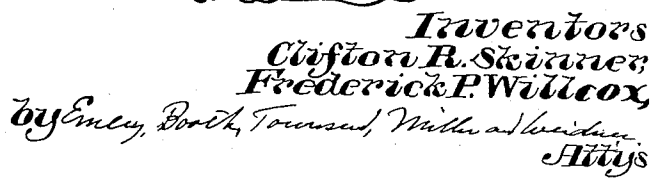


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LAMP HOUSE FOR PHOTOGRAPHIC PRINTERS

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LAMP HOUSE FOR PHOTOGRAPHIC
PRINTERS

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12 Claims. (Cl. 88—24)

This application is a division of our co-pending application Ser. No. 306,042, filed November 25, 1939, now Patent No. 2,236,303, dated March 25, 1941.

This invention relates to lamp houses for photographic enlargers or printers, which may be used in so-called restitutional work to make enlargements or reductions, or prints identical in size with the negatives, or which may be used for making photographic prints without restitution or distortion.

In order that the principle of the invention may be readily understood, we have disclosed a single embodiment thereof in the accompanying drawing, wherein—

Fig. 1 is a side elevation of the enlarger or printer with the enlarging head moved on the way to the top of its supporting structure;

Fig. 2 is an enlarged side elevation of part of Fig. 1, more clearly showing the means employed for tilting the negative carrier, but with the extreme upper part broken away;

Fig. 3 is a side elevation of the enlarger head with the negative carrier shown in vertical section; and

Fig. 4 is a front elevation of the enlarger with the lamp house and negative supporting means shown in vertical section.

The present invention is concerned particularly with the lamp house of the enlarger and printer, but in description thereof, we will also describe certain immediately associated parts not herein claimed, because claimed in the above-referred to parent application Ser. No. 306,042.

Referring to the drawing, a suitable supporting base or paper board is provided (not herein shown) and upwardly extending therefrom are two vertical rods 25, one of which is shown in side elevation in Fig. 1. A third rod 27 is fitted into the basal casting and is supported at a slight angle with respect to the two vertical rods 25, 26. The said three rods 25, 26, 27 are joined into a second or upper casting 28 and held thereto by nuts 29, thus making a very rigid tripod structure. The said casting 28 has two upwardly extending arms 39, 30 between which is placed a pulley 31 having a pivot 32. Slidably mounted on the slightly inclined rod 27 is a counterweight (not shown) having a cable 35 of suitable material which passes over the said pulley 31 and is attached to the lamp-house bracket or arm 35 by means of a clevis. Mounted for sliding movement upon the said rods 26, 26 is a casting 37 having four bosses (not shown). The said lamp-house bracket or arm 35 is secured to the cast-

ing 37 by means of screws 38 and a clamp screw 39 is provided for securing said casting in any position of vertical adjustment on the said rods 26, 26.

The upper end of the lamp-house bracket or arm 35 is provided with a pad or boss 40 to which is attached the lower section 41 of the lamp house A by means of screws 42, 42. The said lower section 41 is of inverted truncated conical form for reasons which will be set forth fully hereafter. The upper section 43 of the lamp house A is also of truncated but upright conical form for reasons which will be set forth hereinafter and is desirably of greater vertical extent than the lower section 41 of the said lamp house. The two sections or portions 41 and 43 of the lamp house A are attached together by means of a suitable number of circumferentially arranged screws 44. The structure of the lamp house will be more fully described hereinafter.

Also supported on the upper end of the lamp-house bracket or arm 35 is a downward extension or member 45, best shown in Figs. 2 and 3, to which is attached a rod 46 having a focusing member 47 sliding thereon and secured in any position of vertical adjustment by a knob 48. To the said member 47 is attached a lens support member 49 by means of several screws 49a, one of which is shown in Fig. 2. To the said bracket or arm 35 is also attached a yoke 50 to which is secured the upper negative platen 51 by means of two oppositely positioned shoulder screws 52, best shown in their relative positions in Fig. 3.

As best shown in Figs. 2, 3, 4, the lower section 41 of the lamp house A has a downwardly extending cylindrical portion 53. The said yoke 50 is provided with a pad or boss 54 held to the said member 45 of the bracket or arm 35 by means of a screw 55. The yoke 50 supports the said upper negative platen 51 by means of the said shoulder screws 52. Other features of said yoke 50 will be later described.

The upper negative platen structure 51 is provided with a cylindrical extension or member 56 upstanding from a flat rectangular portion having a central opening and a latch 59 that is carried by bosses and a rivet pin 61. The said latch 59 is held in latched position by means of a spring 62 that is shown in Figs. 2 and 3.

The said yoke 50 is provided with an upstanding boss 63. The upper platen cylindrical extension 56 is provided with a laterally extending boss 63 shown in Fig. 2. Threaded into the said boss 63 is a short horizontal threaded shaft or

rod 65 having an operating knob 66 provided with a suitable holding notch 67.

As will best appear from Fig. 2, if the adjusting knob 66 be turned in a clockwise direction, the shaft or rod that is threaded into the boss 63 will be moved inward and contact with the said laterally extending boss 64 of the upper cylindrical extension or member 56 of the upper platen 51, thus causing the said cylindrical extension member 56 to be rocked about its axis on the two opposite screws 52 of the yoke 50, thus tensioning a spring. If the said knob 66 be turned in a contraclockwise direction, thus causing the said shaft 65 to be retracted from the boss 64 of the said cylindrical extension or member 56, the latter will be caused to be returned by such spring.

Preferably in this manner means is provided to control readily the tilt of the upper negative platen structure 51 in what may be termed a fore and aft direction, or which is more precisely defined as a rocking motion about one horizontal axis which, in this embodiment of the invention, is provided by the opposite screws 52. If desired, the shaft or rod 65 may be provided with a multiple lead thread, so that one turn of the knob 66 will advance the said shaft or rod 65 sufficiently far to obtain all the tilt that is desired of the said upper negative platen structure 51. In order to provide ready means for determining when the said platen structure 51 is in a truly horizontal position, the notch 67 is provided in the knob 66 to be engaged by the spring 68 when the knob 66 is in such position as will insure the horizontal position of the said upper platen structure 51.

We have provided means for adjusting the negative supporting platen in any direction with respect to the vertical axis of the lens, thus providing means for correcting distortion that may be in the negative, means being also thus provided for causing a distortion which may be required in special work. Hinged to the upper platen is a lower platen member 87, by means of hinges 88, 88. The said lower platen 87 is held in a closed position, as shown in Figs. 1, 2 and 3, by means of the latch 59. Attached to the said lower platen member 87 and to the lens support 49 is a bellows 89. The lens support 49 is provided with means for attaching the lens 90 in a manner not needing detailed description.

The lamp house A, the two sections 41, 43 whereof have been briefly referred to, are so constructed as to dissipate rapidly the heat that is radiated by the light source herein indicated as an electric lamp or bulb 91 of suitable power. As already stated, the said lamp house A consists of the lower inverted truncated conical section 41 having integral therewith the downwardly extending cylindrical part 53 and the upper truncated conical section 43. The said cylindrical member 53, which we term a light condenser cylinder and which supports light modifying means, has an upwardly extending portion 92 that is of sufficient vertical extent to prevent direct rays of light from the electric lamp 91 from reaching ventilating holes 93 provided at preferably numerous points circumferentially distributed at or near the base of the section 41. One function of the upwardly extending portion 92 is that of a tubular baffle, and other functions thereof are evident from the further description. The upper section 43 is provided with a relatively large number of vertical heat radiating ribs or fins 94, and the lower section 41 of the lamp

house A is also provided with a corresponding number of heat radiating ribs or fins 95. The fins or ribs of the two sections respectively register with each other in lengthwise alignment when the coned portions are connected together and provide lengthwise extending air channels between them to facilitate heat dissemination, the air admission openings being between the said ribs or fins. The said upper section 43 of the lamp house A is provided with a flap top 96 having a series of circularly arranged ventilating holes 97 sufficient for the purpose. A boss 98 extends upwardly from the said flat top 96 of the upper section 43, and has a central hole through which passes a lamp supporting tube 99 that is held in place by means of a locking screw 100, whereby the vertical position of the light 91 may be very accurately adjusted.

To the lower end of the tube 99 is attached a socket 101 of well known structure, for the said electric light bulb or light 91. To the said lamp socket 101 is attached a heat radiating baffle plate 102, which serves also to prevent direct rays of light emanating from the lamp 91 from passing through the ventilating holes 97. A very important purpose of the said baffle plate is to radiate heat away from the said lamp socket 101. An electric conducting wire 103 passes through the tube 99 and is suitably connected with the socket 101, and, as stated, the structure provides means for readily positioning the electric lamp 91 at the desired point of vertical adjustment.

The lower end of the cylindrical portion 53 of the lower section 41 of the lamp house A, as best shown in Figs. 3 and 4, is provided with a lip 104 for supporting the lower condenser lens 105 of the light modifying means. There is also provided above the condenser lens 105 a spacing cylinder 106 above which is fitted the upper condenser lens 107 that is held in place by a snap ring 108. The said two condenser lenses 105, 107, constituting the light modifying means, are thus positioned beneath the cylindrical portion or member 92 in this preferred embodiment of the invention.

It will be evident from the illustration and foregoing description that the lamp house A does not contact with the upper negative platen structure 51, and that therefore there is no direct path of heat conduction between the said lamp house A and the said negative platen structure. This fact is of peculiar advantage when working with photographic films, since it is well known that if the heat be excessive the film will be ruined.

The construction and form of lamp house herein disclosed has been arrived at only after considerable experimentation, and they are such as to have entirely eliminated the difficulty incident to the generation of a very considerable degree of heat from a lamp that gives sufficient illumination to provide rather short exposures on certain types of photographic paper. We have been enabled to overcome the difficulty referred to by providing a construction in which, as diagrammatically shown by the arrows placed on Fig. 4, air is taken in at the base of the lamp house A through the ventilating holes 93, the air then passing into the upwardly and inwardly tapering section 43 of the lamp house A to the quite narrow top 96, where it escapes through the holes 97. The air is thus heated more rapidly at the upper end of the said lamp house A, and thereby its velocity of movement is increased

in an upward direction. This actually creates a very distinct and considerable upward current of air through the holes 93, around the lamp 91, around the baffle plate 101 and out through the holes 97, as indicated by the said arrows on Fig. 4.

The upright walls of the lamp house A also absorb considerable heat from the lamp 91, and that heat is in turn radiated away from the walls of the lamp house by the ribs or fins 94 and 95, as diagrammatically indicated by the arrows on Fig. 4. Thus, we are enabled by the present invention to use light of much more intensity than could be used in photographic printers heretofore constructed so far as we are aware.

The space provided between the downwardly extending cylindrical portion or member 53, wherein are supported the condenser lenses 105, 107, and the upwardly extending cylindrical member 56 of the upper platen structure 51, which space is clearly indicated in Figs. 3 and 4, is for the purpose of permitting the said cylindrical member 56 to be tilted in any direction for the purpose stated.

In using a photographic printer, whether it be for enlarging or for other photographic purposes, it is necessary that means be provided to adjust the objective lens with respect to the negatives wherefrom prints are to be made. This is provided for in the disclosed construction because of the fact that the objective lens 99 is mounted on the rod 46 constituting a lens carrier, which rod is in turn attached to the focusing member 47 by means of the screws 49a. The said focusing member 47 is thus movable in a vertical direction on the lens carrier rod 46 by means of the focusing knob 48, shown in side and in end elevations in Figs. 3 and 4.

The rod 46 is shown complete in Fig. 1. The length of the said lens carrier rod 46 is such as to permit all necessary focusing adjustment of the objective lens 99 with respect to a base or paper support. The said lens carrier rod 46 itself is, as already stated, fixedly connected to the bracket or arm 35 and so moves up or down therewith as the counterweight referred to is moved along the slightly inclined rod 27. If such counterweight is elevated to, or substantially to, the upper end of the said rod 27, the lamp house A and the supporting parts are correspondingly lower.

It is evident that the size of the print with relation to that of the negative is determined by the focal length of the objective lens 99 and the distance of that lens from the paper upon the base or support. Thus, the print may be an enlargement or a reduction or of the same size as the negative.

It will be evident from the foregoing description that we have provided means for moving the said objective lens 99 closer to or further away from the negative, thus permitting focusing. The said structure is self-locking and needs no further clamping of any kind.

When the focusing position is once found, the focusing member 47 remains in that position.

The photographic printer herein disclosed embodies numerous novel features enabling the operator to make better prints with less danger of injuring the negatives, while at the same time a great amount of illumination can be employed because of the novel structure of the lamp house.

The photographic printer herein disclosed is readily operable in a dark room, inasmuch as the lamp house and the parts attached thereto can be easily moved upward or downward and

locked in any position. Owing to the employment of a counterweight, very little effort is required to make the proper adjustment.

The counterbalancing means is such that as the lamp house A is moved upward, it will reach a point just before the end of the upward movement at which the cable 36 is in a horizontal line. This stops the upward movement of the bracket or arm 35 short of a point where the bracket 37 would strike the bracket 28, and in such case would impart a severe shock to the mechanism. So far as we are aware, we are the first to provide means satisfactorily to accomplish this result and to overcome a defect which has been inherent in photographic printers heretofore manufactured. It is evident that when the operator is moving the lamp house A upward, he is particularly concerned with picture size, and may not have in mind the position of the bracket 27 upon the guide rods 26. If, therefore, means were not provided to limit the upward motion, the shock incident to an excess upward movement would occur.

The lamp house may be made of any suitable material, but desirably it is formed of cast aluminum in order to obtain maximum heat conduction, and the exterior of the lamp house may be blackened for the same purpose.

It is to be noted that in the printer or enlarger of our invention, the negative may be tilted at any angle with regard to the axis of the light path through the negative, and thus either deliberate distortion of a normal negative may be obtained on the paper board or, if desired, a negative having angular distortion therein or faulty perspective may be tilted to form a corrected image on the enlarging or printing paper. It will be obvious to those skilled in the art that the depth of focus and depth of field of the enlarging lens may be adjusted by use of the conventional iris diaphragm to accommodate the change in plane of the negative.

One of the most important features of the mechanism herein disclosed is that the hot lamp house is not directly connected with the negative holder or the negative holder support. An air space is provided therebetween, and thus heat cannot be conducted directly from the lamp house to the negative. This is a great aid in maintaining cool conditions for the negative, and the spacing of the negative holder and holder support away from the condenser lens mount also allows for the tilting movements to take place without contact with the heated lamp house. Furthermore, the flexible bellows not only allows accurate focusing but also permits inspection of the negative.

It will also be obvious that while we have used a vertical enlarger to illustrate the invention, such an illustration is not deemed to be a limitation as a horizontal operation is fully equivalent.

Having thus described one illustrative embodiment of the invention, it is to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

We claim:

1. A lamp house for photographic printers for restitutorial, for enlarging, and for other photographic printing purposes, consisting of two truncated conical sections connected together at their larger ends, the said conical sections having lengthwise extending ribs or fins registering in lengthwise alignment when said coned por-

tions are connected together and providing lengthwise extending air channels between them to facilitate heat dissemination, one of said sections having means for supporting a light source therein, and having at its smaller end an opening or openings for the exit of heated air, the other of said sections having an opening or openings for the admission of exterior air, said last mentioned section having means to support light-modifying means, and also having an upwardly extending, imperforate wall 92 radially inward of said air admission openings and of sufficient height to prevent the direct rays of the light from the light source escaping through the opening or openings in such section, said part 92 having a prolongation extending in the opposite direction outside of the said last mentioned section, to provide said means to support light-modifying means beyond the air entrance end of the said last mentioned section.

2. A lamp house for photographic printers for restitutional, for enlarging, and for other photographic printing purposes, composed of two oppositely coned portions separable from each other but connected together and adapted to receive a light source therein, said lamp house having openings to admit air at an end of one conical portion and openings to permit the exit of the air from the opposite end of the other conical portion, said lamp house having on its outer surface a series of ribs or fins extending lengthwise thereof along both of said coned portions for the purpose stated, the said ribs or fins of the two coned portions registering in lengthwise alignment when said coned portions are connected together and providing lengthwise extending air channels between them to facilitate heat dissemination, said air admission openings being between said ribs or fins, said two coned portions having at spaced points between said ribs or fins, at the meeting ends of said coned portions, securing means 44, said lamp house being supported by a bracket, the lower one of said two coned portions being directly secured at its outer surface to said supporting bracket.

3. An upright lamp house structure for photographic printers, for restitution, for enlarging and for other photographic printing purposes comprising, in combination, two structurally distinct, truncated, conical sections, means connecting them together at their larger ends, a light source supported in the upper conical section, the latter having air exit openings at its upper end, the lower conical section having air inlet openings in the lower part thereof, and having radially within said air inlet openings a downwardly extending tubular portion, light-modifying means mounted in said depending portion, means directly connected to the said lower conical section for supporting the entire lamp house structure for up and down vertical adjustment on an upright support, the said depending tubular portion being surrounded by but spaced from an upwardly extending part from the negative holder that is also supported by said upright support, thus providing a free air space between the lamp house and the negative holder to prevent overheating of the lamp house.

4. An upright lamp house structure for photographic printers, for restitution, for enlarging and for other photographic printing purposes comprising, in combination, two truncated conical portions meeting at their larger ends to provide a lamp house consisting of oppositely tapered portions, a light source supported in the

upper conical portion, the lower conical portion having a tubular, downwardly extending projection, light modifying means mounted in said tubular projection, means directly connected to said lower tubular projection for supporting the entire lamp house structure for up and down vertical adjustment on an upright support, the said tubular projection being, when the lamp house structure is supported for operation, spaced at all points from the other parts of the photographic printer including the negative holder, thus providing a free air space between the lamp house structure and the other parts of the photographic printer to prevent over-heating of the parts.

5. A lamp house structure according to claim 4, but in which there are provided air inlet openings at the lower end of said lower conical portion and air exit openings at the upper end of the upper conical portion, and an upwardly extending, imperforate, cylindrical wall is provided rising from the lower end of said conical portion radially inside of the air inlet openings and of sufficient height to prevent light rays escaping through said air inlet openings.

6. An upright lamp house structure according to claim 4, but wherein the said lower conical portion has a downwardly extending cylindrical part 53 having a light modifying element 105 supported therein, a supporting ring 106 above said element, and a second light modifying element 107 supported on said ring.

7. An upright lamp house structure according to claim 4, but wherein the said lower conical portion has a downwardly extending cylindrical part 53 having a light modifying element 105 supported therein, a supporting ring 106 above said element, and a second light modifying element 107 supported on said ring, said lower conical portion having, as an upward continuation of said part 53, a cylindrical, imperforate wall 92 of sufficient height to prevent the escape downwardly of light rays from the said light source, said lower conical portion having air admission openings in the conical wall thereof near the base of said upward continuation and the upper conical portion having air exit openings at the upper end thereof.

8. An upright lamp house structure according to claim 4, but wherein air inlet openings 93 are provided in the lower part of said lower conical portion and air exit openings 97 are provided in the upper part of said upper conical portion, and wherein said light source is a downwardly directed, electric lamp 91, and wherein there is provided a transversely extending, light baffle 102 between said lamp and the support therefor.

9. An upright lamp house structure according to claim 4, but wherein the bottom of the lower conical portion is provided with a cylindrical, downward prolongation 53 having an inturned lip 104 at the lower end thereof, a lower condenser lens 105 supported on said lip, a snap ring 106 directly above the peripheral part of said lower lens, and an upper condenser lens 107 supported on said snap ring.

10. An upright lamp house structure according to claim 4, but wherein the lower conical portion is provided with a series of air inlet openings 93 at the base thereof, and the upper conical portion has a flat top of substantially lesser diameter than is the lower end of the lower conical portion, said flat top having formed therein air exit openings 97 spaced about the support for the light source, the light source having such

supporting means extending substantially centrally upward through said flat top.

11. An upright lamp house structure according to claim 4, but wherein the lamp house structure is supported for counterbalanced up and down movement upon the upright support therefor. 5

12. An upright lamp house structure according to claim 4, but wherein the means directly con-

necting the lower conical portion to its support includes a boss **40** formed upon said upright support, and securing means **42** extending through said boss into the structure of the lower conical portion, thereby supporting the lamp house.

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