribs, and as already described, it is narrowed or flattened in a vertical direction (when the optical axis is horizontal) by the use of the blocking member 91. The combination of the diffusing ribs and the blocking member produces a resultant beam of light which is extraordinarily satisfactory for dental use for illuminating the oral cavity.

The characteristics of this beam of light are illustrated schematically, in a general way, in the diagram constituting Fig. 7 of the drawings. The dotted circle 111 indicates the shape which the cross section of the projected beam of light would have, at any given transverse plane, if the diffusing ribs 103 and the blocking member 91 were both absent, so that light would be reflected and projected in the normal manner from approximately the entire circular area of the reflector. But with the use of the blocking member 91 to flatten the top and bottom of the beam, and the use of the diffusing ribs 103 to expand the beam laterally, the resultant beam, in cross section, has somewhat the shape indicated schematically by the solid line 113. When thrown properly

upon the face of a dental patient, the beam, due to being flattened or cut off at the top, will not fall upon the patient's eyes, although it will furnish adequate and brilliant illumination at the area of the mouth and in the oral cavity. Due to the horizontal expansion or widening of the cross section of the beam of light, the beam need not be readjusted as the patient turns his head from side to side, and the mouth will still be within the brilliantly illuminated area of the beam even when it moves back and forth from side to side, through the normal extent of movement occasioned by turning the head from one side to the other. Hence, with this improved lamp, the dentist usually finds it unnecessary to readjust the beam of light when the patient is required to turn his head one way or the other.

Another feature of the invention, particularly useful in a dental lamp or other operating lamp where reasonably true color values are desirable, is the feature of using, in conjunction with the heat absorbing screen 81, a material which will correct some of the color deficiency caused by this screen.

The heat absorbing cylinder, if made of the commonly available heat absorbing glass as mentioned above, will unavoidably absorb a substantially greater proportion of the visible light rays from the red end of the spectrum than those at other parts of the spectrum, and will thus shift the color value of the transmitted light toward the violet end of the spectrum. According to the present invention, means is provided for absorbing enough of the green rays to compensate roughly or approximately for the excess absorption of the red rays by the heat absorbing cylinder, thus shifting the color value of the light back toward true white light and greatly improving its color value so that better observation of the colors of the teeth and mouth tissues is possible.

This is accomplished, according to the present invention, by passing the light through a filtering material capable of absorbing a substantial proportion of green rays, after the light has passed through the heat absorbing cylinder or screen 81. The green absorbing filter can be made of cylindrical shape to surround the heat absorbing cylinder 81, or it may be placed in any other desired or suitable location so that the light will pass through it either before or after being reflected by the reflector. In the preferred form, the lens 101 which closes the front of the lamp unit constitutes the green absorbing filter, this lens being made of suitable glass for absorbing a substantial proportion of the green rays. For instance, it may be made of glass containing selenium, or of any known glass having green-absorbing properties. It is found that the light from an incandescent light bulb passing first through the heat absorbing glass 81 and then through the green-absorbing lens 101, will issue from the lamp in a beam having a color value greatly improved over that produced if the green-absorbing filtering medium is omitted.

I claim:

1. A lamp including a reflector, a source of light associated with said reflector to cast light

thereon to be reflected thereby, a cylinder of light transmitting and heat absorbing material surrounding said source of light and interposed in the path of travel of light therefrom toward said reflector, a cylindrically shaped blocking member of material opaque to light closely surrounding said heat absorbing cylinder and blocking the travel of part of the light from said source toward said reflector approximately along two diametrically opposite directions, to control the dimensions of the beam of reflected light projected from said reflector, and a light transmitting element interposed in the path of reflected rays projected from said reflector, said transmitting element being provided with a plurality of diffusing ribs.

2. A lamp as described in claim 1, in which said heat absorbing cylinder absorbs a greater proportion of light rays near the red part of the visible spectrum than those at other parts thereof, and in which said light transmitting element absorbs a substantial proportion of light rays near the green part of the visible spectrum to improve the color value of the transmitted light by compensating partially for the excess absorption of red by the heat absorbing cylinder.

3. A lamp including a reflector of generally concave shape with an opening near its center and a rearwardly extending annular flange surrounding said opening, a bulb holding unit including an annular flange for detachable engagement with said flange on said reflector and means for holding a light bulb in position to extend into the interior space within said reflector, a heat absorbing screen of generally cylindrical form surrounding said bulb and having its rear edge seated within said flange on said reflector, and a metal shield surrounding said cylindrical screen and likewise having its rear edge seated within said flange on said reflector, said shield serving to block transmission of light rays from said bulb toward said reflector in two diametrically opposite directions and being cut away at its sides between said two directions to permit transmission of light rays from said bulb toward said reflector in diametrically opposite directions substantially perpendicular to the blocked directions.

4. A lamp including a reflector of generally concave shape with an opening near its center and a rearwardly extending annular flange surrounding said opening, a bulb holding unit including an annular flange for detachable engagement with said flange on said reflector and means for holding a light bulb in position to extend into the interior space within said reflector, a heat absorbing screen of generally cylindrical form surrounding said bulb and having its rear edge seated within said flange on said reflector, and a metal shield surrounding said cylindrical screen and likewise having its rear edge seated within said flange on said reflector, said shield being of approximately the full length of said cylindrical screen along two diametrically opposite sides and being cut away to be of materially reduced length along two other sides between said full length sides.

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