

March 2, 1943.

A. A. LEONARD

2,312,561

PHOTOGRAPHIC ENLARGER.

Filed Feb. 12, 1941

2 Sheets-Sheet 1

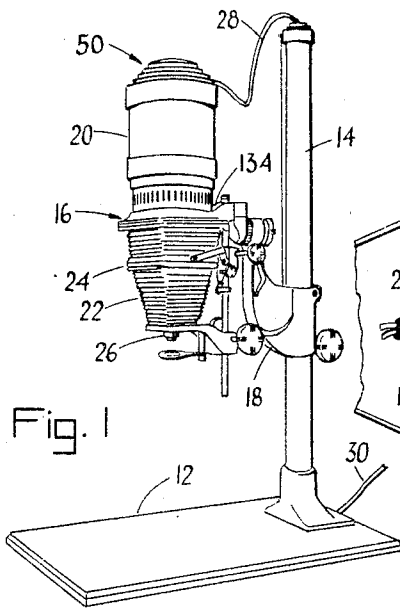


Fig. 1

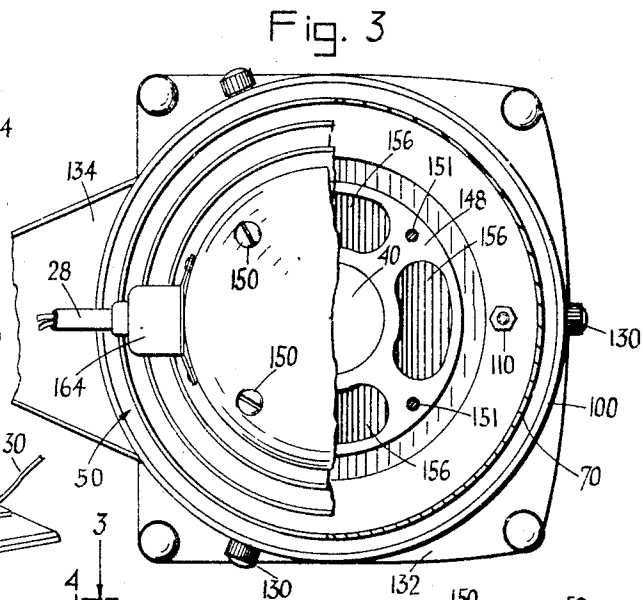


Fig. 3

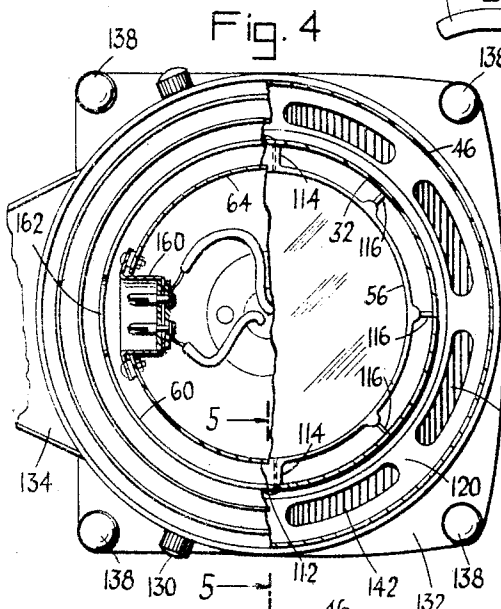


Fig. 4

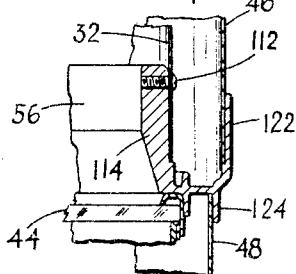


Fig. 5

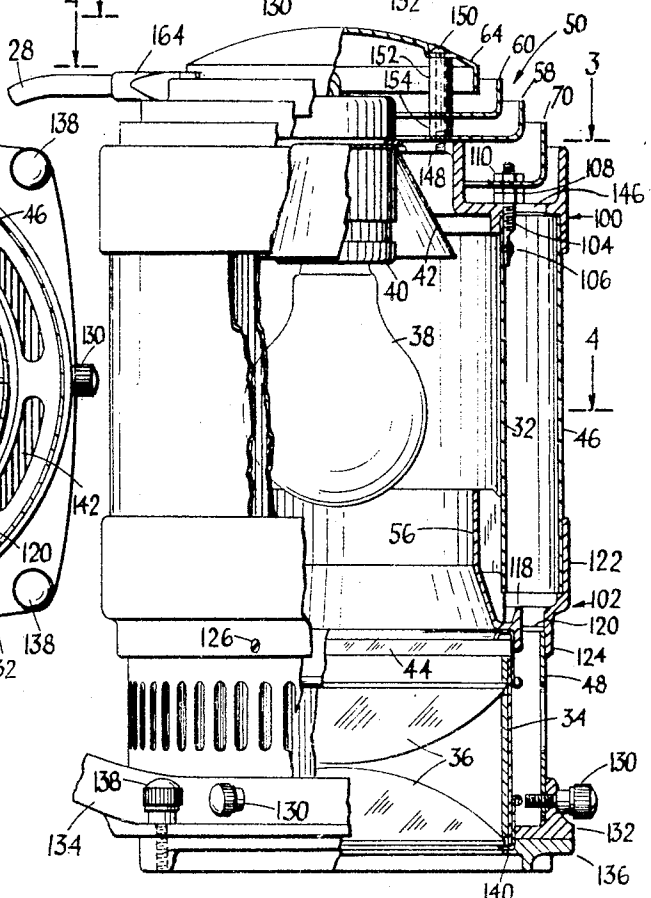


Fig. 2

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Fig. 6

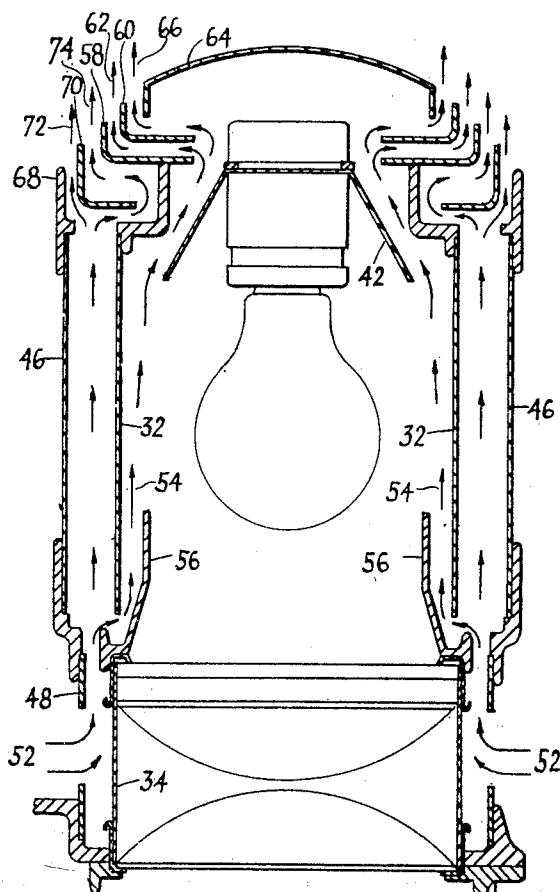
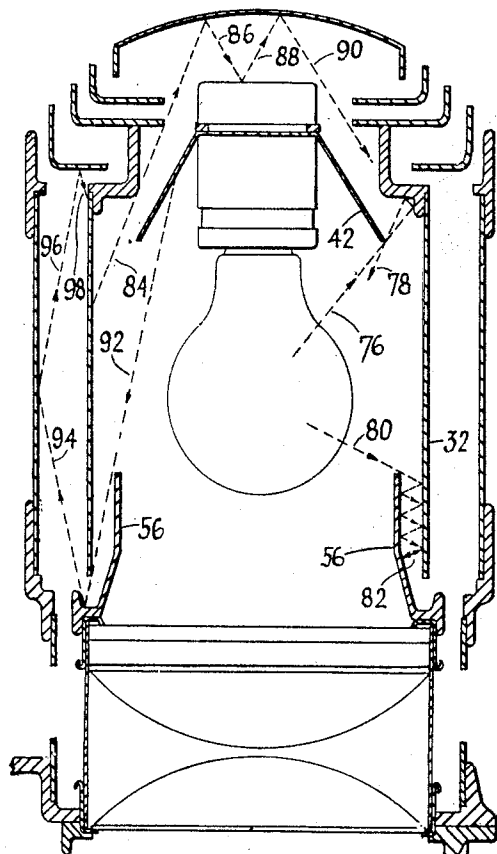


Fig. 7

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UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC ENLARGER

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9 Claims. (Cl. 240—47)

This invention relates to photographic enlargers, and more particularly to an improved lamp house therefor.

The primary object of my invention is to generally improve photographic enlargers of the vertical type, and more particularly to improve the lamp house for such enlargers.

More particular objects are to arrange the lamp house for axial flow of air for cooling purposes, and to provide inlet passages so located that the upward flow of air caused by the heated lamp house will also cool the condenser lenses. A further object is to provide an extra cooled jacket around the lamp house, so as to avoid danger of injury on contact with the same. Another object is to cool both the inner case and the exterior jacket, by means of appropriately divided air streams.

A further object is to provide a top assembly for the lamp house which will afford free discharge of air from both the jacket space and the interior of the lamp house, the air being discharged over a large area, while preventing passage of light out of the lamp house, and the settling of dust into the lamp house. Another object is to provide the top assembly with a maximum area for radiation of heat.

To the accomplishment of the foregoing, and such other objects as will hereinafter appear, my invention consists in the lamp house and condenser elements and their relation one to the other as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings, in which:

Fig. 1 is a perspective view of an enlarger embodying features of my invention;

Fig. 2 is a partially sectioned elevation of the lamp house;

Fig. 3 is a partially sectioned plan view taken in the plane of the line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken in the plane of the line 4—4 of Fig. 2;

Fig. 5 is a transverse section showing a detail, and taken in the plane of the line 5—5 of Fig. 4;

Fig. 6 is a schematic sectional view through the lamp house explanatory of the flow of air through the same for cooling purposes; and

Fig. 7 is a similar view explanatory of the manner in which light from the lamp house is baffled.

Referring to the drawings, and more particularly to Fig. 1, the enlarger comprises a base 12, an upright column 14 rigidly mounted on base 12, a head generally designated 16, and carried on a bracket 18 which is slidable on column 14. The

head 16 comprises a lamp house 20 with a bellows 22 therebeneath. The negative may be placed in a negative stage 24, while a lens is mounted at 26. The lamp is energized through an electric supply cord 28, which passes downwardly through hollow column 14, and thence outwardly at 30 for connection to a household wiring outlet.

Referring now to Fig. 2, the lamp house comprises a cylindrical inner case 32 beneath which is carried a condenser housing or barrel 34 containing the usual plano-convex condenser lenses 36. A lamp 38 is carried in a socket 40 surrounded by a frustro-conical light shield 42. A heat absorbing glass 44 is disposed in the top of the lens housing, between the lamp 38 and the lenses 36.

The inner case 32 is imperforate and is surrounded by an imperforate outer jacket 46 spaced therefrom. A highly perforate ventilator band 48 is disposed around and spaced from the lens housing 34. A multiple flanged cap assembly, generally designated 50, is disposed at the top of the lamp house and is so arranged as to permit upward discharge of air and radiation of heat while baffling the escape of light and settling of dust.

The cooling action of the lamp house is more clearly shown in Fig. 6, referring to which it will be seen that heating and consequent upward flow of air in the lamp house causes intake of air at 52 through the apertures in ventilator band 48. The cool air flows upwardly along the lens housing 34 and cools the same. The rising air then divides, one part flowing inside the case 32, as is indicated by the arrows 54. This part is guided upwardly by an annular wall 56. The heated air then flows upwardly around the light baffle 42 and is discharged between upwardly flanged caps 58 and 60, as is indicated by arrow 62, and also between cap 60 and center cap 64, as is indicated by arrow 66.

Another component of the air entering the ventilator band flows upwardly through the jacket space between case 32 and jacket 46. This air cools the inner case 32, and prevents heating of the outer jacket 46, so that the latter remains comparatively cool at all times. The air flowing upwardly through the jacket space is discharged between an outer flange 68 and a cap 70, as is indicated by arrow 72, while another part is discharged between cap 70 and cap 53, as is indicated by arrow 74.

The action of the lamp house in preventing the escape of unwanted light will be clear from inspection of Fig. 7, in which it will be seen that

light ray 76 clearing baffle 42 is reflected back at 78. Light ray 80 clearing baffle 56 encounters wall 32, and even if repeatedly reflected finally is stopped by perpendicular reflection at 82.

Even if it be assumed that every point on the true interior of the lamp house is a source of light, it will be found that any light rays passing outside the shield 42, such as the ray 84, will be trapped as indicated by the reflections 86, 88, and 90. Similarly, a light ray clearing the baffle 56, such as the ray 92, will be baffled by reflections indicated at 94, 96, and 98.

Various other rays may be drawn, but it will be found that the lamp house as here designed is light-tight, and this is an important advantage not only for general work, but also for three-color work.

The constructional details of the lamp house may be described with reference to Figs. 3 through 5 of the drawings. The lamp house comprises a cylindrical sheet metal inner case 32 and an outer jacket 46 carried between an upper preferably die-cast member 100 and a lower preferably die-cast member 102. The inner case 32 is secured to members 100 and 102, while the outer jacket 46 is merely carried therebetween. Specifically, inner case 32 has a number of studs 104 secured thereto by screws 106, and these studs pass upwardly through member 100. They also function to hold the upwardly flanged cap 70 in position, as by means of nuts 108 and 110. The inner case 32 is secured to the lower member 102, as by means of screws 112 (Figs. 4 and 5). These screws pass into thickened fins 114 which replace some of a series of thinner radial fins 116, these fins all being die-cast integrally with lower member 102. In the present case there are eight fins, two of which are thickened. The fins project radially outward from the guide and baffle wall 56, and bear against the inside of case 32.

The bottom member 102 further includes an upwardly and downwardly extending light baffle 118 connected by a web 120 to upwardly extending flange 122 and downwardly extending flange 124. The outer jacket 46 is received within upwardly extending flange 122. The downwardly extending flange 124 is connected by means of screws 126 to the upper edge of the ventilator band 48. The lower edge of this band is connected by means of thumb screws 130 to a die-cast generally square member 132 having an arm 134 which leads to the bracket 18 mentioned in connection with Fig. 1. Member 132 is secured to another generally square member 136 by means of thumb screws 138, and the upper end of the bellows is connected at this point. The member 136 also serves to hold the condenser housing 34 in position, this resting against a ledge 140 on member 136.

It will be understood that the web 120 of member 102 is cut away to form large area ventilating passages, these being indicated at 142 in Fig. 4. Similarly, the web 146 in upper member 100 is cut away to form ample ventilating passages of similar character.

The upwardly flanged cap 58 rests on a raised annular surface 148 forming a part of the upper die-cast member 100. Caps 60 and 64 are disposed thereabove and are all secured in position by screws 150, these screws passing through suitable tubular spacers 152 and 154. The lower ends of the screws are received in threaded holes in the raised surface 148, two of these being indicated at 151 in Fig. 3.

This raised surface is cut away to form large

ventilator openings indicated at 156 in Fig. 3. The lamp socket 40 (Fig. 2) is secured at the center of this surface, together with the upper edge of light baffle 42. The conductors from the lamp socket extend to a connector 160 (Fig. 4) which is mounted on cap 64. A part of the flange of the next lower disc 60 is cut away at 162 to clear a passage for the male connector member 164 (Figs. 2 and 3) at the end of the electric supply cord 28.

It is believed that the construction, method of assembly, and operation of my improved lamp house, as well as the many advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while I have shown and described my invention in a preferred form, many changes and modifications may be made in the structure disclosed without departing from the spirit of the invention as sought to be defined in the following claims.

I claim:

1. A top assembly for a vertically disposed cylindrical lamp house, said assembly comprising a series of circular upwardly flanged caps of progressively smaller diameter superposed in the order of decreasing diameter, said caps being annular and spaced at their inner and outer peripheries, each cap having a flat annular portion surrounded by an upwardly turned cylindrical portion, a topmost circular imperforate cap having a downwardly turned flange, and means including spacers to hold said caps in desired spaced superposed relation, the assembly affording ready egress of air, but baffling the passage of light.

2. A top assembly for a vertically disposed cylindrical lamp house, said assembly comprising a lamp socket, a frustro-conical light shield at said socket, and a series of circular upwardly flanged caps of progressively smaller diameter superposed in the order of decreasing diameter, said caps being annular and spaced at their inner and outer peripheries, each cap having a flat annular portion surrounded by an upwardly turned cylindrical portion, a topmost circular imperforate cap having a downwardly turned flange, and means including spacers to hold said caps in desired spaced superposed relation, the assembly affording ready egress of air, but baffling the passage of light, the resulting discharge passages between the upwardly turned flanges of the caps occupying a large portion of the area of the top of the lamp house, and the multiple flanges providing a substantial surface area for heat radiation.

3. A lamp house for an enlarger, said house comprising a cylindrical inner case, a cylindrical outer jacket surrounding but spaced from said case, a condenser housing beneath said case, a perforate ventilator band surrounding but spaced from said condenser housing, passages between the ventilator band, the case, and the jacket space, for dividing air flowing upwardly from the ventilator band past the condenser housing and for permitting part of said air to be drawn into the lamp case for upward flow through the case, and for permitting the remainder of said air to be drawn upwardly through the jacket space between the case and jacket, and multiple flanged caps supported in spaced telescoping relation to each other at the top of said lamp house for affording free upward discharge of air from both the case and jacket while preventing passage of light.

4. A lamp house comprising a cylindrical case, a condenser housing beneath said case, a ventila-

tor band surrounding but spaced from said condenser housing, and a cast metal member for holding said parts in assembled relation, said member having a guide wall spaced inwardly of said case, fins extending radially from said guide wall to said case, and an external flange extending downwardly for receiving said ventilator band.

5. A lamp house comprising a cylindrical case, a condenser housing beneath said case, a ventilator band surrounding but spaced from said condenser housing, and a cast metal member for holding said parts in assembled relation, said member having a guide wall spaced inwardly of said case, fins extending radially from said guide wall to said case, a light baffle between said case and lens housing, and an external flange extending downwardly for receiving said ventilator band.

6. A lamp house comprising a cylindrical case, a cylindrical jacket surrounding but spaced from said case, a condenser housing beneath said case, and a cast metal member for holding said parts in assembled relation, said member having a guide wall spaced inwardly of said case, fins extending radially from said guide wall to said case, and an external flange extending upwardly for receiving said jacket.

7. A lamp house comprising a cylindrical case, a cylindrical jacket surrounding but spaced from said case, a condenser housing beneath said case,

and a cast metal member for holding said parts in assembled relation, said member having a guide wall spaced inwardly of said case, fins extending radially from said guide wall to said case, a light baffle between said case and lens housing, and an external flange extending upwardly for receiving said jacket.

8. A lamp house comprising a cylindrical case, a cylindrical jacket surrounding but spaced from said case, a condenser housing beneath said case, a ventilator band surrounding but spaced from said condenser housing, and a cast metal member for holding said parts in assembled relation, said member having means to hold said case, a light baffle between said case and lens housing, and external flanges extending upwardly for receiving said jacket and downwardly for receiving said ventilator band.

9. A lamp house comprising a cylindrical case, a cylindrical jacket surrounding but spaced from said case, a condenser housing beneath said case, a ventilator band surrounding but spaced from said condenser housing, and a cast metal member for holding said parts in assembled relation, said member having a guide wall spaced inwardly of said case, fins extending radially from said guide wall to said case, and external flanges extending upwardly for receiving said jacket and downwardly for receiving said ventilator band.

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