

Feb. 18, 1941.

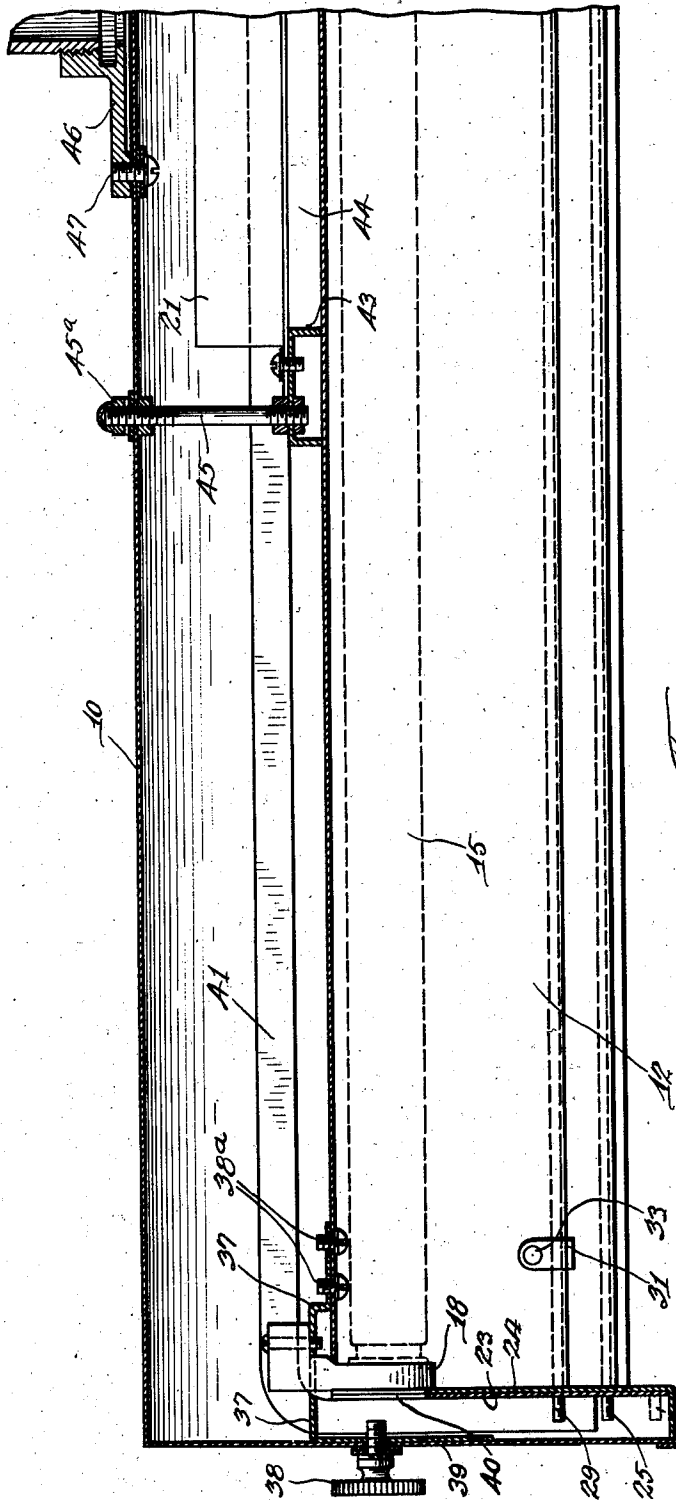
J. H. WATERBURY

2,232,499

LIGHTING FIXTURE

Filed Nov. 12, 1938

2 Sheets-Sheet 1



Inventor
John H. Waterburg.
By: Amos, Thessa,
Wm. & Mecklenburger
Attys

Feb. 18, 1941.

J. H. WATERBURY

2,232,499

LIGHTING FIXTURE

Filed Nov. 12, 1938

2 Sheets-Sheet 2

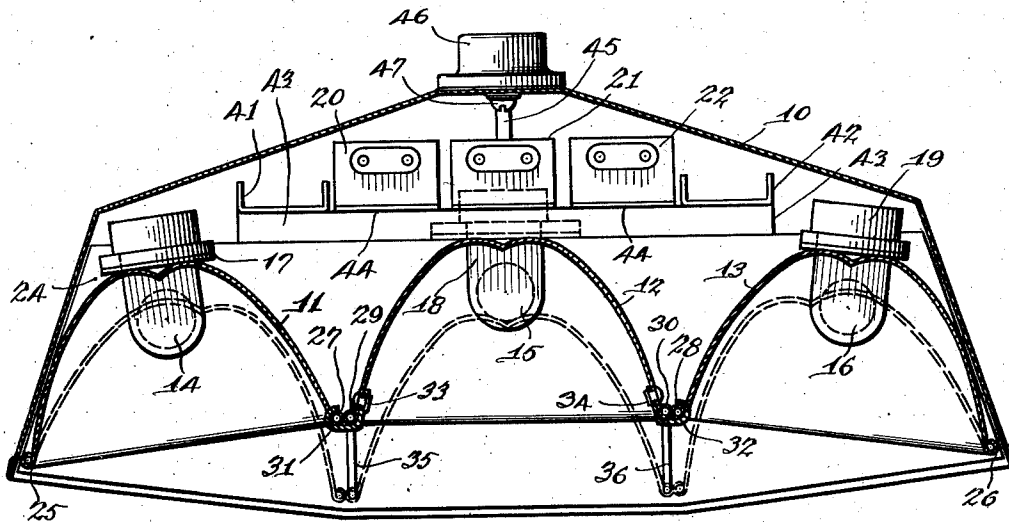


Fig. 2.

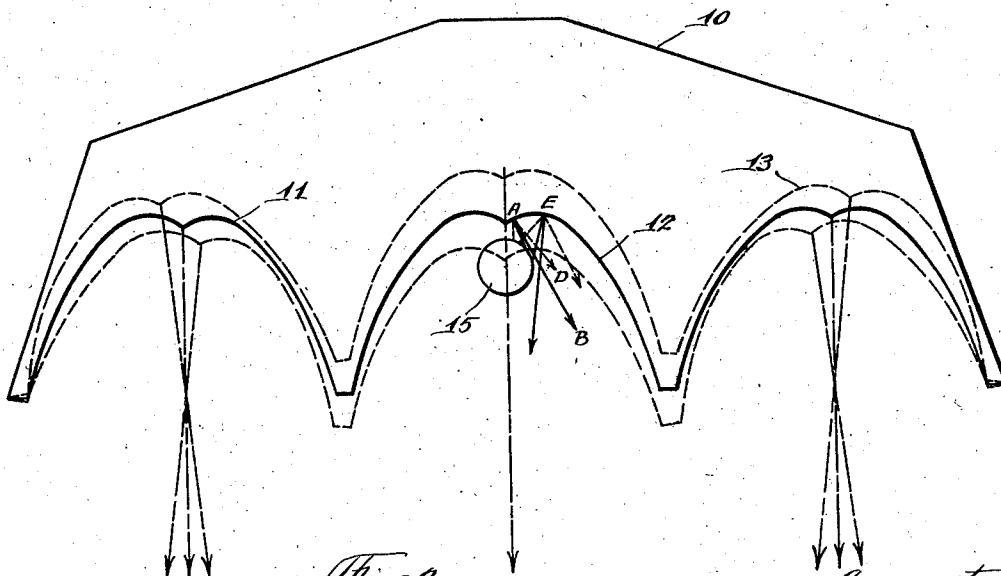


Fig. 3.

Inventor
John H. Waterbury
By: Amos, Thomas, Olsen & Muckelbauer
Attys.

UNITED STATES PATENT OFFICE

2,232,499

LIGHTING FIXTURE

John H. Waterbury, Chicago, Ill., assignor to
Benjamin Electric Mfg. Company, Des Plaines,
Ill., a corporation of Illinois

Application November 12, 1938, Serial No. 239,930

4 Claims. (Cl. 240-78)

This invention relates to a lighting fixture and has for an object the provision of a lighting fixture that is particularly adapted for close inspection work such as is encountered in the textile and printing industries.

Various types of electric light sources and reflectors have been proposed in the past. Recently, however, mercury arc vapor tube lamps have come into extensive use for lighting purposes. These tubes and certain incandescent lamps generally take the shape of elongated cylinders, and it consequently has become necessary to develop lighting fixtures containing reflectors which will accommodate these sources of light.

It is, therefore, a further object of this invention to provide a lighting fixture which may be used in conjunction with an elongated tubular light source.

It is a further object of this invention to provide a lighting fixture having a plurality of reflectors which may be focused within a predetermined range.

A still further object of this invention is to provide an adjustable lighting fixture which is particularly adaptable for illuminating uniformly a predetermined area with an intense light.

A still further object of this invention is to provide a reflector which is particularly useful for elongated incandescent lamps or mercury arc tubes having an inside coating of a fluorescent material such as certain salts of barium or uranium.

Further objects will appear from the following description, the attached drawings, and the appended claims.

Referring to the drawings, wherein

Fig. 1 is a partial longitudinal sectional view of a fixture constructed in accordance with one embodiment of this invention;

Fig. 2 is a transverse sectional view of the fixture shown in Fig. 1; and

Fig. 3 is a diagrammatic sketch indicating the manner in which light may be focused from the fixture as well as the manner in which the light is reflected from the reflector so as to not be reflected back to the source of light.

In accordance with one embodiment of this invention, the fixture may comprise a housing within which may be mounted a plurality of trough-shaped reflectors and tubular sources of light. The tubular light sources may comprise mercury vapor tubes which have been coated on the inside with a fluorescent material such as any one or combination of the fluorescent salts

of barium or uranium. Also within the housing may be positioned suitable transformers which may be necessary for the successful operation of the mercury vapor lamps. The tubular light sources are mounted in fixed relation to each of the trough-shaped reflectors which extend longitudinally of the housing. The reflectors are pivotally mounted edge to edge and the outside edges of each of the outside reflectors are pivotally mounted on the housing so that, when a center reflector is raised or lowered within the housing, the outside reflectors are tilted to a predetermined extent, whereby the light from the reflectors may be directed in various directions.

The trough-like reflectors may have any suitable cross section which will give the desired light distribution. In accordance with one preferred embodiment, however, the apex of the trough-shaped reflector is formed so that the light emitted from the tubular light source will not be reflected back into the tube.

For a more complete understanding of this invention, particular reference will now be made to the drawings. A housing 10 may be provided which contains a plurality of reflectors 11, 12, and 13. The reflectors have tubular light sources 14, 15, and 16, secured therein and extending in parallel relation thereto. The light sources 14, 15, and 16 may be mounted at either end by a plurality of suitable separate sockets 17, 18, and 19. Within the housing and above the reflectors, suitable reactant switches 20, 21, and 22 may be mounted which are employed in conjunction with the mercury arc tubular light sources 14, 15, and 16.

The housing 10 is provided with false ends 23 and 24 which may comprise a metal sheet 23 which may be faced with a sheet of polished aluminum metal 24. The false ends 23 and 24 may be secured to the ends of the housing 10 by any suitable means such as spot welding or the like.

The trough-like reflectors 11, 12, and 13 extend longitudinally of the housing 10 and are mounted in side-by-side relationship. They extend within the housing between the false ends 24 and are vertically movable therebetween. The reflectors may be surfaced with polished aluminum or other suitable reflecting material. All of the trough-shaped reflectors may be open at their ends so that the end plate 24 provides the reflective surface for the ends of the reflectors. The outside reflectors 11 and 13 are pivotally mounted at their outside edges on rods 25 and 26. These rods extend the entire length of the reflector and project through holes provided in the false end plates 23 and 24 at either end of the housing 10.

Consequently, it will be observed that the reflectors 11 and 13 are pivotally mounted at their outside edges adjacent the housing 10.

The inside edges of the outside reflectors 11 and 13 are also pivotally mounted to the edges of the reflector 12. Rods 27 and 28 are secured to the inside edges of the outside reflectors 11 and 13. These rods extend the length of the reflector up to the end plate 24, but do not extend therethrough. The rods 27 and 28 are secured adjacent rods 29 and 30, positioned on the edges of the reflector 12, by means of suitable straps 31 and 32. The straps 31 and 32 are firmly engaged with the reflector 12 by means of suitable rivets 33 and 34. The straps extend around the rods 27 and 28, respectively, through holes punched in reflectors 11 and 13 so that the edges of the reflectors 11 and 12 and reflectors 12 and 13 are pivotally mounted with respect to each other. The straps engage the rods 27 and 28 only loosely so that there is a lost motion in the pivotal relationship between the edges of the reflectors. The rods 29 and 30 at the edges of the reflector 12 extend the length of the reflector and also pass through the end plates 23 and 24 in suitable slots 35 and 36.

Thus, when the center reflector is moved vertically within the housing, it follows the path predetermined by the slots 35 and 36 which guide the rods 29 and 30. It will be observed that, when the center reflector 12 is moved vertically, the outside reflectors 11 and 13 will be tilted in the manner shown by the dotted lines in Fig. 2. In this manner the direction of the light from the various reflectors may be focused in accordance with the diagrammatic representation shown in Fig. 3.

In order that the center reflector may be conveniently raised and lowered in the manner previously indicated, it is secured at either end at the apex to a bracket 37 by means of suitable screws 38a. The bracket extends from the upper surface of the reflector 12 to the housing 10 beyond the false end plates 23 and 24. The bracket 37 is threadably engaged with a thumb screw 38 which extends through a slot 39 provided in the housing 10. The bracket 37 may thus be moved along the inside surface of the housing 10 in accordance with the direction of the slot 39 and may be secured tightly in any desired position by tightening the thumb screw 38 down onto the outside of the housing 10.

It will be observed, therefore, that the center reflector 12 may thus be readily moved in a vertical direction by raising and lowering the thumb screw attached to the bracket 37. The reflector may also be secured in any desired position by merely tightening the thumb screws 38. A slot 40 may be provided in the end plates 23 and 24 in order to provide a clearance for the strap 37 when the latter is lowered into the position indicated by the dotted lines in Fig. 2.

The sockets 17, 18, and 19 are secured in fixed relationship to the reflectors and, consequently, the light sources 14, 15, and 16 and the sockets 17, 18, and 19 also move with the reflectors 11, 12, and 13.

In order to provide a firm support for the reflectors and the adjusting means, a pair of U-shaped channel bars 41 and 42 are provided which extend the length of the housing 10 near the inside upper surface thereof. The ends of the channel bars 41 and 42 extend downwardly between the end walls of the housing 10 and the false ends 23 and 24. The channel bars may

be secured to the false ends by spot welding, rivets, or other suitable means.

A second pair of channel bars 43 and another not shown may be provided which extend transversely and directly underneath the channel bars 41 and 42. These channel bars extending crosswise of the fixture may have suitable plates 44 extending between them, onto which may be positioned the reactant switches 20, 21, and 22. The channel bar 43 may be secured to the channel bars 41 and 42 by spot welding if desired. The entire channel bar assembly may be suspended from the housing by means of suitable bolts 45, which may be threadably engaged with the channel bar 43 and nuts and washers 45a positioned outside of the housing 10.

A suitable means is provided for attaching the housing 10 to any desired electrical outlet, which may comprise a flange 46 attached to the housing 10 by means of suitable screws 47. The wires, not shown, may be introduced into the fixture through this opening and connected in any desired manner to the respective light sockets and transformers.

It will be recognized that any type of trough-shaped reflector may be used in conjunction with the fixture constructed in accordance with this invention. However, it has been found preferable to employ a reflector which is so constructed that the light emitted from the tubular light source is not reflected directly back into that source. A reflector having this property may be obtained by forming the apex of the reflector in such a manner that all of the light given off by the tubular light source will be reflected away from the source of light. It will be recognized that the only light reflected back into the light source from the reflector comes from a region of the reflector positioned back of the source of light. The curvature of this surface, in accordance with one embodiment of this invention, may be designed to direct the light from the tubular light source away from that source. A desirable cross sectional shape of the trough reflector is shown in the figures and more particularly in Fig. 3. The apex of the reflective surface of the reflector is formed to produce a curvature such that the light emitted from any portion of the surface of the light source will be reflected away from the light source. Thus, a beam of light striking the reflector 12 at A and being emitted from the outside edge of the light source along its tangential line to A will be reflected along the line A—B. Consequently, any light emitted at any point from the light source, such as from the point C, will be reflected from A along the line A—D which does not strike the light source. Similarly, none of the light originating in the light source reflected from E passes through the light source. This type of reflector has been found to be particularly useful with fluorescent tube lamps, since no substantial portion of the light emitted therefrom is reflected back into and absorbed by the light source itself.

It will be observed that a lighting fixture has been provided which is capable of projecting a uniform amount of light over an extensive area. The light emitted from the fixture may be focused to smaller or larger areas by a simple adjusting operation.

While three reflectors are indicated in the particular embodiment described above, it will be readily recognized that any number of reflectors may be employed in a single fixture as desired.

While a particular embodiment of this invention is shown above, it will be understood, of course, that the invention is not to be limited thereto since many modifications may be made, and it is contemplated, therefore, to cover any such modifications as fall within the true spirit and scope of this invention as defined by the appended claims.

I claim:

1. A lighting fixture comprising a housing, a plurality of trough-like reflectors extending side by side within said housing, means for supporting a light source within each reflector in fixed relationship to its corresponding reflector, false ends positioned at each end of said housing and adjacent the ends of said trough-like reflectors, said trough-like reflectors being movable in a plane parallel to said false ends, means extending through said false ends for pivotally mounting the outside edges of the outside reflectors to said housing, and a pivotal mechanical connecting means between the inside edges of the reflectors whereby movement of one of the reflectors will cause movement of the other.
2. A lighting fixture comprising an inverted trough-like reflector means, lamp sockets mounted in fixed relation to said reflector means, each socket having lamp-engaging contacts for engaging the contacts of an elongated lamp bulb within said trough-like reflector means and extending longitudinally thereof, and an inverted trough-like cover above said reflector means and cooperating with said reflector means to house the circuit connections leading to said sockets, said cover extending downwardly along the sides of said trough-like reflector means for housing them, and said trough-like reflector means comprising three parallel trough-like reflector members, the two outside reflector members being pivotally mounted on said downwardly-extending sides of said cover member, the intermediate reflector member being movable up and down and connected with the swinging edges of said pivoted reflector members.
3. A lighting fixture comprising an inverted

trough-like reflector means, lamp sockets mounted in fixed relation to said reflector means, each socket having a mounting base portion above said reflector means and lamp-engaging contacts for engaging the contacts of an elongated lamp bulb within said trough-like reflector means and extending longitudinally thereof, and an inverted trough-like cover above said reflector means and mounting bases and cooperating with said reflector means to house said bases, said cover extending downwardly along the sides of said trough-like reflector means for housing them, and said trough-like reflector means comprising three parallel trough-like reflector members, the two outside reflector members being pivotally mounted on said downwardly-extending sides of said cover member, the intermediate reflector member being movable up and down and connected with the swinging edges of said pivoted reflector members.

4. A lighting fixture comprising an inverted trough-like reflector means, lamp sockets mounted in fixed relation to said reflector means, each socket having a mounting base portion above said reflector means and lamp-engaging contacts for engaging the contacts of an elongated lamp bulb within said trough-like reflector means and extending longitudinally thereof, a reactance switch for controlling the lamp circuit mounted above said reflector means, and an inverted trough-like cover above said reflector means, mounting bases, and reactance switch and cooperating with said reflector means to house said bases and switch, said cover extending downwardly along the sides of said trough-like reflector means for housing them, and said trough-like reflector means comprising three parallel trough-like reflector members, the two outside reflector members being pivotally mounted on said downwardly-extending sides of said cover member, the intermediate reflector member being movable up and down and connected with the swinging edges of said pivoted reflector members.

JOHN H. WATERBURY. 45.